CHAPTER – II

REVIEW OF LITERATURE

The review of literature is a selected study analysis of existing researches done which are relevant to the current selected topic. The reviews explain and justifies how our investigation could bring into light some of the answers to questions or gaps in the area of research. Implying these reviews as a pillar of foundation, the entire chapter has been formulated to build a strong and solid framework for our present study.

The review of literature gives an understanding of previous studies done on the nutritional status of the fishermen community and the effect of nutritional intervention. These reviews help us to get an overview of the findings of various previous studies done on fisherfolk and helps us to identify general patterns of findings and the conclusions that can be made.

This chapter gives a review of the published literature related to fisherfolk, their socio-economic status, standard of living, health and nutritional aspects and much more.

The review of literature for the present study "Effect of nutrition interventions on vitamin A and iron nutriture of school children (6 – 8 years) from fishermen community" is presented under the following headings:

A. Fishermen in India and their Livelihood

B. Socio-economic and Nutritional status of Fishermen

C. Prevalence of Vitamin A Deficiency and Iron Deficiency Anaemia in Children

D. Vitamin A rich – Orange Fleshed Sweet Potato

E. Effect of Nutritional Education

A. Fishermen in India and their Livelihood

According to the Marine fisheries census 2016, there are 3,477 marine fishing villages and 1,547 marine fish landing centres in 10 maritime states and 3 union territories in India. The total marine fisherfolk population was about 37,74,577 comprising in 8,93,258 families, in which 8,18,491 were traditional fishermen families. Nearly 67.3 per cent, that is 6,00,890 fishermen families were under BPL category. The average family size was 4.63 and the overall sex ratio was 928 females per 1000 males. Almost 58 per cent of the fisherfolk were educated with different levels of education. About

1,60,96,975 marine fisherfolk were engaged in active fishing in which 1,05,26,758 were men and 55,70,217 were women. 54,09,563 of the fisherfolk work full time, 32,57,176 work part-time, 24,74,494 work occasionally, and 49,55,742 work has been unspecific.

According to the CMFRI Marine Census 2010, about 97 per cent of 1,63,427 total fishermen families come under the BPL category in Andhra Pradesh in 2010. Majority of fishermen families were below poverty line. A study by CMFRI revealed that in Andhra Pradesh, Engels Coefficient of standard of living was 73.25. The higher Engels coefficient of Andhra Pradesh indicates low level of standard of living, indicating that income is enough to meet only the food needs of fishermen, leaving little amount for their welfare. Andhra Pradesh had the highest illiteracy among fishermen in India; approximately 66 per cent of the fishermen of the State are unschooled (CMFRI, 2010).

Omwega et al. (2006) in their research revealed that fishermen who earn income from fishing cannot sustain them because of increased daily expenses, exploitation on fish prices, strict laws and regulation as well as decline in fish catches by about 88 per cent. Fishers live in isolation and far from urban centres but 55.3 per cent live near markets or beaches while 35.2 per cent lived in remote areas with primary level of education forming 60.9 per cent. Results indicate that fishers are always vulnerable to diseases like Diarrhoea, Amoebae, typhoid, Malaria, cholera and Aids. Majority of fishers are men who are self-employed but always exploited by middlemen on fish prices; they live in isolation in grass-thatched houses and eat three meals a day. Poverty among them was due to lack of capability of efficiently participating in the industry.

Fishing at sea is probably the most dangerous occupation in the world. Over 32,000 fishermen die every year. More than 50 per cent of the world's population lives within 60km of the coastline. Billions of people are depending on the scarce marine resources, they are depending on the fishermen and the fish that they bring home. A lost vessel and a lost fisherman have a vital impact on the coastal community (FAO, 2019). (http://www.fao.org/fishery/safety-for-fishermen/en/)

Urvashi Sarkar (2015) in the article published in ruralindiaonline.org. has reported that fisher-women at Sunderbans wade into cold, chest-level water to make a catch. They sell their catch with hope and no guarantees to make little money. If they succeed to sell, the earnings are funneled into immediate household expenses and fishing input costs. Many of the fishing communities here are landless second and third generation fish-

workers, entirely dependent on fishing for their survival. So, what they earn will determine what they buy at the market (https://ruralindiaonline.org/en/articles/a-right-to-fish-a-fight-to-live/).

Rao, et al. (2016) in their research on 'Demographic and socio-economic changes in coastal fishing community of India' had revealed that the marine fishermen of India, who depend on fisheries for their subsistence, were significantly below the national averages in many of the key demographic indicators. They also reported that at national level 5.24 lakh (61 per cent) of the fishermen households belonged to BPL category in 2010, with Andhra Pradesh having the highest proportions of BPL fishermen families (97 per cent).

Elizabet (2018), in the article published in Madhyamam reported that more than 1500 fishermen from Kerala and Tamilnadu went missing at sea after cyclone Ockhi on November 30th 2017. Only half of the missing fishermen were rescued but for the others the search is still going on. (https://ruralindiaonline.org/bn/articles/islands-of-hope-oceans-of-despair/).

Rajadurai and Manickavasagam (2020) in their study mentioned that fishermen were very close to nature with accumulated knowledge about fish, fish habits, waves, currents and stars. They have a tradition of learning by doing, handed over from generation to generation to go to school implies keeping away from fishing. Most of the arts of fishing, particularly with traditional craft and gear, can only be picked up through a process of learning by doing from young age. Consequently, schooling on one hand results in putting the children out of their traditional occupation and that's the reason behind the dropout rate from school.

B. Socio-Economic and Nutritional Status of Fishermen

Reuben et al. (2006) in their investigations have reported that the fisherfolk community is the poorest of all communities and is down the ladder economically. Majority of the fisherfolk were weak, poorly dressed, obsessed with drinking liquor, dwell in poor structured houses and on the whole are economically and socially backward of all sectors. They have a large household size to maintain in spite of their very less income.

Karthikeyan et al. (2013). The poor economic condition coupled with limited availability of finance from the institutional agencies force the fishermen to sustain with the less equipped fishing equipment, which in turn result in lesser returns entangling them

in vicious circle of poverty. Income of the fishermen is based on the category of the fishing unit they own. Majority of the families borrow money to meet their expenditure during the lean season even for buying food. The main reason for the indebtedness of the fishermen depends on their income and expenditure pattern. The poor economic condition coupled with limited availability of finance from the institutional agencies force the fishermen to sustain with the less equipped fishing equipment, which in turn result in lesser returns entangling them in vicious circle of poverty.

Salagrama (2006) reported that fishers get trapped in an endless and hopeless cycle of debt as their borrowing progressively overwhelms their capacity to repay. Up to 90 per cent of households in a typical fishing village remain in debt for a good part of the year. While poverty has always defined most fishing-based livelihoods, it is now compounded by vulnerability. As fishers face increasing days of poor catches or no fishing opportunities at all, many fishing households report an increase in the number of days that they go hungry. The lack of a surplus is most acutely felt in old age or when the earning member of the family dies suddenly. For many households, such circumstances spell a descent from the category of 'the poor' (i.e., with income barely sufficient for survival) to 'destitute' (i.e., no certain source of income, exposed to social rejection and frequent hunger).

Patterson et al., (2005) in their study highlighted that fishing is the only source of income for livelihood for the majority of the coastal families residing in five villages of Thoothukudi district. Many of these fisherfolk families dwell in poverty with no proper access to basic facilities such as drinking water, sanitation and electricity.

Cruz et al. (2002) reported that on extreme days when bad weather precludes any fishing from the small barrios of Ilocos Norte, Philippines, the day's meals consist of rice and salt and nothing more. Even on good days the catch is so low that it does not go far when sold in order to purchase other necessities. It means that some families have never consulted a doctor, even though several are located only a few kilometres away, because they cannot afford the nominal fee. It means that the family's sole possessions, besides its single room nipa palm house and the clothes they are wearing, are cooking utensils and some sleeping mats. It means that, with no savings and material possessions, the poorest fishing families can never hope to secure loans for gear purchase from collateral-minded banks, whose experience with previous loans to fishermen has been anything but

rewarding. It means that with little or no education, and few non-fishing skills, the poorest fishermen have little hope of shifting to another occupation.

Asian Developmental Bank (2003) in their study brought into light the fact that out of 29 coastal panchayats dominated by fishing population, majority of them are below poverty line leading considerable poor lives.

In a report on "Coastal Fisheries and Poverty: The Case of India", (2003), it is evidently mentioned that the preference of fishing communities to living next to the sea, in a context where pressure on coastal resources is increasing rapidly, often leads to overcrowding and conditions of poor hygiene and sanitation. It also increases vulnerability to natural elements, such as cyclones and tidal waves, in States like Orissa, Andhra Pradesh, West Bengal and Gujarat, as well as to coastal erosion along several parts of the coast, as in Kerala and Tamil Nadu. An evaluation of Centrally Sponsored National Welfare Schemes for Fishermen, conducted in 1995 in five States (Kerala, Andhra Pradesh, Tamil Nadu, Pondicherry and Uttar Pradesh), interviewed a sample of fishermen households (NIRD, 1995). The study found that a majority of those in the sample were landless. In Tamil Nadu, for example, 98 per cent of the sample was found to be landless, while the corresponding figures for Andhra Pradesh was 92. It is not clear though how landless is defined in the study: whether it means those who own no land or those who own no land other than the land they live on. Following the devastating cyclone in Andhra Pradesh in 1996, AFPRO (1998) conducted a survey of affected villages. In Bhairavapalem village, a major fishing village near the mouth of the river Godavari, the study found that, prior to the cyclone 80 per cent of the houses in the village had been thatched, and that only 44 per cent had been electrified. General sanitation was very poor and there was a shortage of drinking water (available from an open tank). The situation in the three other villages surveyed (Balusutippa, Report on "Coastal Fisheries and Poverty: The Case of India" for the International Fund for Agricultural Development (IFAD) by International Collective in Support of Fishworkers (ICSF) 12 Masanitippa and Peddagadimoga) also indicated that the proportion of thatched houses ranged from 87 to 94 per cent. Available evidence would thus seem to suggest that fishing communities, in general, have lower levels of literacy, a lower sex ratio, and poorer conditions of housing, as compared to State and national averages, indicative of a lower level of well-being in fishing communities, even though, as indicated in the Maharashtra study, it is likely that

there has been overall improvement in socioeconomic conditions, as compared to past decades.

Dayananda (2004) in his study pointed out that fishing is a livelihood involving family labour for the poor families. Women, men and children (immediately after attending school) collectively contribute to earning a subsistence income from fishing. The livelihood of the poor is at stake when organized fishermen operate intensively in the lagoon, using mechanized boats. Indebtedness is a common social phenomenon among the fishing communities, although it is not perceived as a pressing economic issue to the individual household. Community members are in debt due to several reasons. Most importantly, they depend heavily on informal credit, which provides collateral-free quick money to purchase necessary fishing gear. There was no proper education given to the children of the fisherfolk in rural coastal villages even though education is recognised as one of the basic amenities for better livelihood. Young boys above the age of 10 were engaged in fishing activities to reduce the labour cost. Majority of them hardly know how to write even their name. The majority of the fishermen residing in the coastal belt live in huts with lack of amenities such as drinking water, electricity and latrines.

Zaman et al. (2006) in their study reported the fisherfolk were down the ladder socio-economically leading very poor lives. Poor fish farmers had no access to bank loan due to lack of mortgage assets. Marginal farmers mostly borrow money from local moneylenders. Comparatively rich farmers used to borrow money from different NGO's and banks. The poor and marginal farmers who had managed membership in a co-operative society, borrowed money from there. Most of the poor fish farmers lived in very poor housing conditions. The majority of the houses in the villages were made of mud and bamboo fencing or roofing of chhan (one kind of weed leaves). Most of the fish farmers were not very much aware about nutrition, health and sanitary conditions. From the survey it was observed that intake of vegetables was the highest whereas intake of meat was the lowest in a month. The entire fish farmers used tube-well which was as a source of drinking water and they also used ring well, pond and canal water for other purposes. 23.3 per cent fish farmers had no latrine for defecation. So, most of the fish farmers suffered from dysentery and also diarrhoea. Maximum fish farmer's family took quack treatment against disease, which showed the unawareness of getting treatment of diseases.

Mahesh and Rajasenan (2006) in their research have revealed that the artisanal fishermen generally concentrate on harvesting pelagic species while the mechanised boats

hauling bottom trawls, fish for the demersal prawns in the same area. When large mechanised purse-seines haul in huge shoals of pelagic fish before the schools get a chance to move inshore, they deprive the shore seine fishermen of their livelihood. The damage caused to marine resources by the use of destructive fishing gears and the deprivation of access 58 to resources resulted in hardships to majority of the artisanal fishermen who depend on fishing as the sole source of livelihood.

Kerala Development Report (2008) brought into focus the poor housing conditions of the fisherfolk, their density of population and conditions in which they live in. They stated that a majority of the fisherfolk live in huts made of mud and only a few of them reside in small houses made of bricks and cement.

Sathaidas (2009) in his investigation came up with the findings the level of employment for fishermen not having motorized equipment is low. The uncertainty of catch and risk of occupational hazards associated with marine fishing entangled the fishermen in low-income trap. The fishermen due to less availability of finance from institutional agencies have to go fishing with less equipped fishing implements which in return results in diminishing returns thus dragged the fisherfolk to remain in poverty.

Ujjania and Patel **(**2011) in their study on the socioeconomic status of fishermen community of Danti village in Valsad district of Gujarat observed that there were 78 per cent nuclear and 22 per cent joint families. 90 per cent of the fishermen had primary school education and the 10 per cent are completely illiterate and showcases that the education level of the fishermen was very poor. They also revealed that lack of higher education, deprivation from school in the early age and lack of specific training for fishing and related field is the problem.

Hossain et al. (2014) in their study on socio-economic condition of the fishermen mentioned that fishermen villages were mostly located in inaccessible areas where there are no modern communication systems, having a very low developmental and socio-economic impact in community. There is no denying the fact that fishermen and fishing community as a whole the poorest and most disadvantaged group of Bangladesh. They have no other income generating activities except fishing, which cannot be carried out throughout the year and in idle periods, they lack alternative employment opportunities. Their socio-economic development is negligible. The following problems had been identified during their study - Lack of initiatives among fishermen, lack of awareness

among fishermen, lack of leadership and unity, particularly in challenging situation, loose social cohesion, low income, the fishing community had no control over the fish market, due to money lending they can't get the legal price of their catch fishes.

Parashar and Kumar, et al., (2016) in their case study on socio-economic status of fishermen community from a selected reach of River Narmada, reported that income pattern of fishermen is not enough for their annual expenditure which effects their lifestyle and forcing them to change their traditional source of income and dependency on other sources of income for their livelihood activities.

Bhendarkar, et al., (2017) in their study on profile of socio-economic condition of fishermen in Kabirdham District have reported that landless fishermen live below poverty line and they were mostly illiterate, their housing conditions are kutcha and they use pit toilets. They also reported that the livelihood status of the fishermen was not satisfactory.

Prabhavathi and Krishna (2017) in their study on socio-economic conditions of fishermen community in some selected areas of Nizampatnam area, Guntur district, Andhra Pradesh revealed that the living conditions of the fisherfolk were very miserable. In most of the families there were more than four members and among them majority were illiterate. Their dietary intake is very less with no consumption of nutritious food due to which their ability to stay physically active declines. Eighty six per cent were usually addicted to drinking and smoking habits (liquor and tobacco). With no proper sanitation and drinking water facility they live poor lives. Children of this community suffer from diseases like malaria, typhoid, helminthiasis and malnutrition which leads to gastrointestinal disorders.

Sundaram et al. (2018) in their research revealed that the nature of poverty is cyclical in the case of artisanal fishermen. Poverty has been passed down across generations. Specifically, it is the boat crew who is suffering the poverty. Though there is a glimmer of hope since the younger generation is choosing different vocations apart from fishing, poverty never ceases.The problems associated with the artisanal fishermen are numerous and not unidirectional.

Paul and Shapron Kumar et al. (2018) in their comparative socio-economic study with a review on fishermen's livelihood around Tulasiganga River revealed that the economic condition of the fishermen was much below the standard level of a developing

country (Bangladesh) and almost all of them borrowed money from different NGO's at a high interest to get on with their livelihoods.

Karthikeyan (2018) in his study revealed that the majority of the fisherfolk had no habit of saving money as they earn less than Rs. 5000 per month in peak season and less than Rs.3000 during the lean season. The majority of the fisherfolk (79.9 per cent) are in debt as they have borrowed loan from various sources, in which 48 per cent of them had a debt of Rs. 50,000 or below and 2 per cent above Rs.50,000.

Gibson et al. (2020) in their study have found out that 50 per cent of the mothers and children of the fisher households failed to meet the minimum recommended dietary diversity, and while fish was the main source of food in diets, the introduction of fish to infants and young children's diets was delayed due to fears of allergies and illnesses.

Various standard operating procedures and a boost in budget allocation by the centre for the fisheries sector seem to have failed in their objective with over 67 per cent of families engaged in marine fishing languishing in poverty. The poverty figures were quoted in a report by the Union Ministry of Fisheries, Animal Husbandry, and Dairying. "The traditional fishing communities are poor people who have no other means of livelihood or any other qualification. Small fishermen borrow money from private moneylenders at higher interest rates to build their boats. Thus, they get burdened with loans and this further worsens their financial conditions," said M Ilango, chairperson of the National Fisherfolk Forum.

C. Prevalence of Vitamin A Deficiency and Iron Deficiency Anaemia in Children

Toteja et al. (2002) in their multicentre study for ICMR in 16 districts of 11 States, covering 1.64 lakh preschool children revealed the highest prevalence of Bitot's spot (4.71 per cent), corneal scar (0.5 per cent) and night blindness (5.17 per cent) in children was found in Gaya district whereas the highest prevalence of night blindness (19.62 per cent) among pregnant women was observed in Dibrugarh.

West (2003) in his study revealed that there were approximately 127 million preschool aged children and pregnant women who suffer from vitamin A deficiency globally. Approximately 6 million mothers suffer night blindness during pregnancy and 4.4 million preschool children have xerophthalmia. He also explained that vitamin A deficiency is an endemic nutrition problem throughout the developing world especially affecting infants, young children, pregnant and lactating mothers.

Rivera et al. (2003) in their study 'The effect of micronutrient deficiencies on child growth: A review of results from community-based supplementation trials.' have mentioned that Vitamin A and iron deficiencies also have been demonstrated to cause growth faltering, however only when the deficiency state of these nutrients is severe. Globally, half of preschool children are anaemic due mainly to iron deficiency, around 140 million preschool children have subclinical vitamin A deficiency.

Radhika et al. (2003) in their cross-sectional clinical study stated that out of 736 pregnant women belonging in their third trimester 21 women (2.9 per cent) suffered from night blindness. The presence of night blindness was seen only in the women hailing from low socio-economic background. Pregnant women having low socio- economic background were identified having vitamin A deficiency with serum retinol <20µg/dl, significantly associated with spontaneous preterm delivery and moderate to severe maternal anaemia.

Danapal and Lakshmi et al. (2003) in their study on 'Anthropometric measurements of fisherwomen and preschool children' have revealed that 41 per cent of the children surveyed were in grade-1 category of malnutrition, 32 per cent were in normal grades and 19 per cent of the children were in grade-2 category of malnutrition and the remaining 8 per cent were in grade-3 category of malnutrition.

National Nutrition Monitoring Bureau (NNMB) in its article 'Prevalence of Micronutrient deficiencies. Hyderabad, India in 2003 revealed that Vitamin A deficiency continues to be a major public health nutritional problem in India. The prevalence of Bitot's spot, the objective sign of clinical VAD (0.8 per cent) was higher than the figures recommended by the WHO (≥0.5 per cent), indicating the public health significance in rural pre-school children of India.

National Nutrition Monitoring Bureau (2006), in its technical report on prevalence of vitamin A deficiency among preschool children in rural areas. The study thus revealed that the prevalence of sub-clinical VAD among 1-5 year children is very high, the coverage of children for massive dose of vitamin A was low, and the nutrition education component of IEC was poor. The earlier NNMB surveys have shown that the dietary intake of vitamin A of community was grossly inadequate. The overall prevalence of Bitot's spots is 0.8 per cent, Madhya Pradesh having 1.4 per cent, Maharashtra 1.2 per

cent and Andhra Pradesh 1.2 per cent. The overall prevalence of night blindness was about 0.3 per cent and that of conjunctival xerosis was about 1.8 per cent.

Strobel et al. (2007) in their research pointed out that vitamin A is necessary for growth and differentiation of a number of cells and tissues during pregnancy, throughout the breast feeding period and foetal development especially lung development and maturity being particularly important.

Dole et al. (2008) in their study examined 1,589 children, 22 of whom had xerophthalmia, prevalence of 1.32 per cent. They mentioned that illiteracy among mothers and lack of safe drinking water were the independent risk factors for xerophthalmia. They also recommended that imparting vitamin A supplementation and female education would be a better approach to improve the vitamin A status in children living in deprived areas like urban slums.

Pal et al. (2008) in their study revealed that the overall prevalence of xerophthalmia, based on night blindness (XN) and Bitot spots (X1B), was of moderate public health importance, according to World Health Organization criteria, at 144 (3.42 per cent). They suggested that reliable long term solution to prevent nutrition related Xerophthalmia and blindness among Indian rural preschool children is to bring about change in dietary habits through behaviour change communication with the strategies of nutrition education, nutritional supplementation and nutritional rehabilitation.

WHO Global Database on Vitamin A Deficiency (WHO 2009) in its survey revealed that approximately one third of the world's preschool-age population is estimated to be vitamin A deficient; with highest prevalence (44-50 per cent) being reported in regions of Africa and South-East Asia.

Arlappa et al. (2011) in their study stated that the prevalence of night blindness and Bitot's spots among the rural preschool children of Madhya Pradesh was 0.8 per cent and 1.4 per cent respectively and the prevalence increased significantly ($p < 0.001$) with age. The proportion of children with subclinical vitamin A deficiency (<20µg/dL) was 88 per cent. The prevalence of Bitot's spots was significantly ($p < 0.001$) higher among children of lower socio- economic communities, 3–5-year age group and those of illiterate mothers. They have also revealed that appropriate intervention measures if initiated could improve the vitamin A status in children.

Justin et al. (2012) in their study stated that areas with highly prevalent VAD often share common dietary and other environmental exposures, including poverty, infectious diseases, limited development and poor availability of vitamin A rich foods. They also suggested that by improving availability of vitamin A rich foods or vitamin A fortified foods to prevent vitamin A deficiency.

Laxmaiah et al. (2013) in their community-based cross- sectional study on a total of 71,591 rural preschool children of eight states in India stated that the prevalence of Bitot's spots was 0.8 per cent. The risk of Bitot's spots was 2.4 times higher among preschool children of Scheduled Caste (SC) or Scheduled Tribe (ST) or illiterate parents living in unhygienic conditions like not possessing a sanitary latrine than others.

Akhtar et al. (2013) have stated in their investigation that in South Asian Developing countries, VAD is exacerbated by lack of education, poor sanitation, absence of new legislation and enforcement of existing food laws and weak monitoring and surveillance system. They also revealed that according to many recent estimates it has been figured out that there are higher morbidity and mortality rates among children and women of child bearing age. They pointed out that supplementation, fortification and dietary diversification are the general ways to improve vitamin A status.

Silva et al. (2014) in their article have pointed it that vitamin A deficiency is a health concern among children and adolescents especially with lower weight or underweight. They also reported that lower intake of retinol was detected among those with severe vitamin A deficiency.

UNICEF (2018) in its report, "coverage at a crossroads" revealed that in the year 2016, 64 per cent of the children in need of vitamin A supplementation were reached, but, more than 141 million children were left behind, leaving them vulnerable to disease and death. The number of children left unprotected has tripled over the years increasing from 19 million to 62 million.

Mahfuz et al. (2019) in their study have stated that child undernutrition is the result of interplay between multiple causal and contextual factors including poor complementary feeding practices which results in both macro and micro nutrient deficiencies. They specified that cereal based diets which lack in bio-available micronutrients are generally the foods that children are fed upon in developing countries.

Maia et al. (2019) in their study identified vitamin A deficiency (VAD) as a leading cause of preventable blindness in the world. They stated VAD in pregnant women is a public health issue in most of the developing countries because vitamin A is very much essential for morphological and functional development, ocular integrity foetal organs and foetal skeletal development. Vitamin A deficiency (VAD) remains the leading cause of preventable blindness in the world. VAD in pregnant women is a public health issue in most developing countries.

Kotecha (2011) stated that anaemia is a serious condition that impacts cognitive development. The effects of iron deficiency that are observed in the first six months of life can lead to permanent brain damage. An afflicted child is likely to remain vulnerable to infection and continue to have lower immunity toward infection throughout childhood. Also, the overall appetite is reduced and this vicious cycle perpetuates a series of events that must be stopped, to ensure the child's health.

Anand et al. (2014), reported that Iron deficiency anemia (IDA) continues to be major public health problem in India. It is estimated that about 20 per cent of maternal deaths are directly related to anemia and another 50 per cent of maternal deaths are associated with it. The question, therefore, is why, despite being the first country to launch the National Nutritional Anemia Prophylaxis Programme in 1970, the problem of IDA remains so widespread. As is to be expected, the economic implications of IDA are also massive. The issues of control of IDA in India are multiple. Inadequate dietary intake of iron, defective iron absorption, increased iron requirements due to repeated pregnancies and lactation, poor iron reserves at birth, timing of umbilical cord clamping, timing and type of complementary food introduction, frequency of infections in children, and excessive physiological blood loss during adolescence and pregnancy are some of the causes responsible for the high prevalence of anemia in India. In addition, there are other multiple programmatic and organizational issues.

Chandran and Kirby (2021) in their study revealed that anaemia is highly prevalent in all strata of populations in India, with established evidence of intergenerational anaemia. Higher likelihood of having severe childhood anaemia was observed among children of younger mothers (15- to 19-year-old, less educated (uneducated mothers and belonged to a scheduled tribe. Strong associations between anaemia in mothers and their children suggest intergenerational anaemia which has long-term effects. Malnourished

children (severe stunting) and children born with very low birth weight were more likely to have anaemia.

Behera and Bulliyya (2016), in their study evaluated the prevalence of anemia and status of various hematological parameters among children of Khurda district, Odisha. They reported that overall occurrence of anemia was 62 per cent comprised of 23 per cent mild, 23 per cent moderate, and 16 per cent severe categories. School age children were found to be more anemic than preschool children. Prevalence of anemia was 48.5 per cent among preschool children of which 47.6 per cent were boys and 50.0 per cent were girls. Mild, moderate, and severe anemia were found to be 12.9 per cent, 22.7 per cent, and 12.9 per cent, respectively. Among school age children 68.9 per cent had anemia, of which 27.4 per cent were mildly, 23.6 per cent were moderately, and 17.9 per cent were severely anemic. Girls were significantly more anemic than boys in the age group of 11-12 years (93.1 per cent versus 72.2 per cent) while more boys were anemic in the age group 10-11 years (84.6 per cent versus 53.1 per cent).

D. Vitamin A Rich – Orange Fleshed Sweet Potato

Orange flesh sweet potato (OFSP) is a globally important staple crop. Health benefits of OFSP are substantial, especially for nutrition-endangered populations. OFSP is a richer source of nutrients especially beta carotene, a source of vitamin A and fibre. In some parts of the world, OFSP is unfortunately regarded as a poor farmer's crop.

Kammona et al. (2015) in their study revealed that intensity of the colour of sweet potatoes is directly proportional with its beta- carotene content. They stated that the beta-carotene content of the sweet potatoes ranged from 91.95±2.05 µg/g dry weight in white sweet potato to 376.03±11.05 ug/g dry weight in orange sweet potato.

Islam and Jalaludddin (2004) in their research article stated that sweet potatoes are an important source of vitamin A, thiamine, riboflavin, niacin, potassium, ascorbic acid and many other functional compounds such as polyphenols, anthocyanins , dietary fibre, etc. which play a crucial role in protection of human health.

Van Jaarsveld et al. (2005) in their research study claimed that intervention of β- carotene rich orange fleshed sweet potato in children indicated a greater improvement in vitamin A liver stores. They stated that there was an increase of 78 per cent to 87 per cent in the vitamin A deposits in liver.

Strobel et al. (2007) in their study stated that the provitamin A carotenoid, beta-carotene remains the essential source of vitamin A. They clearly mentioned that the use of orange and dark green vegetable is the essential source of vitamin A for the population who are unable to meet their vitamin A requirement and also to pre developmental disorders in foetus.

Low et al. (2007) in their study suggested a food-based approach of intervention of orange fleshed sweet potato which is rich in β- carotene and can meet 90 per cent of the required daily allowance of vitamin A intake and elevate serum retinol concentration in children. They also claimed that orange fleshed sweet potato is well accepted by young children and has emerged as a least expensive source of vitamin A in local markets.

Burri (2011) in his study mentioned that vitamin A deficiency causes over 600000 deaths per year in mostly young children or pregnant women. He also stated that populations prone to vitamin A deficiency can obtain 82 per cent of their vitamin A from plant sources like orange fleshed sweet potato which are rich in beta-carotene. His results clearly recommended substitution of white, cream, yellow or purple sweet potatoes for orange fleshed sweet potatoes to prevent vitamin A deficiency in many food-deficit countries.

Emmanuel et al. (2012) in their comparative study opined that orange fleshed sweet potato is believed to contribute to the prevention of vitamin A disease. According to results obtained in their study, it was analyzed that orange fleshed sweet potato had higher β-carotene content, about 8.75mg/ 100g when compared to other varieties of sweet potatoes.

Holtz et al. (2012) in their research stated that the consumption of β-carotene - rich orange fleshed sweet potato helps to alleviate vitamin A deficiency. They have also stated that large scale intervention to introduce orange fleshed sweet potato as a staple food, into diets of women and children improved their vitamin A status and minimizes the risk of dietary vitamin A diet. They revealed at follow-up, vitamin A intake from OSP was positively associated with vitamin A status ($P<0.05$). Introduction of OSP to Ugandan farming households increased vitamin A intakes among children and women and was associated with improved vitamin A status among children.

Srivastava et al. (2012) in their study revealed that most of the school-aged children belonging to slums had a poor nutritional status and are prone to many

deficiencies like vitamin A deficiencies, anemia, etc. . They also quoted that interventions such as, skilled- based nutrition education, fortification of food items, effective infection control and integrated nutrition programs are required to prevent malnutrition in children.

De Brauw et al. (2019) in their research mentioned that provitamin A rich orange fleshed sweet potato works as a good strategy to reduce vitamin A deficiency particularly in children and women in developing countries. Their study which demonstrated that introduction of orange sweet potatoes (OSP) increased vitamin A intake among both targeted children and their mothers and reduced the prevalence of inadequate vitamin A intake in both countries.

Laurie et al. (2018) in their research work revealed that population living in a third world impoverished countries has to always face crucial food provisions to get on with their day- to- day life. So, they have come up with a suggestion that Orange-fleshed sweet potato (OFSP) is considered the single most successful example bio- of a staple crop, and presents a feasible option to address vitamin A deficiency. For the major OFSP variety, Bophelo, 66 g consumption can be sufficient to meet the recommended daily allowance for 1–3 year old children (300 μRE vitamin A). Despite a national Vitamin A supplementation programme and fortified in South Africa, 43.6 per cent of children under 5 years of age were reported to be vitamin A deficient in 2012, indicating a stronger need to promote the consumption of Vitamin A-rich foods, such as OFSP.

Kurabachew (2015), in the study quoted that orange fleshed sweet potato, given its high provitamin A content, low input requirements and adaptations can be an appropriate and sustainable approach to satisfy the vitamin A deficiency problem. orange-fleshed sweet potato (OFSP) which is rich in β-carotene has the potential to mitigate vitamin A deficiency problem.

Jenkins et al. (2015) in their research stated that food-based approaches encouraging the consumption of vitamin A rich foods, such as orange fleshed sweet potato have the potential to positively affect vitamin A status in population deficit in vitamin A levels. The results of the study showed that > 50 per cent of the intervention children who consumed orange fleshed sweet potatoes 3-6 days a week showed a rise in their serum retinol levels.

Motsa et al. (2015) in their study revealed the importance of OFSP varieties in supplementing vitamin A deficiencies cannot be overemphasised. And production of the

OFSP varieties in areas with a prevalence of vitamin A deficiency should be promoted. It is possible to produce this crop and have it available all year round in the tropical and subtropical areas of South Africa where warm conditions prevail, even if drought is a challenge for staple crops such as cereals. orange fleshed sweet potatoes is recognised as a good source of β-carotene, a precursor of vitamin A and is promoted by FAO across the developing world as a supplementary food to combat vitamin deficiencies in children.

Bowser et al. (2017) in their article mentioned that the health benefits of orange fleshed sweet potato are substantial, especially for nutrition – endangered populations. They also stated that orange fleshed sweet potato stands out as a rich source of vitamin A, calcium and fibre and as a result is recommended by researchers to utilise its benefits for upgrading nutritional status in populations. They have revealed that researchers from 9 different countries have developed food products that included orange fleshed sweet potato in 22 different categories over a 26 -year period.

Pillay et al. (2018) in their study stated that Vitamin A deficiency (VAD) is a major public health problem that affects South African children and is a major contributor to the mortality of children under five years of age. VAD can result in visual impairment, diarrhoea and increased risk of severe measles and death. Orange-fleshed sweet potato (OFSP), a staple crop biofortified with provitamin A, has the potential to improve vitamin A intake in infants, especially when used as a complementary food. The OFSP complementary food was well-accepted, especially its colour and soft texture. It has the potential to be used in complementary feeding and to improve the vitamin A status of infants.

Laurie et al. (2018) in their research has stated that orange fleshed sweet potato is considered the single most successful example of biofortification of a staple crop, and presents a feasible option to address vitamin A deficiency. They also stated that though the major approach is focused on unprocessed, boiled orange fleshed sweet potato (OFSP), there are unexploited opportunities for processing of OFSP.

Neela, et al. (2019), in their study reported that the orange fleshed sweet potato has good concentrations of provitamin A, β-carotene, moderate presence of phosphorus and potassium and low concentrations of calcium, magnesium, zinc and sodium. They also stated that the role of orange fleshed sweet potato is successfully reported in the prevention of vitamin A malnutrition in developing countries.

E. Effect of Nutritional Education

Nutrition education is an essential component in improving dietary habits and food choices, in order to reverse the under nutrition and improve the nutritional diagnosis. Poor dietary habits and lack of physical activity can be the main reason for poor nutritional status among children and adults. The importance of nutrition education as a means for improving nutrition of the community in the developing countries has increased rapidly during the recent past. Lack of awareness about the dietary requirements and nutritive value of different food is the main cause for prevailing malnutrition among school children, pregnant women, lactating mother and other vulnerable sections of the community.

Nutrition education should be practical and should be easily adaptable to the socioeconomic status, food habits and the available local food resources generally needed for the purpose of demonstration and feeding of the locally available audience. Nutrition is one of the single most important factors when it comes to a child's development. Proper nutrition is essential for children to succeed in school. By feeding our children a proper diet, we are helping them to be able to function properly in school in addition to fostering their growing mind and bodies.

Rajammal P. Devadas (1987) revealed from the study about the nutritional knowledge of mothers from 200 families that a detailed education programme incorporating nutrition, home science health and childcare for 10 days has brought about an incredible increase in consumption of green leafy vegetables and fruits and also brought about improvement in cooking practices.

Chikagoudar et al. (2000) in their study on the impact of intervention on rural mothers' knowledge regarding childcare and nutrition in Karnataka incorporated interventions such as lectures, meetings, and an educational package and nutrition for a period of 6 months. They have come to a conclusion keeping in view the results of their intervention that finished intervention maternal knowledge can be enhanced, which is very important for promoting healthy growth of infants.

Mangala et al. (2001) in their 3 stage educational intervention study on knowledge of 225 mothers of under five children on home management of diarrhoeal diseases claimed that there was significant improvement in knowledge scores after the educational intervention when compared with their initial knowledge before intervention.

Perez et al. (2001) in their study on school-based nutrition education : lessons learned and new perspectives, stated that nutrition education is a key element to promoting lifelong healthy eating and exercise behaviours and should start from early stages of life. They also stated that nutrition education is an accessible effective tool in health promotion programmes with a focus on the development of healthy eating practices.

Ghosh et al. (2002) in their longitudinal based study on nutrition education and infant growth in rural Indian infants where mothers were counselled about the need of exclusive breast feeding for 4-6 months, choice of appropriate complementary foods and feeding frequency. The results showed a statistically significant positive association between intervention and weight velocity in female infants and there was an overall improvement in feeding practices such as avoidance of feeding bottle and increased variety of foods. The research brought to light that the implication of this association is promising for the development of low-cost educational interventions to improve nutritional status.

Perez-Rodrigo et al. (2003) in their study nutrition education in schools : experiences and challenges, stated that health promotion from early stages in life by fostering healthy eating practices and regular physical activity has a potential for a major impact on health and well-being during childhood and later stages in life. They also conveyed that nutritional education should be progressively part of the school curriculum for all ages, from the very early age to secondary school. They also stated that, to be effective, nutritional education strategies must be creative, engaging, inexpensive and widely disseminated.

Walsh, Dannhausar and Joubert (2003) in their study have stated that there is appositive impact of nutrition education programmes on nutrition knowledge and dietary practices of lower socio- economic communities in the Free State and Northern Cape. In their results it was evident that knowledge of foods to eat regularly in order to remain healthy improved significantly by between 42.2 per cent to 52.6 per cent in the rural intervention areas. The per centage of rural households that included three food groups (protective foods, energy foods and building foods) in their cooked meal improved by 32.6 per cent to 38.8 per cent. A significant improvement was also seen in milk, vegetables and fruits consumption.

Vijayapushpam et al. (2003) conducted a study to evaluate the nutritional knowledge levels and dietary intakes among children from Hyderabad, Andhra Pradesh, India, with low or high socio-economic status. The results after the nutrition education intervention showcased that children from the high socio-economic group scored better than the low socio-economic group children in knowledge related to food and nutrition, but there was an overall improvement in the knowledge regarding nutrition due to the intervention programme.

Murty et al. (2016) in their survey on knowledge, attitude and practice (KAP) of health and nutrition on a sub-sample of 142 mothers with 6- to 24-month-old children done initially and at the end of three years showed marked improvement in mothers' knowledge and child-feeding practices. At the end of three years, 335 target families had raised vegetable gardens diverting 57.8 acres of land. The KAP survey responses showed that the per centage of families raising homestead gardens increased from 30 per cent initially to over 70 per cent finally. Weekly mean frequency of green leafy vegetables (GLV) cooked, increased from 1.9 to 2.4. The per centage of households cooking GLV more than three times per week increased from 21 in the initial survey to 45 in the final survey. Weekly frequency and quantity of eggs consumed, among households who set up BYP, more than doubled. ICDS records showed gradual decline in per centage of 6 to 24-month-old children suffering from moderate-to-severe malnutrition, over the three-year experimental period.

Bhandhari et al. (2004) in their community study on "Educational Intervention to promote appropriate complimentary feeding practices and physical growth in infants and young children in rural Haryana", mothers of eight communities were assigned to receive educational intervention. In the overall analyses, there was a small but significant effect on length gain in the intervention group The effect was greater in the subgroup of male infants Weight gain was not affected. Energy intakes from complementary foods overall were significantly higher in the intervention group children.

Anderson et al. (2005) in their study about impact of school-based nutrition education intervention on dietary intake and cognitive and attitudinal variables relating to fruits and vegetables, stated that nutrition education intervention increases the scores related to knowledge and has a significant effect on cognitive and attitudinal variables on food intake.

Kilaru et al. (2005) studied about the effectiveness of an education intervention to improve infant feeding and rearing practices in 2 villages in Karnataka. The intervention study showed a statistically significant improvement in the weight velocity. These results provide further evidence that community based can be used to enhance knowledge and improve the community's overall health.

Barlow et al. (2006) in their randomized trail study on 'Home visiting intervention to improve child care among American Indian adolescent mothers', revealed that mothers in the intervention compared to the control group had significantly higher parent knowledge scores after the intervention period. It was concluded that educational intervention significantly increased mother and childcare knowledge.

Culp et al. (2007) in their study on health and safety intervention with first time mothers assessed the outcomes of health education intervention and concluded that mothers who received early education home visits from child development specialists, experienced positive health and safety outcomes.

Perez et al. (2008) in their research on impact of peer nutrition education/ counselling on dietary behaviours and health outcomes among Latinos reported that nutritional education has a positive influence on diabetes self-management and breast feeding outcomes, as well as on general nutrition knowledge and dietary intake behaviours.

Joshi and Vijayalaxmi (2009) in their study on the use of nutrition education tool to improve overall dietary attitude and knowledge among young women have revealed that the weakest link in intervention programmes to control malnutrition is the absence of proper nutrition education. Scarcity of appropriate and specific education material is the main reason for the failure of nutrition education endeavours. Simple messages were prepared in the form of booklets, group discussions were conducted and focused ethnography was utilised. Significant improvement in knowledge was observed.

Van Cauwenberghe et al. (2010) in their study on the 'Effectiveness of school-based interventions in Europe to promote healthy nutrition in children and adolescents', revealed that in the 42 studies which have been reviewed, strong evidence of effect was found for multicomponent interventions on fruits and vegetable intake promoting a healthy diet in school-aged children.

Lua et al. (2012) in their article 'The impact of nutrition education interventions on the dietary habits of college students aged between 18 – 24 years in developed nations', revealed that in general, college students experienced significant positive changes in their dietary habits after the interventions were employed. The results also showed that the combination of nutrition education and supplement provision was significantly beneficial in improving body composition, dietary habits, daily nutrient intake and quality of life.

Debnath and Agrawal (2016) in their study on the effect of nutrition education and dietary modification on the health status of kinder garden children have revealed that their study resulted in 74 per cent increase in number of cases taking optimal nutritional intake after a trail period of 1 month. They have also observed a significant increase in the anthropometric status of the cases particularly height and chest circumference whereas no remarkable changes were noted among the control.

Pavithra et al. (2019) in their study about the effectiveness of a community-based intervention on nutrition education of mothers of malnourished children in a rural coastal area of South India, came up with result that awareness in all domains increased significantly in the intervention group. They revealed that 81 per cent of the malnourished children turned out normal with statistically significant increase in the calorie intake, protein intake and weight gain.

Sangra et al. (2019) in their study revealed that adequate knowledge of mothers regarding dietary patterns of under-five children is of paramount important as it will enhance their attitude and help them change the harmful practices which would go a long way in solving the nutritional health problems in our settings.

Saha et al. (2020) in their research on "Effects of a nutrition education intervention on fruit and vegetable consumption-related dietary behavioral factors among elementary school children"revealed that participants showed significant improvements in nutrition knowledge, fruit and vegetable preference, eating and cooking self-efficacy after the intervention. Study results suggest that a brief 6-week multi-component and school-based nutrition education intervention had the potential to engage students and create health-promoting behaviours.

Concluding comments

The above depicted studies dealing with the socio-economic conditions, income and expenditure patterns, savings and indebtedness of the fisherfolk, the prevalence of vitamin A deficiency, its prevalence and measures, vitamin A rich – orange fleshed sweet potato and its nutritional significance, and the effect of nutrition education intervention have been analysed to get a better picture and to take forward this present study with relevant support. There is no particular study which was done focusing on the fisherfolk children's nutritional status of East Godavari District of Andhra Pradesh. Hence, the investigator has made this attempt for the present study.