

Intervention of various technologies to improve the food & nutritional status of the vulnerable group of the population

Introduction

Norman Borlaug, the architect of Green Revolution in Asia observed "High yield technology of the 60's, if fully exploited would help us succeed in our war against hunger. Over 7000 people die of hunger every day. Close to 70% of women and children suffer from hidden hunger. Ironically, India is the 11th largest and 2nd rapidly growing economy. No wonder, eradication of hunger became the one-point agenda of the four successive World Food Summits since 1974. India is the second most populous country in the world; 120 million women live in poverty. Over 70% of India's population - livelihood from land resources (includes 84% of the economically-active women). Population increased- from 1951- 361.1 million to 2011 1027 millions; 933/1000 Female & Male sex ratio, 22.8% adolescent girls, 16% BPL families, 70% land based livelihood, 84% women agricultural laborers, 75% male and 54.2% female literacy (21.7% gap in literacy), 14% male and 15% female child labour, 54% child marriages, 65% hidden hunger among women and children. Gender disparities are present in nutrition from infancy to adulthood. Anemia in girls of 6-14 years is 95%. As per the National and Regional Survey, prevalence of anemia in 74% children below 3 years of age, in 85% pregnant mothers and among 90% of adolescents girls. India's maternal mortality rate in rural areas is highest in the world. Antenatal care - 40-50% of women, pregnancy related deaths- one-quarter of all fatalities. In gynecological disorder 92% suffered from one or more. Most vulnerable sections are adolescent girls, pregnant and lactating mothers, and underweight children under five age. Receive far less education than men; largest population of non-school working girls. Literacy rate for women is 39% versus 64% for men. Encouragement to private colleges will reduce women's opportunities for higher education, since privatization in education promotes only male-dominated professional and technical courses. In sex-selective abortion, 96% of female fetuses were aborted. Malnutrition is both a driver and an outcome of poverty and inequality. Under nutrition leading to stunting causes irreversible damage to both individuals and society. Obesity in childhood is a growing problem in all regions. Ensuring universal access to nutritious food in the 1000-day window of opportunity between the start of pregnancy and a child's second birthday is essential to tackling stunting. This should be supported by a multi-sect oral approach which includes nutrition-sensitive health care, water, sanitation, education, agriculture, social protection and specific nutrition interventions, coupled with initiatives that enable empowerment of women

Intervention of various technologies to improve the food & nutritional status of the population proved the following facts: Promotion of malt based small scale food industry not only provides opportunity for rural women to develop entrepreneurship and employment, but also provides food and nutritional security through income generation. Several technologies were developed under

Volume 2 Issue 6 - 2018

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Received: November 03, 2017 | **Published:** December 20, 2018

NATP like value addition to fish & prawn products, artificial pearl culture, processing of salted fish, which helped the self help group women of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu to improve their economic status. Received two patents & licensed the technology which helped the women to reduce their drudgery and also preserve the fresh fish for a longer time without getting spoiled. Product development can be taken as income generating activity in the rural areas by the illiterate women. Products can be included in supplementary feeding programs in order to improve the nutritional status of the vulnerable groups of the population. The horse gram which is commonly used for cattle feed can be diversified for human consumption with less investment. Mothers as well as Anganwadi workers preferred amylase rich supplementary foods which reduced Grade 3 and grade 4 malnutrition in Pre- school children significantly. The studies revealed that spawn multiplication can be done by women as a co-operative venture and mushroom cultivation can be undertaken at household level as an income-generating activity. Introducing red palm oil is beneficial to overcome vitamin A deficiency. Impact of women's supplementary income on family's nutritional status showed that the supplementary income of women has a positive impact on the socioeconomic status of the family. This impact is particularly felt on the food and nutrient intake of the family contributing towards food & Nutrition security.

Research carried out by Dr. Vijayakhader to improve the nutritional status of vulnerable group of Population. Home based low cost energy protein rich preparations using Horse gram for vulnerable groups.¹

The horse gram which is commonly used for cattle feed can be diversified for human consumption with less investment. The low cost energy protein rich products namely RAGINA and EPRF were prepared using the simple home scale processing methods like germination, roasting and puffing, to improve the nutritional status. Horse gram has been identified as potential food resource for the tropics and also occupies an important place among pulses because of its ability to resist severe drought conditions Product development can be taken as income generating activity in the rural areas by the illiterate women. Products can be included in supplementary feeding programs in order to improve the nutritional status of the vulnerable groups of the population.

To study the effect of feeding malted food on the nutritional status of vulnerable groups²

Amylase Rich Malted Mixes (ARMM) two types were formulated using Ragi / Wheat and suitable products namely Laddu, Roti, Kheer, and Porridge were prepared using formulated malted mix. For the supplementation of malted mixes 8 villages of Lepakshi Mandal, Ananthapur District was selected. Preschool children (400), pregnant women (100) and Lactating women (100) were selected and fed with two types of malted mixes (Ragi / Wheat) for a period of 3 months. Anthropometric data, Food intake showed a significant increase in the preschoolers, pregnant women and Lactating mothers. Clinical assessment showed considerable reduction i.e. (50%) in nutritional deficiency symptoms and morbidity rate of all the subjects. Promotion of malt based small scale food industry not only provides opportunity for rural women to develop entrepreneurship and employment but also provided Food and Nutritional Security through income generation. The then Honorable Minister for Agriculture Dr.N.Raghuvveera Reddy was very much impressed and interested to introduce ARMM in the ongoing ICDS supplementary feeding programs based on research results.

Therapeutic food supplementation in ICDS projects of Andhra Pradesh³

Total 2267 children of age range of 1-3 years were selected (892 children from rural ICDS project, Saravakota; 507 children from new ICDS project, Kottam; and 778 children from tribal ICDS project, Seethapeta) for a period of 1 year. The three types of supplements were prepared and distributed by A.P. Foods, Hyderabad. The supplements were distributed either in the form of Laddu or as in the form of powder. Nutritive value of 100g of supplements provides 400 to 480 Kcal 12.5 to 13.8 g proteins. It was very encouraging to note that 92% of grade III children showed improvement in their weight and height; 80% of moderately malnourished; 42% of mildly malnourished and 44% with normal grade showed improvement. It was also observed that there was positive correlation between the calorie and protein intake and also improvement in weight and height. All 100% of mothers as well as Anganwadi workers preferred these supplementary foods better as compared to earlier supplied food i.e. ready to eat food.

Studies on Fisher Women in the Coastal Eco System of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu^{4,5}

Two Equipments I) Low Cost Ice Cream Freezer II) Fresh Fish Vending and Display Table have been fabricated and the patents were received on 13th October, 2003. The technology has been licensed to Smt.G.Varalakshmi, W/o. Sri G.Satya Kiran, M/s. Yogi Industries, and Secunderabad for manufacturing these two equipments for a period of two years. She is the sole authority to manufacture in the country. After expiry of two years the technology on low cost ice cream freezer was licensed second time to another women entrepreneur namely Mrs. Lakshmi Bhuvanewari W/o Devi Hariprasad, D.No.23/321, Bachupeta, Hindu College Road, Machilipatnam – 527 001 on 16th September, 2006 for a period of 6 years. These equipments were fabricated mainly to improve the Health Security. Tribal mother's attitude towards lactation performance (Vijayakhader, Vimala, Sarojini & Rajya Lakshmi, 1996) Majority (85%) of tribal women do not think lactation as a necessity to take special care about either food

because they were lactating. Majority of mothers (66%) were aware of the reason for decrease in lactation performance. Only a small number of mothers (5%) knew that sickness and insufficient food (2%) played a role in decreasing the lactation performance. As nursing mothers, they do not receive any special attention from the family members regarding the additional intake of food. A positive change was observed in lactating mothers through Nutrition Education.

Effect of Jawahar Rojgar Yojana Programme during lean season on the Nutritional Status of Women in Landless Labour Families of Drought prone areas⁶

The study was conducted in eight villages of four interior Mandals having low rainfall (500-750mm) in Ananthapur a drought prone district of Andhra Pradesh. A household survey was conducted to screen the families having at least one women of child bearing age from the eight selected villages of the four Mandals. A total of 120 families were selected for the study of which 60 families were JRY beneficiary families' where at least one member of the family was being employed under JRY scheme and 60 families were non-JRY beneficiary families. The study showed that the additional income gained by the landless labor families during the lean season from Jawahar Rojgar Yojana (JRY) programme had beneficial effect on the nutritional status as assessed by the anthropometric measurements as well as clinical observations. The results indicated the past malnutrition status of the population in Ananthapur district because of the repeated and prolonged droughts

Rural Women as Entrepreneurs in Mushroom Cultivation⁷

Every woman is an entrepreneur as she manages, organizes and assures risibility for running her house. It has been increasingly realized that women possess entrepreneurial talent which can be harnessed to create employment opportunities. In the rural areas a woman can easily manage 4-10 beds depending on the space available, helping them to earn Rs.180 to Rs.450 per month. The results of the studies revealed that spawn multiplication can be done by women as a co-operative venture and mushroom cultivation can be undertaken at household level as an income-generating activity.

Family income and nutritional status of pre-scholars' in rural areas of Tenali division⁸

The increase in the annual per capita income of the family increased slightly the nutritional status of pre-scholars. The results also reveal that no significant difference was observed between the body weight of children and income of the parents in all the age group. In spite of having high purchasing power, lower educational status of the mothers and also low nutritional awareness, majority of the children are in Grade 1 degree malnutrition.

Transfer of home level preservative techniques of selective fruits and vegetables to rural women in Guntur district⁹

There was a significant, negative correlation between age of the respondents and gain in knowledge. There was a significant positive correlation of socio economic variables such as educational status, family income, and land holding on gain in knowledge

Operational feasibility of RPO supplementation to pre-school children in Anganwadi centers of ICDS Project¹⁰

Vitamin A deficiency causes many health problems especially among children. A study was undertaken to screen the effect of supplementation of Red Palm Oil (RPO) obtained from the fruits of tree *Leis guineensis* Jac. The oil is rich in B-carotene, a precursor of Vitamin A. Supplementation of crude RPO to Anganwadi Children increased the attendance of children, increase in heights and weights of children. Decrease in Grade 11 and Grade 111 malnutrition was observed in respect of sex.

Impact of women's supplementary income on families' nutritional status¹¹

The Study was carried in 4 villages of Rajendranagar Mandal and Ranga Reddy District (Vegetable venders, Agarbathi labourers, Shopkeepers, Washers, Fruit venders, Tea and Snack workers). The results reveal that the supplementary income of women has a positive impact on socio-economic status of the family. This impact as felt on food and nutrition intake of the family.

Impact of dairy programme on the nutritional status of women and preschool children in Vihiga District, Kenya Africa¹²

The dairy programme in Kenya has a significant impact on the overall improvement of the family in specific to improving production, consumption and marketed surplus of milk. Food and nutrient intake and nutritional status of women and preschool children from participant households improved. The prevalence of under nutrition in preschool children in participant households was lower (1.7%) than that of children in non participant households (2.9%). Stunting was 8.7% and 21.4% in preschool children from participant and non-participant households respectively. Less percent (6.7%) of women in participant households had body mass index less than 18.5, whereas 7.3% of women from non-participant households fell below this cut-off point.

Success stories of fisher women

The National Agricultural Technology Project entitled Studies on Fisherwomen in coastal ecosystem of Andhra Pradesh, Karnataka, Tamilnadu and Kerala explored the socio-economic status of fisherwomen and found the families wherein women are actively involved in one or other occupation has flourished and achieved all round development. Seven Fisherwomen (3 from Kerala ;2 from Karnataka and 2 from A.P) have attained the Training and Awareness from National Agricultural Technology Project, implemented in their places and enhanced their socio-economic status through various skill oriented training programs and continuous day-to-day discussions with the Scientists.

Technologies developed ready for commercialization

Entrepreneurship Technologies: Sorghum Food Enterprise/Geriatric Foods/Malted Infant Foods/High Fiber Vermicelli/Preservation of Palmyra Palm Fruit/Mushroom Cultivation.

Knowledge Empowerment Technologies: Multipurpose fresh fish Vending & Display Table/Low Cost Ice-cream Freezer

Value Addition Technologies: Value addition to Fruits/Value addition to Red Palm Oil/Fruit Powders/Horse gram Products & Soya Products.

Acknowledgments

None.

Conflicts of interest

Authors declare that there is no conflict of interest.

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