

# **Agriculture- Nutrition Linkages through Enhancing the Curriculum: Review and Recommendations**

**BIHAR**

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# Demography and Health

- **Bihar, with a population of 104 millions, is the third most populous State in India**
- **The population density in the State is 1,102 persons per sq. km**
- **The State has recorded the decadal growth of 25.07% as against all India decadal growth rate of 17.6%, between 2001 and 2011 with a fertility rate of 3.7 compared to national figure of 2.6, it is only going to increase further**
- **Out of the total population nearly 90% of the population lives in rural areas**
- **Around 40% of the population is below poverty line**

- **The major health and demographic indicators of the State like Infant Mortality Rate (IMR), Maternal Mortality Ratio (MMR), Total Fertility Rate (TFR), etc. are much higher than all-India level and reflect a poor health status in the State.**
- **Maternal Mortality Ratio in Bihar (261 per 100,000 live births) is the 4th highest in the country. The high level of MMR can be attributed to low level of institutional deliveries (23.2% compared to national figure 41%), high level of anaemia among women (63.4% compared to national figure of 51.8%), low provision of iron and folic acid tablets to ante-natal cases (8.1% compared to national figure of 20.4%), and low level of full ante-natal coverage (5.4% compared to national figure of 16.4%).**

- **The percentage of women with chronic energy deficiency is also higher (39.3%) compared to the national figure of 35.8%.**
- **Number of infants receiving semi-solid foods at the age of six months is much lower than the national level and as a result, under nutrition rate in children is much higher than the national level. About 54.4% children are under weight and 81% are anemic.**

➤ **Vitamins and minerals are vital components of good nutrition and human health, advancing physical and intellectual development in many important ways. And yet, around the world, billions of people live with vitamin and mineral deficiencies, quite pertinently termed as ‘Hidden Hunger’.**

➤ **One in three people in the world suffers from hidden hunger. Women and children from the lower income groups in developing countries are often the most affected.**

➤ **It is a chronic lack of vitamins and minerals that is often not evident and has no visible warning signs; therefore people who suffer from it may not even be aware of it.**

➤ **The consequences are nevertheless disastrous – it can increase child and maternal mortality, cause birth defects and developmental disabilities, contributes to and exacerbates global poverty, constrains women’s empowerment and limits the productivity and economic growth of nations.**

- **The Human Development Index (HDI), a composite of literacy, life expectancy and per capita income, has increased in Bihar like rest of India, but the State still lags at 0.367 compared to the Indian average of 0.472**
- **Amongst the major States, the HDI of Bihar has been the lowest for the last three decades**
- **In view of the large population size, high poverty ratio, and high decadal growth indices in the state, Bihar is one of the States covered by the National Rural Health Mission**

- **Based on the indicators primarily related to primary health care infrastructure and reproductive and child health care, the State ranks 35<sup>th</sup> in the country (DLHS 2002-04)**
- **On a similar basis, the districts in Bihar have also been ranked amongst the districts which are lagging behind in the State are – Seohar, Samastipur, Kishanganj, Jahanabad, Nalanda, Khagaria, Araria, Sitamarhi and Paschim Champaran.**
- **Social and family health issues such as malnutrition of women and children, declining child sex ratio, adolescent health, care of older persons however continue to be areas of concern requiring immediate intervention.**

## State Profile : BIHAR

Indicator	Bihar	India
<b>Total population (In Crore) (Census 2011)</b>	<b>10.38</b>	<b>121.01</b>
<b>Decadal Growth (%) (Census 2011)</b>	<b>25.07</b>	<b>17.64</b>
<b>Crude Birth Rate (SRS 2011)</b>	<b>27.7</b>	<b>21.8</b>
<b>Crude Death Rate (SRS 2011)</b>	<b>6.7</b>	<b>7.1</b>
<b>Infant Mortality Rate/1000 (SRS 2011)</b>	<b>44</b>	<b>44</b>
<b>Maternal Mortality Rate/lakh (SRS 2007-09)</b>	<b>261</b>	<b>212</b>
<b>Total Fertility Rate (SRS 2011)</b>	<b>3.6</b>	<b>2.4</b>

(Source: RHS Bulletin, March 2012, M/O Health & F.W., GOI)



## State Profile : BIHAR

Indicator	Bihar	India
<b>Sex Ratio (Census 2011)</b>	<b>916</b>	<b>940</b>
<b>Child Sex Ratio (Census 2011)</b>	<b>933</b>	<b>914</b>
<b>Schedule Caste population (In Crore) (Census 2001)</b>	<b>1.3</b>	<b>16.6</b>
<b>Schedule Tribe population (In Crore) (Census 2001)</b>	<b>0.076</b>	<b>8.43</b>
<b>Total Literacy Rate (%) (Census 2011)</b>	<b>63.82</b>	<b>74.04</b>
<b>Male Literacy Rate (%) (Census 2011)</b>	<b>73.39</b>	<b>82.14</b>
<b>Female Literacy Rate (%) (Census 2011)</b>	<b>53.33</b>	<b>65.46</b>

(Source: RHS Bulletin, March 2012, M/O Health & F.W., GOI)

# **NUTRITIONAL CHALLENGES**

- 1. Malnutrition**
- 2. Infant Mortality Rate**
- 3. Maternal Mortality Rate**
- 4. Total Fertility Rate**
- 5. Low Institutional Deliveries**
- 6. Chronic Energy Deficiency**
- 7. Micronutrient deficiency/Hidden hunger**
- 8. Low Coverage of Full Immunization**
- 9. Low Level of Female Literacy**
- 10. Poor Status of Family Planning**
- 11. High Percentage of Vector borne Diseases**
- 12. Lack of Access to Pure drinking Water**
- 13. Health Hygiene and Sanitation**
- 14. Women more vulnerable to HIV/AIDS**
- 15. Substantial Gaps in Primary Health Care Infrastructure**

## **Various programmes running in the state to combat the identified nutritional challenges**

- 1. Integrated Child Development Services (ICDS)**
- 2. Rajiv Gandhi Scheme For Empowerment Of Adolescent Girls (RGSEAG)-Sabla**
- 3. Indra Gandhi Matritva Sahyog Yojana (IGMSY)**
- 4. Mid Day Meal (MDM)**
- 5. Reproductive and Child Healthcare (RCH) Services**
- 6. Anaemia Control Programme**
- 7. Vitamin – A Supplementation Programme**
- 8. National Rural Health Mission**

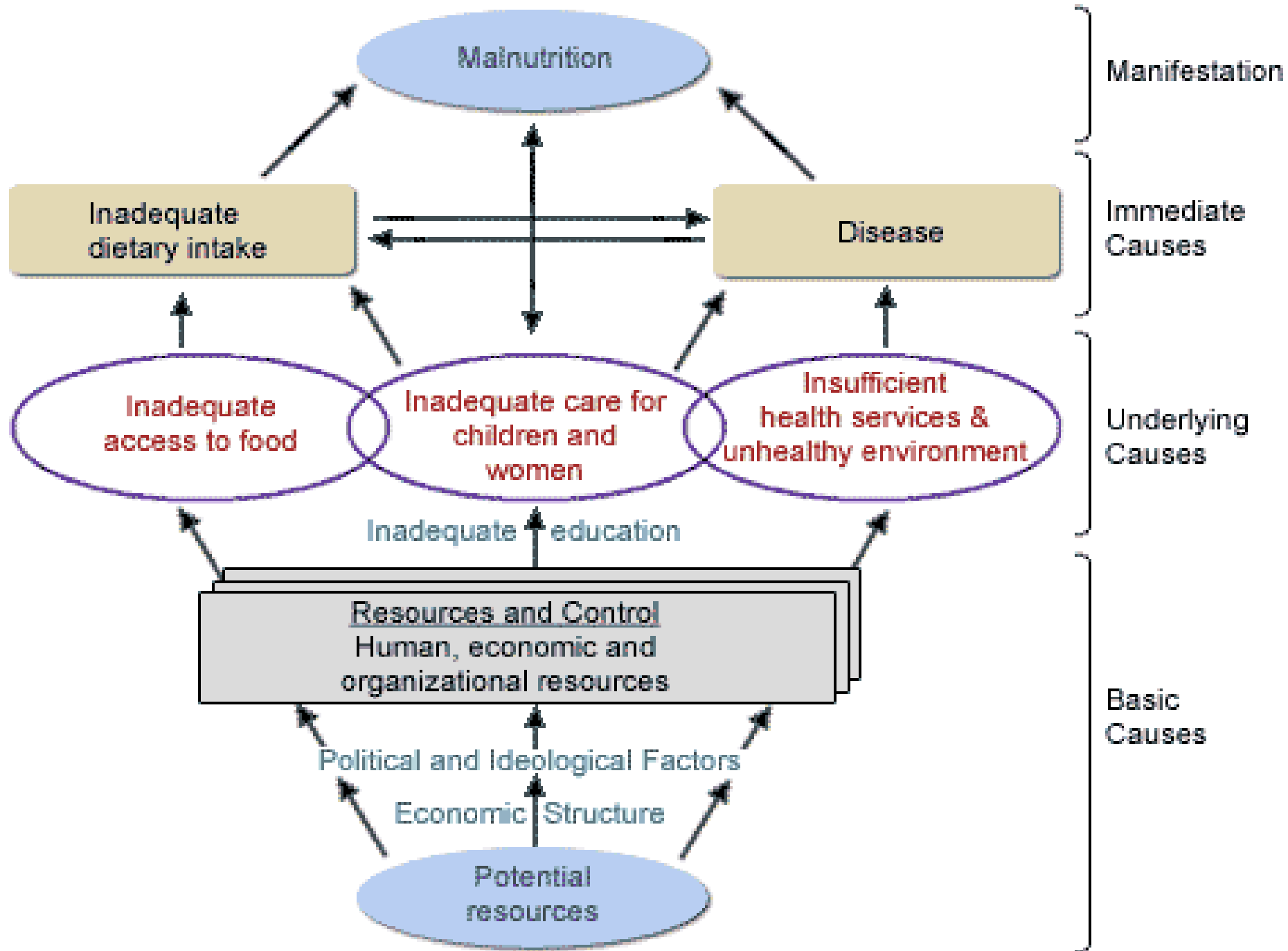
- 9. Programme for Elimination of Iodine Deficiency Disorders**
- 10. National Vector Borne Diseases Control Programme (Kala-azar)**
- 11. National Vector Borne Diseases Control Programme (Malaria and Filariasis)**
- 12. Revised National Tuberculosis Control Programme (RNTCP)**
- 13. National AIDS Control Programme**
- 14. Integrated Disease Surveillance Programme (IDSP)**
- 15. Blindness Control Programme**

# Malnutrition - A Serious Problem

According to world Bank 60 million children in India are underweight, 45 per cent children have stunted growth, 20 per cent have wasted indicating acute malnutrition, 75 percent are anemic while 57 percent suffering from vitamin A deficiency.

This horrible situation exist despite of being a food surplus country in terms of food production and coverage of a strong network of extension functionaries reaching out to grass root level.

Malnutrition increased susceptibility to infection, slow recovery from illness which result in reduced productivity, responsible for low income and again mire in poverty. This cycle of poverty and malnutrition need to be addressed strategically.



# **Causes of Hunger**

## **1. Low food accessibility**

- Large population**
- Poverty**
- Unemployment**
- Illiteracy**
- Lack of skill oriented education system**
- Small land holdings**

## **2. Low food availability**

- Improper management of public distribution channel**

## **3. Low ability to avoid starvation**

- Lack of knowledge on balanced diet**
- Major food intake of rural folks being cereal and pulses**
- Ignorance of proper nutritional food intake**



## **Agricultural Production Increased, Not Nutritional Status**

**The green revolution technology, despite its severe criticism on equity, ecology and environment grounds, has made significant contribution in transforming the food-deficit economy into food-surplus economy. Agricultural development during this period was largely supply-driven, backed by policy support, sincere efforts of agricultural scientists, and the hard working farmers who positively responded to the new technology. By contrast, agricultural development in the last two decades to a greater extent has been driven by demand side factors. Agriculture has begun to diversify towards high value commercial crops, including horticulture, floriculture and livestock products, especially to cater to the need of growing middle and upper middle class households whose dietary pattern have been shifting from food grains to these products**



**However, there are a number of problems related to diversification of farming. While India produces over 162 million tons of fruits and vegetables, the cold storage facilities exist only for 12% of total produce**

**It is relevant to note that agricultural diversification and rising energy prices have significant implications for food security of common masses. A high growth in horticulture and livestock products may not improve nutritional status of the common masses as they have little or no access to fruits and livestock products due to their high prices.**

**Cereal consumption among poor is the main source of calorie intake and pulses are the major source of protein, a decline in the per capita availability of cereals and pulses due to diversification may increase food insecurity among them.**

**Secondly, increasing consumption of highly income-elastic food products, such as, meat and dairy products have also increased the demand for cereals for feed-grains and thus increasing the cereals prices, affecting the poor households. For instance, production of one kilogram of meat requires more quantity of grains than that is required when it is directly consumed by a consumer. Thus, if more quantity of grains is diverted towards production of meat and dairy products, less quantity would be available for common masses for direct consumption.**

**Presently a large number of rural and urban slum households are not able to get adequate quantity of food and thus suffer from chronic poverty and hunger. Hence, appropriate output-mix is necessary to strike a right balance between “wage goods” and “high value goods” for the point of view of food security.**

**Improvement in agricultural production and productivity helps to ease the problem of food security in two ways: first, by making the food items affordable to the consumers, and second, by generating additional employment opportunities to rural workforce in farm and non-farm activities.**

## **STRATEGY FOR BETTER COMMUNITY NUTRITION (THROUGH AGRICULTURE PERSPECTIVE)**

- **Availability of food items in the market is one aspect related to food security and the other is accessibility of the food items to the poor households.**
- **If the prices of food items increase faster than the income of poor households, they would not be able to have access to food even if the market has adequate supply of food items. In this context, agricultural diversification can help to increase the income of small and marginal farmers and agricultural labourers by creating more gainful employment.**

- **More employment opportunities could also be created through non-farm activities**

- **Improve the productivity and profitability in agriculture through enhancing public investment in agricultural infrastructure, R&D, extension, irrigation and water management, market, post-harvest technology, storage and distribution.**

- **Due to inadequate post-harvest infrastructure, about 10 per cent of the food grain produce (about 20 million tonnes) go on waste every year. Saving of 20 million tonnes of food grains through efficient supply chain management and creating better storage and distribution infrastructure can help to release about 6 million hectares of land under food grain cultivation for other remunerative crops or can produce additional 20 million tonnes of food grain.**

**•Develop such a supply chain system for agricultural products that benefits both farmers and consumers. High market prices of agricultural commodities paid by the consumer do not always benefit the farmers due to inefficient supply chain system. Therefore, effective linkage between farmers groups and consumers groups need to be established to eliminate the multi layers of intermediaries between farmers and consumers.**

## Strategy For Local Community

It is to be understood that food security cannot be ensured simply by providing rice and wheat but it calls for a delivery of balanced diet, entailing sufficient calcium, protein, vitamin and other nutrients. Food security is materialized only when all the nutritional needs are met. Deficiencies have been found to cause a number of diseases.

•Need of the hour is to re-discover the wisdom of traditional nutritional regime. The traditional food habits favoring coarse grains and pulses were totally scientific and customized according to the easy availability. Coarse grains like sorghum or *Jowar*, *Bajra*, Maize and many others coarse grains were sufficient for the nutritional requirements of the rural folks. Nutrition was thus embedded in the farm culture of rural India. Those were very easily cultivable too, even in droughts.

•Of course, iron, iodine and vitamin deficiencies particularly need to be addressed immediately but the long term nutritional strategy should be to revert back those coarse grains which are repository of substantial nutrients. This coupled with milk, fish and green leafy vegetables will go a long way to fulfill the nutritional needs of rural folks.

•*Ragi*, rich in the calcium is must for the formation of bones. No other source holds even a fraction of calcium compared with *Ragi*. Iron deficiency in rural areas should be a matter concern because this deficiency adversely impacts the health of the people. About 57 percents of rural population is suffering from iron deficiency which in turn very adversely impact the productivity of children, youths and adults alike.



**•According to the National Nutrition Institute, 40 percent nutrients should come from grains and the rest should be derived from vegetables, milk, curd, spices and meat. But in rural India 72 percent nutrition come from grains. This imbalance will have to be corrected and right mix of nutrients is the need of the hour.**

**•The multiplication and cultivation of outstanding varieties of chickpea, pigeon pea, moong, urad, and other pulses under the Pulses & Oilseeds Villages Program can significantly bridge the gap of about four million tons of pulses between the demand and supply. The Central and State agencies should procure pulses and crops like jowar, maize, bajra, ragi, and hill millets in order to diversify food basket.**

# **EMPOWERING RURAL EXTENSION WORKERS FOR EFFECTIVE DISSEMINATION OF COMMUNITY NUTRITION EDUCATION**

**There is presence of strong extension functionaries in the state running under the different departments like Department of social welfare, Department of Health, Department of women & Child development etc. in addition there is also two Agricultural University and at present there are 31 KVKs in Bihar out of which 13 KVKs running under Rajendra Agricultural University, Pusa. All the extension workers of these systems just need the knowledge and awareness about community nutrition so that they can effectively perform their duty.**

## **Rural Extension Workers**

- **Subject Matter Specialists (Krishi Vigyan Kendras)**
- **Extension departments of Home Science college of Agricultural University**
- **Subject Matter Specialists (Bihar Govt.)**
- **Anganwadi workers**
- **Lady Supervisors**
- **Accredited social health activists (ASHA)**
- **Auxillary Nurse Midwife (ANM)**
- **Kisan Mitra**
- **Village level workers (VLW)**
- **Agricultural Extension Officer**
- **Block Extension Officer**
- **Block Agricultural Officer**
- **District Agricultural Officer**

## **Ways of empowering extension workers through Agricultural Institutions**

- **Pre – service training**
- **In – service training**
- **Skill Demonstration**
- **Method demonstration**
- **Result demonstration**
- **Exposure visit**
- **Orientation programme**
- **Providing literature/ teaching aids**
- **Providing audio-video extension materials**
- **Tele & Video conferencing**

# **Existing OPPORTUNITIES in the current Agricultural Extension System to address the identified Nutritional Challenges and necessary ACTIONS to be taken**

## **OPPORTUNITIES :**

- Existing strong network of government extension functionaries through out the state reaching at grass root level.
- Presence of strong extension system of Agricultural University in the state having College Of Home Science equipped having qualified staff and various KVKs each having home science subject matter specialists.

- **Presence of diverse agro-climatic situation in the state gives various agro-produce which provide immense opportunity to product diversification.**
- **Diverse agriculture produce in the state provide opportunity to processing and value addition.**
- **Technologically empowered institutions in the state gives opportunity to develop low cost nutritious food.**

## **ACTIONS**

- **Development of Nutrition package as per the need of different age group of children**
- **Development of Nutrition package as per the dietary requirements of women during pregnancy and lactation period.**
- **Development of Nutritional package to meet the challenges during natural disaster for different age group.**
- **Development of therapeutic diet for different diseases like typhoid, constipation, diarrhea, hypertension, ulcer, diabetes, cardiovascular diseases etc.**

- **Imparting nutrition education on planning and preparation of diet for weight management, obesity control, improving nutritional status of target group.**
- **Developing the low cost nutrition rich food items from locally available materials and assessing its impact on local groups.**
- **Mass awareness on Aflatoxin contamination of food**
- **Awareness on prevention of food toxicants**



- **Imparting nutrition training programme of various time duration at micro and macro level.**
- **Imparting in-service training to the functionaries involving in Health and Nutrition programme.**
- **Time to time refresher courses on nutrition must be attended to update**
- **Regular feedback assessment to modify the programme if needed.**
- **Collaborating with concerned Health and Nutrition department.**

- **Proper coordination with all the line department for strong implementation of the extension programme.**
- **Development of extension teaching material for local target group.**
- **Imparting nutrition education on balanced diet/ nutri - rich sources so as to enhance capability of maximum utilization of locally available foods – as it can potentially prevent food insecurity and hidden hunger.**
- **Imparting skill training to develop agro based/ home based entrepreneurship to raise income level of rural families which will enhance their purchasing**

## **MAJOR AREA OF NUTRITION EDUCATION FOR EXTENSION WORKERS TO INCORPORATE IN THEIR EXTENSION PROGRAMME**

- **Balanced diet**
- **Breastfeeding practices**
- **Household Food Security and Livelihoods**
- **Micronutrient deficiency**
- **Chronic energy deficiency**
- **Malnutrition**
- **Prevention of food toxicants**
- **Prevention of nutrition loss during food processing**

- **Prevention of nutrition loss during cooking**
- **Women and Child Care practices**
- **Healthcare practices**
- **Water, Environmental Sanitation and Hygiene**
- **Infant and Young Child Caring and Feeding Practices**
- **Kitchen gardening**
- **Food product diversification**

## **CURRENT NUTRITION COURSE CURRICULUM IN HOME SCIENCE EDUCATION SYSTEM**

- **At present Food Science & Nutrition courses are being taught only in Home Science College of Agricultural University at UG & PG level.**
- **There is no Diploma course in Nutrition education.**
- **The Home Science college is presently coordinating the Middle Level training center (MLTC) for ICDS.**
- **C.H.Sc. is also coordinating in strengthening of Infant and Young Child Feeding (IYCF) practices through Indira Gandhi Matritva Sahyog Yojana (IGMSY) scheme.**

## **RECOMMONDATIONS FOR CURRICULUM REVIEW IN CONTEXT OF LOWER NUTRITIONAL STATUS IN THE STATE**

- 1. Before implementation of recommendation of 4<sup>th</sup> Dean's Committee of ICAR (2008) Nutrition Science courses were included also in the Agriculture & Agricultural Engineering Faculties at UG level, it should again be implemented.**
- 2. Elective courses Community Nutrition (HFN-301) and Health Hygiene and sanitation (HFN-302) should be included in core courses of B.Sc. Home Science.**
- 3. There is need to design a specific course containing information on basic food science, community nutrition, health hygiene & sanitation and food processing techniques suitable for adolescent girl, rural women and extension workers.**

**4. There is need to start various certificate/diploma/PG Diploma courses as per the requirements of specific job to enhance performance of different extension functionaries like :**

- **Certificate Courses in Food and Nutrition**
- **Certificate Courses in Home Based Health Care**
- **Certificate Courses in Maternal and Child Health Nursing**
- **Certificate Courses in Nutrition and Childcare**
- **Diploma Programme in Value Added Products from Fruits and Vegetables**
- **Diploma Programme in Nutrition and Health Education**
- **Diploma Programme in Value-added Products from Cereals, Pulses and Oilseeds**
- **Diploma Programme in Entrepreneurship development**
- **Post-Graduate Diploma in Food Safety and Quality Management**
- **Post-Graduate Diploma in Maternal and Child Health**

**5. In-service training for various extension functionaries like**

- Subject Matter Specialist**
- Anganwadi workers**
- Lady Supervisors**
- Village Level Worker**
- Kishan Salahkar**

**6. There should be more emphasis on practical orientation and field exposure of all agriculture and allied sciences students towards present scenario of rural agriculture system & nutritional aspects of the State.**

**7. There is need to include nutrition education and Health and hygienic courses in school as compulsory courses at Middle and senior secondary level**



## **New Techniques Being Employed By Department Of Food & Nutrition Towards Food And Nutrition Security**

**Research Scientists of the college of Home Science, Rajendra Agricultural University, Pusa are conducting various research projects on processing and value addition of QPM and dietary diversification & value addition of Root & tuber crops with the objective of securing nutritional status of the local rural community.**

# Nutritious food products from QPM

PRODUCTS	TARGET GROUP
QPM extract in honey (fortified with Vit C)	New born babies
Weaning food	4 to 6 months old infants
Health mix, Nutritious laddoo, Chocolates and toffees, Biscuits etc. Noodles, chips, bread, sev, sewai etc	All age groups specially Preschool children, Pregnant/lactating women, Aged populations Convenience food for all
Therapeutic Food products from Quality Protein Maize	For patients having different problems of nutritional disorders

# **Products Developed From Quality Protein Maize By Rajendra Agricultural University, Pusa ( Bihar)**

## **1. Weaning foods –**

- Weaning food – I
- Weaning food - II
- Weaning food ( flavoured)
- Weaning food ( enriched with Vit A)
- Weaning food ( flavoured & enriched with Vit A)

## **2. Health food -**

- QPM mix – I
- QPM mix - II
- QPM laddoo
- Honey maize chocolate
- Maize coconut chocolate
- Maize coconut toffee
- Maize groundnut toffee
- Choco- maize bar
- QPM biscuit ( 3 combinations)
- Honey maize chikki
- Maize matthi
- Namakpara
- Sev
- Shakarpara
- QPM – barfi

### **3. Convenience food**

- QPM flour
- Suji
- Vada
- Sevian
- QPM groundnut chatni powder
- QPM coconut chatni powder
- QPM mango chatni powder

### **4. Specialty food**

**Therapeutic products**

# Conclusions for the state

- **Low profile of the state needs to be given more attention. Despite almost six decade of planned development, the problem of health and nutrition in general in the Bihar has not cut much ice though there are many programmes implemented to combat the problem. Therefore, sincere efforts are needed whole heartedly and implementation of programme efficiently, so that targeted groups are benefited.**
- **Nutrition training programme should become a part and parcel of the ongoing rural development programme and it necessitates re-enforcement by way of follow up an intensive home visit by lady extension workers. Income generating activities should also be strengthened in right prospective to full fill the nutrition goal.**





# Thanks

*How beautiful a day can be  
when kindness touches it.*

*George Alliston*