

# Agriculture and Extension Policies in India: Connect and Disconnect with Nutrition

## Review Article

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### Abstract

This paper describes the linkages of nutrition agriculture poverty and health and suggests some extension and policy strategies for achieving food and nutrition security. Agriculture growth has the highest power for reducing malnutrition and poverty (2 to 4 times than other sectors). Agriculture growth and development in the country largely shaped by the policies related to agriculture and extension. Various agricultural production and extension programs, social safety net, nutritional security etc. were initiated keeping in view the emerging scenarios of poverty and nutritional security. Currently, food production is dictated by consumers. Consumption pattern of different consumers segments of the society are synchronized with appropriate mix of production portfolios at farmer's field levels. We recommend that for amelioration of nutrition problem extension should follow collective approach, market based extension, women empowerment, more use of ICT and convergence approach. Policy makers should give more priority to nutrition in public research, follow public information campaign, accomplish land reform agenda and bring effective trade policies and market reforms for nutrition security of the individual, household and nation.

**Keywords:** Nutrition; Food security; Agricultural policies

## Problem of Malnutrition in World and India

The traditional concept of food security discerned two aspects viz. firstly the need for production and access to adequate food grains to feed the world's increasing population [1]. The term 'nutrition security', is much broader than food security; focused on food consumption by the household or the individual and on how that food is utilized by the body [2]. International Food Policy Research Institute (IFPRI) building on UNICEF's conceptual framework of malnutrition, defined 'nutrition security' as 'adequate nutritional status in terms of protein, energy, vitamins, and minerals for all household members at all times' [3].

Globally, 165 million children under the age of 5 years suffer from chronic malnutrition, or stunting, and Asia contributes to more than half (85 million) of these children [4]. In India, according to the third National Family Health Survey (NFHS-3), one-third of Indian children are born with low birth weight, 45 percent of children below three years of age are stunted, 23 percent are wasted, and 40 percent

are underweight. Around one-third of all women have Body Mass Index (BMI) below 18.5. About 79 percent of children, 56 percent of women and 24 percent of men are anemic (Table 1). One young child in three continues to be at risk for iodine deficiency. Under nutrition

Table 1: Under nutrition in India.

Nutrition indicators	NFHS II (1998-99) (In per cent)	NFHS III (2005-06) (In per cent)
Stunting (children < 3)	51	45
Wasting (children < 3)	20	23
Underweight (children < 3)	43	40
Anemia (<11.0 g/dl) (children 6-35 months)	74	79
Vitamin A deficiency (children < 5)	NA	57
Women with BMI < 18.5	36	33
Men with BMI < 18.5	NA	28
Women with anemia	52	56
Men with anemia	NA	24

Source: National Family Health Survey-3 (2005-2006).

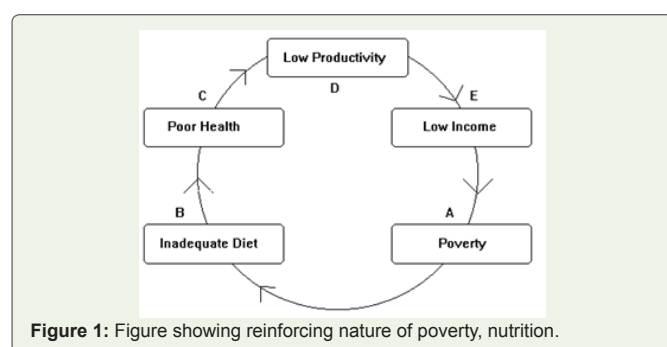
exerts a physical, cognitive, and economic toll, which is costing India as much as 3 percent of its GDP per year [5]. The economic cost of micronutrient deficiencies is estimated to be 2.4-10.0 percent of Gross Domestic Product (GDP) in many developing countries [6].

This problem of under nutrition need to be glanced from the prism of a part of larger set of processes that produces and consumes agricultural commodities on farm, transform them into food in the marketing sector and sells the food to customers to satisfy nutritional aesthetic and social need [7]. Agriculture is pivotal to fight with hunger and malnutrition. Nearly 60% of small holder's falls under below poverty line in India are actually engaged in agriculture as their livelihood. Henceforth, agricultural livelihoods need to be addressed, in order to eradicate hunger and malnutrition [8]. National Nutritional Policy echoed that nutrition is a multi-sectoral issue and needs to be tackled at various levels. Nutrition affects development and vice versa. It is therefore important to tackle the problem of nutrition both through direct nutrition intervention for targeted groups as well as through various development policy instruments.

Dev and Sharma described three main drivers of under nutrition in developing countries (i) household food insecurity (The outcome of low food availability and access to food); (ii) poor maternal and child care practices and (iii) inadequate access to drinking water, sanitation and health services [9]. Gender inequality also affects the malnutrition levels. Mere access to and availability of food is not enough to eliminate hunger and malnutrition. This fact is corroborated by the fact as South Asian Enigma (malnutrition levels in South Asia are higher than in Africa). Therefore, problem of nutrition needs a multi-disciplinary approach covering diet diversification including micronutrients, women's empowerment, education, health, safe drinking water, sanitation, and hygiene [9].

### Nexus of Nutrition Agriculture Health Poverty

Agriculture, nutrition and poverty are tightly interrelated. Poverty and under nutrition reinforces each other (Figure 1). Agricultural growth also tends to enhance poverty reduction more than other forms of economic growth. Studies of various countries have shown that the poverty reduction from growth in agriculture is on average 2 to 4 times greater than from equivalent growth in other sectors of the economy, which can be attributed to a greater level of poor labour participation in this growth [1,10]. For every 1% increase in height, adults can experience a 4% increase in agricultural wages [11]. Underweight adults can have lower productivity compared to adults of average weight [12]. Eliminating anemia has been shown to increase adult productivity by 5 to 17 percent [4,13].



The pathway to reduce poverty is through rapid agricultural development. World Bank estimates that economic growth from agriculture is at least twice as effective in reducing poverty, hunger and under nutrition, as growth in any other sector [4,14]. Headey had shown that agricultural growth has significantly impacted in reducing underweight and stunting in food-insecure settings [15]. Income poverty is another reason for lower access to food and malnutrition. Access to food can be improved with reduction in income poverty, but studies have shown that malnutrition exists even after eradication of poverty. For example, income poverty in India is 26% while child malnutrition is 46%. Studies in India and South Asia show that malnutrition levels are surprisingly high even in rich income quintiles. Thus, reduction in malnutrition is going to be a bigger challenge than income growth and reduction in poverty [9]. This calls for participative ameliorative programmes, proactive extension system and enabling policy environment for the enhancing nutrition and food accessibility and security.

Gillespie et al. identified seven key pathways between agriculture and nutrition for amelioration of nutrition problem [16]:

- Agriculture as a source of food
- Agriculture as a source of income
- The link between agricultural policy and food prices
- Income derived from agriculture and how it is actually spent
- Women's socioeconomic status and their ability to influence household decision making and intra household allocations of food, health, and care
- Women's ability to manage the care, feeding, and health of young children
- Women's own nutritional status

### How Agriculture can contribute to the Solving Problem of Nutrition?

One of farmers' most important tasks is to produce food of sufficient quantity (that is, enough calories) and quality (with the vitamins and minerals needed by the human body) to feed the world population sustainably for healthy, productive lives [17]. Agricultural growth alone cannot guarantee amelioration the problem of underweight and stunted in children, therefore effective planning is required on the part of policy makers. Evidence shows that by including nutrition objectives at the outset, agricultural interventions can improve the capacity, productivity, and future prospects of people and also contribute to reducing under nutrition [4,18]. Agriculture has potential to improve the quantity and quality of diets in households; reduce income poverty through produce sales and agricultural labour; empower women as income earners, decision makers and primary childcare providers; decrease food price volatility by diversification and increase government revenues that can be used to finance health care, education, and nutrition interventions.

Food availability is a necessary but not essential condition for food security. Increase in income and urbanization led to change in lifestyle, preferences of consumers, consumption patterns, demand for fruits,

vegetables, dairy, meat, poultry, and fishery products has increased which necessitates the crop and enterprise diversification [9]. This necessitates synchronizing transitioning of food consumption with food production at farmer's field level. Diversification of agriculture has the potential to improve access to more diverse and nutritious foods, a key component of meeting the "Minimum Acceptable Diet" for nutrition of children [4].

Our Agricultural Policy has been hitherto concerned with food production exclusively and not nutrition, which should be the focus now. Green Revolution has largely remained a cereal revolution, with bias towards rice and wheat; coarse grains and pulses, which constitute the poor man's staple and protein requirements, have not received adequate attention. The prices of pulses, which were below cereal prices before the Green Revolution, are now almost doubled. Country's Food Policy should be consistent with national nutritional needs, this call for the introduction of appropriate incentives pricing and taxation policies [7]. It is well acknowledged that small holders' (86%) vital contribution to India's food and agricultural economy. The food security of the country depends on responsiveness to public policies and to national investments in agricultural research and development and public infrastructure [19].

#### **Different Phases of Agriculture and Extension Policies and Programs in India and Connect with the Nutrition**

Agriculture and extension policies and programs in India can be broadly categorized into five different periods.

1. Pre-independence period
2. Independence to green revolution
3. Green revolution to liberalization reforms
4. Liberalization reforms to contemporary
5. Contemporary period.

#### **Pre-independence period**

Before independence, extension and agriculture development programs were not uniform but sporadic in nature. They were initiated by either by influential persons or the social organization. Examples are Gurgaon project, Shantiniketan project, Martandam project etc. Agricultural research systems established originally under colonial rule, focused primarily on export crops such as sugar, tea, coffee, cocoa and cotton. There were no significant research programs on root crops, oilseeds, pulses, sorghum, millets etc., but few small programs on rice and wheat [20]. Thus agriculture policies in this phase were guided by the colonial interest rather than need and interests of natives.

#### **Independence to green revolution**

Government took the responsibility for agriculture development along with the industries. In 1950s institutional reforms like abolition of zamindari system; enactment of tenancy laws and ceilings on Landholdings were introduced [16]. Community development remained the important goal of government with the assumption of trickledown effect. Government started the National Extension Program in the year 1953. Panchayat Raj institutes were started for

decentralization of decision making. However, initially developing country policies were geared toward rapid industrialization through import substitution and research on food crops was given low priority [21].

This period saw the imbalances between demand for food and domestic supply, making import of foods necessary. This prompted the government to start the initiatives to produce more food for feeding the growing population under PL 480. During 1962 Intensive District programmes was started followed by high yielding varieties programmes. The Indian Council of Agricultural Research (ICAR) began its participation in agricultural extension through National Demonstrations in 1964. The Food Corporation of India (FCI) and Commission on Agricultural costs and Prices (CACP) were established in 1964-1965 to oversee the country wide procurement, distribution and stocking of food grains and recommend minimum support prices of agricultural crops to the Government, respectively. These food policy operations are aimed at stabilizing prices, protecting the interests of the producers, consumers and the economy, as a whole, and reducing interregional disparities in production and consumption of food grains [9]. All these efforts led to increase in productivity of rice and wheat significantly, what we called it as Green Revolution.

#### **Green revolution to liberalization of economy**

Mid-1960s observed shift in policy emphasis from institutional to technological factors, with introduction of high yielding rice and wheat varieties, near self-sufficiency achieved for food. Implicit assumption in green revolution technologies was that increasing yield was sufficient condition for the improving nutritional status [22]. The ramping up of cereal production in the Green Revolution, for example, saved countless lives in Asia and agricultural growth there has served as a lever for pace of economic growth, improving the lives of millions [23].

However, green revolution remained restricted to the well endowed, irrigated areas of the country and rice and wheat crops only. Of late 1980s, deceleration in production and of factor productivity growth in some of the major irrigated production systems of the north and north-west regions had been recorded. Even in this arena, a growing disparity between the actual and the potential yields pointed to a crucial gap between research and extension [24]. Agricultural intensification has led to nutrients mining; increased the risk of agriculture-associated diseases; led to the development of new diseases and exacerbated environmental degradation that can have negative consequences for human health [17].

Government launched Krishi Vigyan Kendras (KVKs) or Farm Science Center's, Lab to Land programs, and Operational Research Programs by the 1970s. To meet the gap between research and extension, the most significant development was the introduction of the Training and Visit (T&V) extension management system (1974) which was well suited to the rapid dissemination of broad-based crop management practices for the high yielding wheat and rice varieties that were released since the mid-1960s. Though T&V system played an important role in ushering in the green revolution, low level of involvement of farmers was the limitation of it [24].

Till the end of the 4<sup>th</sup> plan, India's main emphasis was on the aggregate growth of the economy and reliance was placed on the percolation effects of growth. In the face of continuing poverty and malnutrition, an alternative strategy of development comprising a frontal attack on poverty, unemployment and malnutrition became a national priority. From the beginning of the 5<sup>th</sup> plan, this shift in strategy has given rise to a number of interventions (Integrated Rural Development Programme (IRDP) and employment generation schemes like Jawahar Rozgar Yojana, Nehru Rozgar Yojana and DWCRA) to increase the purchasing power of the poor, to improve the provision of basic services to the poor and to devise a security system through which the most vulnerable sections of the poor (viz. women and children) can be protected [7]. The era of 1980s saw regional spread of agricultural growth and crop diversification. There was shift from cereal to other food crops. Accordingly, Government started technological mission on oilseed in 1986 and strengthening of Operation Flood (which was initiated in 1970) to bring about white revolution.

### Post liberalization to contemporary

This period (1991 to 2014) observed yield plateau or technology fatigue in agriculture sector. Government started shift in policy emphasis to liberalizing trade in agriculture. World Trade Organization (WTO) brought substantial change in agriculture trade. March 2001 saw end of all quantitative restrictions [16]. The National Agriculture Policy announced in June 2000 highlighted the need for restructuring agricultural extension. However it did not mention nutrition at all [25]. Plan documents of 11<sup>th</sup> five year plan did discuss inclusive growth, diversification, and the role of women in agriculture, which are some of the pathways for improving nutrition. The 12<sup>th</sup> Five Year Plan Approach Paper indicated that output of fruits, vegetables, and protein rich food items needs to grow at a faster pace than production of cereals, to meet the rising demand in these items. This may be the first official recognition of the need to increase the supply of protein rich foods.

Dev and Sharma highlighted breakthrough in yield of crops in emerging scenario containing elements viz. (i) globalization challenges, volatility in prices; (ii) shrinking farm size; (iii) dry land farming challenges and (iv) environmental stress [9]. Rashtriya Krishi Vikas Yojana, National Horticulture Mission, ISOPOM-Integrated scheme of oilseed pulses oil palm and maize and National Food Security Mission were started with eyeing improvement in Indian citizens' nutrition security, especially in districts with a substantial overlap between poverty and under nutrition. Rashtriya Krishi Vikas Yojana (RKVY), a bottom-up and demand driven platform, encourages effective integration of livestock, poultry and fish farming with the crop sector. National Horticulture Mission (NHM) paid dividends by increasing production and area under horticultural commodities. Along with RKVY, National Rural Livelihoods Mission and state-level nutrition missions are worth serious exploration in nutrition arena [5].

Other programs, like the Mahatma Gandhi National Rural Employment Guarantee Act (NREGA), also have an impact on nutrition of women and children. Uppal found that, in general, a self targeting strategy seems to be working: disadvantaged workers

do participate in the NREGA program [26]. Moreover, there seems to be a positive correlation between program participation and anthropometric indicators of health outcomes. NCEUS identifies several positive externalities created by NREGS, including-reduction in distress out-migration, improved food security with wages being channeled into incurring expenses on food, health, education and repaying of loans, employment with dignity, greater economic empowerment of women workers and sustainable asset creation [27].

In extension also, new initiatives like National Agricultural Technology Project (NATP), Agricultural Technology Management Agency (ATMA) and National Agricultural Innovation (NAI) program were started. Unlike earlier programs, these were characterized by bottom up approach, demand driven, location specific, women participation, private sector participation and diversified agriculture. Diversification and women empowerment are linked to nutrition implicitly. New service providers and innovative institutional arrangements in agricultural extension have emerged like private extension agencies, input agencies, agri-business firms, farmers' organizations, producer cooperatives, financial agencies which also rendered rural credit delivery and consultancy services [19].

### Contemporary

Contemporary phase may be called as post planning commission phase, where many new initiatives are started by GOI. Government has initiated the steps for doubling the income of the farmers, diversification of agriculture by starting fund for livestock, balanced use of fertilizers through soil health cards, e NAM-e market platform, Pradhan Mantri Shichaiyi Yojana, Paramparagat Krishi Vikas Yojana, Fasal Bima Yojana, Digital India, health insurance for poor, different schemes for the women and child. These all are expected to contribute to the nutrition security through better health, more income, income transfer and availability and access nutritious foods to the consumers.

### Extension Strategies for the Nutrition

We require improved knowledge on the agriculture nutrition health nexus and go beyond a pursuit of agricultural growth to focus on distribution and diversification. Important steps to build up this knowledge base include investments in research, evaluation and education systems capable of integrating information from all three sectors [17]. As the National Commission on Farmers mentioned, there is a yield gap and knowledge gap of the prevailing technology which can be bridged up using string of extension system for improving agricultural productivity. This demands that scope of extension become wider, covering all aspects of farming, from seeds to market. Farmers need information not only on best practices and technologies for crop production, but also information about post harvest tasks including processing, marketing, storage and handling [19].

Different Extension approaches that may solve nutrition problem are:

#### a) Collective approach

To protect small and marginal farmers in India (about 86%) from national and international price volatility, different models for



collective marketing viz. Self help group model, cooperative model, contract farming can be used [9]. Through such group actions, farmers can increase their bargaining power, economics of scale and income from the agriculture. They can market their produce collectively, reducing their transaction cost, reducing the price of commodity to consumers, transferring benefits to the consumers also. Thus affordability component of nutrition security can be fulfilled by collectives of farmers.

#### **b) Market extension (Market led extension)**

In post WTO regime, marketing extension so far a peripheral issue in the extension scenario need to be brought to centre stage since production is significantly dictated by market requirements and farmers most of the time fail to get good price for their produce. The focus needs to change from production to beyond production. The multi-agency extension service can address hunger and malnutrition through strengthening capacity of the public agency, supporting private sector in marketing extension through extensive use of media, internet and IT in information and technology dissemination to the farmers.

#### **c) Farmer led extension**

The vast majority of smallholders, especially women, lack an effective voice in influencing research and extension priorities. Farmer led extension can be started by organizing farmers into functional groups, such as Self Help Groups (SHGs), Farmer Interest Groups (FIGs), Commodity Associations (CAs) and/or other types of Farmer Organizations (FOs). These FOs can provide an effective channel for both dissemination of technology to smallholder and feedback to research and extension [24]. Maharashtra State Grape Growers association (MRDBS) is excellent example of such approach. Considering the fact that, only 40% of farmers had access to any source of information on modern technology and highest proportion obtained information from other progressive farmers (16.7%), farmers to farmers extension disseminates maximum (80%) knowledge with negligible time lag for transfer of technology and innovations. This potential of social capital building can be utilized for reducing under nutrition and poverty.

#### **d) Women empowerment and education**

More than 80% of rural women engaged in the labor force work in the agriculture sector which provides a significant opportunity to unleash the gender dimensions of agriculture nutrition linkages [5]. Strengthening women's position both within the agricultural sector and within the household can significantly improve households' nutrition and health [17]. There is evidence that women's employment does have beneficial effect on household nutrition, female education also has a strong inverse relationship with IMR, educated women have greater roles in household decision making, particularly those relating to nutrition and feeding practices [7].

#### **e) Use of ICT**

Awareness creation about the problem of nutrition and need for diversified diet is essential for the change in dietary habit of the consumers and production pattern of the farmers. In this scenario, ICT can play important role right from the production to marketing

for the farmers and for the price, information and awareness among the consumers.

#### **f) Focus on diversified agriculture**

Rather than focusing on single crop, extension services can look for livestock, poultry, fishery, fruits and vegetables etc. The range of micronutrient rich foods consumed has to be improved. Interventions like improvement in the production, availability and access to micronutrient rich and locally produced foods can be introduced. Educating people on dietary diversification is also important.

#### **g) Farming systems approach**

The Farming System (FS) approach considers the farm, the farm household and off farm activities in a holistic way to take care not only of farming but also aspects of nutrition, food security, sustainability, risk minimization, income and employment generation which make up the multiple objectives of farm households. In order to integrate nutrition and agriculture or livelihood security Dr. Swaminathan and colleagues designed the Farming System for Nutrition (FSN) model which will target problem of malnutrition through mainstreaming nutritional criteria in the selection of the components of a farming system involving crops, farm animals and wherever feasible, fish' [28,29].

#### **Focus of Government Policies**

It is time for reorientation of Indian agriculture policy from productivity to diversity, from food security to nutrition security. Learning from the earlier mistakes of focusing on couple of cereals (staples), vegetables, fruits, pulses, oilseed and animal based protein etc. need to be promoted at policy level also. Farm policies that encourage research on improving productivity and quality of the nutrient rich commodities would incentivized the production system that would reduce not only price but make high value commodities economically accessible to disadvantaged groups of the society.

Public information campaign by government through mass media will likely to create awareness about the nutrition problem, which is the first step in changing the behavior and adoption of new practices by the both farmers and consumers can be started. Safety net and social protection programs helps in income transfer to poor and marginal section of the society which leads to increasing purchasing power of them ultimately improving food and nutrition standards [30]. Implementing land reform (both tenural reforms and ceiling laws measures) so that the vulnerability of the landless and the landed poor could be reduced [7]. The supply chain along which value is added to a product offers opportunities for improving nutrition and value chain approaches can be used to design and implement solutions to increase the availability, affordability and quality of nutritious foods [31,32]. Effective trade policies have a substantial impact on the food environment and on diet quality. Market and infrastructure policies influence the movement, storage and marketing of foods, and have an important role to play in more perishable (but often nutrient rich) foods, such as certain fruits and vegetables or fresh animal products [33]. There is need to reorient the agriculture policies from higher production to enhanced nutrition and health.

## Conclusion

Poverty and malnutrition are the outcome of complex interaction and interplay of factors and actors in food environment like food production, distribution and consumption. Public policies and efforts of all economic actors/agents should focus towards safe, clean and green nutritious food for nutritional security of the country. For micromanagement of food security and for enhancing nutritional security, there must be location specific diverse and strategic agricultural production and extension that can improve nutrition which would result in a more productive work force.

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