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Agriculture, Collective Action and Nutrition: Meeting the Challenges in Bihar

Manish Kumar[1] & Savera Sharma[2]

Abstract

Malnutrition presents a worldwide dilemma, carrying substantial social and economic burdens; virtually every nation contends with a public health issue stemming from inadequate nutrition, excessive weight, or deficiencies in essential nutrients. Malnutrition emerges as a multifaceted challenge, influenced by intricate interactions among household and personal choices, agricultural, and food systems. This paper examines the relationship between the theory of collective action and nutrition, and how collective action impacts farmer households' nutrition. It discusses the role of Farmer Producer Organisations (collective action) in addressing malnutrition and enhancing agricultural productivity through community-based interventions. The paper concludes by outlining recommendations derived from this study, focusing on knowledge dissemination, political and policy considerations, and capacity building. Additionally, it emphasises the necessity of reviewing existing literature to comprehend the nutritional effects of collective action, and it conducts a systematic review to investigate dietary implications associated with this collective action.

Keywords: Malnutrition, Agriculture, Collective Action, FPO, Bihar

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Introduction

Malnutrition is the leading cause of the world's illness burden, posing significant social and economic challenges (Bhatia et al., 2016). Malnutrition affects one in three individuals worldwide and poses a severe threat to public health in almost every nation. A "triple burden" of energy and micronutrient deficits, together with increased rates of overweight and obesity, is being experienced by many nations (De Benoist., 2008). According to statistics from the Food and Agriculture Organisation of the United Nations (FAO), 22% of Indians are undernourished. Furthermore, the malnutrition issue in India is a worldwide one. According to UNICEF estimates from 2008, 42% of underweight (low weight for age) and 32% of stunted (low height for age) children in poor countries were born in India. The fact that food insecurity, malnutrition, and poverty are present in all of India's states attests to the reality that these problems are more common in the country's comparatively poorer states, where the majority of the population depends on agriculture for work, at the very least (Pandey, 2021). The profitability of this industry determines how well agriculture is doing concerning nutrition. Still, in a state like Bihar, where over 90% of farmers are small-scale and marginal, it is challenging to find a pathway that works and where the risks associated with climate change are increasing profitability. Food security, nutritional status, and health have all been positively correlated with improved agricultural productivity and the market chain via Farmer Producer Organisations (collective action) [3] (Fischer et al., 2012). Some questions are raised by the text above. Is it possible to reduce the rate of malnutrition by improving agricultural performance? Is the presence of Farmer Producer Organisations beneficial to enhance agricultural output and lessen rural residents' malnutrition?

Against this background, this paper is divided into five parts. The first section presents a brief overview of what causes of malnutrition. The second part presents linkages between agriculture and nutrition. The third part presents a review of

[1] Research Assistant, IIM Shillong; E-mail: mk0428000@gmail.com, Mob: 8582060300
[2] Research Scholar, A N Sinha Institute of Social Studies, Patna-800001, E-mail: saverasharmanav101@gmail.com,

[3] FPO stands for Farmers Producers Organisation. It is a farmer's collective action group or producer group that provides end-to-end services to farmers (especially small and marginal farmers) covering practically all elements of agriculture from inputs to technical services to processing and selling. In India, agencies such as the Small Farmers' Agribusiness Consortium (SFAC) and NABARD help to establish and promote FPOs.

agriculture in Bihar. The fourth part gives the details of agricultural commercialisation reducing the malnutritional presence among rural people of Bihar. Finally, the fifth part presents meeting the challenges in Bihar.

Methodology

This article follows a review of literature that focuses on the relationship between Agriculture, collective action, and nutrition. A systematic review assists in synthesising data from all available sources and integrating it to effectively reach research papers to link within Agriculture, collective action, and nutrition. The findings of this study could thus be used to develop new strategies for improving the nutrition status of rural people in Bihar. the current systematic review included studies on Agricultural commercialisation and the links between collective action, and nutrition. This study used the Google Scholar search engine to identify relevant literature. The search string used in Google Scholar was "TITLE-ABS-KEY (Collective Action) OR TITLE-ABS-KEY (Agricultural Commercialisation) AND TITLE-ABS-KEY (Causes of Malnutrition) AND TITLE-ABS-KEY (Collective Action and Nutrition) AND TITLE-ABS-KEY (Collective Action in Bihar)".

Data Management

Mendeley and Zotero, a bibliographic reference management tool, was used to import all
pinpointed references and duplicates were removed.

Selection of Studies

Initially, we conducted an independent screening of articles based on their titles and abstracts, followed by subsequent screening and data extraction. Articles about "Agriculture, Collective Action, and Nutrition: Meeting the Challenges in Bihar" were included for full-text review. After the primary screening, the chosen articles underwent full-text examination to assess their eligibility.

Study Characteristics

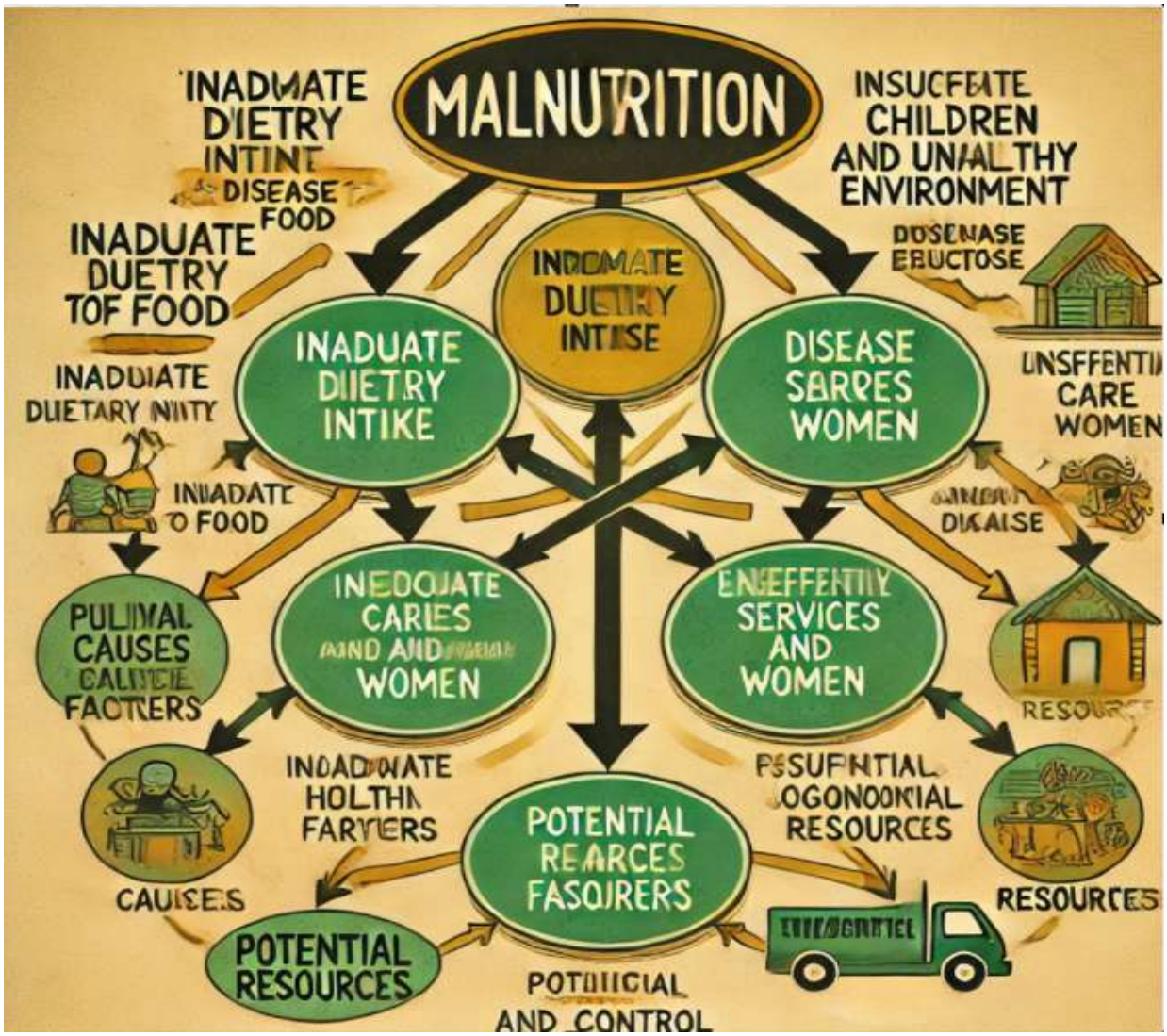
The systematic review's final selection comprises 30 research articles/papers, primarily descriptive and quantitative in nature. These articles explore the connections between collective action and agriculture, as well as household nutrition, both in India and internationally.

Section-1

Malnutrition and its Causes

Malnutrition occurs when there are imbalances or deficiencies in nutrient intake, which can lead to either insufficient or excessive nutrition. It can be categorised into two main types: undernutrition and overnutrition (Sandesh, 2017). Undernutrition encompasses various forms such as stunting (chronic malnutrition), wasting (acute malnutrition), underweight (acute and/or chronic malnutrition), and deficiencies in essential micronutrients. Overnutrition, on the other hand, involves being overweight or obese (WHO, 2021). Wasting refers to having a low weight with height, with severe and moderate classifications. It often results from inadequate food intake, prolonged illnesses, or both, particularly in children, increasing the risk of mortality (Brazier, 2020). Stunting, characterised by low height for age, is primarily caused by chronic undernutrition and is associated with factors like poverty, maternal health issues, frequent illnesses, and feeding difficulties (NHS, 2020). Underweight denotes having a low weight for age and can encompass stunting, wasting, or both. Micronutrient deficiencies occur when the body lacks essential vitamins and minerals for various bodily functions, such as enzyme and hormone production, crucial for growth and development (Young,2020). Energy overnutrition is prevalent in developed countries and may coexist with micronutrient deficiencies if diets are high in calories but lacking in essential micronutrients.

Figure 1. UNICEF's Conceptual Framework For The Causes of Malnutrition



Source: Sablah, 2019

Figure 1 illustrates the multifaceted causes of malnutrition, organising them into categories: immediate, underlying, and basic causes. At the top, malnutrition is depicted as the main outcome resulting from complex interactions. The immediate causes of malnutrition are twofold: inadequate dietary intake and disease(Mandal, 2021). Inadequate dietary intake refers to insufficient consumption of nutritious food, while disease impacts nutrient absorption, increases nutrient needs, and often reduces appetite, all contributing to malnutrition. These immediate causes stem from underlying factors. The first is inadequate access to food, which highlights the role of food availability and affordability in dietary intake. The second is inadequate care for children and women, emphasising the importance of maternal health and childcare practices, which directly influence nutrition, especially in vulnerable groups(Younis, 2015). Additionally, insufficient health services and an unhealthy environment contribute to disease prevalence and worsening malnutrition. A lack of education underpins these underlying causes, as it limits knowledge about proper nutrition, health practices, and caregiving. At the root of these issues are basic causes, which shape the availability of resources and opportunities. These include the distribution and control of human, economic, and organisational resources, which are essential to support health and nutrition. Political and ideological factors, including policies, social norms, and cultural beliefs, play a crucial role in determining access to and control over these resources. The economic structure further influences income levels, employment opportunities, and access to affordable nutritious food. Beneath it all, potential resources represent foundational aspects like natural and economic resources, which can be mobilised or restricted depending on the broader social and economic context. This diagram thus emphasises how malnutrition is a manifestation of deeply interconnected factors, suggesting that addressing malnutrition requires interventions targeting each layer of causation, from basic causes up to immediate factors.

Table 1 categorises types of malnutrition based on specific nutrient deficiencies or excesses and links each type to corresponding diseases or abnormal conditions. Protein-energy malnutrition results from a deficiency of protein, leading to conditions like Kwashiorkor (characterised by swelling and an enlarged liver) and Marasmus (severe wasting and stunted growth). Deficiencies in specific vitamins and minerals cause additional health issues. For instance, a lack of iodine leads to goiter, while a deficiency in vitamin A causes Bitot's spots and night blindness. Iron deficiency results in anaemia, and inadequate thiamine (vitamin B1) leads to beriberi, a condition affecting the cardiovascular and nervous systems.

Other essential vitamins and minerals also have distinct deficiency-related diseases. Lack of niacin (vitamin B3) results in pellagra, folic acid (vitamin B9) deficiencies can cause various birth defects, and insufficient vitamin C leads to scurvy. A deficiency in vitamin D can cause rickets and contribute to osteoporosis, while inadequate vitamin E may lead to hemolytic anaemia in infants. Similarly, insufficient vitamin K causes abnormal blood clotting, low calcium can result in osteoporosis and osteomalacia, and zinc deficiency can lead to growth retardation. Selenium deficiency is linked to Keshan's disease, a heart condition. Overnutrition, or the excessive intake of energy and nutrients, is also a form of malnutrition and is associated with conditions like cardiovascular disease, cancer, and Type II diabetes. This table emphasises the diverse impacts of both nutrient deficiencies and excesses on health, highlighting the importance of balanced nutrition.

Table 1. Common Types of Malnutrition, Diseases, and Their Specific Causes

Types of malnutrition	Caused by a deficiency of	Diseases and abnormal conditions caused by malnutrition
Protein-energy malnutrition	Protein	Kwashiorkor
	Protein	Marasmus
	Iodine	Goiter
	Vitamin A	Bitot's spots, Night blindness
	Iron deficiency	Anemia
	Thiamine (Vitamin B1)	Beriberi
	Niacin (Vitamin B3)	Pellagra
	Folic Acid (Vitamin B9)	Several birth defects
	Vitamin C (Ascorbic Acid)	Scurvy
	Vitamin D	Rickets, Muscle diseases, osteoporosis
	Vitamin E	Hemolytic anemia in premature infants and children
	Vitamin K	Abnormal blood clotting,
	Calcium	Osteoporosis, Osteomalacia
	Zinc	Growth retardation
	Selenium	Keshan's Disease
Overnutrition	Caused by consumption of over energy and micronutrients	Cardiovascular disease. Cancer. Type II diabetes

Source: Ersado, 2022

Section-2

Linkages Between Agriculture and Nutrition

Agriculture plays a critical role in producing the food people consume and serves as the main source of income for many of the world's impoverished individuals, who are particularly susceptible to health issues and malnutrition (Herforth & Harris, 2014). By focusing on agricultural development, significant strides can be made in reducing malnutrition and related health problems. Given its direct connection to factors influencing undernutrition, such as dietary practices, access to healthcare, and income, as well as broader determinants like education and gender equity, the agricultural sector has the potential to greatly improve nutritional outcomes (Gulati et al., 2012). Income generated from agriculture can be used to purchase goods and services that enhance nutrition, benefiting the poor and the undernourished. However, due to market complexities, farmers may prioritise growing crops for personal consumption, leading to intricate policy considerations. It's important to recognise the macroeconomic impact of agricultural conditions and food prices on consumption choices and to address the connections between child undernutrition and maternal socio-economic and nutritional status (Fan et al., 2017). Additionally, agricultural conditions can influence women's decision-making power, access to nutrition-related resources, and their ability to care for young children, which profoundly impacts nutrition outcomes.

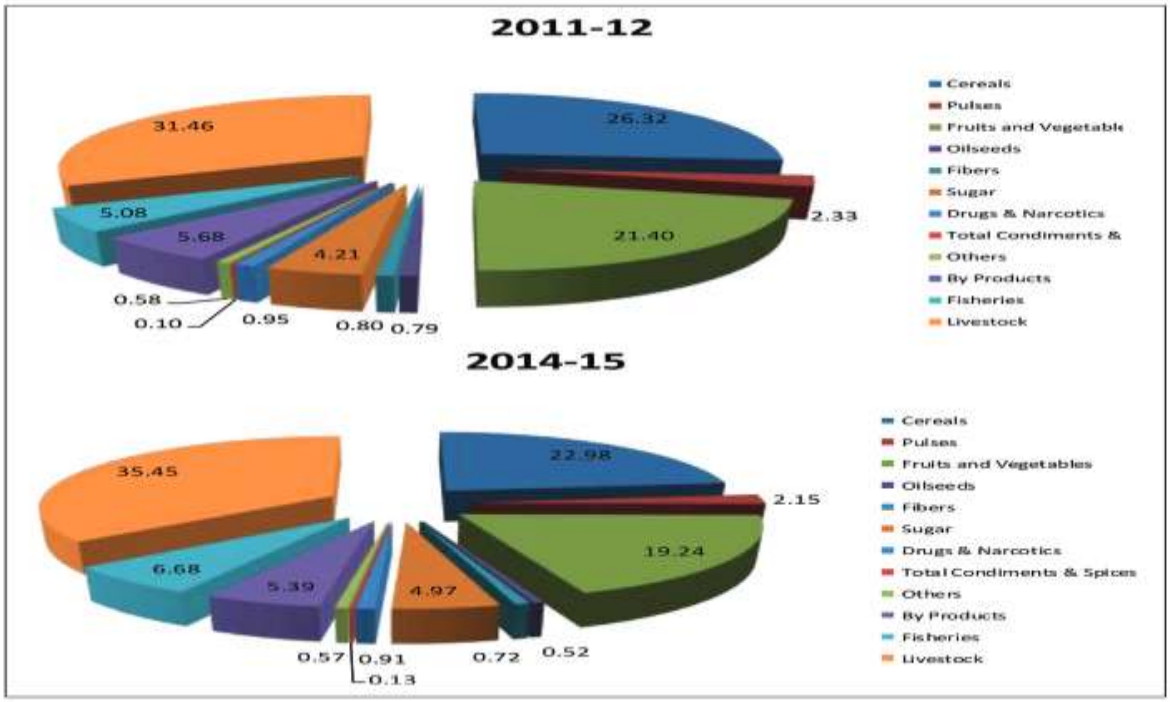
Section-3

A Review of Agriculture in Bihar

Bihar, situated in eastern India, is primarily known for its agricultural activities. Despite a decrease in the agricultural sector's contribution to the state's total gross state domestic product (GSDP) from 42 per cent to around 20 per cent between 2004–2005 and 2014–2015, agriculture remains the largest employer in Bihar (Hoda et al., 2017). Recognizing its significance, the government has prioritized agricultural development, introducing a comprehensive agricultural policy in 2006. However, until 2008, agricultural growth was sluggish. Subsequently, the government launched the First Agriculture Road Map aimed at a comprehensive agricultural revolution encompassing various sectors like agriculture, horticulture, forestry, sugarcane, fishery, poultry, and animal husbandry (ESB, 2008). Within five years, there were notable achievements, with income from agriculture and animal husbandry increasing substantially “increased from `19,747. 50 Crore in 2004–2005 to `31,567 Crore in 2014–2015 (based on 2004–2005 prices)”. Despite this progress, agricultural production was volatile, although total food grain production witnessed an increase. The state saw improvements in crop intensity, land productivity, and labour

productivity, thanks to policy support (ESB, 2016). The transformation in Bihar's agricultural landscape, particularly under the Second Agriculture Road Map. It highlights a surge in credit allocation to agriculture and the adoption of mechanisation, leading to a substantial increase in agricultural credit coverage by 2015–2016, up from 71% in 2011–2012 to 97%. These changes are reflected in Figure 3, indicating a shift in the state's agrarian economy (ESB, 2017). Initially, agriculture dominated the gross value output (GVO), but by 2014–2015, the prominence of livestock and fishery sectors had grown. Notably, within agriculture, the production shares of sugar, pulses, and oilseeds underwent significant alterations during 2011–2015. Additionally, a comparison between the periods of 2008–2012 and 2012–2015 reveals a decline in rainfall and government spending on irrigation and flood control, affecting agricultural dynamics. Moreover, the pattern of mechanisation support favoured larger farmers over smaller ones, influencing Bihar's agricultural performance (Hoda, 2017). These factors collectively underscore the evolving nature of Bihar's agriculture and its implications. As a result, Bihar witnessed a decrease in the output of grains, fruits (such as litchi and guava), and nearly all types of vegetables in the latter period. Additionally, wheat and pulses productivity declined across Bihar during this timeframe (2012-2015). Disparities in agricultural achievements are evident among Bihar's districts. Notably, Rohtas and Kaimur stood out as high-performing districts in per capita rice and wheat production.

Figure 2. Segment-Wise Shares in the GVOA of Bihar, State in 2011–2012 and 2014– 2015 (at 2011–2012 prices)



Source: Pandey, 2021

Section-4

Agricultural Commercialisation via Farmer Producer Organisations (Collective Acrion) Reducing Malnutritional Presence Among Rural People of Bihar

The study conducted by IFPRI delves into the intricate connections between agricultural commercialisation and the nutritional and health status within households (Von Braun 1989). Specifically, it analyses the impact of agricultural commercialisation facilitated by Farmer Producer Organisations (collective action) on the four pivotal stages identified by Pinstrup-Andersen in the early 1980s: "national/community food availability," "ability and desire of households to obtain food," "intrahousehold food distribution," and "health and sanitary factors." The decision to transition to a market-oriented production system is anticipated to affect food availability at various levels - nationally, within communities, and at the household level (Braun & Kennedy, 1994). Factors such as competition for limited resources (e.g., land, labour, capital), the influx of food imports and aid, the diversity of available foods, and seasonal fluctuations are influenced by the increasing market orientation among smallholder farmers. Consequently, these changes may impact national or regional food availability, thereby influencing food prices and subsequently affecting nutritional outcomes. However, relying solely on national food sufficiency as an indicator of household nutritional well-being is inadequate, as abundance at the national level doesn't guarantee accessibility for all households (Billah, 2002). Therefore, it's imperative to examine each household's ability to acquire food effectively. This ability hinges on various factors influenced by agricultural commercialisation, with household income being a particularly significant determinant. Understanding these dynamics is crucial for assessing the true impact of collective action on household nutrition and health (Rabeneck, 1982). An increase in real income at the household level has the potential to initiate a positive cycle wherein smallholder farmers can elevate their food consumption standards. However, merely augmenting real income is insufficient to ensure enhanced household consumption. Alongside economic growth, there must exist a genuine desire within households to access available and nutritious food, a desire that often remains unfulfilled due to various intra-household dynamics (Wood et al., 2013). Factors such as differing income elasticities among household members can influence consumption patterns. Moreover, even if additional income is allocated towards food, its distribution within the household may be uneven, with children and women typically receiving less compared to adult males. Additionally, an inclination to spend more on food doesn't necessarily translate to a proportional increase in calorie consumption (De Janvry, 2009). Households might opt for a more diverse and potentially costlier diet rather than solely focusing on boosting energy intake. Furthermore, the impact of income changes on health and sanitation is crucial. Increased income, especially from avenues like Farmer Producer Organisations (collective action), could be directed towards enhancing water sources and sanitation facilities at both

household and community levels (Ibrahim, 2013). This underscores the multidimensional nature of improving food security and well-being beyond mere income growth. Farmer producer organisations (collective action) have the potential to enhance rural farmers' access to production resources, thereby augmenting household income and consequently improving nutritional status. Study indicates that when managed by farmers themselves, collective action can yield significant positive effects, as evidenced in studies conducted in the state. Initiatives like JEEVIKA and NABARD are actively supporting Farmer Producer Organisations (collective action) in Bihar, empowering rural farmers. Nevertheless, despite these efforts, there is a dearth of studies examining the nutritional outcomes of collective action in Bihar. Hence, conducting micro-level studies becomes imperative to assess the influence of collective action on household nutrition.

Section-5

5. Meeting the Challenge

In this final section, we structure and summarise these main recommendations. Written in bullet form, these are largely recommendations for policymakers and investors toward creating and sustaining enabling policy and institutional environments for collective action.

5.1 Knowledge, Evidence, and Communication.

Importance of knowledge, evidence, and effective communication in addressing the disconnect between agriculture and nutrition. It emphasises the need to generate and utilise knowledge about effective solutions and approaches to catalyse and sustain change at scale. Key recommendations include identifying and integrating nutrition-relevant indicators into data collection efforts, applying a nutrition lens to food systems and value chains, evaluating programs and showcasing successful interventions, raising awareness about sustainable and healthy diets, supporting rigorous monitoring and research, and strengthening feedback mechanisms for continuous learning and improvement.

5.2 Politics, Governance, and Policy.

Policy recommendations for addressing nutrition through agricultural and collective action. It highlights the importance of setting clear objectives based on comprehensive assessments, promoting collaboration across sectors, ensuring accountability, and incentivising practices that benefit nutrition. The text also outlines specific policy recommendations for agricultural production and market systems via Farmer Producer Organisations, such as aligning research investments with nutritional goals and promoting diverse production systems. Additionally, it suggests improving access to nutritious foods and enhancing infrastructure for processing and storage in market and trade systems. Overall, the text emphasises the need for a multifaceted approach to effectively address nutrition within the broader context of agriculture and food systems.

5.3 Capacity, Leadership, Financing.

The significance of capacity building, leadership development, and financial resources to enhance the nutrition sensitivity of agriculture. It outlines several recommended actions, including the need to enhance interdisciplinary integration within administrative structures of FPOs, particularly through training and tools facilitating communication across sectors. Additionally, there's a call for the development of operational and strategic capacities at mid-level administrative levels with a focus on agriculture's connection to nutrition. Cultivating leadership, including the support of nutrition champions and policy entrepreneurs at various levels, is highlighted as crucial, alongside promoting cross-sectoral leadership to bridge divides between agriculture and health sectors. Finally, there's an emphasis on the necessity to clarify financing mechanisms, advocating for budgetary reallocations or increased funding to support nutrition-sensitive agri-food systems, as part of a broader national effort to address nutritional challenges.

Conclusions

Malnutrition requires a multifaceted approach that acknowledges the intricate interplay between agriculture and nutrition. Malnutrition, affecting one in three individuals globally and significantly burdening nations like India, stems from various factors including inadequate dietary intake, diseases, and socioeconomic disparities. Agriculture, as the primary source of food and income for many, holds immense potential to alleviate malnutrition by improving food security and dietary diversity. However, realizing this potential necessitates targeted interventions that address underlying challenges such as food insecurity, limited access to healthcare, and inequitable resource distribution. In regions like Bihar, where agriculture

remains a cornerstone of the economy but faces productivity fluctuations and disparities among districts, government initiatives aimed at enhancing agricultural productivity and income are essential. Furthermore, leveraging Farmer Producer Organisations (FPOs) to facilitate agricultural commercialisation presents an opportunity to improve household nutrition and health outcomes. Yet, the success of such initiatives depends on addressing market dynamics, ensuring equitable income distribution, and promoting access to nutritious food and sanitation facilities. Policymakers and investors play a crucial role in creating enabling environments for FPOs through knowledge dissemination, effective policy frameworks, capacity building, and financial support. A holistic approach that emphasizes multisectoral collaboration and evidence-based interventions is paramount to effectively addressing malnutrition within the broader context of agricultural development. By integrating agricultural strategies with nutrition-sensitive policies, communities can achieve sustainable improvements in nutrition outcomes, thereby mitigating the global burden of malnutrition.

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