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A Study on the Role and Challenges of Food Supply Chain Management Towards Achieving Zero Hunger in Uttar Pradesh

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Abstract:- **Aim:** The study's aim is to explore the role of and challenges faced by the food supply chain management of Uttar Pradesh towards achievement of Zero Hunger in the state.

Methods: The secondary qualitative analysis was employed in this research to identify both the optimistic aspects and barriers of the food system and supply chain management.

Results: The review through thematic analysis implicate food supply chain management to be highly important, hence given the obstructions in food supply chain and food security indicate challenges faced by the state on agricultural, infrastructural, and demographic reach level.

Conclusion / Recommendation: Alongside this, the study also included several tangible recommendations, that can help the researchers to meet the study goals to achieving the Zero Hunger in Uttar Pradesh.

Keywords*: SDG, sustainability, Uttar Pradesh, hunger, food security, food, supply chain, agriculture.*

1. Introduction

Sustainability development goals as had been adopted under United Nations agenda for 2030 and identified to be focused on outlining the sustainability achievements that need to be made for a better future for upcoming generations. Among these SDGs, the target of minimising hunger and inequality has been a major prospect for achieving environmental sustainability under the Goal 2 that focuses on "end hunger, achieve food security and improve nutrition as aims at promotion of sustainable agriculture" (Arora & Mishra, 2022). It is noted that food security and sustainability of agriculture are a particular focus on the prospect of achieving end of hunger and zero hunger system as had been observed in developing nations of Asian countries such as in India. The target of achieving eradication of malnutrition and increasing distribution of food supply has been particularly in association to achievement of maintaining and improvement in adequate food and food security provisions that contribute towards improvement of the issues of hunger.

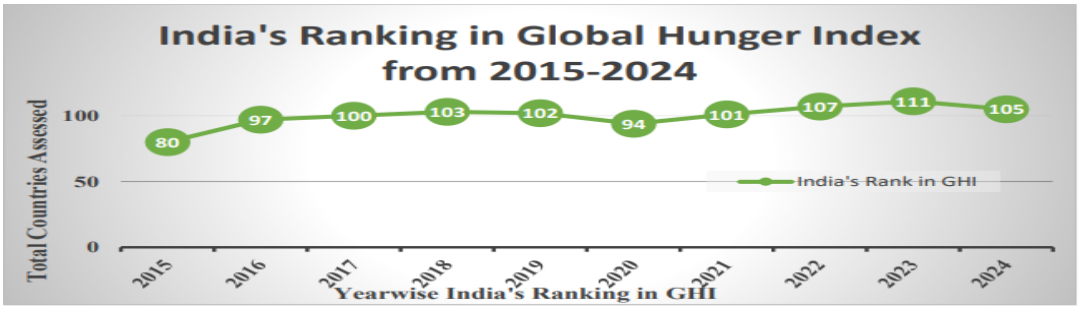


Figure 1: India's Rank in Global Hunger Index

(Source: Yadav & Srivastava, 2024)

As of recently it has been observed in the case of India the Global Hunger Index trends indicate to show a constant struggle of maintaining a positive development into tackling hunger and malnourishment in population system throughout the last 10 years for India the constant poor trend of GHI score for India have been prominent since the years 2015 to 2024 (Yadav & Srivastava, 2024). The trend of GHI score ranking in 2025 had India rank 80 out of 104 countries which had deteriorated to 94 ranks out of 107 countries and now at 105 rank out of 127 countries. It has been noted that India has prominently been ranking in positions that have constantly shown a prominent trend of downfall instead of positive development in a rather nonlinear fashion.

In the particular context to Indian states, the case of management and food availability and supply and food security among the states have been a subject of concern. It is particularly in case of understanding the position of the people in the states in terms of prevalence of undernourishment and food insecurity. As of recently it has been noted that Uttar Pradesh is considered to be considered to have a much higher prevalence of under management and is among one of the worst performing states in India as well noting that the per capita daily calorie intake in Uttar Pradesh was noted to be 2116 Kcals in the year 2011- 12 (Dev et al. 2025). This makes it essential to explore the prospect of food security and food supply chain management in assessment to realise the condition of Uttar Pradesh in terms of achieving the second SDG goal of ending hunger and malnourishment in the state of Uttar Pradesh.

Research Aim and Objectives

The following research aims to explore the role played by food supply chains and the different kinds of difficulties faced by food supply chain management regarding achievement of zero hunger in Uttar Pradesh. The research objectives are as follows.

To explore the situation of food availability as per demand and supply and food distribution supply chains of Uttar Pradesh for food security strategies.

To note the issues faced in food supply chain management in Uttar Pradesh in association to food security.

To recognise the challenges towards achievement of zero hunger as a part of food security for Uttar Pradesh.

To identify opportunities of equitable access to resources and improvement strategies for achieving a zero-hunger system.

2. Literature Review

Food Availability, Demand-Supply Conditions, and Distribution Systems in Uttar Pradesh. The agri-food system of India is a crucial segment of the production of food and the food supply chain. The research by **Joshi, P. K. (2024**), also highlighted the agri-food system of India in its transformation to more self-dependent, and more import and export focused production. The diversification of food production and consumption across the world is effectively enhanced. The food commodities, including the vegetables, spices, fish, fruits, dairy products and meat, are major high-value commodities in per capita consumption. However, the research is valuable to understand the importance of India in shaping the food availability, supply chain distribution in cross-border aspects.

According to the study by Patidar & Agrawal, (2022, March), nearly 85% of the farmers of India have less than 2 hectares of farming land in India, which provides low profitability and high transportational cost in the food supply chain in domestic and cross-border markets. A “multi-period mixed-integer nonlinear programming model” was employed in this research to interpret the multiple food products in a “four-echolen supply chain”. Alongside this, the methodology was operated in the Mandasaur district of India, to provide valid information about the farming products’ role in the food supply chain and availability. In this order, the study was crucial to provide potential insights to contribute to this study.

To continue the topic, the research by **Hernandez-Cuellar et al. (2025),** came with specifying the food supply chain in the climate-focused aspects. The fruits and vegetables are the major parts of the food supply chain, which

need to be fresh, affordable and cost- effective. The traditional optimisation of food production leads to reducing the inefficiencies, refining the inventory management, enhancing the relationship with the suppliers and controlling the integration of technology to use in an appropriate manner, rather than over- dependence on it. However, the study capitalises on the food production and supply chain factors, which are slightly different from the specific topic, but the food availability to mitigate the hunger issue relies on the key factors mentioned in this research.

Structural and Operational Issues in Food Supply Chain Management

The research by Patidar et al. (2022), demonstrated that core knowledge is about food supply chain management, reviewing the past half-decade. The research involved 281 research articles based on the chosen topic on authentic sites to obtain the evidence-based insights. Alongside this, the findings also demonstrated that the majority of the food supply chain is based in cold areas, which helps the food commodities to enhance their shelf-lives. Apart from this, at this moment, the research indicates a structural and operational issue for the food supply chain in countries like India, because of the lack of cold storage. Alongside this, the chosen literature also did not find too much research published in these aspects, which can enlighten about the issues of these areas and evaluate the problems.

Looking into the rapidly growing population, it is a concern to ensure food availability for all individuals. The research by **Gupta et al. (2025),** emphasised that food availability needs to be addressed urgently by mitigating the inefficiencies of the agri-food supply chains. On the other hand, the agri-food supply chain is difficult to manage because of the operation of multi-echelon structures. The "Fuzzy Multi Objective Linear Program" or (FMOLP) is employed to determine the aspects such as food procurement, resilience and quality considerations and cost-effective storage expenditure. In this order, the research paper implemented core methodologies and techniques to address the core opportunities and issues regarding structural and operational aspects.

Conversely, sustainability is one of the important factors of the food supply chain. The paper by Ada (2022), also highlighted that the food supply chain is heavily reliant on the three dimensions of sustainability, including factors such as weather, water supply, soil footprint, usage of energy and raw materials. The paper reviewed several literatures on this aspect before including the key information, which made it reliable to align with this study. The research also involved the agri-food supply chain-related valuable business policies and tangible solutions in the study, which can mitigate the queries of this research. However, the study is greatly integrated into the structural and operational complexities of food production, from the key factors discussed in this study.

The study by Gurrala & Hariga, (2022), illustrated that the large volume and diversity of the collection demonstrate the challenges regarding the food supply chain (FSC) through a systematic literature review. 141 articles have been verified and reviewed to underscore the findings of this study. The findings resulted that 40% of the challenges were related to IoT- based technological frameworks and 56% were done mathematically, with computational optimisation methods. Although the research was mainly focused on the countries of Europe, North America and Asian countries, this is also relevant for the Indian agri-food supply chain landscape as well. In addition, there were a security challenges found in this comprehensive review, which need to be mitigated.

The demand for organic and authentic products with respect to food is one of the top trends at the current time. Due to this, the food supply chain is required to decrease its lead-time and maintain more advanced productivity, as per the study by Gružauskas & Burinskienė, (2022). These approaches created challenges for the farmers because of the rapid shift in the range of variation of food, which results in low-quality products. Through scientific literature analysis and macro indicator clustering, the literature demonstrated that the food supply is needed to maintain collaboration, complexity management and capabilities to adopt higher productivity. Although this can be difficult for the farmers in India, due to a lack of technology adoption, old systems and integrated production are used multiple times. However, the research can be useful in adopting the ideas to mitigate the operational complexities in food production.

Barriers to Achieving Zero Hunger and Food Security Outcomes

The study by **Anand et al. (2013),** demonstrated that, being a big state with several climatic zones, Uttar Pradesh is a hub of food production. The availability of cereals are 36% higher, vegetables are 34% higher, and fruits are 56% higher than the sufficient demand of these products. Also, the research mentioned that out of the total land, 19.8 million hectares, 6.6 million hectares are occupied by food grains in this state. However, despite these strengths, the lack of proper technology integration, awareness and education among farmers about technology-based farming creates a gap in utilising this production in mitigating hunger to establish zero hunger.

On the other hand, **Lile et al. (2023),** is based on focusing on the initiatives of the United Nations General Assembly and SDG2 to fulfil the zero hunger. Alongside this, the research was conducted with the extensive analysis of grey literature and peer-reviewed literature, which provides a comprehensive understanding of this core knowledge. The authentic sources and reports about the organisational scheme for addressing the hunger issues are needed to evaluate the mitigating strategies according to this.

The research by **Sporchia et al. (2024),** illustrated that Sustainable Development Goal (SDG) 2 is focused on mitigating hunger issues, named likely the "Zero Hunger", which is a potential "polycrisis" across the world. The study is also followed by the challenges that hinders the pathway of mitigating zero hunger. The lack of a systematic review of global and domestic dimensions of the food system is noticeable in this study. In this order, the study is valuable to provide critical information about the food system and zero hunger mutation challenges in the rising time.

On the other hand, **Hendriks et al. (2023),** showcased that the Action Track 1 of the Food Systems Summit is one of the major solutions for food safety, nutrition, poverty and inequalities. The framework of this research is crucial for food systems, which is related to climate and environmental changes. Alongside this, the fundamental rights, rights of food and supply of safe water and sanitation are considered to avoid discrimination. However, the research is not properly aligned with the subject, but the food system and security for zero hunger are relevant in this aspect.

Opportunities, Equitable Access, and Strategies for Strengthening Food Systems

In the contemporary era, there is a vibrant condition, when hunger is becoming normal and diets are worsening the concept, as per the statement by Cabral et al. (2023). Alongside this, the research underscores that 4.5 billion people are involved in food systems with low wages and insecure jobs, while small-sized farmers and women are situated in worse situations. On the other hand, there are multiple challenges raised within food systems, which have investigated a gap as inequalities rather than addressing the problems. However, technology integration and innovation can improve equitable access, opportunities and solidify the food system. Alongside this, a lack of democracy is seen in the food systems that creates the inequalities in these production systems.

Similarly, the research by Agarwala et al. (2022), is based on addressing the food security challenges by governmental policies within the segmentations such as environment, social, and economic sustainability. The comprehensive analysis in this research, is underscores that there are several risks in food systems and security to mitigate hunger, including the policy implementation gaps, climatic variability, lack of governmental face and authentic approvals. Apart from this research, state like Uttar Pradesh has several obligations, despite the huge production of grains, which were reviewed before. These are aligned with a certain literature paper, which can provide the solutions for enhancing the roles of the state to fulfil the Zero Hunger.

3. Methods

The study in this research about the role of Uttar Pradesh in mitigating the hunger issue in the nation is a crucial subject to discuss in this contemporary period. There are several existing articles and websites, and governmental and organisational reports are available to know the key information with authenticity. Therefore, the research employed secondary qualitative research, which will demonstrate a well-structured data analysis of this relevant topic (Chand, 2025). The published academic literature, such as systematic reviews and scoping reviews, is an important factor in conducting secondary research. Alongside this, thematic analysis is one of the major drivers

of qualitative research, through "identifying, analysing and interpreting" the obtained data from this process (Ahmed et al. 2025). This provides in-depth insights that foster emphasis on key information, reflexive consideration, barriers and significance of the chosen topic. A narrative synthesis approach was followed in this research to align the thematic analysis findings, which connect to the objectives of this research.

Ethical considerations of this research article in these secondary qualitative methods ensure proper citation and recognition of the authentic sources, clear interpretations and provide real-time data (Hakimi et al. 2021). As this study is wholly dependent on the secondary data, the research would investigate the obtained data, whether it is authentic or not, and avoid generalisation of the data, because the context is dependent on a large area.

4. Findings

The following research has selected secondary qualitative measures and data analysis to involve thematic analysis of various articles and reports from both government and international institution agencies.

Thematic Analysis

Thematic analysis of the study has been evaluated on the basis of the research objectives that had been identified. As per the objectives there are 4 themes that are evaluated through review of published literature as follows.

Theme 1: Situation of food availability and supply chains of Uttar Pradesh for food security

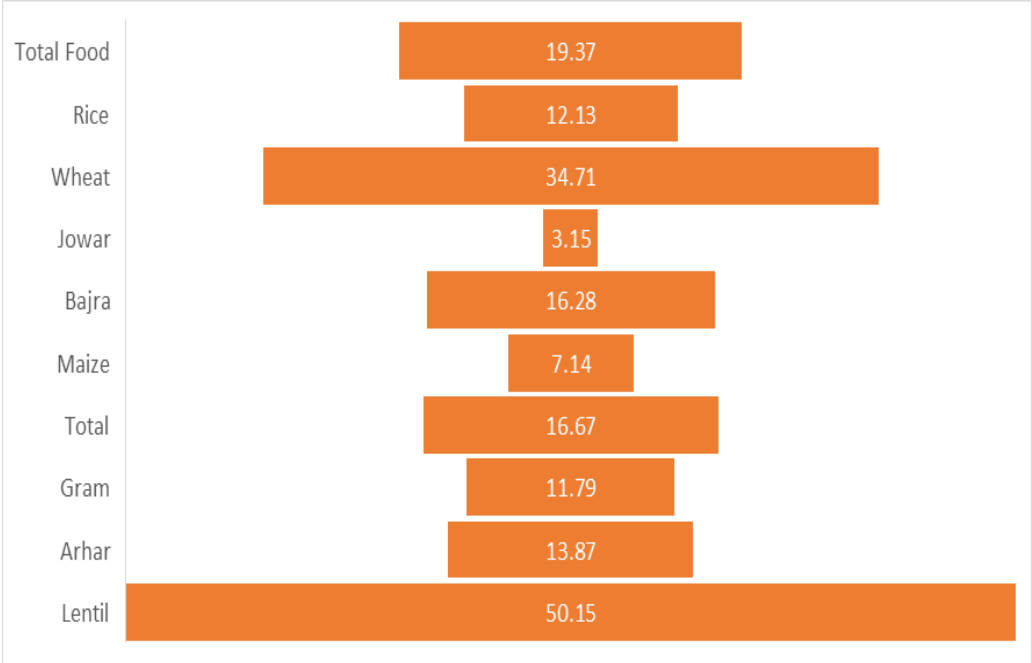
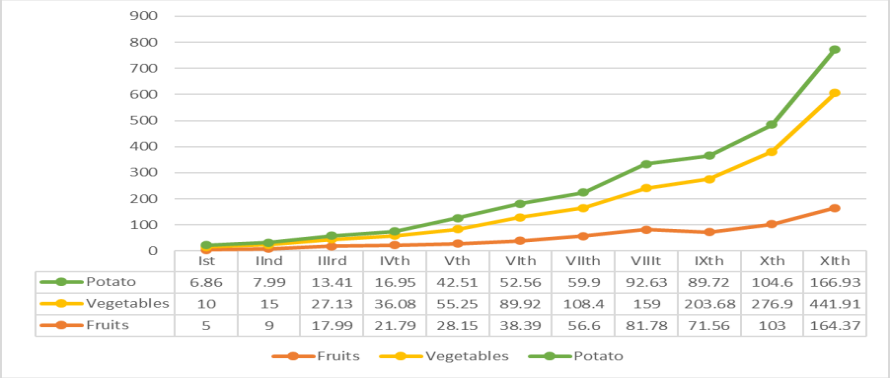


Figure 2: Agricultural Commodity Shares, Uttar Pradesh

(Source: Mishra et al., 2013)

The food security and availability of Uttar Pradesh is considered to be in another complicated situation due to its vast agriculture background. Uttar Pradesh is a major tropical monsoon climatic state with different climatic zones with 36% higher for capital accessibility of cereals then adequate demand and exceeding ICMR dietary requirements however missing out on per capita availability of milk and pulses 24% less than ICMR diet requirements (Mishra et al., 2013). Uttar Pradesh is considered to be a strong production position in terms of food grain production with contribution of UP regarding agriculture commodities such as rice, wheat, Jowar, Bajra, maize, gram and lentil. The share of food grain agriculture commodity of UP stands at 19.37% while in particular assessments it is noted that food grain production as of 2011-12 has been Uttar Pradesh to show a strong capacity of high production as opposed to lower food security.



	Ist	IInd	IIIrd	IVth	Vth	VIth	VIIth	VIIIt	IXth	Xth	XIth
Potato	6.86	7.99	13.41	16.95	42.51	52.56	59.9	92.63	89.72	104.6	166.93
Vegetables	10	15	27.13	36.08	55.25	89.92	108.4	159	203.68	276.9	441.91
Fruits	5	9	17.99	21.79	28.15	38.39	56.6	81.78	71.56	103	164.37

Figure 3: Area and Production of Vegetable, Fruit and Potato

(Source: Mishra et al., 2013)

Additionally, the state is strongly noted for its major crop to involve paddy and wheat followed by "sugarcane, potato, mustard, gram, pea, groundnut and lentil" that all are noted to contribute majorly towards export such as for food crops including potato rice vegetables and mangoes. It is noted that Uttar Pradesh throughout its 18 divisions in 75 districts is noted to have the highest crop area of around 25,785,000 hectare but also counts for over 21 million farm holdings. As in the 11th 5 year plan period fruits had a major production of 164.38 lakh metric tons while vegetables presented to show 441.91 lakh metric tons of production while potatoes accounted for 166.93 lakh metric tons of production (Mishra et al., 2013). It is noted that the total cultivation of food in Uttar Pradesh accounts for counting the state third in rank for fruits and first in rank for potato production.

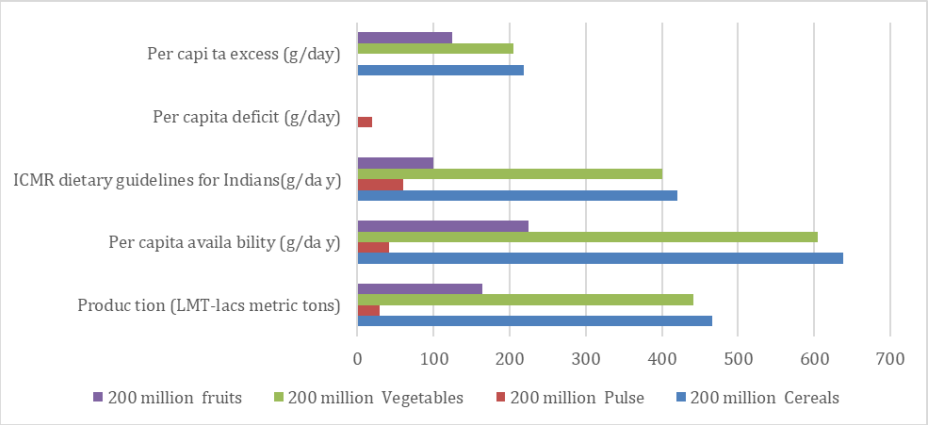


Figure 4: Evaluations of Uttar Pradesh's Food Security

(Source: Mishra et al., 2013)

It is identified that over 26% of total population was noted to be living under poverty level in 2011 and show a strong implication of malnourishment or undernutrition indicating lack of food accessibility in adequate amounts. They are very showing food insecurity and low purchasing capacity among people. Food security represents under ICMR dietary requirements to show that production of cereals being 630 grams per day with requirement margin to be 400 grams per day, indicating 37% sufficiency of meeting demand above level (Mishra et al., 2013). However the per capita availability of vegetables and fruits was estimated at 605 grams per day and 225 grams per day respectively and recommended requirements be 400 grams per day and 100 grams per day respectively indicating 34% and 56% higher production than demand respectively. This however stands at a total estimation where it is not noted that 25 to 30% of harvest classes are caused due to a storage and preservation with transport network issues that by indicating deficits being marginalised.

Theme 2: Barriers faced in food supply chain management in Uttar Pradesh for food security

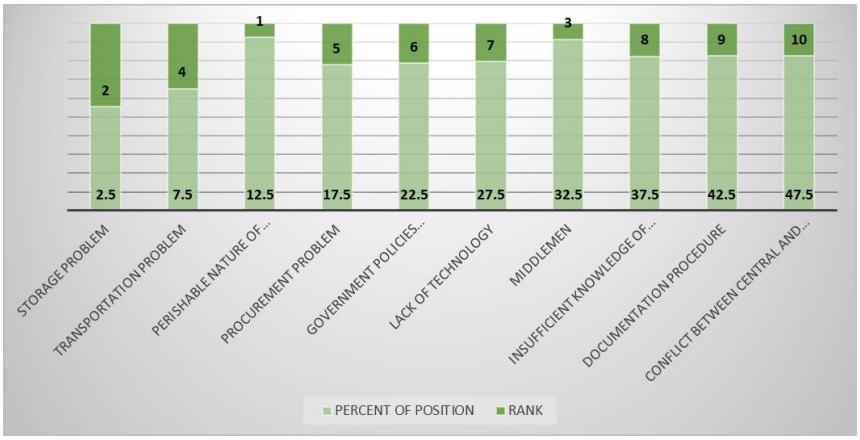


Figure 5: Agricultural Commodities Challenged in Export Distribution, Uttar Pradesh

(Source: Singh et al., 2025)

Agriculture commodity distribution is an essential aspect of understanding regarding any probable obstructions in the supply chain of the food sector. It has been noted that there are certain issues that cause limitations regarding export for agriculture commodities in Uttar Pradesh. Studies indicate major regions that act as hubs for Merchandise trade in Uttar Pradesh such as Kanpur Nagar district have observed issues associated with distribution of agricultural commodities that include problems in storage and transportation as well as procurement (Singh et al., 2025). Studies indicate that as per ranking it is noticeable that issues such as storage and transportation problems as well as state and central government conflicts and document procedure lagging are some issues.

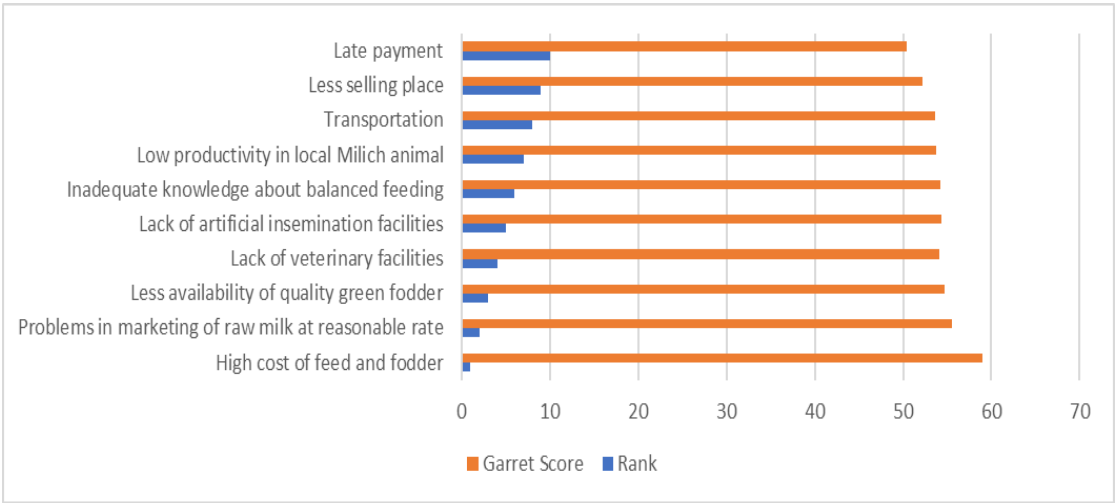


Figure 6: Milk Supply obstructed in Uttar Pradesh, Major Reasons

(Source: Yadav et al., 2025)

Issues of knowledge regarding market and supply chain and lack of technology with intervention of government policies account to be challenges. Other studies show that there have been issues in maintaining supply for necessary food commodities such as milk in Uttar Pradesh as well. It has been noted that producers face issues throughout the milk supply chain that involve challenges of feed and fodder cost to be at the highest rank, in districts such as Banda District (Yadav et al., 2025). Some of the major noted issues are related to availability of fodder production and other challenges regarding transportation and selling place of option of supplies with problems regarding lack in balanced feeding knowledge are also prominent.

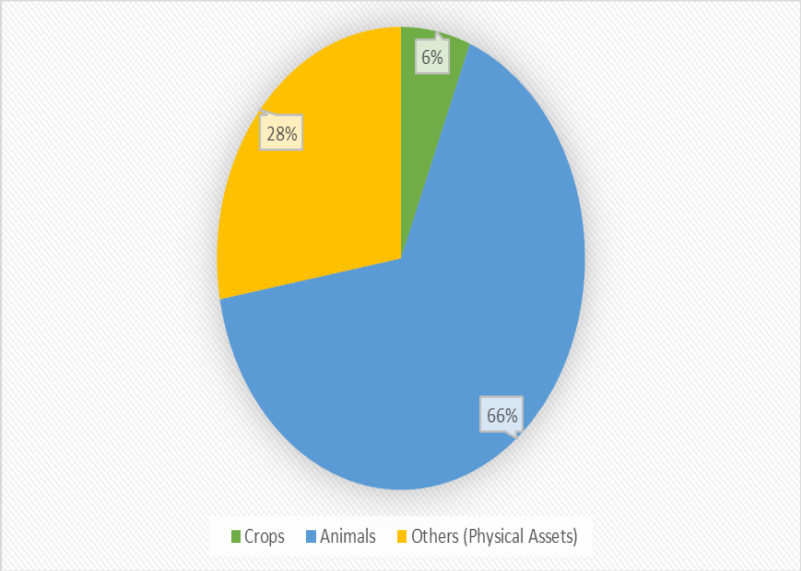


Figure 7: Flood/ Drought causing losses to Agricultural Products in Uttar Pradesh

(Source: developed based on: Baliyan, 2022)

Additional assessments in particular context to agriculture products have noted that the agriculture sector faces problems associated with natural disasters and institutional issues as challenges faced by districts regarding agriculture product distribution in the supply chain Uttar Pradesh. Findings have suggested that on an average almost 6.1% of loss of Rs. 985012 valuehas occurred for crops due to flood and drought situations between 2017 to 2019 while animal and livestock loss accounts to 66% of total loss between the same time. Resistance in technology adoption accounted for 12% of problems while small and fragmented land holding 14% and lack of hired labour 13% also accounted for social and institutional issues in all districts (Baliyan, 2022). These infrastructure issues also add to problems of agriculture productions that further hamper supply chain from the stage of production and distribution throughout the food supplies in management of Uttar Pradesh.

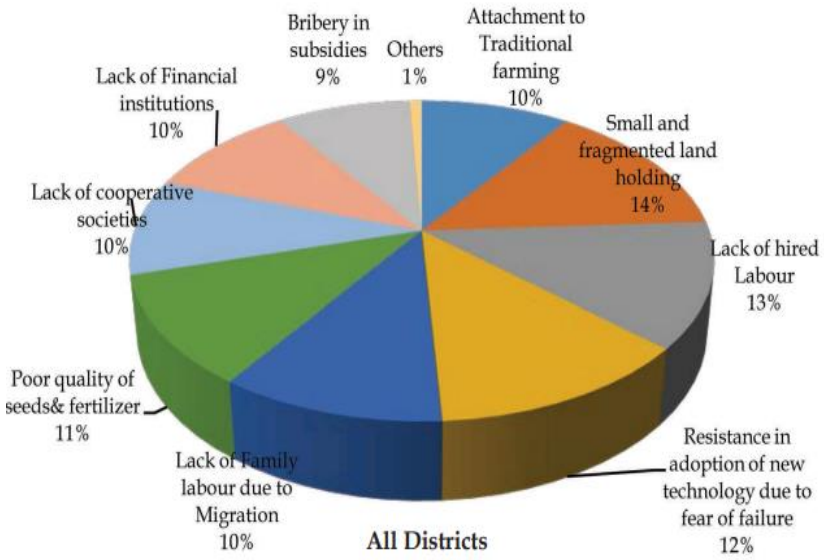


Figure 8: Social and Institutional Obstructions to Agriculture Market, Uttar Pradesh

(Source: Baliyan, 2022)

Theme 3: Challenges in achievement of zero hunger as a part of food security for Uttar Pradesh

Districts	FSI Rank	FSO Rank	Criteria	Region	Districts	FSI Rank	FSO Rank	Criteria	Region
Fatehpur	58	56	By Both	Central	Chitrakoot	68	52	By Both	Southern
Sitapur	55	55	By Both	Central	Lalitpur	64	69	By Both	Southern
Rae Bareli	56	47	By FSI	Central	Mahoba	69	41	By FSI	Southern
Unnao	48	63	By FSO	Central	Banda	66	43	By FSI	Southern
Hardoi	45	53	By FSO	Central	Hamirpur	60	46	By FSI	Southern
Kheri	39	60	By FSO	Central	Jhansi	57	36	By FSI	Southern
Kanpur Dehat	34	57	By FSO	Central	Auraiya	24	59	By FSO	Western
Balrampur	67	66	By Both	Eastern	Pilibhit	21	62	By FSO	Western
Kaushambi	61	61	By Both	Eastern	Farrukhabad	14	67	By FSO	Western
Siddharthnagar	59	54	By Both	Eastern	Mainpuri	12	68	By FSO	Western
Sonbhadra	70	30	By FSI	Eastern	Aligarh	9	64	By FSO	Western
Shrawasti	65	50	By FSI	Eastern	Hathras	8	65	By FSO	Western
Mirzapur	63	40	By FSI	Eastern	Bulandshahar	6	70	By FSO	Western
Bahraich	62	42	By FSI	Eastern					

Figure 9: FSI/ FSO Prioritised Status Districts of Uttar Pradesh

(Source: World Food Programme, 2010)

Uttar Pradesh faces challenges in achieving zero hunger as a part of food security with the implication that almost all districts facing high priority in terms of index for both food secure (FSI) and food secure outcome (FSO) have indicated inequalities and moderate insecurity. In Uttar Pradesh almost 28 districts have been identified to be priority status in terms of being food insecure among which several account for food insecurity under what food secure index and food security outcome (World Food Programme, 2010). Districts falling under priority status length in Uttar Pradesh included districts such as Mahoba ranked at 69 at FSI and 43 in FSO, Chitrakoot ranking at 68 in FSI and 52 in FSO, and Fatehpur ranking at 58 in FSI and 56 in FSO. All identify priority criteria to involve both kinds of food security indexes and priorities definition in understanding the importance of district priority.

Figure 10: ISHI categorical distributions for Uttar Pradesh

(Source: developed based on: Verma et al., 2025)

It is noted that in terms of food insecurities and hunger, the state of India Uttar Pradesh counts as one of the major and implied upon states regarding food related distribution issues among other challenges. Examination of the India State Hunger Index (ISHI), factors such as child under 5 years that are stunted (CST) and children under 5 years that are wasted (CWA) and under 5-year child mortality rate for 100 live births (CM) and prevalence of

undernourishment (PUN) account to be health and nutrition indicator (Verma et al., 2025). As per studies, in 2011-12 it was noted that PUN accounts for 34.45 value in ISHI, it was noted that CST CWA and CM , all had accounted to be 39.70, 17.30 and 5.98 respectively to ISHI components in Uttar Pradesh.

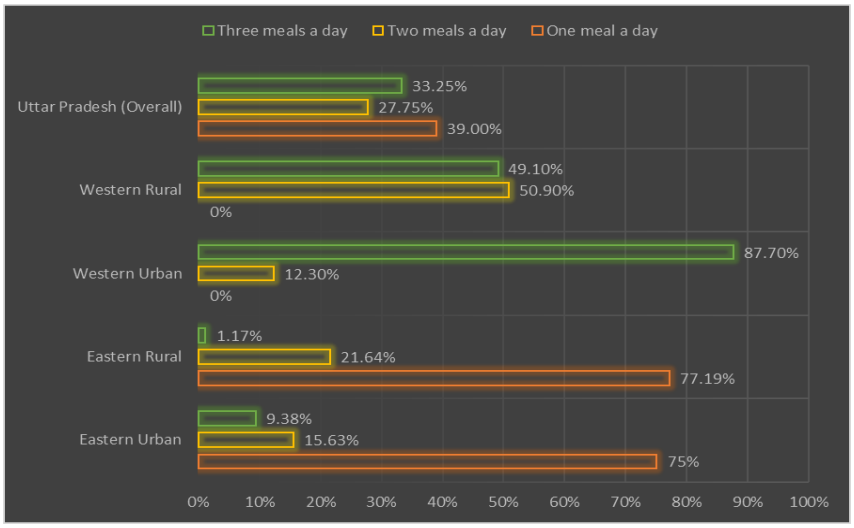


Figure 11: Daily Meal Consumption Statistics, Regional and Overall, Uttar Pradesh

(Source: developed based on: Sikarwar & Gogia, 2024)

In terms of frequency in consumption of meals Uttar Pradesh does face the issue of seeing a fractionally higher majority of poor food consumption pattern on overall and regional level in rural and urban level. As per report 39% of people in Uttar Pradesh consume only one meal per day while only 33.25% consume three meals per day (Sikarwar & Gogia, 2024). In terms of rural and urban region differences, the Eastern region observes 75% of urban people and 77%. 19% rural people consume only one meal per day. Such projections indicate the existence of challenges in meal access and inequality of food security and distribution on a regional and category basis.

Theme 4: Opportunities of equitable access and strategies for achieving zero hunger in Uttar Pradesh

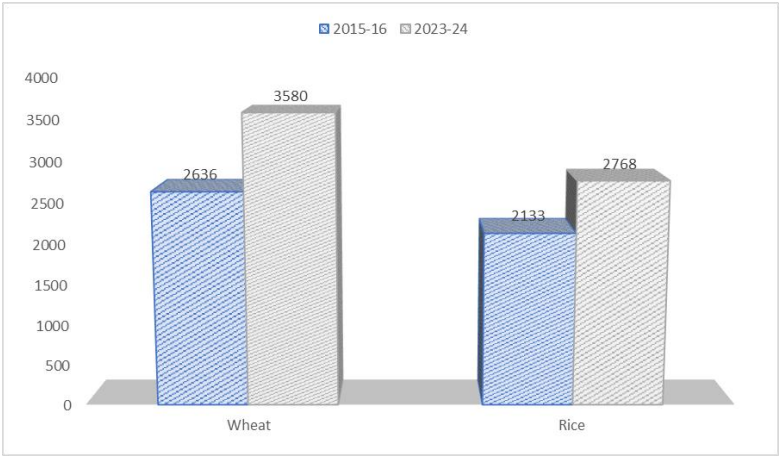


Figure 12: Wheat and Rice Production Improvements, Uttar Pradesh

(Source: developed based on: UP.NIC.in, 2025)

However there has been traces of opportunity regarding equitable access and Strategies for achievement of zero hunger in Uttar Pradesh under the second goal of SDG that focuses on eradicating hunger for achievement of zero hunger system in food supply chain management. It is noted that wheat productivity has increased from 2636 kg per hectare in 2015-16 to 3580 kg per hectare in 2023-24 while 2133 kg per hectare in 2015-16 has improved to 2768 kg per hectare as of 2023-24 (UP.NIC.in, 2025). Such developments, for instance also 0.73 lakh per worker

gross value added in agriculture, account for a slower yet progressive improvement in production and supply of major crops and serials such as wheat and rice that add to the food supply chain management for achieving zero hunger in Uttar Pradesh.

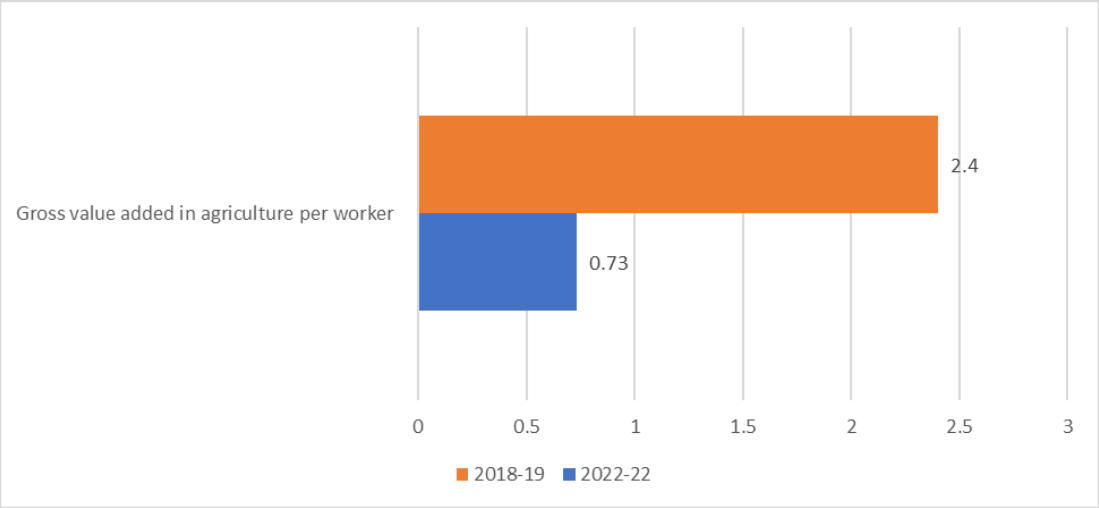


Figure 13: Gross Value Added in Agriculture, lakh/worker, Uttar Pradesh

(Source: developed based on: UP.NIC.in, 2025)

In terms of achieving the vision of sustainable development goals achieved by 2030, interventions and strategies have already been set in motion. Strategies regarding development of appropriate eco-friendly farming systems to improve farm productivity and enhance natural resource conservation to increase agriculture diversification and build food and nutritional security core competence are essential prospects subject of developing food security under national policies for the state (UP.NIC.in, 2019). The target is to focus on effective integration of multiple national policies such as new agriculture policy and state nutrition missions and NFSA among others, integration of agriculture sector development through infrastructure and linked age of market while building farmer social protection and sustainable agriculture practice promotion (NITI.gov.in, 2019). Such commitments only outline the central government's involvement in achieving zero hunger in the state.

5. Discussion

Food production in Uttar Pradesh is very high, but the barriers regarding the food supply chain have not been addressed according to the requirements and importance of this area. This document does not allow a seamless transportation to the crucial market areas, the regular nutrition outcomes for hunger mitigation. The methodology of this research, systematic and thematic analysis of the qualitative secondary sources, facilitated the core and authentic information that is available in several government and organisational reports and scholarly articles (Mc Grath-Lone et al. 2022). The comprehensive review was crucial to cover the vast areas of this subject and not to generalise the data pattern.

The thematic analysis aligned the segments with the research objectives and research purposes. The analysis of the overall findings demonstrated that the food supply chain was developed in Uttar Pradesh, but the food distribution is not able to meet the required efficiency. Alongside this, the climatic variability, transportation cost and inefficiency in technology usage are the major problems or barriers for the structural and operational process in FSCM. In addition, as per the government's report of India, the Zero Hunger the gross value added per worker in agriculture is 0.73 (in lakh/worker) in 2022-2023, which is not sufficient for growth (UP.NIC.in, 2025). Although the progress towards the goal in this initiative is aimed at fulfilling and meeting all the requirements by 2030.

Moreover, the barriers to performing the production adequately are climatic changes across the several areas of the state, post-harvest losses due to a lack of cold storage, which cause wastage, and transportation costs, but

insufficient returns from the produced crops. However, analysing the Uttar Pradesh-SDG VISION 2030, the state is focused on developing the agricultural segments by the poverty issues (UP.NIC.in, 2019). Through sustainable interventions, irrespective of urban and rural areas, the goal will be effective, which is related to mitigating the hunger issues as well. However, the thematic analysis covers all the research objectives to demonstrate the different dimensions of the study and illustrate a clear insight about the final outcome.

6. Conclusion

The effect of good agricultural production on household nutrition is limited by constraints within the Uttar Pradesh food supply chain. Significant losses in post-harvest due to lack of cloud storage, poor transportation within high-cost, short land access and weak technological integration hinder the productivity of Uttar Pradesh, which prevents it from being a central to fulfilling the Zero Hunger. Alongside this, the climatic variability and inequalities in gender aspects reduce the efficiency of the food systems. However, the study found several key solutions from the reviews and findings, and there are recommendations for future approaches as well.

7. Recommendation

Implementing a Single Supply Chain Coordination Platform: The implementation of the single supply chain coordination platform in Uttar Pradesh would be paramount. The platform will integrate the departments related to the food production and system, such as agriculture, transportation and nutrition into one organisational body that provides compact planning, tracks the progress and aligns the policies and monitors approvals or controls over production in terms of Zero Hunger fulfilment.

Enhancing Cold-storage Facilities: The government should support the farmers to enhance the cold storage facilities for the cultivated grains in the state and control the supply chain to distribute the commodities adequately and avoid wastage.

Governmental Subsidies through Financial Incentives: The initiatives from the government, like low-interest loans for farming, agricultural subsidies, and providing technical equipment to enhance productivity, can push the approaches towards the desired goals, such as Zero Hunger, with higher productivity of food in the state (Okunlola & Ayetigbo, 2024). The farmers with low income can also be motivated in cold storage, new innovations and integrated production methodologies through this.

Strengthening Protein-rich Value Chains: The focus should be on solidifying protein-rich value chains, whether it is pulses or dairy, to disclose the gaps in nutrition in hunger issues.

Avoiding Gender Bias in Production: Strategically, the responsiveness to gender across programs should ensure training and the emergence of women in leadership in supply chain approaches in India (Akbari et al. 2024).

Diversification in Crop Cultivation: Diversification of cropping in the farming lands can provide more productivity and benefits for the farmers, which also improves the variety in food functionalities.

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