

Spatial Analysis of Food Security through Public Distribution, Rohtak District

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Received: 29 Jul 2025; Received in revised form: 26 Aug 2025; Accepted: 29 Aug 2025; Available online: 31 Aug 2025

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Abstract— Food security is still one of the most critical policy issues for the Indian households with limited financial capacity. The Public Distribution System (PDS), as an important component of the country's food security system, plays a significant role in providing subsidized food grains to the vulnerable households. The existing literature on the PDS reveals the functioning gaps in the areas of supply and delivery such as irregular supply, quality of commodities, and access. This paper aims to assess the performance of PDS and user's perception in the urban areas of Rohtak District (Haryana). The findings of the study revealed that a majority of the households are fully dependent on subsidized ration to fulfill their nutritional requirements. However, the gap in the supply of PDS both in terms of quantity and quality forces the households to meet their food requirements from the open market. The issues of irregular opening hours of fair-price shop, the shortage of stock, and erratic distribution underscore the implementation challenges in the PDS. The paper reiterates the need for a robust PDS with reforms in the areas of effective monitoring systems, right-sizing logistics, quality-assurance framework, and grievance-redressal mechanisms, among others, to make the distribution system more inclusive, efficient, and effective in terms of nutritional outcomes. The study can be extrapolated to the semi-urban and rural areas as well.



Keywords— **Public Distribution System (PDS), Food Security, Accessibility, Ration Shops, Supply Chain, Policy Reforms.**

I. INTRODUCTION

Food security according to the Food and Agriculture Organization (FAO) is a state where all people always have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security in India is the arrangement of constant supply of basic commodities and services to the citizens of India. At the center of this framework is the Public Distribution System (PDS), a state-supported mechanism that delivers subsidized food grains and essential goods to economically disadvantaged households, with the twin goals of alleviating poverty and safeguarding food security.

Over time, the PDS has pursued multiple objectives:

1. Stabilizing food prices,

2. Providing subsidized food grains to poor households,
3. Improving welfare by making essential commodities affordable,
4. Enforcing rationing during shortages, and
5. Regulating the private trade of food grains (Nair, 2011).

The Public Distribution System (PDS) represents a central pillar of India's strategy to combat food insecurity and extend support to socio-economically marginalized groups. Utilizing its wide-reaching national network and subsidized supply mechanism, the PDS is designed to promote equitable access to essential food commodities for millions of households across the country's diverse regions.

1.1 Ration Shops: Fair Price Shops, commonly referred to as ration shops, function as government-regulated outlets

that distribute food grains to low-income families at prices substantially lower than those prevailing in open markets. These outlets form a crucial operational unit within the PDS framework, ensuring that subsidized commodities are delivered to households that meet prescribed eligibility standards, thereby reinforcing the program's food security mandate.

1.2 Food Corporation of India: Established in 1965, the Food Corporation of India is a public sector organization entrusted with safeguarding national food security. Its responsibilities encompass the procurement of food grains from farmers, their scientific storage, and the structured transportation and distribution of these stocks to state governments for allocation under various welfare initiatives.

The FCI's principal objectives include guaranteeing price support to protect small and marginal farmers, maintaining buffer and operational reserves to ensure uninterrupted food supply, enabling efficient distribution through the PDS, and stabilizing market prices so that essential commodities remain accessible and affordable to the population at large.

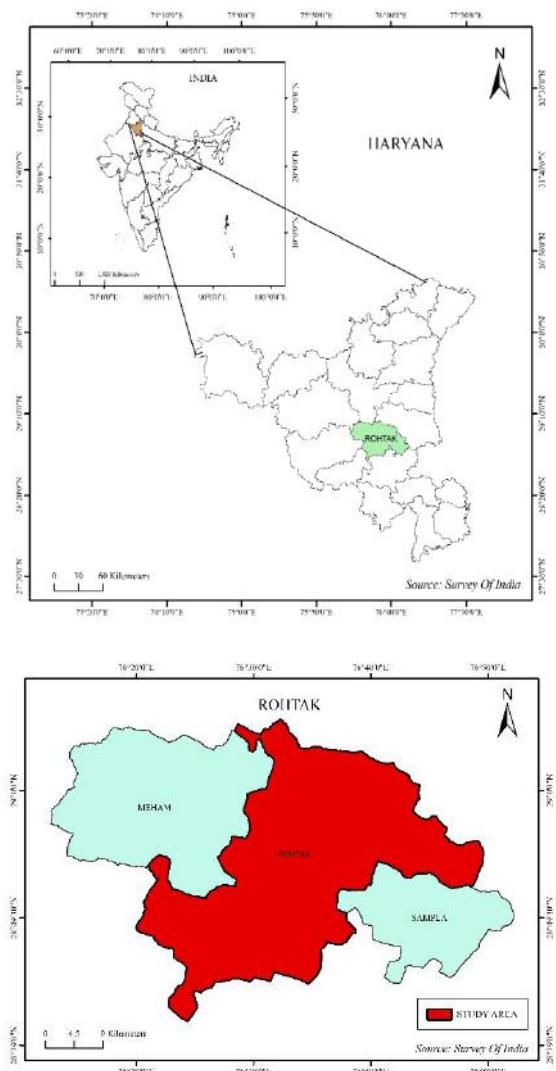
1.3 Poverty: Poverty is typically characterized as a socio-economic condition in which individuals or groups are deprived of adequate financial resources and essential assets necessary to sustain a minimum standard of living, thereby impeding the fulfillment of fundamental human needs. In 2015, the World Bank redefined the global poverty benchmark, raising it from US\$1.25 to US\$1.90 per day, a figure derived from the average poverty thresholds of the world's poorest nations. Persons falling below this benchmark are regarded as living in extreme poverty, unable to secure sufficient income for vital requirements such as nutrition, housing, and healthcare. Addressing poverty is indispensable for strengthening food security, as economically disadvantaged populations allocate a large portion of their earnings to food and are, therefore, particularly vulnerable to food insecurity arising from income fluctuations or rising prices. Poverty is a serious obstacle to achieving some basic human rights, including the right to adequate food, adequate housing and health care. Today about 8.5% of the global population, which corresponds to about 700 million people, live on less than US\$2.15 per day, which is the international poverty line for low-income economies. About 44% of the world's population, or roughly 3.5 billion people, live on less than US\$6.85 per day, which is the reference value used for upper-middle-income countries. Because of continuous population growth, these percentages have changed little since 1990. Extreme poverty is the highest in Sub-Saharan Africa and in countries affected by political turmoil, fragility or conflict.

Public Distribution System (PDS) in India is an important policy tool for enhancing food security of the poor and weaker sections of society, especially in rural areas, including the study area in Rohtak District. However, in spite of its widespread coverage, there are persistent structural deficiencies in PDS in terms of accessibility, management and effective delivery of the subsidized food items to the intended beneficiaries. Problems of irregular supply and quality of food grains and pilferage, i.e. of the benefits leaking to the ineligible persons have been a recurring feature in the Ration Shops, where PDS is being operated. The PDS is plagued by issues related to governance, such as irregular opening hours, supply chain inefficiencies, and administrative gaps. Beneficiaries also face challenges in terms of access and distribution of essential commodities. Additionally, the PDS suffers from frequent disruptions in the delivery system, as well as leakages and targeting errors, which limit its ability to effectively meet the goals of food security and poverty alleviation.

II. STUDY AREA

Haryana is a state in northern India and is known as the "breadbasket of India." It is in the forefront in the national economy as far as agricultural commodities, especially wheat and rice, are concerned. It is a food-surplus state. Yet, more than 40 percent of its population is dependent on the PDS for its nutritional requirements. It has taken up wide-ranging reforms in the TPDS in the state for more transparency and efficiency. The reforms include the computerization of ration card management, Aadhaar-based beneficiary authentication, and computerization of supply chain management. The introduction of an online grievance redressal portal shows Haryana's commitment to improving accountability and promoting citizen participation. Haryana has 9,591 Fair Price Shops and a total of 2,700,365 ration cards under its integrated e-PDS. The geographical area for the study is Rohtak district, in the northwestern part of India, at a distance of 70 kilometers from the National Capital, Delhi. Over the past ten years, Rohtak has developed into an important urban center. It has experienced infrastructural development and growth, increasing healthcare, and rise in educational institutions. However, the district still shows socio-economic diversity with major population still dependent on state-assisted welfare programs like PDS for their subsistence needs.

MAP 1: STUDY AREA



III. LITERATURE REVIEW

Ranjan (2016) offers a critical analysis of the National Food Security Act (NFSA), 2013, with a particular focus on the financial implications and challenges associated with its implementation. The study presents a comprehensive overview of the differing perspectives on the NFSA, highlighting that while critics argue that the Act could exacerbate existing inefficiencies and leakages in the Public Distribution System (PDS), proponents believe that the financial burden is relatively manageable and that appropriate policy adjustments can mitigate the associated challenges. The existing literature explores both the strengths and weaknesses of the PDS, as well as alternative policy options, such as the potential use of conditional cash transfers, as a means to improve food security in India.

Kumar et al. (2017) provide an in-depth analysis of governance reforms in the Public Distribution System

(PDS) in the state of Odisha, highlighting the importance of accountability and transparency in enhancing efficiency and achieving more stable food security outcomes. Similarly,

Gupta and Mishra (2018) examine the system in Uttar Pradesh and find notable improvements in accessibility and utilization, especially among poorer households. The PDS has been found to be effective in ensuring food security in poor households. Participation has been shown to be greater in areas of greater social and economic vulnerability. However, even with reforms, the PDS has been unable to address long-standing problems such as corruption and the low margins provided to ration shop dealers. The latter often results in malpractice, with diversion of subsidised food grains to the open market or extraction of fees from consumers to make up for the shortfall.

Beura and Mishra (2022) investigated PDS in the Balangir district of Odisha from the angles of access, efficiency, sufficiency of supply, and user perspectives. The findings reveal that even though the study shows a notable improvement over the years, the reliability of quality and quantity of food grains is a challenge, and the recipients express their preference for in-kind distribution overwhelmingly. It upholds the significant function of the PDS in ensuring food security in the region.

Gokhale and Rao (2022) explore how socio-demographic and socio-economic factors influence the dietary diversity among pregnant women in rural India. The study's conclusions highlight the importance of customized interventions that can improve and maintain diversity in diet, focusing on elements such as maternal age, education, work status of both spouses, family composition, and monthly income, and home ownership.

IV. OBJECTIVES

- To assess the availability and accessibility of Fair Price Shops (ration outlets) in Rohtak District.
- To study the socio-economic profile of beneficiaries under the Public Distribution System (PDS) in Rohtak District.
- To analyze the linkages between the Public Distribution System (PDS) and food security outcomes in Rohtak District.

V. DATA SOURCES AND METHODOLOGY

Primary and secondary sources of data have been used in this study. Primary data was collected using a variety of methods such as through structured questionnaires, interviews and informal discussions with local people.

Secondary information was gathered from existing literature, comprising both published and unpublished reports, project documents, program assessments, and other relevant archival records.

5.1 Primary data: The study has been based on primary data with an objective to analyze the extent of reach, availability and eating habits of the target groups covered under the PDS. In order to get unbiased data as to the delivery of services through PDS and also to cover a wide range of user experience, 10 ration shops were selected using simple random sampling. A pre-designed questionnaire was then filled by 90 respondents, who were ration card holders and users of the PDS facilities.

In addition to the household survey, an Interview was conducted with Food and Security Officer, Rohtak to get an administrative perspective on the working of the PDS. An unstructured questionnaire was used for the Interview allowing a wide ranging, open ended discussion on various aspects of how the system works, including gaps and bottlenecks such as leakages and supply side and policy implementation gaps. The qualitative approach used here helped in understanding system and governance gaps which might not have been evident from a survey of beneficiaries alone. Results from the interview helped to triangulate the quantitative findings and thus gave a more holistic, multi-dimensional view of the functioning of the ration shops. By combining survey-based data from beneficiaries with qualitative evidence from administrative stakeholders, the study seeks to present a holistic evaluation of both the spatial and functional aspects of ration shop accessibility and their implications for dietary diversity within the PDS framework.

5.2 Secondary data: Secondary data for this study were obtained from multiple government departments, official digital portals, and administrative offices. These sources complement the primary findings by providing detailed insights into the availability, accessibility, and operational functioning of ration shops. Moreover, they offer important evidence on the nutritional outcomes associated with the Public Distribution System (PDS), thereby contributing to a more holistic assessment of its impact on beneficiaries. The key government portals and organizations utilized for data collection include:

- Food Corporation of India (FCI)
- Ministry of Consumer Affairs, Food & Public Distribution
- NITI Aayog

- AePDS Haryana (Automated e-Public Distribution System, Haryana)
- National Food Security Portal (NFSA)

VI. RESULTS AND DISCUSSIONS

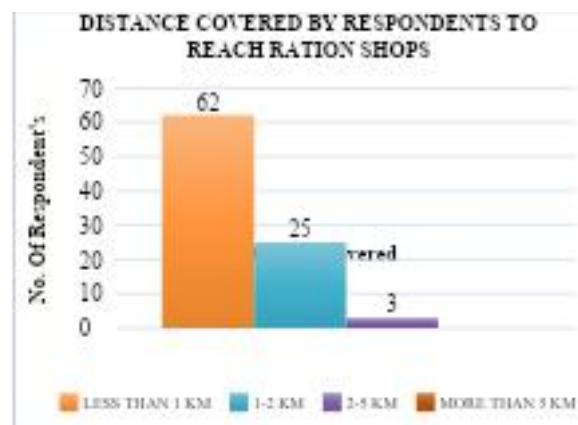


Table 1 Distance Covered by Respondents to Reach Ration Shops

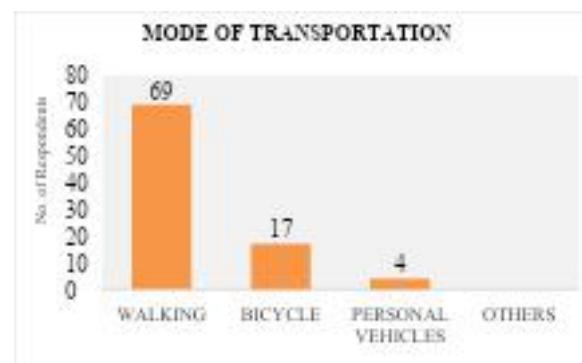


Fig. 2 Mode of Transportation

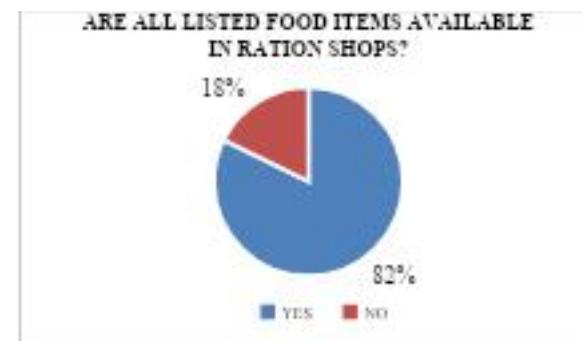


Fig. 3 Are all listed food items available in ration shops?

Findings demonstrate that three-fourths of respondents (75%) access ration shops by walking, implying close proximity and ease of reach for most households. Another 18.5% utilize bicycles, reflecting either efficiency

considerations or convenience in mobility. A small portion (4.5%) rely on personal vehicles, which may be due to distance or financial constraints. In general, the information suggests that ration shops are reachable for most users, with few transportation-related obstacles.

Survey responses show that many ration shops are closed on non-working days. This closure may affect the availability of essential commodities to the beneficiaries who rely on these outlets. Respondents also mentioned irregular opening hours across areas. Limited access poses challenges to individuals with rigid work schedules or those with demanding jobs, as they may struggle to visit shops during regular hours.

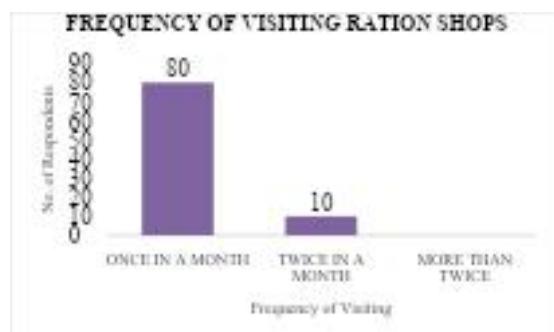


Fig. 4 Frequency of visiting ration shops

It can be also be seen from the survey that beneficiaries shop twice a month in a ration shop. This is an indication of leakages in the PDS. Often the PDS shops have a non-uniform pattern of timing and beneficiaries are forced to make two trips because they are not sure when the shop will open. Also, the beneficiaries do not get the full quota of food grain on the day of distribution and have to return to the shop later to get the balance.

The findings point to ongoing issues concerning both accessibility and inventory management in ration shops, which may be causing inconvenience to some beneficiaries. Although most outlets are within accessible distance for the majority of households, there remains a section of the population that encounters difficulties in accessing them. Closing these gaps is crucial for enhancing the overall effectiveness and inclusiveness of the PDS.

Although most outlets have enough stock, there are still some that experience frequent shortages, which have been blamed largely on logistical issues such as delays in transport and lack of storage. Leakages due to corruption and mismanagement, with the stock being siphoned off from the official route, have also been a problem, as have natural disasters, seasonal variations in agricultural production, and administrative inefficiencies. Shops in remote rural locations are more likely to face this problem,

and often experience irregular resupply and resultant shortages.

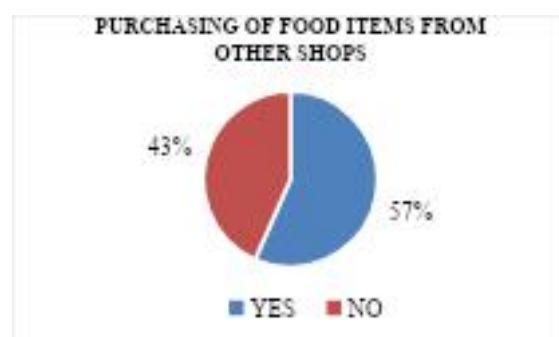


Fig. 5 Purchasing of Food items from other shops

The survey results reveal that 57% of the sample households are buying extra food grains from market outside indicating the short fall of the quantity they are getting from the PDS. While 42% are saying that they do not need extra purchase because the ration size is enough for them. The purchase of extra food grains by most of the households increases their total expenditure on food and thus reduces the household savings.

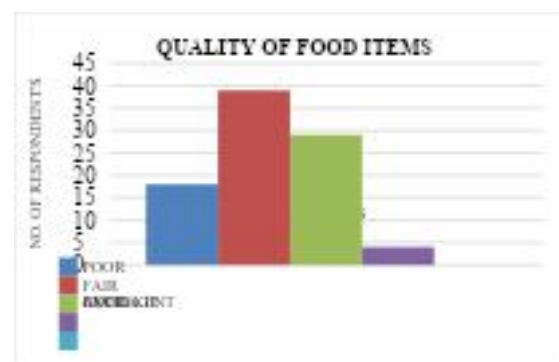


Fig. 6 Quality of food items

The survey results demonstrate that the majority of respondents consider the quality of food items distributed through the Public Distribution System (PDS) to be fair or average. Only a limited proportion rated the quality as good, and none regarded it as excellent, reflecting a considerable gap in meeting acceptable quality benchmarks. These perceptions underscore the urgent need for quality improvements within the PDS. Inferior food quality reduces the program's effectiveness and may exacerbate nutritional deficiencies and long-term health risks, especially among economically disadvantaged groups. Enhancing both the quality and quantity of food provisions, while ensuring consistent access to ration shops, is therefore critical for protecting the health and well-being of beneficiaries in Rohtak.

VII. CONCLUSION AND RECOMMENDATIONS

The examination of the Public Distribution System (PDS) in Rohtak underscores its vital role in safeguarding food security for households with limited economic means. The overwhelming majority of the beneficiaries are from low-income and low-education households. A significant number of these beneficiaries are dependent entirely on PDS for their food consumption because of their unsFig. or low/no income. The recent changes such as digitisation of PDS and introduction of biometric authentication have improved transparency and accountability in the system. However, there still exist issues of irregularity in supply, low quality of supplied commodities, long waiting hours, and congestion at the FPS. While FPSs act as crucial distribution points to ensure access to food, they face long-standing structural and financial issues such as weak infrastructure and low/no profitability, which can cause questions about their long-term sustainability.

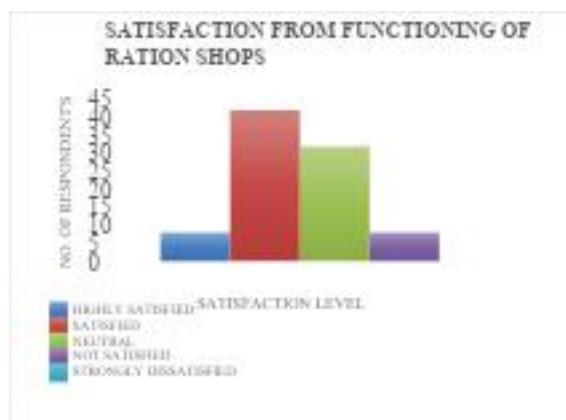


Fig. 7 Satisfaction from functioning of ration shops

In order to improve the PDS's functioning in Rohtak, the research paper makes several policy recommendations. The prompt and consistent supply of essential commodities, such as pulses, sugar, and edible oils, is of utmost importance. A fixed and transparent distribution schedule can help in reducing the frequency of beneficiaries having to visit the ration shops multiple times. Emphasising the quality of food grains and other items, even at a slightly higher cost, can help in meeting the nutritional needs of the population. Token/slot-based system along with technological interventions at the ration shops may ease the overcrowding. Strengthening monitoring and enforcement mechanisms for FPSs can help in improving accountability. Additionally, providing better incentives for dealers and improving infrastructure can help in ensuring a consistent and efficient supply of goods under the PDS.

Survey responses also showed a mixed picture on the aspect of beneficiary satisfaction towards the ration shop services. Close to 40% of the surveyed respondents

expressed satisfaction with their experience at the ration shop, with an additional 10% expressing a high degree of satisfaction with the experience. However, a third (30%) of the respondents remained neutral on the issue. While 10% of the respondents to the survey had expressed dissatisfaction over the services at the ration shop, citing reasons as the quality of food items and adequacy of the items, a smaller proportion of those expressing dissatisfaction towards the PDS services mentioned the behavior of shop staff as a reason for dissatisfaction. These results call for a need for robust monitoring. Setting up of better monitoring mechanisms along with robust grievance redressal mechanisms are some of the ways to deliver better services with regards to food quality and overall beneficiary satisfaction levels from PDS.

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