

Analyzing the Effectiveness of the Public Distribution System in Ensuring Food Security: A Case Study of Bhubaneswar City, Odisha, India

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Abstract—This study assesses the effectiveness of the Public Distribution System (PDS) in ensuring food security in Bhubaneswar, Odisha. Using data from 200 beneficiaries, it analyzes satisfaction levels based on factors such as availability, accessibility, and service quality. Results show that while most users report moderate to high satisfaction, issues like irregular supply, poor-quality grains, limited shop hours, and lack of transparency persist. Vulnerable groups—such as the elderly, migrants, and less-educated individuals—face added challenges, particularly with digital systems like electronic Point of Sale (e-PoS) and Aadhaar authentication. Despite recent reforms like fortified rice, monthly distribution, and women-led Fair Price Shops (FPS), systemic issues like diversion and weak grievance redressal remain. The study emphasizes the need for inclusive digital practices, improved governance, and targeted support to enhance the efficiency and equity of the PDS.

key words—Beneficiary Satisfaction, Food Security, Odisha, Public Distribution System (PDS), Urban Poverty

I. INTRODUCTION

Food is a fundamental human necessity, crucial for maintaining health, well-being, and overall quality of life across the globe. The global concept of food security is founded on the idea that all individuals must consistently have physical, social, and economic access to adequate, safe, and nutritious food necessary for leading a healthy and active life [1]. Food security is typically understood through four interrelated dimensions: availability (adequate supply of food), access (affordability and ability to acquire food), utilization (proper biological use of food, ensuring adequate nutrition and food safety), and stability (consistent access over time without the

risk of sudden disruptions) [1]. Ensuring food security is essential not only for protecting individual well-being but also for promoting sustainable development and poverty reduction. Hunger and malnutrition continue to pose significant challenges, as they impair health, reduce labor productivity, and hinder economic progress [2].

II. LITERATURE STUDY

The Public Distribution System (PDS) has been a cornerstone of India's strategy to combat food insecurity, aiming to provide subsidized food grains to the economically disadvantaged. Its effectiveness, however, varies across regions due to differences in implementation, infrastructure, and governance. In Bihar, a state historically challenged by poverty and malnutrition, the PDS has shown notable improvements. An examination of data from the National Sample Survey Organization (NSSO), along with detailed findings from Village Level Studies, indicated notable enhancements in the performance of the Public Distribution System (PDS). The findings showed increased cereal consumption and higher calorie intake in both rural and urban regions, along with greater inclusion of economically weaker sections [3]. Kerala's experience with the PDS, particularly in Manjeswar Taluk of Kasaragod District, highlights the transition from a universal to a targeted system. Although the Targeted Public Distribution System (TPDS) was designed to allocate resources specifically to Below Poverty Line (BPL) families, it unintentionally left out many eligible households classified as Above Poverty Line (APL). The introduction of the Aadhaar Enabled Public Distribution System (AePDS) in 2015 sought to

address issues of mismanagement and corruption, leading to improved service delivery and beneficiary satisfaction [4]. In Delhi, the COVID-19 pandemic underscored the PDS's critical role in ensuring food security. However, challenges such as leakages, pilferage, and unequal distribution persisted. Recommendations for integrating blockchain technology and appointing dedicated 'Ration Inspectors' were proposed to enhance transparency and accountability in the supply chain [5]. Odisha, the state encompassing Bhubaneswar, has made significant strides in overhauling its PDS. Although the reach and coverage of the system have expanded, more than 60% of the state's population continues to suffer from undernourishment. The study suggests that while access to subsidized grains has improved, nutritional security lags. It is recommended to implement a universal system across the state and to broaden the range of food items by incorporating high-protein pulses, coarse grains, and biofortified foods [6]. Nationally, the PDS faces systemic challenges. Studies have highlighted issues such as inclusion and exclusion errors, with estimates indicating that 61% of the poor are excluded while 25% of non-poor are included. Leakages during transportation and storage further exacerbate inefficiencies. The need for reforms like end-to-end computerization, transparent beneficiary selection, and the inclusion of more commodities has been emphasized [7]. Enacted in 2013, the National Food Security Act (NFSA) was designed to legally support food security programs, extending coverage to as much as 75% of the rural population and 50% of the urban population. While it marked a significant policy shift, challenges in implementation, such as corruption and diversion, continue to impede its success [8]. In conclusion, while the PDS has been instrumental in addressing food security in India, its effectiveness is contingent upon robust implementation, technological integration, and continuous monitoring. The case of Bhubaneswar offers a unique opportunity to study these dynamics in an urban setting within Odisha.

III. INDIA'S PDS AND THE CHALLENGE OF FOOD SECURITY

India, the world's second most populous nation with over 1.3 billion people, has roughly 195 million individuals suffering from undernutrition [11]. Addressing food insecurity has been central to India's development strategy since independence. Reflecting Jawaharlal Nehru's vision of a welfare-oriented state,

successive governments have introduced multiple food and agricultural interventions aimed at protecting vulnerable populations [9]. Among these, PDS remains the most significant institutional mechanism for ensuring food access. India's food security efforts have their roots in the colonial period. Prior to 1939, there was no organized food policy, and the British administration responded to the Bengal famine of 1942–43—which claimed millions of lives—by initiating emergency rationing in Bombay [10]. To address supply imbalances, the colonial state began procuring grains from surplus provinces and distributing them at subsidized rates to deficit regions. Though originally temporary, this system persisted after independence despite inconsistencies in early food policies [10].

A significant milestone occurred in 1965 with the establishment of the Food Corporation of India (FCI), which formalized the Public Distribution System (PDS) as the country's key food security framework. The FCI manages the procurement of foodgrains directly from farmers, frequently paying prices above market rates, and oversees their storage and distribution through an extensive network of FPS across the nation. These shops supply vital commodities like rice, wheat, sugar, oil, and kerosene at subsidized prices. Initially universal, the PDS shifted to a TPDS in 1997, focusing on Below Poverty Line (BPL) families [10]. The PDS operates alongside a host of other food and agricultural initiatives. These include the Mid-Day Meal Scheme, the National Food Security Mission, Pradhan Mantri Fasal Bima Yojana, and the Rashtriya Krishi Vikas Yojana. The government has also implemented programs for irrigation, soil and water conservation, and the establishment of electronic agricultural markets. These efforts ultimately led to the introduction of the NFSA in 2013, which grants legal entitlement to subsidized food grains for up to 75% of rural residents and 50% of those living in urban areas.

Despite its scale and ambition, the PDS continues to face serious operational inefficiencies. One major issue is the improper identification of beneficiaries under the TPDS. Large inclusion and exclusion errors have been reported, where non-eligible individuals receive benefits while deserving families are left out [12]. Additionally, many states report the existence of "ghost" ration cards issued to non-existent individuals, suggesting significant leakage and diversion of grains to the open market. Corruption

and inefficiency remain endemic. According to the Planning Commission (2005), nearly 36% of subsidized rice and wheat under TPDS is lost due to leakage. According to a 2011 estimate from the Department of Food and Public Distribution (DFPD), the figure was even greater, reaching 46.7% [13]. These losses occur during procurement, transportation, and distribution stages—before the food ever reaches intended recipients. Furthermore, the PDS was identified as one of the ten most corrupt public services in India [14]. In response, the government has introduced the e-PDS system to digitize and monitor transactions throughout the supply chain. This digital transformation aims to enhance transparency, accountability, and efficiency through the use of Information and Communication Technologies. A key component of this reform is Aadhaar-based biometric authentication, intended to ensure accurate identification and prevent duplication or fraud [15]. The NFSA mandates end-to-end computerization to track the flow of food grains and reduce diversion. However, the integration of Aadhaar has not been without challenges. Technical issues in linking Aadhaar with ration cards have disrupted access to food for some beneficiaries. Moreover, while technology has the potential to reduce corruption and leakage, its implementation must be accompanied by administrative reforms and capacity-building at the state level to be truly effective. Ultimately, while the PDS remains a cornerstone of India's food security apparatus, it must overcome significant structural and governance-related challenges. The transition to digital platforms, if executed inclusively and transparently, holds promise for reducing inefficiencies and reinforcing the right to food for all citizens. The objective of this paper is to assess the current role of PDS in food security in Bhubaneswar Municipal Corporation boundary; to examine the role of government policies and food security programs – Assessing the effectiveness of initiatives like PDS, NFSA, and other local interventions; to examine the factors associated with the beneficiary's satisfaction from the public Distribution System; to propose policy recommendations and long-term solutions pertaining to PDS System in the study area.

IV. ARCHITECTURE OF THE PDS IN ODISHA

The PDS in Odisha has undergone significant reforms to enhance food security and ensure efficient delivery of subsidized food grains to its citizens. The system operates under a decentralized procurement model,

with the Odisha State Civil Supplies Corporation (OSCSC) playing a pivotal role in procurement, storage, and distribution. To streamline operations and improve transparency, Odisha implemented the Paddy Procurement Automation System (P-PAS). This digital platform automates the procurement process, from farmer registration to payment, ensuring timely and accurate transactions. The integration of P-PAS has been instrumental in reducing delays and enhancing accountability in the procurement cycle. Further digitization efforts include the end-to-end computerization of the TPDS. This initiative encompasses the digitization of beneficiary databases, automation of FPS with electronic Point of Sale (e-PoS) devices, and real-time tracking of food grain distribution. Such measures have significantly curtailed leakages and improved service delivery. Odisha has also been proactive in implementing the One Nation One Ration Card (ONORC) scheme, facilitating intra-state and inter-state portability of ration cards. This allows beneficiaries to receive their allotted food grains from any Fair Price Shop within the state, improving both accessibility and convenience. In terms of storage and distribution, the state has established Departmental Storage Centres (DSCs) and Rice Receiving Centres (RRCs) to manage inventory and ensure timely supply to FPS. These centers are equipped with modern facilities to maintain the quality of food grains and streamline logistics. Moreover, Odisha has pioneered the fortification of rice distributed through PDS, aiming to address nutritional deficiencies among its population. The fortified rice initiative, initially piloted in Malkangiri district, has been expanded to all 30 districts, reflecting the state's commitment to enhancing the nutritional value of subsidized food grains.

V. CEILING OF PDS BENEFICIARIES UNDER NFSA

The beneficiary limit under the NFSA in Odisha is set at 82.17% of the rural population and 55.77% of the urban population, amounting to approximately 326.41 lakh beneficiaries, with 3.5 lakh residing within the Bhubaneswar Municipal Corporation (BMC) area. This coverage is based on data from the 2011–12 Household Consumption Expenditure survey by the National Sample Survey Office (NSSO). At the national level, the Targeted Public Distribution System (TPDS) under NFSA covers 67% of the population—75% in rural and 50% in

urban regions—with members of Priority Households eligible to receive 5 kilograms of food grains monthly at subsidized prices of ₹3 per kilogram for rice, ₹2 for wheat, and ₹1 for coarse grains. Meanwhile, households categorized under the Antyodaya Anna Yojana (AAY) continue to be entitled to 35 kilograms of food grains per month at these subsidized rates [15].

VI. NFSA SCHEMES IN ODISHA

Under NFSA, Odisha has implemented two primary categories of ration cards: AAY and Priority Household (PHH), each designed to address the food security needs of different segments of the population. The AAY focuses on the most impoverished households in Odisha. Under this program, beneficiaries receive 35 kilograms of rice monthly per household at a heavily subsidized price of Re. 1 per kilogram. The scheme is designed to guarantee that the most vulnerable groups have adequate access to food grains to fulfill their nutritional needs (foodcommission.odisha.gov.in). The PHH category includes families that fulfill certain eligibility requirements established by the state government, targeting economically disadvantaged groups. Each individual in a PHH household is eligible to receive 5 kilograms of food grains monthly at subsidized prices: ₹3 per kilogram for rice, ₹2 per kilogram for wheat, and ₹1 per kilogram for coarse grains [16]. This provision ensures that a broader segment of the population has access to affordable food grains. To facilitate the distribution and management of these ration cards, Odisha has established 378 Ration Card Management System centres across its 314 blocks and 64 urban local bodies. These centres play a crucial role in processing applications, issuing ration cards, and addressing grievances related to the PDS. Through the implementation of AAY and PHH ration cards, Odisha continues to strengthen its commitment to food security, ensuring that both the most vulnerable and economically disadvantaged populations have consistent access to essential food grains.

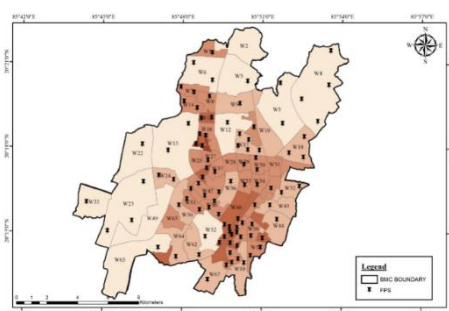


Fig.1 Map showing the location of FPS in BMC wards
Source – Author generated this figure using open street data in Arc GIS.

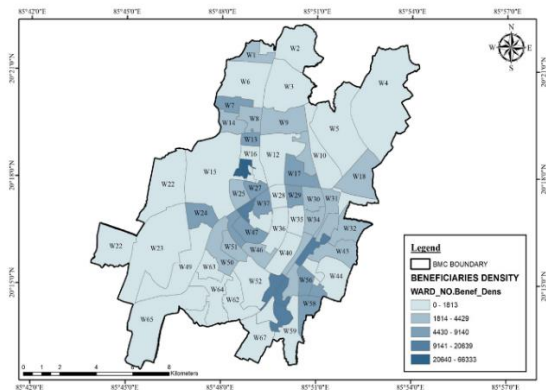


Fig.2 Map showing the beneficiary density in BMC wards,
Source – Author generated this figure using open street data in Arc GIS.

Table.1 Table showing the number of ration card holder & beneficiaries of AAY & PHH Scheme in BMC wards.

Antyodaya Anna Yojana (AAY)	
RATION CARDS	5,264
BENEFICIARIES	15,260
Priority Household (PHH)	
RATION CARDS	97,495
BENEFICIARIES	3,35,796
TOTAL NFSA RATION CARD HOLDER	1,02,759
TOTAL NFSA BENEFICIARIES	3,51,056

VII. CRITERIA FOR SELECTION OF BENEFICIARIES

The identification of PDS beneficiaries under the National Food Security Act (NFSA) in Odisha is based on assessing the economic status of families, following a principle of exclusion. The Government of Odisha has specified nine exclusion criteria for this purpose.

Inclusion Criteria:

- Households without any shelter.
- Households with destitute individual's dependent on alms.
- All households belonging to Primitive Tribal Groups.
- Households with a widow pension holder, provided they do not fall under any exclusion criteria.
- Individuals with disabilities of 40% or higher.

- Any transgender individuals.

Exclusion Criteria:

Families falling under any of the following nine conditions are ineligible for NFSA benefits in Odisha:

- Households owning two or more motorized three-wheelers, four-wheelers, heavy vehicles, trawlers, or motorboats.
- Households possessing mechanized agricultural equipment like tractors or harvesters.
- Households that have members working as regular gazette or non-gazette employees in the Central or State Government, Public Sector Undertakings, government-supported autonomous organizations, or local government bodies (excluding those receiving only incentives or honorarium) are included in this category.
- Households where any member has a monthly income exceeding Rs. 10,000 in rural areas or Rs. 15,000 in urban areas are included in this category.
- Pensioners who receive a monthly income exceeding Rs. 10,000 in rural areas or Rs. 15,000 in urban areas fall under this category.
- Households owning registered enterprises (excluding micro-enterprises) engaged in manufacturing or services.
- Households liable to pay Income Tax or Professional Tax.
- Households that have a domestic electricity connection of 2 kilowatts or higher and use an average of 300 units of electricity monthly are included in this category.
- Households having three or more rooms with pucca walls and pucca roofs.

VIII. CURRENT REFORMS IN POLICIES

Since early 2024, the Odisha state government has introduced a series of policy reforms to enhance the efficiency, transparency, and inclusivity of its PDS and related welfare initiatives. In February 2024, one-time cash assistance of ₹1,000 was provided to around 96 lakh PDS beneficiary families to help them cope with rising prices of essential commodities. Beginning January 2025, the government revised the

distribution schedule of ration rice from a tri-monthly to a monthly basis, aiming to curb misuse from bulk stockpiling and reduce logistical burdens on beneficiaries. The State Food Security Scheme (SFSS) was also extended until December 31, 2028, benefiting approximately 9.97 lakh individuals across 3,14,923 families, with a financial outlay of ₹1,250 crore over five years to ensure sustained food security. To promote transparency and efficiency, the digitization of FPS was undertaken, involving the installation of e-POS machines for real-time tracking of grain distribution. In a move to tackle nutritional deficiencies, the state introduced fortified rice enriched with essential vitamins and minerals through the PDS, especially targeting rural populations. Additionally, women's Self-Help Groups (SHGs) were encouraged to participate in FPS operations, aiming to empower women economically while enhancing accountability within the PDS framework. The government also implemented a temporary scheme during the COVID-19 pandemic to supply free dry rations (5 kg rice per person per month) to migrant laborers and workers without ration cards. Furthermore, to ensure better service delivery and beneficiary satisfaction, grievance redressal mechanisms were strengthened with the establishment of dedicated helplines and complaint resolution cells. These collective reforms underscore the state's commitment to inclusive food security and responsive governance.

IX. BENEFICIARY'S SATISFACTION IN PDS

The frequency with which customers purchase goods from fair price shops is largely influenced by the quality of services provided. The core objective of the Public Distribution System (PDS) cannot be achieved if genuine beneficiaries do not effectively utilize the resources made available through these shops. Customer satisfaction plays a crucial role in encouraging consistent use of PDS services; without it, beneficiaries may not fully engage with the system. This study aims to identify the key factors that contribute to customer satisfaction. Conducted within the jurisdiction of Bhubaneswar Municipal Corporation, the research involved collecting feedback from 200 ration cardholders using a random sampling method. The data was examined through the Chi-square test, which indicated that factors like age, occupation, income, family spending, regular availability of goods throughout the month, and the precision of the distributed quantities significantly impact customer satisfaction [17]. The Likert Scale is

used method for measuring customer satisfaction by assigning numerical values to responses. It generally employs a 5-point scale, with 1 indicating the most negative response and 5 indicating the most positive response. The respondents had to scale their response on a scale of 1 to 5 based on their experience, where 1 stands for very Dissatisfied and 5 stands for very Satisfied. The level of consumer satisfaction with services provided at public distribution shops was assessed by scoring responses to ten satisfaction-related questions included in the questionnaire. Each answer was rated using a five-point scale. Responses were scored on a scale from one to five, making 50 the highest possible total score for a consumer. Each consumer's total score was then divided by 50 and multiplied by 100 to create a 'Satisfaction Index.' This index ranged from 20.00 to 100.00, with an overall average (Grand Mean) of 68.03. Using the satisfaction index, consumers were categorized into three groups: low, moderate, and high satisfaction levels. Quartiles were employed to define these groups. Consumers with an index up to 54.53 were classified as having low satisfaction; those with scores between 54.54 and 81.52 were considered moderately satisfied; and consumers with an index above 81.53 were regarded as highly satisfied. Among the 200 respondents, 22 (11%) fell into the low satisfaction category, 142 (71%) were moderately satisfied, and the remaining 36 (18%) were highly satisfied. Table no. 2 illustrates the different variables / factors associated with the Consumer's Satisfaction.

Table.2 Table showing the χ^2 Value.

Variables	Level of Satisfaction			Total	x ² Value
	Low (n=22)	Moderate (n=142)	High (n=36)		
Age					
Up to 30	2	34	7	43	4.87
31 to 50	9	59	19	87	
Above 50	11	49	10	70	
Gender					
Male	8	63	12	83	1.71
Female	14	79	24	117	
Educational Qualification					

Illiterate	3	13	0	16	84.61
Up to H.Sc.,	0	18	0	18	
Diploma	0	0	2	2	
Under Graduate	7	44	18	69	
Post Graduate	4	0	14	18	
Others	8	67	2	77	
Occupation					
Agriculturists	2	23	3	28	47.08
Business	0	0	1	1	
Self Employed	16	82	8	106	
Home Maker	3	32	16	51	
Salaried	1	5	8	14	
Monthly Income (Rs.)					
Up to 5000	0	11	2	13	7.20
5001 to 10000	13	45	14	72	
Above 10000	9	86	20	115	
Total Family Members					
Up to Three	7	27	11	45	16.66
Four	11	82	8	101	
Above Four	4	33	17	54	
Type of Family					
Joint	9	84	22	115	2.83
Nuclear	13	58	14	85	
Possible to Obtain Goods from PDS in all Months					
Yes	4	67	19	90	7.55
No	18	75	17	110	
Accurate Weight of Goods					
Yes	19	102	28	149	2.37
No	3	40	8	51	

Time Spent on PDS (Hrs.)					
Up to One	14	113	18	145	25.60
Two	7	26	10	43	
Above Two	1	3	8	12	
PDS Located at Easily Accessible Place					
Yes	18	121	24	163	6.55
No	4	21	12	37	
Working Hours					
Up to Six	9	56	12	77	0.51
Above Six	13	86	24	123	
Goods Supplied in Time					
Yes	17	94	22	133	1.62
No	5	48	14	67	
Display of Stock Details					
Yes	20	106	23	149	5.25
No	2	36	13	51	
PDS function on All Sundays					
Yes	6	34	11	51	0.70
No	16	108	25	149	

X. FINDINGS AND ANALYSIS

An analysis of consumer satisfaction with PDS reveals notable demographic and operational influences. Individuals aged between 31 and 50 tend to report higher satisfaction levels, while those above 50 years often express dissatisfaction, potentially due to the physical challenges older consumers face, such as standing in long queues. To address this, it is recommended that PDS staff prioritize elderly consumers during distribution to enhance their experience and satisfaction. Among occupational groups, homemakers generally exhibit greater satisfaction with PDS services, whereas self-employed individuals report lower satisfaction levels. Satisfaction is also closely tied to the regular availability of goods—cardholders who believe that essential commodities are accessible every month through the PDS tend to be more satisfied, whereas

those who face irregular availability express dissatisfaction. This inconsistency is partly attributed to the diversion of PDS goods to the open market, suggesting the need for strict actions against those involved in such malpractice, including corrupt officials and political influences. Furthermore, limited operating hours at Fair Price Shops also affect satisfaction; cardholders have shown discontent when shops are open for only six hours a day. To improve this, supervising authorities like Deputy Registrars and Cooperative Sub-Registrars should conduct unannounced inspections and ensure shops remain operational for at least eight hours daily, thereby promoting accountability and better service delivery. The PDS continues to play a vital role in ensuring food security, with most beneficiaries acknowledging that it provides essential food grains at subsidized rates, significantly reducing household food expenses. Improvements in beneficiary identification and reduced diversion of resources have bolstered public trust in the system. Beneficiaries who are well-informed about their entitlements tend to report higher levels of satisfaction. Furthermore, areas with consistent shop timings, proper infrastructure, and transparent practices—such as clearly displayed stock registers—experience better user satisfaction. Innovations like rice ATMs in pilot areas such as Bhubaneswar have received positive responses due to their convenience and round-the-clock availability.

However, the adoption of digital systems, while largely welcomed, has posed challenges for certain groups, particularly the elderly and less-educated users who often struggle with the e-PoS systems. Similarly, while the One Nation One Ration Card (ONORC) initiative is gradually improving service for migrant workers, many are still unaware of their eligibility to access rations outside their home districts or lack clarity about the process. Urban migrants without proper documentation also face significant barriers in accessing benefits. Women, in particular, encounter difficulties due to shop distance, unsuitable timings, or safety concerns. Satisfaction levels are adversely affected by recurring issues such as the distribution of poor-quality grains, especially in urban slums, and the irregular availability of rations, including skipped months. Long queues caused by limited shop hours and inadequate staffing further add to the inconvenience. Frequent complaints include harassment, overcharging, and denial of full entitlements. Unpredictable shop timings, such as delayed openings or sudden closures,

are common sources of dissatisfaction, particularly among working beneficiaries. The lack of displayed stock and pricing information in many Fair Price Shops undermines transparency and breed mistrust. More educated beneficiaries tend to be better at identifying issues and navigating grievance redressal systems, while marginalized groups—such as the elderly and those without mobile phones—face difficulties in Aadhaar or e-PoS authentication. Despite these challenges, the PDS has proven especially valuable during times of crisis, like the COVID-19 pandemic, where it served as a crucial safety net. Overall, beneficiaries recognize the system's role in maintaining a minimum level of food security, particularly during periods of inflation or unemployment.

XI. CONCLUSION

In conclusion, the PDS is vital for maintaining food security and reducing household expenditure on essential commodities, particularly for vulnerable populations. Recent reforms—such as digitalization, improved beneficiary identification, and initiatives like fortified rice and rice ATMs—have contributed to enhanced satisfaction among users. However, challenges persist, especially for elderly individuals, women, migrants, and less-educated beneficiaries, who often face barriers related to accessibility, digital literacy, and documentation. Issues like irregular ration supply, poor-quality grains, limited shop hours, and lack of transparency continue to undermine user trust. Satisfaction levels are notably higher in areas with consistent service, informed beneficiaries, and visible accountability mechanisms. In respect to further strengthen the system, there is a pressing need for better grievance redressal, stricter measures against diversion, inclusive digital practices, and targeted support for marginalized groups.

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