

Assessing the Impact of the Public Distribution System on Household Poverty and Nutritional Security in Bahraich District, Uttar Pradesh

Tabrez Khan¹, Dr. Suneet Kumar Singh²

¹Research Scholar, Ph.D. (Economics), Dr. Ram Manohar Lohia Avadh University, Ayodhya, Uttar Pradesh, India

²Professor, Department of Economics, Ram Nagar P.G. College, Ram Nagar, Barabanki (U.P.)

Abstract:

India's Public Distribution System (PDS) is simultaneously a food-security instrument, an implicit income transfer and an administrative platform for reaching vulnerable households. This study examines what recent secondary evidence implies for poor households in Uttar Pradesh, with particular reference to Bahraich, a predominantly rural and socio-economically deprived district. A descriptive secondary-data design was used. Evidence was triangulated from the Census of India, National Family Health Survey-based District Nutrition Profile, NITI Aayog's Multidimensional Poverty Index, Household Consumption Expenditure Surveys (HCES), National Food Security Portal, programme evaluations and peer-reviewed literature. Percentage-point changes, relative changes and state-national consumption gaps were calculated where comparable observations were available. Bahraich's multidimensional poverty headcount declined from 71.85% in 2015–2016 to 54.44% in 2019–2021, while the MPI value declined from 0.391 to 0.285. Child stunting fell from 65% to 52% and underweight from 44% to 38%, but wasting remained 14% and child anaemia remained extremely high, declining only from 74% to 72%. Uttar Pradesh's rural monthly per-capita consumption expenditure rose from ₹3,191 in 2022–2023 to ₹3,481 in 2023–2024, yet remained 15.6% below the national rural average. Current administrative data show a very large PDS platform in Uttar Pradesh, with more than 36.3 million ration cards. The combined evidence suggests that the PDS is indispensable for protecting staple consumption and household purchasing power, but cereal security alone does not generate nutritional resilience. A nutrition-sensitive, portable and exclusion-resistant PDS, supported by robust grievance redressal and district-level monitoring, is required in high-deprivation districts such as Bahraich.

Keywords: Public Distribution System; food security; multidimensional poverty; nutrition; Bahraich; Uttar Pradesh; secondary data.

1. Introduction

Food insecurity in India is not simply a problem of aggregate food availability. It is also a problem of purchasing power, entitlement, distribution, local administrative capacity and the ability of poor households to convert public support into adequate diets. The Public Distribution System (PDS) occupies a central place in this institutional architecture. Under the National Food Security Act (NFSA), eligible Priority Household (PHH) and Antyodaya Anna Yojana (AAY) beneficiaries are entitled to subsidised

food grains through Fair Price Shops (Government of India, 2013). Since January 2024, food grains covered by the NFSA have been provided free of cost under the extended Pradhan Mantri Garib Kalyan Anna Yojana, further increasing the real transfer represented by the system for low-income households (Department of Food and Public Distribution, 2025).

The scale of the PDS makes its performance economically significant. Yet national coverage can conceal major differences in effective access. Earlier research found that utilisation depends on shop-level supply, the market-to-PDS price gap, ration-card status and administrative reliability, rather than household demand alone (Khera, 2011a). Leakage also varied widely across states, and subsequent reforms demonstrated that diversion could fall when doorstep delivery, computerised records, transparent allocations and stronger monitoring were introduced (Drèze & Khera, 2015). More inclusive state systems have frequently generated better household use because they reduce exclusion and create a broader constituency for reliable service delivery (Kishore & Chakrabarti, 2015).

Bahraich provides a particularly important setting for examining these issues. The district is overwhelmingly rural and has historically combined low literacy, agrarian dependence, weak infrastructure and high poverty. The research problem identified in the underlying doctoral synopsis is therefore broader than whether food grains are officially allocated. It concerns whether poor households can reach Fair Price Shops, obtain adequate quantities of acceptable quality, realise meaningful savings in household budgets and avoid exclusion caused by administrative or technological barriers. The synopsis also highlights the need to examine corruption, pilferage, entitlement awareness, e-PoS devices and Aadhaar-based authentication as determinants of PDS effectiveness.

Recent official datasets make it possible to place this district-level problem within a wider empirical context. NITI Aayog's district nutrition profile provides comparable nutrition indicators for Bahraich from NFHS-4 and NFHS-5. The national Multidimensional Poverty Index provides district-level estimates of poverty incidence and intensity. The HCES provides current benchmarks for consumption expenditure and the imputed value of selected free welfare items, while the National Food Security Portal provides an administrative snapshot of the current ration-card and Fair Price Shop network. Taken together, these sources cannot establish a causal effect of PDS on poverty or nutrition, because they were collected for different purposes and at different times. They can, however, identify whether the direction of change in deprivation is consistent with the role expected of a large food-security system and, equally importantly, where food insecurity persists despite broad cereal coverage.

2. Literature Review and Analytical Perspective

Empirical research has moved away from treating the PDS as a uniform national programme. Khera (2011a), using household evidence from Rajasthan, showed that under-purchase could reflect supply-side constraints such as unavailable stocks rather than low beneficiary demand. Khera (2011b) also documented high diversion in earlier periods, which encouraged a policy debate over whether physical food distribution should be replaced by cash. Later evidence complicated that conclusion. Drèze and Khera (2015) showed that leakage declined substantially in several reforming states, indicating that diversion was responsive to governance. Kishore and Chakrabarti (2015) similarly found that the “new-style” PDS, characterised by broader coverage, lower prices and tighter administration, improved utilisation and welfare outcomes relative to narrowly targeted systems.

A second strand of literature distinguishes food security from nutritional security. Subsidised rice or wheat can raise real disposable resources and protect calories, but a cereal-dominated transfer cannot

independently address deficiencies in protein, iron, micronutrients or diet diversity. Chakrabarti, Kishore, and Roy (2018) found that subsidising pulses increased total pulse consumption, demonstrating that the composition of the food basket matters. A systematic review by George and McKay (2019) concluded that the PDS is important for food access, especially for poor households, but its nutritional contribution is constrained by operational problems and the limited diversity of distributed commodities. This distinction is essential for Bahraich because high PDS dependence can coexist with high anaemia or wasting.

A third strand concerns digitisation. Biometric authentication, electronic point-of-sale devices and digitised beneficiary databases can reduce duplicate identities and improve transaction traceability. However, technology can also create an exclusion channel when authentication fails or connectivity is weak. Menon (2018) documented implementation problems in Jharkhand and cautioned against treating biometric success as equivalent to entitlement validity. Masiero (2018) similarly argued that technological systems redistribute trust and accountability rather than automatically resolving institutional weaknesses. These findings support an analytical framework in which PDS performance has four dimensions: coverage and access, quantity and reliability, economic transfer, and administrative inclusion. Nutritional outcomes are treated as a downstream condition influenced by PDS but also by sanitation, health care, maternal nutrition and dietary diversity.

3. Objectives

- To assess recent trends in multidimensional poverty and nutrition in Bahraich using comparable official secondary data.
- To examine current consumption expenditure and the scale of PDS-related welfare infrastructure in Uttar Pradesh.
- To interpret whether existing secondary evidence supports a transition from cereal security toward a nutrition-sensitive and exclusion-resistant PDS in high-deprivation districts.

4. Materials and Methods

The study used a descriptive and comparative secondary-data design. The unit of analysis varied according to source: Bahraich district for poverty and nutrition indicators, Uttar Pradesh for consumption and administrative PDS indicators, and India for benchmark comparisons. The principal observation window extends from Census 2011 to July 2026, but trend calculations use only datasets with sufficiently comparable definitions. The district's socio-demographic context was obtained from the Census of India. Bahraich nutrition indicators were obtained from the District Nutrition Profile prepared by NITI Aayog and the International Food Policy Research Institute using NFHS-4 (2015–2016) and NFHS-5 (2019–2021) data (Singh et al., 2022). District multidimensional poverty estimates were taken from NITI Aayog's national MPI baseline and progress review (NITI Aayog, 2021, 2023).

Consumption evidence was obtained from MoSPI's HCES 2022–2023 and 2023–2024. HCES 2022–2023 covered 261,746 households nationally, including 155,014 rural and 106,732 urban households, and used a stratified multistage sampling design (Ministry of Statistics and Programme Implementation [MoSPI], 2024). The survey's imputed consumption measure includes selected goods received free through social-transfer programmes. Because this imputation includes several programmes and commodities, the difference between imputed and non-imputed monthly per-capita consumption expenditure (MPCE) is not interpreted as a PDS-only effect. Current administrative coverage was taken from the National Food

Security Portal as a July 2026 snapshot (National Food Security Portal, 2026). Supporting interpretation drew on peer-reviewed research and the NCAER evaluation of the TPDS (Paul, 2015).

Analysis was intentionally parsimonious. For indicators observed at two points, absolute change was calculated as the later value minus the earlier value in percentage points; relative change was calculated as the absolute change divided by the earlier value. Uttar Pradesh's state-national MPCE gap was calculated as the difference between the national and state value as a percentage of the national benchmark. No regression, causal attribution or pooled significance testing was undertaken because the datasets have different sampling frames, periodicities and outcome definitions. The method therefore constitutes triangulation of high-quality secondary evidence rather than an impact evaluation in the experimental sense.

Table 1. Secondary Data Sources and Analytical Use

Source	Level	Key variables	Use in analysis
Census of India 2011	Bahraich	Population, rurality and district context	Baseline structural characteristics
NITI Aayog MPI 2021/2023	Bahraich	Headcount, intensity and MPI score	Change in multidimensional poverty
District Nutrition Profile 2022 (NFHS-4/NFHS-5)	Bahraich	Child and women nutrition	Nutritional progress and persistence
HCES 2022–23 and 2023–24	Uttar Pradesh/India	MPCE; imputed welfare consumption	Purchasing-power benchmark
National Food Security Portal, July 2026	Uttar Pradesh	Ration cards, FPS and e-PoS	Administrative scale and digitalisation
Peer-reviewed and programme evaluations	India/states	Access, leakage, nutrition, digitisation	Interpretive triangulation

Note. The data sources were not merged at the micro level. Comparisons are descriptive and use published aggregate indicators only.

5. Results

5.1 Poverty reduction in Bahraich remains substantial but incomplete

Bahraich registered a marked reduction in multidimensional poverty between the NFHS-4 and NFHS-5 periods. The headcount ratio fell from 71.85% to 54.44%, a decline of 17.41 percentage points or approximately 24.2% relative to the baseline. The intensity of poverty declined more slowly, from 54.38% to 52.42%, while the MPI value fell from 0.391 to 0.285, a relative reduction of approximately 27.1% (NITI Aayog, 2023). The divergence between a relatively large fall in headcount and a much smaller fall in intensity is analytically important. It suggests that many households crossed the multidimensional poverty cut-off, but households that remained poor continued to experience multiple simultaneous deprivations. In a district where food subsidy is likely to be a substantial component of social protection, this means that successful ration delivery can reduce one dimension of household stress without necessarily resolving deficits in housing, sanitation, education, health and employment.

5.2 Nutrition shows improvement in anthropometry but persistent anaemia

The nutrition profile presents a similarly mixed picture. Child stunting declined from 65% in 2016 to 52% in 2020, a 13 percentage-point reduction. Underweight declined from 44% to 38%. In contrast, wasting remained unchanged at 14%, severe wasting rose from 6% to 7%, and child anaemia decreased only

marginally from 74% to 72% (Singh et al., 2022). Among women aged 15–49 years, underweight declined from 35% to 30%, while anaemia among non-pregnant women declined from 53% to 49% and anaemia among pregnant women from 50% to 49%. These changes indicate that the district has made progress in chronic anthropometric deprivation while acute undernutrition and micronutrient deficiency remain deeply entrenched.

The magnitude of the remaining burden is large. The 2020 profile estimated approximately 284,414 stunted children under five, 78,322 wasted children, 207,621 underweight children and 351,391 anaemic children. Thus, a high-coverage cereal safety net should be understood as necessary but not sufficient. The persistence of anaemia and wasting is consistent with evidence that rice and wheat subsidies protect calories and household purchasing power more effectively than they improve diet quality. Diversifying the subsidised basket, where fiscally and logistically feasible, is therefore relevant to districts with continuing micronutrient deprivation.

Table 2. Selected Changes in Poverty and Nutrition in Bahraich

Indicator	Earlier period	Later period	Change
MPI headcount (%)	71.85	54.44	-17.41 pp
MPI intensity (%)	54.38	52.42	-1.96 pp
MPI score	0.391	0.285	-27.1% relative
Child stunting (%)	65	52	-13 pp
Child wasting (%)	14	14	0 pp
Severe wasting (%)	6	7	+1 pp
Child underweight (%)	44	38	-6 pp
Child anaemia (%)	74	72	-2 pp
Women underweight (%)	35	30	-5 pp
Non-pregnant women anaemia (%)	53	49	-4 pp

Sources: NITI Aayog (2023); Singh et al. (2022). MPI periods are 2015–2016 and 2019–2021; nutrition indicators compare NFHS-4 and NFHS-5 district estimates.

5.3 Uttar Pradesh consumption has risen, but remains below the national benchmark

HCES indicates improving consumption levels in Uttar Pradesh, but the state remains below national averages. Rural MPCE without imputation increased from ₹3,191 in 2022–2023 to ₹3,481 in 2023–2024, an increase of about 9.1%. Urban MPCE rose from ₹5,040 to ₹5,395, or about 7.0% (MoSPI, 2024, 2025). In 2023–2024, the corresponding all-India values were ₹4,122 for rural households and ₹6,996 for urban households. Uttar Pradesh’s rural MPCE was therefore approximately 15.6% below the national rural benchmark, while its urban MPCE was about 22.9% below the national urban benchmark.

The HCES imputation of selected free welfare items raises Uttar Pradesh’s 2023–2024 rural MPCE from ₹3,481 to ₹3,578 and urban MPCE from ₹5,395 to ₹5,474. The increments, ₹97 and ₹79 per person per month respectively, should not be read as the monetary value of the PDS alone, because MoSPI’s imputation includes multiple free goods and programmes. Even so, the comparison illustrates an important welfare principle: in-kind transfers increase effective household consumption beyond cash expenditure. For a poor household with several members, the cumulative monthly value can materially relax the food budget and protect expenditure on medicines, transport, schooling, cooking fuel and other necessities.

Table 3. Monthly Per-Capita Consumption Expenditure (₹)

Period	Geography	Rural MPCE	Urban MPCE	With imputation: Rural / Urban
2022–23	Uttar Pradesh	3,191	5,040	3,277 / 5,104
2023–24	Uttar Pradesh	3,481	5,395	3,578 / 5,474
2023–24	India	4,122	6,996	4,247 / 7,078

Sources: MoSPI (2024, 2025). “With imputation” includes selected goods received free through social-transfer programmes and is not a PDS-only estimate.

5.4 The administrative platform is large and increasingly digitised

The contemporary scale of the PDS in Uttar Pradesh is substantial. The National Food Security Portal reported 36,373,543 ration cards in the state in July 2026, including 4,081,014 AAY cards and 32,292,529 PHH cards. AAY therefore accounts for approximately 11.2% of cards and PHH for 88.8%. The portal separately reported 78,455 Fair Price Shops, while the operational e-PoS dashboard reported 80,493 operational devices or units under its own reporting base (National Food Security Portal, 2026). These dashboard totals should not be converted into a coverage percentage because their update cycles and denominators differ. Nonetheless, they demonstrate that digitised transaction infrastructure now operates at enormous scale.

Scale does not eliminate local transaction failure. A system can be highly digitised and still impose exclusion through outdated household records, biometric mismatch, network interruption, incorrect seeding or inability of an elderly beneficiary to authenticate. For Bahraich, where many settlements are rural and livelihoods involve manual work and mobility, digital systems require fallback authentication and rapid correction. The relevant performance measure is not the proportion of shops equipped with technology, but the proportion of eligible households that receive the correct quantity at the correct time without excessive travel, repeat visits or denial.

Table 4. Selected NFSA Administrative Indicators for Uttar Pradesh, July 2026

Indicator	Reported value
Total ration cards	36,373,543
AAY ration cards	4,081,014 (11.2%)
PHH ration cards	32,292,529 (88.8%)
Fair Price Shops	78,455
Operational e-PoS (separate dashboard basis)	80,493

Source: National Food Security Portal (2026). FPS and e-PoS counts come from separate dashboards with different reporting bases and should not be treated as a direct numerator-denominator pair.

6. Discussion

The evidence supports three central interpretations. First, the PDS should be evaluated as an income-protection mechanism as well as a food-distribution programme. The persistent consumption gap between Uttar Pradesh and the national average means that subsidised or free grain has a larger marginal value for low-expenditure households. Where a family receives its full entitlement, the avoided market purchase releases resources for other necessities. This is consistent with earlier evidence that PDS participation changes household purchasing power and that broad, reliable coverage can outperform narrowly targeted

systems (Khera, 2011a; Kishore & Chakrabarti, 2015). For a district such as Bahraich, which remains highly deprived despite poverty reduction, the opportunity cost of an interrupted ration is therefore substantial.

Second, the nutritional evidence argues against equating cereal availability with nutritional adequacy. The fall in stunting and underweight is encouraging, but the near-stagnation of anaemia and wasting shows that households can remain nutritionally vulnerable even when staple food access improves. Anaemia has multiple determinants, including iron intake, infection, maternal nutrition and health-service access, but the composition of the food basket also matters. The pulse-subsidy evidence reported by Chakrabarti et al. (2018) illustrates that a PDS can influence healthier consumption when it subsidises foods that poor households otherwise purchase in small quantities. Districts with very high child anaemia may therefore justify carefully designed diversification toward pulses, fortified staples or locally acceptable millets, combined with maternal-child health and sanitation interventions.

Third, governance quality determines whether nominal entitlement becomes real welfare. Historical leakage estimates were high, but subsequent reductions show that physical distribution can be improved rather than simply abandoned (Drèze & Khera, 2015). The policy implication is to distinguish diversion from exclusion. Diversion requires stock tracking, dealer accountability, public disclosure and audit. Exclusion requires current beneficiary lists, portability, accessible enrolment and authentication fallback. Biometric systems can reduce some forms of fraud, but they should never convert a technical failure into a food denial (Masiero, 2018; Menon, 2018). The One Nation One Ration Card architecture is particularly relevant to seasonal and migrant workers, but portability must be matched by awareness and functioning devices at the destination.

The Bahraich evidence also demonstrates why district-level analysis is necessary. State averages cannot reveal travel distance to a Fair Price Shop, local road conditions, dealer opening schedules, grain quality, informal charges or the transaction costs borne by women, elderly persons and daily-wage workers. These are precisely the mechanisms emphasised in the doctoral research framework on which this paper is based. Secondary data can identify the macro-pattern and the policy tension, but household surveys are required to measure whether the poor actually experience the expected transfer. In this sense, the present analysis complements rather than replaces primary field research.

7. Policy Implications

A nutrition-sensitive PDS should be the first priority for high-burden districts. Rice and wheat remain essential because they provide a predictable calorie floor, but the persistence of anaemia suggests a case for nutritionally richer complements. Pulse distribution has empirical support, while fortified staples and locally consumed millets can be considered where supply chains are reliable. Diversification should not reduce the quantity or reliability of basic entitlement.

Second, administrative success should be measured through beneficiary receipt rather than equipment counts or grain offtake alone. District dashboards should publish entitlement, quantity actually delivered, failed authentication transactions, grievance disposal, stock-out days and independent quality complaints. Exception handling must permit OTP, alternate household authentication or authorised manual fallback so that network and biometric failure do not become exclusion mechanisms.

Third, Bahraich requires convergence. The same households facing food-budget pressure may also face sanitation deficits, anaemia, unstable employment and limited health access. Linking PDS monitoring with nutrition, maternal health and local social-protection programmes would make the system more responsive

to multidimensional deprivation. Gram Panchayats and community organisations can support public verification and social audit, but they require access to timely allocation and transaction information.

8. Limitations

The study has four limitations. First, it uses aggregate secondary data and cannot identify household-level causal effects of PDS participation. Second, the principal datasets cover different periods, so temporal co-movement should not be interpreted as a single longitudinal series. Third, HCES imputation includes multiple free welfare items; the increment in MPCE cannot be attributed solely to PDS grain. Fourth, current NFSA administrative dashboards are dynamic and may use different reporting bases across ration-card, Fair Price Shop and e-PoS indicators. The analysis therefore emphasises direction, magnitude and policy consistency rather than causal effect sizes.

9. Conclusion

Secondary evidence presents a clear but nuanced picture. Bagraich has experienced an important reduction in multidimensional poverty and improvements in stunting and underweight, yet more than half of the population remained multidimensionally poor in the NFHS-5 period and child anaemia remained above 70%. Uttar Pradesh's consumption expenditure is rising, but remains below the national average, making food transfers economically important for poor households. At the same time, the present PDS platform is large and deeply digitised, creating both opportunities for transparency and risks of technology-mediated exclusion. The central policy lesson is that the next generation of PDS reform should move beyond the narrow question of whether grain is allocated. It should ask whether each eligible household can obtain its full entitlement reliably, whether the transfer materially protects the household budget, and whether the food-security platform contributes to a more diverse and nutritionally adequate diet. In Bagraich, a robust PDS remains indispensable, but its developmental value will be greatest when cereal security is combined with nutritional diversification, portability, grievance redressal, authentication fallback and district-level accountability.

Declarations

Ethics statement: This study used only publicly available, aggregate secondary data and did not involve direct interaction with human participants.

Funding: No external funding was received for this study.

Conflict of interest: The author declares no conflict of interest.

Data availability: All data used in the analysis are available from the cited public sources, including NITI Aayog, MoSPI, Census of India and the National Food Security Portal.

REFERENCES:

1. Chakrabarti, S., Kishore, A., & Roy, D. (2018). Effectiveness of food subsidies in raising healthy food consumption: Public distribution of pulses in India. *American Journal of Agricultural Economics*, 100(5), 1427–1449. <https://doi.org/10.1093/ajae/aay022>
2. Department of Food and Public Distribution. (2025). Food security and Pradhan Mantri Garib Kalyan Anna Yojana: Programme updates. Government of India.
3. Drèze, J., & Khera, R. (2015). Understanding leakages in the Public Distribution System. *Economic & Political Weekly*, 50(7), 39–42.

4. George, N. A., & McKay, F. H. (2019). The Public Distribution System and food security in India. *International Journal of Environmental Research and Public Health*, 16(17), 3221. <https://doi.org/10.3390/ijerph16173221>
5. Government of India. (2013). The National Food Security Act, 2013 (Act No. 20 of 2013).
6. Khera, R. (2011a). India's Public Distribution System: Utilisation and impact. *Journal of Development Studies*, 47(7), 1038–1060. <https://doi.org/10.1080/00220388.2010.506917>
7. Khera, R. (2011b). Trends in diversion of grain from the Public Distribution System. *Economic & Political Weekly*, 46(21), 106–114.
8. Kishore, A., & Chakrabarti, S. (2015). Is more inclusive more effective? The 'new style' Public Distribution System in India. *Food Policy*, 55, 117–130. <https://doi.org/10.1016/j.foodpol.2015.06.006>
9. Masiero, S. (2018). Explaining trust in large biometric infrastructures: A critical realist case study of India's Aadhaar project. *The Electronic Journal of Information Systems in Developing Countries*, 84(6), e12053. <https://doi.org/10.1002/isd2.12053>
10. Menon, S. (2018). Aadhaar-based biometric authentication for Public Distribution System and food security: Observations on implementation in Jharkhand's Ranchi district. *Indian Journal of Human Development*, 11(3), 327–343. <https://doi.org/10.1177/0973703017748384>
11. Ministry of Statistics and Programme Implementation. (2024). Household Consumption Expenditure Survey 2022–23: Fact sheet. Government of India.
12. Ministry of Statistics and Programme Implementation. (2025). Household Consumption Expenditure Survey 2023–24 (Report No. 592). Government of India.
13. National Food Security Portal. (2026). Uttar Pradesh: State dashboard and operational e-PoS statistics. Department of Food and Public Distribution, Government of India. Retrieved July 24, 2026.
14. NITI Aayog. (2021). National Multidimensional Poverty Index: Baseline report. Government of India.
15. NITI Aayog. (2023). National Multidimensional Poverty Index: A progress review 2023. Government of India.
16. Office of the Registrar General & Census Commissioner, India. (2016). District Census Handbook, Bahraich: Census of India 2011, Uttar Pradesh, Series 10, Part XII-A and XII-B. Government of India.
17. Paul, S. (2015). Evaluation study of Targeted Public Distribution System in selected states. National Council of Applied Economic Research.
18. Singh, N., Nguyen, P. H., Jangid, M., Singh, S. K., Sarwal, R., Bhatia, N., Johnston, R., Joe, W., & Menon, P. (2022). District nutrition profile: Bahraich, Uttar Pradesh. International Food Policy Research Institute and NITI Aayog.