TPM Vol. 32, No. S8, 2025
ISSN: 1972-6325
https://www.tpmap.org/

THE AGRARIAN TRANSFORMATION OF UTTAR PRADESH: LAND HOLDINGS, POLICY INTERVENTIONS, PRODUCTION DYNAMICS, AND LIVELIHOOD TRAJECTORIES (2012-2025)

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Abstract

Uttar Pradesh (UP), India's most populous state with more than 240 million people, about 77% of whom still live in rural areas, remains at the heart of the country's agrarian economy. Agriculture continues to sustain 59% of the rural workforce and contributes nearly one-fourth of the state's Gross State Domestic Product (GSDP). In recent years, this share has fluctuated between 13.7% in 2022–23 and 16.8% in 2023–24, with agricultural output estimated to grow by 17.7% in 2024–25. Despite this growth, the sector is dominated by small and marginal farmers (SMFs), who form 86.4% of the 2.3 crore agricultural households and cultivate on average less than one hectare of land. These farmers continue to face entrenched challenges: low and unstable incomes (₹8,931 per month on average), rising debt burdens, shrinking landholdings, worsening groundwater depletion, and high exposure to climate shocks such as droughts and floods. From the Kisan Rin Mochan Yojana and PMFBY to the Soil Health Cards, PM-KISAN, PMKSY, ODOP, the Agriculture Export Policy, and the emerging Digital Agriculture Policy, a spate of state and national policies during the last decade has tried to plug these holes while fast-tracking the sector into modernity. These have collectively pushed agricultural GVA from a sluggish 2.5% growth rate to 7.23% in 2022–23 and further to an estimated 17.7% in 2024–25. Production too has surged: foodgrain output rose from 45 million tonnes (MT) in 2012 to 66.8 MT in 2023–24, that of sugarcane from 150 MT to 200 MT, and milk production from 25 MT to 30 MT.

Incomes of SMFs have increased partly due to DBTs and digital delivery, which reduced leakages and marginally reduced migration. However, regional disparities persist: western UP is relatively better off because of better irrigation; eastern UP and Bundelkhand face chronic drought, fragmentation, and climate stress. Social disparities also remain sharp: women hold less than 13% of land titles, while Dalits continue to constitute a quarter of the landless laborers. This paper draws upon the NSSO series, ICRIER, NABARD, NITI Aayog, and the latest 2023–2025 estimates to critically review the impact of these policies on farmers in different landholding categories. It uses Punjab's post-Green Revolution experience as a cautionary parallel to argue that UP's progress, though real, remains unfinished. The paper concludes by advocating for inclusive, climate-resilient reforms necessary to achieve the Amrit Kaal dream of doubling farmers' incomes by 2027.

Keywords: Agrarian Economy; Small and Marginal Farmers (SMFs); Policy; Agricultural Policy; Livelihood Trajectory

1. INTRODUCTION: UNDERSTANDING UTTAR PRADESH'S AGRARIAN LANDSCAPE

Uttar Pradesh's agricultural sector captures the contradictions of India's development story: impressive production gains on one side, yet deep-rooted vulnerability and inequality on the other. With a population exceeding 240 million in 2025—nearly 78% residing in rural areas—agriculture is the economic backbone for nearly 155 million people in the state. It employs almost 59% of the rural workforce and contributes close to 25% of GSDP, a share that has risen sharply in recent years, supported by a projected 17.7% growth in 2024–25. But beneath this aggregate progress lies a fragmented and unequal structure. According to NSS 77th Round data, UP has around 2.3 crore agricultural households, of which 86.4% are small and marginal farmers cultivating less than two hectares. The average operating holding has dropped to around 0.73 hectares largely due to population pressures and inheritance patterns, which limits mechanization, access to credit,

and profitability. Before 2012, the state was struggling with stagnation: agricultural growth hovered around 2.5%, foodgrain production was stuck at 45 MT, and farmer incomes remained low. Migration rates were high, indebtedness was widespread, and climate risks frequently disrupted livelihoods. Matters are further complicated because regional differences run deep: Western UP has canal irrigation and consolidated landholdings, which push high yields in sugarcane and wheat; Eastern UP, with its small, fragmented plots and recurrent flooding, lags behind; and Bundelkhand, which has traditionally been drought-prone, suffers from persistent water stress and consequent degradation of soil.

Social inequality intersects with these geographical patterns. While upper castes comprise only 20% of households, they hold close to 60% of agricultural land. Dalits remain largely landless and dependent on wage labor. Women contribute significantly to agricultural labour but retain less than 13% of land titles, which compromises their access to schemes such as KCC and PM-KISAN. Between 2012 and 2025, however, UP undertook wide-ranging reforms: expanding irrigation coverage, improving market linkages, digitizing subsidy delivery, and enhancing risk mitigation through PMFBY and Soil Health Cards. These efforts, supported by a rising agricultural budget and strong policy convergence, have helped push agricultural GVA to new highs. But critical gaps remain, especially for tenant farmers, informal laborers, and climate-vulnerable regions.

2. Landholding Patterns and Socioeconomic Typology of Farmers

Shrinking landholdings, persistent inequality, and widespread dependence on small-scale farming characterize UP's agrarian structure. Historical factors such as the legacies of zamindari, incomplete land reforms, and demographic pressures have all contributed to the present situation. NSSO data from the 70th and 77th Rounds, as well as estimates from 2023, show that the average size of operational holdings has continued to decline from 0.76 hectares in 2019 to around 0.73 hectares in 2023. This fragmentation makes it difficult for farmers to adopt modern technology, diversify their cropping patterns, or benefit from economies of scale. Small and marginal farmers cultivate nearly half of the state's land but earn less than the national average. Marginal farmers, in particular, rely heavily on informal tenancy arrangements, making them invisible in official records and ineligible for major agricultural schemes. Social inequalities further shape land ownership: upper castes own a disproportionate share of land, Dalits remain largely landless, and OBCs dominate the small and marginal farmer category. Women farmers face the double burden of labor-intensive work and lack of land rights.

Scholars group UP's farmers into three broad socio-economic categories:

Pure cultivators: For the most part, small farmers dependent only on agriculture, who are at the mercy of the weather and price fluctuations.

• **Semi-proletarians:** Households combining farming with wage labor or migration; they gain benefits from schemes like PM-KISAN but remain caught in their debt-related cycles.

• **Landless laborers:** Completely dependent on wage work, excluded from most agricultural schemes.

Regional differences deepen these inequalities. Western UP with average holdings above one hectare and better irrigation supports semi-commercial agriculture. Eastern UP's fragmented plots and recurrent floods limit diversification. Bundelkhand's droughts force households into distress migration and chronic debt. Despite policy attempts at reform, indebtedness remains widespread, and climate shocks continue to destabilize livelihoods evident from the fertilizer shortages and protests seen in 2025.

3. Policy Architecture

From 2012 to 2025, the agricultural policy landscape of UP moved from fragmented and reactive approaches to integrated and technology-driven strategies. The state substantially increased its agricultural budget and aligned various national flagship programs with state-level initiatives.

3.1 Debt Relief and Income Support

The Kisan Rin Mochan Yojana of 2017 provided much-needed debt relief to small and marginal farmers, creating liquidity in the rural economy and increasing creditworthiness. Under PM-KISAN, income support is strengthened further through direct transfers, minimizing leakages and allowing farmers to invest in inputs and enabling diversification.

3.2 Risk Mitigation and Productivity Enhancement

PMFBY provided insurance coverage against crop loss, thus encouraging farmers to use the latest technologies. Soil Health Cards promoted efficient fertiliser use and reduced cultivation cost, particularly in drought-prone areas.

3.3 Irrigation and Infrastructure Development

Schemes like the PMKSY and PM-KUSUM spread micro-irrigation and encouraged solar pumps, thereby lowering dependence on diesel and improving water-use efficiency. These interventions have been especially transformative in Bundelkhand.

3.4 Market and Value Chain Reforms

UP's sugarcane reforms, ODOP initiative, and Agriculture Export Policy helped improve price realization, create rural employment, and promote value addition. Digital agriculture systems introduced in 2025 aim to integrate real-time data on crops, weather, and markets. Despite these achievements, challenges such as tenant exclusion, informal credit dependence, and inadequate cold-chain usage continue to limit the full potential of these reforms.

4. Transformations in Agricultural Production

Over the last ten years, the agronomic profile of Uttar Pradesh has changed dramatically. This change is essentially due to focused policy initiatives, better risk management, and gradual diversification of agriculture. The total agricultural output in the state has risen by almost 43% from 2016–17 to 2024–25, which definitely represents one of the fastest growth phases the state has seen lately.

Foodgrain production increased from 45.2 MT in 2012 to 66.8 MT in 2023–24, accounting for more than 18% of India's total foodgrain output. Wheat remained the backbone of UP's production landscape and reached 39.8 MT, nearly one-third of the national supply. These gains were possible due to stabilizing schemes like PMFBY and Soil Health Cards, which encouraged the adoption of high-yielding seeds and better nutrient management. Despite inconsistent monsoons, hybrid seeds helped raise yields upwards by 12–15%. Sugarcane was the other large crop that continued to dominate western UP's agrarian economy. Spread over 27 lakh hectares, sugarcane benefited from improved recovery rates from 10% to 11% and intercropping practices, raising yields upwards by 30% while reducing water use. The livestock and horticulture sectors were also seeing a fast growth rate. Milk production—UP's strongest allied activity—went up by 20%, giving the state a 17–18% share in India's total milk output. Horticulture, assisted by ODOP value-chain development and export incentives, saw a 3.7% rise in 2024–25.

There are stark regional differences. Western UP used irrigation and markets to sustain 5% annual growth in sugarcane and dairy. Eastern UP diversified into pulses and oilseeds, seeing pulse production rise 15%. Bundelkhand witnessed better yields from PMKSY, with almost 20% less loss on account of drought. With agricultural GVA reaching 7.23% in 2022–23 and slated to reach 17.7% in 2024–25, the changes in UP's production profile have a resemblance with China's rural reforms after 1978 when strong output gains coexisted with the sharpening of inequalities and resource pressures.

5. Livelihood Transformations: Income, Debt, Migration, and Resilience

While agricultural growth in UP has improved production indicators, it has had a gradual and uneven impact on rural livelihoods. Household incomes have risen, but structural vulnerabilities persist. Between 2013 and 2023, small and marginal farmer incomes increased from ₹6,459 per month to an estimated ₹11,500. PM-KISAN and debt relief programs provided much-needed liquidity, contributing to a 10–15% rise in incomes. Programs like PMFBY reduced the financial shocks of crop failures, enabling more consistent reinvestment into farming. Livelihood composition has also shifted. In 2019, 55% of rural household income came from wage labor, with only 28% from cultivation. By 2025, allied activities such as dairy and small-scale enterprises supported by ODOP had become more significant, contributing as much as 41% to agricultural GVA. Many small farmers increasingly depend on non-farm incomes as a hedge against climate variability and market volatility.

These changes are reflected in migration trends. Traditionally, about 15 per cent of rural households migrated seasonally to states such as Punjab. However, with better payment systems, improving dairy incomes and new opportunities through the operation of solar pumps-each generating an additional annual income of Rs 30,000 per farmer-migration fell by around 10-15 per cent in many major cane-growing regions. But indebtedness continued unabated. On the one hand, while the average number of farming households with outstanding loans rose from only 52 per cent in 2019 to roughly 55 per cent in 2023, the average debt burden rose sharply-during some 2024 survey rounds, it touched over Rs 91,000. While the provision of formal credit improved with the expansion of KCCs, informal lenders still account for nearly 60 per cent due to flexible collateral requirements and ease of access. Indicators on social resilience point to mixed outcomes. For example, Dalit households benefited significantly from employment linked to ODOP and transfers from PM-KISAN. Women's economic participation improved due to better access to information on Soil Health Cards and greater involvement in operating dairy cooperatives; land ownership was virtually zero, as before. Overall, the transformation in livelihoods in UP is reminiscent of Vietnam's Doi Moi reforms.

6. Disaggregated Policy Impacts by Landholding and Farmer Typology

Agricultural policy effects are very different across the different farmer categories, regions, and social groups. Marginal Farmers (<1 ha; 68.5% of households) Gained most from direct-income schemes like PM-KISAN. Soil Health Cards reduced fertilizer costs by about ₹2,000 per hectare. PMFBY stabilized incomes and increased them by approximately 22%. However, almost 30% remain excluded because of informal tenancy and lack of land titles.Small Farmers (1–2 ha; 17.9%) Benefited from irrigation schemes like PMKSY, and subsidy-driven microirrigation. The adoption of hybrid seed and ODOP value-chain integration resulted in an income rise of about 25%. Medium and Large Farmers (>2 ha; 13.6%) Mechanization, export markets, and sugarcane reforms proved most rewarding. Their incomes went up by 30% or more, thereby increasing rural income inequality. The poorest, largely landless Dalit households benefited most from wage employment and ODOP clusters, incomes rising approximately 18 percent. Gains for women remained more modest-12 to 15 percent-due to limited land rights, although their participation in cooperatives did increase.

The strongest impacts were recorded in Western UP, with 5% annual agricultural growth. While there is improvement, Eastern UP remained constrained by fragmentation and flooding. There was notable recovery in Bundelkhand due to targeted irrigation programs, and still, it remains climate-sensitive. While the expansion of Aadhaar-linked portals improved digital equity, protests in 2025 highlighted implementation gaps, especially for tenant farmers and landless workers.

7. Persistent Challenges and Structural Constraints

Despite substantial progress, several deep-rooted challenges continue to restrict the pace and inclusiveness of UP's agrarian transformation. Water Stress and Climate Vulnerability More than 76% of blocks have now been classified as over-exploited or critical regarding groundwater, largely by water-intensive crops such as sugarcane. Production losses of almost 20% arise each year due to climate shocks, frequent droughts, floods, and unseasonal rains. Tenancy and land rights issues are another major concern; approximately 20% of cultivators are either tenants or sharecroppers, but most government benefits are still attached to formal landownership. In the absence of any tenancy reform or certification, these farmers remain beyond the pale of policy support. KCC coverage has been expanding, but 60% of rural credit is still controlled by informal lenders. High interest rates and exploitative repayment structures lock households into chronic indebtedness.

Cold storage and supply chain infrastructure is underutilized, with almost 60% operating below capacity. This results in post-harvest losses and low price realization, mainly for fruits and vegetables. Caste-based land centralization and gender inequality restrict the scope of reforms. Dalits and women are sideshifted in asset ownership, credit availability, and decision-making platforms. The fertilizer shortages and farmer mobilizations of 2024–25 have once again underlined the fact that if there is progress, structural cracks remain and need systemic reform, rather than an incremental fix.

8. Future Trajectories: Pathways Toward Amrit Kaal

Looking ahead, doubling farmers' incomes in Uttar Pradesh by 2027 will call for a shift away from piecemeal solutions toward integrated and climate-resilient strategies that orient toward equity.

Key priorities include:

Strengthening Farmer Producer Organizations: To enable improvement in collective bargaining, reduce input costs, and increase market access.

Scaling up AI-powered Extension Services: real-time advisories on weather, pests, and markets; leveraging the 2025 Digital Agriculture Policy.

Encouragement of Crop Diversification: toward pulses, oilseeds, and horticulture to ease water stress and improve soil health. Promote Contract Farming with Safeguards: allow small farmers to have stable prices while preventing exploitation. Social Inclusion: promote gender-sensitive land reforms, recognition of tenants, and focused attention for marginalized castes. This emerging agricultural model of UP, which combines safety nets with growth-enhancing reforms, holds immense promise for other states. But long-term sustainability and inclusiveness would depend on addressing persistent inequalities and ecological vulnerabilities.

CONCLUSION

In little over a decade, Uttar Pradesh has engineered one of the more remarkable agricultural recoveries in modern India: production has soared, millions of small farmers have recorded real income gains and the state has begun to imagine itself as an export powerhouse rather than a perennial laggard. But it is a recovery resting on fragile foundations. Land remains hopelessly fragmented, groundwater is disappearing, and whole categories of rural citizens tenants, women without titles, landless Dalit labourers still watch the benefits pass them by. The Punjab nightmare of the 1980s and 1990s looms as a warning: spectacular yield increases can mask, and ultimately deepen, ecological and social crises. If Uttar Pradesh is to avoid that fate, the next phase of reform must be bolder and more inclusive than the last. The tools are now in place: digital platforms, direct transfers, satellite monitoring, renewable energy. What is still missing is the political will to extend them to every farmer who actually works the soil, regardless of the name on the land record. Only then will the state's agrarian transformation become something more than a statistical triumph: a genuine lifting of rural Uttar Pradesh into dignity and durable prosperity.

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