

SPATIAL PATTERNS OF RURAL LIVELIHOODS: EVIDENCE FROM GRAM PANCHAYATS IN BIHAR

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ABSTRACT

Rural livelihoods across Bihar's gram panchayats have shifted markedly over the past decade, moving away from the state's historically land-locked, monocrop agrarian base toward a mixed portfolio of farm income, wage labour under MGNREGA, and short-duration migration. This paper documents that shift at the panchayat level, using survey data from six gram panchayats spread across two agro-climatic zones of Bihar – the North Bihar floodplain and the South Bihar upland – to map how households allocate labour and income across sources. The study covers 480 households, selected through stratified random sampling weighted by landholding category, and its central concern is not whether diversification exists, since prior work has already established that, but how the pattern of diversification varies by land size, caste category, and distance from the block headquarters. Findings indicate that marginal and landless households derive over 60 percent of annual income from non-farm sources, chiefly MGNREGA wage labour and short-term migration to Punjab, Haryana, and Delhi-NCR, while medium and large landholders retain agriculture as their dominant income source but increasingly supplement it through dairy and non-farm self-employment. A livelihood diversification index computed for each panchayat shows considerable inter-panchayat variance that correlates more strongly with irrigation access and road connectivity than with landholding size alone. The paper argues that panchayat-level heterogeneity, routinely flattened in district- or state-level livelihood studies, carries direct implications for how MGNREGA convergence and skill-development schemes ought to be targeted, and closes with methodological and policy implications drawn from the panchayat-wise comparison.

Keywords *Rural livelihood diversification¹; Gram Panchayat²; Bihar³; MGNREGA⁴; agrarian transition⁵; livelihood diversification index⁶; non-farm employment⁷.*

I. INTRODUCTION

A. THE AGRARIAN BACKDROP OF BIHAR'S RURAL ECONOMY

Bihar remains one of India's most densely populated agrarian states, with average landholding size well below the national mean and a cropping pattern still dominated by the paddy-wheat rotation in the northern plains,

while cultivation in the south stays more diversified but largely rainfed. Fragmentation of holdings across generations has pushed an increasing share of rural households toward wage labour, and the state's recurring flood cycle in the north adds a seasonal dimension that few livelihood studies account for with any precision. Against this backdrop, the last fifteen years have seen substantial growth in non-farm income sources construction labour, MGNREGA employment, small trade, and migration yet aggregate state-level figures tend to obscure how unevenly this transition has occurred across even neighbouring panchayats.

B. WHY THE PANCHAYAT IS THE RIGHT UNIT OF ANALYSIS

Village-level and even block-level livelihood studies in Bihar typically average out variation that exists at a finer grain than the block itself. Two panchayats in the same block, separated by no more than ten kilometres, can show very different livelihood profiles depending on whether a minor canal reaches one and not the other, or whether one sits on a state highway and the other does not. The panchayat is the natural administrative and social unit through which schemes such as MGNREGA, the National Rural Livelihood Mission, and PMAY-G are actually implemented, and yet very little empirical work builds its sampling frame around the panchayat itself rather than treating it as a convenient label nested under a block or district. This study takes the panchayat, not the block or district, as its unit of comparison, specifically to surface that finer-grained variation that district-level averages routinely erase.

C. OBJECTIVES AND SCOPE OF THE STUDY

The study asks three linked questions. First, what does the current mix of farm and non-farm income look like across a sample of Bihar panchayats, disaggregated by landholding category? Second, how much of the variation in this mix is explained by physical infrastructure irrigation coverage, road connectivity, distance to the block headquarters as against social factors such as caste category and household size? Third, does a simple livelihood diversification index computed at panchayat level track more closely with infrastructure variables or with land-based variables? The scope is deliberately narrow: six panchayats and 480 households, drawn from two districts representing Bihar's two broad agro-climatic zones. The intent is not to produce a state-representative estimate that work exists elsewhere and is cited in the survey of literature below but to demonstrate a method for panchayat-level comparison that could be replicated at a larger scale by state rural development departments or academic researchers working with limited field budgets.

II. SURVEY OF LITERATURE

Three broad strands of prior work are useful for situating this paper. The first concerns livelihood diversification as a general rural phenomenon. Ellis's sustainable livelihoods framework treats diversification as a risk-management response to agro-climatic and market uncertainty rather than as a sign of agrarian distress alone [1], and subsequent Indian adaptations of the framework have generally supported this reading, showing diversification rising with, not only in the absence of, agricultural growth [2], [3]. Later work on eastern India

specifically found that diversification is as much a function of access to credit and information as of landholding size [4], a finding this paper's data revisit at panchayat scale. A second strand concerns Bihar specifically. Studies using National Sample Survey rounds have documented Bihar's exceptionally small average operational holding and correspondingly high dependence on casual wage labour among marginal households [5], [6]. Migration studies covering North Bihar districts describe a well-established seasonal circuit to Punjab, Haryana, and the Delhi-NCR construction sector, with flood-prone blocks showing higher out-migration intensity than blocks with assured irrigation [7], [8]. Kumar and Singh's district-level work on Muzaffarpur and Purnia found migration remittances contributing between a fifth and a third of household income among landless and marginal categories, though their analysis stopped at the block level and did not disaggregate by panchayat [9].

A third strand concerns MGNREGA's effect on rural labour markets. Early evaluations found the scheme raised the reservation wage for casual agricultural labour in several states, Bihar included, though implementation quality varied sharply by district administration [10], [11]. Later work using panel data found that MGNREGA participation is not uniformly distributed even within a single gram panchayat, correlating with distance from the panchayat bhawan and with awareness of entitlements among Below Poverty Line households [12]. Studies on convergence between MGNREGA and allied livelihood schemes, such as dairy development and the National Rural Livelihood Mission's self-help group architecture, report mixed results, with convergence succeeding more often where panchayat-level functionaries actively coordinate across departments than where it is left to demand alone [13], [14]. Taken together, this literature establishes diversification as a well-documented, largely rational household response, and establishes Bihar as a state where wage labour and migration have become central rather than residual livelihood components. What it does not do, with a few partial exceptions [9], [12], is hold the panchayat constant as the unit of comparison across a matched sample. Most studies either aggregate to the district or select a single village for depth. This gap is where the present study is positioned: it treats six panchayats as parallel cases, drawn to differ along irrigation and connectivity, and asks whether a diversification index computed the same way for each panchayat tracks infrastructure variation more closely than it tracks the landholding variation that most existing literature foregrounds [1]–[9].

III. METHODOLOGY

The study was carried out in two districts chosen to represent Bihar's two broad agro-climatic zones: one North Bihar district lying within the Kosi-Gandak floodplain, where irrigation is largely rain-dependent and flooding recurs in most monsoons, and one South Bihar district on the upland plain south of the Ganga, where canal and tube-well irrigation cover a larger share of cultivated area. Within each district, three gram panchayats were purposively selected to vary along two dimensions identified in the literature as under-examined at this scale: distance from the block headquarters and the presence or absence of an all-weather approach road. This yielded six panchayats in total, each treated as an independent unit of comparison rather than as a sub-sample of its district. Within each panchayat, households were listed using the panchayat's BPL and ration-card registers as the sampling frame, stratified into four landholding categories – landless and near-landless (up to 0.5 acre),

marginal (0.5–2.5 acres), small (2.5–5 acres), and medium-to-large (above 5 acres) to ensure that smaller landholding categories, which form the numerical majority in Bihar but are sometimes under-represented in convenience samples, received adequate coverage. Eighty households were drawn per panchayat through simple random sampling within each stratum, proportionate to the stratum's share of the panchayat's household register, giving a total sample of 480 households. Field investigation was carried out over four months, with each household covered through a single structured visit supplemented by a shorter follow-up for households where income recall required cross-checking against a family member other than the initial respondent.

Data were collected using a structured schedule covering household demographics, landholding, cropping pattern, livestock holding, MGNREGA job-card status and wage days in the preceding agricultural year, migration history, and self-reported income by source over the same reference period. Income data were cross-validated where possible against MGNREGA muster-roll records obtained from the panchayat office and against SHG passbook entries for member households. Analysis combines descriptive cross-tabulation by landholding category and panchayat, a chi-square test of association between landholding category and primary occupation, and a Simpson-type livelihood diversification index computed at the panchayat level as one minus the sum of squared income shares across five broad sources – crop agriculture, livestock, MGNREGA wage labour, non-MGNREGA wage or migration labour, and non-farm self-employment – so that an index closer to one indicates a more evenly spread livelihood portfolio and an index closer to zero indicates dependence on a single dominant source. All computation was carried out in a spreadsheet environment with cross-checks against manual tabulation for a 10 percent random sub-sample.

IV. DATA COLLECTION AND ANALYSIS

Table I summarises the demographic and landholding profile of the sample. Average household size is largest in the North Bihar panchayats, consistent with the higher dependency ratio typically reported for flood-affected blocks, and the share of Scheduled Caste and Extremely Backward Class households is higher in the two panchayats farthest from the block headquarters, which is itself a pattern worth flagging for targeting purposes rather than treating as incidental.

TABLE I. DEMOGRAPHIC AND LANDHOLDING PROFILE OF SAMPLE HOUSEHOLDS BY PANCHAYAT (N = 480)

Panchayat	District/Zone	Households (n)	Avg. HH size	SC/EBC share (%)	Landless/Near-landless (%)	Marginal (%)
P1 – Rampur Diara	North Bihar	80	6.4	41.3	38.8	35.0
P2 – Kusheshwar	North Bihar	80	6.8	47.5	45.0	32.5

Tola						
P3 – Basantpur	North Bihar	80	6.1	35.0	31.3	37.5
P4 – Nayagaon	South Bihar	80	5.5	28.8	22.5	36.3
P5 – Sherpur Kothi	South Bihar	80	5.7	33.8	26.3	38.8
P6 – Baruna Bigha	South Bihar	80	5.3	25.0	18.8	40.0
Overall		480	6.0	35.2	30.4	36.7

Table II reports the primary reported occupation by landholding category, pooled across all six panchayats. Agriculture remains the modal primary occupation only among small and medium-to-large holders; among landless and marginal households, MGNREGA and migration-based wage labour together account for the majority of primary occupation reports, which is consistent with the broader Bihar-specific literature cited above [5]–[9] but confirms it at a considerably finer sampling scale than most of those studies used.

TABLE II. PRIMARY OCCUPATION BY LANDHOLDING CATEGORY, POOLED SAMPLE (%)

Landholding Category	Crop Agriculture	MGNREGA Wage Labour	Migration/ Non-MGNREGA Labour	Livestock /Dairy	Non-farm Self-employment
Landless/Near-landless (n=146)	6.2	34.9	38.4	9.6	10.9
Marginal (n=176)	28.4	27.3	24.4	11.9	8.0
Small (n=101)	51.5	12.9	11.9	14.9	8.8
Medium–Large (n=57)	68.4	3.5	5.3	15.8	7.0
Pooled (n=480)	29.6	23.3	22.7	12.3	9.0

Table III turns from primary occupation, which captures only the largest single source, to the fuller income-share picture, since a household's primary occupation can understate its actual dependence on secondary sources. The gap between the two tables is itself informative: landless households derive 34.9 percent of primary-occupation reports from MGNREGA alone, yet MGNREGA's average share of annual income for that category is somewhat lower once migration earnings, which tend to be lumpier and higher-value per work-day, are added in.

TABLE III. AVERAGE SOURCE-WISE SHARE OF ANNUAL HOUSEHOLD INCOME BY LANDHOLDING CATEGORY (%)

Landholding Category	Crop Agriculture	Livestock /Dairy	MGNREGA Wages	Migration /Casual Labour	Non-farm Self-employment
Landless/Near-landless	4.1	8.7	26.5	37.9	22.8
Marginal	22.0	10.4	21.8	27.6	18.2
Small	46.8	13.1	10.7	16.2	13.2
Medium–Large	64.9	14.6	3.0	8.1	9.4
Pooled Average	27.9	11.4	17.7	24.4	18.6

Table IV disaggregates MGNREGA participation by panchayat rather than by landholding category, and the spread is wide enough to matter for programme administration. Average wage days realised against the entitled 100 days per household range from just under half in the best-performing panchayat to under a quarter in the weakest, and the gap does not track landholding composition as closely as it tracks distance from the block office and whether a panchayat-level MGNREGA mate was in position for most of the reference year.

TABLE IV. MGNREGA PARTICIPATION AND WAGE OUTCOMES BY PANCHAYAT

Panchayat	Job Card Coverage (%)	HHs with ≥ 25 Wage Days (%)	Avg. Wage Days/HH	Distance from Block HQ (km)
P1 – Rampur Diara	88.8	61.3	42.7	14
P2 – Kusheshwar Tola	91.3	68.8	48.2	19
P3 – Basantpur	76.3	43.8	31.5	9

P4 – Nayagaon	70.0	35.0	26.8	6
P5 – Sherpur Kothi	65.0	27.5	22.1	11
P6 – Baruna Bigha	58.8	21.3	18.4	17
Overall	75.0	42.9	31.6	

Table V brings the panchayat-level diversification index together with the two infrastructure indicators discussed in the methodology, alongside landholding as a comparator variable. The pattern is the paper's central empirical finding: the two panchayats with the highest diversification index, P1 and P2, are also the two with the highest MGNREGA wage-day realisation and the highest share of landless households, yet P6, which has the lowest landless share of all six panchayats, records the lowest diversification index because its livelihood base leans heavily on a single crop-agriculture source with comparatively little non-farm supplementation. Landholding composition alone would not have predicted this ordering.

TABLE V. LIVELIHOOD DIVERSIFICATION INDEX (LDI) AND ASSOCIATED VARIABLES BY PANCHAYAT

Panchayat	LDI (0–1)	Irrigation Coverage (%)	All-weather Road (Y/N)	Landless Share (%)
P1 – Rampur Diara	0.78	34	N	38.8
P2 – Kusheshwar Tola	0.81	28	N	45.0
P3 – Basantpur	0.71	46	Y	31.3
P4 – Nayagaon	0.66	58	Y	22.5
P5 – Sherpur Kothi	0.62	64	Y	26.3
P6 – Baruna Bigha	0.54	71	Y	18.8

V. DISCUSSION

Read against the abstract's opening claim, the data support a fairly specific version of the diversification story rather than the generic one. It is not simply that poorer households diversify more – Table III already shows that clearly enough – but that the panchayat itself, not just the household's landholding category, sets the ceiling on how much diversification is actually available to a household within it. A landless household in P6, where irrigation coverage is highest and the road is paved, still shows less access to MGNREGA wage days and a narrower livelihood portfolio than a similarly landless household in P1, where infrastructure is weaker by every conventional indicator. This is, on its face, counter-intuitive: better infrastructure ought to expand livelihood

options, not narrow them. The more plausible reading is that P6's stronger irrigation base has made crop agriculture more remunerative for the landowning households who lease it out, crowding attention and local administrative energy away from MGNREGA implementation, since demand for the scheme is politically weaker where agricultural wage employment is already reasonably steady. The chi-square test of association between landholding category and primary occupation returned a statistically significant result ($\chi^2 = 187.4$, $df = 12$, $p < 0.001$), confirming what Table II already suggests visually, but the more analytically useful finding sits in the mismatch between Tables II and III described above: primary-occupation classification, the variable most household surveys stop at, systematically understates the income contribution of secondary and tertiary sources for exactly the households whose livelihood security matters most for policy targeting. Any panchayat-level MGNREGA or NRLM planning exercise that relies on primary-occupation registers alone, as several block offices visited during fieldwork appeared to, would under-count migration's role in landless household income by a considerable margin, since a household's primary-occupation entry often records the male household head's own reported occupation rather than the pooled household income structure captured here. Set against the literature surveyed in Section II, these findings both confirm and complicate prior work. The confirmation is straightforward: Bihar's landless and marginal households do rely overwhelmingly on wage labour and migration, consistent with district-level NSS-based estimates [5], [6], and MGNREGA does raise the effective wage floor where it is well implemented, consistent with earlier scheme evaluations [10], [11]. The complication is that Kumar and Singh's district-level remittance-share estimates for Muzaffarpur and Purnia, in the range of a fifth to a third of household income for landless categories [9], sit close to but somewhat below this study's pooled migration-income share of 24.4 percent for the same category, and the difference narrows further once P1 and P2, the two North Bihar panchayats in this sample, are considered on their own – both record migration-income shares above 35 percent, closer to the upper end of the range reported for comparable flood-prone blocks elsewhere in the eastern Gangetic plain [7], [8]. This suggests that district averages of the kind Kumar and Singh relied on may themselves be compressing a similar panchayat-level spread to the one documented here, simply at one administrative level higher.

On the MGNREGA-convergence literature specifically [12], [13], [14], this study's Table IV offers a more granular confirmation than most prior convergence studies could manage, since wage-day realisation here is shown to vary by more than a factor of two across panchayats within the same two districts, a gap similar in magnitude to what earlier panel-data work attributed to distance and entitlement-awareness effects within a single panchayat [12]. What this paper adds is that the same distance-and-awareness logic appears to operate between panchayats and not only within one, meaning that state-level MGNREGA convergence guidelines calibrated to district averages will systematically over-serve panchayats like P1 and P2, which already show comparatively strong wage-day realisation, unless targeting is recalibrated to the panchayat as the unit of allocation. This is, admittedly, a claim built on six panchayats rather than a state-representative sample, and it would be overreaching to generalise the exact index values in Table V beyond the two districts studied; the more defensible claim is methodological – that panchayat-level heterogeneity of this magnitude is unlikely to be

confined to just these two districts, given that the infrastructure and administrative variables driving it (road connectivity, distance from block office, presence of a functioning MGNREGA mate) are not unique to North or South Bihar. A further point of tension with prior literature concerns the direction of the irrigation-diversification relationship. Ellis's original framework treats diversification largely as a risk response to agro-climatic uncertainty [1], which would predict lower diversification where irrigation is more assured, and Table V's pattern across P4, P5, and P6 is broadly consistent with that prediction. But P1 and P2, the two panchayats with the least irrigation coverage in this sample, do not diversify primarily as a risk-management response in the classic sense described by Ellis; they diversify because MGNREGA and migration have become more reliably remunerative than the flood-exposed agriculture available to them, which is closer to what later Indian-context adaptations of the framework describe as diversification driven by relative returns rather than by risk-spreading alone [2], [3]. The data here cannot fully adjudicate between these two mechanisms without panel data across multiple agricultural years, and this is flagged as a limitation rather than resolved.

VI. CONCLUSION

This paper set out to test whether a panchayat-level lens changes the picture that district- and state-level livelihood studies in Bihar typically present, and the data suggest that it does, in ways that matter for how MGNREGA and allied schemes are targeted rather than merely for academic completeness. The livelihood diversification index computed across six panchayats tracked road connectivity and distance from the block headquarters more closely than it tracked landholding composition, reversing the emphasis most existing literature places on land as the primary driver of diversification. Landless and marginal households everywhere in the sample depend heavily on MGNREGA and migration, but the extent to which that dependence translates into actual wage days realised, and therefore into secure income, varies by more than a factor of two between panchayats in the same two districts. The clearest policy implication is that MGNREGA convergence planning, currently calibrated largely at block or district level, would benefit from panchayat-level indicators of the kind assembled in Table V, particularly distance from the block office and MGNREGA mate deployment, as targeting variables in their own right. The clearest methodological implication is that future livelihood surveys in Bihar, and plausibly elsewhere in the eastern Gangetic plain, should treat the panchayat rather than the block as the primary sampling and reporting unit if they intend their findings to inform scheme administration rather than only describe aggregate trends.

VII. REFERENCES

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