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Socio-economic and Tribal Inequity in Healthcare Use and Out-of-Pocket Expenditure in Odisha

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Abstract

Odisha reports one of India's lowest out-of-pocket (OOP) expenditures per hospitalization and near-universal publicly funded insurance. Low spending may signal financial protection, but it may also reflect forgone care among poor and Scheduled Tribe (ST) households. Using NSS 75th Round (2017–18) and 80th Round (2025) unit-level data covering 19,078 and 22,315 persons in Odisha, with India as benchmark, this paper estimates Erreygers-corrected concentration indices, indirect need standardization, and Wagstaff decompositions to measure horizontal inequity (HI) in reported illness, outpatient treatment, hospitalization, public facility use, OOP spending, and catastrophic health expenditure (CHE). After adjusting for need, hospitalization was concentrated among better-off people in both rounds (HI = 0.015, SE 0.003), even as government-funded insurance rose from 15% to 67% of the population. The sources of inequity shifted: the contribution of consumption fell from 107% to 55% (not significant), while ST status and tribal-district residence rose significantly from −0.0001 to 0.0043 ($p = 0.006$). Hospitalization in ST-majority districts fell from 28.3 to 25.5 per 1,000 while rising elsewhere from 34.1 to 47.6. Insurance contributed almost nothing. Among people reporting illness, outpatient treatment showed no significant inequity in 2025, but reported illness became steeply pro-rich (E from 0.044 to 0.137). CHE was concentrated among the better-off (E = 0.067), unlike India as a whole. Low OOP spending among Odisha's poor reflects both free public care and lower inpatient use than need warrants. Closing the gap requires supply-side investment and earlier recognition of illness in tribal communities, not further expansion of coverage alone.

Keywords: Horizontal inequity; Catastrophic health expenditure; Tribal health; Odisha; Need standardization; Health insurance

1. Introduction

Universal health coverage (UHC) pursues two goals that do not always move together: people should receive the care they need, and paying for that care should not cause financial hardship. Financial protection indicators such as catastrophic health expenditure (CHE) are widely used to track Sustainable Development Goal 3.8. Yet a household that does not seek care spends

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nothing and therefore appears protected. Where poverty, distance, and social exclusion suppress care-seeking, low out-of-pocket (OOP) spending can be a symptom of unmet need rather than evidence of a well-functioning health system (Wagstaff & van Doorslaer, 2000; O'Donnell et al., 2008). This ambiguity is central to Odisha.

According to the NSS 80th Round (2025), average OOP medical expenditure per hospitalization in Odisha was ₹16,948, half the all-India average of ₹34,064, excluding childbirth (National Statistical Office [NSO], 2026). Two-thirds of Odisha's population report coverage by a government-funded scheme, against 41% nationally. The state ran the Biju Swasthya Kalyan Yojana (BSKY) from 2018 and integrated its successor, the Gopabandhu Jan Arogya Yojana (GJAY), with Ayushman Bharat PM-JAY in January 2025 (Ministry of Health and Family Welfare [MoHFW], 2025). On spending and coverage indicators, Odisha looks like a success story.

Odisha is also home to one of India's largest tribal populations. Scheduled Tribes form about 22.8% of the state's population (Census of India, 2011), concentrated in hill districts such as Koraput, Nabarangpur, Rayagada, Malkangiri, Kandhamal, Mayurbhanj, and Sundargarh. These districts combine high poverty, dispersed settlements, difficult terrain, and weak health infrastructure. The national Expert Committee on Tribal Health documented systematically worse health outcomes and access among STs (MoHFW & Ministry of Tribal Affairs [MoTA], 2018). If tribal and poor households use less care than their need warrants, Odisha's low average spending may conceal inequity.

Two national surveys bracket Odisha's expansion of coverage. The 75th Round (2017–18) was fielded just before BSKY, when 15% reported government-funded coverage. The 80th Round (2025) is the first national health survey since PM-JAY rollout. Existing Indian studies measure income-related inequality with earlier NSS rounds (Thakur & Sangar, 2022; Yadav et al., 2022; Sriram et al., 2024). Odisha-specific evidence comes mainly from small facility or district samples (Rout & Choudhury, 2018). To our knowledge, no study has estimated need-standardized horizontal inequity in healthcare use for Odisha, compared tribal and non-tribal areas, or traced how inequity and its sources changed as coverage expanded.

This paper asks four questions. First, how are reported illness, outpatient care, hospitalization, public facility use, OOP spending, and CHE distributed across consumption groups in Odisha, and how does this compare with India? Second, after adjusting for need, is there horizontal inequity favoring better-off households, and is it larger in tribal areas? Third, which factors contribute most to measured inequality? Fourth, how did inequity and its sources change between 2017–18 and 2025 as insurance coverage expanded from 15% to 67%?

The paper makes three contributions. Empirically, it provides the first need-adjusted inequity estimates for Odisha from the NSS 80th Round and the first comparison with 2017–18. Conceptually, it shows that in a low-spending state, spending-based and use-based equity measures can point in opposite directions: CHE is concentrated among the better-off while hospital use is pro-rich. For policy, it shows that a fourfold expansion of insurance coverage coincided with an unchanged level of inequity in inpatient care and a growing disadvantage for tribal communities.

2. Literature and Conceptual Framework

Horizontal equity requires that people in equal need receive equal treatment, irrespective of income, caste, place of residence, or other non-need characteristics (Culyer & Wagstaff, 1993). Empirical work operationalizes horizontal equity by comparing the actual distribution of care across socioeconomic groups with the distribution expected from need alone; the difference is horizontal inequity (Wagstaff & van Doorslaer, 2000). Indian studies consistently find that the burden of paying for care falls unequally. Thakur and Sangar (2022) found that the concentration of OOP spending shifted toward the poor over time, while the concentration of catastrophic overshoot remained among the rich. Sriram et al. (2024) found CHE on hospitalizations concentrated among the poor, with an Erreygers index of −0.19 that widened to −0.26 after need adjustment. Akhtar et al. (2020) identified consumption and household structure as the main drivers of CHE inequality.

Evidence on use is equally important. A benefit-incidence analysis of the 75th Round found that high OOP spending on private inpatient care was associated with lower use among marginalized communities (Yadav et al., 2022). Jeyashree et al. (2017) reported pro-rich inequity in inpatient care for non-communicable diseases. Kujawski et al. (2018) showed that perceived poor quality drives households with hypertension away from public facilities. On insurance, Karan et al. (2017) found that the earlier Rashtriya Swasthya Bima Yojana did not reduce inpatient OOP spending. Early evaluations of PM-JAY show mixed effects on hospitalizations and catastrophic spending (Parmar et al., 2023). Odisha-specific research is mostly facility-based; Rout and Choudhury (2018) estimated OOP spending in secondary-level public facilities in two districts and found medicines to be the largest component. Tribal health research documents low use of formal care, long travel distances, and reliance on traditional healers, but few studies link these findings to population-representative measures of inequity. Recent work on structural inequalities and dietary diversity in Odisha (Sethy & Mahapatro, 2025) and on health production functions and inequality decomposition (Sethy et al., 2026a) reinforces the need to examine both use and spending outcomes together.

We follow Andersen's behavioural model of health service use (Andersen & Newman, 1973; Andersen, 1995). Use of care depends on need factors (age, sex, type and severity of ailment, chronic illness), predisposing factors (social group, education, household composition), and enabling factors (household consumption, insurance coverage, rural or urban residence, and region of residence as a proxy for facility supply). Under horizontal equity, only need factors should explain differences in use. Any remaining association between use and consumption, after controlling for need, is inequity. The framework yields two testable hypotheses. H1: after need standardization, the use of outpatient and inpatient care in Odisha is concentrated among better-off households (HI > 0), and this inequity is larger in the tribal Southern and Northern regions than in the Coastal region. H2: untreated ailments are concentrated among poorer households and ST households (CI < 0), so low average OOP spending in these groups partly reflects forgone care rather than protection.

3. Study Setting

Odisha is a large eastern Indian state with a population of about 42 million (Census of India,

2011). Its geography divides into a relatively developed coastal plain and hill and plateau regions in the south and north. Most tribal communities live in these hill regions, including 13 Particularly Vulnerable Tribal Groups. Eight districts have an ST majority: Mayurbhanj, Malkangiri, Rayagada, Nabarangpur, Gajapati, Kandhamal, Sundargarh, and Koraput. These districts also rank low on most health and development indicators. The state's health financing has changed considerably over the study period. Before August 2018, free care at public facilities was combined with limited insurance, mainly the earlier national scheme for below-poverty-line families. From 2018 to 2024, BSKY provided free care at all public facilities for everyone and cashless private care for over 9 million eligible families, state-funded and outside PM-JAY. From January 2025, GJAY integrated with AB PM-JAY offers ₹5 lakh per family per year plus an additional ₹5 lakh for women, covering about 10.3 million families with access to the national network of empaneled hospitals. Odisha signed a Memorandum of Understanding with the National Health Authority on 13 January 2025 and became the 34th state to implement AB PM-JAY in convergence with GJAY (MoHFW, 2025). The 75th Round captures the period just before BSKY, when 15% of Odisha's population reported government-funded coverage. The 80th Round captures the first year of the integrated scheme, after seven years of BSKY.

4. Data and Methods

We use unit-level data from two rounds of the NSS survey on Household Social Consumption: Health (Schedule 25.0), conducted by the National Statistical Office. The 80th Round was fielded from January to December 2025 and covered 139,732 households and 651,440 usual members. The 75th Round was fielded from July 2017 to June 2018 and covered 113,823 households and 555,115 usual members. The design is stratified two-stage, with villages and urban blocks as first-stage units and households as second-stage units. Morbidity and outpatient treatment are recorded for a 15-day reference period, and hospitalizations for 365 days, with item medical and non-medical spending, reimbursement, and sources of finance. The Odisha 2025 sample comprises 5,288 households and 22,315 usual members; 3,823 persons reported an ailment, and 3,587 inpatient episodes excluding childbirth were recorded. All estimates use the survey multiplier (final weight = Mult/100). Our weighted estimates reproduce the published figures exactly: illness reported by 13.1% of persons, 29.0 hospitalizations per 1,000, average OOP medical spending per hospitalization of ₹34,064 for India and ₹16,948 for Odisha, and government insurance coverage of 45.5% rural and 31.8% urban. The 2017–18 Odisha sample comprises 4,264 households and 19,078 usual members, with 1,531 persons reporting an ailment and 2,617 inpatient episodes; it uses the sub-sample-combined weight. Our estimates again match the official report (NSO, 2019): illness reported by 7.5% of persons in India and 9.2% in Odisha, and average medical expenditure per hospitalization of ₹20,135 for India and ₹12,295 for Odisha. The data are anonymized and publicly available, so no ethics approval was required.

The main geographic variable identifies residence in one of Odisha's eight ST-majority districts (ST share of 50% or more in Census 2011): Sundargarh, Mayurbhanj, Gajapati, Kandhamal, Rayagada, Nabarangpur, Malkangiri, and Koraput. Outcome variables include reported ailment (chronic ailment or any other ailment in the last 15 days, all persons); outpatient treatment (at least one spell treated on medical advice or hospitalized, among persons reporting an ailment,

15 days); hospitalization (at least one inpatient episode excluding childbirth, all persons, 365 days); public facility use (treated in a government facility, among hospitalized or treated persons); OOP expenditure (medical expenditure net of reimbursement, per hospitalization episode); CHE (annual household OOP of 10% and 25% or more of annual consumption expenditure, households); and distress financing (borrowing or sale of assets as the major source of finance, hospitalization episodes). Annual household OOP combines inpatient spending over 365 days, including childbirth, with outpatient spending over 15 days scaled to a year (×365/15). The capacity-to-pay definition of CHE is not used because the health schedule does not record food expenditure separately. Negative net amounts are set to zero.

Individuals are ranked by household monthly per capita consumption expenditure (MPCE). An equivalized measure using the modified OECD scale is used as a robustness check. Following Andersen's framework, covariates are divided into need variables (14 age-sex cells; presence of a chronic ailment; a communicable disease in the last 365 days; any ailment in the last 15 days for hospitalization; and the type of the main ailment, whether non-communicable, communicable, or injury, for outpatient treatment) and non-need variables (MPCE quintile; social group; residence in an ST-majority district; rural residence; education of the household head in four levels; household size; casual-labor household; government-funded insurance; and other insurance). For the all-India models, state fixed effects replace the tribal-district indicator. Insurance is recorded as a single response per person. All variables are defined identically in both rounds, with three harmonizations: education codes are mapped to the same four levels; government-funded insurance in 2017–18 refers to schemes such as RSBY; and ailment codes, which shift by one position after code 15 in 2025, are mapped to the same groups. Household consumption is measured differently—by a single question in 2017–18 and by five components in 2025—so its level is not comparable between rounds, but concentration indices depend only on ranks, so comparisons of inequality remain valid.

The concentration index of an outcome y with mean μ ranked by the fractional rank R in the MPCE distribution is $C = (2/\mu)\text{cov}_w(y_i, R_i)$, where cov_w is the survey-weighted covariance and ties in MPCE receive the average rank. A positive value means y is concentrated among the better-off. For OOP amounts we report the standard index. For binary outcomes we report the Erreygers corrected index, which satisfies the mirror property for bounded variables: $E = 4\mu C/(b - a) = 8\text{cov}_w(y_i, R_i)$, where a = 0 and b = 1 are the bounds of y (Erreygers, 2009). Because E is an absolute measure, its size depends on the prevalence of the outcome; for a rare outcome such as hospitalization, even a modest E reflects a steep gradient. We therefore also report the Wagstaff normalized index as a relative measure (Wagstaff, 2005). We use indirect standardization (O'Donnell et al., 2008). Each outcome is regressed on need variables x and non-need variables z; the need-predicted value holds non-need variables at their weighted means; and the horizontal inequity index is the concentration index of actual use minus that of need-predicted use: $HI = E(y) - E(\hat{y}^X)$. A positive HI means that, for equal need, better-off people use more care. The standardizing regression is a weighted linear probability model, which gives an exact additive decomposition; results are checked with a probit model.

Following Wagstaff et al. (2003), the Erreygers index is decomposed into the contributions of each determinant, where each term is a determinant's absolute contribution and dividing by

E(y) gives its percentage share. A factor contributes to pro-rich inequality when it raises use and is concentrated among the better-off, or lowers use and is concentrated among the poor. To explain the change between 2017–18 and 2025, we apply the Oaxaca-type decomposition of changes in the concentration index: the change in each factor's contribution splits into a change in how unequally the factor is distributed and a change in its effect on the outcome. Standard errors for all indices and decomposition terms are obtained by bootstrapping: first-stage units are resampled with replacement within strata (500 replications for Odisha, 300 for Odisha subgroups and decompositions, 200 for India, the same for each round), and ranks and regressions are re-estimated in each replication. Differences between groups and between rounds are tested with z-statistics from the bootstrap standard errors. All analysis was done in Python 3 using pandas, NumPy, and statsmodels; the code is provided as supplementary material. Robustness checks include equivalized MPCE ranking, the Wagstaff normalized index instead of the Erreygers index, probit-based need standardization, NSS region instead of the ST-majority district indicator, a narrower need set (age-sex and chronic ailment only), a 25% CHE threshold, and OOP excluding the top 1% of episodes (O'Donnell et al., 2016).

5. Results

Tribal districts are poorer, more rural, and less literate than the rest of Odisha, yet they report less illness and are hospitalized far less often. Their hospitalization rate of 25.5 per 1,000 is barely half that of other districts (47.6) and below the national rate (29.0). Government-funded insurance is high in both (72.7% and 64.5%) and well above the national level (41.1%). The consumption gradient runs in opposite directions for different outcomes. Reported illness rises steeply with consumption, from 8.2% in the poorest quintile to 24.1% in the richest, and hospitalization follows the same pattern, rising from 26.5 to 57.8 per 1,000. By contrast, among those who report an ailment, the poorest are the most likely to be treated (95.0%); most untreated ailments among the better-off are ones "not considered serious." Public facilities carry most care for the poor: 73.3% of hospitalizations in the poorest quintile are in public hospitals, against 48.8% in the richest. Median OOP per hospitalization is ₹1,200 in the poorest quintile and ₹4,500 in the richest; the poorest quintile's high mean of ₹21,149 is driven by a small number of very costly private episodes.

Hospitalization in Odisha is significantly concentrated among the better-off (E = 0.019), and adjusting for need removes little of this: need-predicted hospitalization is nearly neutral (E = 0.004), leaving a significant pro-rich horizontal inequity of HI = 0.015 (SE 0.003). In relative terms, the Wagstaff normalized index is 0.121. Odisha's HI is about 1.8 times the national value (0.009); the difference is marginally significant (z = 1.95, p = 0.05). The actual hospitalization curve lies below the need-expected curve across the whole distribution. Outpatient treatment among people reporting an ailment shows no significant inequity in Odisha (HI = −0.032, SE 0.028); the point estimate is pro-poor, unlike India, where treatment is pro-rich (HI = 0.015). Reported illness itself is strongly pro-rich (E = 0.137). Public facility use is strongly pro-poor for both inpatient (E = −0.198) and outpatient care (E = −0.164). OOP per episode is concentrated among the better-off; the estimate is significant once the top 1% of episodes are excluded (C = 0.216, SE 0.026). CHE at the 10% threshold is significantly concentrated among

the better-off in Odisha (E = 0.067), whereas nationally it leans toward the poor (E = −0.017). The 25% CHE threshold is not significant (E = 0.005).

Subgroup analysis shows that hospitalization inequity is concentrated in the Southern region (HI = 0.023, SE 0.004), while the Urban (0.006), Coastal (0.008), and Northern (0.007) estimates are smaller and not individually significant. Outpatient treatment in the Southern region is pro-poor (HI = −0.175, SE 0.084). Tests of difference for hospitalization show rural versus urban p = 0.04 and Southern versus Coastal p = 0.09, while ST versus non-ST (p = 0.70) and tribal versus other districts (p = 0.34) are not significantly different.

Need factors explain only 22.7% of the pro-rich concentration of hospitalization. Non-need factors account for the rest. The largest contributor is consumption itself (55.3%): richer households are more likely to be hospitalized at the same level of need. ST status contributes 15.9%, because ST individuals are hospitalized less (by 1.2 percentage points, holding other factors constant) and are concentrated among the poor. Residence in an ST-majority district adds 6.4%. Household size contributes 20.6%: larger households are poorer and less often hospitalized. Education of the household head and rural residence offset part of the inequality (−12.9% and −10.1%). Government-funded insurance contributes almost nothing (−0.4%): coverage is broad, barely related to consumption (C = −0.02), and only weakly associated with hospitalization. For outpatient treatment, consumption is again the largest contributor (68%) to the pro-poor concentration, while ST and SC membership push toward the better-off (−47% and −29% of the index). In other words, among people with an ailment, ST and SC individuals are less likely to be treated than others at the same consumption level.

Between the two rounds, government-funded insurance in Odisha rose from 14.6% to 66.7% of the population. Pro-rich horizontal inequity in hospitalization did not change at all (HI = 0.015 in both rounds; z = 0.01). Nationally, by contrast, it fell significantly from 0.011 (SE 0.001) to 0.009 (SE 0.001; z = −2.89), and inequity in outpatient treatment fell from 0.075 to 0.015 (z = −4.91). The hospitalization gap between tribal and other districts widened sharply: the rate in ST-majority districts fell from 28.3 to 25.5 per 1,000, while elsewhere it rose from 34.1 to 47.6. The public share of hospitalizations fell from 72.2% to 61.1%. Outpatient treatment moved from pro-rich to pro-poor; the unadjusted index changed significantly (E from 0.092 to −0.034; z = −2.12), while the change in HI is marginal (from 0.065 to −0.032; z = −1.68), and neither year's HI is significant on its own. Reported illness became much more concentrated among the better-off (E from 0.044 to 0.137; z = 5.07). CHE at 10% became more concentrated among the better-off, though not significantly.

The unchanged HI hides a shift in its sources. In 2017–18, consumption alone accounted for more than the whole concentration of hospitalization (107%), and ST status and tribal-district residence contributed nothing (−0.0001, SE 0.0009). By 2025, the consumption contribution had fallen to 0.0107 (55%), although this fall is not statistically significant (z = −1.34, p = 0.18). The combined contribution of ST status and tribal-district residence had risen to 0.0043 (SE 0.0013), a significant increase (z = 2.77, p = 0.006). Almost all of this change comes from a change in the effect of these factors on hospitalization, not from a change in how they are distributed. ST individuals and residents of tribal districts became less likely to be hospitalized relative to others with the same need and consumption. Household size became a larger

contributor as well, mainly because household size became more strongly concentrated among the poor.

Patients in tribal districts rely more on public hospitals (81.5% versus 57.0% of episodes) and pay much less there (₹1,317 versus ₹2,841). They pay more when they go private (₹45,917 versus ₹39,115). Only 19.5% are treated outside their home district, against 36.4% in other districts. Among those who bypass public hospitals, the most common reasons in tribal districts are poor quality or no doctor (40.7%) and preference for a trusted doctor (34.1%). Long waiting matters far less there than elsewhere (6.0% versus 19.6%). Nearly all untreated ailments in tribal districts were "not considered serious" (89.9%). Being unable to leave work was cited far more often in other districts (15.3% versus 2.5%). Cost was almost never given as a reason for bypassing public hospitals. The pro-rich HI for hospitalization is robust: it stays positive and significant under equivalized ranking (0.012), probit standardization (0.015), regional controls (0.015), and a narrower need set (0.015). The HI for outpatient treatment remains negative and non-significant in every specification.

6. Discussion

This study asked whether Odisha's low out-of-pocket spending reflects financial protection or forgone care. The evidence supports both, through different channels. Public facilities carry most of the care for poor households, and care there costs little: public hospitalizations cost ₹1,317 in tribal districts. This keeps spending and catastrophic expenditure low among the poor. Yet poorer people in Odisha are hospitalized less than their measured need predicts (HI = 0.015), which supports H1 for inpatient care. The regional part of H1 is only partly supported: inequity is larger in the Southern region than in the Coastal region ($p = 0.09$), but not in the Northern region. Low spending among the poor is therefore partly a consequence of lower use. The two findings fit together. Catastrophic expenditure in Odisha is concentrated among the better-off ($E = 0.067$), unlike in India as a whole, where it leans toward the poor ($E = -0.017$), as in earlier national studies (Sriram et al., 2024). A household that is not hospitalized cannot incur catastrophic hospital costs. In a low-spending state with strong public provision, CHE alone therefore gives a misleading picture of equity. Use-based measures are needed alongside it to monitor SDG 3.8.

H2 is not supported. Among people who report an ailment, the poor in Odisha are not less likely to be treated; the point estimate is pro-poor, and the poorest quintile has the highest treatment rate (95%). Untreated ailments are concentrated among the better-off and are mostly ones they consider minor. The inequity lies earlier in the pathway. Reported illness is steeply pro-rich (8.2% in the poorest quintile versus 24.1% in the richest), and hospitalization is pro-rich even after need adjustment. The reporting gradient has two readings. It may partly reflect real differences in morbidity, since chronic conditions such as diabetes and hypertension are more common among the affluent. But the survey records perceived illness, and poorer and less educated people are known to under-report it. They tend to report only illness serious enough to need treatment, which explains why those who do report are almost always treated. Under-reporting also biases measured need toward the better-off, so our HI for hospitalizations is likely a lower bound on the true inequity.

Tribal areas show the clearest signs of under-use. Hospitalization in ST-majority districts is about half the rate elsewhere, down from 28.3 to 25.5 per 1,000 since 2017–18. ST status and tribal-district residence together account for over a fifth of the pro-rich concentration of hospitalizations (22.3%), up from nothing in 2017–18. Within the Southern region, which contains most tribal districts, inequity is three times that of the Coastal region. Among people with an ailment, ST individuals are less likely to be treated than others at the same consumption level. Three mechanisms are consistent with the evidence, although the data cannot separate them. First, supply and reach: patients in tribal districts rarely travel beyond their home district (19.5% versus 36.4%), which suggests limited access to secondary and tertiary care, and when they bypass public facilities the main reasons given are poor quality or absent doctors (40.7%), not cost. Second, recognition of illness: nearly all untreated ailments in tribal districts were "not considered serious" (89.9%), and low perceived need, shaped by norms and by reliance on traditional healers, may delay care until illness is advanced. Third, scheme design: GJAY and PM-JAY reimburse hospital care at empaneled facilities but do not reduce distance, staff shortages, or the cost of reaching a hospital.

Between 2017–18 and 2025, government-funded coverage in Odisha rose more than fourfold, to two-thirds of the population, and is now distributed almost evenly across consumption groups ($C = -0.02$). Yet need-adjusted inequity in hospitalizations was exactly the same in both rounds, and insurance contributes nothing to it in either. This is consistent with earlier evidence that publicly funded insurance in India has had limited effects on use among the poorest (Karan et al., 2017; Parmar et al., 2023). The decomposition of change suggests why the level stayed flat. The direct influence of consumption on hospitalizations weakened: richer households' advantage at the same need and social position fell by about 40%, although this fall is imprecisely estimated. This is what one would expect if insurance and free public care reduced the price barrier to hospital care. At the same time, the disadvantage of ST individuals and residents of tribal districts grew significantly, and hospitalization rates in tribal districts fell while they rose sharply elsewhere. The financial barrier fell, but the remaining barriers—distance, quality, and recognition of illness—became more important. This pattern is consistent with recent evidence that structural inequalities in nutrition and health persist even as aggregate spending changes (Sethy & Mahapatro, 2025; Sethy et al., 2026b), and with work showing that health system performance depends on supply-side determinants rather than insurance coverage alone (Sethy et al., 2026a).

7. Policy Recommendations

First, monitor use-based equity alongside spending. CHE is concentrated among the better-off in Odisha, so spending indicators alone overstate equity. State UHC monitoring should also report need-adjusted hospitalization and reported illness by consumption group, social group, and district type. Second, strengthen secondary care in tribal districts. Few tribal patients are treated outside their home district, and those who bypass public hospitals cite poor quality and absent doctors. Filling specialist and medical officer posts through targeted incentives, and upgrading district and sub-divisional hospitals in the Southern region, would address the main reasons given. Third, invest in early detection and recognition of illness. The pro-rich gradient in reported illness, and the high share of untreated ailments "not considered serious," point to

under-recognition. Population-based screening for hypertension, diabetes, and other chronic conditions at Ayushman Arogya Mandirs, combined with ASHA-led follow-up, can bring hidden need into the health system. Fourth, reduce the non-financial costs of reaching hospital. Free referral transport and compensation for wage loss during hospitalizations address barriers that insurance does not cover; lost earnings average about ₹2,600–2,900 per episode. Fifth, target ST communities directly. ST individuals are less likely to be treated than others at the same consumption level, and ST status adds to inequity in hospitalizations beyond income. Health communication in tribal languages and partnerships with community leaders and traditional healers as referral links can shorten delays in care. Sixth, track scheme use, not only enrolment. GJAY and PM-JAY claims data, disaggregated by district and social group, can show where coverage is not translating into hospital use. Persistent gaps in the Southern region should trigger supply-side review rather than further enrolment drives.

8. Limitations

The study has six limitations. First, self-reported morbidity: need is measured from reported illness, which is steeply pro-rich; if poorer people under-report illness, measured need is biased toward the better-off, and the HI for hospitalizations understates the true inequity, so the estimates are conservative. Second, comparability between rounds: reported illness rose from 9.2% to 15.4% of Odisha's population between rounds, and some analysts argue that the 2017–18 round under-captured morbidity; consumption was also measured differently, so changes in inequality over time should be read with caution, although rank-based indices are robust to differences in the level of consumption. The two rounds are repeated cross-sections, so they cannot identify the effect of BSKY or PM-JAY. Third, consumption measure: MPCE in the health schedule comes from a short set of questions, which is less precise than a full consumption survey, and ranking errors may attenuate the concentration indices. Fourth, sample size: the Odisha sample is modest for subgroups; estimates for ST individuals with an ailment ($n = 558$) and the reasons reported in tribal districts rest on small numbers, and district-level estimates are not possible. Fifth, cross-sectional design: decomposition results describe associations, not causal effects, and the near-zero contribution of insurance should not be read as the causal impact of GJAY or PM-JAY. Sixth, annualized outpatient spending: CHE combines 365-day inpatient spending with 15-day outpatient spending scaled to a year, which adds noise at the household level.

9. Conclusion

Odisha spends less out of pocket on hospital care than almost any other Indian state, and between 2017–18 and 2025 it expanded government-funded insurance from 15% to two-thirds of its population. This paper shows that these achievements coexist with inequity in the use of care. Once need is accounted for, better-off people in Odisha are hospitalized more than poorer people with similar needs, and this gap did not narrow as coverage expanded. Its sources have changed. Income matters somewhat less than before, but ST communities and tribal districts have fallen further behind, and their hospitalization rates declined while rates elsewhere rose. The gap does not lie in outpatient treatment once illness is reported. It lies in recognizing illness and reaching hospital. Broad insurance coverage has protected those who reach care, but it has not equalized who reaches it. Universal health coverage in Odisha now depends on stronger

secondary care in tribal districts, earlier detection of illness, and monitoring of who uses care, not only of who pays for it.

Declarations

Ethics approval and consent to participate: Not applicable.

Consent for publication: Not applicable.

Availability of data and materials: All data analysed in this review are drawn from published sources cited in the reference list. The Python (NumPy) code for the nutrient-substitution model is available from the corresponding author on reasonable request.

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