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Re-assessing the Incidence of Poverty and Policy Crisis in Assam: An Empirical Analysis of Char and Plain Areas

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Abstract

NITI Aayog's Multidimensional Poverty Index (MPI) reveals the poverty rate in the Indian state of Assam is about 14.5 percent which is more than double of the national average in 2022-23. However, the study shows the ground reality is entirely different both in terms of magnitude and incidence. Based on primary data of 450 households covering 31 villages including both Char and Plain areas, the study measures headcount ratio (HCR), poverty gap (PG), squared gap (SG), Sen index, and Sen-Shorroks-Thon (SST) index, at purchasing power parity (PPP) poverty lines of 2017, 2022, and 2025. Besides, the Lorenz curve and Gini coefficients are also used to analyze the income distribution. The major conclusions are that Assam consistently suffers in dire poverty practically showing all households below the global poverty line (HCR = 0.996). In addition, the level of poverty and its severity are growing as time goes on and the poverty gap ratio (PGR) is growing to 0.761 and the squared poverty gap ratio (SPGR) to 0.592. There is also a significant increase in the Sen and SST indices, which indicates the exacerbated poverty crisis. Notably, the measures of poverty indicate insignificant regional inequalities. Conversely, the income inequality is different: Char households have a homogenous low Gini coefficient of 0.203, and Plain areas have a larger Gini of 0.301, which represents different income distributions on an identical low-income background. These findings indicate that the issue of poverty in Assam is extensive and increasingly becoming worse, which means that prior interventions have been insufficient. It is recommended to use a multi-layered, customized policy that would involve both short-term aid in the form of cash transfers and food aid and long-term investment in infrastructure, education, and health amenities. The solution of resilience infrastructures and climate-adaptation in Char localities and social programs that would embrace marginalized people in the plains are crucial and region-specific. Such a holistic, place-sensitive approach is thus considered essential in alleviating poverty in Assam setting.

JEL Classification: I32, I38, O15, R11, R23, R58 & Q54

***Key words*:** Poverty, Sen index, Sen-Shorrocks-Thon index, Lorenz curve, Gini coefficient, Income inequality, Regional disparities, Multidimensional poverty, Char areas, Plain areas, Rural Assam

Despite decades of economic growth, poverty remains a persistent issue globally. Data revealed that around 700 million people live in extreme poverty as they survive on less than $2.15 per day [1]. The World Bank (2024) suggests that the 2020–2030 decade may be a "lost decade" for poverty alleviation. Globally, poverty eradication is recognized as a top priority for development and human well-being, as drawn in the United Nations' Sustainable Development Goals (SDG 1) [2-4]. Countries like India fall under the "Lower-Middle-Income Country" category despite significant economic gains over the past decades [5]. Though, the NITI Aayog's report on Multidimensional Poverty Index (MPI), [6] reveals India's progress in poverty as the rate reduced to half from 29.2% in 2013–14 to 14.96% in 2019-21, a large portion of the population continues to live below the subsistence threshold and intra-state disparities remain obvious, particularly in Northeast India [7-16].

Assam, characterized by geographically and socially vulnerable regions, has much higher poverty rates than the national average. The NITI Aayog's MPI [6] report revealed a 32.67 per cent poverty rate, nearly double the national average. The state ranks among the bottom five Indian states in terms of MPI performance, according to the report. More than 75 per cent of the state directly or indirectly continues to support people's livelihood through agricultural activities, employing more than 53 per cent of the total workforce [17]. Moreover, the National Council of Applied Economic Research [NCAER], [18], demonstrates gender disparity in education, employment and wages in Assam. A notable gap in higher education for women, with 20.06 per cent compared to males at 31.41 per cent

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and the Female Labour Force Participation Rate (LFPR) in Assam is 50.2 per cent compared to 83.3 per cent for males.

Most districts in Lower Assam exhibit higher poverty rates compared to the state average, worsening regional disparities. The riverine islands called "Char" in Assam, formed by the shifting Brahmaputra River, are marked by geographical isolation, limited access to basic services and distinct socio-economic vulnerabilities [19-21]. Assam Human Development Report [22] data show a lag in human development parameters in char areas, including the Headcount Ratio and annual per capita income. Recurrent floods and erosion, ignorance, illiteracy, poor communication, unplanned family planning, unchecked population growth and political underrepresentation are the core reasons for poverty among the people [23-27]. Currently, the char area's population constitutes 10% of Assam's total population [28]. Despite both central and state governments launching schemes to uplift disadvantaged groups over the period, data suggest that char areas remain considerably behind the rest of the state [29]. However, government intervention can play an important role in providing HYV seeds, proper technical support and training and development projects for people of char lands. Their economic and social development has a strong potential to enhance agriculture and food production on its fertile soil [30-35].

Poverty is often intense in remote rural regions, deepened by limited infrastructure [36-38]. Low levels of education limit employment opportunities and income, lengthening the cycle of poverty in rural agricultural areas [21], [39]. Additionally, in the case of gender dimension, women in rural areas face several disadvantages in accessing assets, education and healthcare, leading to deepening poverty [40-42]. It is necessary to provide access to markets, education and healthcare and an improvement in infrastructure, such as communication, transportation, water, sanitation, energy and networks, with the motive of poverty reduction [43-47]. Moreover, policy shaping is important to highlight in data accuracy, political unbiasedness and inclusion of unpaid labour [48-50]. Specifically, region-specific and multi-pronged policies are crucial for planning effective poverty alleviation strategies [51-53].

The present study undertakes a comparative analysis of poverty and income distribution in the Char and Plain areas of Assam. The existing literature often focuses more broadly on rural poverty in Assam without engaging in micro-regional comparisons. This study aims to address two important geographical regions, focusing on bridging the research gap. It will help to uncover the potentially conflicting patterns of deprivation between Chars and Plains. The primary objective of this study is to examine the incidence, depth and severity of poverty in Char and Plain areas of Assam. The study employed multiple poverty and inequality indices, including the Head Count Ratio, Poverty Gap Ratio, Squared Poverty Gap Ratio, Sen Index, and Sen-Shorrocks-Thon Index. Another objective is to evaluate income inequality across regions via the Lorenz Curve and Gini Coefficient, highlighting the conflicting patterns of deprivation in Chars and Plains. By integrating these measures, the study aims to provide a comprehensive understanding of poverty dynamics and identify region-specific challenges.

MATERIALS AND METHODS

The analysis is based on primary data collected from a household survey. A total of 450 households were surveyed using a stratified two-stage sampling design, where the strata (Stage 0) are Char regions and Plain regions, Primary Sampling Units (PSUs) are Villages within each stratum and Secondary Sampling Units are Households selected within sampled villages. In the study, a total of 31 PSUs (villages) were surveyed, 14 in Char areas and 17 in Plain areas. As households within the same village share similar socio-economic and environmental features, responses are clustered. Moreover, the Taylor-linearised approach is used for the estimation of sampling errors in multistage designs. The study was conducted in the two largest and two lowest char-populated districts of Assam, namely Nalbari, Barpeta, Bongaigaon and Dhubri of the Lower Brahmaputra Valley Zone (LBVZ) in the state.

Distribution-Sensitive poverty measures, the Sen Index and Sen-Shorrocks-Thon (SST) Index [54-55], are used in the study, which covers the incidence, depth and severity of poverty [56].

Sen Poverty Index, $Sen = H\left[APG + (1 - APG)G_p\right]$

Where;

$APG = \frac{PGR}{H}$ is the average poverty gap among the poor,

G_p is the Gini coefficient among the poor

And, the Shorrocks–Thon Index (SST), $SST = H\left[APG(1 + G_p)\right]$

Hence, the SST index includes Head Count Ratio (HCR), Poverty Gap Ratio (PGR) and Squared Poverty Gap Ratio (SPGR).

Headcount Ratio (H), $H = \frac{1}{n}\sum_{i=1}^{n} I(y_i < z)$

Poverty Gap Ratio (PGR), $PGR = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z-y_i}{z}\right) I(y_i < z)$

Squared Poverty Gap Ratio (SPGR), $SPGR = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z-y_i}{z}\right)^2 I(y_i < z)$

Where;

y_i= daily per capita expenditure

z= poverty line (₹280.67 for 2017; ₹320.13 for 2022; ₹368.37 for 2025)

Moreover, the Gini coefficient and Lorenz curve were used to examine income distribution [57].

For poor households ($y_i < z$),

$$y_{(1)} \leq y_{(2)} \leq \cdots \leq y_{(n_p)}$$

Gini among the poor, $G_p = \frac{2\sum_{i=1}^{n_p} i y_{(i)}}{n_p \sum_{i=1}^{n_p} y_{(i)}} - \frac{n_p+1}{n_p}$

All analyses were performed using Excel and STATA 17.0 for poverty measurement.

RESULTS AND DISCUSSION

The Foster–Greer–Thorbecke (FGT) indices cover Head Count Ratio (HCR), Poverty Gap Ratio (PGR) and Squared Poverty Gap Ratio (SPGR). With the 2017 World Bank poverty line, observed from (Table 1), the incidence of poverty exceeds 99 per cent across both Char and Plain areas, revealing an in-depth monetary deprivation when compared to the global poverty threshold on minimum consumption. It is in total contrast of what the NITI Aayog's reveals in its report. The Multidimensional Poverty Index (MPI) in the Indian state of Assam is about 14.5 percent which is more than double of the national average of 5.3 percent in 2022-23 [58].

Due to the stricter poverty line compared with most national lines, which are inflation-adjusted, almost all households lie below this line. So, estimates of the household consumption ratio (HCR) are nearly at unity. Poverty gap ratio (PGR) and squared poverty gap ratio (SPGR) show substantial average shortfalls relative to the international standard and are the same for both Char and Plain households. The Sen and SST indices of poverty support this consistency by capturing distribution-sensitive poverty. In effect, compared to the global minimum standards, it is clear that both Char and Plain areas display the same levels of extreme and rampant poverty with no statistically significant difference [59].

Table 1 Poverty measures in char, plain, and overall sample (World Bank 2017 Poverty Line: ₹280.67/day PPP-adjusted)

Measure	Char	Plain	Overall
HCR	0.9956 (0.0044)	0.9956 (0.0042)	0.9956 (0.0030)
PGR	0.6891 (0.0217)	0.6872 (0.0171)	0.6882 (0.0139)
SPGR	0.4941 (0.0277)	0.4894 (0.0210)	0.4918 (0.0175)
Sen Index	0.7570 (0.0173)	0.7570 (0.0134)	0.7570 (0.0102)
SST Index	0.8423 (0.0278)	0.8423 (0.0196)	0.8423 (0.0159)

Note: The poverty line corresponds to the World Bank international poverty benchmark converted to PPP-adjusted INR/day for 2017.
Standard errors shown in brackets. Estimates use survey design–corrected means and cluster bootstrapping (500 reps).
Source: Field survey

The poverty threshold set by the World Bank in 2022 has increased the existing subsistence floor, thus augmenting the quantified levels of poverty and its acuity. In line with this, from (Table 2), the poverty gap ratio (PGR), severe poverty gap ratio (SPGR), Sen index, and squared socioeconomic time (SST) are all higher compared to 2017, indicating that both Char and Plain regions have not been growing their real incomes in relation to the world, inflation-adjusted minimum standard. Despite the severe deprivation, there are still insignificant differences in Char and Plain households.

Table 2 Poverty measures in char, plain, and overall sample (World Bank 2022 ₹320.13/day PPP-adjusted)

Measure	Char	Plain	Overall
HCR	0.9956 (0.0044)	0.9956 (0.0042)	0.9956 (0.0030)
PGR	0.7269 (0.0192)	0.7252 (0.0153)	0.7261 (0.0123)
SPGR	0.5439 (0.0260)	0.5398 (0.0199)	0.5419 (0.0164)
Sen Index	0.7864 (0.0160)	0.7864 (0.0124)	0.7864 (0.0097)
SST Index	0.8886 (0.0263)	0.8886 (0.0182)	0.8886 (0.0150)

Note: The 2022 poverty line is based on updated World Bank global poverty thresholds translated to India's PPP-adjusted values.
Standard errors shown in brackets
Source: Field survey

This finding suggests that, by a globally standardized poverty measure, inequalities within Assam on the continental scale are overshadowed by widespread consumption of people in the region. As a result, the households belonging to both categories have similar abilities or the inabilities to meet the demand to fulfil purchasing-power-parity (PPP)-adjusted consumption demands. The 2025 World Bank poverty benchmark from Table 3 highlighted the gap between the global minimum consumption requirements and daily consumption levels in surveyed households. With the high level of poverty, PGR, SPGR, Sen, and SST indices, all reach their maximum levels from 2017 to 2025. This trend reflects a serious erosion of the real-income level, relative to the increasing international poverty line. The Char-Plain differences once again demonstrate considerably narrow values across all indicators. It is concluded that the regional differences in Assam tend to be insignificant compared to the absolute level of deprivation. Regardless of significantly different geographical and ecological oppositions, households in both areas are uniformly poorer than the international poverty standard [60].

Table 3 Poverty measures in char, plain, and overall sample (World Bank 2025 ₹368.37/day PPP-adjusted)

Measure	Char	Plain	Overall
HCR	0.9956 (0.0044)	0.9956 (0.0042)	0.9956 (0.0030)
PGR	0.7621 (0.0168)	0.7606 (0.0137)	0.7614 (0.0109)
SPGR	0.5933 (0.0240)	0.5899 (0.0185)	0.5916 (0.0152)
Sen Index	0.8138 (0.0142)	0.8138 (0.0103)	0.8138 (0.0078)
SST Index	0.9318 (0.0236)	0.9318 (0.0150)	0.9318 (0.0127)

Note: 2025 poverty line reflects the World Bank's projected global poverty threshold adjusted for PPP revisions.
Standard errors shown in brackets. Bootstrapped standard errors use 500 cluster replications
Source: Field survey

From all three tables, it is observed that the Head Count Ratio (HCR) across Char and Plain areas reveals a persistence of poverty with no change over time. For the years 2017, 2022 and 2025, the ratio stands at 0.996 in both Char and Plain regions. Moreover, the Poverty Gap Ratio (PGR) shows a deepening intensity of poverty. The PGR rises from 0.688 in 2017 to 0.761 in 2025, demonstrating that the poor are falling further below the poverty line over time. This indicates that not only is poverty widespread, but its intensity is also deepening, making it tougher for families to escape poverty without substantial intervention. Further, the Squared Poverty Gap Ratio (SPGR) strengthens this finding by reflecting growing inequality among the poor themselves. From 2017 to 2025, the SPGR increased from 0.492 to 0.592, reflecting the rising inequality among the poor. The poorest are becoming increasingly marginalized. This signifies that poverty

mitigation initiatives have failed to reduce poverty incidence in these areas. Such poverty reduction measures are not enough unless they are explicitly targeted at the most exposed groups [61].

The inequality dimensions measures, such as the Sen Index and Sen–Shorrocks–Thon (SST) indices, further indicate a wide gap among the poor across the regions. The Sen Index provides a combined effect of poverty incidence, depth and inequality. In both Char and Plain areas, it rises from 0.757 in 2017 to 0.812 in 2025. It highlights the multidimensional nature of poverty, with greater depth of poverty and increasing inequality. This underscores that incidence and severity, combined with unequal distribution, result in worse conditions for the poor in both Char and Plain areas. Similarly, the Sen-Shorrocks-Thon (SST) Index confirms the same trend, a worsening trajectory of poverty. The SST increased from 0.8423 in 2017 to 0.932 in 2025 in both the Char and Plain regions. This consistency in rising values across all indices suggests strong policy interventions; otherwise, poverty will continue to intensify in these regions.

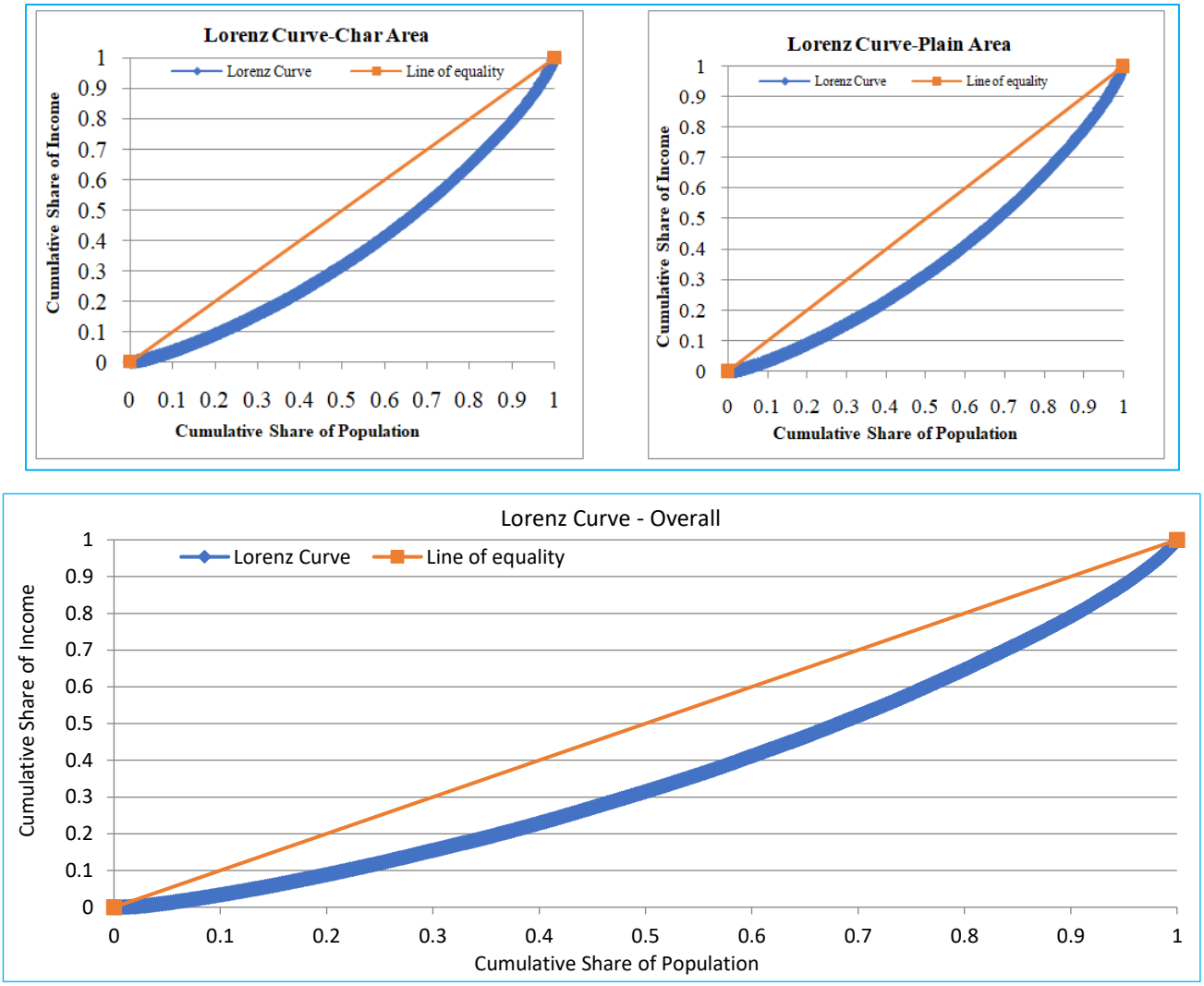

Fig 1 Lorenz curves for char and plain areas

Combined, the tables imply that geographical location (Char vs. Plain) has no significant influence on the intensity of poverty. Rather, an increase in poverty levels mechanically raises measured deprivation across all measures, which is a decline of real purchasing power as a result of inflation. The findings, therefore, highlight an economy-wide phenomenon of intense monetary deprivation as opposed to regional differences [62].

The Lorenz Curve and Gini Coefficient further show regional variations in inequality. The Lorenz Curve analysis offers a graphical representation of inequality in income distribution across Char and Plain areas. In the Char areas, the Lorenz Curve lies closer to the line of equality compared to the Plain areas. The Gini coefficient in the Char area (0.203) is relatively low compared to the Plain area (0.301). In Char areas, poverty is nearly universal and income levels are uniformly low. In plain areas, however, the variation is high, indicating a more unequal distribution of income.

The households in the Plains enjoy relatively better living conditions, while others remain intensely impoverished. When both regions are combined, the Lorenz Curve indicates moderate inequality with an overall Gini coefficient of 0.266, balancing the unambiguously diverse patterns of income distribution. Thus, the Lorenz Curve not only strengthens the Gini coefficient verdicts but also highlights the dual nature of poverty. It reveals uniformity in deprivation in Chars and unequal but persistent poverty in the Plains [63].

CONCLUSION

The analytical evaluation shows that the poverty level in Assam's Char and Plain areas is both pervasive and deepening. The Head Count Ratio (HCR) has continued to stay at about 0.996 (99.56) in both regions across 2017, 2022, and 2025 and thus, suggesting that practically all households are below the

globally set poverty line. Paradoxically, the severity of poverty is growing. The Poverty Gap Ratio (PGR) grows by 0.688 to 0.761 during the same temporal interval, and the Squared Poverty Gap (SPGR) grows by 0.492 to 0.592 over its time interval. The trend indicates that the poorest families become further below the ever-growing global poverty line every passing year. The Sen Index and the Sen-Shorrocks-Thon (SST) index, integrating measures of incidence, depth and inequality, similarly show a strong increase, as the Sen index increases by about 0.757 to 0.814 and the SST index increases by about 0.842 to 0.932 between 2017 and 2025. Overall, each of the key poverty indicators leads to the same finding that there is an established and worsening crisis. Poverty is not only prevalent but also growing in magnitude and inequality. It has been explicitly pointed out in the analysis that there is no statistically significant difference in the levels of extreme and rampant poverty between the two areas, reflecting identical HCR, PGR, SPGR, Sen and SST values of households in both regions. The only variation that is observed in the distribution of income: Char households, nearly homogeneous in the sense of being almost uniformly poor, have a low Gini coefficient of 0.203, and the Plain region shows greater heterogeneity with a Gini coefficient of 0.301. The aggregate Gini coefficient of 0.266 is therefore a two-fold trend of homogeneous low standards of living in the Chars and non-homogeneous but still persistently low income in the Plains. Geography, therefore, has no protective role; poverty is basically a state-wide phenomenon within Assam. The current trend of the consistent increase in all measures of poverty implies that the interventions, which have so far been implemented, have been so feeble and unless the policies are reinforced, the trends are probably going to be even worse. It is worth noting that the policy strategies should not be strictly limited to the work of one particular sphere, but the data require multisided interventions that would combat inflation, improve the real income and stimulate productivity across the state of Assam. The social protection and livelihood programmes should be carefully designed to reach those households that are increasingly below the poverty line. In general, the observations highlight the fact that abject poverty in Assam is still deeply rooted and is getting worse when compared to the global reference, hence requiring a comprehensive, economy-wide reaction to reverse the negative trends. Moreover, Char areas, characterized by geographical isolation with frequent flooding, erosion, lack of physical connectivity and weak institutional presence, require distinct interventions. Investments in resilient infrastructure, such as elevated housing, flood-resistant schools, all-weather-proof roads, more mobile health units and digital education platforms, potentially vindicate existing isolation. Moreover, climate-resilient agricultural practices with access to microcredit and crop insurance are the way to strengthen the economic base of Char dwellers. Inequality is more evident in the Plain areas, creating major concern. While relatively wealthier households in the Plain areas can access better opportunities, marginalized groups are at risk of being left out. Dedicated social protection schemes such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Pradhan Mantri Awas Yojana-Gramin (PMAY-G) and Assam Orunodoi scheme are crucial in bridging the gap. Moreover, empowering women from the marginalized groups through their participation in economic activities through expanding and strengthening Self-Help Groups (SHGs) can serve as a powerful lever for poverty reduction. In conclusion, the persistence of extreme poverty suggests substantial policy implications, as poverty alleviation measures have limited impact in these regions. Policies must be reformed to reflect discourse, not just the incidence but also the depth and inequality of poverty. Broadly, poverty alleviation strategies must go beyond addressing income discrepancies alone rather integrate both short-term and long-term multidimensional approaches. Hence, short-term instruments, targeting direct benefit transfers, nutritional support and livelihood guarantees are important developmental policy requirements for these regions. Besides, long-term strategies should focus more on human capital formation through investments in infrastructure, healthcare, education and skill development. A comprehensive policy framework that combines short-term relief with long-term structural alteration is more practical for sustained poverty reduction. For inclusive growth, region-specific development planning must be taken into consideration. This will recognise the distinct challenges of Char and Plain areas and allocate resources accordingly but if not planned strategically, the persistence of poverty may continue to undermine the state's development trajectory.

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