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## ASSESSING THE IMPACT OF COVID-19 ON RURAL POVERTY IN NAGALAND: EVIDENCE FROM FARM HOUSEHOLD DATA

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### Abstract

This study examines the dynamics of rural poverty among farm households in Nagaland, India, using the Foster-Greer-Thorbecke (FGT) class of poverty indices, during the year (2020–2022). Based on primary household data from five districts, the analysis reveals a persistently high incidence, depth and severity of monetary poverty, with the headcount ratio exceeding 74% in all years and peaking at 84.8% in 2021. The sharp deterioration in 2021 reflects pandemic-induced disruptions to agricultural markets, restricted mobility and reduced off-farm income opportunities. Although modest recovery occurred by 2022, poverty levels remained substantially above pre-pandemic levels, indicating limited livelihood resilience. Spatial analysis highlights pronounced inter-district disparities, with Dimapur showing relative resilience due to better infrastructure and market access, while Kiphire and Zunheboto remained entrenched in chronic poverty. The findings underscore the compounded effects of structural constraints and external shocks on rural welfare in Northeast India. Policy responses should therefore extend beyond short-term income restoration toward building resilience through livelihood diversification, infrastructure investment and targeted support to high-risk districts. The study contributes empirical evidence to the growing discourse on post-pandemic poverty and resilience among smallholder farmers in ecologically fragile regions.

**Keywords:** Covid-19 Pandemic, Foster-Greer-Thorbecke indices, Post-Pandemic recovery, Rural Poverty.

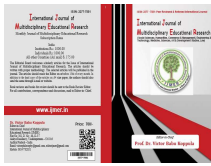
### 1. Introduction

Rural poverty in India remains a deeply entrenched and multidimensional challenge, particularly among smallholder farm households whose livelihoods depend on unstable agricultural incomes. Poverty reflects not only low monetary earnings but also limited access to education, health services, productive assets and infrastructure (Alkire & Foster, 2011). Farm households face overlapping structural constraints such as small landholdings, weak market integration, gender disparities and inadequate institutional support that interact to create persistent poverty traps (Barrett, Carter, & Chavas, 2021). These vulnerabilities are amplified in geographically isolated and ecologically fragile regions such as Northeast India.

Nagaland, a predominantly agrarian hill state in India's northeastern region, is characterized by steep terrain and reliance on traditional farming systems such as jhum (shifting cultivation) and terrace rice cultivation (Government of Nagaland, 2015). While these systems sustain food security and preserve biodiversity, they yield limited cash income, exposing smallholders to livelihood insecurity and market volatility. Over 70% of the state's population depends on agriculture and allied sectors for sustenance, yet the lack of industrial diversification and infrastructure continues to constrain household welfare.

The COVID-19 pandemic, which peaked during the year 2020-2021, had lingering effects into 2022, severely disrupted India's rural economy. Lockdowns, mobility restrictions, and market closures led to declining agricultural incomes, input shortages and weakened supply chains (Mahajan & Tomar, 2021; Jaacks et al., 2021). Nationally, these disruptions reversed years of poverty reduction, increasing rural deprivation and income inequality (IMF, 2023; Narayanan & Saha, 2022). Similar patterns have been reported across developing countries, where rural households faced disproportionate livelihood losses and slow recovery (FAO, 2023).

Against this backdrop, the present study examines the dynamics of rural poverty among farm households in Nagaland during the pandemic and early recovery period. Using the Foster-Greer-Thorbecke (FGT) class of poverty measures (Foster, Greer, & Thorbecke, 1984), it estimates the incidence, depth and severity of poverty across the three survey years, thereby capturing



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both the short-term economic shock of COVID-19 and the persistent structural constraints shaping post-pandemic recovery in the state's agrarian economy.

## 2. Methodology

The study covers five districts of Nagaland, viz., Dimapur, Tuensang, Peren, Zunheboto and Kiphire were selected to capture spatial variation in agro-ecological and socioeconomic conditions. A multistage random sampling approach was adopted: two blocks per district, two villages per block, and 20 farm households per village, yielding 400 households. The sample size was determined using the Arkin and Colton (1950) formula to ensure representativeness within resource constraints. Surveys were conducted in 2020, 2021 and 2022, covering the peak pandemic and recovery phases. Data were collected through structured questionnaires on household income, landholding and demographic characteristics.

For the Poverty line construction, the 2011–12 Tendulkar rural poverty line of ₹1,270 per capita per month served as the base and was updated using the Consumer Price Index for Rural (CPI-Rural) to adjust for inflation. Annual CPI-Rural averages (all-India) were 153.8 (2020), 161.6 (2021), and 172.5 (2022), corresponding to updated monthly poverty lines of ₹1,953, ₹2,053, and ₹2,190 respectively. This inflation adjustment ensures temporal comparability of poverty measures.

The Foster-Greer-Thorbecke (FGT) class of poverty measures (Foster, Greer & Thorbecke, 1984) provides a flexible and widely used framework for capturing monetary poverty. It consists of a family of indices that quantify poverty incidence (headcount), depth (poverty gap) and severity (squared gap). The general formula is:

$$FGT_{\alpha} = \frac{1}{N} \sum_{i=1}^q \left( \frac{z - y_i}{z} \right)^{\alpha}$$

Where:

$N$  is the total number of households

$q$  is the number of poor (those for whom  $y_i < z$ ),

$z$  is the poverty line (CPI-adjusted, monthly per capita income),

$y_i$  is the income of the  $i^{\text{th}}$  poor individual, and

$\alpha$  is the sensitivity parameter:

Such that:

$\alpha = 0$ : Headcount Ratio (FGT0) is the proportion of the population below the poverty line.

$\alpha = 1$ : Poverty Gap (FGT1) is the average income shortfall from the poverty line among the poor, expressed as a proportion of the poverty line.

$\alpha = 2$ : Poverty Severity (FGT2) is the squares the poverty gap to give greater weight to the poorest.

FGT indices are decomposable across subgroups and years, allowing dynamic analysis of poverty trends during and after the pandemic.



### 3. Results

#### 3.a Poverty Incidence, depth and Severity (2020-2022)

**Table 1: FGT Indices among Farm Households, 2020-2022**

| Year | Poverty Line<br>(Rs/capita/month) | Headcount<br>Ratio FGT<br>(0) | Poverty<br>Gap FGT<br>(1) | Poverty<br>Severity FGT<br>(2) |
|------|-----------------------------------|-------------------------------|---------------------------|--------------------------------|
| 2020 | Rs. 1,953                         | 0.748                         | 0.504                     | 0.393                          |
| 2021 | Rs. 2,053                         | 0.848                         | 0.584                     | 0.463                          |
| 2022 | Rs. 2,190                         | 0.775                         | 0.537                     | 0.428                          |
|      |                                   |                               |                           |                                |

**Note:** Poverty thresholds adjusted using CPI-Rural (All-India)

The results reveal a persistently high incidence and intensity of monetary poverty among farm households across the three years under study. The poverty incidence (FGT0) remained above 74% in all years, peaking at 84.8% in 2021, reflecting the compounded effect of pandemic disruptions on agricultural incomes. This suggests that over three-fourths of farm population consistently fell below the CPI-adjusted poverty line. The spike in 2021 is indicative of post-pandemic shocks as well as climate-induced income variability during the recovery phase.

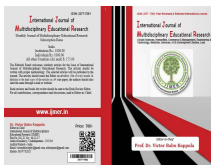
The poverty gap (FGT1) also increased in 2021 to 0.584, indicating that on average, poor households were experiencing an income shortfall of over 58% of the poverty line. This signals a deepening of poverty rather than mere marginal cases of deprivation. While, poverty severity (FGT2) shows a notable increase from 0.393 in 2020 to 0.463 in 2021, reflecting a rise in income inequality among the poor. This metric is particularly sensitive to the disproportionate burden borne by the ultra-poor, capturing the squared distance from the poverty line. Although there is a marginal recovery in 2022, with the headcount ratio falling to 77.5 % and severity dropping slightly to 0.428, poverty levels remain significantly high, underscoring limited livelihood resilience despite policy and institutional support mechanisms.

Taken together, these results reveal the persistence of income deprivation even beyond the immediate crisis phase, suggesting that the pandemic acted less as an isolated shock and more as a catalyst that exposed pre-existing structural weaknesses. The moderate recovery visible in 2022 appears to stem more from short-term market reopening than from systemic livelihood strengthening. Such findings echo national and global analyses which caution that temporary income rebounds often mask deeper asset erosion and indebtedness among rural poor (IMF, 2023; FAO, 2023). For smallholder farmers in Nagaland, therefore, the challenge extends beyond restoring incomes as it lies in rebuilding resilience through sustained access to productive inputs, infrastructure and social safety nets.

#### 3.b Income and District Variations

**Table 2: District-wise Monthly Per Capita Income and Poverty Gap (2020-2022)**

| District  | Year | Population<br>Share | Average<br>Income (Rs.) | Average<br>Income of<br>Poor (Rs) | Average Income<br>Gap of Poor (Rs.) |
|-----------|------|---------------------|-------------------------|-----------------------------------|-------------------------------------|
| Zunheboto | 2020 | 20 %                | 576                     | 550                               | 1403                                |
| Dimapur   | 2020 | 20 %                | 4662                    | 1010                              | 943                                 |
| Tuensang  | 2020 | 20 %                | 1457                    | 988                               | 965                                 |
| Kiphire   | 2020 | 20 %                | 238                     | 238                               | 1715                                |
| Peren     | 2020 | 20 %                | 1312                    | 797                               | 1156                                |
|           |      |                     |                         |                                   |                                     |



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|           |      |      |      |      |       |
|-----------|------|------|------|------|-------|
| Zunheboto | 2021 | 20 % | 438  | 438  | 1615  |
| Dimapur   | 2021 | 20 % | 2841 | 914  | 1139  |
| Tuensang  | 2021 | 20 % | 1172 | 972  | 1081  |
| Kiphire   | 2021 | 20 % | 262  | 262  | 1791  |
| Peren     | 2021 | 20 % | 1144 | 798  | 1255  |
|           |      |      |      |      |       |
| Zunheboto | 2022 | 20 % | 406  | 406  | 1,784 |
| Dimapur   | 2022 | 20 % | 4818 | 1045 | 1145  |
| Tuensang  | 2022 | 20 % | 1693 | 1112 | 1078  |
| Kiphire   | 2022 | 20 % | 294  | 294  | 1895  |
| Peren     | 2022 | 20 % | 1200 | 933  | 1257  |

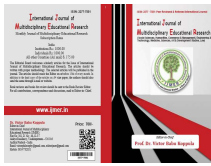
- The average monthly per capita income across all households
- The average income among poor households (those below the poverty line), and
- The income gap, defined as the mean per capita shortfall between the poor's per capita income and the poverty threshold.
- The uniform share (20%) reflects equal representation across districts in the survey sample

Table 2 provides a district-wise overview of monthly per capita agricultural income and poverty characteristics among rural farming households across five districts of Nagaland from 2020 to 2022. The results reveal persistent and substantial spatial disparities in rural income distribution. Dimapur district being Nagaland's most economically dynamic and connected district, consistently records the highest per capita incomes (Rs. 4,662 in 2020 and Rs. 4,818 in 2022). In stark contrast, Kiphire and Zunheboto remain entrenched in chronic poverty, with alarmingly low averages (Kiphire: Rs. 238 in 2020; Rs. 294 in 2022).

In these lagging districts, the mean income among poor households closely mirrors the district-wide mean, suggesting that poverty is not confined to a marginal subset but represents a widespread structural condition. This is corroborated by near-unity FGT (0) headcount ratios, indicating pervasive deprivation. The income shortfall among the poor is particularly acute in Kiphire (Rs. 1,715 in 2020; Rs. 1,896 in 2022) and Zunheboto (Rs. 1,403 to Rs. 1,784), underscoring deep and worsening poverty. Conversely, Dimapur's poor face smaller income gaps (Rs. 943 to Rs. 1,145), reflecting less severe poverty intensity.

A notable income contraction in 2021, particularly in Dimapur, Tuensang and Peren district, likely reflects pandemic-related disruptions compounded by climate-induced vulnerabilities. While partial recovery occurred by 2022, structurally disadvantaged regions such as Kiphire, Zunheboto and Tuensang continued to stagnate. These findings emphasize the need for spatially targeted poverty alleviation strategies addressing both the incidence and depth of deprivation within Nagaland's agrarian economy.

The stark inter-district disparities underscore the spatial dimension of poverty that has long defined the hill regions of Northeast India. Dimapur districts relative resilience demonstrates how market connectivity, diversification and access to non-farm employment mitigate income shocks, aligning with evidence from other agrarian regions of India (Mahajan & Tomar, 2021). Conversely, the chronic deprivation in Zunheboto, Kiphire, Peren and Tuensang districts illustrates the poverty trap mechanisms described by Barrett et al. (2021), where geographic isolation, low productivity and weak institutional reach reinforce cyclical poverty. The regional differentiation observed here highlights the urgent need for district-sensitive development planning, one that integrates rural infrastructure, digital market linkages and climate-resilient agricultural programs as complementary poverty reduction strategies.



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#### 4. Discussion

The observed 2021 spike in poverty aligns with studies documenting pandemic-induced income losses and livelihood disruptions in rural areas (Narayanan & Saha, 2022; Mahajan & Tomar, 2021). Although national rural poverty had declined steadily prior to COVID-19 (World Bank, 2020), the crisis reversed years of progress, particularly among smallholders with limited coping capacity. The persistence of high FGT1 and FGT2 values even in 2022 reflects similar patterns reported across other developing regions, where post-pandemic recovery was uneven and tended to favor better-connected households (FAO, 2023). This pattern is evident across all the five sample districts, where the 2021 downturn disproportionately affected poorer and more remote communities.

The results further corroborate literature emphasizing structural poverty in Northeast India due to difficult terrain, limited mechanization and market isolation (Das & Baruah, 2020). In Nagaland, where over 70% depend on agriculture (Government of Nagaland, 2015), these structural challenges amplify vulnerability to global or national shocks such as COVID-19.

The persistence of high poverty incidence despite policy interventions also calls into question the adequacy of existing safety nets and agricultural support programs. Empirical evidence from other developing contexts indicates that cash transfer schemes, input subsidies and rural employment guarantee often provide short-term relief but do not address the deeper structural drivers of rural poverty (Barrett et al., 2021; FAO, 2023). In the context of Nagaland, where subsistence farming dominates and market access is limited, poverty reduction strategies must therefore move beyond income support toward improving agricultural productivity, diversification and value chain participation.

Furthermore, the differential recovery across districts mirrors what Narayanan and Saha (2022) describe as the “dual-speed” nature of India’s rural recovery, where better-connected regions rebounded faster while remote areas remained trapped in low-return activities. This uneven recovery pattern has implications for the design of post-pandemic development programs, suggesting that targeted regional investment is essential to prevent further spatial polarization of poverty.

Finally, the elevated FGT2 (severity) index points to the emergence of a subset of ultra-poor households whose deprivation is both deep and persistent. This resonates with global findings from the FAO (2023) and the IMF (2023) that emphasize how shocks like COVID-19 disproportionately affect households with minimal asset buffers, pushing them into long-term poverty even after macroeconomic conditions stabilize. Addressing this severity dimension, requires multidimensional approaches that integrate livelihood diversification, microfinance and community-based risk-sharing systems rather than relying solely on income-based poverty metrics.

#### 5. Conclusion and Policy Implications

The analysis of rural poverty among farm households in Nagaland during 2020-2022 reveals the complex and enduring nature of deprivation in the state’s agrarian economy. The FGT indices demonstrate that poverty incidence, depth and severity rose sharply during the COVID-19 pandemic and remained elevated even by 2022, reflecting an incomplete and uneven recovery. The year 2021 marked a critical inflection point when restrictions on mobility and market disruptions severely constrained farm incomes, echoing national patterns of livelihood loss and food insecurity observed across rural India (Mahajan & Tomar, 2021; Narayanan & Saha, 2022).

Spatial heterogeneity in income and poverty underscores that not all districts were equally affected. Dimapur displayed relative resilience due to stronger market connectivity, while structurally disadvantaged hill districts such as Kiphire, Zunheboto, Tuensang and Peren experienced persistent, chronic poverty. These findings affirm broader evidence that regional disparities, weak infrastructure and limited livelihood diversification amplify vulnerability in geographically isolated rural settings (Das & Baruah, 2020; Barrett et al., 2021).



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The persistence of high poverty severity (FGT2) highlights the emergence of ultra-poor households trapped in long-term deprivation. This calls for policy frameworks that move beyond income restoration toward resilience-building through improved agricultural productivity, access to finance and non-farm income opportunities. Strengthening institutional linkages, expanding digital market access and tailoring resilient livelihood programs to hill contexts can help mitigate both idiosyncratic and systemic shocks.

Overall, the findings provide empirical evidence that the COVID-19 crisis magnified existing structural inequalities rather than creating new ones. As the state and national governments transition toward post-pandemic rural development, there is a critical need for district-sensitive, inclusive and adaptive poverty alleviation strategies, particularly in lagging districts such as Kiphire, Zunheboto, Tuensang and Peren, ones that integrate short-term income support with long-term investments in human capital, infrastructure and sustainable agriculture.

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