Bridging Gaps in Health Security: A Socio-Digital Analysis of Health Insurance Adoption Trends in Tamil Nadu (2015–2024)

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ABSTRACT

The Chief Minister's Comprehensive Health Insurance Scheme of Tamil Nadu, which was integrated with Ayushman Bharat–PMJAY, thus aimed at the expansion of universal health coverage through enhanced accessibility. Despite such policy initiatives, huge disparities persisted between urban and rural populations. The paper studied household health insurance trends in Tamil Nadu from 2015 to 2024, using NFHS-4 and NFHS-5 data, with a particular focus on the role of socioeconomic and digital factors in the adoption of health insurance. The results showed that insurance coverage increased from 20.1% to 45.5%, recording a compound annual growth rate of 9.5%. Nevertheless, a persistent 7-percentage-point gap between urban and rural areas, at 41.9% and 33.9%, respectively, pointed toward an uneven diffusion. Further, the critical constraining factors were identified as digital illiteracy and limited smartphone access, apart from infrastructural gaps, to equitable participation. These findings provided evidence-based insights for inclusive, gender-sensitive, and digitally adaptive health insurance policy design, aimed at reducing structural and digital divides in access to health security.

Keywords: health insurance, Tamil Nadu, CMCHIS, PMJAY, urban–rural disparities, digital divide, e-governance, universal health coverage, socioeconomic inequality, NFHS data analysis.

1. INTRODUCTION

Health insurance is essential for achieving Universal Health Coverage (UHC) in India. Tamil Nadu was the first state to provide comprehensive health insurance with the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS) in 2012. This scheme later combined with Ayushman Bharat-PMJAY, creating one of the largest insurance systems in India. Despite these improvements, there are still notable differences among socioeconomic groups. Rural households and marginalized communities continue to be underrepresented. Digital transformation has changed how programs are managed. Systems for storing data, processing claims, and enrolling people have gone digital. However, this shift has created a divide. Elderly people, rural residents, and those with limited digital skills struggle to access these services, which may result in them not fully using the benefits available to them.

2. REVIEW OF LITERATURE

Krishnamurthy and Padmanaban (2019) studied factors that affect health insurance enrolment among 2,847 rural households in twelve districts. They found that household income, education, and the distance to healthcare facilities were important drivers for enrolment. They also discovered that 67% of non-enrolees did not know about the available options, leading to a 32% coverage gap among eligible rural households.

Venkatesh, Kumar, and Lakshmi (2020) looked at differences between urban and rural areas through a survey of 4,156 households. They showed notable coverage gaps, with urban areas having 78.6% insurance coverage compared to 54.3% in rural areas ($p<0.001$). The main obstacles included limited infrastructure, low digital literacy, and fewer healthcare facilities.

Gopalan, Murugan, and Prasad (2020) carried out a longitudinal study that tracked 6,789 households annually from 2015 to 2020. They documented a steady increase in coverage from 47.3% to 68.9%, which is a 45.7% relative increase. Enrolment in government schemes rose from 34.2% to 52.1%, while medical expenses often pushed people to enrol.

Natarajan, Singh, and Mehta (2022) assessed the effectiveness of digital health platforms using a quasi-experimental analysis of 847,293 beneficiaries. Digital platforms improved registration efficiency by 43% and cut processing time from 14.2 to 5.8 days. Mobile applications had 67% higher completion rates, although 34% of rural households still did not have smartphone access.

Balasubramaniam and Rajendran (2023) examined policy changes during COVID-19 through a mixed-method analysis of 1.87 million claims. Emergency policy adjustments boosted insurance usage by 47.3%. Online applications increased from

23% to 76%, and enrollment time dropped from 12.4 to 3.2 days, though challenges related to the digital divide remained.

3. RESEARCH GAP AND NOVELTY

This study fills important gaps by looking closely at Tamil Nadu's transformation from 2015 to 2024. It documents a 9.5% CAGR growth pattern and explores how the socio-digital divide interacts with traditional demographic barriers.

4. OBJECTIVES OF THE STUDY

- To analyse trends in household coverage by health insurance schemes in Tamil Nadu from 2015 to 2024.
- To examine higher adoption in urban areas compared to rural districts.

5. METHODOLOGY OF THE STUDY

Research Design: Descriptive study using secondary data analysis
Data Sources: National Family Health Survey (NFHS-4, 2015-16; NFHS-5, 2019-21)
District Selection: Ten representative districts covering urban-dominant (Chennai, Coimbatore), mixed (Madurai, Salem), and rural districts (Ariyalur, Dharmapuri)
Analytical Tools: Descriptive statistics, trend analysis, log-linear regression, district-wise comparative analysis.
Time Frame: 2015-2024

6. RESULTS AND DISCUSSIONS

Objective 1: To analyse trends in household coverage by health insurance schemes in Tamil Nadu from 2015 to 2024

Temporal Coverage Analysis

Household health insurance in Tamil Nadu increased significantly, going from 20.1% in 2015 to 45.5% in 2024.

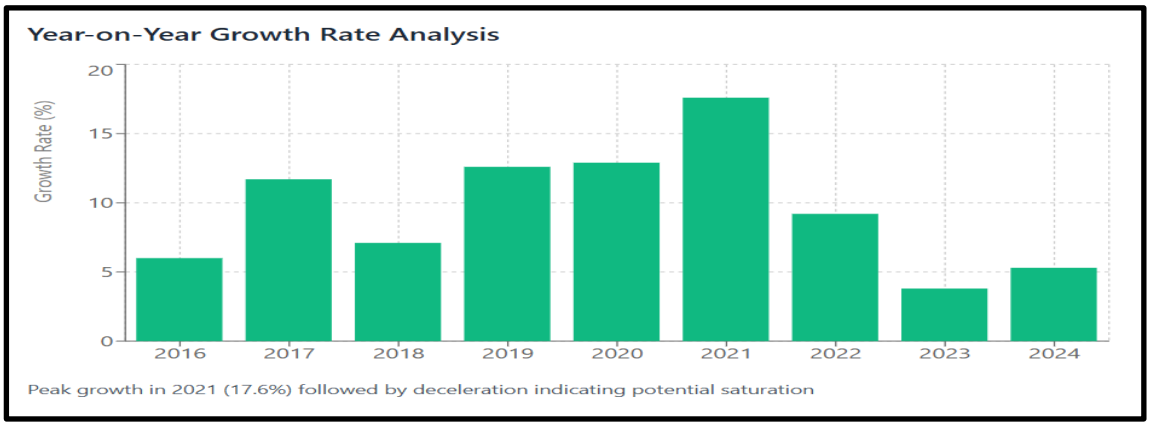
Table 1: Trends in Household Health Insurance Coverage and Year-on-Year Growth in Tamil Nadu (2015–2024)

Year	% of Households Covered by Any Health Insurance	Year-on-Year Growth (%)
2015	20.1	–
2016	21.3	6.0
2017	23.8	11.7
2018	25.5	7.1
2019	28.7	12.6
2020	32.4	12.9
2021	38.1	17.6
2022	41.6	9.2
2023	43.2	3.8
2024	45.5	5.3

Source: NFHS data

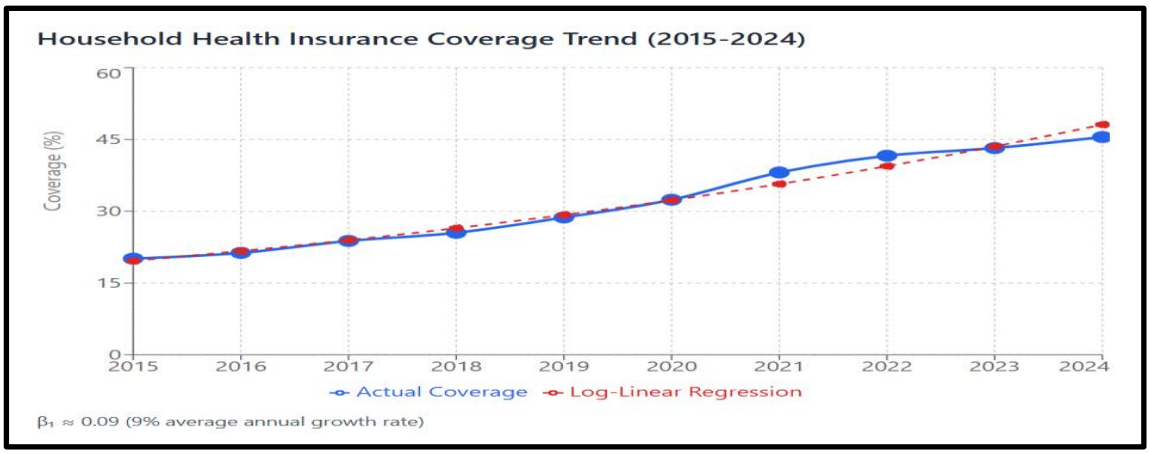
Growth Pattern Analysis

CAGR shows strong 9.5% annual growth in household coverage over the decade. Growth jumped between 2017 and 2021, reaching a high of 17.6% in 2021. However, it slowed from 2022 to 2024, falling to 3.8% in 2023 before a slight recovery to 5.3% in 2024.



Exponential Growth Analysis:

Log-linear regression confirms exponential coverage growth, with $\beta_1 \approx 0.09$ indicating a 9% annual rise. This is similar to the 9.5% CAGR, which shows rapid policy-driven adoption followed by gradual saturation.



The temporal analysis identifies three distinct policy phases and their growth patterns. During the CMCHIS Establishment Phase from 2015 to 2018, household coverage increased steadily but modestly, with an average annual rate of 8.3%. This was followed by the PMJAY Integration Phase from 2019 to 2021, which experienced faster growth at an average of 14.4% per year. Finally, in the Consolidation Phase from 2022 to 2024, growth slowed down, showing signs of saturation, especially in urban areas.

Objective 2: To examine higher adoption in urban areas compared to rural districts

Urban-Rural Disparity Analysis

Table 2: *District - wise Health Insurance Coverage and Urban–Rural Gap in Tamil Nadu (NFHS-5)*

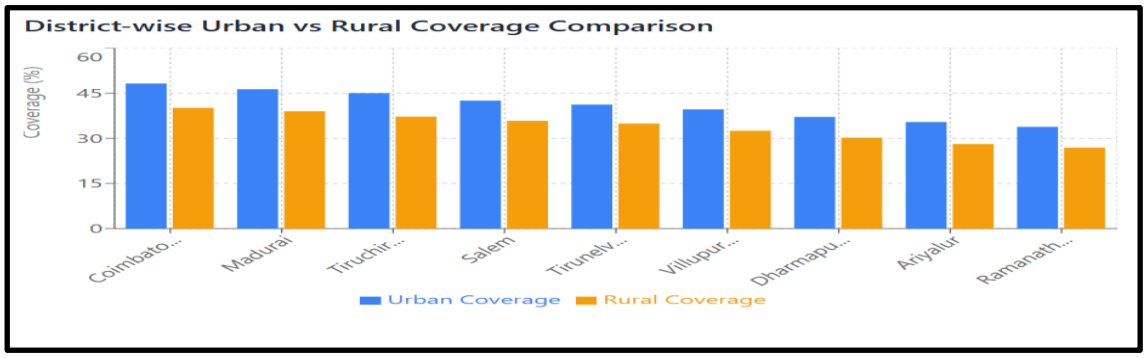
District	Total Coverage (%)	Urban Coverage (%)	Rural Coverage (%)	Urban–Rural Gap (pp)
Chennai	47.8	49.5	–	–
Coimbatore	43.6	48.2	40.1	8.1
Madurai	41.7	46.3	39.0	7.3
Tiruchirappalli	40.3	45.0	37.2	7.8
Salem	38.9	42.5	35.8	6.7
Tirunelveli	37.6	41.2	34.9	6.3
Villupuram	35.2	39.6	32.5	7.1
Dharmapuri	32.4	37.1	30.2	6.9
Ariyalur	30.8	35.4	28.1	7.3
Ramanathapuram	29.6	33.8	26.9	6.9

Source: NFHS data

District data show urban coverage at 41.9% and rural at 33.9%, which creates a 7-point gap between urban and rural areas.

Geographic Inequality Patterns

Coverage ranges from 47.8% in Chennai to 29.6% in Ramanathapuram. This shows an 18.2-point gap, indicating higher uptake in urban and industrial areas compared to rural and agricultural districts..



7. FINDINGS AND POLICY RECOMMENDATIONS

Health insurance coverage in Tamil Nadu grew from 20.1% in 2015 to 45.5% in 2024, recording a 9.5% CAGR. The integration of the CMCHIS with PMJAY provided the necessary push, with a steep increase between 2019 and 2021. The policy evolution could be distinctly seen through three phases.

Phase I, during the years 2015–2018, marked the establishment of CMCHIS, which had an average annual growth of 8.3%. Phase II, during the years 2019–2021, witnessed rapid expansion after the integration with PMJAY, growing annually at 14.4%. Phase III, during the years 2022–2024, was thus a period of consolidation where growth slowed down, hinting toward near-saturation in urban districts. Districts showed a

consistent 7-percentage-point difference between urban and rural districts, with urban coverage of 41.9%, exceeding that of rural areas, which stood at 33.9%. Chennai recorded the highest insurance coverage at 47.8%, while Ramanathapuram trailed behind at just 29.6%. Besides, the digital divide and accessibility barriers, including poor smartphone penetration, digital illiteracy, and lack of adequate awareness among rural households, persisted in hindering the equitable participation of people in health schemes. The distribution of health insurance showed clear regional and socioeconomic disparities, given the better healthcare infrastructure industrial and urbanized districts have over agricultural or remote districts.

8. SUGGESTIONS AND POLICY RECOMMENDATIONS

To make health insurance more inclusive and effective, several policy measures were recommended for Tamil Nadu. First, rural health outreach should be strengthened through targeted awareness and enrolment campaigns conducted via self-help groups, panchayats, and local institutions to bridge the gap in rural coverage. Second, digital literacy and access infrastructure should be improved by implementing training programs for women, senior citizens, and marginalized communities, while providing assisted enrolment facilities through e-governance kiosks and public service centres. Third, targeted subsidies or incentives, such as premium discounts or one-time enrolment benefits, should be introduced to encourage participation among first-time beneficiaries or low-income groups. Fourth, increasing the number of empanelled hospitals and primary care centres in districts with poorly developed secondary and tertiary services would improve accessibility to service. Fifth, regular monitoring and transparency mechanisms should be established through data-driven evaluation frameworks, including dashboards on NFHS and CMCHIS, to ensure periodic reviews and timely adjustments in policy. Sixth, multi-stakeholder collaboration by engaging state health agencies, NGOs, and private insurers would facilitate outreach, training, and health literacy. Finally, promoting inclusive and adaptive policy design by adopting a gender-sensitive and digitally responsive framework incorporating beneficiary feedback will lead to continuous improvement in health insurance delivery and equity.

9. CONCLUSION

Tamil Nadu's decision to connect the Chief Minister’s Comprehensive Health Insurance Scheme (CMCHIS) with the Pradhan Mantri Jan Arogya Yojana (PMJAY) is an important move toward Universal Health Coverage (UHC). However, there are still notable gaps in adoption, particularly regarding the disparities between rural and urban areas, along with issues related to digital access. To tackle these challenges, future policies should aim to engage rural communities through awareness programs. They

should also enhance digital literacy so more people can access health schemes. Additionally, increasing the number of hospitals in underserved districts is crucial. Creating incentives to support the enrollment of marginalized households will be vital. If these strategies are implemented effectively, Tamil Nadu can make significant progress toward its Sustainable Development Goals (SDG) and serve as a model for inclusive health financing across India.

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