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Research Paper

Public health expenditure in north east india: trends, challenges, and policy implications

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ABSTRACT

This study investigates the trends in public health expenditure across the eight North Eastern states of India Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura over the period 2012–2020. Using state-wise expenditure data from official government sources, the research highlights significant disparities in budget allocation, growth patterns, and healthcare investment efficiency within the region. Despite growing public health needs, especially in remote and tribal areas, the study finds that health spending remains inconsistent and insufficient in several states. Key challenges identified include geographic inaccessibility, human resource shortages, inadequate infrastructure, and limited administrative capacity. The paper also examines how socio-political factors and governance models influence policy implementation. Based on the findings, the study proposes targeted policy interventions to enhance regional equity in health financing, improve access to quality healthcare, and promote sustainable health outcomes in the North East.

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1. INTRODUCTION

The public is drawer water in nancing policy reddening on health expenditure (PNE) plays an important role in determining outcomes, and on quality of life. Healthcare, in India being largely a state subject, the level of public spending on health differs drastically between states and regions. The North Eastern region covering eight states, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland,

Sikkim, and Tripura has special terrain challenges: social & political situation and a limited infrastructure. Key messages despite being strategically important and with social-cultural richness, the region had a history of developmental lag especially in health [1], [2].

The public health services in North East India has undergone improvement but was also rocked by waves of issue between 2012 and 2020. Even as some states have invested heavily in health, others are still playing catch-up, prompting worries over equity and access. For example, there was a steady increasing trend in expenditure by states such as Assam and Tripura while modest or erratic spending trends were observed in any smaller states like Sikkim and Mizoram. These gaps are generally a function of broader governance and resource allocation factors, driven by political willingness, administrative competencies and the dynamics of population [3], [4].

Also, notwithstanding attempts by the centrally sponsored schemes including the National Health Mission, health infrastructure and delivery of services continues to be poor in several rural and tribal belt areas. It has high prevalence of disease, low doctor-patient ratios and limited access to specialized care remains an obstacle for improving the region's health. The urgent call for a localized, interactive and responsive policy system is evident in an analysis of the performance of existing public health investments [5], [6].

The objective of the study is to understand, how resources are being allocated and used in North East India over time through analyzing the patterns of public health expenditure. It looks to compare intra-state differences in health expenditure and infrastructure to understand inequities across the region. It will also address the most pressing challenges of investment and delivery in public health services, including financial, institutional and material barriers. It also examines the effect of investment on health service accessibility and outcomes, to ascertain whether high spending is accompanied by improved health metrics. Lastly the study will propose policy implications to reinforce public health systems in the region, emphasizing on fair distribution of resources; effective service provision and sustainable development of healthcare [7], [8], [9].

2. RELATED WORK

The importance of expenditure on health to improve health status has been widely recognized across the world and in India as well. Higher allocation toward public health is generally related to better healthcare access, lesser disease burden, and sounder health infrastructure. India India's public health financing is highly decentralized, with states having the autonomy to set the size and balance of their health budgets. It has resulted in unequal between-state health investments and outcomes [10], [11].

The North Eastern region of India presents a special case in this overall context. Even as it has strategic significance and wealth of tradition, there are many socio-economic indicators in which the region lags behind; health is one among several. Low population density, less connectivity and rugged terrain make healthcare delivery more costly in the NE states in comparison to other parts of the country and they are heavily reliant on Central transfers and special schemes as a result [12], [13].

The National Health Mission (NHM), started in 2005, was supposed to fill the healthcare access deficit between states. Although it has transformed the delivery of service in a number of localities within North East, the standard and coverage of healthcare remains uneven. Manipur, Mizoram and Sikkim have done comparatively much better and states like Arunachal Pradesh, Nagaland continue to suffer from extreme shortfalls in infrastructure and human resource [14], [15].

But expenditure does not necessarily translate into better performance, unless it is underpinned by strong governance, transparent budgeting and effective use of money. This will be of critical significance in the North East where administrative bottlenecks and insurgency related disturbances often impact long term policy implementation [16].

Recent state specific estimates drawn attention to substantial variation in per capita health consumption across North Eastern states. Although Assam and Tripura have experienced fairly steady development of investment, in other States there is stagnation or erratic growth. These disparities highlight

the importance of a targeted policy response that considers local conditions, including tribal demographics and regional health needs [17], [18].

However, even though these problems are acknowledged, there is insufficient specialised research on the trends of public health expenditure in North East region as a whole. This paper aims to do this by looking at temporal trends, understanding the main constraints and suggesting, from empirical evidence, policy recommendations [19], [20], [21].

3. METHODOLOGY

This paper uses the secondary data research method to investigate trends in public health expenditures in the North Eastern states of India. The objective here is to analyze the data as available, in order to determine how money has been or should be spent, what challenges have occurred and how they have affected access. The study will be supported by reliable secondary data sources like National Health Profile (NHP) reports, state government health reports, and state budget documents along with other publications issued by Ministry of Finance and Ministry of Health. The data is expected to juxtapose critical statistics such as outlay for the total health and rural-urban split of funds, inpatient bed strength, and overall health infrastructure too. The research will span the entire Eight (8) States of North Eastern Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, and Nagaland Sikkim Tripura covering a complete situation analysis of regional health care expenditure pattern. The analysis will highlight short-term variance as well as slower long-term changes in spending and may provide a signal of healthcare system development in the area.

4. RESULTS AND DISCUSSION

Primary appraisement of the PH expenditure within North East India appreciates substantial gain particularly in Assam and Arunachal Pradesh, leading to enhanced throughput on healthcare infrastructure. Nevertheless, there are issues such as regional disparities, limited rural infrastructure and lack of well-trained health personnel. Policy interventions that address equitable resource allocation, rural infrastructure and human resource development are important to reducing these disparities [22].

Table 1. Public Health Expenditure in North Eastern States (₹ Crore)

State	2012-13	2019-20	Change (%)
Assam	1539.0	5446.3	+254%
Arunachal Pradesh	283.0	1013.0	+258%
Manipur	332.0	667.8	+101%
Meghalaya	399.0	910.7	+128%
Mizoram	225.0	651.2	+189%
Nagaland	376.0	668.9	+78%
Sikkim	245.0	427.1	+74%
Tripura	318.0	907.4	+185%

Table 1 Change in public health spending across the North Eastern states of India on Indian Rupees base (not adjusted to inflation), comparison between years 2012-13 and 2019-20 as per percentage total from Table 1 shows significant rise during this period. The percentage change in health expenditure was positive across all eight states, demonstrating an overall desire of investing in infrastructure and service delivery. Arunachal Pradesh also reported the highest percentage jump of 258 per cent and Assam was second at 254 per cent, more than tripling their expenditure during this period. Mizoram and Tripura too, had decent growth of 189% and 185%, respectively.

Meghalaya and Manipur grew moderately at 128 per cent and 101 per cent, whereas the least growth was witnessed by Nagaland with 78 per cent followed by Sikkim with 74 per cent. Overall, however, the trend has been an upward prioritization of health in state budgets; yet disparities in percentage growth

indicate different levels of commitment and ability across the region. The data cogently argues the case for states with relatively lower growth, namely Nagaland and Sikkim, to perform better, in order to catch up with regional health needs and development targets.

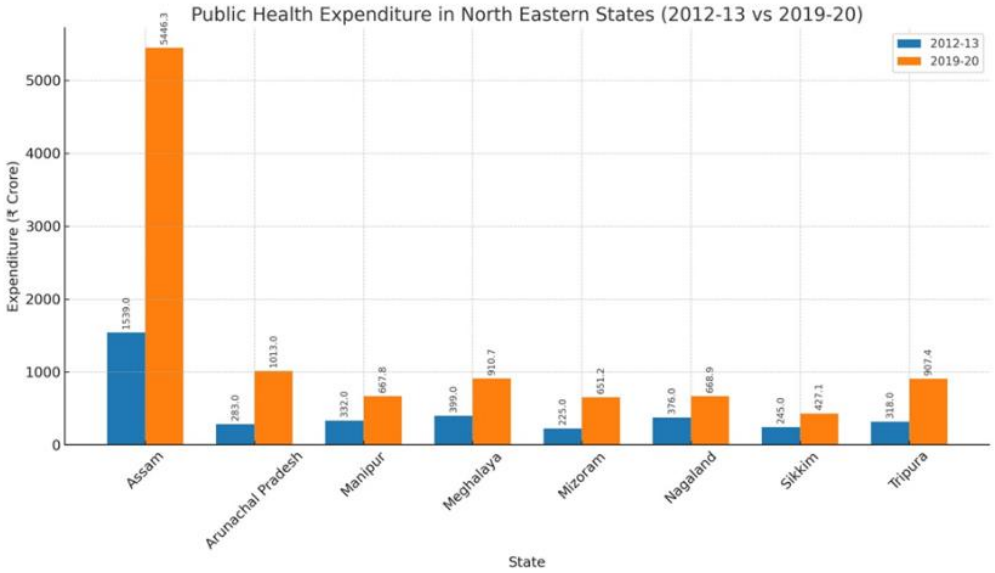

Figure 1. Public Health Expenditure in North Eastern States (₹ Crore)

There is a sharp rise in public health expenditure in all NER states from 2012-13 to 2019-20, as presented Figure 1 Graph of Public Health Expenditure compared with GSDP. Assam has the highest increase, from ₹1539 crores to ₹5446 crores. Other states also show remarkable improvement, and it may depict increased investment in healthcare infrastructure and services to attain better health outcomes at the regional level.

Table 2. Public Health Expenditure in North Eastern States of India (₹ Crore)

State	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Arunachal Pradesh	283.0	357.0	591.0	536.0	708.4	936.1	1118.3	1013.0
Assam	1539.0	1711.0	1927.0	2864.0	3196.8	4514.9	4663.0	5446.3
Manipur	332.0	412.0	578.0	486.0	479.6	580.2	493.9	667.8
Meghalaya	399.0	452.0	574.0	644.0	814.8	1446.4	1108.5	910.7
Mizoram	225.0	348.0	418.0	451.0	491.0	664.3	653.8	651.2
Nagaland	376.0	302.0	418.0	465.0	495.6	613.3	630.2	668.9
Sikkim	245.0	256.0	261.0	262.0	283.3	463.2	408.5	427.1
Tripura	318.0	409.0	596.0	610.0	690.2	785.5	934.9	907.4

Table 2 depicts trends of public health expenditure in the states of North Eastern India from 2012-13 to 2019-20, and an overall increase has been observed for all the eight state1. The highest spending was found in Assam, where expenditure rose from ₹1539 crores in 2012-13 to ₹5446.3 crore in 2019-20 indicating a robust and sustained investment in the health sector. Arunachal Pradesh too saw a marked increase, reaching its peak of ₹1118.3 crore in 2018-19, but marginally dipping the year after. States such as Meghalaya and Tripura saw an uptick but this was because of a sudden spike in the previous year (2017-18 for Meghalya which had ₹1446.4 crore under MPLADS, followed by a drop) and might have plateaued due to one-time projects or re-routing of capital among the several options. Andhra Pradesh, Himachal Pradesh, Manipur, Mizoram and Nagaland showed erratic trends while Sikkim experienced relatively low but steady growth. While fluctuating, all states experienced an increase in public health spending over the

entire review period with varying speed and consistency. States, such as Mizoram and Sikkim, on the smaller side might have been doing better per capita even though the absolute amount spent is lower in comparison to larger states like Assam.

These trends underscore the importance of equitable, sustained, and tailored investment in public health for development across the region.

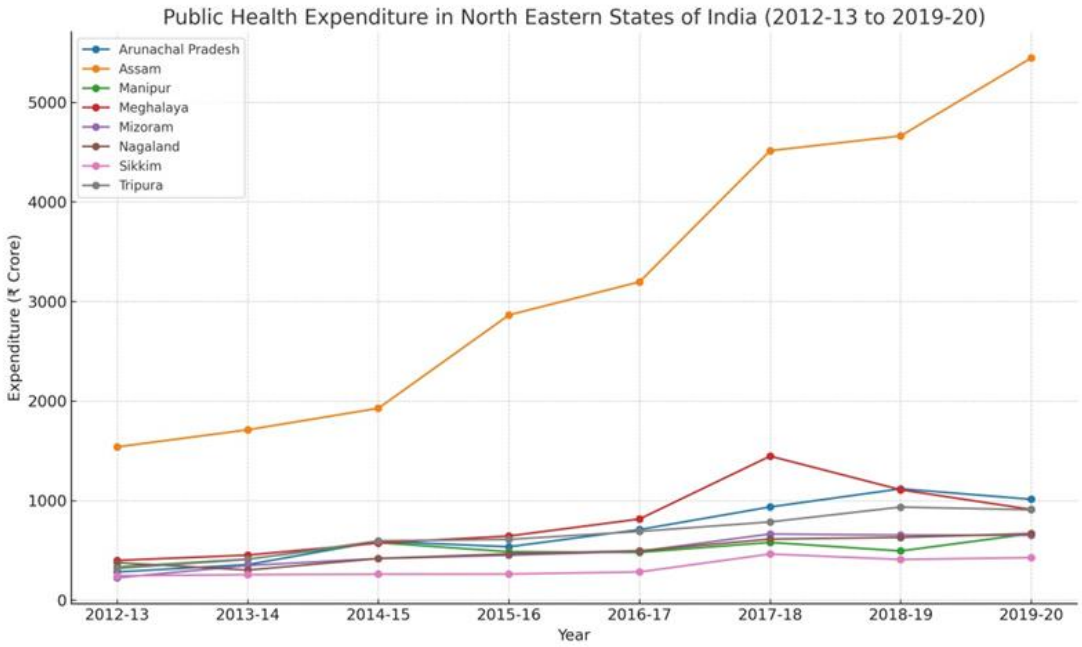

Figure 2. Public Health Expenditure in North Eastern States of India (₹ Crore)

Figure 2 depicts the trend of public health expenditure in NE states during 2012-13 to 2019-20. Assam has always maintained a significant jump, scaling over ₹5,000 crore in 2019-20. The other states present slight incremental gains, but at relatively lower levels indicative of partial and uneven development investments in the region.

Table 3. Government Hospitals and Bed Capacity in North Eastern States of India (As On 31.12.2022)

State	Govt. Hospitals (Rural)	Govt. Hospitals (Urban)	Total Hospitals	Beds (Rural)	Beds (Urban)	Total Beds
Arunachal Pradesh	113	71	184	465	2,198	2,663
Assam	1,262	78	1,340	10,070	13,115	23,185
Manipur	5	6	11	437	2,017	2,454
Meghalaya	146	15	161	2,080	2,470	4,550
Mizoram	72	22	94	935	1,050	1,985
Nagaland	152	19	171	921	967	1,888
Sikkim	24	12	36	260	1,550	1,810
Tripura	145	25	170	2,170	3,173	5,343

Table 3 shows the distribution of government hospitals and bed strength in the North Eastern states (as on 31st December, 2022) with substantial variation between rural-urban and within urban areas. While the other states have a much greater number of total bed capacity, 9924 against 2,946 of government hospitals in case of UP or with Daman and Diu and Dadra Nagar Haveli (436 beds, Governor territory), Assam on the other hand leads by leaps and bounds when it comes to both – numbers for government hospiutals and total bed capacity as Assam is equipped with a better healthcare infra. On the other end of the spectrum are states such as Manipur and Sikkim, which have only 11 and 36 government hospitals,

indicating a lack of access to public healthcare for residents. Although rural hospitals outnumber urban ones in most states, the situation can be the reverse when measured by bed capacity urban areas typically have more beds, indicating facilities that are better staffed.

For example, Arunachal Pradesh has 113 rural hospitals against just 71 in which there are urban beds for its 465 rural hospital beds compared to more than five times the number: i.e. 2,198 urban ones. In the case of Tripura, too, there are more rural health service providers (1,716) but urban hospitals occupy more than double the number of beds (3,173) compared to those in rural areas. These numbers tell us that cities are better off as far as inpatient care facilities are concerned, while the rural regions might be lacking in both infrastructure and services. The evidence clearly demonstrates the underinvestment in rural health infrastructure required to close the urban–rural gap and provide equal access through out the region.

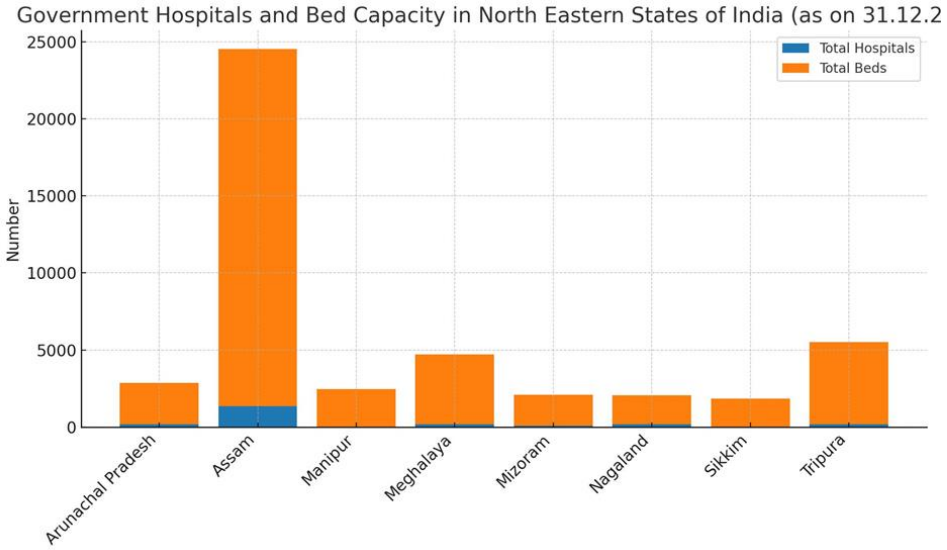

Figure 3. Government Hospitals and Bed Capacity in North Eastern States of India (As On 31.12.2022)

Figure 3 depicts the government hospitals and bed strength in North Eastern States as on 31.12.2022. Assam, which has the largest number of hospitals and beds PMJAY eligible hospital as well as over 24,000 beds. Tripura and Meghalaya are also somewhat equipped but the same cannot be said for smaller states like Sikkim, Mizoram or Nagaland.

4.1 Inter-State Variations in Health Spending and Infrastructure in North East India

Comparison of the NE states in relative terms too, disparities are found today in terms of public health expenditure and healthcare infrastructure.

4.1.1 Health Spending: Increased the most for states such as Arunachal Pradesh and Assam by 258 per cent and 254 per cent respectively between 2012-13 and 2019-20, suggesting strong fiscal focus on health." Nagaland 78% and Sikkim 74%, showed low growth indicating lower rate of acceleration in health investment. Assam continued to have the highest total expenditure throw in terms of absolute quantum (Rs 5446.3 crore in 2019-20), due to its higher population and level of administration. On the other hand, tiny states such as Sikkim and Mizoram had limited budgets and yet could rank high based on per capita health indicators.

4.1.2 Health Infrastructure: Infrastructure Assam has the highest number of government health centres in the region with 1340 hospitals and total bed strength of 23,185 as of December 2022. Tripura and Meghalaya come next, also with higher number of bed capacities (5,343 and 4,550) but fewer hospitals. Manipur and Sikkim, by comparison, have the smallest networks 11 and 36 hospitals and lower aggregate bed capacities (2,454 and 1,810). Also, even though there are generally more rural hospitals across most

states, urban areas consistently have higher bed availability, indicating that urban facilities would be better outfitted.

The data indicates glaring differences in health spending, infrastructure between North Eastern states. Larger states such as Assam have more resources both in terms of financial and infrastructural capacities; the capacity in significantly smaller or less urbanised areas is limited. These inter-state disparities reinforce the necessity of customized policy interventions to bridge distinct health investment and access gaps within the regions.

4.2 Challenges in Public Health Investment and Service Delivery in North East India

4.2.1 Regional Disparities in Funding Allocation: Investment in public health is unconventionally skewed against North Eastern states as Assam seems to be getting a lion's share in comparison to smaller states such as Sikkim and Nagaland etc. This disparity has implications for the capacity of lower-funded states to modernize infrastructure and service provision.

4.2.2 Inadequate Rural Healthcare Infrastructure: Despite a higher number of rural than urban hospitals, their quality and services are often inferior due to lack of facilities, equipment and personnel. Hospital bed and service availability is scarce in rural areas, resulting in overcrowding of urban centres and a high rural case fatality rate.

4.2.3 Shortage of Skilled Human Resources: Shortage of qualified human resources many of the North Eastern states are suffering from an acute shortage of doctors, nurses and paramedics especially in rural and tribal areas. This impedes efficient service provision and undermines the entire public health system.

4.2.4 Geographical and Accessibility Limitations: Inhospitable terrain and poor transportation infrastructure make it difficult to site and operate health facilities in remote locations. This results in restricted health care access for big sectors of the community, particularly in times of crisis.

4.2.5 Mismatched Policy Implementation: Though central and state health schemes exist, uneven implementation and bureaucratic delay mar the opportunity for timely fund-utilization, service delivery, etc. Monitoring and accountability arrangements are typically feeble.

4.2.6 Limited Infusions of Technology and Data Systems in Health: With few exceptions, states have been slow to embrace digital health records, remote care (telemedicine), and other technology-enabled health solutions that would close gaps in access or extend efficiency gains.

4.2.7 Over dependence on Central Funding: Most of the NE states have very high dependence on central support for health financing, rendering them vulnerable to delay and fluctuations in flows of funds and constrains fiscal autonomy.

4.2.8 Sociocultural and Linguistic Barriers: There are varied ethnicities and languages in the region which might lead to limitations in health communication, awareness level, and culturally-sensitive care provision.

Addressing these struggles can be done in various ways including robust financing, investment in human resources, building the rural health infrastructure, leveraging technology and decentralized policy implementation.

4.3 Impact of Public Health Expenditure on Healthcare Accessibility and Outcomes in North East India

Public funding is an important determinant of healthcare access and outcomes in the North Eastern India. This has also resulted in some positive developments in healthcare infrastructure including an expansion of hospital networks and bed capacity, particularly within state governments such as Assam,

Arunachal Pradesh and Tripura. The investments have made it possible to improve access to medicine, particularly in urban centres with more advanced facilities.

But the spending effect is not being felt evenly in the region. In higher-investment status, like Assam and Arunachal Pradesh, public health services are more formidable with better maternal & child health indicators, extensive immunization coverages and increased availability of services. On the contrary, states where growth in spending has been moderate like Nagaland and Sikkim dealing with access to service continues to be an issue especially for rural/remote areas which continue to be woefully insufficient in infrastructure as well as manpower.

Also, higher spending has not necessarily translated into better health infrastructure outcomes and quality of care in terms of saving many from diseases and preventing deaths; that depends on how effectively/efficiently the funds are spent as much as how much is disbursed. Inefficiencies, bad planning, lack of oversight often also get in the way of good health spending.

While increased public spending in public health in the North East has had a positive impact on access and some improvement of health outcomes, however such benefit is maximized once equitable resource distribution coupled with efficient use of funds and targeted health policy interventions for strengthening both infrastructure and services delivery have been achieved.

4.4 Policy Measures for Improving Public Health Systems in North East India

4.4.1 Equitable and Need-Based Funding Allocation: Fair and needs based funding allocation minimize disparities in health funding, by ensuring that resources are proportional to population size, with geographical considerations, and for those areas where infrastructure is required. Extra consideration is required for states with lower growth in expenditures and poorer health statistics.

4.4.2 Enhance Rural Health Infrastructure: Ensure providing upgraded health centers with proper buildings, medical equipment, essential drugs and diagnostic facilities in rural areas by investment. Rural hospitals should be equated with urban centers to mitigate regional disparities.

4.4.3 Human Resource Development and Retention: Inadequate human resources can be addressed by developing packages for doctors, nurses and specialists to work in remote areas. The advocacy to encourage local recruitment and Support to medical and PM colleges in the area.

4.4.4 Enhanced Connectivity & Emergency Response: Improve road and communication network for scaling timely intervention in healthcare facilities especially in hilly / far-off areas. Country and area-level: Strength local emergency health response systems with mobile medical units.

4.4.5 Bolstering Public-Private-Partnerships (PPPs): While advocating closer linkages between private health service providers and NGOs to complement government initiatives through the provision of services on public land, particularly in under-served areas.

4.4.6 Technology and Digital Health Systems Utilization: Harness telemedicine, e-health systems, and mobile health services to surpass physical access limitations. Update and digitize health records, elucidate the HMIS for better planning and monitoring.

4.4.7 Community-Based Health Interventions: Involve local communities, self-help groups and traditional institutions in awareness creation, preventative measures and health monitoring. Some culturally appropriate alternative methods of communication should then be employed to counteract those beliefs and practices at the community level.

4.4.8 Monitoring, Review and Accountability: Set up strong system to monitor the applications of fund, assess the impact of programs and manage with accountability. Real time monitoring systems to pick up the gap and bring course correction in service scheduling if required.

4.4.9 Health Insurance and Financial Protection Schemes (Ayushman Bharat): Increase coverage of schemes like the Ayushman in ways that is implemented without any break and the entire population, especially those who are surging with poverty but not among the vulnerable can afford health care services without suffering economic hardships.

4.4.10 Inter-State Coordination and Knowledge Sharing: Promote regular interaction among North Eastern states to share best practices, successful models, common health challenges etc. and address such Issues together in the region.

By integrating such focused and universal policy interventions, the NE-states can create more Resilient, accessible, and responsive Public Health systems that are appropriate to the region's distinctive demography and geography.

5. CONCLUSION

The present study on public health expenditure in North East India demonstrates a large increase in health spending over the last decade especially among Assam and Arunachal Pradesh. Northern regional inequality in resource allocation, lack of rural health infrastructure and low numbers of skilled health workers however continues to be a significant constraint to FMS delivery. The results indicate that in some health sectors, additional spending has resulted in large gains in accessibility to care though not even improvements towards good health on the sub-continent.

In response to these challenges, policies oriented to equitable financing, rural healthcare facilities development, HRD and technological utilisation are important. Greater intra-state collaboration, improved surveillance systems and focusing on health equity will be critical to designing a resilient and inclusive health system in North East India. These recommendations will help ensure that the region is spending its public health resources as strategically and effectively as possible to enhance the overall health of its population.

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Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Dr. J. Suresh Kumar	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	
Dr. D. Shobana		✓				✓		✓	✓	✓	✓	✓		

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare no conflicts of interest.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

Not Applicable.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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