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EDITORIAL NOTE

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It gives us immense pleasure to present the latest issue of the Journal of the North Eastern Council, which continues its commitment to fostering multidisciplinary scholarship and intellectual engagement on issues of critical importance to Northeast India and beyond. This volume brings together a rich collection of scholarly contributions reflecting contemporary debates, emerging challenges, and transformative developments across law, education, public health, environmental studies, social systems, technology, and climate resilience.

The present issue showcases ten insightful articles authored by researchers and academicians from diverse disciplines. Collectively, these contributions underline the growing significance of interdisciplinary research in understanding the socio-cultural, legal, technological, and developmental dynamics of the northeastern region.

The issue opens with an important contribution by Mr. Imnameren Longkumer and Dr. Sentikumla, who critically examine the codification of tribal customary law in Northeast India using Nagaland as a case model. Their work highlights the delicate balance between preserving indigenous legal traditions and adapting them to contemporary governance frameworks. Legal and human rights concerns are further explored by Dr. Rumi Dhar and Miss Tania Anya in their study on the rehabilitation crisis under the NDPS Act in Arunachal Pradesh, drawing attention to the urgent need for rights-based institutional reforms.

Educational transformation and policy implementation receive thoughtful attention in Kamal Debnath's analysis of the challenges and strategic interventions surrounding the implementation of NEP 2020 in Meghalaya. Similarly, Prof. Rajendra Prasad Das and Dr. Indrani Kalita explore the empowering role of Open and Distance Learning, particularly through Krishna Kanta Handiqui State Open University, in expanding educational opportunities for women in Assam.

This volume also highlights the increasing relevance of scientific and technological research in the region. Prof. Bibhas Deb and Dr. Sudip Bhattacharjee present a scientometric study tracing the evolution of cancer research in Northeast India, offering valuable insights into regional research trends and healthcare priorities. In another significant contribution, Prodipto Das and Shibojyoti Chakraborty examine computational intelligence applications in COVID-19 vaccination data analysis in India, reflecting the expanding role of artificial intelligence and data-driven methodologies in public health research.

Environmental sustainability and climate-related concerns form another important thematic focus of this issue. Lal Dinenga, Lal Dinpuia, and R. Zonunsanga provide a hazard risk assessment study of the Muthi locality in Aizawl City, contributing to the discourse on urban vulnerability and disaster preparedness in ecologically sensitive regions. Dr. Nandini Borah's article on climate-induced challenges faced by street vendors in Guwahati vividly portrays the intersection of climate change, livelihood insecurity, and urban informality.

The cultural and social fabric of Northeast India is meaningfully represented through the article by Ms. Ruokuosanuo Suohu and Dr. Yanbeni Yanthan, who explore the significance of the Peli Krotho age-group system within Angami-Naga society, emphasizing its role in social organization, identity formation, and community cohesion. Questions of justice and customary practices are further examined by Kusalu Lohe and Dr. Rishikesh Singh Faujdar in their study on the role of victims within the criminal justice system under Naga customary law.

The Editorial Board extends its sincere appreciation to all contributors for their scholarly dedication and valuable research contributions. We are equally grateful to the reviewers, editors, and all those involved in the publication process whose efforts have ensured the academic quality and integrity of this journal.

We hope this volume will encourage further scholarly dialogue, informed policymaking, and deeper engagement with the unique developmental, cultural, and socio-political realities of Northeast India. It is our earnest belief that the articles presented in this issue will contribute meaningfully to ongoing academic discourse and inspire future research initiatives in the region and beyond.

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JOURNAL OF NORTH EASTERN COUNCIL

DISCLAIMER

A DIALECTICAL APPROACH TO CODIFYING TRIBAL CUSTOMARY LAW IN NORTHEAST INDIA: WITH NAGALAND AS A CASE MODEL

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Abstract

Poised at a defining crossroads, tribal customary law in India confronts question of survival and relevance. On one hand, because of its uncodifies nature, there is no doctrinal clarity in conflict of laws, accounting for modern rights and remain vulnerable in the face of increasing judicial scrutiny. Codification also poses a significant cultural hazard, leading to the loss of cultural identity by homogenising diverse cultures and practices. Furthermore, it also remains vulnerable to appropriation by non -indigenous groups for strategic gain. Against this backdrop, this paper proposes dialectical approach, an Adaptive Model Code framework, guided by grassroot adaption, harmonisation and not replacement. It further seeks to locate the present phase of the system and suggest the interventions needed to strengthened customary law particularly for the tribals in Northeast emphasising on Nagaland State as a case model.

Introduction

The dialectical approach in law basically understood that law and society are in a constant state of interaction. The Constitution of India in Article 44, has set out an ambitious endeavor of the state to have a uniform set of law (UCC) in matters pertaining to civil law throughout the territory of India. By virtue of it being a Directive Principles, it is basically, left it to the wisdom of the future Indians to homogenize into one single entity in matters of rights, duties and privileges. This is India's commitment to a secular state, harmonizing personal laws considering legal right ensuring equality and justice uniformly.

Six Schedule of the Constitution accorded power to the States of Assam, Meghalaya, Tripura and Mizoram with provisions for the administration of tribal areas. Further in the Constitution of India in Article 371 it has provided special provision to twelve (12) states in the Indian union that also include six Northeastern states as well which grants some temporary, transitional and special powers for governance.

. The state of Nagaland in Article 371A has been given special status reinforcing cultural, social and religious protection. Customary laws are unwritten law and therefore sometimes inconsistent, and to counter this for example, the state of Mizoram has enacted and codified personal customary law to an Act that refines customary law by granting equal privileges, in matters relating to inheritance to women and validated customary marriages (The Mizo Marriage, Divorce and Inheritance of Property Act, 2014).

Article 371A of Nagaland is one of the most powerful protections of its kind under Article 371. This protection though on its face value appears broad but it is basically whittled down to the matters concerning civil laws. The Rule for Administration of Justice and Police in Nagaland (Third Amendment) Act, 1984 largely limits the customary courts in criminal matters only in relation to petty offences. Perhaps through the advancement of modernity or anglicizing, customary laws are not evolving like organic customs should. Customary laws now are often only romanticized while failing to accommodate rights such as women rights especially in matters of inheritance of ancestral properties (Sentikumla, 2025), social empowerment etc. As such, remaining stagnant and gradually losing their relevance in an era of emerging rights-based society.

The Mizo model for codification of customary law is a story of resilience and fight against the patriarchy for decades led by the Mizo Hmeichhe Insuihkhwm Pawl. However, linguistically, culturally, ethnically, politically and sociologically, Mizoram is by far the most homogenous state in the Northeast in contrast states like Nagaland is a mini-India in terms of its diversity. The only common thing is the ethnic race. The customary personal law codification success in Mizoram may be challenging to be replicated in other Northeastern tribal areas otherwise it will result in homogenizing diversity. Customary law is poised in a crossroads in India, for instances in disputes between villages or persons within the village, if customary institutions failed to settled it in accordance with customary law the option for recourse

lies in the formal courts, which the disputed matter gets instituted in relevant formal courts. In such instances, it must be proved by the petitioner to the Court that custom exists for the matter in question. This is not only a herculin task for the petitioners due to doctrinal ambiguity, but the courts are also tasked with finding the custom to be reasonable, certain and continuous. This is not only time-consuming, but the matter keeps pending generally and the cases drags on for years leading to uncertainty and unresolved issues.

The Anticipated Risk of Codification

Customary law still holds significant importance in modern India. Customary law is expressed to be a living doctrine. Scholars often argue that the codification is anticipated to freeze legal evolution, undermines the jurisprudential foundation of customary systems drawn from practice, consensus and communal ethics, and transfer interpretative authority, resulting in loss of legal pluralism, reinforcing adversarial method. The codification of customary law will bring an end to customary law (The Statesman, 2019)
Customary law is non-adversarial, however the desire to codify emerges at a time where increasing emphasis is on non-adversarial forms of dispute resolution. The President of India, Smrti. Droupadi Murmu,in May 2025 launching the First Mediation Conference stressed that alternate dispute resolution mechanism should be effectively extended to rural areas (Press Information Bureau, 2025) lessening the burden of the judiciary and ease of living.

The need for codification also stems, viewed through the lens of detached educated urban elites assuming customary law to be incapable of adopting to modern right based society and viewed with suspicion examined through the lens of formal, state centric education. Another hazard of codification is, in a diverse society whose version of custom becomes law? Codification tends to marginalize the less dominant sub-tribes or groups, homogenizing internal diversity and entrenching existing hierarchies within the community.

A Dialectical Relationship Approach

Codification of law ensures clarification of ambiguity, inconsistency, predictable legal framework for courts. The debate on codification of customary law is grounded on the belief that there is no doctrinal clarity and prone to misinterpretation of customary law by elements. For illustration, in the matters of adoption within customary law. The practices are not uniform among the tribal communities. Adoption occurs on different facts and circumstances diversly according to cultural practices. However, one thing common is that an adopted individual is generally accorded the status and benefits of an indigenous person. He is afforded an identity of the adopted parent by carrying their last name, community belonging, eligibility for village membership, and access to statutory entitlements such as, Schedule Tribe status and other privileges as a member of the village. There is no customary law as to the conditional acceptance of the adopted as a “full member” but it is often very fragile. It tends to operate only so long as the adopted individual conforms to expectations and commits no wrongdoing that might malign the identity of the village. When dispute arises or when the adopted person is alleged to have violated the law, communities often withdraw recognition and deny the individual the status of bona fide member of the village.

This ambiguity creates tension between statutory law and customary law. While statutory laws such as the Hindu Adoption and maintenance Act consider adoption as permanent, legally enforceable relationship, the fragility of this relationship lies in the customary practices that treat adoption as conditional. Such conflict is visible in multiple instances where Village Council deny recognizing an adoptee or deemed an indigenous, once a person is alleged of committing criminal offence that malign the village identity. For an illustrative example, in one case of Moakaba Aier, who was alleged to have committed an act under the POCSO Act had identified himself with an indigenous name of the Ao tribe, having the surname of the particular tribe. In this case the Village Council through press release countered that the very accused is not a bonafide member of their village as it is claimed by the accused and his true decent is Nepali and only his mother hails from the village (Akumen Village Council, 2024).

In another case a 30-year-old an adopted son of an indigenous family, was accused of murdering his own niece in October 2025 in Kohima, Nagaland. Consequently, he was prohibited the use of indigenous village surname “Zao” by the clan though it was already registered in his Aadhaar. This case is very intriguing because the clan issues a statement, that they were not aware of any forms of adoption of this accused man. This depicts the indistinct understanding of customary law that governs adoption or at least lacks an articulated concept of adoption. Not all Village Councils exercise the same degree of authority or vigilance against customary laws. It is concerning that there will be instances in which non-indigenous individuals in different capacity gain entry to certain villages and subsequently misuse or

exploit the indigenous identity and statutory benefit for personal gain. This vulnerability streamlines the disparity in the vigilance of customary institutions and the risk of identity infiltration and exploitation in communities with weak regulatory mechanisms, which can be averted only with doctrinal clarity in customary law and a degree of uniformity. The gender element of customary law remains a challenge, especially in matters of ancestral properties inheritance. In many circumstances, customary practices come into direct conflict with the constitutional guarantee of equality and dignity. Although Article 371A affords protection to the Nagaland customary practices, some protections come into conflict with fundamental rights under Article 14, 15, 16 and 21.

The Jharkhand High court in (Prabha Minz v. Martha Ekka & Others, 2022) on the issue of customary inheritance of a tribal daughter to her father's property was challenged on the ground of customary law that exclude females to property rights. The court robustly applied the principles of constitutional equality to customary laws granting right to female heirs. This case is one of the examples of growing trend in judicial interpretations across different courts to harmonies customary laws with fundament rights of the Constitution especially concerning gender equality. The Supreme Court in (Ram Charan & Others v. Sukhram & Others, 2025) observed that excluding women from ancestral property solely based on gender, in the absence of a proven, valid exclusionary custom, violates the fundamental right to equality under Article 14 of the Constitution. The apex court held that courts must decide according to "justice, equity, and good conscience," which mandates gender equality. Therefore, reasonableness of the customary law and public policy will play a big factor in chipping away the customary law without codification. In this aspect, codification or at least a model code can be viewed a necessary evil or a lesser evil because then it will account for the participation and involvement of the indigenous communities for whose law is made.

Recommendations and Conclusion

The debate on the codification of customary law and a dialectical approach to strengthen customary laws can be broadly encapsulated and identified in three phases. In the first phase, researches were done by educated elites which was mainly locative. In this phase locative customary law is widely conducted and this has generated a strong demand for codification. This can be inferred from the Law and Justice Advisor, Government of Nagaland TN Manen stressed for the need of time to codify Naga customary law (The Morung Express, 2023). The debate surrounding codification of customary law gains momentum in this phase.

The second phase will be concerned with identifying, interpreting and presenting customary legal provision. In this phase it requires the political will and support in the form of institutional infrastructure, admirative infrastructure and legitimacy which can be seen in the government attempt to implement in The Rules for Administration of Justice and Police in Nagaland Act, 1984, (fifth amendment Act) in Nagaland. After more than 50 years of statehood in Nagaland it appears to be in the initial second phase. The Fifth amendment Act in 2025 established and notified for the three-tier customary court system. If and when this system is successfully instituted, customary law even without codification, has the potential of concept similar to the ideas of an English common law system. Thereby adopting to modern rights and jurisprudential clarity.

The third phase will involve academic research on customary laws; it is a stage that require more than political will. The States in this phase must establish and formalise appropriate institutions, resources and encourage scholars with financial incentives as it will be an injustice to assume that the customary institution is inherently weaker than the formal judicial mechanism and deny attention. Customary law operates within different social realities. To follow the Mizoram codification model in other Northeast States might not be positively apt because of the heterogeneity of the Tribals. However, states like Nagaland and similarly located it is also not without certain advantages. For instance, Nagaland is already largely organized on tribal lines, with districts corresponding to particular tribes. This geographical and social serration provides a natural for grassroot level "model code" approach of customary laws. Because districts are homogenized in terms of tribal identity, it becomes easier to document, refine, and standardize customs by the tribal Hohos or the Apex tribal bodies within each area. Moreover, tribal apex bodies can play a crucial role by developing model codes in their respective districts that reflect the core principles of their distinctive customary traditions. Such model codes can then be adopted, adapted, or expanded by village councils and customary authorities. This structure gives Nagaland in effect similar other States a unique advantage in undertaking bottom-up model code approach, ensuring that the process remains community-driven, culturally grounded, and more consistent across regions.

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NEP 2020 IN MEGHALAYA: CHALLENGES AND STRATEGIC INTERVENTIONS

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Abstract

This article explores the primary challenges faced in implementing the National Education Policy (NEP) 2020, which was approved by the Government of India on July 28, 2020, in the state of Meghalaya, a region characterized by educational diversity in Northeast India. The Government of Meghalaya has implemented NEP 2020 reforms in its Higher Educational Institutions (HEIs); however, the transition encounters considerable challenges. Many institutions, especially in urban areas, have indicated a readiness to implement the new policy framework to help augment student performance and elevate the overall quality of higher education. Concerns remain about insufficient funding, infrastructural constraints, a lack of qualified faculty, and the inability of institutions to fulfill the structural and pedagogical demands outlined by the policy. This study examines the existing educational framework to pinpoint significant obstacles to the execution of NEP 2020 in Meghalaya and proposes strategic interventions to facilitate a more effective and sustainable rollout of the policy in the state.

Keywords : National Education Policy 2020, Meghalaya Higher Education, Multidisciplinary Education, Skill Development, Technology Integration, Policy Implementation.

1.0 Introduction

Meghalaya, also known as “the abode of clouds,” is a notable state located in northeastern India. The 2011 census indicated that the state had a population of approximately 2.97 million, comprising around 1.49 million males and nearly 1.48 million females. The overall literacy rate was 74.43%, with male literacy at 75.95% and female literacy at 71.88%. With 989 females for every 1000 males, Meghalaya had a significantly higher sex ratio than the 940 national average.

Meghalaya is distinguished for implementing community involvement at the advisory tier in primary education. The state has 6,612 primary and upper-primary institutions, 783 secondary institutions, and 112 higher secondary institutions. Despite ASER's first assessment indicating that 7% of children aged 6–14 were not enrolled in school, later governmental measures have improved enrollment and overall educational results.

The educational framework adheres to the national 10+2 system, comprising seven years of basic education—four years of primary and three years of upper primary—followed by two years each of secondary and higher secondary education.
Educational institutions are affiliated with the Meghalaya Board, CBSE, or ICSE, utilizing English as the medium of instruction.

The higher education framework in the state includes three central universities, one state university, ten private universities, sixty-three-degree colleges, two engineering colleges, three polytechnics, and seven institutes of national importance. The Directorate of Higher and Technical Education oversees higher, technical, professional, and vocational education, encompassing governance, administration, and quality assurance. Shillong functions as a regional center for post-secondary education, providing various programs in engineering, the arts and social sciences, law, commerce, medicine, and journalism.

The educational framework of Meghalaya persists in encountering substantial structural obstacles, as shown by recent national assessments like the Performance Grading Index (PGI 2.0). The state's position in the lowest performance category underscores ongoing issues related to educational quality, learning outcomes, and school governance. Notwithstanding a substantial network of schools, some structural inefficiencies persist, including unequal teacher allocation, poor resource deployment, and significant discrepancies between rural and urban educational settings. These factors cumulatively hinder the state's progress toward attaining equal and high-quality education.

Infrastructure development has become a primary emphasis of contemporary reforms. The government has commenced extensive modernization of educational facilities, enhancing thousands of institutions with upgraded classrooms, sanitation, electricity, information and communication technology (ICT) tools, and libraries. These efforts are part of larger plans to reorganize the system, like grouping schools together, to make administration more efficient and use resources better among nearby or low-enrollment schools.

The commitment to policy is evident; however, translating infrastructural improvements into better learning outcomes continues to pose a challenge.
Learning achievements, enrollment stability, and dropout trends indicate additional concerns. Recent surveys show that many students, especially those in rural government schools, are not very good at basic reading and mathematics. Many students, especially those from low-income backgrounds, are leaving school before finishing, which shows there are serious problems like money issues, lack of job knowledge, and not enough help with schoolwork. The state government, in partnership with international entities, has initiated targeted programs to enhance foundational learning, bolster adolescent support systems, and mitigate educational discontinuity.

2.0 Comprehensive Overview of National Education Policy 2020

The National Education Policy (NEP) 2020 constitutes a significant reform intended to reshape India's educational structure to meet the requirements of the 21st century. The proposal replaces the 1986 policy after over thirty years, introducing an inclusive, flexible, and multidisciplinary framework aimed at improving learning outcomes and global competitiveness. The NEP is founded on principles including equity, accessibility, quality, and holistic development, aiming to cultivate critical thinkers, creative problem-solvers, and responsible citizens within the education system. The policy seeks to fix existing issues, use technology, give more power to local authorities, and improve basic learning, creating a strong base for a society that values knowledge.

2.1 Structural Reforms: Transition from 10+2 to 5+3+3+4.

The transformation of the school education system from the old 10+2 model to a 5+3+3+4 curricular framework is a key component of NEP 2020. The phases of children's cognitive development are better matched by this design. The foundational stage, which emphasizes play-based learning, consists of two years of primary school and three years of preschool. While keeping experiential approaches, the preparation stage (Grades 3–5) offers more formal classroom instruction.

The middle stage (Grades 6–8) incorporates subject-specific teaching, logical reasoning, and practical engagement. The secondary stage (Grades 9–12) focuses on multidisciplinary learning, flexibility in subject choices, and holistic development. This structure aims to smoothen educational transitions and foster age-appropriate pedagogies.

2.2 Curriculum Reforms and Holistic Education

NEP 2020 signifies a transition from rote memorization to a comprehensive, competency-oriented methodology. It reduces information burden and accentuates comprehension, innovation, and practical application. The policy advocates interdisciplinary education by amalgamating the arts, sciences, vocational skills, and sports, while cultivating critical thinking, communication, digital literacy, and ethical principles. Students may choose topics with more autonomy, facilitating individualized learning trajectories. Assessment reforms replace high-stakes examinations with ongoing, formative assessments that more accurately represent students' skills.

2.3 Teachers and Professional Development

Teacher capacity enhancement is fundamental to NEP 2020. The policy mandates enhanced teacher recruitment, performance assessments, and ongoing professional development. A four-year integrated Bachelor of Education (B.Ed.) is established as the standard teaching certification, guaranteeing comprehensive pedagogical instruction. Current training modules and digital tools seek to enhance competencies in pedagogy, inclusive education, and emerging technology. The establishment of school complexes will enhance cooperation among instructors. The reforms establish teachers as pivotal agents of educational transformation.

2.4 Technology Integration in Education

NEP 2020 emphasizes the significance of digital tools in teaching, learning, assessment, and governance. We suggest creating the National Educational Technology Forum (NETF) to improve educational technology research, innovation, and capacity-building.

We will enhance platforms like DIKSHA and SWAYAM to provide students and educators with accessible content. The policy prioritizes the enhancement of digital infrastructure, particularly in rural regions, to guarantee equitable access. Technology-enabled assessments, virtual laboratories, and adaptive learning tools are anticipated to improve efficiency and inclusivity in educational settings.

2.5 Higher Education Reforms and Multidisciplinary Institutions

NEP 2020 proposes significant reforms in higher education, focusing on both structural and academic aspects. The initiative advocates for multidisciplinary universities and a flexible, credit-based system that enables students to explore varied interests, offering multiple entry and exit options facilitated by an Academic Bank of Credits. The policy aims to dismantle rigid institutional silos and promote research-focused, experiential learning. A proposed unified regulatory body, the Higher Education Commission of India (HECI), aims to enhance governance and accountability. The emphasis on internationalization, innovation, and research seeks to enhance India's position in the global academic arena.

2.6 Vocational Education, Skill Development, and Lifelong Learning

The NEP highlights the importance of integrating vocational education at all levels of schooling and higher education to enhance the connection between education and employability. The policy aims to expose at least 50% of learners to vocational skills by 2025. Industry, skill councils, and local artisans collaborate to contextualize vocational training. Lifelong learning is facilitated by flexible pathways, adult education programs, and digital learning platforms, enabling individuals to consistently enhance their skills in a dynamic economic environment.

3.0 Challenges in the Implementation of NEP 2020 in Meghalaya

The execution of NEP 2020 in Meghalaya encounters structural, financial, technological, and geographical obstacles. The state has presented a comprehensive Concept Note and Action Plan to the Ministry of Education, consistent with the policy's emphasis on flexibility, interdisciplinarity, and holistic education. Capacity-building initiatives, such as workshops, seminars, and webinars have been implemented since 2019 to enhance academic dialogue and formulate institution-specific strategies. North Eastern Hill University (NEHU) has been instrumental in the implementation of NEP 2020 at the postgraduate level during the 2022–23 academic year and has initiated the Four-Year Undergraduate Programme (FYUP) for the 2023–24 academic year.

The Directorate of Higher & Technical Education (DHTE) has regularly provided guidelines and notifications from the Central and State Governments, along with the University Grants Commission (UGC), to ensure a seamless transition. The State Government has established the Meghalaya State Education Commission to enhance the governance framework. This commission includes experts, faculty members from NEHU, principals, and school leaders. The Commission is responsible for recommending strategic interventions, guiding policy reforms in accordance with NEP 2020, and revising the Meghalaya State Education Policy to align with national educational priorities.

The effective execution of the National Education Policy (NEP) 2020 in Meghalaya has several problems arising from institutional, budgetary, technical, and geographical limitations.

3.1 Insufficient Faculty Training and Pedagogical Readiness:

The existing higher education framework in Meghalaya fails to prioritize formal training adequately for college and university educators in contemporary teaching techniques and pedagogical strategies. The NEP 2020 underscores the need for interdisciplinary and comprehensive education, prioritizing conceptual comprehension, critical analysis, and essential life skills. To attain these aims, it is essential to reconstruct curriculum in an organic and adaptable fashion, integrating basic and advanced cognitive abilities. The lack of sufficiently trained faculty may impede the successful execution of these initiatives.

3.2 Financial and Infrastructure Constraints:

Enhancing higher education institutions in Meghalaya is challenging owing to constrained funding and resources. Although NEP 2020 advocates for multidisciplinary, multi-stream universities, the majority of colleges in the state continue to provide solely Arts, Science, or Commerce programs. Transforming them into multi-stream universities requires substantial expenditures in infrastructure, laboratories, libraries, and professors. Despite the national increase in educational expenditure from 3% to 6% of GDP, funding is inadequate to fulfill the stipulations of NEP 2020. Private and assisted schools have challenges, since catering to low-income rural students requires more investment or elevated tuition, thus compromising the policy's objective of fair access.

3.3 Challenges in Multidisciplinary and Vocational Education:

The policy draws attention to the value of interdisciplinary education and the incorporation of skill development and vocational training into the standard academic curriculum. The lack of vocational training institutes in several locations of Meghalaya presents a considerable obstacle. In the absence of sufficient infrastructure and institutional backing, institutions are unable to successfully provide vocational or skill-based courses, hence constraining students' employability and practical skill enhancement.

3.4 Technological and Geographical Barriers:

The steep topography and dispersed population of Meghalaya pose substantial challenges to internet access and digital infrastructure. The NEP 2020 promotes integrating technology to enhance learning and access to educational resources; however, many institutions face difficulties in adopting digital classrooms, AR/VR tools, and other technology-driven teaching methods. Moreover, educators need instruction to proficiently integrate technology into pedagogical practices. Facilitating digital access in rural regions is essential for closing educational disparities, necessitating significant investment in infrastructure and capacity development.

3.5 Policy Implementation and Resource Allocation:

Despite the initiatives undertaken by the State Government, NEHU, and the Directorate of Higher & Technical Education (DHTE) to advance the implementation of NEP 2020—such as workshops, action plans, and the establishment of the State Education Commission—practical problems remain. Ensuring consistent implementation across urban and rural institutions, tracking advancement, and rectifying resource inequities are essential yet unsolved challenges.

4.0 Strategies for Effective Implementation of NEP 2020 in Meghalaya

Effective execution of NEP 2020 in Meghalaya necessitates targeted strategies that consider the state's distinct socio-economic, cultural, and geographical challenges. Key strategies can enhance policy adoption in Higher Educational Institutions (HEIs) and foster comprehensive educational development.

4.1 Multidisciplinary Education:

The NEP 2020 promotes multidisciplinary education to improve critical thinking, creativity, and holistic understanding. In Meghalaya, many colleges, especially People's Colleges, offer only Arts programs, which limits options and leads to higher dropout rates in rural regions. The government should establish at least one multi-stream college in each district, and universities should encourage interdepartmental collaboration to facilitate student enrollment in courses across different disciplines. This initiative aims to improve access to higher education for rural students and reduce migration to urban centers like Shillong.

4.2 Vocational Education and Skill Development:

The NEP 2020 emphasizes the incorporation of vocational education and skill development into a standard curriculum.

Meghalaya, characterized by its rich cultural legacy and varied economic sectors, has significant potential to cultivate a talented workforce. The government should establish Vocational Training Centers and ITIs in each district, while Higher Education Institutions partner with them via MOUs to provide apprenticeships and industry-related training. This will improve student employability, foster entrepreneurship, and alleviate the responsibility of colleges in executing the vocational objectives of NEP 2020.

4.3 Language and Cultural Preservation:

Meghalaya hosts a diverse array of languages and cultures, acknowledged by NEP 2020 as vital for comprehensive education. Higher education institutions can enhance regional languages and cultural heritage by incorporating local dialects into academic curricula, especially within disciplines such as Sociology, History, and Khasi. Cultural sensitization programs, such as performances, exhibitions, and district-level museums, provide students with exposure to local traditions and promote an appreciation for the linguistic and cultural diversity of the state. These initiatives will enhance cultural identity and align with the vision of inclusive and context-sensitive education as outlined in NEP 2020.

4.4 Technology Integration:

The policy emphasizes the incorporation of technology to improve digital literacy, accessibility to educational resources, and the quality of learning. In Meghalaya, geographical constraints and inadequate connectivity hinder e-learning opportunities. The government should establish IT and digital training centers on higher education institution campuses to provide students and educators access to modern software, online learning platforms, and digital skill-building programs. These centers can facilitate online competitive examinations (e.g., JEE, NEET, CUET, SSC, IBPS) for students in rural districts, thereby ensuring equal opportunities and promoting academic and professional development.

4.5 Teacher Training and Professional Development:

NEP 2020 emphasizes the importance of ongoing professional development for educators. Investment in teacher training programs that align with policy objectives will improve pedagogical skills, foster innovative teaching practices and guarantee high-quality education. The government may enhance B.Ed. programs in districts without specialized teacher training colleges and provide workshops, seminars, and capacity-building sessions via People's Colleges. These initiatives will equip educators to effectively implement NEP 2020 and facilitate student-centered learning.

4.6 Inclusive education:

Inclusive education, which ensures equal access for students with disabilities and individuals from marginalized communities, is fundamental to NEP 2020. Meghalaya should establish specialized education centers in each district to deliver focused support and guarantee resource accessibility throughout all regions. Implementing inclusive teaching practices, ensuring accessible infrastructure, and developing tailored learning programs are essential for addressing educational inequities and advancing social justice. Focusing on inclusivity will guarantee the achievement of NEP 2020's goals for equitable and comprehensive education across the state.

4.7 Monitoring, Evaluation, and Policy Support:

To facilitate effective implementation, the state government must establish strong monitoring and evaluation mechanisms at both the district and institutional levels. Regular evaluations, feedback mechanisms, and collaboration with NEHU, DHTE, and the State Education Commission will facilitate the identification of obstacles, evaluation of progress, and implementation of evidence-based policy modifications. This will enhance accountability and ensure the effective adaptation of NEP 2020 reforms to the context of Meghalaya.

5.0 Conclusions

To ensure that Meghalaya's students are prepared for the challenges of the twenty-first century and to change the state's educational environment, NEP 2020 must be implemented effectively.

The alignment of state government policies, curricula, and infrastructure with the vision and principles of NEP 2020 is essential for higher educational institutions. By adopting a multidisciplinary approach, promoting vocational education and skill development, integrating technology, strengthening teacher training, preserving local languages and culture, and ensuring inclusive

education, Meghalaya can develop a holistic, equitable, and future-ready education system.

Successful execution of NEP 2020 will improve both the quality and accessibility of education while also equipping students with critical thinking abilities, practical skills, and social awareness, ultimately cultivating a knowledgeable, skilled, and socially responsible generation. To achieve these objectives, sustained policy support, adequate funding, capacity-building initiatives, and active collaboration between the government, universities, colleges, and communities are essential. Through coordinated efforts, Meghalaya has the potential to exemplify effective policy implementation in the northeastern region, fully actualizing the objectives of NEP 2020 and establishing a basis for sustained educational and socio-economic advancement.

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REHABILITATION WITHOUT RIGHTS: THE UNREGULATED REHABILITATION CRISIS IN ARUNACHAL PRADESH UNDER THE NDPS ACT, 1985

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Abstract

Rehabilitation is meant to restore life and dignity to those struggling with addiction. Yet, in India, it remains one of the least regulated and most neglected aspects of the drug control system. Despite the Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985, empowering the government under Section 71 to establish treatment and rehabilitation centres, the law provides no enforceable rights, operational standards, or mechanisms for oversight, resulting in a fragmented and unmonitored system where patients, often young and vulnerable, are treated as offenders rather than individuals in need of care. In many centres, particularly in Arunachal Pradesh, there is no system of accountability, no CCTV surveillance, no transparency, no grievance redressal, and little to no medical supervision.

This paper critically examines the legal vacuum governing drug rehabilitation in India, with a special reference highlighting Arunachal Pradesh as a "test case" for national reform, and argues that addiction must be recognised and treated as a mental health condition rather than a criminal offence. It explores how the absence of a dedicated rehabilitation law violates constitutional guarantees under Article 21 and the principles of humane treatment enshrined in the Mental Healthcare Act, 2017. The paper concludes that comprehensive legal regulation, mandatory monitoring, and a rights-based rehabilitation framework are essential to ensure that rehabilitation centres become spaces of recovery, not punishment, reaffirming the law's duty to protect life and dignity.

Keywords : Drug Rehabilitation, Narcotic Drug and Psychotropic Substances Act 1985, Legal Accountability, Mental Health Rights, Arunachal Pradesh.

Introduction

The concept of rehabilitation should fundamentally involve a journey of dignity, a systematic process of healing for those suffering from substance dependence[1]. However, in India, this notion is far from reality. Hundreds of centres across the country operate as rehabilitation centres, usually as closed institutions and completely in the absence of medical supervision, accountability, or proper guidelines and ethical regulation. In many cases, these spaces of healing have become spaces of neglect, coercion, and, in some cases, abuse. Families send their loved ones in good faith that the person will recover, but there is a lack of transparency about how patients are treated behind these closed doors[2].

The situation is especially crucial in Arunachal Pradesh, where drug dependence is emerging as a social and public health crisis. While the state has made various efforts under the Mukhya Mantri Nasha Mukti Yojana, institutional rehabilitation is grievously underdeveloped. The absence of formal treatment infrastructure, along with inadequate oversight and monitoring, has resulted in persistent instances of relapse, mistreatment, and a few unexplained deaths, all occurring in rehabilitation centres that have been investigated[3]. This article examines the legal and ethical framework that permits rehabilitation in Arunachal Pradesh to continue without rights or regulations. It argues that addiction should be treated as a mental health disorder that warrants care, not criminalization. A comprehensive legal framework is essential to facilitate the transition from rehabilitation as a space for neglect and abandonment to one of recovery and human dignity.

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The Concept of Rehabilitation

The origins of modern drug rehabilitation can be traced to mid-19th-century America. One of the earliest medically supervised institutions was the Washingtonian Home, established in 1857 in Boston to treat alcohol dependence through structured moral reform and supportive, supervised care[4]. Historians, including William L. White (2023), identify it as one of the first organised addiction-treatment models, demonstrating that formal rehabilitation began as a therapeutic, public-health approach rather than a punitive one[5].

India's legal framework related to drug control and rehabilitation is mainly governed by the Narcotic Drugs and Psychotropic Substances Act, 1985 (NDPS Act). The NDPS Act's purpose when passed was to codify laws on narcotic drug control, to utilize law to reduce the illicit trade of drugs, and to create a more robust regulatory framework[6]. Since then, the NDPS Act has been amended four times, further entrenching the punitive equities of the NDPS Act for drug offences[7]. However, the Act failed to create enforceable rights or binding standards for the rehabilitation process, and hence, its implementation remains weak.

The Legal Vacuum under the NDPS Act, 1985

Section 71 empowers the state to "establish and maintain centres for identification, treatment, education, after-care, rehabilitation, and social reintegration of addicts". [8] However, the provision is vague and non-enforceable. No rule or notification prescribes what constitutes a lawful or humane rehabilitation facility. As a result, the operation of such centres remains largely dependent on voluntary organisations, private individuals, or religious missions, many of which lack medical supervision or trained staff. This legislative lacuna shows a deeper problem in India's drug rehabilitation policy. The NDPS Act treats drug users primarily through a criminal lens rather than as persons requiring healthcare support. Although the Act specifies that courts direct the rehabilitation of addicts for proper treatment in the rehabilitation centres, this discretion is rarely exercised due to the scarcity of registered and credible treatment facilities. Consequently, the law's punitive bias often outweighs its rehabilitative intent.There is no definite procedure dealing with aftercare reporting for addicts under Section 71 or any other provision of the act[9].

On the other hand, the Mental Healthcare Act, 2017[10], under Section 18, stipulates an affirmative right to mental healthcare services and obligates compassionate treatment of persons with mental illnesses. It offers the notion of protection from inhumane or degrading treatment[11]. Very importantly, maternal substance-use disorders (mother or the pregnant woman) fall into an ambiguous status recognised neither fully within the Mental Healthcare Act nor the NDPS treatment. This creates a conflict that particularly affects pregnant women[12]. Apart from the solitary provision on treatment, the NDPS Act contains other provisions that, on paper, permit a health-centred response. Section 64A provides immunity from prosecution to addicts who voluntarily undertake de-addiction treatment[13], Section 39 authorises courts to direct convicted persons to undergo treatment at recognised facilities in lieu of sentence[14]; Sections 4(2)(d) and 7 impose on the Central Government responsibilities to prevent drug abuse and to allocate resources for treatment and rehabilitation[15]; Section 7A establishes a National Fund for the control of drug abuse to finance identification, treatment, rehabilitation, and awareness[16]; and Section 76(2)(f) empowers the Central Government to make rules governing the establishment, maintenance[17] and oversight of centres under section 71. These provisions collectively show that the legislature had contemplated a rehabilitative apparatus alongside prohibition.

Yet, the Act's remedial machinery is largely aspirational: immunity and diversion are under-utilised, funds and preventive duties are not matched with enforceable standards, and the rule-making power under section 76(2)(f) has not produced robust, enforceable norms for licensing, standards of care, grievance redressal, or monitoring. The result is a statutory schizophrenic framework, without corresponding procedural duties and protections, thereby producing the "missing rights" of addicts in India[18].

The judiciary, too, has largely remained silent on the need for regulatory standards in rehabilitation. While courts have occasionally directed governments to address the rising problem of drug abuse, there is no existing or landmark judgment defining the rights of addicts or establishing standards of rehabilitation governance in the whole of India.[19]

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In effect, the NDPS Act, while strong on prohibition and punishment, is structurally weak on prevention and rehabilitation. This imbalance has allowed rehabilitation centres across India to function within a vague regulatory framework, where treatment often resembles confinement and recovery is pursued without dignity or compassion

The Ground Realities in the Rehabilitation Process

The reality of rehabilitation stands in sharp contrast to its intended purpose, evidently in India. What should be a therapeutic environment for recovery has, in many cases, become a site of suffering and neglect. Rehabilitation centres, especially those operating privately or under charitable management, often function without medical oversight, legal accountability, or ethical standards. The absence of a dedicated regulatory framework has left these institutions beyond the reach of effective monitoring.

According to data (2024) from the Ministry of Social Justice and Empowerment, India has over 347 recognized Integrated Rehabilitation Centres for Addicts (IRCAs) under the National Action Plan for Drug Demand Reduction (NAPDDR)[20]. However, numerous unregistered and privately run centres exist outside this network. Most of these institutions function without licensing, lack competent psychiatrists or counselors, and fail to meet basic standards of care, cleanliness, and sanitation. Patients are frequently housed in unsanitary conditions and are not allowed visitors or are constrained during visitation, all in the name of treatment. Reports have emerged from various areas of the country of inmates being beaten, restrained, or deprived of food, hygiene, and healthcare. Once a family member is admitted, families rarely possess the ability to verify the conditions of these facilities[21]. This opacity breeds impunity. And at the same time, addiction is still widely seen as a crime rather than a medical condition, and this moral lens shapes how society, law, and even families approach the addict. As a result, the institutional negligence goes largely unquestioned. Consequently, the system operates in a legal and moral shadow, where accountability is nearly impossible. This ground reality exposes a fundamental flaw in India's rehabilitation approach

Arunachal Pradesh: The Crisis of Rehabilitation Governance

Arunachal Pradesh has undergone one of the fastest transitions of patterns of drug use in the North-East region of India. In the past ten years, the state has undergone a rapid transformation in patterns of use of substances, from the use of traditional alcohol and opium to inhaling heroin, injecting opioids, and rampant misuse of pharmaceutical drugs. According to the National Survey on Extent and Pattern of Substance Use in India (2019), alcohol and drug use are prevalent throughout the North-East, particularly in Arunachal Pradesh, where concerning patterns were observed in youth and young adults[22]. According to the Arunachal Pradesh Budget Speech on March 10, 2025, the State has set up five Drug De-addiction Centres under the Mukhya Mantri Nasha Mukti Yojana, and Arunachal Pradesh Drug De-Addiction Society has been established[23]. However, the program has been minimally implemented.

The rehabilitation routine and infrastructure in Arunachal Pradesh remain deeply inadequate[24]. Most centres operate without CCTV cameras, professional counsellors, qualified psychiatrists, or any form of clinical oversight. Detoxification often occurs without medical supervision, while therapeutic intervention is replaced by punitive discipline, group confrontation, involuntary confinement, and moral-reform practices that have no basis in modern addiction psychiatry. Essential elements of effective rehabilitation, such as psychiatric assessment, dual-diagnosis screening, suicide-risk evaluation, trauma-informed care, and evidence-based counselling, are almost absent[25].

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This failure is further reflected in a series of serious incidents of abuse resulting in death or severe harm. In October 2022, Amardeep Ram (35 years old) died at New Life Foundation Rehabilitation Centre in Namsai. Family members lodged an FIR claiming the incident was a murder and that he was beaten to death during his treatment.

Three people were arrested in this case[26]. In 2024, an inmate at the Serene Life Foundation Rehabilitation Centre in Pasighat was allegedly beaten to death by staff. The center was only closed after public outrage, and it was later confirmed that no shift inspection had ever occurred[27]. These examples are not standalone; they instead expose a systemic failure of regulation.

Adding to the problem is the rapid increase in privately run, unregulated rehabilitation centres across the state. Their mushrooming reflects a much deeper structural failure: the near absence of state-run facilities and the lack of institutional capacity to provide professional, accessible, and rights-based treatment[28]. While no empirical studies exist on relapse rates in Arunachal Pradesh, the absence of after-care, follow-up counselling, community reintegration programmes, and mental-health support strongly suggests that long-term recovery is severely undermined. Patients are discharged directly back into environments marked by untreated trauma, stigma, unemployment, and peer-group influence, conditions that make relapse predictable, even if unmeasured.

Arunachal Pradesh thus stands as a critical illustration of how rehabilitation collapses when law, mental health, and governance fail simultaneously. The state is in urgent need of a rights-based, medically supervised, and profession-led rehabilitation system, recognizing addiction as a mental health problem, and based on clear standards, with accountability. Without these reforms, rehabilitation will remain a space of neglect rather than healing, and the addiction crisis in the North-East will continue to worsen, if not addressed[29]

State-level reform for Rehabilitation Governance

The reforms proposed below are framed primarily as practical measures that the Government of Arunachal Pradesh may consider adopting. If successfully implemented at the state level, they could serve as a workable model capable of demonstrating to the rest of the country and eventually to the Central Government, how the longstanding gaps in the NDPS Act's rehabilitation framework can be effectively addressed.

01. Immediate State-Level Recognition of Addiction as a Mental Health Disorder: The Government of Arunachal Pradesh must, through an executive notification under Section 2(z), read with Section 103[1], The Mental Healthcare Act, 2017, explicitly declares "substance-use disorders" as mental illnesses within the state. This single notification will automatically extend every protection of the MHCA, 2017 (right to informed consent, protection from cruel, inhuman or degrading treatment, advance directives, nominated representatives, etc.) to every person admitted to a rehabilitation centre in the state, whether government or private.

02. Enact India's First State-Level Drug De-Addiction and Rehabilitation Centres (Regulation, Licensing and Monitoring) Act, 2026: Arunachal Pradesh should enact a dedicated state legislation (not merely rules or guidelines) that contains the following mandatory provisions:

- Compulsory registration and annual licensing of every public, private, NGO, or faith-based centre by the Department of Health & Family Welfare.
- Minimum standards for infrastructure, staff-patient ratio, compulsory presence of a psychiatrist/physician and clinical psychologist in every centre with 20 beds, and mandatory medical detoxification protocols.

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- Compulsory installation of CCTV in all common areas and corridors (with footage preserved for 90 days and accessible to the State Inspection Board and family members on special request).
- Mandatory quarterly physical inspection and submission of digital compliance reports.
- Creation of a toll-free, 24×7 State Rehabilitation Grievance Redressal Helpline directly linked to the office of the Secretary (Health). This Act would fill the vacuum left by Section 71 and Section 76(2)(f) of the NDPS Act and become the first comprehensive state law of its kind in India.
- All existing centres under the Mukhya Mantri Nasha Mukti Yojana and every private centre must be brought under its direct administrative and clinical control.

03. Mandatory Transparency and Family Involvement Protocols: Every centre must:

- Allow at least one family visit and one video call per month from the 30th day of admission onwards.
- Conduct compulsory monthly parent/guardian-counsellor meetings and share written progress reports.
- Upload basic non-confidential data (licence status, bed strength, staff list, last inspection report) on a public state portal.
- Report every death, serious injury, or escape to the District Medical Board within 12 hours and to the State Human Rights Commission within 24 hours.

04. Create a Small but Powerful State Inspection and Monitoring Board: A five-member Board headed by a retired District Judge, including a psychiatrist, a senior police officer, a representative of the Arunachal Pradesh State Commission for Protection of Child Rights, and a recovered person in long-term remission, should be empowered to conduct unannounced inspections and recommend criminal prosecution wherever necessary.

The legislative and executive authorities of the Government of Arunachal Pradesh have full authority over these five steps and can be implemented without requiring other Central approvals, possibly funded (at first) by the existing NAPDDR[30] and State Plan allocations. Following a phased and committed approach to each of the steps will allow Arunachal Pradesh to develop a model of rehabilitation governance that addresses historic gaps and provides a positive example to other regions experiencing similar challenges.

Conclusion

The NDPS Act, 1985, though well-intentioned in its effort to control narcotics, has failed to nurture a humane rehabilitation ecosystem. By failing to enforce Section 71, the law has created treatment centres without structure, standards, or a course of oversight[31]. This ignores the intent of Article 21 of the Indian Constitution, which guarantees the right to life and personal liberty and dignity, and is at odds with India's international obligations to human rights, which support health-based approaches to addiction rather than imprisonment. The inaction of the State in the area of rehabilitation is a denial of justice. Rehabilitation must be restored as a legal right, not just a voluntary service. Creating a rights-based rehabilitation framework through comprehensive legislation, independent oversight, and connectivity to mental health services would serve the moral intent of the law and, ultimately, restore faith in the justice system[32]. Today, the need is not just for drug awareness but to raise awareness of drug rehabilitation, a change in view acknowledging that prevention and recovery work side by side. Without the strengthening of rehabilitation literacy among families, communities, and institutions, we do not have a complete effort to counter drug abuse.

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HOW IS CANCER RESEARCH EVOLVING IN NORTHEAST INDIA? A SCIENTOMETRIC STUDY

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Abstract

The landscape of cancer in Northeast India represents different kind of public health dilemma, which is characterized by incidence rates that more exceed the national average and leads to create a distinct pattern of risk factors at local environment and lifestyle. To assess how scientific research is addressing this urgent health challenge, this study is carried out with scientometric analysis. The date is collected from Scopus dataset, which is further processed with Biblioshiny software. By mapping research output, collaboration networks, and keyword trends from 2007 to 2025, it is found an exponential growth in publications recently and increasing co-authorship patterns. The findings reveal prominent institute like Dr. Bhubaneswar Borooah Cancer Institute, Mizoram University, Assam University have contributed more. The thematic evolution again shows that critical areas such as genetics have gained prominence. Despite this progress, the analysis highlights a persistent gap, calling for a more targeted research focus that directly mirrors the region's specific disease profile to drive meaningful intervention strategies.

Keywords: Cancer, Research, Scientometric Study, Risk factor, Northeast, India.

Introduction

The north-eastern region of India has some of the highest cancer incidence rates in the country, with several districts in states such as Mizoram, Arunachal Pradesh, and Meghalaya reporting age-adjusted rates that exceed the national average, highlighting a serious public health concern (National Cancer Registry Programme, 2020; Singh & Das, 2019). This region is characterized by unique geographic features, ethnic diversity, lifestyle patterns, and environmental exposures that combined produce a different cancer profile and risk factor pattern when compared to the rest of India (Phukan et al., 2021).

This regional cancer burden and risk factor underscore the importance of research priorities mainly the trend and lacking with local needs (Lalnunthari et al., 2020).

Population based cancer records in the Northeast have revealed a large number of individuals have cancer of the esophagus, stomach, lung, liver, breast, cervix, or gall bladder, with significant variation among states and districts (ICMR-NCRP, 2021). The high rates of esophageal cancer or cancer related to stomach, lung, liver are linked to a combination of lifestyle choices like tobacco use, alcohol consumption, and diets rich in smoked or preserved foods which linked to a combination of behavioural and environmental determinants (Phukan et al., 2001; Dey et al., 2018).

From a scientometric perspective, the proposed review aims to analyze research contributions on cancer in Northeast India across multiple dimensions, including volume and growth of publications over time, authorship and collaboration patterns, institutional productivity, thematic focus, and citation impact (Sharma & Sen, 2022). It can review to what extent existing research has focused on these high-burden cancers and their determinants versus more general or less region-specific topics, thereby revealing mismatches between disease patterns and the research agenda (Baruah et al., 2020). Initiatives such as screening programmes, training of community health workers, and establishment of oncology training and fellowship programmes have aimed not only to improve service delivery but also to generate data for programme evaluation and operational research (Ministry of Health and Family Welfare, 2022).

Objectives of the Study

The research gap in the present study is focused with the following objectives:

- To find out the, authorship and collaboration patterns, co-authorship under this study.
- To analysis most publication trends and cited year in this field under this study.

- To identify the types of documents used by scientific community and most cited documents under this study.
- To examine the trends in this area topic cancer research evolving in Northeast India with thematic analysis in this study.

Methodology of the Study

"Scientometric" an analytical instrument for evaluating a large volume of publications and citations, offers a data-driven manner for a comprehensive analysis and domain understanding. The current study is undertaken to measure the trends and patterns of publication on cancer research evolving in Northeast India. The data for this purpose has been retrieved from the Scopus (www.scopus.com) database on November 20, 2025. Subsequently, 171 numbers of records were received globally using the above search strategy published related to the topic cancer research evolving in Northeast India. The dataset was exported in Excel format with full bibliographic details along with reference and merged in single file for the analysis. The MS-Excel, Biblioshiny-statistical R (version 6.1.R2) based software was used for the details analysis of the dataset.

Result Analysis

Number of Documents and Average Citations per Year

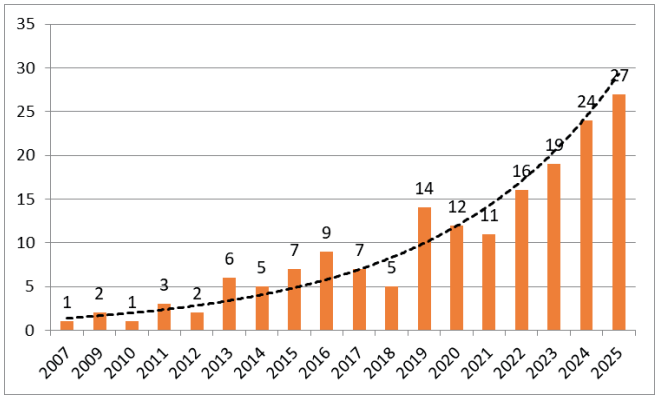

Figure 1: Numbers of documents and average citation per year

Figure: 1 presents the data related to the growth in research related to the topic cancer research evolving in Northeast India from 2007 to 2025. It indicates that research publications on the topic cancer research evolving in Northeast India are taking the hype in recent years. The exponential regression used in this data set indicates the continuous growth of research articles from last 10 years. From Figure: 1, it can be observed that in the year 2025, most of the research works (27) were conducted on these topics. Thus, the Average Annual Growth Rate (AGR) of research publications on orchid topics is found positive in the last two decades (20.09%).

Authorship Collaboration Pattern and Most Prolific Author

Table-1 indicates that total 649 numbers of authors contributed their research in the topic cancer research evolving in Northeast India which includes only 7 numbers of single author documents with international co-authorship 6.4%. Further it is also found that Co-author per document is 8.187%.

AUTHORS	
Total Number of Authors	649
Single authored documents	7
Co-Authors per Documents	6.4
International co-authorships %	8.187

Table: 1 Authorship Patter

Table no. 2, reflects the most productive author list. Among the total number of 171 documents, total numbers of authors 649 have contributed. In this study, topic on cancer research evolving in Northeast India related research, "Ghosh, Shankar Kumar" is found the most prolific author, which is followed by "Kataki, Amal Chandra", and "Nachimuthu, Senthil Kumar" respectively.

Authors	Articles
Ghosh, Shankar Kumar	19
Kataki, Amal Chandra	18
Nachimuthu, Senthil Kumar	15
Sharma, Jagannath Deb	14
Roy, Partha S.	13
Talukdar, Abhijit	11
Das, Garav	9
Hazarika, Munlima	
Mondal, Rosy	
Pautu, Jeremy Lalrinsanga	

Table: 2 Top Most Productive Authors and Their Impact

4.3 Most Cited Countries

Table-3 represents the top countries and their impact on the citation. From the Table-3, it is found that India has received the highest number (1441) of citations with an average citation per article 9.7 whereas Singapore has received the second highest number (193) of citations with an average citation per article 93, which is followed by Korea has received the third highest number (34) of citations with an average citation per article 34 after analysis the research in the topic cancer research evolving in Northeast India.

Country	TC	Average Article Citations
India	1441	9.7
Singapore	193	93
Korea	89	89
China	34	34
Malaysia	29	29
Usa	17	5.7

Table No: 3 Most Cited Countries

4.4 Most Relevant Affiliated Institution

In the field of research, different institutions have contributed their work. Table: 4 indicates the most prominent institutions which have contributed predominately in this field. From Table-4, it is found that "Dr. Bhubaneswar Borooah Cancer Institute" has contributed the highest numbers (256) of articles, which is followed by "Mizoram University" which contributed 96 numbers, and "Assam University" has contributed 94 numbers of articles on the topics of the study.

Affiliation	Articles
Dr. Bhubaneswar Borooah Cancer Institute	256
Mizoram University	96
Assam University	94
Regional Institute of Medical Science India	37
Gauhati University	36
North Eastern Indira Gandhi Regional Institute of Health	29
Vmmc and Safdarjang Hospital	25
Aizawl Civil Hospital	23
Mizoram State Cancer Institute	22
Tezpur University	21

Table: 4 Most Relevant Affiliated Institutions

4.5 Most Relevant Sources

Table: 5 represents the sources such as journals, conference proceeding, etc. which are mostly preferred by the researcher on this research. The data extracted for the study indicates the sources which are actively publishing research works on this topic. In Table: 5, the top preferred sources were listed. Among these top sources, "Asian Pacific Journal of Cancer Prevention", "Indian Journal of Surgical Oncology", "Tumor Biology" have published the highest number of 11 articles each on this topic, which is followed by "Asian Pacific Journal of Cancer Care" and "South Asian Journal of Cancer" with 8 articles each. Further, "Indian Journal of Otolaryngology and Head and Neck Surgery" and "Journal of Cancer Research has published 4 numbers of articles each.

Sources	Articles
Asian Pacific Journal of Cancer Prevention	11
Indian Journal of Surgical Oncology	
Tumor Biology	
Asian Pacific Journal of Cancer Care	8
South Asian Journal of Cancer	
Indian Journal of Otolaryngology and Head and Neck Surgery	4
Journal of Cancer Research and Therapeutics	
Chinese Journal of Cancer	3
Clinical Epidemiology and Global Health	

Table 5: Most Relevant Sources

4.6 Most Global Cited Documents

Table: 6 presents the data related to the most globally cited documents with cancer research evolving in Northeast India from 2007 to 2025. It is found that the article "Wee, 2010, Chin J Cancer" has received total 193 citations with 12.06 average citations per year; which is

followed by "Baruah, 2021, Chemosphere" has received total 101 citations with 20.20 average citations per year. The article "Kamle, 2019, Plants" has received total 89 citations with 12.71 average citations per year.

Paper and DOI	Total Citations	TC per Year	Normalized TC
Wee, 2010, Chin J Cancer DOI: 10.5732/Cjc.009.10329	193	12.06	1
Baruah, 2021, Chemosphere DOI: 10.1016/J.Chemosphere.2020.129150	101	20.2	5.67
Kamle, 2019, Plants DOI: 10.3390/Plants8060150	89	12.71	4.42
Panmei, 2019, J Ethnopharmacol DOI: 10.1016/J.Jep.2019.02.009	89	12.71	4.42
Talukdar, 2013, Plos One DOI: 10.1371/Journal.Pone.0060996	76	5.85	1.96
Mondal, 2013, Plos One DOI: 10.1371/Journal.Pone.0057771	76	5.85	1.96
Behera, 2021, Appl Biochem Biotechnol DOI: 10.1007/S12010-021-03506-Y	61	12.2	3.42
Kataki, 2011, Chin J Cancer DOI: 10.5732/Cjc.010.10607	56	3.73	1.31
Shetty, 2020, Cancer Res Stat Treat DOI: 10.4103/Crst.Crst_290_20	47	7.83	3.84
Kumar, 2017, Tumor Biol DOI: 10.1177/1010428317736643	45	5	1.94

Table No: 6 Most Global Cited Documents

Emerging or Declining Trends

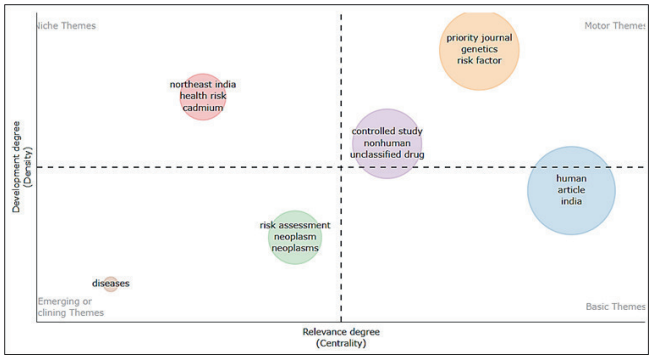

Figure 2: Thematic map shows emerging or declining, informing future research

Figure-2 is a thematic map produced by Biblioshiny (R-bibliometrix), showing clusters of keywords in cancer research related to Northeast India and categorizing them by their importance (centrality) and maturity (density). "Motor Themes" covers well-developed and crucial themes for structuring the field, such as "priority journal," "genetics," and "risk factor." "Niche Themes" shows topics like "northeast india," "health risk," and "cadmium" are mature but not strongly linked to other research areas. "Basic Themes" covers "Human," "article," and "India" are foundational themes widely linked but not deeply developed within the current literature. "Emerging or Declining Themes" shows "Diseases" here suggests a

marginal or underdeveloped theme in this dataset. This map further show the topics "priority journal," "genetics," and "risk factor.", "northeast india," are central and well established, and which are emerging, informing future research priorities in the cancer literature for Northeast India.

Discussion

Cancer related to research into Northeast India has risen over the past two decades, led by sharp increase in publication pattern basically towards collaborative authorship, and thematic diversity. Earlier studies in this region focus on descriptive epidemiological pattern, mapping incidence rates by district wise and finding out the risk factors such as tobacco, dietary patterns, and environmental exposures (Singh & Das, 2019; Phukan et al., 2001). These rerearch established some kind of basic knowledge regarding the high burden of cancers such as oesophagus, lung, as well as highlighted regional risk patterns (ICMR-NCRP, 2021).

On the other hand, the current study highlights an exponential growth of research output from 2007 to 2025, with the average annual growth rate 20.09% in cancer research publications at Northeast India. The number of research works conducted in 2025 shows at highest peaked, reflecting scientific attention towards this topic. The recent study also shows a remarkable shift toward collaborative research, with an average almost eight co-authors per publication. There are very small single-author articles (only 7) though total 649 authors have carried out the research with different regional and international scientific partnerships. Authors like Shankar Kumar Ghosh, Amal Chandra Kataki, and Senthil Kumar Nachimuthu have emerged as prolific contributors in this field.

Institutional evolvement has also identified which shows diversified and intensified pattern. It is found that earlier research were limited to a handful of regional medical and research centers, whereas the current analysis identifies major institutions such as "Dr. Bhubaneswar Borooah Cancer Institute", "Mizoram University", and "Assam University" also become main research institute which actively conducting research in this field. Moreover, earlier studies emphasized area specific environmental and behavioural research deals with tobacco, alcohol, diet, infections often using population based record approaches (Phukan et al., 2001; Singh & Das, 2019). Whereas recent analyses utilizing Biblioshiny software thematic mapping reveal clustering of research topics into well-developed "motor" themes (genetics, risk factor), mature niche themes (cadmium, health risk, Northeast India), basic foundational themes (India, human), and emerging or declining themes (diseases). This reflects a broader and more specific exploration of root causes, inherited tendencies, and treatment approaches.

Conclusion

This study shows the exponential growth of cancer research in Northeast India over the past two decades. The Northeast region of India now stands out for its high incidence of cancers and risk profile which leads by local environmental, behavioural, and genetic factors. Exponential growth in research output, increased collaboration among authors. Further, thematic focus reflect the region's elevated role in Indian and global cancer research. Key institutions, such as "Dr. Bhubaneswar Borooah Cancer Institute", "Mizoram University", and "Assam University" have become main research institute which actively conducting research in this field.

Thematic mapping reveals research studies related to research addressing a broader range of motor, niche, basic, and emerging themes, marking a shift towards deeper inquiry into molecular mechanisms, risk factors, and intervention strategies. High-impact journals and international collaborations have increased while collaboration of research activities. Moreover, there is need for on-going further align research with disease patterns, enhance infrastructure and screening programs, and strengthen health systems to ensure effective cancer control and improved health outcomes for the population of Northeast India along with including AI tool which may leads to deeper research to address the region's unique risk patterns effectively.

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HAZARD RISK ASSESSMENT OF MUTHI LOCALITY OF AIZAWL CITY

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Abstract

Mizoram, located in India's north eastern region, is highly vulnerable to various natural hazards because of its fragile geology, steep terrain and heavy monsoon rainfall. It is classified as seismic Zone V, making it prone to earthquakes of MSK IX or higher, along with frequent landslides, cyclones, hailstorms and flash floods. This study looks at hazard risk and vulnerability in the Muthi locality, a community that relies on a single access road, increasing its disaster risks.

A mixed-methods approach was used, combining household surveys from over 125 households, historical hazard data and GIS-based risk mapping. The analysis focused on physical vulnerabilities like slope instability, fragile sandstone geology, weak housing structures and poor drainage systems. It also considered social vulnerabilities, such as a large dependent population, limited food and water security and very low disaster awareness.

Findings show that landslides are the most common hazard, occurring recently at 35 sites and affecting nearly 28 per cent of households, especially on the eastern slopes. Cyclones and hailstorms have also damaged many homes, while flash floods and road blockages have disrupted water supply systems. Social vulnerabilities are significant as well; 37.6 per cent of houses are kutcha, food supplies cannot last the community beyond a month, and knowledge about disaster preparedness is minimal. All households depend on a solar-powered Water Supply Scheme and the water quality is generally acceptable for human consumption.

Keywords: Hazard Risk Assessment; Vulnerability; Landslides; Disaster Preparedness; GIS Mapping; Muthi locality; Mizoram.

Introduction

Mizoram, situated in the north-eastern extremity of India, occupies a unique position as it nestles in the farthest corner among the states of the Union. Characterized by a rugged terrain marked by hilly landscapes running in a north-south direction, Mizoram's geography is defined by its youthful soil composition, lacking in compactness and stability.

Villages with very high vulnerability were mainly distributed at mid-elevation of mountains with strongly sloping terrain.

In contrast, low-vulnerability villages were generally on plains at low altitudes (Liu et. al. 2020). The Seismic Zonation Map of India underscores the seismic vulnerability of Mizoram, depicting the entire state within Zone V (MIRSAC 2011), denoting the highest risk level for earthquakes. These assessments reveal Muthi locality to be situated within Zone V for earthquake hazards, with an estimated Peak Ground Acceleration (PGA) of 0.4-0.42g. This designation signifies the potential for seismic events of intensity Medvedev–Sponheuer–Karnik (MSK) IX or greater, which could lead to significant devastation and loss if not adequately prepared for.

In addition to seismic hazards, Mizoram grapples with another formidable challenge: landslides. During the monsoon season, the state experiences a heightened frequency of landslides, a phenomenon not uncommon throughout the region. The combination of steep slopes, loose soil and heavy rainfall renders Mizoram particularly susceptible to these natural disasters, posing threats to both lives and infrastructure. Landslides are among the most prominent hazards, particularly during the monsoon season, with several areas experiencing recurring slope failures and subsidence due to the underlying soft sandstone and shale geology (Lallianthanga & Lalbiakmawia, 2019).

Cyclonic storms and heavy monsoon rainfall are additional threats, affecting the region's infrastructure and livelihoods (NDMA 2023). Cloudbursts and flash floods, though less frequent, can cause localized devastation during periods of intense rainfall (MISTIC 2020). Cyclone Remal 2024 brought intense and prolonged rainfall to Aizawl, the capital of Mizoram, triggering widespread and catastrophic landslides. The city's steep terrain and fragile geological composition significantly amplified the hazard, consistent with previous assessments of the region's landslide susceptibility. The event caused severe societal and infrastructural impacts, resulting in 34 fatalities, with 33 bodies recovered and directly affecting 72 families (Sangi et. al. 2025).

On the other hand, despite receiving high rainfall in the monsoon, Mizoram is vulnerable to drought conditions during the dry season due to low groundwater retention and traditional shifting cultivation practices, leading to seasonal water scarcity (NCDC 2024; Saha & Chakraborty 2014).

Each year, Mizoram grapples with a deluge of rainfall, yet paradoxically faces acute water scarcity during the dry season. This precarious balance between abundance and shortage underscores the state's water management challenges. In particular, the month of March often witnesses a critical shortage of water supply, with many areas reliant on the Public Health Engineering Department (PHED) experiencing inadequate access to this essential resource.

The case of Muthi locality serves as a poignant reminder of the vulnerabilities associated with reliance on a single access route. Situated amidst the picturesque landscape of Mizoram, Muthi locality finds itself intricately entwined with the surrounding terrain, with only a solitary road connecting it to the outside world. This solitary lifeline, however, poses a vulnerability of cyclone hazard in the western region of the village within a high classification of wind and cyclone-prone zones (MIRSAC 2011).

The precarious situation faced by Muthi locality is emblematic of the broader challenges posed by natural disasters and their potential to disrupt essential services and supply chains. A scenario where a disaster blocks the sole access route to the village could have dire consequences, including limited access to vital resources such as food, water and medicine. As such, proactive measures are imperative to mitigate these risks and enhance preparedness and response capabilities.

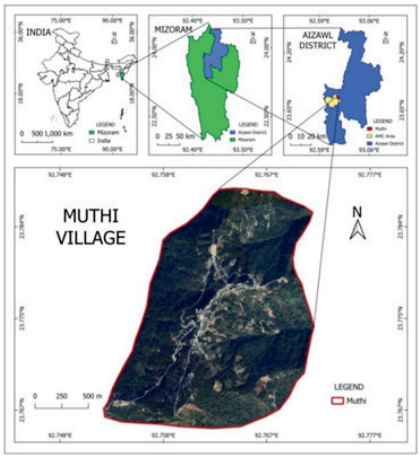

Fig. 1- Map of study area

Methodology

For the comprehensive analysis of disaster risk and vulnerability in Muthi locality, empirical research was conducted, focusing on assessing the village's surface and drainage systems. This analysis entailed a thorough examination of the entire village's layout and infrastructure to identify potential vulnerabilities and areas prone to disasters. To ensure accuracy and relevance, household surveys were employed based on cluster sampling in which divided based on sub-localities and then simple random sampling is applied covering the entire available household on the point on time to ascertain historical data of hazard in the study area, the availability of essential resources and the daily requirements of the residents. This survey specifically targeted food and water storage practices within households, had covered 125 households of the local residences. By gathering data on existing resources and daily needs, insights were gained into the community's resilience and preparedness in the face of potential disasters. Risk mapping has been prepared using GIS software from the obtaining historical hazards data and based on observation of village's layout.

Result and Discussion

Hazard Vulnerabilities

Muthi locality has long been vulnerable to multiple natural hazards, with landslides being the most frequent. Records show landslides in 35 locations, affecting nearly 28 per cent of households. The problem is widespread across the locality, but about 70 per cent of the incidents occur on the eastern side, where the sandstone terrain is fragile, less compact and highly prone to erosion. In contrast, the western side has stronger rock formations and road infrastructure, which reduces landslide frequency but increases the risk of rock falls. Inadequate drainage throughout the locality further worsens the situation, as stagnant rainwater and wastewater seep into the soil, triggering slope failures and recurring landslides.

Fig. 2- Landslide in the eastern site of the locality. Muthi, May. 2024

Additionally, the entire village suffers from inadequate drainage systems. The lack of proper drainage means that waters, particularly waste water and rainwater runoff, accumulates and significantly contributes to landslide occurrences. The areas most affected by landslides are those where water accumulation is most severe. This improper management of water exacerbates the instability of the already vulnerable sandstone terrain,

leading to frequent and severe landslides.

Fig. 3- Rainwater spreading all over the surface due to absence of drainage system. Muthi, May. 2024.

Cyclones have also left significant impacts, with 52 households reporting damage. Localities such as Vengthar, Vengthlang and Venglai were hardest hit, particularly among kutcha and semi-pucca houses, even though RCC buildings experienced partial damage to windows and steel sheet roofs. Cyclone impacts are generally more severe in the higher western slopes, where exposure to strong winds is greater, while low-lying areas like Electric Veng reported fewer cases. Based on the primary data collected for this research information, the occurrence of hailstorm is typically experienced during April-May which become more destructive in recent decades, with 19 houses damaged in the locality—17 kutcha or semi-pucca and two RCC with steel sheet roofing—mostly in the southern part of the settlement within the past year. These recurring wind and hail hazards highlight the structural weaknesses of non-engineered houses and the need for stronger building practices.

On May 2024, a flash flood struck the eastern stream, carrying heavy debris that blocked the zigzag road to the Water Supply Scheme (WSS). This not only cut off vehicular movement but also created the risk of simultaneous landslides. If the water pump, in which the total household of the locality rely on it, were damaged during such a road blockage, repairs would be delayed since equipment and materials could not reach the site, leading to a prolonged shortage of drinking water.

The hazard situation worsened on May 2024, when Cyclone Remal triggered about 30 landslides, of which 13 were major and 17 minor. Three major slides occurred along the main road to the city, while another 17 landslides were recorded along an 800 meters stretch of the Catholic Church–Bethel Veng road, completely cutting off parts of the village. Bethel Veng and Vengtawp were also heavily affected, as steep slopes, heavy rainfall, slope cutting for road construction and poor drainage combined to destabilize the terrain.

Overall, Muthi locality faces high disaster risk due to its fragile sandstone geology, inadequate drainage, weak housing and high exposure to cyclones, landslides, hailstorms and flash floods. Most buildings under the study area were constructed prior to the enforcement of the Aizawl Municipal Corporation regulation of building construction 2019. Addressing these challenges will require better land use management and implementation of safety regulation by the concern authority. Awareness on resilient infrastructure, improved drainage systems and effective community-based disaster preparedness is highly recommended.

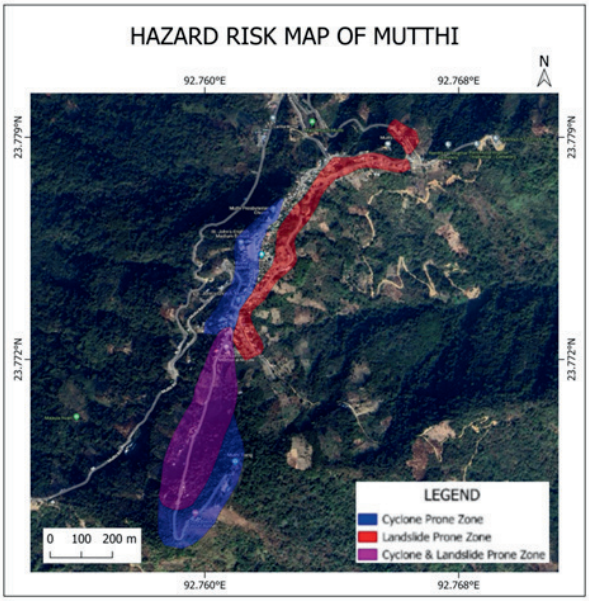

Figure 05: Risk map of various hazards in Muthi locality

Socio-Economics Vulnerabilities

Muthi locality encounters several social vulnerabilities that increase its exposure to disasters. The survey covered 125 households with 696 individuals. A large part of the population consists of children (130) and elderly residents (77), both of whom are highly dependent during emergencies. There are also 11 disabled persons and 4 chronically ill individuals who cannot move independently, representing some of the most at-risk groups, needing special attention during evacuation and relief efforts.

Household structures increase social vulnerability. About 37.6 per cent of homes are kutcha and 17.6 per cent are semi-pucca, both of which are poorly resistant to earthquakes, cyclones or landslides. Although 44.8 per cent of houses are RCC, many are situated on steep slopes over 40 degrees, especially in Vengthlang and Vengthar, making them more susceptible to landslides. The average family size is 5 individuals, with some households having as many as 14 members. This larger size increases strain during emergencies when evacuation and relief distribution are needed.

Livelihood dependence contributes to vulnerability as well. Most households rely on small-scale farming and

animal husbandry, including raising pigs, cattle and poultry. While these activities provide subsistence, they are not resilient to disasters. In case of food shortages, rice supplies are limited; the total available can sustain the community for only about a month. Only 14 households store more than 100 kg of rice at a time. With no rice retailer in the village, residents must rely on nearby areas like Zuangtui and Thuampui, which are 5 km away, making food security tenuous if road access is blocked.

Water supply and storage further increase risks. While most households depend on a new solar-powered Water Supply Scheme, its failure during road blockages or disasters could delay repairs and create extended periods of water scarcity. Water storage capacity varies, with 28 houses having tanks under 4,000 litres and one house lacking a tank entirely. Although 80 per cent of households have rainwater harvesting systems, 43 homes still rely on external spring water, adding to vulnerability during prolonged hazards.

Sl. No	Physical/ Chemical	WHO permissible limit	BIS permissible limit	Unit
1	pH	6.5-8.5	6.5-8.5	8.07
2	EC	500-2000 µS/cm	2500 µS/cm	248 µS/cm
3	TDS	500-1000 mg/L	500 mg/L	102 mg/l
4	Turbidity	5 NTU	1 NTU	0.16 NTU
5	Alkalinity	<200 mg/L	200 mg/L	70 mg/l

Table 1- WSS Muthi locality water properties

Note: The table has been prepared from the results obtained from testing a water sample collected from the stream, which was analysed in the Department of Environmental Science, Mizoram University.

Upon review, the water quality in the WSS Muthi locality is generally acceptable for human consumption (Table 1). The pH level of 8.07 shows that the water is slightly alkaline, which does not pose immediate health risks. Electrical conductivity (EC) and total dissolved solids (TDS) levels are within acceptable limits, indicating that the water is not too salty. The turbidity is very low, meaning the water is clear with minimal suspended particles. Total alkalinity is also within acceptable ranges, likely posing no direct health risks. The water quality appears to meet basic standards for human use based on the tested parameters. However, on-going monitoring is necessary to ensure safety, especially regarding microbial contaminants that were not assessed in this analysis.

Another significant social challenge is the low level of disaster awareness. Out of 696 people surveyed, only 13 reported any knowledge of disaster management, mostly those with higher education or military training. The vast majority lack awareness of preparedness measures, which greatly weakens the community's ability to respond to disasters. While local assets like schools, the YMA hall and the Govt. Hrangbana College satellite campus could serve as shelters during emergencies, the absence of trained personnel and disaster planning limits their effective use.

In summary, the main social vulnerabilities in the Muthi locality include a large dependent population (children, elderly, disabled and sick), prevalence of kutcha and semi-pucca housing on hazard-prone slopes, limited food and water security, reliance on fragile livelihoods and very low disaster awareness. Unless these issues are addressed through improved infrastructure, social support systems, awareness programs and local resource storage, the vulnerabilities will worsen the impacts of natural hazards on the community.

Recommendation and Conclusion

Muthi locality, home to about 1,100 people across 200 households, faces several challenges related to infrastructure, disaster risk and livelihoods. Most families are homeowners who depend on small-scale farming and pig rearing. However, food security is a concern due to limited rice supplies and a lack of local shops. Disaster awareness in the village is generally low, except for a few educated or trained individuals. The settlement includes a mix of kutcha, semi-pucca, and RCC houses, with RCC being the most common. Water supply relies on solar pumps and natural springs, but storage capacity is insufficient, limiting access during emergencies.

The village is vulnerable to various hazards, including earthquakes, landslides, cyclones, hailstorms and flash floods. Cyclone Remal, in particular, caused severe landslides, damaging infrastructure and blocking key routes. Risk mapping reveals that landslides mainly occur in the eastern part of the village, cyclones affect higher western areas, and hailstorms are most frequent in the southern region. While water quality is generally safe, it needs regular monitoring to prevent health risks.

To tackle these challenges, it is crucial to strengthen infrastructure by retrofitting weak houses, improving drainage systems and increasing water storage. Raising awareness through disaster preparedness training and early warning campaigns is equally important. Environmental management measures, such as afforestation, soil conservation and better land-use practices, can help reduce erosion and landslide risks. Developing a thorough village disaster management plan, along with early warning systems and clear evacuation strategies, will enhance risk reduction. Community involvement and governance are also key forming disaster management committees and coordinating with local authorities, NGOs and health teams can improve preparedness and response. Additionally, establishing proper rice storage facilities or shops will ensure food security during emergencies.

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Conflict of Interest

The author declares that there are no conflicts of interest.

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THE ROLE OF THE PELI KROTHO (AGE GROUP SYSTEM) IN ANGAMI-NAGA SOCIETY

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Abstract

Centered on the Angami Naga community, the paper explores the role of peli krotho (age group system), its significance in fostering social identity, cultural transmission, and community cohesion. The peli krotho is a traditional Angami-Naga social structuring of individuals into age groups, forming lifelong bonds and allegiance among the peers. They also serve as active social agents, facilitating the transmission of traditional knowledge, skills, and values through socialization and collective learning. The paper extends the study of the peli group beyond its function as a labour group, evaluating its contribution in cultural preservation, material culture, and the maintenance of group identity through naming practices, ceremonies and communal activities. The study takes a qualitative approach where analysis is based on narrative accounts drawn through interviews and personal archives of six consultants across three generations of the Tsütuonuomia khel of Kohima village. Even today, the peli system remains a vital link to Angami cultural heritage, fostering a sense of rootedness and manifesting a collective identification that brings about cooperation among members.

Keywords : peli krotho, social identity, cultural transmission, community, socialization

Introduction

"U rübei rüna chülieya mo"
one cannot make a village alone

The above traditional saying, often heard circulating in oral tradition reflects the Angami worldview in which the individual is fundamentally situated within, and accountable to the community and kinship network. The peli krotho, or the formal age-group system traditionally practiced by the Angami tribe, where an individual is placed in a group of his peers is one such social structure found among the Angami-Nagas that illustrates the interdependent relationship through which notions of personhood and collective belonging exist.

Members of the peli form life long bonds and allegiance to their peli based on a form of commonality and shared loyalty which in turn influences their behaviour, actions and beliefs. (Tajfel, 1981). This social categorization allows coordination of individuals into larger social groups for social cohesion and cultural continuity, through which agrarian tasks, life cycle rituals as well as every day practices could be performed and transmitted. The creation of a lineage system is formed through the peli krotho that gives members of Angami villages their group identity.

Literature Review

NK Das (2017) describes tribal societies of Nagaland as 'stateless,' self-governing societies structured into a segmentary lineage system. An Angami village is, as such, divided into khels or thinuo, which refers to a group of clans occupying a definite territory and each belonging to a common ancestor. The structuring of village into a social and territorial unit of clans makes mechanism of the society easier.

Theunuo (2018), in his discussion of the mode of production in a traditional Angami village, talks about the division of the village into thinuo or khel, that functions as a compact and well-knit society sharing both land and resources. This common sharing necessitates communal labour. Hence, the Angami divides the whole village into age-set groups or Thetshü (same-age), consisting of both male and female members, that forms a cycle of laboring group called peli, to which various communal works are delegated. Each gender has specialized contribution to agricultural production through various gender-based division of labour (Nienu, 2015). However, most discussions of a peli krotho views it as simply a 'work gang,' having "no meaning outside the economic production." (Jacobs et al. 1990; Theunuo, 2018). This perspective may be an oversimplification of the understanding of the traditionally important peli group and hence, serves as the purpose that drives this paper. The social categorization leads to a mode of identification that "creates and defines the individual's place in a society" (Tajfel, 1981, p.258).

Objectives

The study is an attempt to illustrate:
1) the function played by the peli groups in the creation and transmission of traditional knowledge and skills beyond the confines of traditional educational institutions.
2) the role that peli groups play in fostering a sense of identity and cultural continuity beyond just being a work group

Methodology

The study employs a typical qualitative approach where analysis is based on narrative accounts collected through interviews and personal archives. The lived experiences of six consultants (knowledge keepers) from three generations of the Tsütuonuomia khel of Kohima Village have been collected with due permission to craft an authentic presentation of the subject matter.

Spaces of Group Identification and Learning

The Angami age-group system or peli acts as an important marker of an individual's social identity, shaping their responsibilities and participation in community activities. The informants stressed on the importance of being part of an age-group. The significance of this social group was such that an individual was identified based on it. The informants stressed on its importance, highlighting how one is identified through the age group they belong to. Hence, from a young age- where they are referred to as nhicumia (ages 4-12) the children become legitimate members of the village society.

An informant recounts an experience of attending the 'school' of her grandparents and parents by the age of 8-9 with her Thetshümia (same age peer). This is the initial stage of categorizing individuals into age groups, where the main motive is to familiarize the youngsters with their peers through socialization. A traditional Angami proverb reprimanding those who refuse to socialize - "Thevo sü u se nhie nu tei ngu ya sie" (A pig sees the sky only when it dies) referring to an anti-social person (Sekhose et al. 34) is testament to this imperative. This pedagogic expression acts as everyday tools to reprimand those who violate the socially "accepted patterns of behaviour" (Bascom, 1954, p.346).

When an individual reaches the age of adolescence/ puberty, they shoulder bigger responsibilities and are called Khriesarüümia. At this age, all year long activities are done with their peli, moving and acting as one, where the group formation becomes more concrete as a peli group. It is important to note here an integral feature of a peli group, that is, it consists of three age groups.

For instance, the Miavimia peli of Tsütuonuomia khel consists of members born between the years 1993-1996. According to oral sources, this was done to balance the amount of work with the number of people, where a peli group consist of at least 20-30 members. The male members are called "Pelipfumia" and female members are called "Pelipfümia.".

Maintenance of Group identity through Naming Groups

A peli becomes an integral part of an individual's life placing him in an important place in the social map. Peli groups often practice a naming system that adds to the unique identification of an individual to a certain group. The practice of naming peli groups differed from generation to generation. In some cases, the names served as a defining feature of the group. For instance: the Ketuorasi peli, when loosely translated means "known wherever they go." Meanwhile the Kenei peli, translates to "happy/joyful group".

In another instance, an informant belonging to the older generation said her peli did not have an official name but recounted the story of how one of the elders, who taught them traditional songs, named their group "tepfi peli" (monkey group) because of their playful and jovial nature. Such instances show how one's identity is reflected through the perspective of another person. This is also known as "reciprocal mirroring," where each individual attains their personal identity through their reflections from another individual (Dundes, 1989, p. 5).

Peers also play a significant role in social learning process fostered by mutual trust and relations and a shared commitment among members. An informant mentions a peer who had a wide knowledge of wild plants as she had always followed her elders in foraging activities. Whenever the informant and their peer would go foraging, they would ask if a plant was edible – "Hau saya me?" (What about this?) to which she would reply, "Sazo, Sazo" which basically means "yes, that too, that too." Therefore, they named her "Sazo", which reflected her botanical knowledge or prowess. Possessing a social identity adds additional value to one's own identity where the value factor is again transmitted from the individual to the group, who inherits her traditional knowledge.

Numbering is another way to identify a peli. This form of identification appears to be a modern development. Interestingly, it is noted that peli no 1-3 do not exist and the numbering system starts from peli no. 4 as seen in the image below of the peli groups of Tsütuonuomia Khel[1]. However, in this context, it might be viewed that this numbering system is an attempt to keep alive the identity of the peli groups who had no group name. Naming gives certain characteristic attributes to a peli group.

However, for those with no group names, these peli numbers becomes their group identity, which has since then been used to represent the group.

[1] Upon inquiry, there is no proper explanation given of the absence of peli 1-3. The only explanation was that the members could not be identified and therefore, peli 1-3 have been left blank for that reason.

Peli Incharge	
Peli No. 4	Shürho Solo
Peli No. 5	Khriesalie Sekhose
Peli No. 6	Keyie-o Zatsu
Peli No. 7	Thepfuvilie Suohu
Peli No. 8	Mezhü-o Solo
Peli No. 9	Neilalhoulie Solo
Peli No. 10	Rükuoneilie Solo
Peli No. 11	Dzieseneituo Belho
Peli No. 12	Dr. Atsei-o Whuorie
Peli No. 13	Khriesamhalie Solo
Peli No. 14	Kelhousenyü Whuorie
Peli No. 15	Khrievotuo Sekhose
Peli No. 16	Vilahetuo Belho
Peli No. 17	Kekhriesituo Whuorie

Fig. 1. The different peli numbers
[source]: Unity Club Kohima Village Silver Jubilee Souvenir

Creating Social Value through Thekracü or Thekra hie

The social identification of an individual is driven by its 'value and emotional attachment' (Tajfel, 1981, p. 255) to a group which motivates collective cohesion. When this collective value is translated into a shared, social action, it acquires meaning only in comparison to another group that engages in a similar social action, which according to Tajfel (1981) is due to a desire for 'positive social identity'. Different pelis work and contribute towards the overall development of the village as seen in the following:

The monolith is erected near the mission compound kharu (village gate), one of the oldest kharu of the Khel, and has all the name of the members inscribed in it. The peli monolith stands as a reminder of the great milestone achieved by the peli as a group.

Fig.2. The monolith of the Ketuorasi peli with the members name inscribed on it.
Source: photography by the researcher

Another peli also erected a badze or resting place in between their village and field area. When times of festivity approaches such as Sekrenyi (harvest festival), the peli groups practice folksongs here on their way back from field works.

Fig.3. A resting place by Vira Lozi Peli 14.
Source: Informant's archive

Fig.4. Nourhe Lozi Badze by Peli no. 13
Source: photography by researcher

When asked about the contribution of the Kenei peli or peli no. 9, an informant replied that although their peli did not achieve such big feats as the Ketoukhrie peli, the cleaning and beautification work of a historically significant pond called "Rüziedzükhou" was done by them.

Fig.5. The pond, Rüziedzükhou after beautification
[source]: photography by the Researcher

Hence, the peli makes significant contribution to the Angami material culture or what Dorson (1921) calls 'physical folklife' (Dorson, 1982, p.2). It is a Peli's way to give something back to the community.

A flourishing peli group is one whose legacy is marked by both tangible and intangible testaments of the group's collective achievements.

Another significant milestone that elevates a group's social status is the Thekracü or Thekra hie ceremony, an event marked to commemorate peli camaraderie, observed on the third day of Sekrenyi (harvest festival). It takes place in a 'saphruomia' (elder married couple) house after verbal agreements have been made, afterwhich the 'thevüzie' (chicken sacrifice) is observed. The peli provides the chicken that is sacrificed by the married couple, before blessing the peli. This shows the reverence shown to an elder in the society and the symbolic need for their constant guidance in the life of a young peli group.

The peli clad in their full traditional adornment, sit in a semi-circular manner facing wide spread of plates of Themuo (meat) in big khouphi (wooden four-legged plate) and sing thepfheü (folksongs) throughout the day. The Pelipfumia (peli boys) hold their rice beer either in a Hiepu (bamboo mug) or Hie kie (Mithun horn) and a kierie likhi (bamboo spoon) for scooping food, and pelipfümia (peli girls) use sei hie (wooden cup) with a sei likhi (carved wooden spoon), made for them by their pelipfumia (peli boys) to whom in turn they gift chiepha (waist band). Days ahead of the thekracü, the rice earned by the peli group during harvest is used to make rice beer, while peli groups supervised by an elder or phichümia engage in singing sessions in the cha pru (rest house near field roads).

Thekra hie, thus, signifies reaping the fruit of their labour where harvest festivals like Sekrenyi serves as spaces for the peli to join in a communal sharing of their labour which fosters deeper bond. It was said that a peli can carry out the thekracü more than once. It is a matter of pride for the group who performs this ceremony as only the most active and cooperative of groups take charge of performing the rituals.

The peli groups also preserve the history and legends of the community which is passed on from generation to generation and preserved in the form of songs during festivities. Hence, stored in a form of collective memory, they aid in transmitting intergenerational knowledge. In this way, these gatherings also show age-groups as important knowledge keepers of the Angami community in the making.

One important purpose of the Thekracü is to display the peli dressed in full traditional attire, to showcase a group that has acquired all the necessary knowledge and skills and are now adults of the society, active social agents who make their own contribution to the society.

During this time, pelipfumia (peli boys) would make sei likhi (wooden spoon with carvings) for their pelipfümia (peli girls) and they, in turn, will make their chiepha (waist band)."

Fig.6. Ketoukhrie peli (peli no. 11) of Kohima village during their Thekracü. [Source: Informant's personal archive]

Fig.8 & 9. Chiepha and Rütso likhi
Source: Informant's personal items

Hence, a peli group encompasses much more than an agricultural or labour group. Within this group, an individual is ensured an all-round development when it comes to acquiring traditional skills and knowledge. In turn, this group returns the favour to the society by utilizing these skills in upgrading and preserving the cultural assets and expressions. With its significant role in cultural transmission through effective age-group system or peli, it also serves as an important social identity that gives purpose and meaning to an individual's life in a community.

Conclusion

The peli serves as active social agents where culture and value transmission is fostered through constant interaction and socialization. This parallel learning method of traditional societies acts as strategic social processes where collective learning as well as collective remembering helps in the continuation of culture leads to a smooth transmission of culture and value.
In the modern day, we see the difference in the way the peli is perceived. Older generations had more constant contact with its peer group, hence, while recounting

events, a sense of nostalgia echoes a fading past filled with vibrant community life where peli activities were a year-long engagement. The younger and emerging generation view the peli group as a link to their culture fostering a sense of rootedness in this changing society. Peli activities have become rare over the recent years however, the village peli organizations try to keep the peli spirit alive through peer activities like the inter-peli games during Sekrenyi. This shows the importance of a "we" feeling that one associates with peer groups that manifests a collective identification and motivates cooperation necessary for a vibrant community life.

Interviews:

Female. Age 80 approx. personal interview
Female. Age 56. personal interview
Female. Age 60 approx. personal interview
Male. Age 70 approx. Personal Interview
Female. Age 32. Phone Interview.
Male. Age 67. Personal interview

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IN SILICO ANALYSIS OF COMPUTATIONAL INTELLIGENCE IN COVID-19 VACCINATION DATA IN INDIA

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Abstract

The COVID-19 pandemic and its various waves made human life unpredictable and uncertain. Waves of infection, one after another, and scenarios of lockdowns changed very fast, rendering all data and subsequent predictions unreliable. In this situation, it was highly important to analyse COVID-19 vaccine data computationally, because a new normal life would be possible only when the world became fully vaccinated. Vaccination for COVID-19 was proceeding in different parts of the globe at different rates across various age groups. In India, the rate of vaccination over the past few years was very promising. Despite its huge population, India reported nearly 2.21 billion vaccinations. The present work is based on the analysis of time series COVID-19 vaccine data available on the Indian government's public portal CoWIN and the application of computational intelligence techniques. Various computational approaches were applied to predict the total time required for full vaccination in India. The primary objective of the work was to perform in silico analysis of COVID-19 vaccine data and predict the timeline for reaching a new normal life. An autoregression model was used initially, and as an outcome of the prediction, it was found that a time frame of twenty-three months would be required for completion of vaccinations across all age groups.

Keywords: COVID-19 vaccination, predictive model, time series, dose 1, dose 2

Introduction

As per records, the first COVID-19 case in India was detected in January 2020. Since then, the number of COVID-19 patients increased rapidly. The rapid increase in cases resulted in a lockdown from 24 March 2020. For nearly four months, there was a total lockdown in the country, and as a result, normal life was disrupted. People's minds started thinking about a new normal.

Each and every sector of human civilisation was affected due to the COVID-19 pandemic. When scientists across the world announced the development of a COVID-19 vaccine in October 2020, new hope emerged that there would be a victorious moment over the coronavirus one day. As per the scientific timeline, COVID-19 vaccines were launched in different countries from December 2020 onwards. In India, the Oxford University and AstraZeneca vaccine, Covishield, was launched by the Serum Institute, and subsequently, the indigenous vaccine Covaxin was launched by Bharat Biotech. The first vaccine was administered in India on 16th January 2021. The initial beneficiaries were frontline workers (FLWs) and healthcare workers (HCWs). Gradually, the vaccination drive was extended to senior citizens, i.e., those above 60 years of age. In subsequent months, the vaccination drive was opened for the 45–60 and 18–44 age groups. COVID-19 vaccinations for the 15–18 age group also commenced rapidly. Meanwhile, precaution doses for senior citizens above 60 years began from 10th January 2022. The completion of the entire vaccination process for normalcy in day-to-day activities was highly anticipated throughout India. Human civilisation and mankind awaited full relaxation of restrictions, which was the main motivation for this work.

For smooth administration of vaccinations, the Government of India launched a data portal popularly known as the CoWIN portal. The portal supports user-level registration, slot booking, vaccine data, certification, etc. It also supports inventory management, supply chain management, and operations management in the background. The data projection is purely dynamic in nature. Since CoWIN is a public platform, the research data for this study was periodically collected from the CoWIN portal. The data collected on a daily basis included dose 1, dose 2, and total doses per day. An additional field for precaution doses was added to the data set from January 2022. A dataset in CSV format was created and used for the data input process in the in silico analysis.

The main objectives of the experimental work on vaccination data were:

1. To obtain the predicted value of vaccinations per day in India.
2. To estimate when the vaccination process would be fully completed in India.
3. To find the growth rate of both dose 1 and dose 2 vaccinations.

Different approaches were used for predictive data analysis. The first approach used was the autoregression model. The autoregression model is a technique used for time series data that assumes linear continuation of the series so that previous values in the time series can be used to predict future values. Unlike linear regression, it has an additional feature called lag variables. A lag variable is a dependent variable that is lagged in time. For example, if x(t) is a dependent variable, then x(t–1) will be a lagged dependent variable with a lag of one period. Lagged values are generally used in dynamic regression modelling. Therefore, in the autoregression model, previous data are used to predict future data with multiple lag variables. The general form of an autoregression model is given below:

$$y=a+b1*x(t-1)+b2*x(t-2)+b3*x(t-3) \quad \text{(Eq. 1)}$$

where a, b1, b2, and b3 are variables found during the training of the model, and x(t–1), x(t–2), and x(t–3) are input variables at previous time steps within the dataset.
For autoregression modelling of data, two assumptions are very important. The first assumption is that the previous time step is useful in predicting the value at the next time step—that is, there must be dependence between values. In vaccine data, this is quite obvious because the next value is always more than the present value. Secondly, the data should be stationary. To test whether the time series is stationary, the mean was checked and found in the range of 95,591 to 8,49,28,371, which is not constant over time. The variance was also checked and found in the range of 0.97×10^{10} to 0.59×10^{16}. These huge variances indicate that the vaccine data is not stationary. Hence, the classical autoregression model for prediction is not suitable for this purpose.

Due to this limitation, the Autoregressive Integrated Moving Average (ARIMA) model was used for the vaccine data to predict accurately. The ARIMA model has two parts: the autoregression part and the moving average part. Accordingly, the analysis was conducted for the moving average along with another factor, namely the growth rate. In the analysis of the moving average with growth rate, it was verified that the time series data of vaccines follow a moving average pattern as well as exhibit a changing growth rate. Growth rate is a characteristic of any function through which the pattern of growth can be easily observed and tracked over time.

Related Works

Out of many research works, several studies were identified as relevant to this work. Zhao et al. (2021) used a deep learning approach for COVID-19 detection based on CT images. Generally, through CT scans, mass predictions are not possible since only a limited number of people undergo CT scans. In the proposed model, vaccination data was considered to predict COVID-19 trends. Any data-driven model or data analysis relies on the amount of data available, in addition to its accuracy and reliability. As per the requirements of deep learning, the available datasets for COVID-19 were initially small (Saxena et al., 2020). However, the situation improved subsequently; when examining the CoWIN dashboard, there are plenty of data to process using deep learning techniques. Arun Kumar et al. (2021) discussed and developed a method for forecasting the dynamics of the COVID-19 pandemic in India under different containment strategies. Several regions, age groups, and other criteria were used for the predictions. The accuracy of the experiment was quite high. Chatterjee et al. (2020) used the SIRD model for prediction of COVID-19, whereas Mallick et al. (2020) used a simple mathematical model to predict COVID-19 cases. In another work, Ranjan et al. (2020) used epidemiological models for prediction of COVID-19 cases. Notably, Singh et al. (2020) used ARIMA models for predictions. The work presented in this paper is similar to this work.

Computational Perspectives

The dataset used in the in silico analysis includes the following factors, as shown in Figure 1. The primary factors are births, deaths, frontline workers (FLW), and health and family workers (HFW). Different age groups include those above 60 years (AG 60), 45–59 years (AG 45), 18–44 years (AG 18), and 15–17 years (AG 15). There is a major age group, 2–14 years, which was still not covered under the vaccination drive, as no vaccine had been launched for them. Newborn infants were not counted for COVID-19 vaccination.

As per WHO guidelines, they will receive a separate type of vaccine other than COVID-19 vaccines. Statistics indicate that 28.6% of India's population is less than 14 years of age. Another issue in the analysis using the dataset is that the population on the day vaccination commenced, i.e., 16th January 2021, and the population on the day of assessment, i.e., 16th January 2022, are not the same. Since the population figure is not fixed but ever increasing every second, the growth factor of both the population and vaccinations must be calculated. In the next section, the growth of population and the growth of vaccinations are calculated.

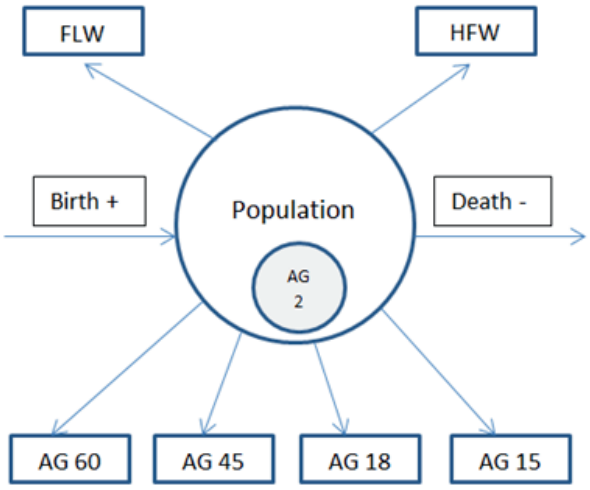

Figure 1: Population Data Factor Diagram

The actual data:
Population of India on 16.01.2021 = 1,37,86,99,000
(Source: Statista.com)
Population of India on 16.01.2022 = 1,40,52,99,000
(Source: Statista.com)

Growth Rate *(Population in Jan 2022-Population in Jan 2021)/(Population in Jan 2021)* X 100 *(Eq.2)*

If the per-second birth rate (1 birth/sec) is considered, the additional population in one year would be 3,15,36,000. The population change in that period is approximately the same when actual values cited above are subtracted. The key point is that the growth rate of population and the growth rate of vaccinations are entirely different. Determining the total time required to complete vaccination is therefore challenging and constitutes the computational challenge.

Let us assume the first dose of vaccination as dose 1 and the second dose of vaccination as dose 2. Henceforth, dose 1 and dose 2 refer to the first dose and second dose, respectively.

Data file Name	Size of Data (H × W)	Source
Data1.csv	300 × 4	https://dashboard.cowin.gov.in/

Table 1: Data Set

Mathematical Modelling

4.1 Prediction using Auto-regression Model

Daily total doses for from dataset Data1 randomly chosen for 84 days from 20th March, 2021 to 12th June 2021 is fed into an Autoregressive Time Series Modeling. In the model, there is a function

$X(t+1)=f\_0+f\_1*X(t)+\varepsilon$ *(Eq.3)*

Where are model parameters and is white noise.
After executing the model, the outcomes are as follows:

$$f_0 = 1075348.7665728, f_1 = 0.5009656, \varepsilon = 0.0959713.$$

Keeping these values fixed, at different time points up to December 2022 was evaluated. If the rate of vaccination is assumed to be the same as in January–June 2021, full vaccination would be completed in November 2022, considering the expected population of India in 2022. However, since the vaccination rate was highly fluctuating, the prediction accuracy was not reliable.

4.2 Moving Average with Growth Function

Initial data analysis was done using simple mathematical techniques such as the moving average function and the growth rate function of the cumulative data of dose 1, dose 2, and total doses.
The growth rate function is defined as:

Growth rate of vaccination

$$G(v) = (Cv_n - Cv_{n-1}) \div Cv_{n-1} \qquad \text{(Eq. 4)}$$

Where $C_n$denotes the covid vaccine data.
Similarly, the moving average function is defined as:

$$M(v) = \left(\Sigma_{i=1}^{n} Cv_i\right) \div n \qquad \text{(Eq. 5)}$$

After computation, it was found that the dose 1 growth rate ranges from 0.000596267 to 0.711951328, and the dose 2 growth rate ranges from 0.0013878 to 2.44659904. Finally, the growth rate for total doses was computed and found to range from 0.000806966 to 0.699970129.

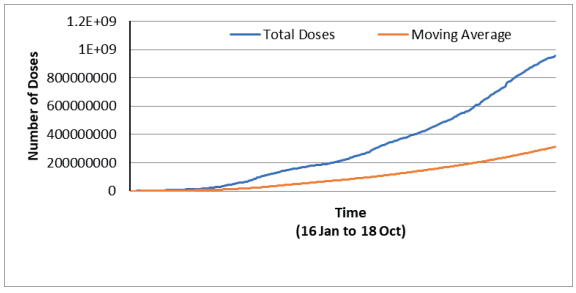

Figure 2: Total Doses with Moving Average

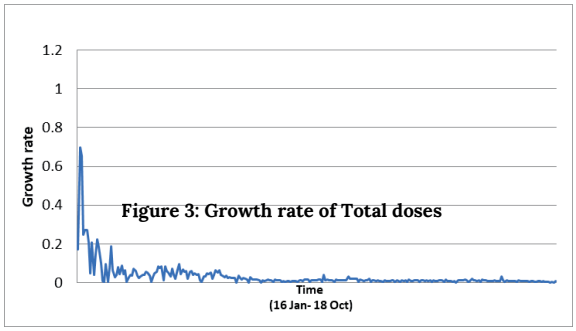

Figure 3: Growth rate of Total doses

Figure 3: Growth Rate of Total Doses

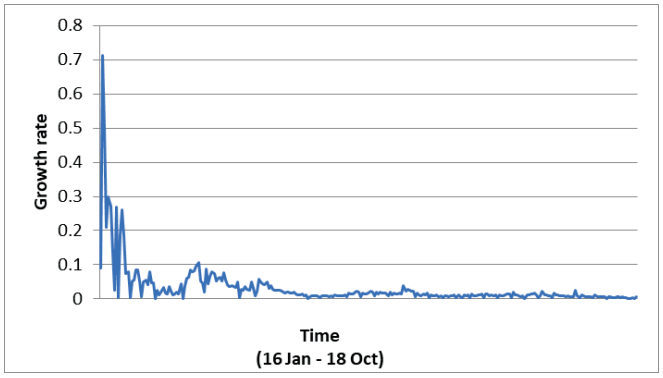

Figure 4: Growth Rate of Dose 1

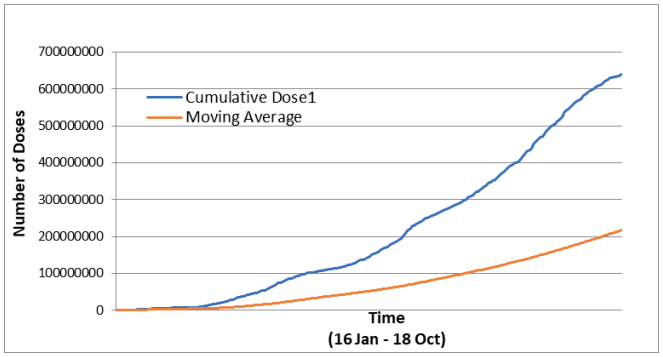

Figure 5: Dose1 with Moving average

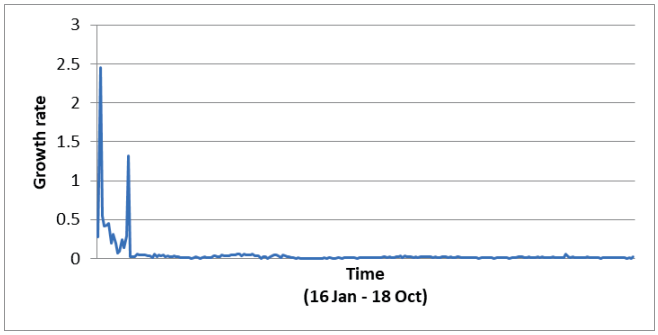

Figure 6: Growth rate of Dose2

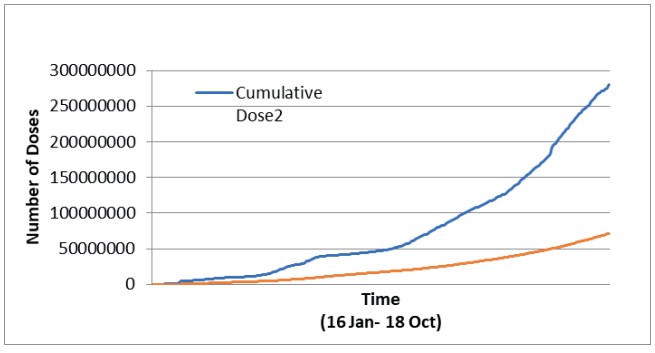

Figure 7: Dose2 with Moving average

4.3 ARIMA Model

Seasonal Autoregressive Integrated Moving Average with Exogenous Factors, or SARIMAX, is an extension of the ARIMA class of models. In this computation, an ARIMA(5,1,0) model was used to predict vaccination trends. Here, the lag value was considered as 5 for autoregression, a difference order of 1 was used to make the time series stationary, and a moving average model of 0 was applied.

The ARIMA model was applied to cumulative total doses, yielding the following results (Table 2):

SARIMAX Results						
Dep. Variable: 191181			No. Observations: 304			
Model:	ARIMA(5, 1, 0)		Log Likelihood		-4815.498	
Date:	Sun, 21 Nov 2021		AIC		9642.996	
Time:	16:29:46		BIC		9665.278	
Sample:	01-17-2021		HQIC		9651.910	
Covariance Type: opg						
	coef	**std err**	**z**	**P>|z|**	**[0.025**	**0.975]**
ar.L1	0.1490	0.071	2.097	0.036	0.010	0.288
ar.L2	0.2292	0.035	6.611	0.000	0.161	0.297
ar.L3	0.2496	0.079	3.167	0.002	0.095	0.404
ar.L4	0.2347	0.052	4.504	0.000	0.133	0.337
ar.L5	0.1114	0.054	2.055	0.040	0.005	0.218
sigma2	3.783e+12	1.1e-14	3.43e+26	0.000	3.78e+12	3.78e+12
Ljung-Box (L1) (Q):		0.01	Jarque-Bera (JB):		4520.89	
Prob(Q):		0.93	Prob(JB):		0.00	
Heteroskedasticity (H):		12.37	Skew:		2.04	
Prob(H) (two-sided):		0.00	Kurtosis:		21.48	

Table 2: ARIMA Result

First, a line plot of the residual errors was generated, suggesting that there may still be some trend information not captured by the model.

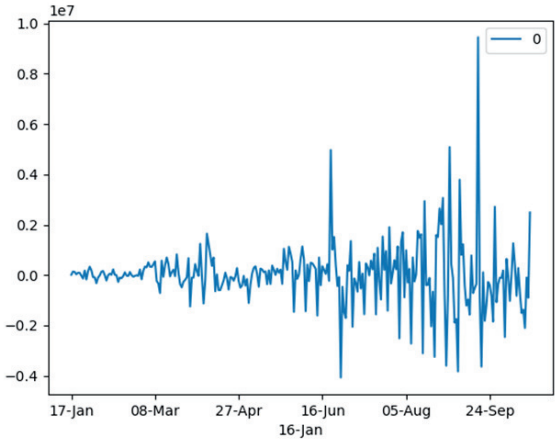

Figure 8: ARMA Fit Residual Error Line Plot

Next, a density plot of the residual error values was generated, suggesting that the errors are Gaussian but may not be centered on zero.

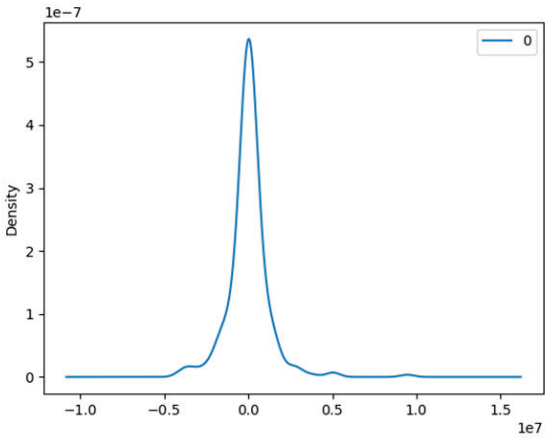

Figure 9: ARMA Fit Residual Error Density Plot

The distribution of the residual errors is displayed. The results show that there is indeed a bias in the prediction (a non-zero mean in the residuals).

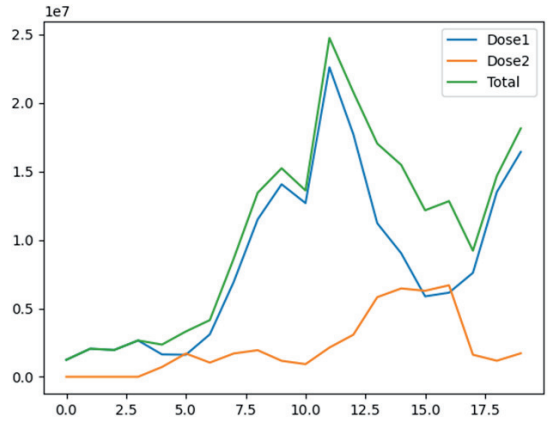

Figure 10: Data plot (Dose1,Dose2, Total Doses) weekly basis

Results

The results are shown in figures from 1-10. It is observed that the predictions using normal statistical methods are comparatively less accurate than the advanced machine learning algorithms. The above two experiments have a clear difference.

Conclusion and future works

Time series data prediction plays a crucial role in understanding temporal patterns and forecasting future behavior across diverse domains such as finance, weather forecasting, healthcare, energy management, and social sciences. By analyzing historical data points collected over time, time series models capture trends, seasonality, cyclic behavior, and irregular fluctuations that influence future outcomes. Traditional statistical approaches like ARIMA and exponential smoothing provide strong interpretability and are effective for linear and stable patterns,while modern machine learning and deep learning models such as LSTM, GRU, and Transformer-based architectures excel in handling nonlinearity, long-term dependencies, and large-scale datasets.

Despite significant advancements, accurate time series prediction remains challenging due to noise, missing values, concept drift, and the inherent uncertainty of real-world systems. Model performance depends heavily on data quality, appropriate feature engineering, and careful model selection and validation. Hybrid approaches that combine statistical reasoning with data-driven learning are increasingly effective in improving robustness and predictive accuracy.

In conclusion, time series prediction is not merely a forecasting task but a decision-support tool that enables proactive planning and risk mitigation. As computational power, data availability, and algorithmic sophistication continue to grow, time series prediction methods will become more adaptive, interpretable, and reliable, supporting informed decision-making in complex, dynamic environments.

Acknowledgements

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HEAT, HEALTH, AND HUSTLE: CLIMATE-INDUCED CHALLENGES FOR STREET VENDORS IN GUWAHATI

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Abstract

Street vendors in Guwahati form a critical part of the city's informal economy, yet they face escalating challenges due to climate change. This study explores the health and livelihood impacts of rising temperatures, erratic rainfall, and worsening air quality on street vendors. Using a qualitative approach, 22 semi-structured interviews were conducted across major markets during peak summer. Findings reveal that 85% of vendors experienced health issues, including heat exhaustion and dehydration, with many missing work and incurring additional medical expenses. Economically, 75% reported income loss, 65% had to suspend work on extreme weather days, and 85% noted reduced footfall. Vendors also observed shifting weather patterns such as heat waves and irregular rainfall. Despite the provisions of the Street Vendors Act, 2014, climate resilience measures remain absent in urban planning. The study underscores the need for inclusive, climate-adaptive urban policies that center the experiences of informal workers in the face of a changing climate.

Introduction

Street vendors, in any country, are an important part of the economy, providing essential goods as well as services to the greater population. According to the Street Vendors Act, 2014, a 'street vendor' is defined as "a person selling articles, goods, food items, or merchandise of everyday use or offering services to the public, in streets, lanes, sidewalks, footpaths, pavements, public parks or any other public places or private areas, from a temporary structure or by moving around". The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 stipulates that the number of street vendors in a city should not exceed 2.5% of the city's total population. Prior to this, the National Policy for Urban Street Vendors (2009) had estimated the number of street vendors in India to be around 10 million, based on an urban population of approximately 377 million as per the 2011 Census—a figure that has continued to grow in subsequent years. The primary objective of the 2014 Act is to protect the livelihoods of street vendors and ensure they can operate within a structured and supportive urban environment.

While the National Policy for Urban Street Vendors (2009) and the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 are aimed at protecting, regulating and mainstreaming street vendors, there has been little change in security of life and livelihood of street vendors. Additionally, climate change poses a significant threat to the life and livelihoods of the street vendors. Rising temperatures across the Indian subcontinent presents adverse effects of different kinds related to health such as dehydration, heat strokes, cardiac arrests, gastrointestinal damage, and organ failure. Heat waves and higher temperatures can also lead to reduced productivity at work. Outdoor workers, including street vendors, are among the worst affected, with the resulting economic impact estimated in billions of dollars. (Bhadwal and Venkatramana, 2025).

The effects of climate change can be witnessed here in Assam as well, especially in the city of Guwahati (Figure 1 and Figure 2). Guwahati, which historically did not experience prolonged heat spells, is now witnessing a significant increase in the frequency of hot days. This shift indicates a clear pattern of climate warming, affecting cities in the northeast—regions previously considered relatively thermally stable. There is a steady upward trend in maximum temperatures, especially in urbanized pockets like Guwahati.According to National Association of Street Vendors of India (NASVI), there are around 45,000 street vendors in Guwahati. And these street vendors are facing exacerbated challenges as a result of climate change.

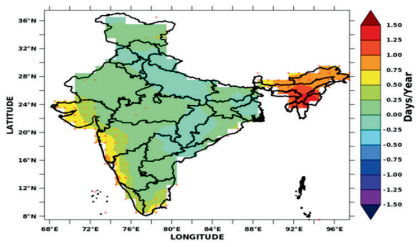

Figure 1: Hot days trends from 1974-2023 (source: https://www.teriin.org/article/burning-point-increasing-heatwaves-threaten-lives-across-india)

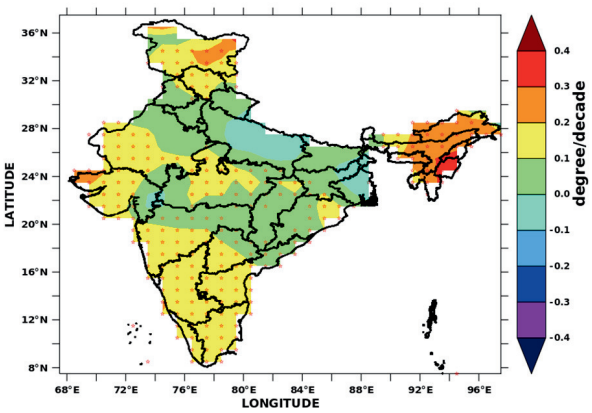

Figure 2: Maximum temperature trend during 1974-2023 (source: https://www.teriin.org/article/burning-point-increasing-heatwaves-threaten-lives-across-india)

The present study aims to understand the climate change related health risks of street vendors. Studies documenting the impact of climate change on street vendors in this region are sparse, and this study attempts to bring forth the voices of the vendors and impact policy making to make it more inclusive.

Climate Change and Street Vendors/ Urban Informality

Research studies are increasingly acknowledging the disproportionate impact of climate change on informal sector workers. According to the International Labour Organization (2018), over 61% of the global workforce is employed informally, with limited capacity to accommodate and adapt to climate risks. Street vendors, who operate in unregulated public spaces with inadequate shelter, are particularly exposed to the physical manifestations of climate change (Brown et al., 2010).

Satterthwaite et. al. (2009) emphasize that climate change adaptation must account for the unique vulnerabilities of the urban poor, including informal vendors, who often lack secure tenure, insurance, and access to early warning systems. Their exposure is compounded by urban heat islands, flooding, and air pollution — hazards that are becoming more intense and frequent due to climate change. Several studies document the adverse health outcomes faced by street vendors due to prolonged exposure to heat and pollution. Kjellstrom et al. (2016) demonstrate that heat stress significantly reduces work capacity, particularly for those engaged in outdoor labor. Street vendors working in markets, pavements, or roadside stalls are directly affected by heat waves, which lead to dehydration, fatigue, respiratory illnesses, and cardiovascular strain.

Climate change also disrupts the economic activities of street vendors. Flooding and heavy rainfall can damage products, reduce footfall, and force early closures, resulting in income loss (Skinner, 2011). A study by Roever (2014) found that climate-related shocks disproportionately impact women vendors, who often operate in more vulnerable locations and sell perishable items like fruits and cooked food. Climate change affects access to water, sanitation, and hygiene (WASH) infrastructure for street vendors. Poor drainage systems and waterlogging after heavy rains limit their access to clean water and toilets.

In India, studies have found that cities witnessed increased rainfall variability that hampered informal vending activities. Many vendors lack savings or financial safety nets, making even minor disruptions catastrophic. The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 in India mandates access to civic amenities, yet practical implementation remains weak in many cities (SEWA, 2017). The impact of climate change is often gendered. Women street vendors face specific challenges such as menstrual hygiene management, child care in harsh weather, and social stigma when occupying public space.

Methodology

This research was conducted using a qualitative, field-based approach to understand the lived realities of street vendors amid climate change in Guwahati. Primary data was collected through 22 semi-structured interviews with vendors from four major markets—Uzan Bazaar, Paltan Bazaar, GS Road, and Ganeshguri. Fieldwork took place during peak summer months from April to June 2025.

Results

This section presents the results of the semi-structured interviews. Out of the 22 vendors, 70% of them were males and 30% were females. 35% of the vendors have been working as vendors for more than 10 years in the city while another 30% have been working as vendors in the last 5 to 10 years. A significant 65% of the vendors worked for 8-12 hours on the streets.

Category	Percentage
Gender	
Male	70%
Female	30%
Work duration	
<5 years	35%
5-10 years	30%
>10 years	35%

Daily work hours	
<8 hours	20%
8-12 hours	65%
>12 hours	15%

Table 1: Demographic details of sample (source: primary data)

When asked about the health impacts of extreme weather, 85% said they experienced health issues due to extreme fluctuations in climate during the day. Among these 85% of the vendors who experienced health issues, 41% experienced exhaustion due to heat, 29% experienced dehydration, 24% experienced respiratory issues, and another 24% experienced problems such as body aches etc. Additionally, 65% street vendors mentioned that they missed work due to the above mentioned illnesses and their health spending increased.

Category	Percentage
Experienced health issues	
Yes	85%
No	15%
Types of health issues experienced (out of 85%)	
Heat exhaustion	41%
Dehydration	29%
Respiratory issues	24%
Other (body aches, etc.)	24%
Missed work due to health issues	
Yes	65%
No	35%
Health spending increased	
Yes	65%
No	35%

Table 2: Health impacts of climate change (source: primary data)

In order to understand the impact of climate change on their livelihood, street vendors were asked about economic impact of climate change on their business. 75% vendors mentioned that their income was affected by weather changes, whereas 65% street vendors mentioned that they had to stop working on certain days due to extreme weather. They mentioned that both extreme heat conditions as well as rainfall both had an impact on their business. 85% of the vendors also mentioned about reduced customer footfalls due to extreme weather.

Category	Percentage
Income affected by extreme weather	
Yes	75%
Maybe	25%
No	0%
Stopped working due to weather	
Yes	65%
No	35%
Reduced customer footfall	
Yes	85%
No	15%

Table 3: Livelihood and economic impact of climate change (source: primary data)

Street vendors were asked about the changes in weather patterns that they have observed over the years. A qualitative analysis of the answers to this question revealed the following themes: heat waves or rising temperatures, changing rainfall patterns, and increased health risks.

Theme	**Percentage**
Rising Temperatures / Heatwaves	55
Unpredictable / Changed Rainfall Patterns	25
Health Impacts	15

Table 4: Weather pattern themes (source: primary data)

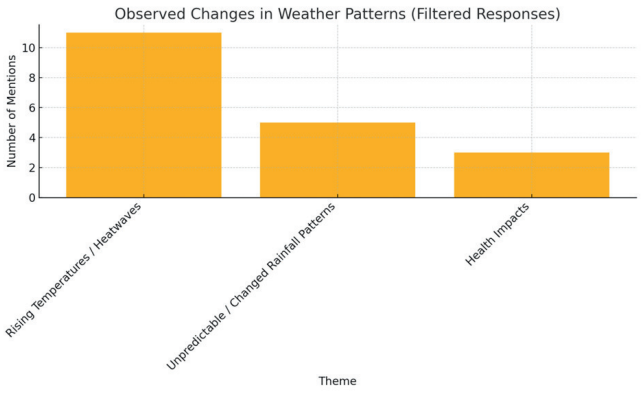

Figure 3: Weather pattern themes (source: primary data)

A majority of vendors reported experiencing significantly higher temperatures, with repeated mentions of extreme heat, rising heatwaves, and a general increase in average temperatures each year. This has led to discomfort, reduced productivity, and increased health risks for both vendors and customers. About one-fourth of the respondents highlighted irregularities in rainfall, including sudden downpours, altered monsoon timings, and waterlogging. These changes disrupt daily operations, making it difficult to set up or continue vending during inclement weather. Some vendors specifically pointed out the adverse effects of extreme weather on health—particularly during peak heat hours and in the absence of basic amenities like drinking water. Vulnerable individuals, such as elderly family members assisting at the stalls, are especially affected.

Discussion and Conclusion

The present study attempted to understand the impact of climate change on street vendors in Guwahati, Assam. The study adopted a semi-structured interview method to obtain data from the vendors. Analysis of the data revealed that vendors report increased fatigue, dizziness, and frequent headaches due to prolonged exposure to sun and heat. To avoid the afternoon heat, many vendors now open late or close early, which directly affects daily earnings. Rainfall unpredictability further restricts operational hours. Climate-induced disruptions (e.g., floods or excessive heat) reduce consumer movement in market areas which thereby impacts footfall and significantly lowers income on such days.

Despite the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014, there is little provision for climate resilience in current urban policy. Key gaps include:

- No mandate for shaded or climate-resilient infrastructure in vendor zones;
- Lack of social security schemes accessible to informal workers for heat-related illness;
- Minimal disaster preparedness plans that include street vendors in urban risk maps; and
- Poor awareness or outreach from urban local bodies.

It is important for policy makers to keep the vendors at the heart of policy planning and designing. Street vendors are not just individuals earning their livelihoods on the street but are also a collective community which needs support in adapting their business and lifestyle to changing climatic conditions. Resilience of street vendors is highly commendable, however, with extreme climatic conditions their sustenance will depend greatly on the support received from urban local bodies. Inclusive urban climate policies must center those who hustle daily in the city's informal arteries—under the blazing sun, through the floodwaters, and amidst the smog.

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THE ROLE OF VICTIMS IN THE CRIMINAL JUSTICE SYSTEM UNDER NAGA CUSTOMARY LAW

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Abstract

Customary law remains a living and functional part of Nagaland's justice system. Rooted in community life and guided by principles of reconciliation and moral responsibility, it continues to shape the administration of justice across Naga societies. Emerging from oral traditions, Naga customary courts such as the village and Dobashi courts dispense justice that is accessible, swift and are constitutionally protected under Article 371 (A). Their coexistence with the formal criminal justice system, however, creates areas of tension especially in how victims experience justice within these parallel structures.

This study examines the role and the treatment of victims within Naga customary system, assessing how far their rights and dignity are protected. While customary justice sometimes prioritizes reconciliation and community harmony, it often sidelines victims by prioritizing restitution over accountability or emotional redress. Through a socio-legal and a comparative approach, the paper analyses the functioning of the customary courts and their interaction with the legal system and their compliance with constitutional principles of equality and human rights. The study argues for a balanced framework that respects cultural traditions while ensuring victim centred, inclusive and constitutionally consistent justice.

Keywords : Victims, Customary Law, Criminal Justice, Legal Pluralism, Nagaland

Introduction

Nagaland, one of India's predominantly tribal states stands at a significant crossroads between age old tradition and the prospects of constitutional democracy. Its justice systems reflect the dual identity where indigenous customary practices coexist with the formal criminal justice system. For generations, Naga communities have relied on the customary law as their primary mode of dispute resolution which were administered by the Village Councils and community elders. The law sometimes is firm and cruel but they are fundamentally intended to preserve the peace, harmony and social order within the community.[1] Rooted in oral traditions and collective memory the customary justice system remains closely woven into everyday Naga life. Its accessibility, swiftness and cultural significant distinguish it from the formal courts whose processes may seem distant, costly and time consuming to rural people. This customary unique system is constitutionally recognized through Article 371(A) which protects Naga religious and social practices, customary law and procedure, administration of civil and criminal justice according to customary law and ownership and transfer of land and its resources.[2] This safeguard affirms the autonomy of the Naga communities within the Indian Union allowing the Nagas to preserve their distinctive legal identity.[3] However, this legal pluralism does not fall short of challenges. The coexistence of customary and formal criminal justice systems often creates jurisdictional confusion especially in cases involving serious offences where statutory law mandates due process and uniform protection of rights. Within this dual framework, victims may find themselves navigating two different conceptions of justice one which emphasize reconciliation and community peace and the other grounded in individual rights, procedural fairness and the state accountability. [4]

Customary adjudication in Nagaland are primarily operates through Village and Dobashi Courts which apply unwritten norms passed down through generations rather than formal statutes.

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[4] Odyuo, B. (2024). Navigating legal pluralism: Understanding Naga customary law and the Indian legal system in Nagaland. Journal of Emerging Technologies and Innovative Research, 11(4).
[5] Chüzho, N. (2025). Customary law and customary practice: Changkija's criticism of the 'customary' in relation to gendered experiences. Open Library of Humanities, 11(2).

. Their decisions prioritise society peace, unity and restoration often through compensation or symbolic reconciliation. While these mechanisms uphold community unity, they may inadvertently sideline the victims by placing community interest over individual experiences of harm. Emotional trauma, procedural rights and personal safety often receive less attention compared to the goal of restoring communal cohesion.[5]

The tension between community-centred and the rights-oriented justice becomes sharper when customary practices intersect with the Indian criminal law. The Bharatiya Nyaya Sanhita and Bharatiya Nagarik Suraksha Sanhita guide formal legal adjudication and due process, yet customary institutions derive authority from moral reasoning and community consent. This divergence raises significant constitutional questions regarding equality, dignity and access to justice. Against this backdrop, this study examines the role and treatment of victims within Naga customary law and whether these mechanisms align with the constitutional guarantees and the human rights standards.

Historical and Legal Framework of Naga Customary Law

The foundations of the Naga customary law lies on the moral and social values that have shaped the Naga society for centuries. Evolving through oral tradition, collective wisdom and customary precedents, these unwritten codes guided everyday life long before the arrival of colonial rule. Although each tribe such as the Angami, Ao, Sema, Lotha, and Chakhesang and others[6] maintained distinct practices, they shared common principles of reconciliation, restitution and participatory in adjudication.[7]

In the earlier days, every Naga village functioned as an autonomous and have separate social and political with its own governance systems and customary court. Village councils which were led by respected elders or a chief acted as both the legislature and judiciary by resolving disputes through customary practice and precedent by the council. Even without codification customary norms were widely understood and consistently applied. The aim usually was not of retribution but restoration where disputes were settled in ways that healed relationships and preserved community life.

Punishments reflected this restorative orientation but also incorporated strong deterrent elements. In cases of theft, for example, the value of the property stolen seven times has to be restored to the victims. Most of the disputes are settled by payment of pigs or cows. For serious crimes such as murder, the punishment includes destruction of the offender's house[8] or granary or expulsion from the village as forms of social exclusion signalling the gravity of the offence. Habitual thieves could be beaten, tied with ropes and rolled on stinging leaves as a public deterrent.[9] Although severe, these measures were understood as necessary to restore moral order and protect the community.

The colonial administration recognized the resilience of these indigenous systems and allowed their continuation through institutions like the Dobashi Courts and the Village Courts. After the independence, Article 371(A) was incorporated in the constitution for the protection and safeguarding of the Naga customary practices While the Sixth Schedule applies to other northeastern states, its underlying principle of community autonomy parallels Nagaland's special status. Today, the Nagaland Village and Area Councils Act, 1978[10] formally empowers Village Councils to administer civil and minor criminal matters according to customary law. Dobashis continue to assist the Deputy Commissioner by offering customary interpretations by acting as an intermediary between indigenous customs and statutory law.

While these institutions embody accessibility and cultural legitimacy their informal systems raise concerns about procedural fairness especially for the victims. The lack of written law, formal procedure, recognized systems of appeal may restrict victims with limited option when customary decisions conflict with their rights or expectations of justice. Balancing the cultural integrity of customary law with constitutional values of equality and fairness remains a central challenge in Nagaland's plural legal landscape.[11]

Position of Victims in Naga Customary Adjudication

The position of victims within Naga customary justice must be understood in light of the structure, culture and procedural rules that governs the traditional dispute-resolution systems. The Nagaland Village and Area Councils Act, 1978 statutorily affirms that Village Councils shall "administer justice… in accordance with the

[6] Nagaland has currently 17 tribes including - Angami, Ao, Chakhesang, Chang, Kachari, Khiamniungan, Konyak, Kuki, Lotha, Phom, Pochury, Rengma, Sangtam, Sumi, Tikhir, Yimkhiung, Zeliang

[7] Ao, M. (2022). On the dispensation of justice by customary courts in Nagaland. International Journal of Research and Review, 9(3), 504–515. https://doi.org/10.52403/ijrr.20220356

[8] For instance, in a recent case at Kohima where an uncle was accused of murdering his niece, the accused was already in judicial custody under the formal criminal justice system yet the village elders proceeded to enforce customary sanctions by destroying his house. This incident shows the continuing parallel operation of Naga customary justice alongside the Indian criminal justice framework. See news from NLTV youtube titled 'Porutso Khel Delivers Customary Justice: Home Destroyed' Dated 8th Nov. 2025

[9] Supra note 1 at 44

customary law and usages as accepted by the canons of justice established in Nagaland."[12]
In both civil and criminal matters falling within their jurisdiction, the village councils shall apply their customary norms rooted in old age tradition, values derived from collective memory, long standing precedents and their own village rules and regulation that has been approved by the villagers .[13]

Conceptual Status of the Victim in Customary Law

Traditionally, a victim is understood as a person who has suffered an injury or wrong and whose grievance must be addressed in a way that brings the village back into balance. In the past for the Nagas, justice was more of individualistic and retributive often followed by the principle of "an eye for an eye."[14] With the advent of Christianity and the growing emphasis on forgiveness, the restorative mindset deepened by shifting the focus from retaliation to reconciliation and communal peace.[15]

Victims initiate disputes by submitting their complaint before the Village Council, which then summons both parties for a hearing where the victim can narrate the harm suffered and the accused is permitted to defend himself.[16] The council, consisting of elders representing different clans or households, deliberates on the oral narratives and issues a judgment based on customary principles and prior resolutions.[17] Victims' voices are often conveyed not only through their own testimony but also through clan elders and family representatives.[18] The degree of direct participation varies across each tribes and villages and is shaped by gender, kinship position and social standing.[19]

Procedural Framework Shaping Victim Participation

Under the 1978 Act and the Rules for Administration of Justice and Police in Nagaland (Third Amendment Act, 1984), Village Courts has the jurisdiction over civil disputes grounded in customary law provided that the parties are residing within the village or the disputed property falls under its jurisdiction.[20] In criminal matters, Village Courts may try offences such as theft, mischief, trespass, assault, affray, drunkenness, and public nuisance that are mostly minor offences which can adjudicated at the village level.[21]

Village Courts are not authorised to impose imprisonment instead; they may levy fines up to ₹500 and award compensation or restitution in accordance with customary law. It may also award payment in restitution or compensation to the aggrieved or injured party in accordance with the customary law.[22] Proceedings at the village court are conducted orally without any formal evidentiary rules and decisions are delivered immediately after the hearing. The absence of written procedures or record-keeping as well as the lack of a formal appellate mechanism, limits victims' ability to seek review when outcomes conflict with their expectations of fairness.[23]

Customarily for some tribes, disputes are firstly attempting resolution within the clan, with clans sending one to three representatives.[24] Only when the inter clan negotiation fails the matter are then taken to the Village Court.[25] This layered structure highlights a model of justice that prioritises communal harmony and accessible dispute resolution. Victims benefit from swift hearings and proximity to the adjudicating forum but may also be constrained by community pressure or hierarchical decision-making.[26]

Procedural Framework Shaping Victim Participation

Remedies in customary adjudication are mostly designed to restore and compensate the victim rather than punish the offenders. Compensation is frequently imposed in the form of livestock pigs, cows, or Mithun or through payment of cash or valuable property.[27]

In cases of theft, some Naga tribes follow the principle of seven times of what they have stolen while for petty or minor theft, doubles the value of the property stolen.[28]

[10] The Nagaland Village and Area Councils Act, 1978, Nagaland Act No. 1 of 1979.
[11] Singh, S. C. (2025). Recognition of Naga customary law and practices in Northeast India: Convergence or conflict. International Journal of Law and Society, 8(2).
[12] Supra note 10 at sec 14.
[13] Supra note 7
[14] Are Nagas destroying themselves by cultivating the practice of an Eye-for-an-Eye? (2007, April 30). The Morung Express. https://morungexpress.com/are-nagas-destroying-themselves-by-cultivating-the-practice-of-an-eye-for-an-eye
[15] Saikia, A. (2025). Faith as an instrument of peace: Exploring the case of Nagaland in Northeast India. Peace Review, 37(1), 54–64. https://doi.org/10.1080/10402659.2024.2436926
[16] Ao, M. (2024). Customs and law: Legal and judicial challenges in Naga customary law. Educational Administration: Theory and Practice, 30(11), 1645–1652.
[17] Ibid
[18] Supra Note 5
[19] Yanthan, E. C. (2018). Gendered practice of Naga customary laws: A critical analysis. Journal of Education, Society and Behavioural Science.
[20] Government of Nagaland. (1984). The Rules for Administration of Justice and Police in Nagaland (Third Amendment Act, 1984) (Nagaland Act No. 1 of 1987). Kohima: Department of Justice.
[21] Id at 45(b)
[22] Id at 46(1)

For serious offences like murder, customary sanctions may include destruction of the offender's house or granary, confiscation of property, or banishment from the village for 7 years.[29] Among the Poumai Nagas, accidental killings were traditionally forgiven, but premeditated murder attracted stringent penalties, including destruction of property and exile.[30]

Other penalties include excommunication, social boycott, or temporary or permanent banishment. Habitual thieves may face immediate, public punishment, including beatings, being tied with ropes, or being rolled on stinging leaves a deterrent that reinforces communal norms.[31] Victims often directly state the compensation or remedy they expect, although acceptance of the final judgment depends on mutual willingness.[32] In case of a deadlock of the decision the opinion of the Chairman shall be final.[33] Under the customary practice for some tribe, in a situation where disagreement or deadlock arises, oath-taking may be used as a method of truth determination, whereby divine intervention is expected to affirm the honest party.[34] If dissatisfied with the outcome of the decision, the parties may approach the Dobashi Court for further hearing.[35]

Strengths and weakness for victim under naga customary law

Naga customary law provides a justice framework deeply embedded in communal values of reconciliation, moral balance and social cohesion. For many victims, customary courts offer several advantages including speedy disposal of case.[36] Its greatest strength lies in accessibility which can be easily accessible by everyone in the village, its low-cost procedures and decisions grounded in local rules and regulations rather than rigid legal formalities. [37]

This closeness and knowledge of the local culture gives many victim, especially in remote areas a sense of belonging and a speedy resolution that formal courts don't provide.[38] The emphasis on reconciliation reflects an enduring moral tradition where forgiveness is seen as the beginning of healing.[39]

However, these same features also reveal structural weaknesses. Victims' experiences are often shaped by community hierarchies, gender norms and clan influence, leading to uneven outcomes and a potential bias.[40] The absence of written procedures, appellate mechanisms or legal representation further limits victims' ability to seek impartial redress or appeal unfair decisions.[41] As Horam (2019) observes, penalties though symbolically restorative sometimes neglect the emotional or psychological dimensions of victimization, prioritizing social harmony over justice. Thus, while customary forums remain vital for maintaining local order, they also expose victims to systemic vulnerabilities that demand reform-oriented safeguards.[42]

Conclusion

The role of victims in the Naga customary criminal justice system shows a delicate balance between community harmony and individual justice. In the Customary institutions of Village councils and Dobashi court the victim is being placed at the centre of the process which aimed at reconciliation rather than retribution. The system of accessibility, social integrity and cultural significant which enable victims to participate directly in the proceedings, often resulting in swift and socially accepted resolutions. However, there are structural limitation beneath this community perspective. Because the process of adjudication is oral, the system is male-dominated and is often grounded in unwritten norms, the voices of victim, particularly those of women and socially weaker members can be suppressed, mediated or even silenced by dominant stakeholders. Compensation and restitution often replace accountability, leaving emotional

[23] *Supra note 7*
[24] *Shimray, R. R. (1985). Origin and culture of Nagas.*
[25] *Godara, S., & Joseph, K. (2022). Customary Laws of the Zeme Naga of Senapati District in Manipur: Administration of Justice in Ze-Mnui Village. Guineis Journal, 9(2).*
[26] *Supra note 5*
[27] *Horam. R. (2019). The Naga Customary Laws of Penalty and Mode of Punishment. JETIR, 6(6).*
[28]*Supra note 1 at 49*
[29] *Id at 47*
[30] *Paul Punü & Dominic Meyieho. (2020). A Worldview of the Poumai Naga Vis-a-Vis Customary Laws and Practices. Dimapur Government College Journal, II (1), 138–157.*
[31] *(supra)Dr. Ringkahao Horam. (2019). The Naga Customary Laws of Penalty and Mode of Punishment. JETIR, 6(6).*
[32] *supra note 25*
[33] *supra note 20 at 60 (2)*
[34] *Das, N. K. (2024). Reappraising stone culture, genna tradition, and ancestor veneration among the Naga tribes. Studies in Indian Traditions (SAGE). https://doi.org/10.1177/0972558X241227861.*
[35] *supra note 20 at 55 (1)*
[36]*Das, Y. S. (2018, June 13). Customary courts in Nagaland have zero pendency. The Times of India. https://timesofindia.indiatimes.com/city/kohima/customary-courts-in-nagaland-have-zero-pendency/articleshow/64566870.cms*
[37] *Ao, M. (2022). The Primary Courts of Nagaland: A Legal Review. Heritage Publications.*
[38] *Eastern Mirror. (2025, July 1). Custom versus modern justice: On Naga customary law.https://www.easternmirrornagaland.com/custom-versus-modern-justice-on-naga-customary-law*
[39] *Morung Express. (2024, May 18). Forgiving as a start to reconciliation. https://morungexpress.com/forgiving-as-a-start-to-reconciliation*
[40] *Singh, S. C. (2025a). Recognition of Naga customary law and practices in Northeast India: Convergence or conflict. International Journal of Law and Society, 8(2).*
[41] *Singh, S. C. (2025b). Recognition of Naga customary law and practices in criminal sphere. KUEY Journal, 12(3), 97–112. https://kuey.net/index.php/kuey/article/view/9735/7414*
[42] *Horam, R. (2019). The Naga customary laws of penalty and mode of punishment. JETIR Journal, 6(6).*

and psychological harm unaddressed. While Article 371(A) of the constitution safeguards the Nagas' right to practice their customary law, it also poses a challenge when victims' rights under constitutional and human rights frameworks are compromised. The future of justice in Nagaland must therefore lie in balancing the tradition with the formal law preserving the communal strengths of customary justice while also integrating procedural fairness, gender sensitivity and respect for victims' liberty. Strengthening victims' protection under the Naga customary law requires streamlining adjudicatory processes, sensitizing customary judges to various victims' rights and institutionalizing coordination between village councils and formal justice mechanisms. Ultimately, the Naga customary system remains a vital, living institution of justice but one whose continued legitimacy depends on its capacity to adapt with the legal, constitutional and human needs of today's society.

Conclusion

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[30] Section 103 of the Mental Healthcare Act, 2017 provides that no person or organization shall establish or run a mental health establishment without registration under this Act; operating an unregistered establishment is a punishable offence.

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[33] Etienne Benson, Rehabilitate or Punish? Monitor on Psychology, Vol. 34, No. 7 (July/Aug 2003) at p46.

EMPOWERING WOMEN THROUGH OPEN AND DISTANCE LEARNING (ODL): A STUDY WITH SPECIAL REFERENCE TO KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY (KKHSOU), ASSAM

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Abstract

The global scenario of higher education increasingly underlines the pivotal role of Open and Distance Learning (ODL) in expanding access and promoting equity. In India, ODL has emerged as a critical mechanism for enhancing the Gross Enrolment Ratio (GER), particularly among disadvantaged sections of society, with women constituting a significant beneficiary group. Against this backdrop, the present study examines the contribution of ODL to women's empowerment in Assam, with a specific focus on the initiatives and impact of Krishna Kanta Handiqui State Open University (KKHSOU). Guided in the University's guiding motto of "reaching the unreached," the study analyses enrolment data spanning January 2021 to July 2025 to trace trends in women's participation in higher education. The analysis considers key variables—including gender, caste, and regional distribution—to assess the extent and patterns of female enrolment across the state. The findings reveal a sustained increase in women learners, with notable growth among rural and marginalised groups. The study further highlights how the inherent attributes of ODL—flexibility, inclusivity, and equity—serve as enabling conditions that foster women's educational advancement, thereby contributing to broader gender equality and socio-cultural transformation in Assam.

Keywords : *Women Empowerment, Open and Distance Learning, KKHSOU, Assam, Inclusive Education, Gender Equality*

Introduction

From the mid-twentieth century onward, education has been widely acknowledged as a foundational instrument for women's empowerment.A historical examination of women's education in India underlines the pioneering efforts of reformers such as Savitribai Phule, who established some of the earliest schools for girls and laid the groundwork for expanding women's access to learning. Despite constituting nearly half of the global population, women continue to encounter persistent barriers to equitable educational opportunities. Globally, the expansion of Open and Distance Learning (ODL) has played a transformative role in advancing women's empowerment by widening access to flexible and inclusive learning pathways.

In the context of Assam, structural socio-economic constraints, entrenched cultural expectations, and extensive domestic responsibilities frequently restrict women's participation in conventional higher education. The emergence of ODL institutions—particularly Krishna Kanta Handiqui State Open University (KKHSOU)—has created meaningful opportunities for lifelong learning, enabling women to pursue higher education free from the limitations of geography, rigid schedules, and restrictive social norms. This paper explores the extent to which KKHSOU has contributed to women's empowerment in Assam through its flexible, learner-centric, and inclusive ODL frameworks.

Background of the Study

Assam, with its diverse ethnic composition and complex socio-cultural milieu, continues to encounter substantial challenges in attaining gender parity in education. Despite sustained governmental interventions, women—particularly those residing in rural areas and belonging to marginalised communities—remain disproportionately affected by early marriage, economic dependency, restricted mobility, and entrenched social norms that collectively impede their educational advancement. In response to these structural barriers, KKHSOU, established in 2005, emerged as a crucial institutional

mechanism for democratising access to higher education through open, distance, and online modes of learning. The university's philosophy is firmly grounded in the principles of inclusivity, accessibility, and lifelong learning, thereby enabling women from varied socio-economic strata to pursue both academic and professional aspirations.

This study analyses enrolment data from the post-pandemic period, specifically 2021 to 2025—a phase during which the formal education system experienced unprecedented disruption and began transitioning into new modalities of delivery. Through this analysis, the study evaluates the extent to which KKHSOU's ODL framework has contributed to empowering women learners across Assam during a time of significant educational transformation.

Objectives of the Study

- To examine the trends in women's enrolment in undergraduate programmes of KKHSOU during the academic years 2021–22 to 2024–25.
- To analyse the patterns of enrolment among rural and urban women across different caste categories.
- To assess the contribution of Open and Distance Learning (ODL) to the educational empowerment of women in Assam.
- To propose recommendations for strengthening women's participation, retention, and academic success within the ODL system.

Review of Related Literature

A substantial body of scholarship has examined the relationship between distance education and women's empowerment. Panda (2018) underlines the role of Open and Distance Learning (ODL) as a vital mechanism for expanding women's access to higher education, particularly for those constrained by domestic responsibilities and socio-cultural barriers. Mishra (2020) further highlights the flexibility, affordability, and learner-centric design of ODL as significant motivators for women seeking to pursue academic qualifications through open universities. The Indira Gandhi National Open University (IGNOU, 2021) reports that women constitute over 40% of its total enrolment, indicating the inclusive character and enabling potential of the ODL system at the national level. Empirical evidence from the regional context also reinforces these insights. Das and Saikia (2022), in their study on KKHSOU, observed that a large proportion of women learners originate from rural areas, driven both by aspirations for self-development and the need to enhance employment prospects. Collectively, this body of literature provides a robust foundation for the present study, which employs quantitative enrolment data from KKHSOU to analyse how ODL functions as a catalyst for women's educational empowerment in Assam.

Methodology

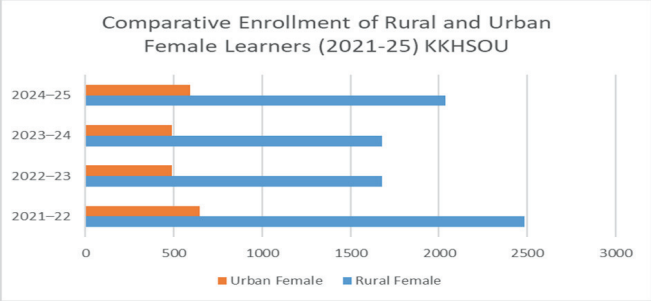
This study employs a descriptive and analytical research design, drawing primarily on secondary data sourced from the enrolment records of Krishna Kanta Handiqui State Open University (KKHSOU) for four academic years spanning 2021–22 to 2024–25. The dataset incorporates critical variables such as gender, rural–urban location, caste category, and programme-wise enrolment of female learners, thereby enabling a multidimensional analysis of women's participation in higher education through the ODL system. The data were systematically organised and analysed using Microsoft Excel to generate year-wise and category-wise trends in women's enrolment. Tabular representations and graphical visualisations were developed to illustrate patterns related to participation, rural–urban disparities, and inclusivity across caste groups. Quantitative findings were further enriched with qualitative interpretations to provide a nuanced understanding of women's empowerment facilitated by ODL. This mixed-method analytical framework offers a comprehensive basis for assessing the extent to which KKHSOU, as a premier Open and Distance Learning institution, contributes to expanding women's access to education, enhancing their participation, and fostering broader empowerment outcomes.

Data Analysis and Interpretation

Objective-1 To examine the trend of women's enrolment in undergraduate programmes of KKHSOU from 2021–22 to 2024–25.

Academic Year	Rural Female	Urban Female	Total Female
2021–22	2483	648	3131
2022–23	1680	492	2172
2023–24	1680	492	2172
2024–25	2038	593	2631

Figure 1: Female enrolment trends at KKHSOU's undergraduate programmes across rural and urban regions from 2021–22 to 2024–25.

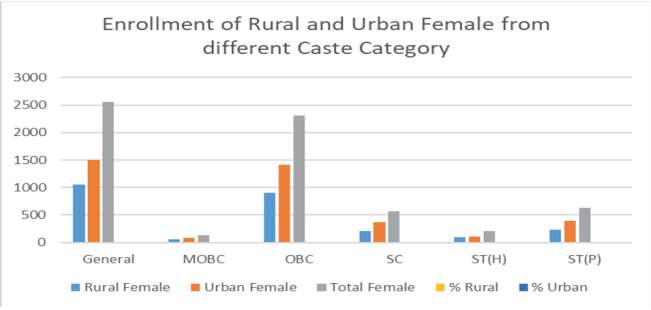


The analysis of enrolment data indicates a consistent and substantial level of women's participation in KKHSOU over the four academic years under review. Notably, rural women constitute approximately 75% of the total female enrolment, underlining the extensive outreach and contextual relevance of the ODL system in the underdeveloped and remote regions of Assam. This predominance of rural enrolment reflects the university's effectiveness in mitigating traditional socio-cultural and geographical barriers, thereby operationalising its motto of "reaching the unreached" in a meaningful manner. The upward trajectory in enrolment further signifies a growing awareness among women regarding the transformative potential of higher education for self-employment, personal development, and broader socio-cultural empowerment. The sustained participation trends highlight KKHSOU's contribution to reducing educational disparities by bridging spatial divides and enhancing equitable access. Overall, the findings affirm the university's pivotal role in promoting inclusive education and expanding higher education opportunities for women across the state.

Objective-2 To analyze the Enrollment of rural and urban women across caste categories.

Caste Category	Rural Female	Urban Female	Total Female	% Rural	% Urban
General	1049	1506	2555	41.08%	58.92%
MOBC	51	81	132	38.64%	61.36%
OBC	907	1407	2314	39.21%	60.79%
SC	202	366	568	35.56%	64.44%
ST(H)	93	110	203	45.81%	54.19%
ST(P)	237	389	626	37.87%	62.13%

Table-2 Enrollment of rural and urban women at KKHSOU across caste categories.



The data clearly illustrate the patterns of women's participation in higher education across diverse socio-cultural groups in Assam. The findings indicate that urban female learners surpass their rural counterparts in most caste categories. Women belonging to the General and OBC categories exhibit the highest levels of enrolment, suggesting comparatively greater access, awareness, and educational mobility within these groups. At the same time, significant participation from SC, ST(H), and ST(P) women underlines the increasing role of ODL in fostering social inclusion and widening access among historically marginalised communities. Although rural women's proportional representation is marginally lower than that of urban learners, their absolute numbers remain substantial across all caste categories. This trend highlights the extensive outreach of KKHSOU in rural regions and its effectiveness in overcoming socio-geographical barriers. Overall, the data affirm the University's commitment to inclusivity and social relevance, demonstrating how the ODL system contributes to bridging both caste-based and regional disparities in women's access to higher education in Assam.

Objective-3 To assess the role of ODL in promoting educational empowerment among women in Assam

The enrolment data indicate a steady and appreciable rise in the number of female learners at KKHSOU from 2021 to July 2025. This upward trend reaffirms that the ODL system has emerged as a vital educational avenue for women who are unable to participate in conventional higher education owing to domestic obligations, socio-cultural constraints, or economic limitations. The increasing enrolment benefits not only young women but also married women, homemakers, working professionals, and those seeking to resume education after long discontinuities.

This sustained growth demonstrates that KKHSOU's contribution extends beyond improving the GER of Assam and India; it also advances women's empowerment by enabling them to acquire recognised qualifications that enhance their socio-economic mobility and overall quality of life. Although data reflect a slightly higher proportional representation of urban women in higher education, rural women account for a significant share—averaging around 40% across caste categories. This substantial participation underlines the positive impact of KKHSOU's decentralised study centre network, accessible online learning resources such as e-SLMs, and region-specific support services, all of which have strengthened opportunities for rural women to pursue higher education without spatial or cultural barriers. In a socio-cultural context like Assam, where women's mobility is frequently constrained, KKHSOU has functioned as an educational equaliser, allowing women to study within their own locality. The participation of women from SC,

ST, and OBC categories further serves as a critical indicator of empowerment, signalling that access to higher education is no longer confined to urban or socio-economically advantaged groups. For instance, the 2024–25 enrolment data reveal a substantial proportion of female learners from SC and OBC communities, illustrating ODL's capacity to democratise education and promote social justice—aligned with the constitutional mandate of equality in education.

KKHSOU's initiatives such as fee concessions, scholarships, and flexible admission policies have proven instrumental in reaching marginalised groups and realising the University's motto of "reaching the unreached." Beyond academic attainment, ODL fosters essential dimensions of empowerment by supporting lifelong learning, enhancing self-confidence, improving self-esteem, and strengthening decision-making capacities among women. Furthermore, the integration of technology through digital platforms and online content delivery has contributed significantly to the development of digital literacy, thereby promoting technological empowerment among female learners across Assam.

As a result of their engagement with ODL, women in Assam are increasingly positioned to access employment opportunities, participate in household and community-level decision-making, and contribute to family income. In a context where many women are employed in the informal sector, credentials obtained through ODL often serve as a stepping stone to formal employment, entrepreneurship, or leadership roles within their communities. Taken together, these findings affirm the transformative potential of ODL in advancing women's educational empowerment and socio-economic mobility in the state.

Objective-4 To provide suggestions for strengthening women's engagement and success in ODL

Although the analysis reveals a steady rise in women's enrolment in higher education through the ODL system, several contextual challenges continue to impede their sustained participation and academic success. These challenges are particularly pronounced in rural areas, where women frequently encounter limited digital access, inadequate academic support, financial constraints, and heavy domestic responsibilities. Such barriers often result in irregular study patterns and occasional dropouts, despite the inherently inclusive and flexible nature of ODL. To enhance women's engagement and ensure their long-term success in ODL, the following recommendations are proposed:

- **Strengthen Learner Support Services (LSS)**: As LSS forms the backbone of Open Universities in India, establishing community-based learning hubs—especially in rural and remote areas—would provide accessible academic support and enhance a more conducive learning environment for women.
- **Enhance Digital Literacy**: Offering structured digital literacy training, particularly for newly admitted female learners, would help them effectively search online platforms, access digital learning resources, and engage in virtual academic interactions with confidence.
- **Expand Financial Support Mechanisms**: Given that a large proportion of learners in Assam come from economically disadvantaged backgrounds, increased provision of gender-based scholarships, fee waivers, and flexible payment options would reduce financial barriers and encourage continuous enrolment.
- **Provide Personalised Academic and Psychological Counselling**: Tailored counselling services would assist women in managing academic expectations alongside family responsibilities, thereby improving retention and academic outcomes. Additionally, the development and dissemination of mobile-friendly audio-visual materials would help mitigate issues related to limited connectivity and device accessibility.
- **Align Programmes with Local Employment Opportunities**: Designing and offering skill-based and career-oriented programmes aligned with local labour market demands would enhance women's confidence, strengthen their employability prospects, and create pathways for post-study economic empowerment.

Collectively, these measures hold significant potential to fortify women's participation in ODL and to promote meaningful and sustainable educational empowerment across diverse socio-economic contexts in Assam.

Conclusion

The analysis of female enrolment at KKHSOU, Assam, over the four-year period from 2021 to 2025 clearly demonstrates that ODL has emerged as a powerful mechanism for advancing women's educational empowerment in the state. The consistent rise in enrolment reflects a positive and transformative trend, indicating that women—particularly homemakers, economically disadvantaged learners, and those with limited mobility—are increasingly perceiving higher education as accessible, flexible, and socially meaningful. A notable surge in enrolment during 2024–25 further suggests that women's participation in ODL is driven not merely by the pursuit of certification but also by aspirations for livelihood enhancement, socio-economic mobility, and personal development. Rural women's enrolment, which constitutes approximately 40 percent of total female participation on average, highlights the effectiveness of KKHSOU's decentralised learner support services, regional centres, and technology-enabled

delivery of Self-Learning Materials (SLMs) in overcoming social and geographical barriers. For women residing in remote areas who are often excluded from conventional, campus-based higher education, the ODL system offers an equitable and viable alternative. This mode of education directly contributes to strengthening women's social autonomy, decision-making capacity, and long-term empowerment. The study also reveals strong representation from SC, ST, and OBC female learners, underlining KKHSOU's inclusive academic ecosystem and its commitment to extending educational opportunities to marginalised communities.

Furthermore, institutional provisions such as flexible fee structures, multiple entry–exit options, and widespread local accessibility have significantly benefited learners from rural and socio-economically constrained backgrounds, enhancing equity and expanding participation. The inherent flexibility of ODL enables married women, working professionals, and caregivers to pursue higher education at their own pace, thus harmonising academic aspirations with domestic responsibilities. The integration of digital technology—through platforms such as e-SLMs, the e-Vidya portal, university-produced YouTube learning resources, and online counselling—has further expanded access for women, particularly those in remote settings, while simultaneously strengthening digital literacy and technological empowerment.

In sum, the findings of this study affirm that the ODL system, exemplified by KKHSOU, plays a pivotal role in advancing women's empowerment by providing accessible, learner-centric, and contextually responsive higher education. By transforming limited opportunities into widely available pathways for self-improvement, participation, and progress, KKHSOU stands as a model of educational inclusivity and social transformation in Assam.

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