

**ISSN:3107-6335 (P)**

**SIKSHA SAMHITA**  
**(Vol.- I, Issue-II, December 2025)**

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**Chief Editor: Dr. Lakhi Prasad Hazarika**

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**PANDIT DEENDAYAL UPADHYAYA ADARSHA MAHAVIDYALAYA, DALGAON**  
**DARRANG, ASSAM**  
**Vill.- Ruhinikash, P.O.- Dalgaon, Dist: Darrang, (Assam) 784116**

### **AIM & SCOPE**

**SIKSHA SAMHITA** is a Bi-annual, Peer-Reviewed, Multidisciplinary research journal committed to promoting academic discussion across diverse disciplines, including Science, Social Sciences, Arts, and Humanities. Published by Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Dalgaon, Darrang, Assam, India. The journal seeks to promote innovative, rigorous, and original research work that break through boundaries and challenge conventional thinking as well as promote critical thinking and interdisciplinary study. The primary aim of the journal is to serve as a platform for scholars, researchers, and academicians to publish high-quality research that contributes meaningfully to their respective fields and to broader intellectual discourses. By promoting the sharing and exchange of ideas and findings, **SIKSHA SAMHITA** aspires to deepen knowledge, stimulate academic collaboration, and contribute to the growth of a dynamic and inclusive research culture.

### **ABOUT US**

**SIKSHA SAMHITA** (Vol. I, Issue II, December 2025) marks the second issue of a multidisciplinary academic journal published twice a year by *Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya*, Dalgaon, Darrang, Assam, India. Under the stewardship of Chief Editor Dr. Lakhi Prasad Hazarika, the journal is edited and reviewed by an esteemed team of academicians from various disciplines and institutions.

Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Dalgaon, is a Govt. model degree college in Dalgaon, Dist.-Darrang, Assam named after Pandit Deendayal Upadhyaya, a great thinker, philosopher, economist and sociologist of the country. The college was established in 2017 and is funded by Rashtriya Uchchattar Shiksha Abhiyan (RUSA-1.0), Ministry of Human Resource Development and Government of India.

This journal is envisioned as a vibrant academic forum for critical thinking and scholarly dialogue. It welcomes contributions from across the globe that reflect rigorous methodology, sound scholarship, and thoughtful engagement with contemporary issues. Committed to academic integrity and excellence, **SIKSHA SAMHITA** encourages submissions that are intellectually robust and socially relevant.

The editorial team extends gratitude to all contributors and invites researchers, academicians, and scholars to be part of this evolving intellectual journey.

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Vill.-Ruhinikash, P.O.- Dalgaon, Dist: Darrang, (Assam) 784116  
Email: principal@pdduamdalgaon.in

Starting Year : 2025	Format : Print	Language : English
Frequency : Bi-annual	Subject : Multidisciplinary	Published : December 2025; Vol- I, Issue : II

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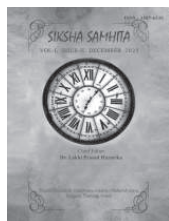
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## || Editorial ||

It gives me immense pleasure to release of the second issue of our academic journal, SIKSHA SAMHITA (Vol. I, Issue II, December 2025), published twice a year by Pandit Deendayal Upadhaya Adarsha Mahavidyalaya in Dalgaon Darrang, Assam, India. This continuing publication aims to promote high-quality research and academic discourse among scholars, academicians and students among many disciplines.

As institutions of higher education, we have a serious obligation to promote academic honesty and develop an environment that encourages critical thinking and original thought in an ethical manner. When research occurs under these conditions, it enhances our academic foundation in addition to serving society.

This second issue brings diverse collection of thought-provoking articles that reflect the changing views of modern academia. Each of these articles is representative of the journal's commitment to diversity and interdisciplinary publication. I wish to extend my heartfelt appreciation to the members of the Editorial and Review Board; all contributors; all who have offered any other range of personal support academically or morally to help support the publication of this issue. May SIKSHA SAMHITA continue to be a vehicle to develop scholarly excellence and contribute meaningful research to the world.

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## Witch-Hunting in Modern Assam from a Foucauldian Lens

### Abstract

This paper examines the problem of witch-hunting in Assam through Michel Foucault's work *Discipline and Punish* (1975). Foucault highlights the models of punishment that exist in human society. He illustrates how enlightenment has transformed the nature of brutal punishment to a more humanised form, showing the mechanisms authorities have developed in disciplining people. Based on three case studies in the Goalpara district of Assam, the paper finds that accused women witches are still subjected to brutal forms of violence, social ostracism, and exiled despite the existence of a modern state system. The execution of the accused witches and the aftermath of violence resemble the Foucauldian pre-modern technologies of power that existed over the condemned bodies and the making of the docile bodies. The community is regulating the actions and spaces of accused witches. Such a person dwells in a perpetual fear of re-accusations, which reinforces power hierarchies within the village. The paper calls for a serious intervention from the modern state and civil society to thwart the violent practices and strive towards restoring the dignity of those accused of witchcraft.

Keywords : Witch-hunting; Foucault; Punishment; Gendered violence; Stigmatization

### Introduction

Michel Foucault, mapping the shift in power dynamics, put forward three models of punishment in his work *Discipline and Punish*. The three models correspond to three different periods in history- up to the 18<sup>th</sup> century, 18<sup>th</sup> to 19<sup>th</sup> century and 19<sup>th</sup> century to the present. In each of the three models, the assertion of power to discipline subjects and the punishment of the deviant differed. The first model is the one in which punishment was a matter of spectacle. It displays the sovereign's power over its abiding subjects. It was mainly popular in medieval and early modern Europe. The second model of punishment, which Foucault discusses, was more corrective than involving physical suffering. For this, different institutions, such as prisons, schools, and military barracks, played their designated roles in controlling and reforming the deviant. The last model he reflected on was the carceral model of disciplining deviants. It goes beyond the institutional control of individuals. Under this model, the entire society turns into an open prison where

individuals are continuously monitored. Thus, individuals are regulated not only by the presence of institutions but also by existing regulations and social norms (Foucault, 1975). This paper contextualises Michel Foucault's idea of punishment for witchcraft accusations in Assam. It strives to question whether the severity of punishment through public spectacle is confined to pre-revolutionary France or extends to the execution of alleged witches in cases of witch-hunting in today's modern epoch. The paper is based on fieldwork in the Goalpara District of Assam. Goalpara is regarded as the most affected district in cases of witch-hunting so far, as the official statistical records are concerned (Assam Tribune, 2019). The study uses a qualitative research approach, incorporating three case studies of survivors of witch-hunting, which have been analysed in the context of Foucault's work. The study shows that despite the existence of a modern state system, pre-modern forms of punishment continue in Assam.

### **Witchcraft Accusations**

Witchcraft accusations in Assam are like those in other parts of the country (Chaudhuri, 2013; Roy, 1998; Kelkar & Nathan, 2020). It resembles the accusations leading to witch-hunting in Early Modern Europe and Colonial America. The practice was reported to have declined later in those regions due to the legal reforms associated with the Enlightenment (Levack, 2014; Pavlac, 2009; Bailey, 2006; Demos, 2008). However, in cases of witchcraft, accusations in Assam, the statement can be limitedly held. The bodies of the condemned- the accused witches in Assam are still susceptible to brutal torture leading to their death.

On March 11, 2025, a group of people attacked a 62-year-old Adivasi woman in Dibrugarh district. She was brutally tortured, and her body was tied and thrown by the riverside (India TV News, 2025). In September 2023, the dead body of Praneswari Rabha, aged 56 years, a resident of Chatabari village of Goalpara, was discovered in a nearby cemetery with legs and hands tied. She went missing a week before her dead body was located. Friends and acquaintances of the deceased believe she was the victim of a witch-hunt (Digital Desk, 2023). In May 2023, a mob killed a 45-year-old Adivasi lady on suspicion of witchcraft. In the same month, another woman from the Dhemaji district was beaten with sticks and stripped naked, and her family was thrown out of the village on charges of witchcraft (Plus, n.d.). In Kokrajhar, in 2022, Anjali Murmu, a native of Mohanpur village in Kokrajhar district, was first killed, and then her body was hanged from a tree (Choudhury, 2022). A few manage to survive the punishment. They are the survivors of the violence of witch-hunting who witnessed a firsthand experience of collective wrath. Narratives of such individuals thus assume prime significance in understanding the episodes of punishment.

### **Technology of Punishment**

Foucault described the execution of Robert Francois Damiens, which took place in Paris in 1757 (Foucault, 1995). Damiens was executed because he attempted to assassinate King Louis XV. Although Damiens's motive for assassination was not altogether political but involved personal and religious grievances. Damiens's actions against the King demonstrated a direct attack on the royal authority. As a repercussion to it, Damiens's brutal execution symbolized a strict deterrence against the authority of the King. The brutality was intended to set an example that anyone who thought of rising against the royal powers would be treated similarly. The act was motivated to create an atmosphere of fear among those who believed in contradicting the absolute powers of the King. With hot metal tools, Damiens's flesh was torn off. Oil was

heated, the wax melted, and it was poured into the wounds in Damiens's body. His body was then pulled apart by the horses which were tied up to his arms and legs. His body was set on fire and what was left were the ashes (Wilde, 2014).

Is the brutal torture of Damiens's body proportionate to the crime he committed? Damiens was a domestic servant. He was the last person in France who was convicted of regicide- an act of purposeful killing of a monarch. He was sentenced to face dismemberment. It was a brutal form of capital punishment for regicides, where the limbs of a living being were permanently removed. Robert Francois Damiens using a penknife stabbed the king. But it was a failed attempt by Damiens. The King was wearing thick winter clothes, so the knife could not easily navigate through them and penetrate his body. It just left a 1 cm deep cut into his chest (Wikipedia, n.d.). However, Damiens did not try to escape the spot. He was at once taken into custody by the King's security.

At that time frame, monarchs ruled their subjects based on the idea of divine right (McMahon, 2024). The Kings were assumed to have been chosen rulers by God himself. So, any uprising against the King resembles an uprising against God. So, to keep people in control and the authority of the divine Kings intact strict discipline among the masses was important. As such, punishment in the most brutal form was justified. It reasserts the monarchs' absolute control over the lives and deaths of the people. Later, with the transition of society and the political system, there were also changes to the penal system, which Foucault discussed in his second and third models of punishment. The technology of punishment shifted from a more brutal disciplinary mode to a more humane disciplinary mode (Foucault, 1995). At present, the French Penal Code prescribes life imprisonment for similar offences (Wikipedia, n.d.). Public executions cease to exist.

The technology of punishment however, has remained the same in the state of Assam. The only difference with the above-discussed case of Damiens is that the offence was committed by a subject against his political master. The matter involved a trial by the relevant authorities. But, in violent witch-hunting, the executors are the citizens of the modern state and the convicts (the accused witches) are members of their community or village. The belief in witches is so deeply embedded in societies that, as soon as someone is identified as an accused witch based on superstitious claims, the entire community often attempts to eliminate the accused, often through public trials (Borah & Das, 2019; Nath, 2014; Saikia, 2017).

### Collective Violence

The accused witches in society are not punished in isolation. It is an open public affair where many people participate. The incidence of witch-hunting is marked by inhuman torture often directed at the body of the accused witches to extract their confessions (Kelkar & Nathan, 2020). But, to observe by Damians' case, it can be asserted that the nature of torture in cases of survivors of witch-hunting is perpetual. Torture resulting in elimination is a one-time event where the body is destroyed at the end, but regarding survivors of witch-hunting, the body and soul witnessed a continuum of tortures in the form of public humiliation, social ostracism, and stigmatization. Cases reveal that many accused have been killed because of physical atrocities and some survived. Survivors are verbally abused and are made to pay monetary penalties.

Jonali Rabha is a resident of Borsora village (Goalpara). She is a mother of four children. Both she and her husband are daily wage earners. In May 2001, Jonali Rabha was labelled as a witch by her neighbours and brother-in-law. The prime reason for the accusation was the illness of a neighbourhood older woman aged 60 years named Dophai. She accused Jonali of her deteriorating health condition. Dophai, aged 60, was believed to be possessed by Jonali. The villagers gathered at the old lady's house to ascertain the matter. In her vernacular language, she uttered *daainigilse*, *daainigilse* (consumed by a witch). The people asked Dophai who the witch was who was responsible for her condition. She pointed to Jonali Rabha. It was sufficient for the *Raij* (public) to put Jonali on public trial. The public trial was meant to fix the punishment for Jonali. Jonali appeared in the public trial. She felt very scared as she was already accustomed to how these trials were. As soon as she reached the trial site, she found many villagers assembled. While she moved to take her seat, many of them started screaming. They angrily asked her the reason why she raised an evil spell against Dophai. Some of them shouted that she must be thrown out of the village. The meeting started and after a few minutes, it was decided that, as it was the first instance of witchcraft by Jonali, she would not be thrown out of the village but she would be fined. An amount of three thousand rupees was levied upon Jonali. She vehemently requested that the executors not vest such an amount in rupees as a penalty. She apprised them about her poor economic status. But all her efforts went in vain. Again, after one month, Dophai alleged that she had committed a similar act. Another *Raij* meeting was organised. She appeared and this time it was decided that she needed to leave the village. She cried and begged the villagers to spare her, but they offered her an option. She either leaves on her own or is thrown out of the village. She decided

to leave at the very moment to avoid any form of violence.

Bina Rabha lives at Dariduri Village (Goalpara). She suffered horrific forms of unwarranted violence and lost her husband in the violence of witch-hunting in May 2013. Both were daily wage earners. She, her little daughter, and her husband were asleep at night when suddenly they were awakened by noises from people outside their house. Out of curiosity, her husband opened the door and saw a group of people in black clothes and covered faces. They were approaching their home. He saw that the people were holding axes and knives. He understood that something was wrong. The group of men reached his doorstep and dragged him outside. He was made to sit on the ground, and both his hands were chopped off and they stabbed him in his stomach. Bina Rabha and her husband witnessed a brutal attack by a group of people who suspected them of practising witchcraft. They forcibly entered Bina's house and carried on their brutal acts against the family.

Bina recounted how the miscreants spilt out the internal organs of her husband's body. After that, they went for her. She was mercilessly beaten and was almost made naked by having all her clothes torn apart. While one of them shouted that she also must be cut into pieces. She was severely injured in the head with a sharp object. Her marks cut in her right thigh are still visible. The nerve veins of her hands, from then on, were permanently damaged when she tried to defend herself from being chopped by the sharp axes of the miscreants. She went unconscious as the people hit her mercilessly. Bina regained her consciousness the next day and found herself in the hospital. When she returned home, she came to know the reason for the violence that they encountered. They were accused of being witches by an *ojha* (medicine man). The *Ojha* was brought to their place by one of her relatives to identify the cause of illness of people in their locality. After accusations made by the *Ojha*, the villagers decided among themselves to eliminate Bina's family.

Janata Sangma and her entire family were accused of being *sikhals* (Garo term for witches). She is a resident of Nalangapahar (Goalpara) and a daily wage earner. The incident happened in June 2017. There was a neighbourhood girl in their village who was suffering from Epilepsy (which the villagers perceived as witchcraft). The family members failed to cure her and gradually she became ill day by day. The girl alleged that Lavita Sangma, her father, and her mother came in her dream and they were eating her. The girl's family at once brought the matter before the *rai*, and a *bisar* was organised. Lavita's family was fined by the *rai* and asked to deposit 2.5 lakh rupees. They accepted the verdict. They sold all their cattle and belongings,

arranged the amount, and paid it to the *raij*. But the *raij* warned them that if anyone else in the village falls ill, they will be held responsible. After one year, the girl again reported a similar allegation against Lavita's family. The *raij* imposed another fine of 2.5 lakh rupees. On this Janata's father went to take help from the police officials. But his efforts did not materialise. The *raij* thrashed her father brutally when he registered disapproval of the mandate against them. Later his body was found hanged from a tree near the site of the trial. The entire family escaped from the village to protect their lives.

The above cases portray the nature of witch-hunting trials. They are a form of community event marked by widespread participation from village people. Violence against the accused is legitimized by collective consensus. The verdict of the community is final and there exists no room for challenging the decision or making appeals by the accused or any other members present. It signifies the power that the *raij* holds over the villagers. The power is being demonstrated through the *raij mels* (community meetings), which draw a line between what is acceptable in society and what is not, without being reasonably judgmental of the validity of such actions. When viewed through a Foucauldian lens, there are both differences and similarities in social control between pre-modern monarchical society and the contemporary Assamese community. In both cases, the authority assumes the role of a public spectacle. The monarch exercises authority through the public execution of the accused, while the *raij* exercises jurisdiction through a community initiative. However, both are unchallenging elements whose power prevails not only over the body of the accused but also the public while reinforcing social norms that seek to regulate people's behaviour and conduct. Kai Erikson, a sociologist, in his analysis of the Salem witch trials, states that the public execution of the accused is "boundary maintenance" (Erikson, 1966), which need not be overcrossed. It makes people aware of the consequences of transgressing such boundaries. The condemned body, therefore, becomes a symbol of the authority's supremacy.

Mostly, witchcraft accusations do not have any sound basis and are influenced by superstitious beliefs. There is also no form of factual validation. A mere allegation against someone like Jonali and Janata is enough to label and brand the individual as a witch leading to the hunting down of the accused witch without any substantial evidence. Illness and misfortunes are often attributed to witches and the local traditional healer, Ojhas, who reinforce the belief among the populace. In such cases, the victims are the individuals affected by the accused's evil spell, and their statements are

considered sufficient evidence of the accused's guilt, which we observe in Bina's case. The technology of punishment in such cases is mostly violent and inflicted on the body as well as the mind of the accused. It ranges from murder to physical violence, fines, and exile from one's native place. The victims of witch-hunting in other words do not get access to a fair trial. The mechanism of defence is almost nil. Emotions override in such spaces, and where human rights have no essence. The trials therefore, serve as a mechanism to sustain fear among the masses in today's time through arbitrary laws, rules, and judgments. It stands antithetical to the idea of justice, fairness, and dignity.

### **Docile Bodies**

It has also been found that most cases target women (Baruah & Thakur, 2019; Brahma & Jyotiraj, 2019; Daimary, 2019; Bharali, 2018). As such, the phenomenon of witch-hunting can be assumed to be an affair of gender discrimination which ensures the sustenance of power hierarchies within the community. The punishment against the women accused is humiliating which is evident from the torture inflicted on Bina where she was stripped and beaten naked. The phenomenon tends to economically exploit the persons who were already downtrodden adding to their misery. The fines levied by the self-assumed justice courts in the case of Jonali and Janata show that it is difficult for such economically poor persons to manage. Furthermore, displacement occurs when a family is attacked. The accused and their family members are forced into exile from their native place in fear of being eliminated. This leads to the extended marginalization of the convicts. The witchcraft accusations are not a one-time affair; they move in a circular form. Re-accusations also take place, accompanied by harsher punishment. This creates a perpetual environment of vulnerability for the one accused of being a witch in the community. Jonali Rabhas was labelled and branded as a witch in 2001. But, after 16 years she was reaccused. Re-accusation took place also in the case of Janata Rabha after a year, and Bina Rabha after five years, from 2013 when she was first attacked on charges of witchcraft. In 2018, miscreants attempted to enter her house early in the morning to kill her.

As Foucault observes, the nature of punishment changed. Victims were glorified and people moved forward to free the condemned and the sovereign's power over the body was opposed. In the 18<sup>th</sup> century, there was a demand for reforms in the method and nature of punishment to make power more operational, which created theatres of punishment where convicts were publicly displayed but in a controlled manner, serving as a representation of the sovereign's power. This paved the way for the development of the idea of

prison in the latter years which aimed to discipline and reform people. It transformed punishment from a public event to an enclosed space of the prison. However, he adds that the transformation is not the end of the sentence; it is just a shift from the body to the mind and soul. The enclosed spaces were meant to discipline the convicts, and the tools used were feelings of shame and remorse. This new model of punishment is not just a one-time affair but it has led to the deprivation of human rights and liberties for an extended period.

Exile in cases of witch-hunting has been responsible for a continuum in the victimization process of the accused witches. From one point of view, it is a protective strategy after accusations to prevent the escalation of violence. From another perspective, it is also a punitive measure on the accused's mind and soul, as discussed above in terms of shame, guilt, and remorse. It is an alternative to public execution. Historically, such exile or witch camps existed in Europe from the 16<sup>th</sup> to 18<sup>th</sup> centuries, in colonial America, and in contemporary Africa (Federici, 2020; Migliore, 2022). In Goalpara, towards the Assam-Meghalaya border such a designated place has emerged since the 1950s. Known as the *dainigaon* (witch village), it is a settlement where accused individuals began taking refuge. Most of them are women who have been ostracized by villagers on charges of involvement in witchcraft. There are now around 75 residents (Zahan, 2023; Saikia, 2019). Such a designated exile resembles a space where the deviant is separated from the mainstream. Stigma has been an inseparable part of the lives of members of the *Dainigaon* in the aftermath of witch-hunting.

Discipline must be accompanied only by coercive force. It requires an apparatus of constant hierarchical observation which Foucault called as "the gaze." Jeremy Bentham's *Panopticon* model of observation was not only limited to prisons but also extended beyond them, spreading throughout society. Foucault argues that such a type of constant observation is a form of disciplining that tends to create a "dynamic normalization" or "docile bodies" (Foucault, 1995, p. 135) out of fear of being watched. A socio-psychological process is involved in acts of aggression or violence against others. It is a method through which individuals or groups sustain social influence and impress others. Mainstreaming of accused witches is a contemporary challenge for such communities. The stigma of being a witch entirely affects their existence in the post-accusations' episodes. Most survivors show self-isolation to avoid misrepresentation of their actions and provide scope to the cycle of re-accusations. Jonali Rabha, Janata Sangma and Bina Rabha represent

women survivors who still dwell in the stigma that operates as a form of power for the villagers who uphold the superstitious beliefs. Such survivors of witch-hunting have regulated themselves to avoid being labelled or punished by society, which Foucault described as the construction of docile bodies.

### Conclusion

Modern society has also witnessed brutal disciplinary events like witch-hunting in Assam, a phenomenon that has been explored through the lens of Foucault's model of punishment. The Enlightenment abandoned the disciplinary model of punishment as a public spectacle. However, the episodes of public trials and violence in witch-hunting provide scope for asserting that such a model of torture on the body still exists in the form of witch-hunting where the accused are brutally tortured before being killed. Few manage to survive the brutal executions and as such the narratives of those survivors like Jonali Rabha, Janata Sangma and Bina Rabha illustrate that the women and their families who are labelled and branded as witches face both immediate physical torture and long-term suffering. Witch-hunting being a gendered crime often targets marginalised women who are ostracised and exploited through public trials and forced into exile. Such acts reinforce a power hierarchy through the superstitious beliefs and practices in the communities and the exile serves as a disciplinary model that replaces the destruction of the body of the condemned in cases of witchcraft accusations to some extent. Foucault shows how power shifted from sovereign to disciplinary power. The transition led to the abolition of violence on the body and led to control of the minds and souls of the convicted. However, the physical punishment in the phenomenon of witch-hunting is deeply embedded and accompanied by psychological vulnerabilities. The existence of designated camps in the Assam-Meghalaya border - the *Dainigaon* reinforces the exclusion of the accused witches from society and leaves a deeply seated stigma in their lives which affects their entire existence in the aftermath of witch-hunting. The modern state must shoulder responsibility along with civil society in abandoning such social structures that encourage the violence of witch-hunting. At the same time, there is an urgent need to create an adequate support system for assisting the survivors to cope with the post-violence scenario and help them come back to a free and dignified life where the fear of punishment diminishes. The trials therefore, serve as a mechanism to sustain fear among the masses in today's time through arbitrary laws, rules, and judgments. It stands antithetical to the idea of justice, fairness, and dignity.

### Acknowledgements

The authors sincerely acknowledge Mrs. Mamoni Saikia, District Programme Officer, Goalpara District, Assam Mahila Samata Society, for providing invaluable guidance, encouragement, and necessary resources and facilities, especially for studying the lives of survivors of witch-hunting in Goalpara District, Assam.

### Conflict of Interest

There is no conflict of interest, including academic, commercial, financial, personal, or professional affiliations relevant to the work, during the preparation of the manuscript.

### Authors' Contribution

The first author has formulated the study's concept and design. Further, fieldwork and preparation of the initial draft of the manuscript have been done. The second author has contributed to and assisted with the data analysis and has interpreted the findings. Both authors revised the manuscripts and prepared the final version.

### Funding

The work has not received any grant or funds from any public or private agencies.

### Informed Consent

As the work involved survivors of witch-hunting, prior informed consent has been obtained, and all ethical standards have been maintained during data collection and manuscript preparation.

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## Study on the Butterfly diversity in No 2 Shyampur area of Dalgaon, Darrang, Assam

### Abstract

Present study aims to assess the diversity of butterfly diversity on two sites of No 2 Shyampur area of Dalgaon, Darrang, Assam, and India from July 2025 to November 2025. The study recorded a total of 365 individuals of 21 butterfly species, belonging to four families. During the survey, the greatest abundance of butterflies was recorded in areas rich in flowering plants, host plants, nectar sources, and wildflowers. In contrast, the lowest numbers were observed in riparian zones and human habitation areas. The family Nymphalidae exhibited the highest number of genera and species. Overall, a moderate level of butterfly diversity was documented. To safeguard this biodiversity and maintain a considerable abundance of butterflies, the adoption of appropriate and effective conservation measures is essential.

Keywords : butterfly, diversity, ecological indicator, flowering plants, abundance, habitat degradation

### Introduction

Northeast India is recognized as one of the 34 global biodiversity hotspots which are also considered to be one of the richest regions in the world in terms of biological diversity and high endemism. This area consists of numerous rare species which are currently under serious threat. Northeast India provides a suitable habitat to exist diverse butterfly fauna. High rainfall (often exceeding 2,000 mm) usually creates ideal conditions for survival of both flora and fauna.

Doubleday in 1845 worked on butterflies and conducted surveys in different areas like Jorhat, Sadia, Cachar etc. which is considered to be the pioneer study in Assam. Moore (1857) also worked on butterflies in the Abor and Mishmi Hills. At around 962 species of butterflies with its subspecies belonging to 5 families have been recorded from Assam by W.H. Evans (1932). Bingham (1905–1907) also provided significant contributions on butterfly study.

Bhuyan et al., 2002 studied on butterflies in the Regional Research Laboratory Campus of Jorhat, Assam and recorded 70 species belonging to 45 genera, out of which family Nymphalidae was found to be

dominant. Ali et al., 2000 also conducted a survey on butterfly diversity in the Zoo-Cum-Botanical Garden of Guwahati, where he recorded 72 species belonging to 43 genera where Nymphalidae again emerged as the dominant family.

Butterflies serve as excellent subjects for biodiversity studies because their taxonomy, distribution, and conservation status are relatively well understood. They also function as reliable biological indicators of habitat quality and environmental health (Sawchik et al., 2005). Strong seasonality is exhibited by many species and is confined to particular habitats (Kunte, 1997). As a result, butterflies often respond quickly to habitat disturbances and environmental changes (Mac Nally and Fleishman, 2004). Their close dependence on plants makes them particularly sensitive to alterations in vegetation structure (Blair, 1999), and slight alterations in habitat may result in migration or local extinction. (Mennechez, Schtickzelle & Baguette, 2003). Butterfly diversity often mirrors plant diversity (Padhye et al., 2006). Consequently, butterflies can act as umbrella species, meaning that their conservation also supports the protection of many other organisms, making them valuable for conservation planning and management (Betrus et al., 2005).

The present study aims to assess the diversity of butterfly fauna in and around the No 2 Shyampur area of Dalgaoon, Darrang.

**Materials and Methods :**

**Study area:** We have selected No 2 Shyampur area of Dalgaoon, Darrang, Assam for the current study. It is located at 26.187 N and 91.691 E, which lies approximately 32 km from the District Head Quarter, Mangaldai. The climate of Dalgaoon is characterized by high humidity and heavy rainfall, with four distinct seasons: summer, monsoon, autumn, and winter. The climate is generally warm, with warm summers, moderate monsoons, mild autumns, and mild winters. The region experiences heavy monsoon rainfall from July to September, with mild and dry winters from October to March. Diverse vegetation, different food plants and the flowers rich in nectar support a better butterfly diversity in that area.



FIG 1: Study site 1



FIG 2: Study site 2

**Survey Method:**

The study was carried out at two sites in No. 2 Shyampur of Dalgaoon from July 2025 to October 2025, using the Pollard Walk method. Surveys were conducted between 0900 h and 1700 h on sunny days. We walked along fixed transects and recorded all butterflies observed within a 3–5 m range. Specimens were caught, identified using field techniques and standard references, and subsequently released (Yasmin et al., 2023). Most identification was performed on-site. Information on date, location, and weather conditions was recorded during each survey. Species identification followed Evans (1932) and Kehimkar (2008). The WPA, 1972 status of butterflies was checked for all the spotted species from the database available at [https://vindhyabachao.org/wildlife\\_guidelines/schedule\\_species\\_insects.pdf](https://vindhyabachao.org/wildlife_guidelines/schedule_species_insects.pdf)

**Relative abundance** is calculated by the following formula:

$$\text{Species relative abundance} = \frac{\text{Species abundance}}{\text{Total abundance}} \times 100$$

**Calculation of Biological Indices:**

Two diversity indices, Shannon diversity index (Shannon-Weaver, 1948), Simpson diversity index

(Simpson, 1949) and one evenness index, Pielou evenness index (Pielou, 1966) were used in this study.

**Result :**

During the survey period from July 2025 to November 2025, a total of 365 individuals of 21 species have been collected from the two different study sites belonging to 17 different genera, 4 families and one order Lepidoptera (**Table 1**). Nymphalidae family was predominant with 10 species followed by the Lycaenidae family with 5 species. Pieridae comprising 4 species and Hesperidae family consisting of 2 species.

Relative abundance of each species within the study area is classified as Very Rare (fewer than 5 individuals) when recorded infrequently; Rare (fewer than 10) when recorded intermittently; Common (fewer than 20) when recorded often; Very Common (fewer than 30) when recorded regularly; and Abundant (30 or more) when recorded in large numbers on a regular basis.

Table 1: *Butterfly species and their abundance status in the study area*

Sl No	Family	Scientific Name	Common name	Status
1	Nymphalidae	Junonia atlites	Grey Pansy	Abundant
2		Junonia almana	Peacock Pansy	Common
3		Melanitis leda	Common Evening Brown	Abundant
4		Melanitis phedima	Dark Evening Brown	Very rare
5		Elymnias hypermnestra	Common Palmfly	Very common
6		Mycalasis mineus	Dark branded Bushbrown	Very common
7		Danaus chrysippus	Plain Tiger	Common
8		Neptis hylas	Common Sailer	Very common
9		Tirumala limniace	Blue Tiger	Very common
10		Hypolimnias asbolina	Great Eggfly	Very rare
11	Lycaenidae	Chilades pandava	Cycad Blue	Rare
12		Arhopala centaurus	Centaur Oakblue	Rare
13		Anthene emolus	Common Ciliate Blue	Very rare
14		Zizula hylax	Tiny Grass Blue	Rare
15		Pseudozizeeria maha	Pale Grass Blue	Very rare
16	Pieridae	Catopsilia pamona	Common Emigrant	Common
17		Catopsilia pyranthe	Mottled Emigrant	Rare
18		Pieris brassicae	Cabbage butterfly	Very rare
19	Hesperidae	Eurema hecabe	Common Grass Yellow	Abundant
20		Pelopidas mathias	Small Branded Swift	Abundant
21		Notocrypta paralyos	Banded Damon	Common

Table 2 presents total number of genera and species belonging to the four butterfly families. While Table 3 represents total number of individuals in both study sites, family wise percentage and relative abundance of each species.

Table 2: Categorization of species under genus and species and family wise percentage of butterfly

Family	Total no genera	%	Total no of Species	%
Nymphalidae	7	41	10	48
Lycaenidae	5	29	5	24
Pieridae	3	18	4	19
Hesperiidae	2	12	2	9
Total: 17			Total:21	

Table 3 showed that *Melanitis leda* was the most abundant species with 47 individuals, followed by *Pelopidas mathias* (43), *Eurema hecabe* (38), and *Junonia atlites* (30), which were the most frequently observed species. In contrast, only a few individuals were recorded for *Pseudozizeera maha* (2), *Melanitis phedima* (2), *Hypolimnas bolina* (3), and *Pieris brassicae* (2).

Table 3: Numerical abundance and Relative abundance (RA) of each butterfly species

S.N	Family	Genus	Species	Site1	Site2	No	Relative Abundance (%)	Total no.of Individuals	%
1	Nymphalidae	Junonia	atlites	18	12	30	8.23	215	59.2%
2			almama	15	3	18	4.93		
3		Melanitis	leda	26	21	47	12.87		
4			phedima	0	2	2	0.54		
5		Elymnias	hypermnestra	12	10	22	6.02		
6		Mycalasis	mineus	12	14	26	7.12		
7		Danaus	chrysippus	14	6	20	5.47		
8		Neptis	hylas	18	4	22	6.02		
9		Tirumala	limniace	12	9	21	5.75		
10		Hypolimnas	bolina	3	0	3	0.82		
11	Lycaenidae	Chilades	pandava	7	2	9	2.46	29	8.0%
12			centaurus	7	1	8	2.19		
13		Anthene	emolus	3	1	4	1.09		
14		Zizula	hylax	4	4	8	2.19		
15	Pseudozizeera	maha	0	2	2	0.54			
16	Pieridae	Catopsilia	pamona	8	7	15	4.1	63	17.4%
17			pyranthe	4	3	7	1.91		
18		Pieris	brassicae	3	0	3	0.82		
19	Eurema	hecabe	16	22	38	10.41			
20	Hesperiidae	Pelopidas	mathias	24	19	43	11.78	56	15.4%
21			Notocrypta	paralysos	11	2	13		
Total				223	142	365			

Table 4 shows the values of different diversity and evenness indices for butterfly species in Site 1 and Site 2. The value for Shannon Weiner index was recorded 2.81 and 2.58 for Site 1 and Site 2. Like wise Simpson's Index of diversity was recorded 0.93 and 0.91 for Site 1 and 2. Pielou evenness index was recorded as 0.91 and 0.89 for Site 1 and Site 2 of the study area.

Table 4: Value of Butterfly diversity and evenness index

Sl No	Index	Value Site 1	Value Site 2
1	Shannon Weiner Index,H	2.81	2.58
2	Simpsons index of Diversity(1-D)	0.93	0.91
3	Pielou evenness index,J	0.91	0.89

**Discussion :**

A total of 21 species of butterfly with 365 individuals of butterfly belonging to 17 genera and four families were recorded in the two study sites. Gogoi et al. (2023) recorded a total of 92 butterfly species belonging to five families during their study at Soraipung Range of Dehing Patkai National Park. Current study recorded Nymphalidae as the largest family containing highest number (48%) of butterflies. The results of the present survey closely align with the findings of Ali and Basistha (2000), where they reported 72 butterfly species belonging to five families from the Assam State Zoo-cum-Botanical Garden, Guwahati, Assam. Ali and Basistha (2000) also found Nymphalidae exhibiting the highest species richness. Dutta et al. (2025) also reported that the family Nymphalidae contained the highest number and percentage of butterfly species throughout all four years of the study period in the IIT campus, Guwahati compared to the other families. Adaptive capabilities and effective landscape management may account for the high diversity observed in the family Nymphalidae. Another reason for the rich diversity of the family Nymphalidae might be due to their strong active flying capability and their polyphagous nature which facilitates them to cover large areas and utilize a variety of host plants (Eswaran & Pramod 2005; Padhye et al. 2006).

The geographical setting of a region, along with its climatic conditions and vegetation composition, plays a crucial role in maintaining a healthy status of butterfly diversity. Investigating species diversity and study of behavior and habitat ecology is essential for developing a comprehensive database for the study area. Types of habitat, quality of food resource and its availability regulate the faunal and floral diversity in a specific area. The two study sites are rich in flowering plants, host plants, and nectar-collecting wildflowers which provides a suitable habitat for the butterfly species. Availability of adequate larval and adult host plant resources influences diversity and distribution of butterfly species (Ramesh et al. 2010).

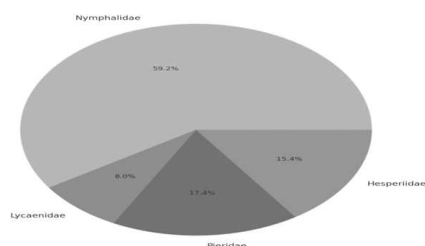


Fig3 : Pie chart showing the relative abundance of four butterfly families

Butterfly species were found to be most abundant in areas rich in diverse flora, which likely provide ample larval host plants and nectar resources. In contrast,

comparatively lower abundance was observed in riparian areas, possibly due to anthropogenic disturbances. Previous studies have reported higher butterfly diversity in disturbed habitats than in undisturbed areas (Hamer et al., 1997). The family Hesperiiidae was recorded to be the least containing only 2 genera and 2 species. *Melanitis leda* exhibited the highest relative abundance (12.87%), followed by *Pelopidas mathias* (11.78%). The lowest relative abundance was recorded for *Melanitis phedima* and *Pseudozizeeria maha* (0.54%). The observed differences in relative abundance between species of the same genus are likely attributable to variations in their habitat preferences. *Melanitis leda* is a highly adaptable and common species, distributed in a large area including degraded forests, human-modified landscapes, and agricultural areas. In contrast, *Melanitis phedima* prefers less disturbed habitats with denser canopy cover. Additionally, habitat degradation due to urbanization, environmental stressors, and natural factors such as parasitism and predation may contribute to the low availability of *Pseudozizeeria maha*

anthropogenic disturbances may be a contributing factor to the present diversity status.

**Conclusion :**

Butterflies and plants are related very specifically. Butterflies collect nectar exclusively from flowers. Consequently, pollination—an essential process for ecosystem survival represents a critical ecological link that must be thoroughly understood to develop effective biodiversity conservation strategies. The study area supports a moderate diversity of butterflies due to absence of diverse microhabitats to support both adult and larva. Adult butterflies generally favor forest areas at medium altitudes, while larvae prefer ecotones rich in food plants with large leaves (Piccini et al., 2022). Establishment of eco-forests or adopting similar conservation initiatives may help to conserve these “jewels of nature,” Therefore suitable habitats for butterflies must be both maintained and enhanced.

PLATE 1: Butterfly species in the No 2 Shyampur area of Dalgaon

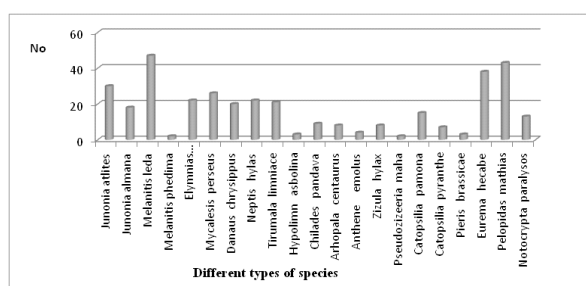
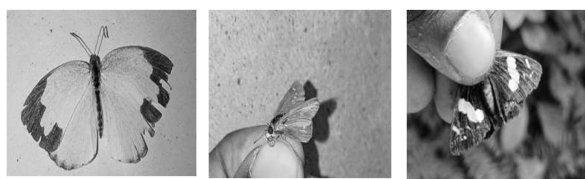


Fig 4: Bar diagram representing different types and numbers of butterfly species

Diversity indices can serve as a good indicator of the overall status of an area. Faunal diversity at different succession stages in an area is marked by diversity indices (Pearson and Rosenberg, 1978). The Shannon–Wiener index values of 2.81 and 2.58 in the two study sites (1 and 2) indicate a moderate level of butterfly diversity. Similarly, Simpson’s index of diversity value was recorded as 0.93 and 0.91 at study site 1 and 2 respectively reflecting a high level of diversity. A high degree of evenness was also found by the values of Pielou’s evenness index as 0.91 and 0.89 in study site 1 and 2 respectively. Although the study sites support a moderate level of biodiversity, no species was found to be listed in Schedule I or II of the Indian Wildlife (Protection) Act, 1972 (Anonymous, 2006) were recorded. This may be attributed to the lack of suitable habitats, expansion of agricultural land, increasing human habitation, and low canopy cover. Furthermore, the gradual degradation of habitats due to various





**B:** *Junonia almanac*      **L:** *Arhopala centaurus*  
**C:** *Melanitis leda*      **M:** *Anthene emolus*  
**D:** *Melanitis phedima*    **N:** *Zizula hylax*  
**E:** *Elymnias hypermnestra* **O:** *Pseudozizeeria maha*  
**F:** *Mycalasis mineus*      **P:** *Catopsilia pamona*  
**G:** *Danaus chrysippus*    **Q:** *Catopsilia pyranthe*  
**H:** *Neptis hylax*          **R:** *Pieris brassicae*  
**I:** *Tirumala limniace*      **S:** *Eurema hecabe*  
**J:** *Hypolimn asbolina*    **T:** *Pelopidas mathias*  
    **U:** *Notocrypta paralysos*

### Acknowledgements

Authors are grateful to the resident people of the study area in collecting data and completion of the whole work. The authors express thanks to all the members of department of Zoology, PDUAM in collection and identification of the species.

### Conflicts of Interest

Authors don't have any conflicts of interest.

### Authors' Contribution

Both the authors have equal contribution in the present work.

### Funding

No funding has received from any agency.

### Ethics Statement

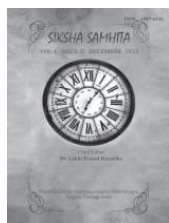
No experiment has been done on human and animals.

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## Service Quality of Public Universities in Assam: An Examination of Tangibility, Reliability, Responsiveness, Assurance and Empathy

### Abstract

Universities are very important agency of higher education and play a great role in providing advanced education. Service quality is an ever-demanding and ever-discussing issue as it determines the success of an educational institution and its stakeholders. The present study employed the SERVQUAL model that examines the service quality of the universities by comparing service expectations and perceptions of the stakeholders. Different demographic variables and five service quality dimensions were considered as important variables in this study. The study sample consisted of 595 postgraduate students and research scholars from six general public universities in Assam. From the empirical statistical analysis, the study reported the mean service gap score of -0.968, which refers overall moderately negative level of service quality. Dimension-wise, the service gap scores were -0.869, -1.138, -0.888, -0.885 and -1.056 respectively for tangibility, reliability, responsiveness, assurance and empathy. This negative service gap in all the SERVQUAL dimensions refers to the clear lacunae in the service rendered by the public universities in Assam.

Keywords : University education, service quality, SERVQUAL, tangibility, reliability, responsiveness, assurance and empathy

### Introduction

Higher education (HE) is a very crucial accelerator of society as it greatly influences the socio-economic development of any country. Higher education is the pivot of the economy of a country. After the USA and China, India has the largest HE system with respect to enrollment. In the backdrop of rapid global competition, there has been a speedy increase in the number of institutions, programmes and student enrollment in the HE of India. Regardless of all the hefty quantitative expansions, the quality of Indian HE is still under scanner. Along with other related problems, quality deprivation is the foremost problem of Indian HE (Altbach, 2014; Baruah, 2018; NEP 2020).

To improve the quality of higher education, there is a need to improve the quality of services rendered by the higher education institutions (HEIs). The HEIs must continuously try to render their services with consideration of the needs and aspirations of their

stakeholders. Service quality refers to the achievement of provided services. It is the general outlook that the client forms regarding its delivery, which is constituted by a series of successful or unsuccessful experiences (Gronroos, 1984). Service quality can be defined as the degree to which the quality of a process or service matches the expectations of its consumers. It is the difference between anticipated expectations of service quality and perceptions of rendered service (Parasuraman et al., 1985).

The SERVQUAL (service quality) scale is an important tool for quantifying the service quality rendered by an organization. Parasuraman, Zeithaml and Berry (1988) standardized the SERVQUAL model which explored perceived service quality by comparing expectations and the actual experience of the service received. Danjuma, Bawuro, Vassumu and Habibu (2018) stated that the growing competition in the service industry has made SERVQUAL better because of its diagnostic ability, even though the other instruments seem to have

some practical measure of stability. The SERVQUAL made it easy to evaluate service quality and to identify those dimensions that are negatively perceived by stakeholders.

The SERVQUAL evaluated the quality of rendered service by an institution with consideration of five dimensions name tangibility, reliability, responsiveness, assurance and empathy. Tangibility refers to the appearance of physical facilities, equipment, human resources and information material. Reliability refers to the ability of the university to perform the service accurately and dependently. Responsiveness refers to the willingness among academic and non-academic staff to help students and scholars and provide prompt service. Assurance refers to the competence and credibility among teaching and non-teaching staff to help the students and scholars. Empathy refers to the caring and individual attention to the students and scholars by the teaching and non-teaching staff of the university.

#### **Review of Related Literature**

Rajasingh (2009) revealed different levels of perceptions among different stakeholders concerning quality assessment in higher education. Danjuma and Rasli (2012) revealed negative perceptions of provided service quality across the four dimensions namely empathy, tangibility, commitment and reliability in technology-based universities. Lemmalodesso (2012) revealed a very poor level of initiative for service quality improvement and service gaps in Ethiopian public HEIs. A different level of service quality perception and expectation was found between staff and students. Koni, Zainal and Ibrahim (2013) indicated that the service quality in Palestine universities is slightly unsatisfactory to the students and needs further attention. The SERVQUAL model revealed a discrepancy in the students' expectations and perceptions regarding university services. Yousapronpaiboon (2013) revealed a significant gap between perceptions and expectations in all five dimensions. Observed gap scores of service quality dimensions were -2.25, -2.72, -2.48, -2.48 and -2.88 respectively for reliability, responsiveness, assurance, empathy and tangibility. Kontic (2014) revealed a moderate level of service perceptions where students were not satisfied with the treatment given by administrative staff. The most important service quality dimensions were assurance and reliability, followed by responsiveness and empathy. Perception of the responsiveness dimension was found different across gender.

Abidin (2015) revealed a perception gap between lecturers and students in terms of the quality of education provided by the Islamic public university in

Malang, Indonesia. Dušević and Èasní (2015) revealed a clear perception difference between the students and faculty of public and HEIs. The service quality was found lower than others at research-oriented HEIs. El-Hilali, Al-Jabar and Hussain (2015) found that the service quality dimension tangibility had a direct influence on students at Kuwaiti private colleges. Twaissi and Al-Kilani (2015) revealed that the tangibility and assurance dimensions affect students' intentions of recommending others to study at their university. The assurance and empathy dimensions had a significant effect with regard to students' intentions. Chui, Ahmad, Bassim and Zaimi (2016) found that the scores of all service quality dimensions were higher for expectation than perception in the private higher education of Malaysia. Akareem and Hossain (2016) revealed the significant relationship between perceptions of higher education quality and the provision of scholarships at five top-ranking private universities in Bangladesh located in Dhaka City. Students who get scholarships had comparatively less expectation about the quality provided by higher education institutions. Satsangi (2016) found overall very good perceptions among graduate and post-graduate students. Kim and Lee (2015) revealed a significant correlation between academic achievement with general satisfaction (0.235) and course satisfaction (0.123) studying among physical therapy students from five regions of the Republic of Korea. Wach, Karbach, Ruffing, Brunken and Spinath (2016) revealed that students with higher academic achievement were also more satisfied with the conditions of their academic program at a teacher education institution in Germany. McCladdie (2017) revealed that there are various factors namely high expectations, consistent communication, parental involvement, supportive environment and purposeful engagement which support the level of satisfaction of stakeholders in improving academic achievement. Chopra, Chawla and Sharma (2017) found a significant gap between expectations and perceptions regarding service quality among the students of education colleges as well as management institutes in Haryana.

Hossain, Hoq, Sultana and Hassan (2019) found less overall satisfaction towards service quality among female students than male counterparts in respective universities in Bangladesh. Students belonging to the urban area and middle-class background had higher satisfaction than others. Makoe and Nsamba (2019) revealed that students' expectations were not met in three service quality dimensions such as tangibility, reliability and delivery dimensions at the University of South Africa, with the use of the SERVQUAL scale. Mulay and Khanna (2020) revealed that the admission process, examination system and placement have the

most significant impact on quality improvement in private engineering and management institutions of India. Osman, Sohel-Uz-Zaman, Ashraf and Uddin (2020) revealed that the image of the institution mediates the correlation between educational service quality and industrial link at the University of Utara, Malaysia. Lijun and Yin (2021) measured higher education service quality during the COVID-19 pandemic in China using a SERVQUAL method. It revealed a gap between perceptions and expectations regarding service quality; where perception was higher than expected in all five dimensions except the tangibility dimension. Chandra and Suhermin (2022) revealed a significant and positive influence of university image and service quality towards word of mouth in Riau province. Kökalan, Yumu'ak and Gürleyen (2022) found that private universities to provide better service quality than public universities in Turkey. Rozak et al. (2022) empirically evaluated educational service quality in Russian versus Indonesian universities and revealed higher service perception among the students of Russian universities than their counterparts.

Pekkaya, Pulat and Zeydan (2023) revealed that different service quality factors namely administration, responsiveness, tangibility, support infrastructure, teaching, curriculum and transformative quality have a strong impact on students' satisfaction in higher education. Alemu (2023) found a disparity between students' expectations and their perceived scores in all service quality dimensions, viz. tangibility ("1.13), reliability ("0.93), responsiveness ("0.46), assurance ("0.58) and empathy ("1.05) in Madda Walabu University. Limbu and Pham (2023) discovered a positive association between e-learning service quality dimensions and student satisfaction with e-learning amid the COVID-19 pandemic. Yidana, Bawa, Gariba and Adabuga (2023) Results showed what students expected of university service quality was higher than what they experienced. Students' experiences of service quality had a significant direct effect on their satisfaction levels. Ban et al. (2024) showed a still-reserved attitude towards certain aspects of the digitization of services, with priority remaining on aspects related to the material base and the prospects of finding a suitable job after graduation. Osman, Joarder and Ashraf (2024) exhibited that service quality, the reputation of the institution and the intake capacity of the students significantly determine the students' satisfaction.

### **Need and Significance of the Study**

Evaluating service quality has emerged as an important interdisciplinary field of study. Evaluation of service quality is an indicator that is used by people to judge whether the performance of a university is good or bad.

Evaluating service quality in universities is a basic priority of the state, which helps in the improvement of the academic activities of the university and will lead to societal betterment. From the evaluation of service quality, the stakeholders can able to know about the strengths and weaknesses of the institution, and they can take remedial actions. The study of service quality can help policymakers and the government to make required changes for the betterment of the institutions. By knowing its status of service quality, an institution can take some steps for the betterment of the institution at the internal level.

A study on service quality will provide a clear-cut status about the performance of universities and this will help the policymakers to take developmental steps in the governance of university education. The study will provide ground-level data about service quality and its influences at the university level.

### **Objectives of the Study**

- i. To examine the service quality of public universities in Assam.
- ii. To compare perceived service quality between research scholars and PG students.
- iii. To compare perceived service quality between male and female students.
- iv. To compare perceived service quality with regard to the locale of the respondents.
- v. To compare perceived service quality with regard to the stream of study.
- vi. To compare service quality with regard to academic achievement.
- vii. To examine the influence of tangibility, reliability, responsiveness, assurance and empathy on service quality.

### **Hypotheses of the Study**

**H<sub>0</sub>1:** There is no significant difference in service quality amongst the five SERVQUAL dimensions at public universities in Assam.

**H<sub>0</sub>2:** There is no significant difference in the perceived service quality of research scholars and PG students.

**H<sub>0</sub>3:** There is no significant difference in perceived service quality between male and female students.

**H<sub>0</sub>4:** There is no significant difference in perceived service quality with regard to the locality of the respondents.

**H<sub>0</sub>5:** There is no significant difference in perceived service quality with regard to students' stream of study.

**H<sub>0</sub>6:** There is no significant difference in perceived service quality with regard to the academic achievement of the respondents.

**H<sub>0</sub>7:** There are no significant correlations between the five SERVQUAL dimensions and total service quality.

**Materials and Methods**

**Method and approach :**

Considering the objectives of the study, the investigator used the descriptive survey method to carry out the present study. Concerning the approach, the investigator employed QUAN-qual approach where quantitative analysis is followed by the qualitative description.

**Population and sample :**

All the post-graduate students and research scholars pursuing their respective courses in Arts, Science and Commerce disciplines at the general public universities in Assam (2021-22) represent the population of the present study. The sample of the institutions was confined to six selected universities; the direct target population includes all the post-graduate students and research scholars of those six universities. From the esteemed population (approx. 18,488), a total of 595 were selected as the respondents of the present study.

**Tools used :**

To examine the service quality of public universities in Assam, the investigator redesigned and adopted the service quality (SERVQUAL) model standardised by Parasuraman, Ziethaml and Berry (1988). From the re-calculation of reliability (Cronbach  $\alpha$ ), the correlation of the coefficient score was found 0.94 and the split-half coefficient value was found 0.84. The reliability scores for five service quality dimensions were 0.82, 0.89, 0.84, 0.82 and 0.86 respectively for tangibility, reliability, responsiveness, assurance and empathy.

**Statistical techniques used :**

Statistical measures namely central standard deviation, variance, Z - test, F – test and correlation of coefficient were used by the investigator for the fulfillment of research objectives, according to need and relevance.

**Analysis and Interpretations**

**Perceived service quality of public universities in Assam:**

Dimension	n	Mean Perception	Mean Expectation	Service Gap	F-value
Tangibility		3.613	4.483	-0.869	
Reliability		3.407	4.545	-1.138	
Responsiveness	595	3.304	4.192	-0.888	12.030*
Assurance		3.585	4.470	-0.885	(4, 590)
Empathy		3.114	4.170	-1.056	
<b>Total</b>		<b>3,404</b>	<b>4,372</b>	<b>-0.968</b>	

**H<sub>0</sub>1:** There is no significant difference in service quality amongst the five SERVQUAL dimensions at public universities in Assam.

Table 1: Overall and Dimension-wise Service Quality

\*Significant at 0.05 level

From the above table, it is apparent that students’ mean service perception was 3.404 against the mean expectation of 4.372, and as a result, the mean service gap was found -0.968. From the dimension-wise analysis, it is evident that every dimension has a lower perception against a higher expectation. The mean service gap was found as -0.869, -1.138, -0.888, -0.885 and -1.056 respectively for tangibility, reliability, responsiveness, assurance and empathy. The negative service gap in all the SERVQUAL dimensions refers to the clear lacunae in the service rendered by the public universities in Assam. The services rendered by the public universities have not been able to fulfill the expectations of the students.

Out of five SERVQUAL dimensions, reliability and empathy showed higher negative service gaps in comparison with the rest three. Further, the ANOVA was employed to calculate the mean difference among five SERVQUAL dimensions and the F - value was found as 12.03. As the calculated F - value is greater than the critical value (2.807), it can be stated that there is a significant difference in service quality among the five SERVQUAL dimensions at public universities in Assam. Hence, the stated null hypothesis that ‘there is no significant difference in service quality amongst five SERVQUAL dimensions at public universities in Assam’ has failed to be accepted.

The findings can be interpreted that the degree of service rendered by the public universities in Assam certainly varies with regard to different factors. If a university provides good service in one dimension, it does not guarantee the same in other dimensions. Assuring and maintaining an equal degree of services in all the factors is a very challenging task for an institution.

In correspondence with the present findings, previous studies conducted by Danjuma and Rasli (2012) in Nigeria; Lemmalodesso (2012) in Ethiopia; Koni, Zainal and Ibrahim (2013) in Palestine; Chopra, Chawla and Sharma (2017) in Haryana, revealed a negative gap between students’ perceptions and expectations in HEIs. Similar to the present finding, Kontic (2014) also revealed the increasing importance of the reliability dimension in service quality. On the other hand, studies conducted by Rahim-Khanli, Daneshmandi and Choobineh (2014) showed the least

gap in the reliability dimension. Further, contradicting the present finding, studies conducted by Satsangi (2016) in Agra; Lijun and Yin (2021) at Chinese HE revealed overall higher service perception.

#### Comparison of the service quality perceived by research scholars and PG students :

**H<sub>0</sub>2:** There is no significant difference in the perceived service quality of research scholars and PG students.

Table 2: *Perceived Service Quality of Research Scholars versus PG Students*

Group	n	Mean Perception	Mean Expectation	Service Gap	Sd	Z-value
Research Scholar	170	3.287	4.383	-1.096	0.76	2.796*
PG Students	425	3.451	4.366	-0.915	0.69	

\*Significant at 0.05 level

The above table depicted that the mean service gap perceived by scholars is found as -1.096 and it is -0.915 for PG students. Afterward, the Z - test was conducted to compare the perceived service quality between scholars and PG students, and the Z - value was found 2.796. The calculated Z - Z-value is larger than the critical value (1.96) with a degree of freedom of 593. Therefore, it can be concluded that there is a significant difference in the perceived service quality of research scholars and PG students. Here, the stated null hypothesis cannot be accepted.

Research scholars have perceived a higher service gap than PG students. This could be due to the diverse needs and expectations of research scholars in comparison with PG students. The service rendered to PG students is mostly related to teaching, and for research scholars, it is related to research as well as extension services. Corresponding to the present finding, Lemmalodesso (2012) at Ethiopian HE and Abidin (2015) at Indonesian HE revealed the different degrees of service perception among the different groups of stakeholders.

#### Comparison of the service quality perceived by male and female students :

**H<sub>0</sub>3:** There is no significant difference in perceived service quality between male and female students.

Table 3: *Perceived Service Quality of Male versus Female Students*

Group	n	Mean Perception	Mean Expectation	Service Gap	Sd	Z-value
Male	231	3.310	4.136	-1.006	0.75	1.060 <sup>NS</sup>
Female	364	3.464	4.406	-0.942	0.69	

<sup>NS</sup> Not Significant at 0.05 level

The above table depicted that the mean service gap perceived by the male is found as -1.006 and it is -0.942 for female students. Afterward, the Z - test was conducted to compare the perceived service quality between male and female students, and the calculated

Z - value was found 1.06. As the calculated Z - value is smaller than the critical value (1.96) with a degree of freedom of 593, it can be concluded that there is no significant difference in perceived service quality between male and female students. Here, the stated null hypothesis 'there is no significant difference in perceived service quality between male and female students' is accepted.

It can be interpreted that students' perception and expectation of service rendered by public universities in Assam do not have a gender influence. Regardless of gender, being a primary member of higher education all the students develop their viewpoints on service quality based on their own study experience. On the other hand, Butt and Rehmann (2010) in Pakistan; Kontic (2014) in Serbia; Twaissi and Al-Kilani (2015) in Jordan revealed variation in the students' perceived service quality with respect to their gender.

#### Comparison of the service quality with regard to the locale of the respondents :

**H<sub>0</sub>4:** There is no significant difference in perceived service quality with regard to the locale of the respondents.

Table 4: *Comparison of the Service Quality with regard to the Locale of the Respondents*

Group	n	Mean Perception	Mean Expectation	Service Gap	Mean Square	F-value
Rural	264	3.332	4.370	-1.038	3.412	6.800*
Urban	185	3.555	4.362	-0.808	0.502	(2.592)
Semi-urban	146	3.344	4.384	-1.040	3.412	

\*Significant at 0.05 level

The study comprised respondents from three groups with respect to locale. The mean service gaps are found -1.038, -0.808 and -1.040 respectively for the rural, urban and semi-urban locales. By employing one-way ANOVA, the calculated F - value was found 6.80 which is larger than the critical value (3.711) at the 0.05 level of significance. Therefore, it can be said that students' level of service expectations and perceptions varies with respect to their locale. Hereby, the stated null hypothesis 'there is no significant difference in perceived service quality with regard to the locale of the respondents' failed to accept.

This result can be interpreted as that, students from different localities get different sorts of exposure to the institutions of higher education. Similarly, students' locality influences educational goal setting and level of aspiration. Accordingly, they build their expectations of services from the institutions they attend. The present findings resembled the findings revealed by Rajasingh (2009); Akareem and Hossain (2016); Hossain, Hoq, Sultana and Hassan (2019).

**Comparison of the service quality with regard to the stream of study :**

**H<sub>0</sub>5:** There is no significant difference in perceived service quality with regard to students’ stream of study.

Table 5: Comparison of the Service Quality with regard to the Stream of Study

Group	n	Mean Perception	Mean Expectation	Service Gap	Mean Square	F-value
Arts	210	3.457	4.288	-0.831	3.006	5.967*
Science	210	3.340	4.372	-1.032	0.504	(2.592)
Commerce	175	3.418	4.469	-1.051		

\*Significant at 0.05 level

The study comprised respondents from three streams namely, Arts, Science and Commerce. The mean service gap scores were found as -0.831, -1.032 and -1.051 respectively for Arts, Science and Commerce streams. The one-way ANOVA revealed the F - value as 5.967 which is greater than the critical value (3.711) at the 0.05 level of significance; it is concluded that there is a significant variation exists in the perceived service quality amongst students from three different streams. Therefore, the stated hypothesis, ‘there is no significant difference in perceived service quality with regard to students’ stream of study’ is failed to accept.

This finding can be interpreted that students of different streams perceive distinct needs and requirements in their academic journey. The tangibility and non-tangibility resources needed for the different streams of study are distinct and vary. In this respect, the investigator observed variation in the resources and service-providing mechanisms from institution to institution and across streams.

**Comparison of service quality with regard to academic achievement :**

**H<sub>0</sub>6:** There is no significant difference in perceived service quality with regard to the academic achievement of the respondents.

Table 6: Comparison of Service Quality with regard to Academic Achievement

Group	n	Mean Perception	Mean Expectation	Service Gap	Mean Square	F-value
80% and above	188	3.360	4.450	-1.090	4.412	8.844*
65-79 %	322	3.470	4.320	-0.850	0.499	(2.592)
50-64 %	85	3.240	4.350	-1.110		

\*Significant at 0.05 level

The respondents of the study were divided into three different groups in terms of their academic achievement. The one-way ANOVA was employed and the F - value was found 8.844, which is greater than the critical value (3.711). This result verified that there is significant variation exists in the students’ perceived service quality concerning their academic achievement.

Students who scored above 80 percent and between 50 to 64 percent perceived higher service gap scores. Therefore, the stated null hypothesis, ‘there is no significant difference in perceived service quality with regard to the academic achievement of the respondents’ is failed to accept.

This result can be interpreted from a psychological perspective (law of effect) that students who achieve more always try to do better and they expect better service from the institutions too. Whereas, students with average or below average academic achievement remain unsatisfied with their self-performance and at the same time they may perceive service lacunae of the institution. Similarly, studies conducted by Kim and Lee (2015) in Korea; Dhaqana and Afrah (2016) in Somalia; Wach, Karbach, Ruffing, Brunken and Spinath (2016) in Germany; McCladdie (2017) in USA revealed the impact of academic achievement in service quality.

**The correlation matrix of five SERVQUAL dimensions and total service quality :**

**H<sub>0</sub>7:** There is no significant correlation between the five SERVQUAL dimensions and total service quality.

Table 7: The Correlation Matrix of five SERVQUAL Dimensions (D) and Service Quality

n-595	D1	D2	D3	D4	D5	Service Qt.
<b>D1: Tangibility</b>	1					
<b>D2: Reliability</b>	0.715*	1				
<b>D3: Responsiveness</b>	0.440*	0.492*	1			
<b>D4: Assurance</b>	0.548*	0.679*	0.468*	1		
<b>D5: Empathy</b>	0.450*	0.545*	0.455*	0.553*	1	
<b>Service Quality</b>	0.804*	0.870*	0.723*	0.817*	0.746*	1

\*Significant at the 0.05 level

The above table depicted that the five SERVQUAL dimensions have significant positive correlations with each other, as the calculated values are greater than the critical value at 0.05 level with the degree of freedom of 593. The correlation value between tangibility and reliability and between assurance and reliability are found strong. Whereas, moderate correlations are found amongst other SERVQUAL dimensions. This correlation indicates that better service quality in one dimension influences positively the other.

From the examination of the correlation between five SERVQUAL dimensions and total service quality, the correlation values are found significantly positive. The tangibility, reliability and assurance dimensions revealed a very strong positive correlation with the total service quality as the correlation are 0.804, 0.870 and 0.817 respectively. The responsiveness and empathy dimension showed a strong correlation with the ‘r’ values of 0.723 and 0.746.

The above analysis cleared that there are significant positive correlation between the five SERVQUAL dimensions and total service quality at public universities of Assam. Better results in one variable, have a positive influence on another. Therefore, the stated null hypothesis, 'there is no significant correlation amongst five SERVQUAL dimensions, total service quality and students' satisfaction at public universities of Assam' is failed to be accepted.

### Conclusion and Suggestions

The present study is an empirical examination of service quality and of public universities in Assam. From the extensive analysis, the study revealed a mean service gap score of -0.968, which refers overall moderately negative level of service quality. The service gap scores were found as -0.869, -1.138, -0.888, -0.885 and -1.056 respectively for tangibility, reliability, responsiveness, assurance and empathy. This negative service gap in all the SERVQUAL dimensions refers to the clear lacunae in the service rendered by the public universities in Assam. Further, significant service variation was found in the five SERVQUAL dimensions. Significant differences were found between research scholars and PG students with regard to their perceived service quality. No significant difference was found between male and female students concerning their perceived service quality. The locality, stream of study and academic achievement of the respondents showed significant impact in their perceived service quality. The correlation analysis showed a significant positive correlation between five SERVQUAL dimensions and total service quality at public universities of Assam.

As the results revealed service quality gaps in all five SERVQUAL dimensions, the employees of all the public universities in Assam should make collaborative efforts to reduce negative service gaps and to meet the needs and expectations of the students and research scholars. The vice-chancellors, deans, heads and faculty members of the universities should focus on consistently better performance regarding all the dimensions of service quality namely tangibility, reliability, responsiveness, assurance and empathy.

### Acknowledgements :

No financial support or personal assistance was received for the present work.

### Conflict of Interest :

Authors do not have any conflicts of interest.

### Authors' Contribution :

Both the authors have equal contribution in the present work.

### Funding :

Not Applicable

### Ethics Statement :

No experiment has been done on humans and animals.

### Informed Consent :

Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## **Advancing Global Protection: The Case for an International Convention on Older Persons**

### **Abstract**

The growing global population of older persons calls for an effective international legal framework to address the diverse challenges and vulnerabilities associated with aging. Current international human rights laws do not adequately protect the rights of older individuals, as ageism and discrimination based on age still exist, aggravated by the lack of a legally binding instrument specifically tailored to their needs. Thus, an International Convention on the Rights of Older Persons is crucial. Such a convention would offer a legally enforceable framework obligating states to protect the rights of the older people. This study examines existing international and regional human rights laws to determine the extent to which they adequately protect the rights of older people. It investigates the need for a specific International Human Rights Convention for the elderly by analyzing its potential benefits. This study also analyzes the debate surrounding the convention and offers specific recommendations to promote its future adoption.

**Keywords :** Elderly Rights, Global Convention, Human Rights, International Law, United Nations

### **Introduction :**

The 21st century has been marked by a significant demographic shift, with the global population rapidly aging. The number of individuals aged 65 and older is projected to more than double, growing from 761 million in 2021 to 1.6 billion by 2050, while the growth rate for those aged 80 and above is even faster (UN, 2023). This development brings about many complex challenges, impacting the global economy, healthcare services and social systems. Rapid increase in the number of older people worldwide requires stronger international legal protection to address the unique challenges that they face.

Human rights are universal by definition. However, despite the universal application of human rights principles, older persons frequently remain insufficiently safeguarded under current international legal frameworks. Ageism often contributes to discrimination and neglect. Existing international human rights laws do not contain a comprehensive legal instrument on the rights of older people. The rights and well-being of older adults have been largely ignored. Older people are increasingly viewed as a

‘problem’ whose needs challenge the resources of care services (Tang & Lee, 2005). Currently, there is a lack of a comprehensive legal framework dedicated to the rights of the elderly, both globally and within regional systems. Therefore, an international convention that recognizes the distinct rights of all older people and is explicitly applicable to older people as citizens of signatory countries is crucial for older people to assert their rights (Doron & Apter, 2010).

### **Research Objectives:**

1. The study examines the existing international and regional human rights laws to determine the extent to which they adequately protect the rights of older people.
2. It investigates the need for a specific international human rights convention for the elderly by analyzing its potential benefits.
3. It analyzes the debate surrounding the convention, offering specific recommendations to promote its future adoption.

### **Research Methodology:**

This study uses a qualitative doctrinal method to critically evaluate the international human rights framework for older adults. It relies primarily on secondary sources, including scholarly books, journal articles, United Nations resolutions and reports (such as the UDHR, ICCPR, ICESCR, and OEWGA documents), policy papers from organizations like the OHCHR, HelpAge International, Amnesty International, and WHO, as well as newspapers, websites, and internet archives. Data collection involved a systematic review and thematic analysis of these sources to identify protection gaps, evaluate existing instruments, and assess arguments for a new convention for older persons.

### **Results and Discussion:**

#### **Evolution of Elderly Rights Frameworks: Historical and Legal Context**

Historically, the United Nations has undertaken several significant initiatives to address the rights and needs of older persons. The preamble of the United Nations Charter affirms the dignity and worth of every human being and recognizes the fundamental rights of all individuals. Article 1(3) of the Charter states that the United Nations aims to address economic, social, cultural, and humanitarian issues and promote respect for human rights without discrimination (Barafi et al., 2023).

The Universal Declaration of Human Rights (UDHR), adopted in 1948, established fundamental rights applicable to all individuals, including older adults. Article 25 (1) of the UDHR states that everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing, medical care, and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, **old age**, or other lack of livelihood in circumstances beyond his control (United Nations, 1948). In 1948, Argentina proposed a convention on the rights of older persons. This proposal was a landmark moment, highlighting global recognition that older people require specific safeguards and protections under international law (Ramachandran, 2014). International Covenant on Civil and Political Rights (ICCPR) (1966) in its Article 7 and the International Covenant on Economic, Social, and Cultural Rights (ICESCR) (1966) in its Article 9; though not specifically, but generally guarantee the human rights of older people, including health, acceptable living conditions, freedom from torture, legal ability, and equality under the law (Barafi et al., 2023). In 2010, the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) adopted general recommendation 27 on older women

and the protection of human rights under the convention, including addressing the multiple discrimination faced by older women (Ramachandran, 2014). Article 8 (1) (b) of the Convention on the Rights of Persons with Disabilities (CRPD) discusses combating stereotypes, including those based on age. The CRPD includes miscellaneous references to older persons in Article 25 (b) on the right to health and Article 28(2)(b) on the right to an adequate standard of living. Additionally, there are references to age-appropriate access to justice in Article 13 and age-sensitive measures of protection in Article 16 (United Nations, 2006). The International Convention on the Protection of Rights of Migrant Workers and Members of their Families, 1990, in its Articles 1 and 7, mandates against age discrimination (United Nations, 1990).

The United Nations General Assembly decided to address concerns related to individual aging in resolution 33/52 on December 14, 1978, and organized the First World Assembly of Ageing in Vienna, Austria, in 1982. Participants in this first World Assembly on Ageing adopted the Vienna International Plan of Action on Ageing. It was the first international ageing instrument, providing the groundwork for developing ageing-related policies and programmes. It was endorsed by the United Nations General Assembly in 1982 (Resolution 37/51). It included 62 recommendations for action in several areas, such as health and nutrition, housing and environment, family, social welfare, income security and employment, and education (Barafi et al., 2023). In 1991, the United Nations adopted 'The United Nations Principles for Older Persons'. It recognizes five principles: independence, participation, care, self-fulfillment, and dignity. The United Nations declared 1999 as the International Year of Older Persons (Tang & Lee, 2006). The UN designated October 1 as the International Day of Older Persons to recognize global aging and address the concerns of older generations. It aimed to raise awareness about aging issues and to promote the contributions of older individuals to society (Hokenstad & Roberts, 2013). In 2002, the Second World Assembly on Ageing convened in Madrid, Spain, to assist governments and societies in creating policies that ensure that older adults can continue to contribute meaningfully to society. Besides reviewing the outcomes of the First World Assembly, the Assembly adopted the Madrid International Plan of Action on Ageing. This plan emphasizes key areas, including the role of older persons in development, promoting health and well-being in old age, and fostering supportive environments. In 2007, a high-level meeting on the Madrid International Plan of Action on Ageing (MIPAA) was held in Macau, China. At this meeting, 46 recommendations were made to strengthen the

implementation of the MIPAA, including mainstreaming aging concerns and promoting the participation of older persons' associations and NGOs to address the rights and needs of older persons (Ramachandran, 2014).

In October 2010, the UN General Assembly adopted Resolution 65/182, establishing the Open-Ended Working Group on Ageing (OEWGA) to strengthen the human rights of older persons, following up on the Madrid Plan. The OEWG has advocated for a United Nations Convention on the Rights of Older Persons. Over 14 sessions, discussions with Member States, NGOs, and National Human Rights Institutions (NHRIs) highlighted protection gaps, leading to the consensus adoption of Decision 14/1 during the 14th and final session on August 13, 2024. Decision 14/1 recognizes gaps in the international human rights system and suggests options for addressing them, including a new, legally binding UN convention on the rights of older persons (GAROP, 2025). Furthermore, the United Nations General Assembly declared 2021-2030 as the Decade of Healthy Ageing. It builds on the Madrid International Plan of Action on Ageing and is aligned with the UN's Agenda 2030 on Sustainable Development and the Sustainable Development Goals (SDGs). It aims to improve the lives of older people, their families, and communities, ensuring that everyone has the opportunity to live a healthy and fulfilling life, regardless of where they live (WHO, 2020).

Besides these initiatives of the United Nations, few efforts have been made at the regional level to promote the rights of older persons. For instance, the Inter-American Convention on Protecting the Human Rights of Older Persons, which entered into force on January 11, 2017, is the first regional treaty specifically addressing the human rights of older persons. In 2016, the African Union adopted a protocol to the African Charter on Human and Peoples' Rights on the Rights of Older Persons in Africa. This came into effect on November 4, 2024 (Mock, 2019).

### **Older Persons and International Laws: Gaps in Protection**

Existing international human rights laws lack a comprehensive legal instrument for the rights of older people. While particular conventions and provisions exist for vulnerable groups, such as women, children, and people with disabilities, there is no similar instrument specifically for elderly people, making their unique needs and problems less clearly addressed within the international human rights framework (OHCHR, 2010). Despite being a vulnerable group like women and children, the elderly lack a binding global human rights convention (Mock 2019). Rodríguez-

Pinzón and Martín note that elderly rights, often embedded in economic, social, and cultural rights (ESCR) treaties, are mostly viewed as "rights of progressive implementation." This means that states are not required to guarantee them immediately but must progressively realize them based on available resources (Tang & Lee, 2005).

In the UN system and development or humanitarian organizations, advisors for gender, child protection, and sometimes disability are common, but dedicated focal points for the elderly or broad awareness of their specific issues are rare. Humanitarian efforts frequently neglect older people, as facilities, services, and information remain poorly accessible, particularly when provided solely in digital formats that exclude those without internet access (Amnesty International, 2024). Therefore, most scholars support for a transnational human rights agreement in the form of an international convention on the rights of older people, which would include comprehensive and legally binding provisions prohibiting all forms of discrimination against older people and would be supported by a strong monitoring system and an individual complaints procedure (Tang & Lee, 2005).

### **The Case for an International Convention on the Rights of Older Persons**

At the United Nations, there is a debate over whether a new global treaty concerning the rights of the elderly is required or whether existing treaties can be properly implemented. Some countries, such as Argentina and Portugal, call for a new treaty to provide more specific guarantees, while others, such as the United States, China, and Russia, prefer to rely on current human rights agreements (Mock, 2019). In a follow-up report from July 2009 to the Second World Assembly on Aging, the UN Secretary-General pointed out the shortcomings of existing human rights instruments in safeguarding older persons' rights. The report proposed that a convention focused on the rights of older individuals could fill this gap by clarifying and strengthening existing international standards and empowering older people (Doron and Apter, 2010). HelpAge International (2009) suggests that a convention could improve attitudes towards older people, enhance their visibility, and address ageism and discrimination (Hokenstad & Roberts, 2013).

The urgent need for a new international convention for older persons arises from a major gap: there is no comprehensive, legally binding treaty focused specifically on their rights and well-being. The convention would recognize the rights of older people as fundamental human rights and require nations to actively promote equality and ensure the full realization of these rights. This would greatly expand human rights

protections for the elderly by not only preventing harm but also actively supporting their well-being and ensuring they have the same standing as other citizens. National governments must incorporate the convention's rights into their own laws to fulfill these goals. The impact of an international convention for older persons becomes even more significant when one looks at the success of treaties like the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and the Convention on the Rights of the Child (CRC). These agreements show how focused legal frameworks can effectively advance human rights by addressing the unique needs and vulnerabilities of particular groups (Doron and Apter, 2010).

Ageism is a widespread social problem where older people are frequently considered as unproductive due to their age. A specific international convention on the rights of older persons could be a strong global measure to combat ageism. By establishing clear standards and protections, the Convention would counter age-related stereotypes and discrimination, promoting respect and dignity for older people globally (Doron & Apter, 2010). The convention would create a clear legal framework for safeguarding older people from various types of abuse. It would define clear guidelines and processes for the prevention, detection, and response to abuse, encompassing physical, emotional, and financial forms (HelpAge International, 2019). Supporters argue that a dedicated international convention for older persons would act as a key reference and foundation for advocacy efforts. It would also raise awareness of the diverse challenges faced by older people, resulting in stronger laws and policies at the national level (OHCHR 2010).

The proposed UN convention would not only clarify how existing human rights apply to older persons but also establish new rights specifically designed for their unique experiences, filling gaps left by current frameworks. The convention would strengthen older persons by involving them in policy-making, amplifying their voice, and lowering their vulnerability. It would clearly outline states' specific human rights duties and responsibilities toward older people. Amnesty International supports a UN convention on the rights of older persons, stating that it would clearly define these rights and set out national responsibilities to protect older people, particularly by tackling age discrimination, abuse, and neglect. The convention would prompt countries to revise their laws, policies, and practices to meet its standards, leading to real improvements in the well-being of older people (Amnesty International, 2024). Many civil society organizations are calling for a Special Procedure

mandate in the Human Rights Council dedicated to the rights of older persons. A Special Rapporteur appointed under this mandate could play a key role in drawing attention to the human rights challenges faced by older people globally and clarifying how existing human rights standards apply to them (OHCHR, 2010).

### **Barriers to Effective Convention Implementation**

Critics of the proposed convention argue that older adults are already adequately covered by existing international "soft law" instruments, thus a new binding treaty is not needed. They emphasize that, even though soft law is not legally binding, it is important in shaping customary international law. In a global context that values flexibility and diversity, the detailed but non-binding nature of soft law frameworks makes them more adaptable to local policies. Critics suggest that efforts should focus on better implementing current international frameworks rather than creating a new convention. This approach involves using existing human rights conventions, as well as following UN resolutions and declarations like the UN Principles for Older Persons, to protect older adults' rights. Governments can also formulate customized strategies to combat ageism, acting according to their own socio-economic conditions without needing international supervision, and relying on current guidelines for direction (Doron & Apter, 2010).

While international human rights conventions aspire to promote equality, they may not fully understand the complexities of multiculturalism. These agreements can sometimes fail to address unique traditions, belief systems, and social norms, which may result in diverse cultural perspectives being overlooked. For many, international conventions suffer from an "implementation gap," meaning they are not consistently enforced. Accountability mechanisms, particularly at the global level, are often weak or overwhelmed, making it difficult to guarantee compliance with human rights standards. Without effective sanctions, these systems may fail to prevent violations, allowing abuses to continue unchecked (Doron & Apter, 2010). Moreover, some scholars point out that countries are already facing heavy reporting and follow-up responsibilities. Creating a convention that demands specific financial and budgetary commitments for implementation may be challenging, particularly when public policies are limited by financial constraints (OHCHR 2010).

### **The Way Forward**

A convention on the rights of older persons should be carefully designed, drawing on lessons from current human rights frameworks. To achieve a positive result, the process must be transparent and inclusive, actively involving NGOs and advocacy groups at every stage.

Crucially, older people themselves should be at the center, playing a leading role in shaping their rights and understanding their place in society. This approach will ensure the convention genuinely reflects their needs and aspirations. The convention should clearly define who is considered an older person and specify their rights and responsibilities. Doing so would empower older individuals and their organizations to hold governments accountable and ensure their meaningful participation in policy development. The proposed convention should promote a rights-based approach to aging, challenging stereotypes and driving social change by affirming that older individuals are entitled to all human rights (OHCHR 2010). By emphasizing dignity and empowerment, the convention should strike a balance, giving equal importance to citizenship, participation, and inclusion, as well as safety and care. To ensure this balance, the drafting process must include active participation from older rights advocates, gerontologists, and representatives of older persons' organizations (Doron & Apter, 2010).

To effectively safeguard human rights in old age, the convention should protect everyone vulnerable to ageism and age-related discrimination. Since the idea of "older" can differ and ageism often stems from perceived traits rather than a set age, the convention's scope should not be restricted by a fixed age limit, such as 60 or 65, which could leave younger individuals exposed to ageist treatment and rights violations. Older persons are a diverse group, and the challenges they face in claiming their rights vary greatly by region. Addressing their rights therefore requires attention to various forms of discrimination, especially how age interacts with factors like gender, socioeconomic status, ethnicity, and health. The convention must ban all discrimination based on older age, whether alone or combined with other characteristics like race or sex, and must cover the full range of political, civil, economic, social, and cultural rights (HelpAge, n.d.)

To ensure effective implementation, the convention require the establishment of national coordinating agencies and designated government focal points, as well as capacity-building initiatives for states to meet their commitments. Independent national watchdogs, involving older persons and civil society groups, are crucial for monitoring progress. Countries should also be mandated to gather age-specific data to tailor policies that address the particular needs of older individuals (OHCHR, 2010). Additionally, binding mechanisms should be set up to handle individual complaints of violations. An independent international body should oversee compliance, and the treaty should be accessible for signature, ratification, and accession by regional bodies. Furthermore, countries should be

required to perform mandatory equality impact assessments on legislation, policies, and budgets, especially concerning age-related issues (HelpAge, n.d.). Beyond a UN global convention, other international human rights instruments and regional organizations can also play a crucial role in advancing the rights of older persons. Regional bodies like the Organization of American States and its Inter-American Commission on Human Rights can take the lead in developing binding regional agreements that promote these rights, integrating local and cultural perspectives to set new standards in the field (Doron & Apter 2010).

#### **Conclusion :**

The rising number of older people makes their rights a central issue in today's world. Despite the universal nature of human rights, current international laws often fail to protect older persons adequately. The absence of a binding and complete global convention leaves them at risk of ageism and neglect in many countries. The study highlights the need for an international convention focused on older people to strengthen the protection of their rights. Such a step would foster a society that is inclusive, and responsive to the needs of all ages.

#### **Acknowledgements :**

This is an independent work and it owes nothing to any person or organisation.

#### **Conflict of Interest :**

The author declares no conflicts of interest.

#### **Authors' Contribution :**

As the sole author, I made equal and full contribution in the present work.

#### **Funding :**

Not Applicable

#### **Ethics Statement :**

No experiment has been done on humans and animals.

#### **Informed Consent :**

Not applicable as no human participants were involved in data collection for the study.

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### Work Life Balance of Female Teachers at Primary Level in Relation to Locality

#### Abstract

This study is mainly focused on discussing the work life balance of primary school female teachers of Kamrup district. The research problem addressed under this study is to investigate the relationship between work-life-balance and the selected variable that is locality. The data for the present study was collected from 125 respondents in primary school in Kamrup district of Assam by administering a self-structured questionnaire, which consisted of 25 statements with 5 point Likert scale. The data analysis with the help of using SPSS. The results of the study emphasize that the majority of the female teachers have average level of work life balance. The study concluded that Work/personal life enhancement (WPLE) had a positive effect on the female teacher at primary level of Kamrup district of Assam. This study may give insight regarding the problem that teachers usually face. Balance should be established between workload distribution, time and extra-curricular activities so as to inculcate efficiency among teachers.

Keywords : Work Life Balance, Locality.

#### Introduction

The role of work has changed throughout the world due to economic conditions and social demands. Originally, work was a matter of necessity and survival. Throughout the years, the role of “work” has evolved and the composition of the workforce has changed. Today, work still is a necessity but it should be a source of personal satisfaction as well. Work-Family Life Balance does not mean an equal number of hours for various work and personal activities. It is defined as an individual’s ability to meet their work and family commitments, as well as other nonwork responsibilities and activities. In addition to the relations between work and family functions it also involves other roles in other areas of life. It includes proper prioritizing between “work” (career and ambition) on one hand and “life” (health, pleasure, leisure, family and spiritual development) on the other. WLB does not mean an equal balance of work and life. It means the capacity to schedule the hours of professional and personal life so as to lead a healthy, happy and peaceful life. When a female teacher managed properly the professional work and personal life, she has achieved

positive work-life balance. According to Muthulakshmi (2018), “work-life balance can be defined as the perfect integration between work and life both not interfering with each other.”

In a global work environment it has been essential of adopting work life balance(WLB) strategies for every class of employees at all types of organizations. Work – life balance for teaching professional has become one of the greatest challenges in demand their time in the institution but also extend to their home so as to get prepared for the following day, apart from maintaining student records and attending to various institution related functional requirements. Teachers need to spend extra hours every day to be effective and productive in their profession so that they could reach higher levels and face the challenging atmosphere. Moreover, teachers not only look forward towards teaching, but need to also focus on soft skills and life skills so that they not only produce good professionals but also develop good citizens.

This study is an attempt to understand the level of work life balance of female teachers and difference based on

locality (Rural and Urban) of the respondent teachers. Based on this understanding, it is proposed that the present study might also provide suggestions for institutions regarding the issue of WLB policies.

### Need and Significance of the Study

Work-life balance for a female teacher has become one of the greatest challenges in today's world. The review of related literature reveals that very few studies have been made on the primary level in Kamrup district in comparison to other state. Therefore the investigator has become interested to carry a study on the work-life balance of female teacher of primary level. The present study will help to know the level of work-life balance of the women teacher of primary schools. In this study the researcher wishes to find out relationship between work-life-balance and gender and locality. The study has been essential for assessing the growing need for work-life balance policies or programmes for female teachers. So, there is need to study how the female teachers keep balance between the professional life and personal life. Keeping in view all these, the investigator wish to undertaken a study on the specific area

### Research gap

Work life balance is one of the widely researched areas in the field of different professions, but in India very few studies has been explored in this concept especially on primary teachers in Kamrup district of Assam state. Though there is a paucity of researches on work life balance of primary school teachers in Kamrup district. The present study will provide a new information and perspective describing work life balance with respect to certain demographical variables among primary school female teachers.

### Statement of the Problem

Considering the need and significance of the said problem the study is entitled as

“WORK-LIFE BALANCE OF FEMALE TEACHERS AT PRIMARY LEVEL IN RELATION TO LOCALITY”.

### Objectives of the Study

The present study attempt to address the following objectives –

- To assess work-life balance of Female teachers at primary level of Kamrup district
- To study differences on work-life balance in relation to locality (Rural and Urban).

### Hypothesis of the Study

The hypotheses of the study are formulated keeping in view the objectives of the study. The hypotheses of other objectives of the study are formulated on the basis of three dimensions of work life balance- Work

Interference with Personal Life (WIPL), Personal Life Interference with Work (PLIW), Work/Personal Life enhancement (WPLE). The hypotheses of the present study are as follows-

Objective: To study differences on work-life balance in relation to locality (Rural and Urban).

Ho<sub>1</sub>: There is no significant difference in mean scores of WIPL on the basis of locality of the respondent teacher.

Ho<sub>2</sub>: There is no significant difference in mean scores of PLIW on the basis of locality of the respondent teacher.

Ho<sub>3</sub>: There is no significant difference in mean scores of WPLE on the basis of locality of the respondent teacher.

### Operational Definition

Work-life balance: “Work” means the professional life and professional responsibilities of the teachers at workplace. Similarly ‘Life’ means the personal life of the teacher with their family, friends and society and other domestic responsibilities.

Locality: In the study locality means the geographical location (Urban area and Rural area) of the primary school in Kamrup District.

### Review of the Related Literature

Reviewing the related literature is an important part of the research process. Work-Life Balance (WLB) refers to the balance between work and life. According to the Byrne (2005) WLB is ‘Juggling five aspects of our lives at any one point in time: work, family, health, friends and self.’

Hayman (2005) studied “Psychometric Assessment of an Instrument Designed to measure work-life Balance”. The instrument design to assess three dimensions of work-life balance Work Interference with Personal Life (WIPL), Personal Life Interference with Work (PLIW), Work/Personal Life enhancement (WPLE). This scale was consisting of fifteen questions. This instrument was found to have acceptable validity and reliability.

Dr. Anu Radha (2015) studied, “A study of Work-Life Balance of Female Teaching professionals in Coimbatore.” The study found that 80% of respondents feel that they are able to achieve work-life balance to a great extend. Most of the women teacher said that they do not get enough time for relaxation and their hobbies.

Ranthli (2016) studied, “A study on work-life balance of women Teachers in private un-aided schools of Aizawal city”. The study revealed that overburdened in the work causes very difficult to balance work and

life which creates huge problems in the lives of women teachers. ‘Stress’ was the main cause of imbalance of work and life balance. The teachers have a good balance between work and life, the institutional support and community support has helped the teachers manage and balance their work and life.

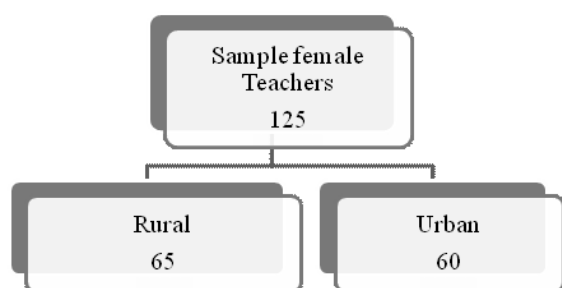
Saikia and Borgohain (2020) studied “Work-life Balance among Married anganwadi workers in Assam”. The study aimed at to investigate work-life balance and work family conflict of married anganwadi workers. The study revealed that work place support, community support and co-operation and family support had positively and work overburden and dependent care had negatively impacted on work-life balance.

**Methodology of the Study**

To conduct the present study “Descriptive Survey Method” was adopted by the researcher. For the present study quantitative method was selected. In the present study stratified random sampling technique was used. Sample school selected 20% out of total sample school for the study. From rural out of 250, 50 schools and 30 schools from metro selected out of 183 as sample schools. From these sample schools 125 teachers were selected for the study stratifying as rural female and urban female teachers. From rural 65 teacher selected and 60 teachers selected from urban as sample for the study. Adding these values the total minimum required size of sample for the study was found out 125.

**Distribution of the Sample for the Study**

Fig.No. 1. Flow chart of sample for the study



**Tools Used for Data Collection**

In the present study the following tool is used:

1. Self-structured work-life balance scale for primary school teachers, named as Work- Life Balance Scale for teachers. (Adapted from Hayman (2005) work-life balance scale Psychometric Assessment of an Instrument Designed to Measure Work Life Balance.

**Analysis and Interpretation of Data**

After collection of data through questionnaire for the study, the collected data are analyzed. The analysis is based on data obtained from 125 respondents. After that the collected data analyzed on the basis of the objectives formulated for the study.

**Demographic Profile of Respondent**

Age: For studying the work-life balance of the teachers in relation to their age, the sample group categorized into three age groups as higher, medium and lower age on the basis of some assumption. Here-

- Age from 51 years and above is categorized as higher age group.
- Age from 36 years to 50 years is categorized as medium age group.
- Age bellow 35 years is categorized as lower age group.

Ages of the respondents are presented in the following table.

Table No. 1 : Age of the respondent teachers

Age Group	Number	Percentage
51 years and Above	21	16.80%
36years to 50years	34	27.20%
Below 35years	70	56.00%

**Marital Status:** Marital status of the respondents are categorized as married and unmarried. The marital status of the respondent teachers are presented in the following table no. -3

Table No. 2 : Marital status of the respondent teachers

Marital Status	Number	Percentage
Married	82	65.60%
Unmarried	43	34.40%
Total	125	100.00%

**Locality:** In the present study, geographical locality of the of the respondent of the lower primary school teachers divided into two parts – Rural and Urban area.

Table No. 3 : Distribution of the respondents on the basis of locality of lower primary school

Location	Number	Percentage
Rural	65	52.00%
Urban	60	48.00%
Total	125	100.00%

**Analysis and Interpretation of Collected Data on the Basis of Objectives of the Study**

The analyzed and interpreted data for the present study have been done objectives wise-

**Objective 1: To assess the level of work-life balance of female teachers at primary level.**

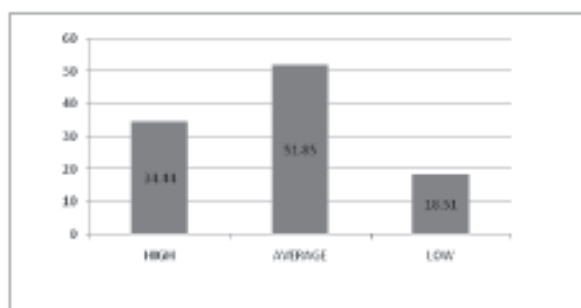
Work-life balance of the female teachers at primary level is measured by using the Self-Structured Work-Life Balance Scale. The result is shown in the following table 1 along with its percentage.

Table 4 : Number and Percentage of the teachers of primary school in deferent level of WLB

Score Range	Number of Respondents	Percentage (Number o Respondents)
High(91-125)	43	34.44%
Average(51-90)	68	51.85%
Low(0-50)	14	18.51%
Total	125	100.00%

The data of the above table is also graphically presented with bar diagram in figure 1:

Figure1: Bar diagram showing percentage of the teachers indifferent level of work-life balance



**Interpretation:** Data presented in the table 1 reveals that 34.44% teachers have high work -life balance, 51.85% teachers have average work-life balance, only 18.51% teachers have low work life balance. It means that majority of the teacher of lower primary school have average WLB.

**Hypothesis Testing:** Test of difference was conducted on the demographics variable - Locality (Rural and Urban).

**Deferece Based On Locality (Rural and Urban):**

For the present study, out of 125 respondents, 65 were from Rural and 60 were from Urban area. An independent samples T-Test was developed to establish difference between locality on the four scales, viz. WIPL, PLIW, WPLE, and JS. The Tables 6.1 and 6.2 detail this.

Table 5. 1: Group Statistic- Locality

Construct	Locality	N	Mean	Std. Deviation	Std. Error Mean
WIPL	Rural	65	3.10	0.898	0.090
	Urban	60	2.78	1.000	0.044
PLIW	Rural	65	2.46	0.918	0.092
	Urban	60	2.20	0.933	0.042
WPLE	Rural	65	3.55	0.848	0.085
	Urban	60	3.74	0.790	0.035

Table 5.2: Independent Sample Test- Locality

Construct	Nature of Variance	Levene's test for Equality of Variance		'T'-Test Result		
		F	Sig	t	df	Sig(2-tailed)
WIPL	Equal Variance Assumed	7.424	0.007	2.992	619	0.003
	Not Equal Variance Assumed					
PLIW	Equal Variance Assumed	0.543	0.461	2.582	619	0.010
	Not Equal Variance Assumed					
WPLE	Equal Variance Assumed	2.585	0.108	-2.169	619	0.030
	Not Equal Variance Assumed					

**Ho<sub>1</sub>:** There is no significant difference in mean scores of WIPL on the basis of locality of the respondent teacher.

Significant differences were observed on the dimension WIPL (t = 2.992, p<.05) between Rural teachers (Mean=3.10, SD=0.898) and Urban teachers (Mean=2.78, SD=1.001) in lower primary school teachers. Thus, the null hypothesis Ho<sub>1</sub> was Rejected.

**Ho<sub>2</sub>:** There is no significant difference in mean scores of PLIW on the basis of locality of the respondent teacher.

Significant differences were observed on the dimension PLIW (t = 2.582, p<.05) between Rural teachers (Mean=2.46, SD=0.918) and Urban teachers (Mean=2.20, SD=0.933) in lower primary level female teachers. Thus, the null hypothesis Ho<sub>2</sub> was Rejected.

**Ho<sub>3</sub>:** There is no significant difference in mean scores of WPLE on the basis of locality of the respondent teacher.

Significant differences were observed on the dimension WPLE (t = -2.169, p<.05) between Rural (Mean=3.55, SD=0.848) and Urban teachers (Mean=3.74, SD=0.790) in lower primary school teachers. Thus, the null hypothesis Ho<sub>3</sub> was Rejected.

### Major Findings of the Study

On the basis of the analysis and interpretation data, the following major findings are obtained:

1) Demographic profile of respondent teachers:

- Age- The study revealed that 16.80% lower primary female teachers falls under higher age group, 27.20% falls under medium age group and 56.00% under low age group.
- Marital Status: The present study revealed that 65.60% respondents female teachers are married and 34.40% are unmarried.
- Locality: The study found that 52.00% respondents' teachers from rural lower primary schools and 48.00% of respondents teachers are from urban lower primary schools.

2) The findings related to the objectives of the present study:

- **To assess the level of work-life balance of female teacher of primary school.**
- The majority of the female teachers (51.85%) have average work-life balance.
- The study found that 18.51% respondent teachers have low level of work-life balance and 34.44% have high level of work-life balance.

Rahim Uddin et.al.(2013) have found average or moderate level of work-life balance among female teachers. While, Tressa (2016) found in her study that most of the female teachers have a balanced work-life balance.

3) Test of Differences:

**Objective : To study differences of work-life balance on the basis of locality.**

❖ **Locality and Work –life balance:**

- The study found that there is significant difference in mean scores of WIPL on the basis of locality- rural and urban teachers.
- It is found that there is significant difference in mean scores of Personal Life Interference with Work on the basis of locality – rural and urban teachers.
- There is significant difference in mean scores of work personal life enhancement on the basis of locality- rural and urban female teachers at lower primary level.
- The study revealed that there is significant difference of work-life balance between rural and urban female teachers. Rural female teachers have greater work-

life balance than urban female teachers of Kamrup district.

Similar findings that is rural female teachers showed higher work-life balance compared to urban female teachers is found in the study of Arushi and Thakur (2025). Dalal and Devi (2025) have found that urban female teachers report significantly higher work-life balance than rural female teachers.

### Limitations and Future Research Directions

1. The study is limited to female teachers of only primary level, so this study can be extended to compare the dimensions of work life balance with higher level of education.

2. The study was conducted in a limited time period on a limited sample. For the purpose of the future study and much better results, the sample size of the respondents can be increased.

### Conclusion and Recommendations

Work-Life Balance is the most significant aspects in every employee's life. There is a need to balance between work and life of the teacher. Providing better and healthier work-life balance is significant for female teacher of primary level. The study concluded that the majority of the female teachers (51.85%) have average level work-life balance. 18.51% of the respondents couldn't able to Balance their Work- Life. Hence the researcher find a suggestion for this type of respondents, regular Exercises, Meditation and other Soft Skill can able to Balance Work- Life of the female teachers. The finding of the study also revealed that the rural female teachers have higher work life balance compared to urban female teachers. From the above discussion, it is reasonable to suggest that modern educational organizations and administrations should address the Work Life Balance related issues among the teaching staff, specifically female and take a holistic approach to design and implement policies to support the teaching staff to manage their work life balance which would add to the performance of these staff members. The management may organize classes and care programs about pressure and overburden, work-life equalization and solitary essentialness management in order to help teachers make better decisions about allocating their energies between work and life. Additionally, to support the work-life balance of the female teachers in the Kamrup district of Assam, the government could create a national culture of WLB. The current culture of 'presenteeism' could be changed to one which holds emphasis on performance outcomes. This needs to be pursued at a national level and should permeate within and across organizations (Doyle & Reeves, 2003). The message has to encompass social/ family and quality of life considerations for men and

women employees thus, building on their work-life balance. As the findings of the present study inform, work-life balance impacts teaching. Policies like – sticking to time schedule, mandatory leaves for female teachers for certain number of days per year at a stretch, Leave Travel Allowance, etc can be put in practice to them to spend quality time with their family members and attain better work life balance. The investigator hopes that the study will be benefited to the teachers, female teachers, administrators and policy maker of the organization.

#### **Acknowledgment**

The authors express gratitude to all respondents who contributed to filling the research questionnaire and appreciate their support and interest in the conducted research.

#### **Conflict of Interest :**

Authors do not have declared any conflicts of interests.

#### **Authors Contribution :**

Both the authors have equal contribution in the present work.

#### **Funding :**

Nil

#### **Ethics Statement :**

No experiment has been done on humans and animals.

#### **Informed Consent :**

Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

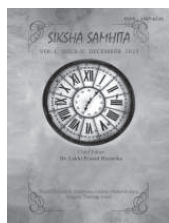
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## **A Fatal Journey Towards Parenthood: An Analysis of the Tension between Family and Society in the Novel *One Part Woman* by Perumal Murugan**

### **Abstract**

Family is a small constituent unit of a society. A society consists of many families of the same race, colour, strata, etc. In most of the cases, the aims, perspectives and aspirations of a family maintain fine tune with that of the concerned society. Although the desire of a family and the same of a society go hand in hand or at times it is motivated by one another, in some cases, things do take a different turn. Social scientists and social critics have observed that family and society always indulge in a perpetual tension or clash of intensions, often resulting in tragic outcomes. Individual aims, desires and aspirations may come into a direct or indirect conflict with certain common societal desires and aspirations. The tension between a family and the society may become visible and harmful because of several factors including superstitions, rituals, customs, etc., of the concerned society along with the life-style and education of the members of a family. PerumalMurugan, a celebrated contemporary writer from Kerala throws light into this issue of the inherent but dormant conflict between family and the society. His famous novel *One Part Woman*- which has been set in the rural Kerala beautifully projects this tussle and displays how greater social forces can crash down individuals of a family. The conflict and the tension between family and society have been projected through the childless couple Kali and Ponna and their continuous efforts at achieving parenthood to free themselves from constant social humiliation. This article is an attempt to deconstruct the tension between family and society and understand the dormant apocalyptic forces of a society in general.

**Keywords :** Social Tension, Parenthood, Superstition, Individual Aspirations, Tussle, Apocalyptic Forces.

### **Introduction**

In his book *The Calvinistic Concept of Culture*, author Henry R. Van Til makes an important statement that "The family is the simplest and the smallest unit of the society and the real fountain of culture." Along with Mr. Henry R. Van Til, there are many other social scientists including Ashley Montagu, Sarah Dassen, Alex Haley etc. who have proposed same kind of relation between society and family. Society has always been seen as an assembly of families: not only in terms of some basic units but also in terms of practice of culture, exchange of values as well as in terms of some common aspirations. Right from the beginning of the

human civilization, it is believed that families of common race, colour, language and culture as a whole contribute to the formation of a society in general. Every person of a family desires to achieve something, do certain things keeping in mind what his/her concerned society values or appreciates the most. We can say that in most of the cases the desires, demands and expectations from one individual of a family is often motivated, inspired and directed by some of the norms of the concerned society.

However, the connection between family as a unit and society as a whole may not be as perceived by the people

in some of the exceptional situations. There can be various kinds of unexpected consequences on those who undergo a sort of tension between their individual expectations (or we can say expectations of the family) and the desires of the society. PerumalMurugan, one of the finest contemporary writers from Kerala, has repeatedly tried to deconstruct this tension of expectations between family and society in majority of his books like *Pyre*, *One Part Woman* etc. PerumalMurugan's novels are set up in a traditional rural Kerala and they often bring before the readers a violent and tragic denouement of the clash between a family and the concerned society.

*One Part Woman*, which was first published in 2014, is a tale of a childless family and their multiple attempts to achieve the joys of parenthood as the traditional set up of the Malayalam society in which the couple resides looks down upon childless couples or families. Kali and his wife Ponnayi have been married for more than twelve years. However, these twelve years have utterly failed to put down the fire of love and passion between them. They are still madly in love with each other both emotionally and physically. However, they are childless; but the couple (initially at least) hardly care about their childlessness. But the in-laws of both the families (who have been displayed in this novel as agents of the society inside Kali and Ponna's familial set up) keep on insisting them to attempt various ways to achieve parenthood. Towards the conclusion of the novel, the forces that put a pressure on the happy but childless couple to become parents and the pressure turns out to be so powerful that it eventually shatters the beautiful family of Kali and Ponna.

**Aims and Objectives:** This article aims to study the inherent tension or conflict between the family (as a constituent unit) and the society (as a whole or complete unit). The author PerumalMurugan uses a traditional Malayalam set up and an uncomplicated childless couple through which this perpetual and inherent conflict between the family and the society has been projected. This article aims to find out some of the most striking examples that showcase the prevalent tension between society and family. Some of the important aims and objectives of this study are to:

1. Deconstruct the inherent conflict between family and society.
2. To conduct an empirical quest for the possible causes that can fuel up the tension between family and society.
3. To make a study and analyse the role of the customs, traditions, superstitions, etc. of the concerned society

in creating a rift between desires of a family and the same of a society.

4. How individuals, i.e., men and women are victimised as a consequence of such tensions.
5. And finally, to look for if there is any solution provided by the author that can reduce the tension between family and society.

#### **Methodology :**

The method of analysing and perceiving notions through the study about the society has been primarily used for this research. Since PerumalMurugan's only one novel i.e., *One Part Woman* has been considered for this study, the researcher is keen on analysing acutely what information, picture or representation does the author provide within the concerned text only. As a result, the overall method used for the scrutiny of this novel is both analytical and speculative in nature.

**Deconstructing the Tension (between Family and Society):** PerumalMurugan's *One Part Woman* begins with the story of a couple: Kali and Ponna, who have been married for as long as twelve years but without a child. They may have been deprived of the joys of parenthood; they have otherwise shared a very passionate connection. They have left no stone unturned to become parents but somehow, they have been deprived of it by their ill-luck. They had tried to appease their forefathers, offered worships to ancient deities of different temples, etc. to beget a child but all without any success. There was also a time in their otherwise eventful married life when the talks of second marriage of Kali had been frequently discussed as the only possible alternative by the in-laws. Kali's mother, other villagers and even Kali's mother-in-law had brought in several prospects of second marriage to Kali. However, Kali's love for Ponna had been unshakable by any outside force. Finally, the parents of Ponna, her very own brother Muthu and Kali's mother played such a fowl game in search of a child that it brought in havoc on Kali and Ponna's life, ultimately destroying Kali (literally) and Ponna (metaphorically).

In a superficial reading, *One Part Woman* can deceive any reader with its humble looking characters and seemingly uncomplicated plot. However, a close analysis of the situations and the characters can reveal some of the darkest tensions between family as a unit and the society itself which generally remain dormant. Here Kali and Ponna could be seen as the representatives of the family as their works, aspirations, etc. are in fine tune with the aims of the family. On the other hand, Kali's mother, Ponna's parents and her brother Muthu could be seen as the agents of the society: reminding the childless couple about their social status

and their 'obligations' towards the society in which they live in.

Right from the beginning of the novel in Ponna's maternal house till the final disillusionment of Kali, it has been displayed that both Kali and Ponna share a very deep physical and emotional connection. When Kali was sleeping under the great Portia tree in the house of his in-laws, even the faintest sound of Ponna's footsteps were more than enough to excite him. A view of Ponna's body could still make him long for strong physical intimacy with his wife. Before the novel delves deep into the flashback, the author showcases Kali and Ponna's longing for each other in these words:

His eyes were fixed on her as she walked away. Her body had stayed firm. As he gazed after her, desire welled up within him, and he wanted her right then. But they had no privacy here, at his in-laws' home. When they were just married, space was made for them by rearranging sacks of harvested kambu millets and pulses. But when he was no longer a new son-in-law, he got a cot in the porch or in front of the house. He was itching to drag her and take her home.

(Murugan, 2014)

Even in the flashback section of the novel too, the bonding between Kali and Ponna stands out as the most powerful connection until finally it was devastated by a systematic and collective attempt of the people who could be considered as the agents of the concerned larger society.

After a few years of childless married life, there had been talks of second marriage prospects for Kali. Many people from his village including his very own mother would ask him to remarry in order to become a father. For example, Chellappan, a village businessman once came to him and advised him that:

'It is fate, mapillai,' said Chellappan, using the colloquial variation of 'mapillai' or son-in-law, also a term of friendly address between two men. 'That is how just some cows are. No matter what you do, they never get pregnant. Just quietly change the cow. If you say yes, I can fetch you one right way.

(Murugan, 2014)

However, Kali had been adamant in his decision. Kali and Ponna's attempts to maintain a happy and healthy nuptial knot – irrespective of the fact that they were childless – instigates a possible clash of intensions between family and the society.

Although Kali and Ponna definitely wanted to become parents, they were never too desperate to become parents only. Their love for each other shows how

keenly they had maintained the ethics of their family. On the other hand, the demands of the society, i.e., to become parents began to fall in the form of heavier nasty blows on the familial ethics of Kali and Ponna. In this novel there are multiple examples where Ponna and Kali were subject to extreme humiliation from time to time for not being able to beget one child. The demand of a child is less a need of the family and more a demand of the society in this novel.

The demand of a child from Ponna and Kali emerged out in different forms; but most of the times, it was in the form of brutal humiliation. For instance, once Ponna excitedly attended the puberty ceremony of Chellama's daughter. There was a custom of spinning red balls of rice on the girl's body to ward off the evil eyes. This ritual had to be performed by Ponna. But when Ponna came forward to follow this custom, Chellama's brother's wife humiliated her in front of all the women by saying that Ponna must stay away from the auspicious girl. She even added that if a childless woman did the ritual, then the girl will also be turned into another 'barren' woman. Similarly, Kali had also been humiliated time and again as the impotent person of the village. In this way, the tension between family and society becomes so harsh and brutal that it brings down the sweet nuptial bonding between Kali and Ponna into a never-ending labyrinth.

**Findings and Discussions:** The author Perumal Murugan has been very lucid and precise in his delivery of the final message in *One Part Woman*. Since society is larger and its powers more dominant, it gradually destroys Kali and Ponna's affectionate bonding. The ferocious forces of the society crash down familial attachments of Kali and Ponna to such an extent that finally Kali had no other option than to commit suicide and Ponna was also robbed off her conscience leaving her only a hollow corpse. The author reiterates that Kali and Ponna had a successful married life until they were being measured by the standards of the societal norms which provide the illusion that Kali and Ponna's lives were full of nothing but frustration and failure.

As far as Ponna is concerned, the agents of the society including Ponna's parents, her brother and even Kali's mother had convinced her to attend the famous Chariot Festival. Here, this chariot festival also serves as the platform on which the tension between family and society reaches the climax point. Finally, Ponna's consent to attend the chariot festival shows the victory of the greater societal forces over that of the familial ones represented by Kali and his wife. To understand the importance of the chariot festival in this tussle between family and society, the reader must be familiar with the festival itself. The famous chariot festival is

celebrated on the month of Aani. According to the beliefs of the people, on the first and the eighteenth day of this festival, Gods comes down the hills in the form of man. Childless women would come to this festival on these days and pick up one random guy-who is believed to be human incarnations of God- make sexual relation and get pregnant. Kali had also been a regular visitor to this festival in his prime youth. Kali's mother tells the readers about the prevalent belief system regarding this chariot festival as:

'Karattaiyan and Devatha of Karattur have so many ways of helping people. From the moment the flag is hoisted to when the Gods come down and go back up the hill, how many miracles they perform for how many people! People in my father's house are entitled to carry the deities. And they have been doing so till date. I was born in that family. [...] The eighth day, when the gods came down, and the eighteenth day, when they go back up the hill, are very important.

(Murugan, 2014)

Since Kali would not consider the idea of second marriage, sending Ponna to the chariot festival had been considered. Kali was deadly against sending his wife to another man. But Ponna was brainwashed to join the festival. As a result, Muthu betrayed Kali and without Kali's knowledge, Ponna was sent to the festival. This shows how the forces within the society had successfully overpowered the sweetness of emotional bonding between Kali and Ponna. When Kali finally learnt that Ponna had gone to join the chariot festival without his consent, he realised his family being distorted forever. Finally, unable to face such a humiliation from the one he loved the most and feeling utterly betrayed, Kali committed suicide.

In this way, the inherent tussle between the family and the society ends with the death of Kali. Kali's death also indicates that Ponna's life will also be totally shattered. It also destructed the relationship between Kali and his childhood friend and present brother-in-law Muthu.

**Conclusion:** A close reading of *One Part Woman* shows that the author was more interested on foregrounding the dormant tension between family as a social unit and society as a whole. PerumalMurugan tactfully uses

two typical characters i.e., Kali and Ponna- the husband and the wife within the dynamics of a conservative Malayalam society to uncover such perpetual inherent tensions. However, the author keeps the book in an open-ended mode by not providing any solution to such problems. He does convey the message that such tensions often ruin individual solace and, in some cases, destroys relationships and human life (as in case of kali) too. Kali's inability to understand the gravity of greater social forces, Ponna's inability to detect her own brother's tricks and their parents' inability to feel the blissful relationship of Kali and Ponna is a strong reminder to the readers that the tussle between the family and the society remains at the very core of the nexus between society and the family.

**Acknowledgement :**

This is an independent work and it owes nothing to any person or organisation.

**Conflict of Interest :**

Since this is a single authored research work, the question of conflict of interest does not arise.

**Author's Contribution :**

This article is solely produced by Dr. Sunil Talukdar.

**Funding :**

Not any kind of financial or other perks have been received for this research work.

**Ethics Statement :**

This research article does not violate any ethical values related to human beings or animals.

**Informed Consent: N/A**

**Data Availability: N/A**

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## Teachers' Preparedness and the Need for Professional Development in Relation to Multilingual Classrooms at the Secondary Level

### Abstract

The present study is an attempt to explore the level of teachers' preparedness to deal with multilingual classrooms and examine the level of professional development needs of teachers in relation to multilingual classrooms. A descriptive survey method was adopted to conduct the study. A total sample of 198 teachers teaching in classes IX, X, XI and XII were selected from different government schools of Darrang district, Assam through stratified random sampling. Teacher Preparedness Scale for Multilingual Classroom and Professional Development Needs Scale for Multilingual Classroom were constructed by the researcher to collect data. The findings of the study revealed that (i) Majority of the teachers (88.38 percent) were above average prepared to deal with students in the multilingual classroom (ii) There was no statistically significant difference between the level of teachers' preparedness based on gender and teaching experience (iii) About 70.20 percent of teachers have above average need for professional development to deal with the multilingual classroom (iv) There was no statistically significant difference between the level of teachers' need for professional development based on gender and teaching experience and (v) however, the study found a significant difference between the level of teachers' preparedness and teachers' need for professional development based on locality.

Keywords : Multilingual Education, Mother Tongue-based Multilingual Education, Teacher preparedness, Professional Development, Multilingual classroom.

### Introduction

"If you speak to a man in a language he knows, it goes straight to his head; if you speak to him in his own language, it goes straight to his heart." (Nelson Mandela)

Linguistic diversity is a major element of today's classroom. A multilingual classroom is one in which students from varied linguistic and cultural backgrounds study together in a setting where the language of instruction is a second language that the majority of the students are still learning. "The unmark classroom of India is fundamentally multilingual and multicultural and these features can be utilized as resources rather than barriers" (Agnihotri, 2010).

According to Agnihotri, the idea that the world is monolingual and that monolingualism is linked to intelligence and scholastic achievement is a western myth. The reality is that the majority of the globe is multilingual. He claims that almost every classroom is multilingual. We are not acknowledging students if we do not acknowledge their language in the classroom.

Language is a most important factor in learning. It is the primary way of expressing thought and communicating with others in a learning process. Learners who do not have adequate knowledge of the instructional language will find it difficult to learn. To make education fruitful, it is important to adopt a language that students understand and speak.

Generally, people are most comfortable in speaking and understanding their language, whether it is their mother tongue or home language. Children who get an early education in their home language perform better in future years of education (Thomas and Collier, 1997). In 1999, UNESCO's General Conference Resolution 12 defined "multilingual education" as the use of at least three languages in education: the mother tongue, a regional or national language, and an international language. The resolution endorsed the idea that only multilingual education can meet the demands of global and national involvement, as well as the different requirements of culturally and linguistically diverse communities. A position paper on education titled *Education in a Multilingual World*, published by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2003 stated that "emphasized should be given on mother tongue instruction as a means of improving educational quality by building upon the knowledge and experience of students and teachers." It further says, "UNESCO promotes bilingual or multilingual education at all levels of education as a method of fostering social and gender equality, as well as a crucial component of linguistically varied communities". It is encouraging to note that Article 350 (A) of the Indian Constitution explicitly declares that every child in the country has the right to learn in his or her mother tongue. Most recently, the National Policy of Education (2020) also prioritized the use of the mother tongue or local language as a medium of education.

To successfully implement the Mother Tongue-based Multilingual Education (MTB-MLE) teacher plays a major role. It can be said that teachers are major stakeholders of MTB-MLE programmes. They play a significant role in implementing techniques and strategies to establish a learner-friendly environment in the classroom. Hence, teachers must have a thorough understanding of the philosophy underlying MTB-MLE programmes. They must be prepared to teach in a multilingual classroom to meet the needs of diverse learners and also they must participate in continuous professional development programmes for the development of their teaching strategies and competencies to teach in a multilingual classroom.

The preparedness of teachers is one of the critical components of effective teaching. And preparing teachers for multilingual education contexts is becoming a more important challenge for teacher education across all education sectors and configurations. Teacher education must cover both the need for multilingualism through language education as well as the problems of teaching in diversely multilingual classrooms to prepare teachers for practice as multilingual educators (Garca & Kleyn, 2013). To

ensure high quality of teaching and maintain a high-quality teacher workforce, education systems attempt to provide chances for in-service professional development for teachers (OECD, 2005).

Teachers require greater support and better training to be effective in multilingual classrooms, serve as functional facilitators of learning, and have a significant impact in multilingual situations. Teachers can therefore establish suitable learning environments and conditions for multilingual students to be successful in school. Students deserve teachers who are appropriately equipped to meet their requirements, and teachers need help to cope with and meet the demands of their students.

### **Literature Review :**

Previous literature reveals that teachers have a positive attitude towards multilingual classrooms and they believe that teaching students in their first language is effective for academic development (Knudsen et al, 2020; Tonio and Ella, 2019; Haukas, 2015). Rinker and Ekinci (2025) found that pre-service secondary school teachers, despite showing high awareness of their responsibility toward multilingual learners, report low levels of preparedness for multilingual classrooms. Kafata, F. (2016) tried to study the impact of adopting the local language as a medium of teaching. It was revealed that giving lessons in the students' native tongue is more effective since they understand things faster. Classroom engagement improves dramatically; however, some students may suffer language barriers, particularly those who have transferred from other regions. Morea et al. (2025) found that helping pre-service teachers reflect on their own multilingual experiences during teacher education strengthens their multilingual identity and improves their readiness to teach in diverse classrooms. Gitschthaler et al. (2021) commented that a divided language learning environment is more detrimental to pupils' academic, social, and emotional development than an inclusive one. Additionally, they believe that more resources are required for multilingual children to develop an inclusive learning environment. Norro (2021) explores Namibian teachers' beliefs about the medium of instruction and implementation of language education policy. The result showed that the beliefs of the teachers about language policy are problematic, and the implementation of the language education policy is challenging for teachers. In the study conducted by Mudenda and Nankamba (2017), it was found that teachers were less prepared to teach in the local language. Lartec et al. (2014) indicated that teachers have difficulty in integrating mother tongue-based instruction due to a shortage of materials published in the mother tongue, a lack of vocabulary, and a lack of teacher training. A study conducted in

Assam by Goswami (2013) revealed that schools do not support multilingualism. Students were intentionally discouraged from talking in their native language by their teachers. Despite receiving training, teachers did not apply it in the classroom, and there was also a lack of resources. Also, it was found from the study that the primary schools of Assam are facing a significant problem in dealing with a linguistically varied student population. O'Neal, Ringler and Rodriguez, (2008); Premier and Miller (2010) conclude that teacher education programmes do not emphasize much cultural and linguistic diversity. It is necessary to meet the requirements of teachers who work with culturally and linguistically diverse pupils. Deng and Hayden (2021) urge that teacher education programmes should reassess their curricula so that all pre-service teachers are better prepared to work with multilingual students. As shown in earlier literature, it is believed that teachers' preparedness to teach in a multilingual classroom is of utmost importance (Chebet, Kiprop and Ndaita, 2018; Cabardo, 2017). Mansueto (2025) found that elementary language teachers in multilingual classrooms need continuous professional development, especially in differentiated teaching strategies and collaborative support, to effectively address linguistic diversity. Magogwe and Ketsitlile (2015) claimed that teachers should be given multicultural training to cope with multicultural teaching and teach culturally diverse students. Foley, Anderson, Hancock, and Conteh (2022) examine how student teachers develop professional identities and agency to respond to linguistic and cultural diversity in multilingual classrooms. Even, Chebet, Kiprop and Ndaita, (2018) suggested that the government should organise in-service training programmes for teachers on the use of mother tongue as a medium of instruction and in providing financial support for the improvement of teaching-learning resources. According to Lorenz, Krulatz and Torgersen (2021); Kirsch, Duarte and Palviainen (2020); Alisaari, et al. (2019) professional development programmes contribute to a change in attitudes of teachers about multilingualism and multilingual teaching approaches.

#### **Research Gap :**

The review of related literature provided an overview of studies related to teacher preparedness and professional development needs in relation to multilingual classrooms. A careful analysis of the review of studies found that multilingual classrooms have been studied in terms of teacher readiness (Cabardo, 2017; Ozudogru, 2018), pre-service teacher's attitude toward the use of mother tongue as a medium of instruction (Tonio and Ella, 2019) challenges of using mother tongue as a medium of instruction (Mudenda et al., 2017), the influence of teacher preparedness on mother tongue usage in classroom

instruction (Chebet et al., 2018), the importance of professional development (Macias, 2019), teacher training needs for bilingual education (Magogwe and Ketsitlile (2015), etc. From them, it was found that there have been very few studies on multilingual classrooms in the Indian context with special reference to Assam. Moreover, no research has been done that includes all of these parameters in the area of Darrang district (Assam), particularly at the secondary level. As a result, the researcher has undertaken "Teacher preparedness and the need for professional development in relation to multilingual classroom at the secondary level" in an attempt to explore a new topic of research.

#### **Rationale of the Study :**

Assam is one of the twenty-eight states of India, which has a highly diversified ethnic society in terms of the number of ethnic and linguistic communities. In a state like Assam, where different languages and cultures exist, there, language diversity act as a prominent aspect where children of different mother tongues take lessons together in the same classroom. The classroom of the Assam is truly multilingual. In this context, teaching effectively in the multilingual classroom is a pressing issue for teachers today. For that, teachers need to be ready for confronting the challenges of a multilingual classroom. Also, they need to participate in the Continuous Professional Development program. Continuous professional development is a crucial element of teachers' practice to maintain and enhance standards in the face of increasing educational provision and globalization. Generally, in the teaching-learning process, we emphasize a student's preparedness to learn. We do not consider teacher preparedness in terms of teaching a class, creating a conducive atmosphere to facilitate learning, interacting with students, etc. Therefore, to make students more engaged with the classroom situation and to make the teaching-learning process more fruitful, the teacher's competency and preparedness must be taken into account. Teachers face many challenges during teaching, especially in multilingual classrooms, for example: choosing the appropriate instruction for different linguistic backgrounds students, trying to assimilate the cultural background in one class to merge all of them, etc. So, it is necessary to have relevant knowledge of teachers regarding multilingual classrooms to teach in this classroom. Also, NEP 2020 has emphasized the local language or mother tongue as a medium of instruction. Therefore, presently, looking at the importance given to mother tongue and multilingual classrooms, teachers' preparedness and their needs for professional development to deal with multilingual classrooms is a relevant area of study.

**Objectives of the Study :**

1. To study the level of teachers’ preparedness to deal with multilingual classrooms.
2. To identify the level of teachers’ professional development needs to deal with multilingual classrooms.

**Hypotheses of the Study :**

**H<sub>0</sub>1** There is no significant differences between the levels of teachers’ preparedness to deal with multilingual classrooms with regard to gender, locality and teaching experiences.

**H<sub>0</sub>2** There is no significant differences between the levels of teachers’ professional development need to deal with multilingual classrooms with regard to gender, locality and teaching experiences.

**Research Methodology : :**

**Research Method:** The present study is aimed to study the teacher preparedness and need for professional development in relation to multilingual classrooms. For this purpose, the researcher used the descriptive survey method because it is considered to be more appropriate and suitable for the current topic.

**Population of the Study:**All the teachers teaching in classes IX, X, XI, and XII in secondary government schools in the Darrang district of Assam are considered the population in this study.

**Sample of the Study:**In the present study, a total of 198 teachers teaching classes IX, X, XI and XII were selected from 3 blocks of Darrang district, Assam as a sample.

Table 1: List of percentage of samples

Sl. no	Block name	Population (no of teachers)	Percentage	Sample
1	Sipajhar	993	10%	99
2	Kalaigaon	549	10%	55
3	Dalgaon	395	10%	40
Total		1937		194

**Sampling Technique:** The samples for the study were selected based on the stratified random sampling technique. A list of Higher Secondary Schools and High schools was obtained from the concerned office of the Inspector of Schools, Darrang District Circle, Mangaldai and 198 teachers from each block were selected randomly from 14 schools in the Darrang district.

**Tools Used:**

**(A) Teacher Preparedness Scale for Multilingual Classroom (TPSMLC)**

The Teacher Preparedness Scale for Multilingual Classroom was developed by the researcher to assess the preparedness of the teachers for multilingual classrooms. There are four dimensions of the scale: Professional knowledge; Professional practice; Professional engagement and Self-management. This scale consists of 22 items with 16 positive statements and 6 negative statements. It was a five-point Likert-type scale with responses of strongly agree, agree, undecided, disagree, and strongly disagree. The Cronbach’s Alpha (0.800) and Split half method (0.782) was estimated to test the reliability of the scale. The scale was validated by experts relating to the field of study.

Table 2: Dimensions of Teacher Preparedness Scale for Multilingual Classrooms

Sl. No.	Dimension	Total no. of items
1	Professional knowledge	5
2	Professional practice	7
3	Professional engagement	4
4	Self-management	6
TOTAL		22

**(B) Professional Development Needs Scale of Teacher for Multilingual Classrooms (PDNSTMLC)**

The Professional Development Needs Scale for Multilingual Classroom was developed by the researcher to assess the need for professional development of the teachers to deal with the multilingual classroom. It is a five-point Likert scale consisting of 7 dimensions- Career needs; Personal and interpersonal needs; Teaching, learning, curriculum, and leadership needs; System and school needs; the need for Knowledge; need for competencies and Organizational support needs. It has 26 items with 20 positive statements and 6 negative statements. The Cronbach’s Alpha (0.832) and Split half method (0.903) was measured to test the reliability of the scale. The scale was validated by experts relating to the field of study.

Table 3: Dimension of Professional Development Need Scale for Multilingual Classrooms

Sl. No.	Dimensions	No. of Items
1	Career needs	7
2	Personal and interpersonal needs	4
3	Teaching, learning, curriculum and leadership needs	3
4	System and school needs	3
5	Need for Knowledge	4
6	Need for Competencies	1
7	Organizational support	4
TOTAL		26

**Results and Discussions :**

**Objective 1:** To study the level of teachers' preparedness to deal with multilingual classrooms.

Table 4: Showing the percentages of scores and level of teacher preparedness to deal with multilingual classrooms (N=198)

Preparedness level	No. of teachers	% of teachers
Highly prepared	6	3.03
Above average prepared	175	88.38
Average prepared	17	8.59
Total	198	100

Fig 1: Graphical representation of the preparedness levels of teachers on the basis of percentage of scores



From table no. 4, it is observed that 3.03% of teachers were highly prepared, 88.38% were above average prepared and 8.59% were average prepared to deal with the multilingual classrooms. Most teachers think that they are above average prepared to teach in a multilingual classroom. But this finding does not align with the findings of Cabardo (2017), who found that teachers were found to be moderately prepared in the Mother Tongue-Based Multilingual Instruction. Rinker and Ekinici (2025) found that pre-service secondary school teachers, despite showing high awareness of their responsibility toward multilingual learners, report low levels of preparedness for multilingual classrooms. The findings of the study conducted by Ozudogru (2018) found that prospective teachers seemed highly prepared for culturally responsive teaching; also, Mudenda and Nankamba (2017) found that out of 100%, 28% teachers are adequately prepared and 72% teachers are not adequately prepared to teach in the local language, which is not supported the findings of the present study.

**Hypothesis 1:** There is no significant difference between the levels of teacher preparedness to deal with the multilingual classroom with regard to gender, locality and teaching experiences.

Table 5: t-test analysis of the levels of teacher preparedness to deal with the multilingual classroom with regard to gender and locality

Selected variables	Group	N	Mean	SD	df	Cal. Value	Critical Value	Remarks
Gender	Male	104	89.88	5.89	196	1.28	1.98	Not Significant at 0.05 level
	Female	94	88.64	7.59				
Locality	Rural	130	88.3	7.51	196	3.37	1.98	Significant at 0.05 level
	Urban	68	91.19	4.52				

From the above table 5, it is shown that the mean and standard deviation of preparedness level of the male teachers are 89.88 and 5.89, respectively. The mean and standard deviation of the preparedness level of the female teachers are 88.64 and 7.59, respectively. The 't' value of the preparedness level of the male and female teachers is 1.28, which is less than the critical value of 1.98 (0.05 level). It indicates that there is no significant difference between the level of preparedness of male and female teachers to deal with the multilingual classroom. Similarly, the mean and standard deviation of teacher preparedness levels of the rural teachers were 88.3 and 7.51, and urban teachers were 91.19 and 4.52, respectively. The 't' value of the preparedness level of the rural and urban teachers is 3.37, which is greater than the critical value of 1.97 (0.05 level).

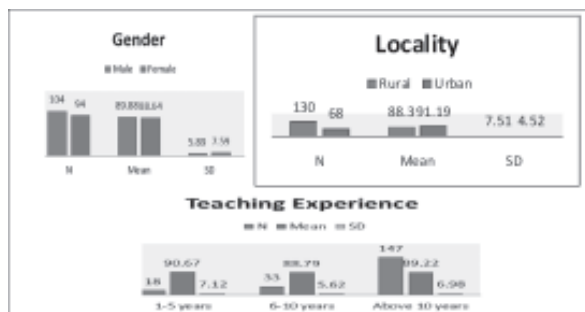
It indicates that there is a significant difference between the level of preparedness of rural and urban teachers to deal with the multilingual classroom.

Table: 6 One-way ANOVA analysis of teachers' preparedness to deal with the multilingual classroom with respect to their teaching experience parameters

Source of Variations	"Sum of Squares"	df	Mean Square	F	Sig.
Between Groups	43.055	2	21.527	0.467	0.628
Within Groups	8989.107	195	46.098		
Total	9032.162	197			

Table 6 shows that the df value of teacher's preparedness in relation to teaching experiences to deal with multilingual classrooms was found to be 2, 195. The calculated F value is 0.467. The critical value or table value at the 0.05 level of significance is 3.05. Since the Calculated F value of 0.467 is smaller than the critical value of 3.05 at a 0.05 level of significance, we **accept** the null hypothesis that states there is no significant difference in the level of teachers' preparedness in relation to teaching experiences.

Fig 2: Graphical representation of total Sample (N), Mean and SD of teacher preparedness scores with respect to their gender, locality and teaching experience



The findings of the study agree with the findings of the study done by Ozudogru (2018), who revealed that there are no significant differences between female and male prospective teachers for culturally responsive teaching. This result supports the findings of the study done by Deng, Kiramba, and Viesca (2020), who found that teachers in suburban/city areas reported higher preparedness than teachers in towns/rural areas to teach multilingual learners.

From table 6, it can be interpreted that there are no significant differences between the levels of preparedness of teachers with more teaching experience or less teaching experience to deal with the multilingual classrooms. It may be due to their mastery or command of the different languages. Another deep reason that may be behind this result is the socio-cultural background of the teachers. Generally, a diverse society in terms of language, religion, beliefs, ethnicity and philosophy provides a variety of opportunities for people to make themselves more efficient in different languages and cultures. So, it can be concluded that the teaching experience of the teachers may not affect their preparedness to deal with multilingual classrooms.

**Objective 2:** To identify the level of teachers' professional development needs to deal with multilingual classrooms.

Table 7: Showing the percentages of scores of professional development needs of teachers to deal with multilingual classrooms (N=198)

Professional development needs level	N	%
Highly need	19	9.59
Above average need	139	70.20
Average need	40	20.20
Total	198	100

Fig 3: Graphical representation of the levels of professional development need of teachers on the basis of percentage of scores



From Table 7, it has been observed that only 9.59% of teachers have a high need for professional development, 70.20% of teachers have an above average need for professional development, and 20.20% of teachers have an average need for professional development to deal with the multilingual classroom. The finding of the present study corroborates the study conducted by Krulatz and Dahl (2016), who found that the majority of teachers lack specialised training in working with students from linguistically diverse backgrounds and were interested in acquiring more training in this area. Also, findings from the study conducted by O'Neal, Ringler, and Rodriguez (2008) revealed a lack of prior training for teachers to teach diverse learners, which supports the findings of the present study.

**Hypothesis 2:** There is no significant difference between the levels of teachers' professional development need to deal with multilingual classrooms with regard to gender, locality and teaching experiences.

Table 8: t-test analysis of the level of professional development needs in the multilingual classroom with regard to gender and locality.

Selected variables	Group	N	Mean	SD	df	Cal. Value	Critical Value	Remarks
Gender	Male	104	104.63	9.14	196	0.86	1.98	Not Significant at 0.05 level
	Female	94	105.74	8.99				
Locality	Rural	130	103.22	8.77	196	4.38	1.98	Significant at 0.05 level
	Urban	68	108.87	8.51				

From the above table 8, it is shown that the mean and standard deviation of the level of professional development needs of the male teachers are 104.63 and 9.14 and of female teachers are 105.74 and 8.99 respectively. The 't' value of the level of professional development needs of male and female teachers is 0.86 which is less than the critical value of 1.98 (0.05 level). It indicates that there is no significant difference between the level of professional development needs

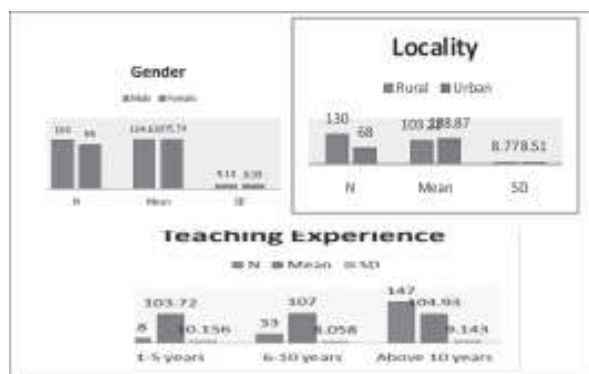
of male and female teachers to deal with the multilingual classroom. Similarly, the mean and standard deviation of teacher professional development needs of the rural teachers is 103.22 and 8.77 and for urban teachers are 108.87 and 8.51 respectively. The 't' value of level of professional development needs of rural and urban teachers is 4.38 which is higher than the critical value of 1.98 at a 0.05 level of significance. It indicates that there is a statistically significant difference between the level of professional development needs of rural and urban teachers to deal with the multilingual classroom.

Table 9: One-way ANOVA analysis of preparedness of teachers with respect to their teaching experience

Source of variations	“Sum of Squares”	df	Mean Square	F	Sig.
Between Groups	157.040	2	78.520	0.955	0.387
Within Groups	16035.788	195	82.235		
Total	16192.828	197			

Table 9 shows that the df value of the level of professional development needs of teachers having more teaching experiences or less teaching experiences to deal with the multilingual classroom is 2, 195. The calculated F value is 0.955. The critical value or table value at the 0.05 level of significance is 3.05. Since the Calculated F value of 0.955 is smaller than the critical value of 3.05 at a 0.05 level of significance, thus, indicates that there is no significant difference between the levels of professional development needs of teachers to deal with the multilingual classroom in terms of teaching experience.

Fig 4: Graphical representation of total Sample (N), Mean and SD of teacher professional development needs with respect to their gender, locality and teaching experience



Alade and Odebode (2014) revealed that age, gender, educational qualification, and years of teaching experience had no significant influence on the benefits derived by teachers from the Professional Development program. The results support the findings of the study done by Peretomode and Dinzei (2019), who found that

there is no significant difference in professional development needs between male and female principals of public and private secondary schools. But the result of the study does not support the findings of Amanulla and Aruna (2014), who found that there are significant differences between professional development needs of male and female teachers.

The findings of the study do not agree with Canado (2014), who concluded that there are significant differences in training needs for bilingual education in terms of teaching experiences. Also, this result of the study is not supported by the study done by Amanulla and Aruna (2014), who found that there are significant differences between more-experienced and less-experienced teachers in the mean scores of items related to professional development. However, this finding is in consonance with the findings of the study conducted by Peretomode and Dinzei (2019), who found that there is no significant difference in professional development needs between principals who had teaching experience of between 10 – 15 years and those with more than 16 years of experience and those with a first degree and those holders of higher degrees. Also, the finding is supported by the result of Sagir (2014) that no significant differences were found between teachers' views regarding their professional development needs based on seniority.

**Educational implications**

- The findings of the present study will help to know about the real position of preparedness of secondary school teachers for multilingual classroom in Darrang district, and it can be helpful in formulating future plans by the government.
- The study will help to understand the professional development needs of teachers to deal with multilingual classroom, so that different continuous development programs for teachers can be organised.
- The study will help other researchers to do further studies in this sector and discover more possibilities in this topic.
- The study will help teacher training institutions to promote awareness and training about multilingual classrooms to the teacher educators.
- As the findings of the present study highlighted the needs of professional development of teachers at the secondary level to teach in the multilingual classroom, the government should take initiatives regarding continuous development programs, workshops, and seminars to prepare the teacher more competent to deal with students from different linguistic backgrounds.

### Practical recommendations for stakeholders

To ensure the effective implementation of Mother Tongue-Based Multilingual Education (MTB-MLE), teachers should engage in continuous, practice-oriented professional development and adopt inclusive classroom strategies such as visual supports, peer learning, and flexible use of multiple languages. At the same time, community organizations and NGOs should collaborate with schools by providing bilingual resources, training support, and community-based learning opportunities that value local languages and cultures. Policymakers must strengthen MTB-MLE through clear language policies, adequate funding, and systematic teacher training, while curriculum developers should design inclusive curricula and culturally relevant multilingual materials aligned with classroom realities. Continuous research and collaboration among educational institutions should guide policy and classroom practices to address learners' linguistic needs effectively.

### Conclusion :

In a classroom with language and cultural diversity, the preparedness and professional development needs of teachers must be taken into account to cater to the needs of the students. The result of the study will help in understanding the level of preparedness to deal with multilingual classrooms and taking steps toward the professional development of teachers in higher secondary schools of Assam to deal with the multilingual classroom.

### Acknowledgements :

I would like to express my gratitude and profound respect to my respected ma'am Dr. Yeasmin Sultana, for her valuable guidance, encouragement and constant help throughout the study. I would like to express my thanks to Mohammad Asif sir, for helping me a lot in the completion of the study. We are highly thankful to the teachers of the higher secondary school of Darrang district for their active cooperation in providing me required data.

### Conflict of Interest :

Authors do not have any conflicts of interest.

### Authors' Contribution :

Dr. Yeasmin Sultana and Mohammad Asif contributed to the conceptualization of the study, tool construction, and proofreading of the manuscript. Bismita Deka contributed to the conceptualization and tool construction, data collection, data analysis, and compilation of the article.

### Funding :

Not Applicable

### Ethics Statement :

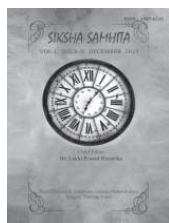
Ethical approval for conducting the study was obtained from the concerned department. Informed Consent: Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## **Role of Bamboo Crafts in Empowering Women in Assam**

### **Abstract**

Bamboo crafts in Assam provide an important pathway for rural women's economic empowerment by offering home-based, low-investment livelihood opportunities that fit with local skills and resources. In the Bareilly district of Uttar Pradesh, women constitute nearly 70% of the workforce in bamboo-based enterprise. However, earlier research from other areas indicates a much higher involvement of men, sometimes ranging from 66% to 88%. An NGO report from 2014, covering multiple caste groups, recorded an equal 50:50 participation of men and women in certain register artisans in Bamboo sector. However, research conducted in Northern Karnataka showed a contrasting trend, where women dominated the bamboo enterprise, accounting for 66.66% of the workforce. According to organisation like IBEF, women are expected to contribute to 50% of employment growth in India's bamboo sector by FY33. A 2024 study also noted that many bamboo artisans from economically disadvantaged rural areas are women, emphasizing the potential for higher incomes through the production of eco-friendly bamboo products. This study explores how bamboo crafts contribute to women's empowerment in Assam, the challenges women artisans face, and the support systems required to make this sector more inclusive and sustainable. This study examines how bamboo-based activities contribute to women's empowerment, the factors that influence their participation, and the challenges they face in the craft sector. The findings aim to highlight the potential of bamboo enterprises as a sustainable pathway for women's economic and social upliftment in Assam.

Keywords : Bamboo Crafts, Women Empowerment, Rural Life, Training Program, SHGs.

### **Introduction**

Assam, with its rich biodiversity and cultural heritage, is one of the leading bamboo producing regions of India. Bamboo has traditionally been an integral part of rural life, used extensively for household utilities, construction, handicrafts, and cottage industries. Among the various bamboo-based activities, handicraft production stands out as an important livelihood source for women, especially in rural and tribal communities. Over the years, women have contributed significantly to weaving, processing, and crafting bamboo products, often combining traditional skills with emerging design innovations. According to the North Eastern Development Finance Corporation Ltd. (NEDFi), more

than 80% of the 10,470 beneficiaries of its sustainable livelihood programmes, including bamboo craft initiatives, were women. Women's participation in bamboo craft activities not only supports household income but also creates pathways for empowerment. It enables women to gain financial independence, develop entrepreneurial abilities, and participate in community-level economic activities. With the support of government initiatives, training program, self-help groups (SHGs), and market linkages, bamboo craft has emerged as an accessible livelihood option that enhances women's confidence, mobility, and decision-making power. Projects designed to promote bamboo MSME clusters often focus on a large number of female

beneficiaries. One such initiative aims to enhance 10,000 livelihoods, ensuring that more than 50% of the participants are women, by strengthening and expanding the bamboo product supply chain. However, despite its potential, women artisans continue to face challenges such as limited access to modern tools, inadequate market exposure, low pricing of products, and the absence of organized structures to support large-scale production. Understanding these factors is essential for developing strategies that strengthen the role of bamboo crafts in empowering women in Assam. This study explores the socio-economic impact of bamboo craft activities on women, evaluates the existing support systems, and highlights the areas where improvements are needed to ensure sustainable and inclusive development.

### **Literature review**

Duflo, E. (2012). examine that Women's empowerment and economic development are strongly connected, but one does not automatically guarantee the other. While development can reduce gender inequality, empowering women can also promote development. However, the relationship between the two is not strong enough to sustain progress on its own. The literature shows that consistent and dedicated policy efforts are still necessary to achieve true gender equality, rather than relying on development or empowerment alone to create a self-reinforcing cycle.

Mandal, K. C. (2013, May). examine that Women's empowerment emerged as an important global issue in the mid-twentieth century and gained momentum after the UN declared 1975 as the Women's Decade. Despite India granting equal voting rights after Independence, many women continued to face social and economic inequalities for decades. Due to India's traditional social structure, progress remained slow. Recently, scholars, policymakers, NGOs, and governments have increased efforts to address these challenges. Empowering women is vital for their overall development and for India's progress as a developed nation.

Sinha, N., Raju, D., & Morrison, A. (2007). Stated that this paper reviews studies that examine how gender equality and women's empowerment help reduce poverty and promote economic growth. It highlights the importance of women's access to education, markets, employment, land, credit, and decision-making power within households. Evidence shows that empowering women improves productivity and wellbeing at the individual and household levels, but proving its impact on poverty reduction and growth at the national level is more difficult. The paper concludes by suggesting key areas where more research is needed.

Das, J., & Das, M. (2024) stated that Small-scale industries such as cottage and handicraft sectors play an important role in the economy of Northeast India, especially in Assam. Bamboo-based production provides livelihood opportunities to many rural households, particularly poor women working from home. Kuriha village, the largest bamboo mat-producing cluster in Assam, was studied to assess the socio-economic condition of 250 female artisans. The findings show that these women face unfavorable living conditions, with low educational levels, inadequate sanitation, poor housing, limited access to LPG, and insufficient use of government schemes.

Pawar, S, Chitagubbi, G, & Desai, R, (2023).examined that Bamboo has been an essential part of human life, used for housing, tools, food, weapons, and supporting traditional cottage industries. Handicrafts, made by hand with simple tools, combine artistic and functional value and offer a strong comparative advantage to low-income countries. These industries are labour-intensive, create large-scale rural employment, and serve as a major income source for weaker socio-economic groups. In India, handicrafts remain a crucial secondary occupation for agricultural households, helping them maintain financial stability.

Varghese, T. (2011)stated that the study examines women's empowerment in the Sohar region of Oman by focusing on household decision-making, economic participation, and mobility. Using data from 150 women and analyzing it through SPSS with regression models, the research identifies five key factors influencing empowerment. Four hypotheses were accepted, showing strong links between these factors and overall empowerment. The Women Empowerment Index indicates that women in Sohar are generally good decision-makers, especially in household and economic matters, though social empowerment is comparatively weaker. Most women are aware of their legal and political rights. The study concludes with recommendations to further strengthen women's empowerment in the region.

Sharma, P. R. (2007) stated that this study analyzes how women's participation in group-based micro-credit programs affects their empowerment in Nepal. Using survey data from 2004–2006 in the hill and terai regions, the findings show that micro-credit participation significantly improves women's decision-making power, access to financial resources, social networks, bargaining power within the household, and freedom of mobility. The impact is stronger on region, likely because women there initially had lower social and economic status, making the improvements more noticeable. The study highlights micro-credit as an

effective tool for strengthening women's empowerment in Nepal.

### Significance of the Study

Bamboo crafts generate employment and supplementary income for rural households, reducing seasonal unemployment and migration. For women, this work is often home-based and flexible, making it compatible with domestic responsibilities while still contributing significantly to household income and poverty reduction. At the same time, bamboo crafts help conserve local culture and traditional knowledge, turning heritage skills into marketable products and sustainable "green jobs.

### Objective of the Study

- To examine how involvement in bamboo crafts affects the economic status of women in Assam (income, savings, and financial independence).
- To study changes in women's social status, mobility, and decision-making within the family and community due to participation in bamboo-based activities.
- To identify major constraints faced by women bamboo artisans, such as access to raw material, tools and markets.

### Statement of the Problem

Despite the economic and cultural significance of bamboo crafts, women bamboo artisans in Assam still face low and irregular incomes, dependence on middlemen, and limited bargaining power in markets. Training programs and schemes exist, but many women have inadequate access to modern designs, technology, institutional credit, and organized marketing channels, which restricts their empowerment potential. There is a need to critically examine whether current interventions are sufficient to translate women's participation in bamboo crafts into genuine economic and social empowerment.

### Research Methodology

- **Research design:** The present study is descriptive and analytical in nature.
- **Population of the Study:** All the bamboo-based green enterprises in Assam have been considered as population for the present study purpose.
- **Sample of the Study:** Out of the population, 100 women from Darrang and Nalbari district of Assam are considered as sample for the present work. The samples are classified as 50 from Darrang and 50 from Nalbari districts.

- **Sampling Technique:** This study used stratified random sampling design across villages/SHGs to collect primary data from the respondents.

- **Data:** This study used both primary and secondary data. The primary data has been collected from the selected respondents and secondary data has been collected from various reports, articles, research papers

- **Data Collection Instrument:** Structured questionnaire has been used to collect the primary data.

**Area of the Study:** This study was conducted in Darrang and Nalbari districts of Assam.

Current status of Women Empowerment in the Bamboo Sector : Darrang and Nalbari Districts (Assam)

#### 1. Darrang District

- Women participate mainly in traditional bamboo craft such as baskets, mats, household items, and small utility products.
- Bamboo work provides supplementary income, helping women support their families and gain basic financial independence.
- Many women work from home, but lack of training, limited market exposure, and low product pricing restricts their full empowerment.
- SHGs and local markets like Banglagarh Bazaar have started creating opportunities, but overall progress is slow and needs more support.

#### 2. Nalbari District

- Nalbari shows stronger women participation in bamboo-based livelihoods compared to Darrang.
- Women produce both traditional and value-added items such as decorative crafts, gift items, and small furniture.
- Active involvement of SHGs, NGOs, and government training programs has improved skills, income, and confidence among women.

The district has better market linkages, helping women emerge as micro-entrepreneurs and contribute more directly to their household economy.



Figure-I

Figure-II

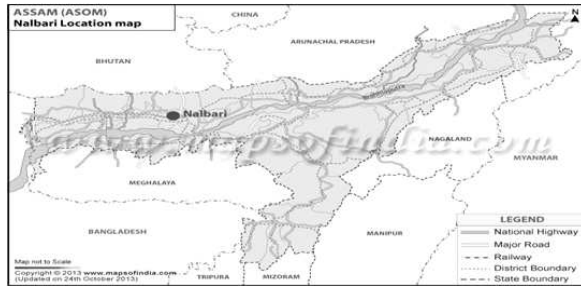


Figure-III

**Data analysis**

Descriptive statistics such as percentages, averages, and comparative tables were used to interpret and analyze the data. Qualitative analysis was employed to assess socio-economic implications and identify key challenges in the bamboo-based enterprise ecosystem.

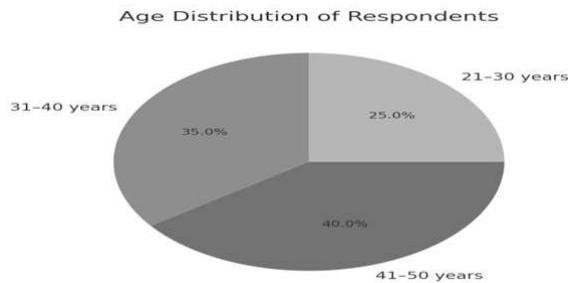
Table 1 : Profile of Respondents

**A. Age Distribution of Women Artisans**

**Interpretation**

Age Group	Percentage(%)
21-30 years	25%
31-40 Years	35%
41-50 Years	40%
TOTAL	100

**Source : Primary Data**



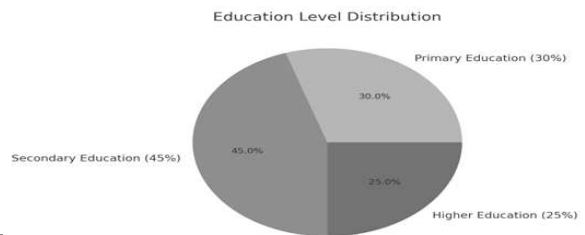
**Interpretation**

The age distribution shows that the largest group of respondents (40%) falls within the 41–50 years range, indicating that middle-aged women are most actively engaged in bamboo craft. Women aged 31–40 years make up 35%, reflecting strong participation from economically productive age groups. The youngest group, 21–30 years (25%), also shows involvement, suggesting that younger women are increasingly taking up bamboo craft as a livelihood activity.

**B. Educational Qualification**

Education Level	Percentage(%)
Primary Education	30%
Secondary Education	45%
Higher Education	25%
TOTAL	100

**Source : Primary Data**



**Interpretation**

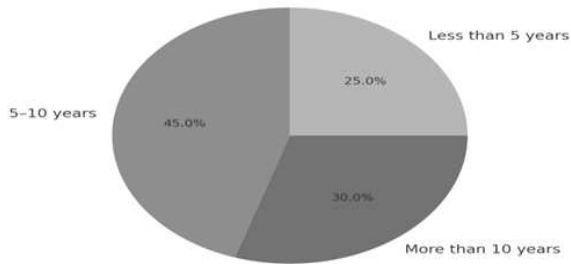
The pie chart shows that most respondents (45%) have secondary education, indicating that women with moderate schooling participate actively in bamboo craft. About 30% have only primary education, suggesting that the craft offers livelihood opportunities even for women with limited formal education. Meanwhile, 25% have higher education, showing that bamboo craft also attracts educated women for income support and entrepreneurial activities.

**C. Years of Experience in Bamboo Crafts**

Experience Level	Percentage(%)
Less than 5 years	25%
5-10 years	45%
More than 10 years	30%
TOTAL	100

**Source : Primary Data**

Experience Level of Respondents in Bamboo Craft



**Interpretation**

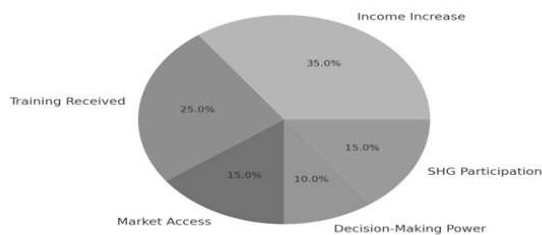
The pie chart shows that most respondents (45%) have 5–10 years of experience, indicating strong skill development among moderately experienced women artisans. About 30% have over 10 years of experience, reflecting a group of highly skilled traditional craft workers. Meanwhile, 25% have less than 5 years of experience, showing that new women are increasingly entering the bamboo craft sector as a livelihood option.

**Table2: Women Empowerment Factors through Bamboo Crafts**

Empowerment Factor	Percentage(%)
Income Increase	35%
Training Received	25%
Market Access	15%
Decision-Making Power	10%
SHG Participation	15%
<b>TOTAL</b>	<b>100</b>

**Source : Primary Data**

Women Empowerment Factors through Bamboo Crafts in Assam



**Interpretation:**

The pie-chart showed that Income increase (35.0%) shows the strongest empowerment impact, followed by training (25%). Market access, decision-making, and SHG participation also contribute but at lower magnitudes.

**Table 3:Major constraints faced by women bamboo artisans**

Major challenges	Percentage (%)
Raw material Shortage	40%
Equipment Issues	35%
Market/Material Constraints	25%
<b>TOTAL</b>	<b>100</b>

**Source : Primary Data**

**Interpretation**

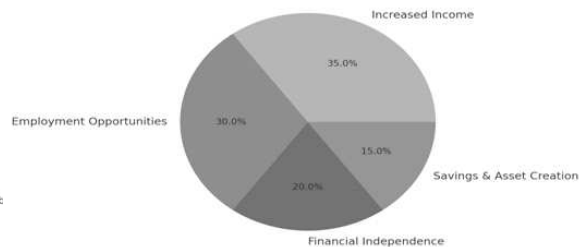
The pie chart represents the major constraints faced by women bamboo artisans, Raw material shortage (40%),tools and equipment issues(35%) and market/ material constraints(25%),showing the most significant challenge for women bamboo artisans.

**Table 4: Bamboo Crafts Affect the Economic Status of Artisans**

Economic Status	Percentage(%)
Increased Income	35%
Employment Opportunities	30%
Financial Independence	20%
Savings & Asset Creation	15%
<b>Total</b>	<b>100%</b>

**Source : Primary Data**

How Bamboo Crafts Affect the Economic Status of Artisans



**Interpretation**

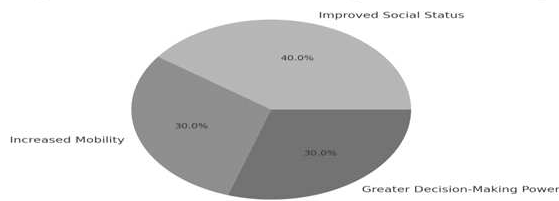
The pie chart shows how bamboo crafts positively affect the economic status of artisans, especially rural women. Increased Income – 35% (Highest Impact), Employment Opportunities – 30%, Financial Independence – 20%, . Savings & Asset Creation – 15%, Women gain control over their own income and feel more empower.

**Table 5: Changes in Women’s Social Status, Mobility and Decision-making With Family and Community**

Changes in Women’s Activities	Percentage(%)
Improved Social Status	40%
Increased Mobility	30%
Decision-Making Power	100%
<b>TOTAL</b>	<b>100%</b>

**Source : Primary Data**

Changes in Women's Social Status, Mobility, and Decision-Making



**Interpretation**

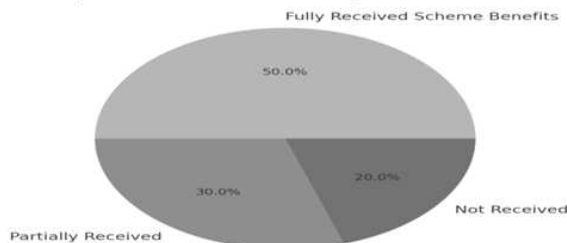
The pie chart illustrates how women’s lives have improved in three major areas due to participation in economic activities such as bamboo craft. Improved Social Status – 40% (Highest Change), Increased Mobility – 30%, Greater Decision-Making Power – 30%, Women gain respect, confidence, and a stronger identity in both family and community. The contribution to income increases their social recognition.

**Table 6 : Receipt of the Govt. Schemes Benefits**

Government Schemes	Percentage (%)
Fully Received Scheme Benefits	50%
Partially Received	30%
Not Received	20%
<b>TOTAL</b>	<b>100%</b>

**Source : Primary Data**

Receipt of Scheme Benefits by Women Artisans



**Interpretation**

The pie-chart showed that receipt of scheme benefits by women artisans in three stages due to 50% of fully received scheme benefits, 30% of partially received, and 20% not received.

**Findings**

1. Women constitute a large portion of bamboo artisans in Assam, especially in rural areas.
2. Bamboo crafts significantly contribute to women’s income and household economic stability.
3. Training program and SHGs help women gain skills, confidence, and market access.
4. Bamboo-based enterprises improve women’s decision-making power within the household.
5. Despite benefits, women face challenges like limited market exposure, low pricing, and lack of modern technology.

6. Government schemes have improved participation but require better implementation and awareness.

**Conclusions :**

Bamboo crafts play a crucial role in empowering women in Assam by providing sustainable livelihood opportunities and enhancing their socio-economic status. The combination of traditional skills, natural resources, and institutional support has helped many women gain financial independence and social recognition. However, to unlock the full potential of bamboo crafts, efforts are needed to strengthen market linkages, provide advanced training, fair pricing, and promote entrepreneurship. Supporting women artisans can contribute significantly to rural development and inclusive growth in Assam.

**Acknowledgement :**

This is an independent work and it owes nothing to any person or organisation.

**Conflict of Interest :**

Since this is a single authored research work, the question of conflict of interest does not arise.

**Author’s Contribution :**

This article is solely produced by Satarupa Devi.

**Funding :**

Not any kind of financial or other perks have been received for this research work.

**Ethics Statement :**

This research article does not violate any ethical values related to human beings or animals.

**Informed Consent: N/A**

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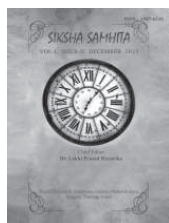
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## Water Imagery and Memory: The Interplay of Visual Projection and Narrative in *A River's Tale*

### Abstract

This paper explores how water imagery and visual projection work together to shape narrative, memory and emotional expressivity in *A River's Tale*, an Assamese monodrama written and directed by Dr. Mrinal Jyoti Goswami. Drawing on ecofeminist theory, postdramatic dramaturgy, semiotics and memory studies, it argues that the play's central metaphor, the river *Lakheitra*—emerges not only through verbal narration but through an intricate interplay of projected imagery, embodied movement, rhythmic soundscape and spatial composition. The script presents non-linear temporal transitions and choreographed physical expressions of trauma and recollection, which are heightened through dynamic projection techniques that evoke flowing water, fragmentation and chromatic shifts. These visual and performative elements collectively construct a fluid memory-scape in which past and present intermingle through image, gesture and rhythm. Ultimately, the paper contends that *A River's Tale* makes a significant contribution to contemporary Assamese theatre by integrating digital scenography with indigenous metaphor, employing water as a potent mnemonic, emotional and political force rather than as mere backdrop.

Keywords : Water Imagery, Visual Projection, Memory and Trauma, Postdramatic Theatre, Ecofeminism, Multimedia Scenography

### Introduction

*A River's Tale* (2024), a 21-minute monodrama performed internationally—including at the Colombo International Theatre Festival (2024) and the International Festival of Theatre in the Sahara (2025)—offers a vivid exploration of memory, trauma and feminine identity through river symbolism. Based on Priyanka Das's poem *Lakheitorai Dhuwa Daag*, the play follows a woman who, through fragmented recollection and a choreographed physical vocabulary, recounts her intimate relationship with the river Lakheitra. The narrative unfolds through cycles of childhood innocence, love, societal violence and eventual psychological collapse, all framed through water imagery that operates both verbally and visually.

What distinguishes this performance is its interdisciplinary use of multimedia projection, which merges water imagery with the actor's body and movement. The opening moments present the protagonist immersed in a musical texture and dim blue lighting, while visual projections suggest "a young

girl's silhouette floating in water-like rhythm."<sup>1</sup> As the narrative progresses, water imagery transforms into a dynamic dramaturgical force—gentle and rhythmic during childhood memories, chaotic during moments of violation and enveloping during emotional breakdown. These projections are not ornamental additions; rather, they function as narrative agents that shape emotional intensity and temporal flow.

The rationale for this study emerges from the intimate connection between the play's thematic concerns and its visual dramaturgy. Water, traditionally associated with fluidity, life, destruction and rebirth, aligns closely with fragmented memory and psychological trauma. By examining the interplay between water imagery and narrative construction, this paper demonstrates how *A River's Tale* generates meaning beyond spoken dialogue, relying instead on multimedia aesthetics to articulate interiority and memory.

Accordingly, the study is guided by the following research questions. First, how does water imagery function as a carrier of memory in the play? Second,

what role do visual projections play in shaping the emotional and narrative trajectory? Third, how does the interaction between projected water imagery and bodily performance generate meaning? Finally, how does multimedia scenography contribute to the development of Assamese postdramatic performance?

These questions direct the analysis towards understanding *A River's Tale* as a hybrid theatrical form—neither conventional narrative drama nor pure movement-based performance, but a postdramatic memory-environment shaped by bodies, images and fluid metaphors.

### Literature Review

The literature relevant to this study spans four interrelated intellectual domains: water symbolism, multimedia scenography, trauma and memory in performance and contemporary Assamese theatre.

Water symbolism has long occupied a foundational position within global cultural imagination. Gaston Bachelard conceptualises water as an archetype of depth, reflection and psychological fluidity, arguing that it resonates powerfully with human emotion due to its unstable and transformative nature.<sup>2</sup> Ecofeminist theorists further extend this symbolic association by linking water to women's lived experiences. Vandana Shiva emphasises the parallel histories of ecological exploitation and the marginalisation of women, particularly in relation to nurturing labour and resource control.<sup>3</sup> Mies and Shiva similarly argue that women and natural elements such as water are subjected to extractive systems yet continue to embody resilience and regenerative potential.<sup>t</sup> Within this framework, water imagery emerges as a feminist metaphor that connects natural cycles with women's embodied histories.

In theatre and performance studies, multimedia projection has been widely recognised as a significant dramaturgical tool for constructing atmosphere, memory and affective landscapes. Dixon documents how digital performance practices merge the performer's body with technological interfaces, producing hybrid modes of presence that extend beyond representational realism.<sup>u</sup> Lehmann's formulation of postdramatic theatre further situates image, sensation and spatial composition above linear plot or character psychology, thereby legitimising the use of projections, soundscapes and visual abstraction as primary meaning-making devices.<sup>v</sup> Contemporary multimedia scenography allows performers to interact dynamically with projected images, shadows and chromatic environments, transforming the stage into a site of sensory and emotional inscription.

Memory studies offer crucial insights into the relationship between performance, recollection and embodiment. Taylor argues that performance functions as a repertoire of memory, preserving and transmitting embodied knowledge that exceeds written archives.<sup>w</sup> Trauma theorist Cathy Caruth conceptualises trauma as a disruption of temporal continuity, often manifesting through repetitive and fragmented recollection rather than coherent narrative.<sup>x</sup> Such a model aligns closely with the non-linear structure of *A River's Tale*, where memory unfolds through bodily gestures and visual cues rather than chronological storytelling. Hirsch's concept of post-memory further illuminates how sensory triggers—such as images, sounds and visual textures—activate affective recall and emotional transition.<sup>y</sup>

Contemporary Assamese theatre has increasingly embraced hybrid performance forms that combine indigenous themes with global theatrical innovations. Theatre collectives such as AANK\_A Creative Line foreground minimalist scenography, monodrama and intercultural performance strategies, contributing to a distinctive aesthetic that blends folk sensibility with postdramatic experimentation.<sup>1p</sup> This evolving theatrical landscape provides the broader cultural and artistic context within which *A River's Tale* situates its multimedia engagement with memory, trauma and water imagery.

### Theoretical Framework and Methodology

This study draws on four intersecting theoretical strands—ecofeminism, performance studies, postdramatic theory and theatre semiotics—to examine how *A River's Tale* constructs its visual and narrative language. Ecofeminism provides an essential starting point because it theorises the intertwined oppression of women and nature, arguing that both have historically been subjected to parallel systems of domination while simultaneously functioning as sources of resilience and renewal.<sup>11</sup> Within the context of the play, the river Lakheitra operates not merely as a geographical entity but as an emotional and symbolic extension of the protagonist's lived experiences. This framework helps illuminate how the river becomes an active participant in the dramaturgy rather than a passive scenic backdrop.

Performance studies further deepen this inquiry by foregrounding gesture, movement and embodiment as primary carriers of meaning. Schechner's concept of "restored behaviour," which understands actions and gestures as culturally coded, repeatable and transmissible across time, enables an interpretation of the protagonist's physical vocabulary as a repository of memory.<sup>12</sup> In the unpublished script of *A River's Tale*, descriptions such as "the trembling body

contorting like a submerged branch”<sup>13</sup> illustrate how memory becomes inseparable from bodily expression. The physical score is therefore not merely representational; it functions as an embodied archive of trauma in which affective memory is inscribed on the performing body.

Postdramatic theory offers a further analytical dimension. Lehmann defines postdramatic theatre as privileging image, rhythm and sensory experience over linear narrative progression.<sup>14</sup> *A River's Tale* clearly aligns with this paradigm. Rather than unfolding through conventional storytelling structures, the production constructs meaning through projection, light, movement and sonic texture. When the script notes that “the projection of water rises with increasing violence,”<sup>15</sup> it signals a dramaturgical shift in which imagery does not simply reflect emotion but actively generates narrative tension. The play's non-linear temporal structure further reflects postdramatic aesthetics, merging past and present into fluid, water-like rhythms that resist chronological order.

The semiotics of theatre, drawing from the foundational work of Elam and Pavis, provides conceptual tools for interpreting how visual, spatial and gestural elements function as signs within performance.<sup>16</sup> Every projection cue, colour modulation and bodily gesture in *A River's Tale* may be read as a semiotic unit contributing to a layered meaning system. Visual moments described in the script, where the actor's silhouette is engulfed by overlapping water textures,<sup>17</sup> create a symbolic merging of body and river that signifies dissolution, vulnerability and transformation. Such instances exemplify the dense semiotic layering characteristic of postdramatic performance.

The methodology employed in this study integrates textual analysis, performance analysis and semiotic-visual interpretation. Textual analysis centres on the unpublished script of *A River's Tale*,<sup>18</sup> which functions as the authoritative dramaturgical document. This analysis focuses on metaphoric language, stage directions and descriptions of embodied action. Performance analysis is conducted through detailed, frame-by-frame viewing of the recorded performance documentation.<sup>19</sup> This approach enables close examination of how projection, lighting, sound and physical movement interact dynamically during performance. For instance, the intensification of rippling light during moments of psychological rupture becomes legible only through repeated viewing.

Semiotic interpretation bridges script and performance by treating recurring motifs—such as water textures, shadow distortions, chromatic transitions and bodily contractions—as signifiers within a broader symbolic

system. By synthesising these methodological approaches, the study demonstrates how *A River's Tale* constructs a fluid memory-scape in which water imagery, projection technology and embodied performance operate cohesively to narrativise trauma and emotional remembrance.

## Analysis and Discussion

### Storyline of the Play *A River's Tale*

The play opens with a young woman seated quietly in the morning light, absorbed in reading a newspaper. As projected visuals begin to shift, her emotional state gradually deteriorates—the pages are filled with reports of violence against women. Although she throws the newspaper aside in distress, the narratives of brutality continue to echo within her consciousness, refusing to dissipate.

Abruptly, the woman transforms into another figure through embodied action, expressing the pain of a woman who has been sexually assaulted. Using a pair of cymbals (*tâl*), she reenacts the brutality, as though the instruments themselves become violating hands. Her movements grow increasingly convulsive and eventually her body collapses under the imagined weight of violence.

The scene shifts once more. She encounters the floating body of a young girl who has taken her own life following sexual abuse. Reaching out helplessly, she attempts to comfort the lifeless form. Gradually, the stage space transforms into a river and the chair on which she had earlier been seated becomes the dead girl's body, which she cradles in mourning.

Turning again to the newspaper, she reads the story aloud: a girl living with her widowed mother near the Lakheitra River—innocent, playful and full of life—who is groomed and eventually raped by a man she trusted. Seeking purification and relief, the girl turns to the river, but the water turns red and the villagers' gossip destroys her remaining sense of self. Silenced by trauma, she becomes mute and her inner world collapses entirely.

The protagonist relives the child's experiences her moments of play with her mother, her trust, her terror and her helplessness. She also embodies the grief of the mother, reaching towards her projected image in a gesture of loss and longing.

In the final moments, the protagonist once again lifts the cymbals, suspended between resistance, action and surrender. Gradually, the cymbals reclaim their symbolic role as violating hands. She freezes in a posture of violation as the projections fade and the stage descends into darkness, concluding the performance in profound silence.<sup>20</sup>

### Water as a Metaphor of Memory

Water functions as the central emotional, narrative and symbolic force in *A River's Tale*. Throughout the script, the protagonist's physical expressions mirror the fluid qualities of water—rising, sinking, trembling and drifting—indicating that memory operates not as a fixed or linear archive but as shifting emotional currents. Early in the performance, soft blue projections ripple across her body, evoking innocence and childhood calm. The image of “the girl's body swaying like a leaf afloat on calm water”<sup>21</sup> resonates with philosophical interpretations of water as a site of reverie and psychological expansion.<sup>22</sup>

As the narrative progresses into adolescence and danger, water imagery becomes increasingly violent. Projections fracture into chaotic waves and harsh light patterns, while soundscapes evoke “destruction and breaking waves.”<sup>23</sup> This aesthetic rupture corresponds with trauma theory, which conceptualises trauma as a disruption of temporal continuity that resurfaces through sensory shock rather than verbal narration.<sup>24</sup>

The river also functions as a silent witness to the girl's life. The script repeatedly returns to the riverbank, initially as a space of play with her mother, later as a site of fear and flight.<sup>25</sup> This aligns with South Asian cultural understandings of rivers as repositories of collective memory and emotional inheritance.<sup>26</sup> The Lakheitra River becomes a custodian of both joy and suffering.

In the final movement, water transforms into a site of surrender and dissolution. Projections soften into silver and pale blue hues, enveloping the actor's silhouette. When her figure “dissolves into fluid light,”<sup>27</sup> the imagery symbolises her merging with memory itself. This moment echoes ecofeminist perspectives in which nature offers refuge and reclamation from patriarchal violence.<sup>28</sup>

### Visual Projection as Emotional Landscape

In *A River's Tale*, projection is not ornamental; it is the principal medium through which the protagonist's emotional world becomes intelligible. Rather than representing literal water, director Dr. Mrinal Jyoti Goswami employs abstract visual motifs—rippling lines, fractured textures and shifting chromatic fields; derived from original paintings created specifically for the production by Dr. Sanjib Bora. These paintings were later transformed into animated video projections that form the backbone of the play's visual design, shaping the spectator's sensory and emotional experience. This strategy aligns with postdramatic theatre, where meaning emerges primarily through sensory and atmospheric experience rather than narrative exposition.<sup>29</sup>

### Interaction of Projection and Body

The relationship between projection and body forms the semiotic core of the performance. The actor's body becomes a living surface upon which images drift, fracture and dissolve. During traumatic sequences, bodily contortions coincide with layered projections that fragment and multiply her silhouette. The script describes how her image “stretches and distorts under layered projections,” reflecting the return of trauma as visceral sensory shock rather than coherent narrative recollection.<sup>30</sup>

Moments of resistance also emerge within this visual–corporeal dynamic. When the protagonist attempts to escape oppressive memory, she is described as “trying to break free from the boundaries of the projected shadows.”<sup>31</sup> Symbolically, this gesture represents an effort to resist not only traumatic memory but also the visual architecture that continuously reinscribes violence upon the body. Yet the projections intensify rather than recede, underscoring the inescapable grip of patriarchal power structures.

An additional layer of symbolism is introduced through the repeated use of the chair. Initially functioning as a neutral object associated with everyday reading, the chair gradually transforms into the site of assault and humiliation. The protagonist is thrown onto it, violated under it and repeatedly returns to it as the narrative unfolds. Later, her attempt to clean the chair proves futile, symbolising the impossibility of erasing or purifying systemic violence.<sup>32</sup> By the end of the play, the chair visually and symbolically transforms into a dead body, signifying the death of innocence and the suffocating weight of patriarchy.

### Narrative Rhythm Shaped by Projections

The narrative logic of *A River's Tale* unfolds through visual rhythm rather than linear plot progression. Slow, undulating projections accompany memories of childhood, while sudden ruptures in light and motion signal traumatic intrusion. The script notes that “the projection rises like swelling water whenever violence is remembered,” making visual rhythm the primary vehicle for memory recall.<sup>33</sup>

These visual cues function as emotional punctuation marks within the performance. Chromatic shifts, shadow expansion and projection density replace dialogue as narrative grammar, guiding the spectator through emotional transitions. This non-linear, affect-driven structuring reflects the nature of traumatic memory itself—episodic, layered and unpredictable rather than chronological.<sup>34</sup>

### Projection as Mnemonic Device

Projection in *A River's Tale* does not merely illustrate memory; it actively activates it. Certain textures, colours and visual rhythms recur as sensory triggers that evoke emotional states. When the protagonist recalls her mother or moments of childhood innocence, projections return to soft blue tones, creating an affective bridge between past and present.<sup>35</sup>

Projection also plays a crucial role in universalising the protagonist's story. Flowing water imagery—pooling, dispersing and engulfing transforms individual trauma into collective experience. The expanding shadow-body becomes an “everywoman,” representing countless silenced female voices. The three-layer visual system—body, projection and shadow, thus creates a multidimensional articulation of social violence and shared suffering, extending the narrative beyond personal testimony into collective memory.<sup>36</sup>

### Conclusion :

*A River's Tale* demonstrates how water imagery and multimedia scenography can operate symbiotically to construct a theatrical language capable of articulating experiences that resist linear narration. By merging projected visual environments, embodied movement, shadow play and sonic texture, the performance reconfigures memory as a fluid and sensorial phenomenon. Water, functioning simultaneously as symbol and dramaturgical principle, becomes the primary carrier of emotional resonance—embodying innocence, rupture, witnesshood and refuge across the narrative arc. The river Lakheitra is not merely a backdrop to the protagonist's life; it emerges as an active presence that absorbs, reflects and amplifies trauma, ultimately becoming the only space in which release is possible.

The projection design developed from the original paintings and subsequent digital animations by Dr. Sanjib Bora—creates a multilayered perceptual field in which meaning is generated through interaction rather than representation. The layering of body, projection and shadow produces a complex semiotic architecture that mirrors the protagonist's fragmented psychological state. These interwoven visual registers enable the performance to articulate what cannot be spoken, particularly in contexts of gendered violence where language frequently fails. The symbolic transformation of the chair further deepens the dramaturgical structure, revealing how patriarchal systems invade bodies, memories and spaces and how attempts to cleanse or resist these structures repeatedly confront systemic constraints.

Through its fluid temporal organisation and reliance on affective visual rhythms rather than linear plot progression, the play operates firmly within the postdramatic tradition.<sup>37</sup> Its fragmented temporality reflects the logic of trauma, wherein memory returns not as chronological sequence but as sensory shock, repetition and rupture.<sup>38</sup> The interaction between bodily movement and projection also exemplifies the concept of restored behaviour, demonstrating how gestures accumulate and transmit lived histories over time.<sup>39</sup> Ecofeminist perspectives further illuminate the protagonist's final merging with water as both an act of surrender and an assertion of agency, allowing nature to reclaim what patriarchal violence has violated.<sup>40</sup>

Within the broader landscape of contemporary Assamese theatre, *A River's Tale* represents a significant step towards a hybrid performance language that bridges indigenous metaphor with digital scenography. It demonstrates how minimalist staging, embodied performance and multimedia aesthetics can converge to articulate the interior life of a character with profound emotional clarity. The play not only foregrounds the urgency of addressing violence against women but also expands the expressive possibilities of regional theatre through technologically integrated storytelling.

Ultimately, *A River's Tale* reveals how water fluid, restless and transformative can function as a powerful mnemonic and aesthetic force. The performance invites audiences to witness trauma not through explicit narrative exposition but through rhythms, images and textures that echo the unpredictable flow of memory. In doing so, it offers a compelling example of how postdramatic performance can engage collective experiences of suffering while retaining the poetic intensity of personal testimony. Through its innovative dramaturgy and emotionally charged visual landscape, *A River's Tale* enriches contemporary performance practice and reaffirms the enduring power of theatre to translate human vulnerability into shared understanding.

### Acknowledgements :

No financial support or personal assistance was received for the present work.

### Conflict of Interest :

Authors do not have any conflicts of interest.

### Authors' Contribution :

Both the authors have equal contribution in the present work.

### Funding :

Not Applicable

**Ethics Statement :**

No experiment has been done on humans and animals.

**Informed Consent :**

Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## Integration of Indian Knowledge Systems in Higher Education : Opportunities, Challenges and Measures

### Abstract

The National Education Policy (NEP) 2020 marks a significant shift in India's higher education framework by strongly advocating the integration of the Indian Knowledge System (IKS) into mainstream academic practices. India's intellectual heritage, developed over centuries, encompasses a wide range of disciplines such as philosophy, mathematics, science, medicine, agriculture, arts, and ethical studies. Despite its richness and relevance, much of this indigenous knowledge has remained largely disconnected from formal education due to colonial influences and the dominance of Western knowledge systems. NEP 2020 seeks to bridge this gap by restoring the rightful place of Indian knowledge traditions within Higher Education. The Indian Knowledge System is deeply experiential and practice-oriented, emphasizing observation, experimentation, critical inquiry, and ethical values. It promotes holistic learning by integrating cognitive, moral, and skill-based development. By embedding IKS within curricula, pedagogy, and research, higher education institutions can make learning more contextual, culturally relevant, and inclusive. This integration encourages interdisciplinary approaches, strengthens learners' connection with their cultural roots, and fosters innovation grounded in local wisdom. Furthermore, the inclusion of Indian perspectives in higher education is expected to enhance student engagement, promote sustainability, and support value-based education aligned with societal needs. It also offers opportunities for meaningful research by combining traditional knowledge with modern scientific approaches. The present paper examines the significance, scope, and potential impact of integrating Indian Knowledge Systems into higher education, highlighting how this initiative aligns with the broader vision of NEP 2020 to create a balanced, inclusive, and future-ready education system.

Keywords : Higher Education, Indian Knowledge System, National Education Policy, Development, Knowledge.

### Introduction

India is one of the world's oldest civilizations with a continuous tradition of knowledge creation and transmission. From ancient times, education in India was deeply connected to life, nature, and society. The Indian Knowledge System evolved through centuries of reflection, experience, and experimentation,

encompassing fields such as philosophy, science, medicine, astronomy, mathematics, agriculture, art, and craftsmanship. This knowledge was preserved through texts like the Vedas, Upanishads, Vedangas, and various philosophical traditions, as well as through oral practices and community-based learning.

Despite its richness, Indian knowledge gradually lost its central place in formal education during the colonial period, as foreign educational models replaced indigenous systems. As a result, modern education became largely disconnected from India's cultural and intellectual roots. Recognizing this gap, the National Education Policy 2020 places renewed emphasis on restoring the relevance of Indian Knowledge Systems within contemporary education.

NEP 2020 envisions an education system that is rooted in Indian values while remaining globally relevant. It recognizes Indian Knowledge Systems as a guiding force for educational reform and encourages their integration into higher education through curriculum design, teaching methods, research, and innovation. The policy promotes interdisciplinary learning and the blending of traditional wisdom with modern scientific knowledge to address present-day challenges.

The integration of Indian Knowledge Systems into higher education aims to develop learners who are not only academically competent but also socially responsible, ethically grounded, and culturally aware. By focusing on inquiry-based learning and practical application, this approach emphasizes "how to know" rather than merely "what to know." Such an educational framework supports holistic development and prepares students to contribute meaningfully to society. In this context, the integration of Indian Knowledge Systems under NEP 2020 represents a significant step toward revitalizing India's educational philosophy and strengthening its knowledge traditions.

### **India's Prosperity and Ancient Knowledge System**

India's growth and prosperity have always been closely linked with its rich tradition of knowledge and wisdom. For centuries, Indian society developed knowledge systems that addressed not only intellectual pursuits but also practical aspects of daily life, ethics, health, environment, and governance. These systems evolved through careful observation, experience, reflection, and experimentation, making them both scientific and philosophical in nature.

At the heart of India's ancient knowledge lies the Vedic literature, which includes the Rigveda, Samaveda, Yajurveda, and Atharvaveda. These texts are more than religious scriptures; they are comprehensive sources of knowledge that discuss subjects such as philosophy, mathematics, astronomy, medicine, linguistics, environmental awareness, and social organization. The wisdom contained in these texts has deeply influenced Indian culture, spirituality, and ways of living.

The teachings of the Vedas emphasize values such as truth, harmony, self-discipline, and respect for nature.

Over time, these principles shaped various fields including education, art, music, architecture, literature, and systems of governance. The holistic worldview of ancient Indian sages promoted balance between material progress and spiritual well-being, which contributed to the long-term stability and prosperity of Indian civilization.

In the modern context, there is a growing realization that this vast intellectual heritage should not remain confined to history. Reviving and integrating ancient Indian knowledge into contemporary education can provide meaningful insights for addressing present-day social, environmental, and ethical challenges. Recognizing this, recent educational reforms emphasize the need to reconnect learners with India's intellectual roots. NEP 2020 and the Integration of Indian Knowledge Systems

The National Education Policy (NEP) 2020 marks an important step toward reviving Indian Knowledge Systems within formal education. The policy acknowledges that traditional knowledge, when combined with modern education, can create a more balanced, inclusive, and culturally relevant learning experience. NEP 2020 promotes the scientific study of Indian knowledge traditions rather than viewing them merely as cultural or historical subjects.

Under NEP 2020, Indian Knowledge Systems are to be integrated across disciplines such as mathematics, engineering, philosophy, medicine, yoga, environmental studies, arts, sports, and languages. Special attention is given to indigenous and tribal knowledge, including traditional healthcare practices, forest management, sustainable agriculture, and ecological conservation. This approach helps students appreciate the relevance of local knowledge in solving contemporary problems.

The policy also encourages multilingual education, recognizing that Indian knowledge has been preserved in many regional and classical languages. Learning through one's mother tongue and classical languages allows students to understand concepts more deeply and fosters a sense of cultural continuity. Additionally, the use of modern technologies, digital platforms, and experiential learning methods makes the teaching of IKS more engaging and accessible.

NEP 2020 envisions a gradual and thoughtful integration of Indian knowledge into existing curricula. Subjects such as the history of Indian mathematics, architecture, philosophy, and Ayurveda can be naturally incorporated into mainstream education, thereby enriching the learning process without overburdening students.

### **Integration of Indian Knowledge System into Higher Education**

Integrating Indian Knowledge Systems into higher education requires innovative teaching approaches that reflect the spirit of traditional learning methods. One of the most significant models from ancient India is the Gurukula system, which emphasized a close and respectful relationship between the teacher (Guru) and the student (Shishya). This system focused not only on intellectual development but also on character building, discipline, creativity, and moral values.

In the modern higher education context, the integration of IKS involves designing well-structured courses that highlight the relevance of traditional knowledge in today's world. Educators need to be adequately trained to understand and communicate the philosophical foundations and practical applications of Indian knowledge systems. This will help ensure that IKS is taught in a meaningful and scholarly manner.

Interdisciplinary learning plays a crucial role in this integration. By connecting Indian knowledge traditions with modern scientific and technological disciplines, students can develop a holistic understanding of knowledge. Such an approach encourages critical thinking, innovation, and problem-solving skills, preparing learners to address complex global challenges.

The inclusion of Indian Knowledge Systems in higher education also contributes to the preservation of Indian languages, arts, and cultural practices. It helps students develop a strong sense of identity and cultural awareness, enabling them to apply traditional wisdom creatively in contemporary contexts.

### **Role of NEP 2020 in Promoting Indian Knowledge System (IKS)**

The National Education Policy (NEP) 2020 represents a significant policy intervention aimed at reorienting India's education system towards inclusivity, interdisciplinarity, and cultural rootedness. A central feature of NEP 2020 is its emphasis on the systematic integration of Indian Knowledge Systems (IKS) into mainstream education at all levels, particularly in higher education.

NEP 2020 acknowledges the intellectual depth and scientific relevance of India's indigenous knowledge traditions and seeks to bridge traditional wisdom with contemporary academic disciplines. The policy envisions IKS not as an alternative to modern knowledge, but as a complementary and enriching framework that can contribute to holistic learning, ethical development, and contextual problem-solving. By embedding IKS within curricula, research, and

institutional structures, NEP 2020 aims to revive, modernize, and institutionalize indigenous knowledge while aligning it with global academic standards.

### **Key Initiatives for Integration IKS Under NEP 2020**

1. Strengthening Interdisciplinary Research and knowledge Integration:

NEP 2020 encourages interdisciplinary research that integrates Indian Knowledge Systems with modern disciplines such as science, technology, engineering, medicine, environmental studies, and social sciences. Research in areas including Ayurveda, traditional ecological knowledge, ancient Indian mathematics, linguistics, and philosophy is being revisited using contemporary scientific methodologies. The policy advocates collaborative engagement between traditional scholars (Shastris) and modern researchers to foster innovative, evidence-based knowledge creation.

2. Institutionalisation of Indian Knowledge Systems through Dedicated centres:

To facilitate structured research, documentation, and dissemination of indigenous knowledge, NEP 2020 recommends the establishment of dedicated IKS centres, chairs, and departments in universities and research institutions. Leading institutions such as IITs, IISc, and central universities are encouraged to institutionalize IKS through specialized academic units. The Indian Knowledge Systems Division (IKS-D) under the Ministry of Education plays a pivotal role in supporting research projects, academic programs, and capacity-building initiatives in this domain.

3. Curricular Integration and Digital Dissemination of IKS:

The policy emphasizes curricular reforms to incorporate IKS-based courses across disciplines. Credit-based courses in Sanskrit studies, Indian philosophy, Ayurveda, Vedic mathematics, traditional arts, and crafts are encouraged. Digital learning platforms such as SWAYAM and NPTEL are leveraged to enhance accessibility and outreach, ensuring the widespread dissemination of IKS across regions and learner groups.

4. Promotion of Bilingual and Multilingual Education for Knowledge Preservation:

NEP 2020 recognizes language as a critical vehicle for the preservation and transmission of knowledge. The policy promotes bilingual and multilingual education, encouraging the study of classical and regional languages such as Sanskrit, Pali, Prakrit, Tamil, and other indigenous languages. This initiative

facilitates engagement with original texts, including the Upanishads, Arthashastra, and Charaka Samhita, thereby preserving their authenticity and contextual relevance for contemporary learners.

### **Opportunities Offered by the Integration of Indian Knowledge Systems**

The integration of Indian Knowledge Systems (IKS) into mainstream education presents wide-ranging opportunities for both learners and society as a whole. One of the most significant benefits is that it helps students develop a deeper and more meaningful understanding of India's rich cultural and intellectual heritage. When learners are exposed to indigenous knowledge traditions, they begin to appreciate the depth, diversity, and scientific nature of India's ancient wisdom, fostering respect for traditional knowledge that has evolved through centuries of lived experience.

Indian Knowledge Systems promote holistic development by addressing physical, mental, emotional, and spiritual well-being. Traditional practices such as Ayurveda and Yoga emphasize preventive healthcare, balanced living, and harmony between body and mind. Their inclusion in education not only improves students' well-being but also raises awareness about natural and sustainable approaches to health, reducing over-dependence on purely modern medical systems. Similarly, indigenous environmental knowledge—such as traditional farming methods, water conservation practices, and forest management—offers valuable insights into sustainable development and ecological balance, which are crucial in addressing contemporary environmental challenges.

The integration of IKS also encourages innovative and critical thinking. By drawing upon time-tested solutions rooted in Indian traditions, students are inspired to explore alternative ways of problem-solving that combine traditional wisdom with modern scientific approaches. This interdisciplinary blending of knowledge fosters creativity, research orientation, and practical application of learning, making education more relevant to real-life situations.

Furthermore, the inclusion of Indian Knowledge Systems strengthens national identity and cultural pride among learners. Understanding one's cultural roots instills a sense of belonging and confidence, enabling students to engage with global knowledge systems without losing their cultural grounding. This process ensures the preservation, documentation, and transmission of India's intellectual heritage to future generations.

By bridging ancient wisdom with contemporary education, the integration of IKS contributes to the creation of an education system that is inclusive, contextual, and forward-looking. It not only enriches academic learning but also prepares students to become responsible, culturally aware, and socially sensitive citizens capable of addressing modern challenges with informed and balanced perspectives.

### **Challenges in Integrating Indian Knowledge Systems**

Despite its many benefits, integrating Indian Knowledge Systems into education presents several challenges. One major challenge is the lack of sufficient resources, infrastructure, and trained educators who can effectively teach these subjects. Some educators and policymakers may remain skeptical about the relevance of traditional knowledge in modern education.

Another significant challenge is the oral and experiential nature of much indigenous knowledge, which makes documentation and curriculum development difficult. Language barriers also limit accessibility, as many classical and regional languages are not widely understood by students today. Additionally, the dominance of Western educational models has created biases that sometimes marginalize Indian knowledge systems.

The absence of a standardized curriculum and assessment framework, along with a shortage of qualified teachers, further slows the process of integration. Addressing these challenges requires careful planning, awareness-building, and long-term commitment.

### **Measures for Strengthening Indian Knowledge Systems in Education**

For the successful and meaningful integration of Indian Knowledge Systems (IKS) into education, a well-planned and systematic approach is essential. One of the foremost measures is the introduction of structured, well-designed, and credit-based courses on Indian philosophy, sciences, arts, literature, and traditional practices. These courses should be academically rigorous and aligned with modern educational standards, ensuring that Indian knowledge is studied scientifically rather than as mere historical or cultural content.

Strengthening teacher training programs is another crucial step. Educators play a central role in implementing IKS effectively, and therefore, they must be adequately trained in both the conceptual foundations and pedagogical approaches of Indian Knowledge Systems. Professional development

programs, workshops, and orientation courses should be organized to equip teachers with the necessary skills to integrate traditional knowledge with contemporary teaching methods.

Encouraging interdisciplinary research is also vital for the growth and relevance of IKS. Research that connects Indian knowledge traditions with modern disciplines such as science, technology, health, environmental studies, and social sciences can generate innovative insights and practical solutions to current challenges. Additionally, systematic documentation of indigenous and traditional knowledge is necessary to preserve oral traditions and make them accessible for academic study.

The use of digital platforms and technology can further enhance the reach and impact of Indian Knowledge Systems. Digital repositories, online courses, and multimedia learning resources can help disseminate IKS to a wider audience, especially among younger learners. Technology also supports the preservation of rare manuscripts, traditional practices, and regional knowledge systems.

Collaboration among scholars, educational institutions, policymakers, and local knowledge holders is essential to create a supportive ecosystem for IKS integration. Such collaboration ensures curriculum relevance, policy support, and effective implementation at institutional and national levels. Through these collective efforts, Indian Knowledge Systems can be successfully embedded within higher education, contributing to holistic learning, cultural continuity, and the overall development of the nation.

#### **Conclusion :**

Indian knowledge systems have the potential to renew and strengthen India's education system by reconnecting it with the country's rich cultural heritage. When education is guided by IKS, it can lead to intellectual empowerment, cultural confidence, and a sense of mental freedom among learners. As India moves forward in the modern world, the relevance of indigenous wisdom and its practical applications becomes increasingly important, not only for the nation but also for the global community.

The inclusion of IKS in education helps individuals understand their cultural identity more deeply and promotes a holistic understanding of nature and society. Since Indian knowledge is largely based on experiential and implied learning, it equips learners to address real-life challenges such as environmental issues, sustainable development, and food security.

However, integrating IKS into the curriculum is not without challenges. There is a strong need for properly

trained teachers who possess both subject knowledge and the ability to present IKS meaningfully in classrooms. Although the Indian government has taken steps under the National Education Policy (NEP) to promote IKS, systematic planning and teacher training are essential for successful implementation.

The process of integrating IKS cannot happen overnight. Indigenous knowledge systems have evolved over thousands of years and must be adapted thoughtfully using modern tools such as information technology. Gradual, well-planned integration based on the needs and capacities of learners and educators will ensure that IKS becomes a meaningful and effective part of contemporary education.

#### **Acknowledgement**

I, Ritu Devi, the author, and Mrs. Sunu Deka, the co-author, sincerely express our heartfelt gratitude to all those who have contributed, directly or indirectly, to the successful completion of this research paper entitled "Integration of Indian Knowledge Systems in Higher Education: Opportunities, Challenges and Measures."

#### **Author's Contribution**

Ritu Devi, Assistant Professor, Department of Education, R. C. Saharia Teachers' Training College, conceptualized the study and designed the overall structure of the research paper.

Sunu Deka, Assistant Professor, Department of Assamese, R. C. Saharia Teachers' Training College, Tangla, contributed to the theoretical and cultural interpretation of Indian Knowledge Systems, particularly enriching the discussions on Opportunities Offered by the Integration of Indian Knowledge Systems and Measures for Strengthening Indian Knowledge Systems in Education.

#### **Funding :**

Not any kind of financial or other perks have been received for this research work.

#### **Ethics Statement :**

This research article does not violate any ethical values related to human beings or animals.

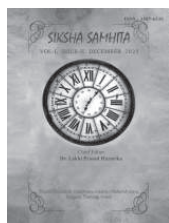
#### **Informed Consent :**

Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## **Cultural Identity in the Age of Artificial Intelligence: The Marginalization of Northeast Indian Languages**

### **Abstract**

The rapid advancement of artificial intelligence has created unprecedented opportunities for human progress, yet it simultaneously threatens to erase minority linguistic and cultural identities from the digital landscape. This paper examines how the predominance of high-resource languages in AI development systematically excludes Northeast Indian languages, comprising over 200 distinct tongues spoken by approximately 45 million people. Despite accounting for nearly 40% of India's endangered languages, these linguistic communities face technological marginalization that extends beyond mere inconvenience to fundamental questions of cultural survival in an increasingly digital world. Through analysis of language endangerment data, digital infrastructure disparities, and recent technological developments including specialized language models, this study demonstrates that AI's linguistic bias represents not just a technical challenge but a profound threat to cultural autonomy and identity. Recent efforts in developing dedicated neural language models demonstrate technical feasibility, yet systemic barriers to adoption persist. The research concludes that addressing AI's linguistic exclusion requires coordinated action across policy, infrastructure, and community engagement.

**Keywords :** artificial intelligence, language endangerment, Northeast India, cultural identity, digital divide

### **Introduction**

Artificial intelligence has emerged as one of the defining technologies of the 21st century, fundamentally transforming how humans interact with information, communicate across distances, and access essential services. However, this technological revolution carries an inherent bias: the overwhelming majority of AI development focuses on a handful of high-resource languages, primarily English, Mandarin, and Spanish. This concentration creates a profound disparity where speakers of minority and indigenous languages find themselves increasingly excluded from the digital ecosystem that shapes modern economic, social, and political participation.

Northeast India presents a particularly compelling case study of this linguistic marginalization. The region encompasses eight states and represents one of the most linguistically diverse areas in the world, with over 200

distinct languages belonging primarily to the Tibeto-Burman and Austroasiatic language families. These languages serve approximately 45 million speakers and embody centuries of accumulated cultural knowledge, oral traditions, and unique worldviews. Yet UNESCO's Atlas of the World's Languages in Danger (2009) identifies 197 endangered languages in India, with Northeast India accounting for a disproportionate share of this linguistic vulnerability.

When artificial intelligence systems cannot understand, process, or generate content in minority languages, speakers face a stark choice: abandon their linguistic heritage to participate in the digital economy, or maintain their cultural identity at the cost of technological exclusion. This paper examines the cultural implications of AI's linguistic bias with specific focus on Northeast Indian languages, analyzing the current state of language endangerment, digital

infrastructure disparities, and recent technical efforts to develop language-specific AI models.

### Literature Review

The intersection of artificial intelligence and linguistic diversity has received increasing scholarly attention in recent years, particularly concerning the systematic exclusion of low-resource languages from technological development. This review examines three interconnected bodies of literature: language endangerment and preservation, AI bias in natural language processing, and digital inclusion in minority language communities.

### Language Endangerment and Documentation

Research on language endangerment has established that technological marginalization accelerates intergenerational language shift. Austin and Sallabank (2011) demonstrate that languages lacking digital presence face compounded threats, as younger generations increasingly inhabit technology-mediated spaces. Crystal (2000) argues that language death represents irreversible loss of unique cognitive frameworks and cultural knowledge systems. Recent documentation efforts, including India's People's Linguistic Survey (Devy, 2010), reveal that over 600 Indian languages face potential extinction, with Northeast India bearing disproportionate burden due to limited institutional support and economic pressures favoring dominant languages.

### AI Bias and Low-Resource Language Processing

The concentration of AI development in high-resource languages has been extensively documented. Joshi et al. (2020) categorize the world's 7,000+ languages into five classes based on data availability, finding that fewer than 100 languages possess sufficient resources for robust NLP system development. This creates what Cieri et al. (2016) term "digital language death," where technological exclusion accelerates linguistic marginalization. Recent work on cross-lingual transfer learning (Ruder et al., 2019) demonstrates technical feasibility of extending AI capabilities to low-resource languages, yet deployment remains limited by lack of coordinated funding and policy support.

In the Indian context, AI4Bharat has developed significant infrastructure for Indic languages, including IndicTrans2 for machine translation and IndicBERT for text understanding (Ramesh et al., 2022). The No Language Left Behind (NLLB) project by Meta has extended coverage to some Indian languages (NLLB Team, 2022). However, these initiatives primarily focus on languages with larger speaker populations and existing digital corpora, leaving many Northeast Indian languages with minimal or no coverage.

### Digital Inclusion and Cultural Identity

Scholars examining digital inclusion increasingly recognize language as a fundamental dimension of technological access. Warschauer (2004) argues that meaningful digital inclusion requires not merely infrastructure but cultural and linguistic relevance of digital content. Research on India's Northeast region documents how digital infrastructure disparities compound linguistic marginalization. This literature establishes that AI's linguistic bias operates not as isolated technical challenge but as manifestation of broader patterns of cultural and political marginalization.

The present study extends this scholarship by examining cultural implications of AI exclusion specifically for Northeast Indian languages, integrating sociolinguistic analysis with infrastructure assessment to demonstrate how technological marginalization threatens cultural autonomy and identity formation.

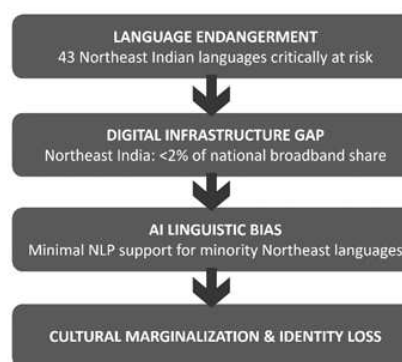


Figure 1: *The Triple Exclusion Framework demonstrates how infrastructure gaps, AI bias, and language endangerment compound to threaten cultural identity in Northeast India.*

### Analytical Framework

This study employs a conceptual and analytical approach rather than empirical investigation, synthesizing secondary data from authoritative sources to examine the cultural implications of AI's linguistic bias on Northeast Indian language communities. The analysis is grounded in three primary data categories: language endangerment statistics from UNESCO's Atlas of the World's Languages in Danger and Government of India documentation; digital infrastructure metrics from the Telecom Regulatory Authority of India and policy research institutions; and technical assessments of language model development for Northeast Indian languages.

The analytical framework integrates sociolinguistic perspectives on language endangerment with critical technology studies examining AI bias and digital exclusion. Rather than generating original empirical data, this research critically synthesizes existing

evidence to construct a comprehensive understanding of how technological marginalization intersects with cultural identity. The study examines three interconnected dimensions: the sociolinguistic landscape documenting patterns and drivers of language endangerment; the technological infrastructure revealing connectivity disparities and access inequalities; and the cultural implications exploring how AI exclusion affects identity formation, knowledge transmission, and community autonomy.

This approach allows for examination not merely of technical aspects of language technology development but of broader social and cultural contexts within which these technologies operate and the communities they affect. Recent developments in language-specific AI models for Northeast Indian languages provide concrete examples of technical feasibility while highlighting persistent barriers to adoption and meaningful impact on speakers' daily lives.

**Research Questions**

This conceptual and analytical study is guided by the following research questions:

1. How does linguistic bias in contemporary AI systems intersect with existing patterns of language endangerment in Northeast India?
2. What structural factors: technological, economic, and policy-related compound the exclusion of Northeast Indian languages from AI-enabled digital ecosystems?
3. What implications does AI-driven linguistic exclusion have for cultural identity, knowledge transmission, and community autonomy in the region?

**Limitations:** This study relies entirely on secondary data from published sources and does not include original empirical research, field studies, or primary data collection. The analysis is conceptual and interpretive in nature.

This study is a conceptual and policy-oriented analysis rather than a technical NLP survey. It does not provide: systematic review of recent MT/ASR/TTS systems, per-language technical audits, or state-level disaggregated infrastructure data. Comprehensive technical surveys of NLP capabilities for individual Northeast languages, including recent developments in low-resource machine translation, speech recognition, and orthographic transfer methods, remain important directions for future research.

The primary contribution of this study lies in integrating sociolinguistic, infrastructural, and AI-

focused scholarship to frame linguistic exclusion as a cultural and identity-level challenge rather than a purely technical limitation.

**Results and Discussion**

The data reveal a stark paradox: Northeast India, home to some of the world's most linguistically diverse ecosystems, faces systematic technological erasure in the age of artificial intelligence. This is not accidental neglect but the predictable outcome of AI development driven by commercial imperatives that privilege linguistic markets over cultural preservation. The following analysis examines three dimensions of this exclusion and their implications for cultural autonomy.

**The Linguistic Landscape: Endangerment and Erosion**

Northeast India's linguistic diversity represents an irreplaceable repository of human cultural achievement, yet this diversity exists under severe threat. According to UNESCO (2009), India has 197 endangered languages. While exact regional breakdowns vary across data sources, Northeast India accounts for a disproportionate concentration, with the Government of India's Scheme for Protection and Preservation of Endangered Languages (2013) identifying 43 languages from this region requiring urgent documentation and preservation efforts. Table 1 presents the distribution of endangered languages across India, highlighting Northeast India's disproportionate burden.

Table 1: *Endangerment Status of Indian Languages*

Category	Number	Percentage
Total Endangered (India)	197	100%
Critically Endangered	42	21%
Severely Endangered	7	4%
Definitely Endangered	62	31%
Vulnerable	81	41%
Extinct (since 1950)	5	3%

Source: UNESCO (2009). *Atlas of the World's Languages in Danger (3rd ed.)*. Paris: UNESCO Publishing. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000192416>

The drivers of this endangerment are complex and interconnected. Economic migration to Hindi or English-speaking urban centers creates environments where minority languages lack functional utility. Educational systems that operate exclusively in state or national languages further accelerate language shift, as children spend formative years immersed in linguistic environments divorced from their home languages.

The cultural implications of this language loss extend far beyond communication. Each language embodies unique conceptual frameworks and ways of understanding the world that have evolved over centuries. When languages disappear, entire knowledge systems vanish with them, including traditional ecological knowledge, medicinal practices, oral histories, and artistic traditions. For indigenous communities in Northeast India, language loss represents a severance from ancestral wisdom and cultural continuity that cannot be fully recovered once broken.

**Digital Infrastructure and the Deepening Divide**

The technological exclusion facing Northeast Indian languages operates within a broader context of digital infrastructure inequality. Northeast India accounts for less than 2% of India’s total broadband subscriber base despite representing 3.7% of the national population, a disparity that translates to approximately 18-19 million subscribers across all eight states combined. Table 2 presents comparative data on digital infrastructure disparities affecting the region.

Table 2: *Digital Infrastructure Disparity in Northeast India*

Metric	NE India	National
Population Share	3.7%	—
Broadband Subscriber Share	<2%	—
Total Subscribers (millions)	18-19	900+
Active Mobile Users (millions)	12.7	750+
Internet Penetration Rate	Variable*	52-65%

\*Varies significantly by state within Northeast India

Source: TRAI (2024); Observer Research Foundation (2025)

When government services transition to digital platforms that operate exclusively in dominant languages, minority language speakers face double exclusion: first from physical infrastructure access, and second from linguistic accessibility even when connectivity exists. This pattern risks creating permanent underclasses excluded from participation in India’s growing digital economy, which is projected to contribute nearly one-fifth of national income by 2030.

The psychological impacts of technological exclusion deserve particular attention. When digital platforms cannot accommodate minority languages, speakers internalize messages about the value and legitimacy of their linguistic heritage. Younger generations receive powerful signals that their ancestral languages lack relevance in modern contexts. This perception accelerates language shift as parents conclude that maintaining minority language fluency disadvantages

their children rather than enriching their cultural inheritance.

**Artificial Intelligence and Cultural Exclusion**

The rise of artificial intelligence as a mediating layer between humans and information systems amplifies existing patterns of linguistic marginalization. Contemporary AI systems require massive training datasets and computational resources that remain concentrated in high-resource languages. For most Northeast Indian languages, this AI exclusion manifests in practical barriers: mainstream voice assistants lack support for languages like Khasi, Garo, and Mizo; machine translation systems produce nonsensical outputs; and search engines struggle to index information in underrepresented languages.

Preliminary efforts to explore multilingual foundation models for Northeast Indian languages have been proposed (Nyalang, 2025, preprint), alongside published language-specific models including MizBERT for Mizo (Lalramhluna et al., 2024) and AxomiyaBERTa for Assamese (Nath et al., 2023). These peer-reviewed models demonstrate that Northeast Indian languages, despite limited digital resources, can achieve competitive performance when provided dedicated development effort. However, the gap between research prototypes and production deployment in consumer applications and government services remains substantial.

International precedents demonstrate that linguistic inclusion in AI is achievable with political will. New Zealand’s investment in Māori language AI, Wales’ development of Welsh language models, and Ireland’s funding for Irish language technology show that minority language communities can resist digital marginalization through coordinated policy action. Northeast India can learn from these models while adapting them to its unique multilingual context.

**Cultural Identity and the AI Future**

The stakes of linguistic inclusion in AI development transcend technical considerations to encompass fundamental questions about cultural survival and human diversity. For indigenous communities in Northeast India, language serves not merely as a communication tool but as the foundation of cultural identity, the repository of ancestral knowledge, and the primary mechanism through which values and traditions pass between generations. When AI systems exclude these languages, they effectively declare these cultures irrelevant to the digital future.

Yet the binary between tradition and technology represents a false dilemma. Indigenous communities have always adapted to changing circumstances while

maintaining cultural continuity. Many actively embrace digital technologies as tools for cultural revitalization when those technologies accommodate their linguistic needs. The question is not whether minority language communities should participate in the AI age, but whether AI systems will be designed to accommodate human linguistic diversity or enforce conformity to economically dominant languages.

#### **Critical Analysis: The Political Economy of AI Exclusion**

The marginalization of Northeast Indian languages in AI development is not merely a technical oversight but reflects deeper political-economic structures. Unlike market failures that can be corrected through policy intervention, AI's linguistic bias represents what Couldry and Mejias (2019) term "data colonialism" - the extraction and valorization of data from dominant language communities while rendering minority languages invisible to algorithmic systems.

This raises fundamental questions about technological sovereignty. When AI systems are developed primarily by corporations in the Global North optimizing for commercial returns, minority language communities face a choice between linguistic assimilation or technological exclusion. The "solution" of creating language-specific models, while technically feasible, remains constrained by the same market logics that produced the exclusion initially.

A truly transformative approach requires reconceptualizing language technology development as a public good rather than commercial product. This implies government investment in digital linguistic infrastructure, community-controlled data governance, and regulatory frameworks that mandate linguistic accessibility as a precondition for AI deployment in public services.

#### **Conclusion**

The intersection of artificial intelligence development with linguistic diversity presents humanity with a choice about the future we wish to build. For Northeast Indian languages, already vulnerable due to limited speaker populations, lack of institutional support, and economic pressures favoring dominant languages, AI's linguistic bias compounds existing threats to create what may be an existential crisis for cultural survival.

The technical feasibility of developing language models for low-resource languages has been demonstrated through projects like NE-BERT and language-specific models for Mizo and Assamese, with emerging exploratory efforts for other Northeast Indian languages. What remains is the political will and coordinated action necessary to transform proof-of-concept demonstrations into deployed systems that

meaningfully serve linguistic minority communities. This transformation requires policy frameworks that incentivize inclusive AI development, infrastructure investments that address connectivity disparities, community-driven technology design, educational initiatives that build digital literacy while respecting linguistic diversity, and sustained funding mechanisms.

The path forward must recognize that linguistic inclusion in AI is not merely a technical problem but a question of cultural justice and human rights in an age of increasing technological mediation. Every language embodies unique ways of conceptualizing the world. The loss of linguistic diversity represents an impoverishment of human cognitive and cultural possibilities that cannot be recovered once extinguished. The future of Northeast Indian languages, and minority languages globally, depends on whether societies choose to build inclusive technological systems or allow market forces alone to determine which cultures deserve representation in the digital age.

#### **Towards Linguistic Justice in the AI Age**

Addressing AI's exclusion of Northeast Indian languages requires coordinated intervention across multiple domains:

**Policy Level:** The government should mandate linguistic accessibility standards for AI systems deployed in public services, similar to physical accessibility requirements. A "Digital Linguistic Rights Act" could establish minimum standards for language inclusion in government-funded technology projects.

**Infrastructure Level:** Dedicated funding for Northeast language digital infrastructure, including standardized Unicode implementations, text-to-speech systems, and curated training datasets, is essential. The proposed allocation should match at least 5% of Digital India's budget, proportional to the region's linguistic diversity.

**Community Level:** Language technology development must be community-driven, with indigenous speakers involved in data collection, model validation, and deployment priorities. This requires capacity-building programs training Northeast community members in computational linguistics and NLP.

**Technical Level:** Major technology companies operating in India should be incentivized through tax benefits or procurement preferences to develop and maintain models for all languages, with special provisions for endangered languages regardless of speaker population.

**Research Level:** Establishment of a Northeast Languages AI Research Consortium, bringing together regional universities, central research institutions, and

community organizations to coordinate research efforts and prevent duplication.

These interventions recognize that technological inclusion is not charity but a prerequisite for cultural survival in an increasingly digital world.

**Declarations**

**Acknowledgements :**

The author acknowledges the linguistic communities of Northeast India whose cultural resilience and linguistic heritage inspire this research.

**Conflict of Interest :**

The author declares no conflict of interest.

**Authors' Contribution :**

Badal Nyalang conducted the research, analysis, and writing of this manuscript.

**Funding :**

This research received no external funding.

**Ethics Statement :**

Not applicable.

**Informed Consent :**

Not applicable.

**Data Availability :**

All data sources are publicly available and cited in the references section.

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## Trends and Patterns in India's Essential Oil Exports (2010-2024)

### Abstract

The global essential oils industry has expanded rapidly in the recent years due to growing demand for natural and sustainable products. This paper studies India's essential oil exports under HS codes 330129 and 330190 from 2010 to 2024. It analyses trends in export quantity, value and unit prices along with the structure of major destination markets. The study is based on secondary data. Descriptive and comparative methods are used to identify changes in trade pattern and market concentration over time. The analysis provides insights into India's position in the global essential oils trade and the factors that influence export performance, including demand patterns, pricing and external market conditions.

Keywords : essential oils, export trends, trade performance, green exports

### Introduction

Over the past decade, the global essential oils industry has expanded rapidly. Essential oils, which are natural extracts derived from plants, are widely used in perfumes, cosmetics, food flavouring, pharmaceuticals, and aromatherapy. This increasing demand is largely driven by a global shift in consumer preference towards natural, sustainable, and chemical-free products. According to recent market reports, the essential oils industry is valued at several billion US dollars and is projected to maintain a strong growth path in the coming years (Grand View Research, 2023; Allied Market Research, 2022). The growing use of plant-based ingredients in the personal care and wellness sectors has been a key factor supporting this expansion.

Within this context, essential oils have become a vital component of what are often termed "green exports", that is, products derived from renewable natural resources that support rural livelihoods while maintaining a low environmental footprint (FAO, 2021). This trend holds particular significance for India, which cultivates a wide range of aromatic crops such as lemongrass, citronella, and palmarosa. The production and export of essential oils not only provide employment and income opportunities for rural and tribal communities but also offer a promising avenue for increasing agricultural foreign exchange earnings (Government of India, 2022).

India occupies a prominent position in the global essential oils trade. However, to strengthen its competitiveness in international markets, the country must enhance its certification processes, ensure higher quality standards, and develop more integrated value chains. These improvements are essential for accessing premium markets and increasing export returns (APEDA, 2023). This study therefore examines India's essential oil exports between 2010 and 2024.

### Methodology

This paper adopts a quantitative research design based on empirical analysis of secondary data. The study is descriptive and analytical in nature, aiming to examine India's performance and position in the global essential oils market. It focuses on export trends, destination patterns, and price movements to understand the evolving trade dynamics between 2010 and 2024.

Quantitative data for the analysis are sourced from the United Nations Comtrade Database, using HS Code 330190 and HS Code 330129. The dataset includes India's annual export values, quantities, and principal trading destinations. All trade values are recorded in USD for uniformity and comparability across years. Descriptive statistical methods such as growth rate analysis, trend comparison, and share estimation are applied to interpret the data. Graphical tools are used to present export performance and destination distribution clearly. Additional insights are drawn from

reports published by the Ministry of Commerce and Industry (Government of India), APEDA, and international market studies to contextualise the quantitative results within broader industry and policy developments.

**Literature Review**

The global essential oils industry has expanded rapidly over the past decade, determined by the rising demand for natural and sustainable products across cosmetics, food, and wellness sectors. According to Grand View Research (2023), the global essential oils market reached USD 10.3 billion in 2023 and is expected to grow at a compound annual growth rate (CAGR) of around 7.9% from 2024 to 2030. Similarly, Allied Market Research (2022) attributes this growth to increasing consumer awareness of the therapeutic benefits of essential oils, particularly in aromatherapy and personal care products.

Developing economies in Asia, including India, China, and Indonesia, are becoming key producers and exporters due to favourable agro-climatic conditions and lower production costs (FAO, 2021). However, global trade in essential oils is shaped by strict quality standards and increasing emphasis on sustainable sourcing (OECD-FAO, 2022). The market has also been influenced by growing demand for organic certification, which helps exporters gain access to high-value markets in Europe and North America (UNCTAD, 2021).

India holds a leading position as one of the largest producers and exporters of essential oils, particularly mint-based oils under HS Code 330129. The country accounts for over 70% of the world’s mint oil production, making it a key player in global trade (Singh & Sivakumar, 2020). Major essential oils cultivated in India include lemongrass, citronella, palmarosa, and peppermint, which are largely grown in Uttar Pradesh, Assam, and Tamil Nadu (APEDA, 2023). The export of these oils supports rural livelihoods and contributes significantly to agricultural foreign exchange earnings.

According to Rathore and Kumar (2019), India’s essential oil exports have shown steady growth due to rising global demand for natural products. However, export competitiveness is constrained by issues such as inconsistent quality, limited branding, and lack of harmonised international certifications. These constraints hinder Indian producers from capturing higher-value segments of the global market (Brahmachari, 2021). Essential oils operate within global value chains dominated by advanced economies, which control higher-value stages like blending, formulation, and branding. Developing countries like

India primarily export raw or semi-processed essential oils (UNCTAD, 2021). Studies highlight that enhancing value addition through improved distillation technologies, traceability, and quality assurance is essential for India to strengthen its global position (Singh & Sivakumar, 2020).

Moreover, the essential oils sector aligns closely with the concept of green exports, referring to environmentally sustainable trade based on renewable natural resources. Sustainable production and eco-certification can enhance India’s access to premium markets (FAO, 2021). Strengthening the green export base also supports the national agenda of promoting low-carbon growth and rural employment generation (OECD-FAO, 2022). While there is extensive research on the production and use of essential oils, few empirical studies have examined India’s export performance using disaggregated HS codes such as 330190 and 330129. Earlier studies often focus on domestic market dynamics or production efficiency rather than analysing trade structure, destination patterns, and price behaviour over time. This paper contributes to filling this gap by using UN Comtrade data from 2010-2024 to assess India’s essential oil exports in the context of global demand, sustainability, and value chain integration.

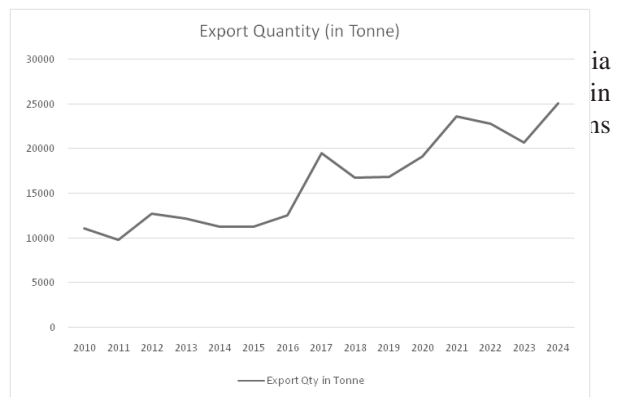


Figure 1: *Export of essential oils from India (2010-2024)*

India exported 11,072 tonnes of essential oils in 2010, which slightly declined to 9,804 tonnes in the year 2011. Exports then recovered to 12,704 tonnes in 2012, followed by a moderate fluctuation to 12,583 tonnes until 2016. A sharp increase to 19,488 tonnes could be observed in the year 2017, followed by a slight decline to 16,720 tonnes in 2018 and it stabilised to 16,795 tonnes in the year 2019. Exports again increased to

19,146 tonnes in the year 2020 and surged to 23,614 tonnes in 2021, before slightly decreasing to 22,739 tonnes in 2022 and 20,652 tonnes in 2023. The highest export quantity was achieved at 25,065 tonnes in 2024, including strong recent growth.

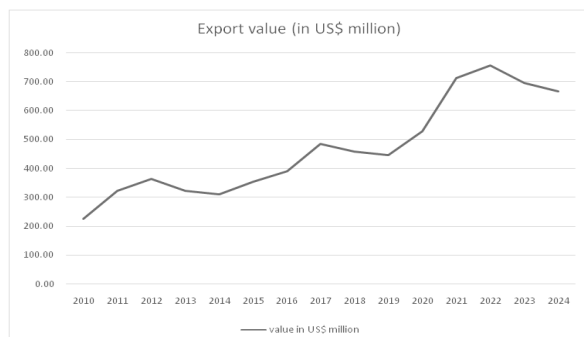


Figure 2: Export of essential oils from India (2010-2024)

The export value of essential oils mirrors the quantity trend but with more distinct fluctuations. In 2010, India earned US\$ 226.67 million from exports, which increased sharply to US\$ 324.27 million in 2011 and US\$ 363.67 million in 2012. Following these, falls were noticed in the export values at US\$ 323.26 million and US\$ 310.41 million in the year 2013 and 2014 respectively. Export values steadily rose to US\$ 392.09 million in the year 2016 and US\$ 487.05 million in the year 2017. Export values increased to US\$ 528.92 million in 2020, followed by a remarkable increase to US\$ 714.48 million in the year 2021 and to US\$ 757.43 million in the year 2022. Values slightly declined to US\$ 668.63 million in the years 2023 and 2024 respectively.

**Unit Value Trend of India’s essential oil exports (2010-2024)**

Table 1: Unit Value trend of India’s essential oil exports

Year	Export Qty in Tonne	value in US\$	Unit value
2010	11071.522	226666751	20472.95
2011	9804.486	324266636	33073.29
2012	12703.884	363671485	28626.80
2013	12192.787	323257656	26512.20
2014	11275.83	310408730	27528.68
2015	11302.687	355401109	31443.95
2016	12582.667	392086831	31160.87
2017	19488.05485	487050817.9	24992.27
2018	16719.94975	459682121.4	27493.03
2019	16795.33984	446166965.3	26564.93
2020	19145.66419	528920417.9	27626.12
2021	23614.35476	714482276.7	30256.27
2022	22739.25654	757432509.4	33309.47
2023	20651.74955	696090732.7	33706.14
2024	25064.51108	668634687.6	26676.55

Table 1 shows the unit value trend of India’s essential oil exports. It represents the average export price per tonne (US\$/t) of India’s essential oil exports. It is calculated as the ratio of total export value to total export quantity for each year. It shows that the average price per tonne of essential oils has increased over the period, reflecting both higher global demand and possible shifts towards higher value products. Unit values rose from approximately US\$ 20,472/t in 2010 to US\$ 26,676.55/t in 2024, with peaks observed in 2021 at US\$ 30,256.27/t and 2022 at US\$ 33309.47/t, coinciding with large jumps in export value relative to quantity.

**Compound Annual Growth Rate (CAGR) of India’s export of essential oils**

Table 2: CAGR of India’s exports of essential oils

Year	Qty CAGR in %	Value CAGR in %
2010		
2011	-11.44	43.06
2012	29.57	12.15
2013	-4.02	-11.11
2014	-7.52	-3.97
2015	0.24	14.49
2016	11.32	10.32
2017	54.88	24.22
2018	-14.20	-5.62
2019	0.45	-2.94
2020	13.99	18.55
2021	23.34	35.08
2022	-3.71	6.01
2023	-9.18	-8.10
2024	21.37	-3.94

Table 2 shows the Compound Annual Growth Rate (CAGR) of India’s export of essential oils. The year-wise CAGR analysis of essential oils exports between 2010 and 2024 shows how India’s essential oil export performance evolved over time. It shows a fluctuating growth pattern for both quantity and value. Substantial increase in quantity to 54.88 % and 23.34% was observed in the years 2017 and 2021 respectively. Negative growths were observed in years such as 2011, 2018 and 2023. In comparison, the value growth was more resilient with notable rises to 43.06% in 2011 and 35.08 % in 2021, even during years when quantity declined. This pattern showcases that even in periods of lower export volume revenue growth was sustained. This may be likely due to favourable pricing or higher value products. Overall, the CAGR trend highlights the dynamic nature of essential oil exports, marked by alternating periods of expansion and contraction in both volume and value.

### Top 10 Export Destination for India's essential oils in 2024

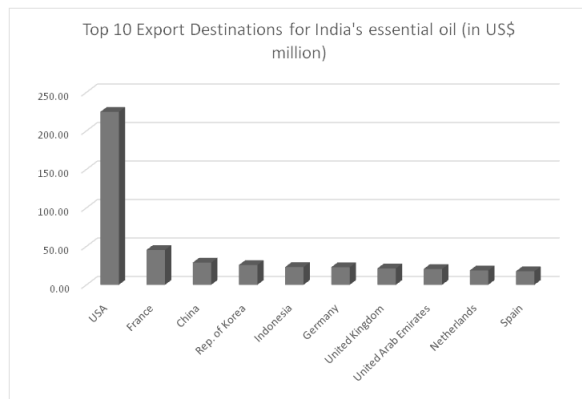


Figure 3: Top 10 destinations for India's essential oil exports (2024)

Figure 3 shows the destination wise distribution of India's essential oil exports in 2024. It shows a highly concentrated market structure, with the United States emerging as the dominant partner. The USA alone accounted for US\$ 224.58 million representing more than half of India's total exports of HS 330129 and 330190 for the year. This indicates a strong and sustained demand in the US market. The US essential oil market is driven by large scale applications in cosmetics, aromatherapy, pharmaceuticals, and natural wellness industries. France is the second largest destination at US\$ 45.30 million followed by China at US\$ 28.83 million and Republic of Korea at US\$25.69. These four countries form the core premium market cluster. This is mainly because of the reflecting demand in high value global fragrance and beauty industries. Countries like Indonesia, Republic of Korea, Indonesia, Germany, United Kingdom, United Arab Emirates, Netherlands and Spain form the secondary tier of importers, with export values ranging from US\$ 17 million to 23 million. These markets though individually smaller represents diversified demand across Europe, East Asia and West Asia. The bar chart clearly demonstrates the large asymmetry in India's export destinations. One of the very large markets is the USA and one medium market is France and other eight are smaller but stable markets. This structure highlights both opportunities and risks as the US market though provides scale yet India's market is highly sensitive to demand fluctuations, regulatory changes and quality standards in the US. At the same time the availability of multiple mid-size markets indicates scope for diversification particularly in Europe and East Asia. The demand for natural oils and aromatherapy continues to grow in these parts of the world. Overall, the 2024 destination pattern suggests that India must balance its reliance on the US market with strategic expansion into other

emerging and established markets to ensure stable long term export growth.

### Discussion

The fluctuations observed in India's essential oil exports between 2010 and 2024 can be attributed to a combination of global market, domestic production, and policy-related factors. Firstly, variations in export quantity are partly linked to climatic and agronomic conditions affecting aromatic crop yields. Essential oil-bearing crops such as lemongrass, citronella, and mint are highly sensitive to rainfall and temperature fluctuations and irregular monsoon patterns in northern India during 2012-2014 and 2018 temporarily reduced output and export volumes (APEDA, 2023). Secondly, global price volatility has played a crucial role, especially for mentha oil under HS Code 330129. Periods of price increase, such as 2011 and 2021, reflect both strong global demand and supply tightening, while declines in 2018 and 2023 correspond to market corrections and increased competition from China and Indonesia (OECD-FAO, 2022; FAO, 2021).

Exchange rate movements have also contributed to short-term export value changes. A weaker Indian rupee during 2017-2020 improved price competitiveness, while subsequent appreciation moderated export earnings despite stable volumes (Government of India, 2022). Furthermore, non-tariff barriers and certification requirements in major markets such as the United States and the European Union periodically constrained export growth, particularly during 2019-2020 when stricter quality and traceability norms were enforced (Sharma & Patel, 2023; UNCTAD, 2021). The COVID-19 pandemic further accentuated market disruptions in 2020-2021, leading to temporary supply chain bottlenecks, freight rate escalation, and shifts in consumer demand toward health and wellness products. This explains the strong rebound in export value during 2021 and 2022, supported by premium pricing and growing demand for natural products (Grand View Research, 2023). Overall, the mixed growth pattern highlights the dual sensitivity of India's essential oil exports to both external market shocks and domestic supply factors. Strengthening production resilience, enhancing value addition, and diversifying export destinations can help stabilise performance in the long term.

### Conclusion

This study analysed India's essential oil exports from 2010 to 2024 using UN Comtrade data under HS Codes 330129 and 330190, focusing on trade performance, market concentration, and price behaviour. The findings reveal a generally upward trend in both export value and quantity, reflecting India's growing integration into the global essential oils market.

However, the analysis also indicates periodic fluctuations caused by climatic variability, price instability, changing demand conditions, and evolving regulatory standards. The United States remains India's dominant export destination, accounting for more than half of total exports in 2024, underscoring both dependence and opportunity within a concentrated market structure.

To sustain growth and enhance competitiveness, India's essential oil sector must prioritise product standardisation, organic certification, and higher value addition through processing and branding. Policies encouraging sustainable cultivation, technology upgrading, and diversification toward emerging Asian and European markets could mitigate market risks and ensure stable foreign exchange earnings. The sector's alignment with the principles of green trade positions it strategically within global sustainability transitions, making it a key contributor to India's low-carbon export growth in the coming decade.

**Acknowledgement :**

This is an independent work and it owes nothing to any person or organisation.

**Conflict of Interest :**

Since this is a single authored research work, the question of conflict of interest does not arise.

**Author's Contribution :**

This article is solely produced by Dr. Arifa Tabassum.

**Funding :**

Not any kind of financial or other perks have been received for this research work.

**Ethics Statement :**

This research article does not violate any ethical values related to human beings or animals.

**Informed Consent: N/A**

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## National Rural Livelihood Mission: Empowering Marginalised Women in Self- Help Groups

### Abstract

The National Rural Livelihoods Mission (NRLM), implemented through the State Mission Management Units nationwide, is a flagship programme for women's empowerment. The present study examines the role of the National Rural Livelihood Mission in empowering marginalised women within Self-Help Groups (SHGs) in the Barhampur community development block of the Nagaon district of Assam. The sample size for the study is 205, which was determined by using the Morgan table of sample size. Primary data to fulfil the objectives was collected with a pre-developed interview schedule. The collected data are analysed through appropriate statistical packages. The study found that the NRLM has a significant impact on empowering marginalised women. The status of these women was not substantial during the pre-SHG period; however, they experienced self-development, economic and social empowerment after joining SHGs in the study area. The study is carefully planned, though it faces some limitations like a limited period of the study, a limited sample size and is based on respondents' responses. The study concluded that the NRLM is significant in empowering women in SHGs formed by different age groups and different social categories.

Keywords : NRLM, SHG, Empowerment, Marginalised, Women

### Introduction

Marginalised women are those who don't get equal treatment in society. They face many challenges because they are women and sometimes also because of their caste, religion, disability or where they live. These challenges make it hard for them to get an education, healthcare, jobs, income and respect (pragya.org, 2025). Womenfolk such as dalits, muslims, tribal women, women with disabilities and those living in poor areas often face this kind of unfair treatment (cultureally.com, 2025). Empowering women including these marginalised women is essential for a country's welfare. The twelve five-year plan also recognised that the overall development of women is necessary for the country's economic growth and development (Bordoloi & Limbu, 2015). Several government schemes have been launched from time to time to empower women. Such a flagship program is the National Rural Livelihood Mission (NRLM). It is a centrally sponsored poverty reduction program launched in 2011 and was renamed Deendayal Antyodaya Yojana - National Rural Livelihood Mission in 2016 by the Government of India. The mission's

primary objective is to mobilise the poor households of rural areas into Self-Help Groups (SHGs) in a phased manner and provide the requisite support to uplift their lives and livelihoods (PIB-MIB-GOI, 2023). Therefore, the mission emphasises supporting the rural poor women by providing them with an institutional platform. For this, the mission moves towards the formation of grassroots institutions, i.e., Women Self-Help Groups with 10-20 members on mutual affinity-based and facilitates them with finance provision, skill training, capacity building and other institutional support through implementing agencies (Grievances, D.O., 2017) for their advancement.

### Review of Literature

Women's empowerment is the key factor towards development of a society. Inculcating education to women lead to their progression in a favourable way (Nath 2020). Associating poor women in to SHGs is instrumental for their holistic development. In this regard NRLM plays significant role in rural areas. Rural women feels their lives and livelihoods changed after joining self-help group (Bhardwaj & Rana, 2020)

and Jha , 2021). SHGs are empowered by inculcating leadership, entrepreneurship and financial skills under the National Rural Livelihood Mission (Patil,2021). Also, the state rural livelihood mission opens the door to new opportunities to undertake various livelihood activities for the rural women SHG members. Members experienced changes in their personal and economic lives after associating themselves with the group (Parganiha&Khare, 2021). The SHG strategy followed under the Assam State Rural Livelihood Mission witnessed that rural women's socio-economic status and role in family and society became stronger post-SHG membership (Baruah et al. 2022). Membership in SHG encourage women to start savings from their income-generating activities (Singh et al. 2022).The NRLM assists women in expanding their sources of income for long-term viability, fostering entrepreneurial endeavours, generating income and ensuring their inclusion in the financial system (Soti, 2023). NRLM fosters marketing and technical skills of the beneficiaries to make them socially and economically advanced(Singh et al, 2023). NRLM

### Research Gap

The researcher has not uncovered documented research on the specific effects of NRLM on marginalised women, particularly in the study area of interest. Hence, the current study aims to assess the effects of NRLM on the marginalised women.

### Objectives of the Study

The objective of the present study is to analyse the impact of NRLM on the empowerment of marginalised women beneficiaries.

### Research Methodology

The present study is descriptive and exploratory. It employs a description of specific phenomena or subject matter. Moreover, it collects real-world data and applies statistical tools to derive meaningful conclusions. The study was carried out in the Barhampur community development block of the Nagaon district in Assam and was selected at random. The total number of SHGs formed by marginalised women in the study areas of 14th May, 2025 is 429 ([www.nrlm.gov.in](http://www.nrlm.gov.in)) and the total number of members is 4290(approx.). The sample size is determined at 205 by using Morgan's table on sample size.

Table 1. *Sample Size Distribution (Category-wise)*

Social Category	No. of SHGs	No. of sample respondents taken from SHGs
SC	54	50
ST	129	75
Minority	246	80
Total	429	205

**Source:** *Researcher compilation*

For the present study, the researcher selected one sample from each SHG, which is treated as the respondents for the study. Therefore, the total number of respondents is 205. Primary data was collected through an interview schedule developed with the help of various sources earlier and secondary data was obtained from different published sources. Rensis Likert's five-point scale is used to test the qualitative aspects of data. Cronbach's alpha test was applied to determine the reliability of the data. The test shows a score of .760 which demonstrates its reliability. Data are presented in tabular form and percentage, mean values and Chi-square test are used to interpret the data. Statistical Package for Social Science (software) is used to analyse the data.

### Limitations of the Study

The present study is carefully executed though it has some limitations like, the study is limited to only a single community development block in the Nagaon district of Assam. Only 205 sample respondents were selected randomly for the study. The study's findings relied on respondents' responses, leading to the assumption that some reported information may be biased or inaccurate.

### Data Analysis and Interpretation

Table 2. *Socio-Economic Profile of Respondents*

Age	Frequency	Percent
18 to 25 years	26	12.70%
26 to 33 years	86	42.00%
34 to 41 years	56	27.30%
42 or Above	37	18.00%
Total	205	100.00%
Level of Education	Frequency	Percent
Up to the 9 <sup>th</sup> standard	127	62.00%
10 <sup>th</sup> passed	47	22.90%
Higher Secondary	18	8.80%
Graduate	13	6.30%
Total	205	100.00%
Marital Status	Frequency	Percent
Married	189	92.20%
Unmarried	16	7.80%
Total	205	100.00%
BPL card	Frequency	Percent
Yes	158	77.07%
No	47	22.93%
Total	205	100.00%

Source:Field Survey

Table 02 reflects the socio-economic status of the respondents. It is found that 42.00% of respondents are from the age group of 26 to 33 years, 27.30% of respondents are 34 to 41 years, 18.00% are 42 or above ages and 12.70% of respondents are between 18 to 25 years. In case of educational qualifications, 62.00% of respondents have read up to the 9<sup>th</sup> standard, 22.90% have passed 10<sup>th</sup> standard, 8.80% have completed higher secondary level and 6.3% have completed graduation. In the case of marital status, 92.20% of respondents are married and 7.80% are unmarried. Among the respondents majority have a BPL card (77.07%) and 22.93% of respondents have no BPL card.

Table 3. Started Income-Generating Activity (Frequency/Percentage)

Category	Before		Total	After		Continue (earlier)	Total
	Yes	No		Yes (new)	No		
SC	9	41	50	35	9	6	50
	18.00%	82.00%	100%	70.00%	18.00%	12.00%	100%
ST	22	53	75	57	10	8	75
	29.33%	70.67%	100%	74.67%	13.33%	12.00%	100%
Minority	21	59	80	66	8	6	80
	26.25%	73.75%	100%	80.00%	11.25%	8.75%	100%
<b>Total</b>	<b>52</b>	<b>153</b>	<b>205</b>	<b>158</b>	<b>30</b>	<b>22</b>	<b>205</b>
	<b>25.37%</b>	<b>74.63%</b>	<b>100%</b>	<b>77.07%</b>	<b>13.17%</b>	<b>9.76%</b>	<b>100%</b>

Source:Field Survey

Table 3 reveals the category-wise women who have started livelihood activity before and after joining the SHG. From the three categories, 74.63% of women have no self-earning activity apart from performing their regular household activities and helping their husbands in agricultural activities. After joining SHG, a total of 77.07% of women started new individual income-generating activities and 9.76% of women have continued their previous livelihood activity in an expanded way. The new income-generating activities include farming, pig-rearing, poultry, vermicompost, pisciculture, handloom and processing local food products that have been started by SHG members. Initiation of livelihood activities is important for their empowerment.

Table 4 depicts the empowerment aspects of women before and after joining SHG. It is found that the mean value for all the items under the heads of a) Self-Empowerment lies between 2.31 and 2.47 with a grand mean of 2.38; b) Economic Empowerment lies between 2.22 and 2.47 with a grand mean of 2.29 and c) Social Empowerment lies between 2.38 and 2.53 with a grand mean of 2.45 before the joining SHG. This signifies their low level of empowerment in the respective fields. The respondents either agreed or strongly agreed that their level of empowerment increased after joining the

SHG. It found that the mean value for all the items under the heads of a) Self-Empowerment lies between 3.41 and 3.48 with a grand mean of 3.46, b) Economic Empowerment lies between 3.44 and 3.56 with a grand mean of 3.49 and c) Social Empowerment lies between 3.52 and 3.65 with a grand mean of 3.56 after the joining of the SHG. This signifies that post membership in SHG significantly contributes to their self-development as well as economic and social empowerment.

Table 4. Empowerment Variables

SI Aspects	Before Mean	Standard Deviation	After Mean	Standard Deviation
<b>A Self-Empowerment</b>				
1 Knowledge	2.33	1.042	3.48	.826
2 Communication skills	2.31	1.013	3.41	.873
3 Self-confidence	2.38	.923	3.47	.931
4 Risk-bearing capacity	2.43	.955	3.48	.843
5 Management capacity	2.47	.977	3.45	.865
<b>Grand Mean</b>	<b>2.38</b>		<b>3.46</b>	
<b>B Economic Empowerment</b>				
6 Ability to start income-generating activities	2.33	1.041	3.49	.921
7 Income	2.28	.948	3.44	.961
8 Savings	2.23	.865	3.48	.905
9 Frequency of transactions with the bank	2.22	.890	3.56	.903
10 Acquisition of assets	2.47	.977	3.48	.931
11 Financial support to the family	2.22	.962	3.47	.843
12 Decision-making capacity	2.33	1.032	3.51	.801
<b>Grand Mean</b>	<b>2.29</b>		<b>3.49</b>	
<b>C Social Empowerment</b>				
13 Social mobility	2.38	.923	3.54	.848
14 Participation in community activities	2.43	.955	3.65	.875
15 Recognition in society	2.47	.977	3.52	.921
16 Aware of social benefit schemes	2.42	.999	3.56	.903
17 Political Awareness	2.53	1.007	3.54	.871
<b>Grand Mean</b>	<b>2.45</b>		<b>3.56</b>	
<b>N</b>			<b>205</b>	

Source: Field Survey

Table 5: Women Empowerment ( Descriptive Statistics: Chi-square test to test age-wise difference in response

Aspects	Statements	Chi-Square Value	Asymptotic Significance (2-sided)	Significant/ Non-significant
<b>Self-Empowerment</b>	Increase knowledge. (I)	12.855	.169	Sig.
	Increase communication skills. (II)	16.422	.173	Sig.
	Increase self-confidence. (III)	16.235	.181	Sig.
	Increase risk-bearing capacity. (IV)	7.745	.560	Sig.
	Increase management capacity. (V)	18.123	.112	Sig.
<b>Economic Empowerment</b>	Build the ability to start income-generating activities. (VI)	13.278	.349	Sig.
	Increase income. (VII)	19.773	.071	Sig.
	Increase savings. (VIII)	5.511	.788	Sig.
	Increase frequency of transactions with the bank. (IX)	6.613	.677	Sig.
	Increase the acquisition of assets. (X)	16.235	.181	Sig.
	Increase financial support to the family. (XI)	7.745	.560	Sig.
	Increase decision-making capacity. (XII)	18.123	.112	Sig.
<b>Social Empowerment</b>	Increase social mobility. (XIII)	13.278	.349	Sig.
	Increase participation in community activities. (XIV)	19.773	.071	Sig.
	Increase recognition in society. (XV)	5.511	.788	Sig.
	Increase awareness of social benefit schemes. (XVI)	6.613	.677	Sig.
	Increase political awareness. (XVII)	15.465	.079	Sig.

Source: Field Survey

Table 5 discloses the significant values of the Chi-Square test of the respondents' opinions for various

statements under the aspects of Self-Empowerment, Economic Empowerment and Social Empowerment. In Self-Empowerment, it is observed from the table that the significant value of Pearson Chi-Square (12.855) is .169 for statement I “Increase Knowledge”. Similarly, the significant value of Pearson Chi-Square (16.422) is .173 for statement II “Increase communication skills”. Likewise, the significant value of Pearson Chi-Square (16.235) is .181 for statement III “Increase self-confidence”. The significant value of Pearson Chi-Square (7.745) is .560 for statement IV “Increase risk-bearing capacity”, also the significant value of Pearson Chi-Square (18.123) is .112 for statement V “Increase management capacity. “ In all the statements, the significant values are higher than the acceptable value of 0.05. Hence, we can say that age-wise, there is no difference in opinion among the respondents.

In Economic-Empowerment, it is observed from the table that the significant value of Pearson Chi-Square (13.278) is .349 for statement VI “Build the ability to start income-generating activities”. Similarly, the significant value of Pearson Chi-Square (19.773) is .071 for statement VII “Increase income”. Likewise, the significant value of Pearson Chi-Square (5.511) is .788 for statement VIII “Increase savings”. The significant value of Pearson Chi-Square (6.613) is .677 for statement IX “Increase frequency of transactions with the bank”, also the significant value of Pearson Chi-Square (16.235) is .181 for statement X “Increase the acquisition of assets. “ Likewise, the significant value of Pearson Chi-Square (7.745) is .560 for statement XI “Increase financial support to the family”, also the significant value of Pearson Chi-square (18.123) is .112 for the statement XII “Increase decision making ability”. In all the statements, the significant values are higher than the acceptable value of 0.05. Hence, we can say that age-wise, there is no difference in opinion among the respondents.

In Social Empowerment, it is observed from the table that the significant value of Pearson Chi-Square (13.278) is .349 for statement XIII “Increase social mobility”. Similarly, the significant value of Pearson Chi-Square (19.773) is .071 for statement XIV “Increase participation in community activities”. Likewise, the significant value of Pearson Chi-Square (5.511) is .788 for statement XV “Increase recognition in society”. The significant value of Pearson Chi-Square 6.613 is .677 for statement XVI “Increase awareness of social benefit schemes”, also the significant value of Pearson Chi-Square (15.465) is .079 for statement XVII “Increase political awareness. “ In all the statements, the significant values are higher than the acceptable value of 0.05. Hence, we can say

that age-wise, there is no difference in opinion among the respondents.

### Results and Discussion

Empowering marginalised people, especially women who live in rural areas, is essential for the welfare of a nation. The NRLM, since its implementation, has been working towards empowering rural women in India. This study was conducted to analyse the impact of the mission on marginalised women in the Barhampur development block in the Nagaon district of Assam. The analysis of primary data reveals that the mission has a significant impact on the women in the study area.

The study found that the majority of the respondents are from the age group of 26 to 33 years and their level of education is up to the 9<sup>th</sup> standard (62%). Also, the majority of them are married (92.2%) and belong to the below poverty line (77.07%). It is found that most of these poor women had no own income-generating activity/activities except a few. Women had started livelihood activity/activities that include farming, pig-rearing, poultry, vermicompost, pisciculture, handloom and processing local food products. And 80.49% of women started these livelihood activities and 7.32% of them continued their previous activity in an expanded way after joining SHG. Hence, it is deduced that NRLM made these women work. These help them to generate income and make them economically independent. Concerning women's empowerment in different aspects is also witnessed during the post-SHG period. Their self-empowerment, economic empowerment and social empowerment show a significant improvement with high grand mean values 3.46, 3.49 and 3.56 respectively from their pre SHG period which are 2.38, 2.29 and 2.45 respectively. Women's advancements are revealed in some prominent areas, which have enhanced their frequency of transactions in banks, as well as enhanced their decision-making capabilities. Women's engagement in community activities shows a greater pace, increasing their recognition in society; they are now more aware of social entitlements, politically aware and also enhance their social mobilisation. Similarly, the application of Chi-square in different statements under the heads of Self-empowerment, Economic empowerment and Social empowerment reveals that the significant values are higher than the acceptable value of 0.05, which undermines age wise no difference in opinion among the respondents. This analysis reveals NRLM's contribution towards empowering marginalised women in the study area. The study revealed that the NRLM is significant in the lives of these marginalised women.

### Conclusion

NRLM now called DAY-NRLM, is a poverty alleviation programme. The main target groups of this mission are rural poor womenfolk. The mission works towards the formation of SHGs by women and provides the requisite support to the SHGs through the community cadre developed under the mission. The present study reflects a picture of empowerment of marginalised women. These women are lagging in different spheres of life like education, income, decision-making and so on. But after the intervention of the mission, their life and livelihoods changed in a significant direction. Women's role now is not only limited to the four walls, but their participation and involvement are widened into different fields, from household decisions to take part in community activities, income earning to asset acquisition and self-confidence to the management of group activities. The mission covers different ages and social categories of women and the NRLM is instrumental in the lives of these women.

### Acknowledgement :

This is an independent work and it owes nothing to any person or organisation.

### Conflict of Interest

The authors declare no conflict of interest.

### Author's Contribution

The research article was prepared by author<sup>1</sup> and examined by author<sup>2</sup>.

### Funding Details

NA

### Ethics Statement :

This research article does not violate any ethical values related to human beings or animals.

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## **Flood Susceptibility Assessment Using Analytical Hierarchy Process in Majuli Island, Assam, India**

### **Abstract**

Floods are among the most frequent and destructive natural disasters in Assam, particularly affecting Majuli Island, the world's biggest river island situated in the Brahmaputra River system. Majuli Island is highly susceptible to frequent flooding, bank erosion, and associated socio-economic and environmental challenges. Majuli being an agro-based community have to face a great loss each year to this phenomenon. Flood Susceptibility Analysis is a reliable method in zoning the flood prone areas and reduces the flood menace. Considering this, present study aims to delineate flood susceptibility zonation and assess flood susceptibility across Majuli Island using an integrated Geographic Information System and Analytical Hierarchy Process framework. A number of parameters have to be considered to carry out this process. Topographic Wetness Index, slope, elevation, precipitation, drainage density, distance from road, soil data, distance from river, Normalized Difference Vegetation Index, and Land use/ Land cover are the ten flood factors that are considered for calculating the flood susceptibility. The values are subsequently grouped into five categories as very high, high, moderate, low and very low flood affected areas. The findings reveal that 43.41 % areas of the island fall under the high and very high flood susceptibility and risk category, posing serious threats to the communities, agriculture, biodiversity and infrastructure. The study reveals the flood affected zones of Majuli Island which can be put forward for better mitigation planning.

**Keywords :** Flood susceptibility, Analytical Hierarchy Process, GIS, Majuli, Assam

### **Introduction**

Flooding is among the most widespread and destructive natural hazards globally, with significant and pernicious impacts on life, property, infrastructure, and ecosystems. As floods (both the large and small variety) reoccur with increasing frequency due to climate change, uncontrolled urbanization, and inconsistent land-use practices, it has become clear that effective assessment and techniques related to flood susceptibility is an area of great importance. More recently, Geographic Information Systems (GIS) and decision-support tools, i.e. Analytical Hierarchy Process (AHP), have been utilized as effective modelling, assessment, and visualization tools for flood susceptibility across different geographies. As is

evidenced globally, there are a plethora of studies utilizing GIS and AHP for flood susceptibility mapping and flood susceptibility assessment. For instance, Rahmati et al. (2016) integrated both GIS and multi-criteria decision-making (MCDM) methods in Iran to produce flood susceptibility maps for regional development. In a similar way, Tehrany, et al. (2014) utilized GIS and the AHP to create flood susceptibility maps in Malaysia- illustrating how the integration of physical, hydrological, and socio-economic factors can effectively identify risk during extreme weather events. In Europe, Fernández and Lutz (2010) utilized GIS based multi-criteria decision-making to provide flood susceptibility maps in the Ebro River Basin, Spain; a useful tool for local government and disaster risk

management. These approaches were constructed to increase the accuracy of flood susceptibility predictions and also potentially allow for advance planning and mitigations of flood susceptibilities at the local and regional levels.

There is an increased attention in the literature of studies in flood-prone areas such as Bihar, Uttar Pradesh, and Assam in India. These areas were researched through the application of GIS and AHP to create a flood susceptibility map and provided flood management strategies and mitigation measures for areas of 'high' to 'very high' flood susceptibility (Kumar et al. 2018; Sharma and Jain 2015). Assam, located in the north-eastern region of India, experiences recurrent and severe flooding during the monsoon season due to the high discharge of the Brahmaputra River and its numerous tributaries, which frequently overflow into extensive floodplains (Debnath et al., 2023). Majuli Island, one of the most flood-vulnerable areas in the state, is widely recognized as the largest inhabited river island of the world, formed and continually reshaped by the dynamic Brahmaputra system. Historical records indicate extensive erosion and land loss on Majuli over the past century, raising serious concerns about its long-term sustainability (Roy et al., 2020; Xue et al., 2025). Despite the high frequency and profound impacts of flooding in Assam, existing research specific to Majuli's flood susceptibility remains limited. Many studies on the Brahmaputra Basin use multi-criteria decision-making and machine learning to assess flood susceptibility across broader regions, including Assam districts such as Dhemaji, Dibrugarh, and Lakhimpur highlighting the usefulness of spatially integrated methodologies (Bora et al., 2023; Borah & Sarma, 2025; Debnath et al., 2023). While related work examines riverbank erosion and ecological vulnerability in the Middle Brahmaputra floodplains, there remains a notable deficit in localized, geospatial studies that combine physical and anthropogenic factors for island-specific flood risk analysis (Bhuyan, Sajjad, Kanti Saha, et al., 2024).

Addressing this gap, the present study conducts a GIS-based flood susceptibility assessment of Majuli Island using the Analytical Hierarchy Process (AHP). This research integrates critical physical parameters—including slope, elevation, land use/land cover, and drainage density—with anthropogenic factors such as population density and proximity to infrastructure to generate a spatially explicit flood susceptibility model. By employing multi-source geospatial datasets and a systematic weighting approach within ArcGIS, the study produces a detailed flood susceptibility zonation map designed to inform disaster risk reduction, land-

use planning, and climate adaptation strategies for Majuli. The outcomes are expected to contribute actionable insights for local decision-making and enhance community resilience, while also offering a methodological template that may be applied to other flood-prone riverine and island environments in Northeast India and comparable global settings.

### Study Area

Majuli Island lies within the Brahmaputra River (Figure 1) are a centre of considerable neo-Vaishnavite cultural and ecological diversity. In the past few decades, however, this unique landform has increasingly been impacted by flood and bank erosion. Every year from the monsoon season, the Brahmaputra is subject to flooding. Alongside the extreme flow of the Brahmaputra and its shifting and bank, the combined waters have led to significant land area loss, the community displacement due to flood and river bank erosion, and in the process have also impacted traditional livelihoods on the island (Bhuyan, Sajjad, Sharma, et al., 2024; Rahman et al., 2025; Xue et al., 2025). Erosion on Majuli river Island has been particularly concerning because significant portions of the land area have disappeared over a period of time. From an estimated area of about 1,200 sq. km in the early twentieth century, Majuli Island has undergone substantial spatial shrinkage, raising serious concerns about its long-term existence (Bhattacharya, 2024). These natural processes combined with upstream deforestation, sediment variations, limited river management, and both climate change and its impacts on the changes in rains and glacier melt have compounded the existing threats (Mahanta, et al. 2024).

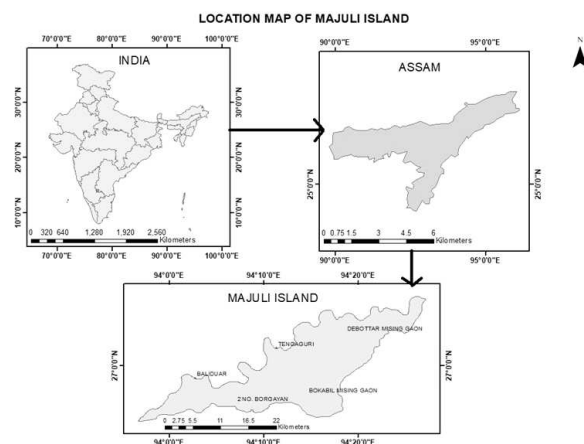


Figure 1 – Study area map

**Methodology and Data Collection**

The study adopted an integrated research approach that combines geospatial analysis with multi-criteria decision-making techniques, employing the Analytical Hierarchy Process (AHP) within a GIS environment (ArcGIS) to assess and map flood susceptibility (Figure 2). Flood susceptibility zonation for Majuli Island was conducted using the following steps:

**Data Collection/ Pre-Processing**

The researchers collected a variety of geospatial and non-geospatial datasets from various trusted datasets.

- Digital Elevation Model (DEM): It was obtained from NASA’s Shuttle Radar Topography Mission at a spatial resolution of 30 meters.
- Precipitation Data: Precipitation data was obtained from the Climatic Research Unit datasets.
- Soil Data: Soil data was taken from the FAO global soils database.
- Land-Use/Land-Cover (LU/LC): LU/LC data was derived from Sentinel-2 imagery.
- Normalized Difference Vegetation Index (NDVI): NDVI was derived from the Near-Infrared (NIR) and red bands of Sentinel-2 imagery.
- Drainage Network: The drainage network was created using the hydrological modelling tools in ArcGIS.
- Roads & Rivers Data: The roads and rivers were taken from high-resolution topographic base maps.

**Selection of parameters and thematic layer creation**

The selection of the ten flood-conditioning parameters was guided by established flood-susceptibility literature and the specific hydro-geomorphological setting of the Brahmaputra floodplain. Topographic variables such as elevation, slope, and Topographic Wetness Index (TWI) were included due to their dominant control on surface runoff, flow accumulation, and water retention in low-lying alluvial environments such as Majuli (Kaya & Derin, 2023; Shrestha et al., 2025). Hydrological parameters—precipitation, drainage density, and distance from river—are particularly relevant in the Brahmaputra Basin, where intense monsoonal rainfall, dense channel networks, and frequent river migration govern flood occurrence and spatial inundation patterns (Bhuyan, Sajjad, Kanti Saha, et al., 2024; Hasan et al., 2026). Land surface characteristics represented by land use/land cover (LU/LC), NDVI, and soil type were incorporated to capture variations in infiltration capacity, vegetation cover, and surface roughness, which strongly influence flood propagation and waterlogging in Assam’s floodplains

(Kaya & Derin, 2023). Anthropogenic influence was accounted for using distance from roads, as transport infrastructure in flood-prone alluvial settings often disrupts natural drainage and increases localized flood susceptibility, a pattern observed in several Brahmaputra Valley studies (Hasan et al., 2026).

The Analytical Hierarchy Process (AHP) was adopted to assign relative weights to these parameters due to its effectiveness in integrating expert knowledge with spatial data in data-scarce regions such as Northeast India. AHP has been widely applied in flood susceptibility assessments across Assam and the Brahmaputra Basin to systematically prioritize flood-controlling factors while accounting for regional geomorphic and hydrological processes (Kaya & Derin, 2023; Shrestha et al., 2025).

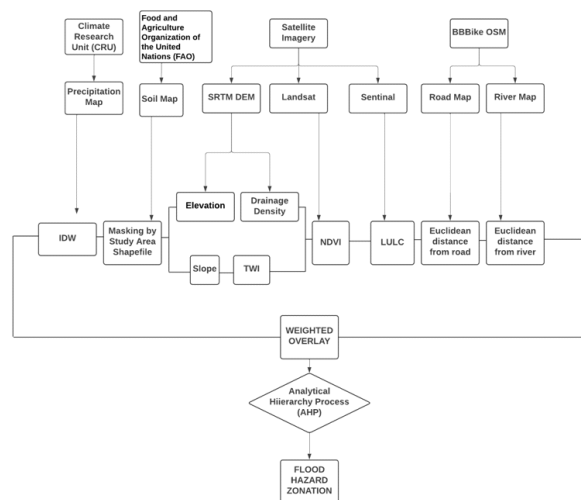
All parameters were used to create thematic raster layers in ArcGIS to show spatial distribution. Slope, drainage density, and TWI came directly from the DEM data while NDVI was computed using equation 1.

$$NDVI = (NIR - R) / (NIR + R) \quad Eq.1$$

**Re-classification and standardization**

To allow for comparative analysis, all raster layers, were normalised and re-classified into five flood susceptibility classes (1 to 5), where 1 = very low susceptibility and 5 = very high susceptibility. Inverse classification was applied appropriately, i.e. for slope, elevation, NDVI and distance from road/river, based on their effect on flood susceptibility.

**Figure 2 –Methodology of the study**



**Results and Discussion**

Flood-affected areas of Majuli Island were identified using a flood susceptibility zonation map developed through AHP and GIS, classifying the island into five zones from very high to very low flood susceptibility. For this analysis we need some key parameters to be able to make the flood susceptibility assessment, including, the Topographic Wetness Index, elevation, slope, rainfall, soil type, LU/LC, drainage density, NDVI, distance from roads, and distance from rivers (Figure 3). The geospatial database was collected and integrated using ArcGIS (Sahoo et al, 2020). Given this vast set of parameters, the study concludes that slope and elevation are the key factors influencing flood susceptibility mapping. The slope is responsible for how water flows on the surface, whereas elevation was not significant environmental variability in regard to the climate on Majuli due to the flatness of the terrain (Samanta et al, 2012; Adiat et al, 2012). Additionally, distance from river is important for conducting flood susceptibility assessment since flooding generally occurs near a river (Natarajan et al, 2021). AHP is a multi-criteria decision-making method that organizes and ranks complex decisions from assigned relative weightings to its criteria.

**Topographic Wetness Index (TWI):** The TWI is a robust measure generally used to assess how topography influences hydrological behaviour and changes in soil moisture associated with landscape. The TWI calculation involves a combination of slope and upstream contributing area. TWI has been correlated with different measures of soil properties, including horizon depth, silt, organic matter, and phosphorus content (Sorensen et al., 2006; Moore et al., 1993). TWI was first described by Beven and Kirkby and is mathematically stated as equation 2.

$$TWI = \ln a/\tan b \quad \text{Eq. 2}$$

Where, 'a' is total area divided by length of contour and the  $\tan b$  is the local slope in degree.

ArcGIS software is used to compute the TWI for the Majuli Island region. TWI values in this area range from -7.42946 to 10.5661. These values are categorized into five susceptibility levels: 0–1, 1–2, 2–3, 3–4, and 4–5. On the flood susceptibility map, areas with the highest TWI values are marked in blue, while those with the lowest are shown in green. According to Rahmati et al. (2016), higher TWI values suggest an increased likelihood of flooding.

**Elevation:** Elevation values in the region range from -8 meters to +63 meters above mean sea level. For the study, elevation values classify into five categories 0 - 1, 1 - 2, 2 - 3, 3 - 4, and 4 - 5. Depressed areas are denoted with green tones, while blue tones illustrate

the higher elevations. However, in the context of flood susceptibility mapping, elevation values were reversed to give lower elevations (i.e., more prone to flood) higher flood susceptibility, 4 - 5 and higher elevation values (i.e., less prone to flooding) lower flood susceptibility, 0 - 1. Several low-lying areas, many of which are classified as wetlands or beels, occur scattered throughout the area of Majuli Island.

**Slope:** An ArcGIS slope map of Majuli Island was generated using the DEM file. The slope values range from 0° to 25.0809°. Like elevation, slope also was classified in reverse for relative flood susceptibility assessment - flatter areas (i.e., 0 - 1 class) would be more flood prone or higher susceptibility (4 - 5) compared to steeper areas that are less prone to flood (i.e., lowest 0 - 1 class). Areas with little slope are lightly shaded red, while areas with steepness are shaded blue.

**Precipitation:** Precipitation is one of the most significant indicators to be included in the flood susceptibility zone map. Climate data is obtained from the Climatic Research Unit. As Majuli Island is located in the northeastern plain region and falls under Sub-Tropical Monsoon climatic zone which receives excess amount of annual rainfall. The minimum average annual rainfall is 157.66 mm whereas the maximum average annual rainfall is 174.99 mm. The precipitation layer has been classified again into 5 classes and the top value is assigned as 0-1 red colour and the lowest value is assigned 4-5 as yellow colour.

**Soil:** Soil texture and soil type are also the main parameters for flood zonation; soil map is extracted from Food and Agriculture Organization. After processing the soil data in ArcGIS, Majuli Island consists of only one type of soil i.e. Ao (Orthic Acrisols) as coloured brown. The soil composition of Majuli Island is clay loam; there are no hard resistant rocks that make it vulnerable to bank erosion.

**NDVI:** NDVI is used to measure vegetation density and health using the equation 1. NDVI values for Majuli varied from -0.0608948 to 0.444353. As NDVI lower values will mean a higher vulnerability to flooding, thus each category was inversely classified so the lowest NDVI value, more susceptible, whereas the less vulnerable NDVI with a higher value rated at a lesser qualify.

**LU/LC:** Land use/land cover (LU/LC) maps were generated using ArcGIS software based on Sentinel satellite imagery. The classification results show that the island comprises water bodies, flooded vegetation, tree-covered areas, croplands, bare land, built-up areas, and rangelands. These LU/LC classes were

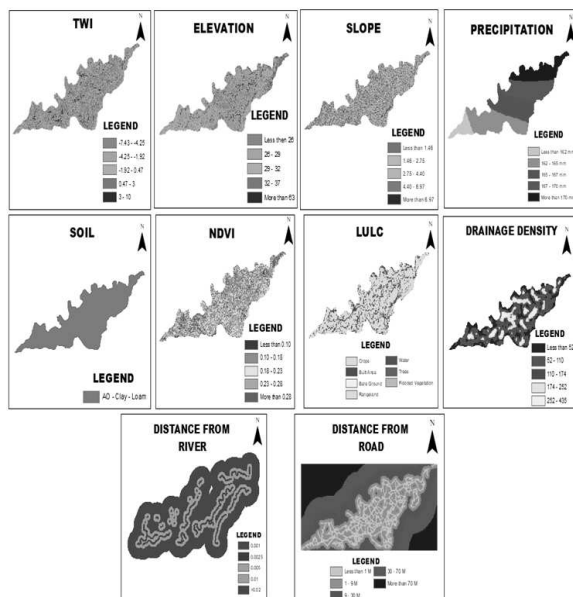
subsequently reclassified into five flood-susceptibility categories for flood-risk analysis. The results indicate that areas dominated by water bodies and dense tree or vegetation cover exhibit the lowest susceptibility to flooding, whereas croplands, bare surfaces, and built-up areas are relatively more vulnerable.

**Drainage Density:** Drainage Density is calculated using ArcGIS watershed DEM data and the Hydrology tool, the drainage density for the island ranged from 0 to 435. High drainage density indicates an increased risk of flooding; the denser the drainage the more likely flooding will occur. Drainage intensity in this image is coloured beige, meaning high drainage dense areas and blue, meaning low drainage density areas.

**Distance from River:** The distance from rivers is important in measuring flood susceptibility. A Multiple Ring Buffer tool was used in ArcGIS to record the distance from the river from 0 to 30 m. Areas closer to a river will have greater risks of flooding, thus areas along the river should have higher flood susceptibility.

**Distance from Road:** Distance to road was measured within a range of 0–176 m. Areas located closer to roads were assigned higher flood-susceptibility values, as road networks often disrupt natural drainage patterns, increase surface runoff, and exacerbate localized flooding. Consequently, flood susceptibility decreases with increasing distance from roads.

All the above parameters were reclassified into a range of 1 to 5 based on flood susceptible parameters, and maps were created for all of the above parameters to illustrate the individual effects of the parameters to flood susceptibility (Figure 3).



The ten parameters are compiled and processed with the help of ArcGIS software using Weighted Overlay

tool (Figure 4). The reclassified parameters are given certain weightage as per vulnerability to flood (Table 1). This weightage is computed using the AHP excel sheet (K. D. Goepel Version15.09.2018).The Consistency Ratio of the calculated table is 0.05 (5%). The weightage provided to each parameter are tabulated below:

**Table 1 – Weightage provided using Analytical Hierarchy Process**

Source: Calculated by Authors

SL. NO.	CRITERION	WEIGHTS
1	TWI	13.8%
2	Elevation	12.1%
3	Slope	9.9%
4	Precipitation	13.5%
5	LU/LC	6.6%
6	NDVI	5.9%
7	Distance from river	14.1%
8	Distance from road	5.6%
9	Drainage density	9.3%
10	Soil type	9.3%

The weighted average distance to a river (14.1 %), as a primary driver of flooding in Majuli where seasonal overbank flooding, migration of channels and erosion of riverbanks are the main causes of inundation, is the highest impact total of the four components. The Weighted Average TWI (13.8 %) and weighted average of runoff from precipitation (13.5 %) were also high ranked components because the potential for surface saturation and the amount of runoff due to rainfall determines the occurrence of a flood. TWI and rainfall runoff are very important in low-gradient floodplain environments.

NDVI (5.9 %), however, received a significantly lower weight compared to TWI as such vegetation cover affects the potential for flooding indirectly due to its impact on the rate of infiltration and the roughness of the surface, but TWI considers both slope and areas of contributing drainage upstream in calculating topographic conditions associated with surface water storage. Thus, as the two variables were evaluated in pairwise comparisons, TWI was consistently rated as being moderately to strongly greater than NDVI (values from 3 to 5) using the Saaty scale, rather than simply ranked first in terms of one being arbitrarily more important than the other.

Likewise, relative to distance from river, distance from road (5.6 %), is lower because roads affect localized obstruction for drainage and surface runoff and do not affect large flood inundation processes over a large portion of Majuli island.

The Matrix table (Table 2) generated from the above data and the Normalized Principal Eigenvector.

Normalized Principal Eigenvector is also known as Priority Vector. As given by its name i.e., normalized, the sum of all elements in this is 1. This shows the relative weight of criteria being compared.

**Table 2** –Matrix table using AHP

Criteria	TWI	Elevation	Slope	Precipitation	LU/LC	NDVI	Distance from River	Distance from Road	Drainage Density	Soil Type	Priority Weight
TWI	1	1	1	1	3	5	1	3	1	1	0.138
Elevation	1	1	1	1	2	3	1	3	1	1	0.121
Slope	1	1	1	1	3	1	0.5	1	1	1	0.099
Precipitation	1	1	1	1	3	2	2	3	1	1	0.135
LU/LC	0.33	0.5	0.33	0.33	1	1	0.33	3	1	1	0.066
NDVI	0.2	0.33	1	0.5	1	1	0.2	1	1	1	0.059
Distance from River	1	1	2	0.5	3	5	1	3	1	1	0.141
Distance from Road	0.33	0.33	1	0.33	0.33	1	0.33	1	1	1	0.056
Drainage Density	1	1	1	1	1	1	1	1	1	1	0.093
Soil Type	1	1	1	1	1	1	1	1	1	1	0.093

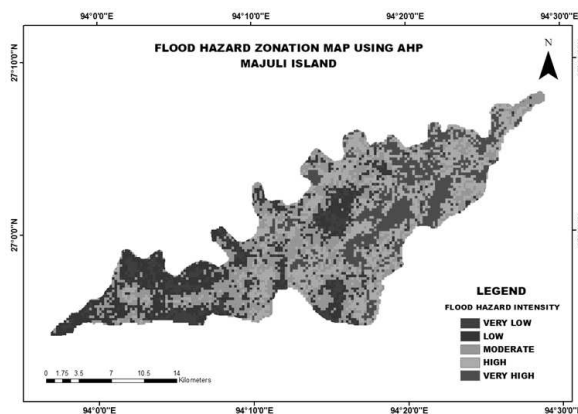
Source: Calculated by Authors

Using the AHP-OS software (Goepel, 2018), the normalized principal Eigenvector (priority vector) was calculated from the pairwise comparison matrix. The total of the resulting weights equals unity and indicates how much each factor is contributing relative to other factors to overall flood susceptibility.

$$CR = \frac{CI}{RI} \text{ Eq. 3}$$

A Consistency Ratio (CR) was calculated to check the reliability of the Judgments using:

Where CI = Consistency Index, RI = Random Index for the number of criteria. The CR obtained (0.05 or 5%) was much less than the commonly accepted value of < 0.1, indicating a high degree of internal consistency and logical coherence within the Pairwise Comparisons.



**Figure 4** –Flood susceptibility Mapping of Majuli Island

**Table 3** – Spatial Distribution of Flood Vulnerability Classes in Majuli Island

Sl. No.	Flood Vulnerability Class	Area (in Sq.Km)	Area (in %)
1	Very low	34	7.34
2	Low	97	20.95
3	Moderate	131	28.29
4	High	120	25.92
5	Very high	81	17.49

Source: Calculated by Authors

Flood vulnerability on Majuli Island is spread spatially across the island (Figure 4), reflecting that just over 54% of the island experiences moderate to severe flooding risk. The vast majority of the island experiences either moderate (28.29%) or high (25.92%) flood vulnerability, which combined represents greater than 54% of land area (Table 3). The very high vulnerability category represents 17.49%; meaning just over 70% of vulnerability on the island is moderate all the way to very high flood susceptibility. Flood vulnerability is minimal for low (20.95%) and very low (7.34% vulnerability), so the overall flood vulnerability spatial distribution shows a clear need for to improve flood susceptibility management, land use planning and resilience of infrastructure overall, but primarily in high and very high flood vulnerability areas.

A key limitation of this study is the lack of quantitative validation of the flood susceptibility map due to the unavailability of reliable, spatially explicit historical flood inundation and discharge data for Majuli Island. As a result, direct comparison between model outputs and observed flood events was not feasible, and susceptibility classes were interpreted based on geomorphological coherence, hydrological logic, and consistency with regional flood studies. Future research should incorporate historical flood inventories, satellite-derived inundation time series (e.g., Sentinel-1 SAR), field observations, and statistical validation techniques such as ROC–AUC and success–prediction rate curves to enhance model reliability and robustness for Majuli and similar riverine island systems.

**Conclusion**

The present study provides an effective geospatial approach for flood susceptibility zonation of Majuli Island, utilizing the AHP and GIS tools. The study included ten influential indicator variables: TWI, slope, elevation, soil type, precipitation, NDVI, LU/LC, distance from river, drainage density, and distance from road provided a multi-criteria based study to assess flood susceptibility. Each indicator variable was quantitatively reclassified by assigning a score by level

of impact on flood susceptibility, normalized using the AHP weightage technique, and all respective thematic layers integrated and visualized using ArcGIS.

Topographic and hydrological variables like slope, elevation, and TWI were shown to have the dominant control on surface runoff and wet area accumulation. Areas of low elevation and no slope were consistently mapped as areas of high susceptibility reaffirming the terrain-driven flooding nature of Majuli's geomorphic setting. Also, the addition of satellite-derived indices of LU/LC and NDVI resulted in known surface character and vegetative cover to the level of soil infiltration and wet regime of known sites. Hydrological parameters like drainage density and proximity to river channels were very important in defining the parameters of flood susceptible corridors, especially for a channel migrating and bank eroding island like Majuli.

The spatial reclassification of all factor datasets into five susceptibility classes which denote very low to very high susceptibility represents a kind of intensity that provides spatial and temporal comprehensive means for the assessment of flood susceptibility; the concurrent inverse classification of factors like elevation, slope, NDVI, distance to roads is a fuller representation of patterns of vulnerability. Additionally, the spatio-temporal construct of the CRU and SRTM datasets merged with the FAO soil data and the Sentinel benthic terrain and land cover conditions provided greater reliability and discriminative resolution for regional spatial analysis.

Overall, this study provides a reproducible and replicable framework for the mapping of flood susceptibilities in alluvial and low-lying areas. The resultant flood susceptibility zonation map provided can inform an important component of any plans for disaster risk reduction, early warning, land-use regulations, and resilient infrastructure for Majuli Island. Furthermore, the analytical framework developed for the study could be applied to other flood-vulnerable lowland river landscapes in regions of similar climate or geomorphological context.

The study is limited by its dependence on static spatial datasets and the absence of real-time hydrological variables, including flood depth and discharge. AHP provides a structured way to weight things, but it relies on expert judgment, which makes it subjective. Also, the moderate resolution of some datasets makes it challenging to study how floods affect small areas. Future research should integrate high-resolution DEMs, time-series inundation data, hydrodynamic modelling, field validation, and trends in climate

change and socio-economic factors to improve the assessment of flood susceptibilities and resilience planning in Majuli and equivalent riverine contexts.

**Acknowledgements :** None

**Conflict of Interest :**

The corresponding author declares on behalf of all authors that there is no conflict of interest.

**Authors' Contribution :**

All the authors have equal contribution in the present work.

**Funding :**

The author declares that no funds, grants or other support were received during the preparation of this manuscript.

**Ethics Statement :**

No experiment has been done on humans and animals.

**Informed Consent :**

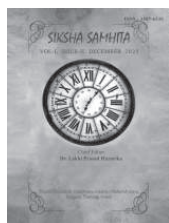
Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## A comparative study of Carvaka philosophy and Berkeley's theory of knowledge

### Abstract

This paper presents a comparative discussion of the epistemological ideas of the empiricist philosopher Berkeley and the materialist Carvaka philosophy.

One of the non-Vedic schools of Indian philosophy is the materialist Carvaka philosophy, which acknowledges that knowledge of the external world can only be gained through pratyaksa. Carvaka philosophy accepts 'inert' as the basic principle of the world, denies the existence of the spiritual and supernatural worlds, and explains the world with the help of inert. Except perception Carvaka philosophy reject all pramanas which is accepted by Indian philosophy for the gained of valid cognition. On the other hand, Berkeley epistemology founded on idealism. George Berkeley accepts the mind or soul as the fundamental reality of the world and recognizes that the existence of things in the world depends on perception. He says there is no independent existence of the material things outside the mind. Except mind and its ideas are nothing exist in the world. He contends that God is the main perceiver of this universe. The aim of the paper is to explain how there are align and contrast Berkeley's epistemological ideas with the epistemological ideas of Carvaka philosophy.

Keywords : Carvaka philosophy, Berkeley, perception, epistemology, idealism, God, inert

### Introduction

This article will explore the opposing epistemologies of two valuable but unlike philosophical perspective: the ancient Indian materialist school of Charvaka and the modern idealist George Berkeley. While Charvaka is also known as Lokayata philosophy, acknowledges that knowledge can only be gained through direct perception and sensory experience and it rejects all other pramanas, like-Anumana, Upamana, Sabda, Arthapatti, Anupalabdi which is admits by Indian philosophy. According to Carvaka, the world composed four elements, like-earth, water, fire and air and it reject Ether because that cannot be perceived. Carvaka gives importance on present life and does not recognize the future which is never now by us.

In contrast, George Berkeley's immaterialist theory is summed up in the expression "to be is to be perceived," or "Esse Est Percipi." Berkeley's view on epistemology is that reality is mind-dependent, and knowledge comes

from sensory experience. Berkeley asserts the existence of material things depends on their perception by the senses; whatever the existence of object depends for its existence on individual mind is called Subjective idealism.

By examining these two systems, we will gain insight into the basic questions of how we determine what is real and how our perspective influences our perception of the universe.

### Carvaka Epistemology

The entire Carvaka philosophy is based on epistemology. Carvaka philosophy complete discussion of the major issues of epistemology, such as How far can we know reality? How does knowledge come and develop? What are the difference sources of knowledge? How can true knowledge be attained?

### **Perception:**

In Indian philosophy, correct, infallible, free from doubt-knowledge is called Prama and incorrect, erroneous and doubtful knowledge is called Aprama. The materialist Carvaka philosophy states that only correct and doubt-free knowledge can be gained through perception. It believes that true knowledge can be achieved only when it is perceptible to our five senses and our minds and only perceptible things are exits in the world. Un-perceived things are never existed in the world. Therefore, Carvaka states that perception is only source of valid cognition. It rejects all other pramanas and said all other pramanas are included in the perception. Carvaka claims that perception can only provide sure knowledge because it comes from the direct contact between the senses and material things. They contend that sensory experience is self-evident, verifiable, and free from other forms of knowledge.

Carvaka philosophy admits two **types of Perception**—these are external and internal; the external perception involves for the function with the five senses while the internal perception involves for the functioning with the mind. One of the five senses needs to come into contact with a material thing in order to acquire knowledge, but the mind can supply this sense-based knowledge. So, Carvaka stated that valid cognition originates from the senses.

### **Inference:**

Carvaka philosophy deny inference as an independent source of valid cognition because it depends on Vyapti (universal relation), the major premise on which it is made, is impossible. A universal relation between major term and minor term is called Vyapti, example: -

Whatever has smoke has fire

The hill has smoke

Therefore, the hill has fire.

Here an immutable relation is assumed between the smoke and the fire. This type of unchanging relation cannot be determined by perception anytime. Inference gives the knowledge about the unseen based on what is seen or known. Carvaka argued that inferential process could lead to erroneous knowledge and was not feasible to us.

**Shabda:** The statement of a trustworthy person is called Sabda. Trustworthy cannot be perceived, it depends on inference. Carvaka argues that we cannot be certain whether a person is trustworthy or not. Again, Carvaka claims that Sabda gives knowledge of the supernatural world through inference. The knowledge of the invisible obtained through Sabda is of doubtful, unreliable and uncertain nature. That's why Carvaka do not accept Sabda as an independent source of true knowledge.

### **Rejection authority of the Vedas**

The Vedas are insignificant and deceitful because it is clear that the Carvaka have no regard for testimony. Those who wrote them accomplished it in order to promote their own personal ambitions. Therefore, the Carvaka do not accept the Vedas as evidence of valid knowledge.

### **Berkeley epistemology:**

George Berkeley's epistemology is recognized that there is only one ethos that is the mind and their ideas and his main principle is "to be is to be perceived". He says that anything exists if it is observed by someone. Without being perception, nothing exists in the phenomenon.

Berkeley acknowledges two types of ideas, such as the ideas created by the senses and the ideas created by the imagination and memory. First one is the ideas of heat, color, smell etc. which is portrayed by the five senses. And these are certain and real but their copies are doubtful. Last one there is no certainty and it's always un-real.

Berkeley epistemology covers the following areas:

**Subjective Idealism:** Berkeley's subjective idealism emphasizes that mind or soul is the main reality. He contends that existence of external objects depends on individual mind. And also rejects the existence of physical objects. According to Berkeley, experience is clearly the ultimate and basis source of our knowledge concerning the world. Berkeley stated that only the mind and its ideas exist and everything in the universe depends on individual minds for their existence.

**Esse Est Percipi:** The idealistic conclusion is established by Berkeley depending on his popular maxim "To be is to be perceived". To be is to be perceived refers perception is the only source for anything exist. All our thought and imaginations entirely depend on our individual mind and these are never got exclusion of it. Our mind determines the existence of all things which are existing in this universe. When a thing gets authenticity then this thing is considered by us actual. So, we may accept the concept of perception and the concept of existence are totally same. That's why the existence of anything is entirely dependent on the observation of human perception. Here the human perception is the only key through which the existence of all is determined. Generally, the existence of everything based on our conscious and active mind, not our passive mind. A thing gets uncertainty when it is outside of our perception. The existence of anything means the observation of it. So, existence refers the human mind's observation.

### Rejection of primary and secondary quality:

According to Locke, there are two types of qualities, like primary and secondary. Weight, shape, structure etc. are the instances of primary quality, on the other hand, colour, taste etc. are examples of secondary quality. He states that primary qualities are unchangeable but secondary are not. Berkeley does not consider the differences between primary and secondary qualities mentioned by Locke. For him, there is no any kind of difference between the above qualities. Both the qualities are changeable and depends on our mind. As for example, the size of a particular thing is existing in our near place then that thing getting larger but the same thing existing far place from us then than that one getting smaller. Therefore, Berkeley never considered the distinction between the two and states that all the qualities depend on our mind. So, we can say that all qualities are changeable and he concludes like -Esse Est Percipi or the existence always depends on our perception.

Rejection of Matter: "Locke regards matter as unknowable and unknown substratum of the primary qualities." Chatterjee and Goswami, p.76. He states that we are unable to observe the material things. But Berkeley denies the existence of material things because we can know only mind and its ideas. According to Berkeley, we can see shape, size, colours etc.; except these we never observed anything. There is no matter or anything outside the mind. Berkeley says God is the ultimate perceiver of everything. No one perceived something but it exists in the world because God perceived it all the times.

**Role of God in Knowledge:** An empiricist philosopher Berkeley admits of God for the existence of the universe and says everything depends on it. He regards everything created by God and also maintain it. So, Berkeley claim that God is the absolute reality and exist in the world nothing else. Berkeley says if something exists in the world which was not observed by us but that things exist because God perceived it.

### Comparison between Carvaka and Berkeley's theories of knowledge:

Carvaka and Berkeley are both gives importance on experience and human observation.

Carvaka emphasizes that *pratyaksha* is the only valid *pramana* and inert is the exclusively real. Conversely, idealist Berkeley contends that existence of an external objects emerged from human observation and says that everything is originates from mind. So, Mind is actual. He claims that everything of the phenomenal world flourished from Mind and its ideas.

### Similarities

- In the process of an acquiring knowledge Carvaka and Berkeley are both asserts that all wisdom comes from sensual observation.
- In the process of an acquiring knowledge both are getting confused regarding unperceived things. Carvaka do not accept inference as a valid source of *pramana* and say inferential knowledge are always doubtful and Berkeley is getting confused in the knowledge acquiring process of matter by human observation. So, both are skeptical regarding the thought process.
- Both denies the existence of non-observables things. In Carvaka philosophy denies the existence of unperceived things such as God, soul, afterlife etc. which is cannot be observed by the senses. At the same time, Berkeley do not admit existence of external objects outside the mind.

### Differences

- Materialist Carvaka emphasizes inert is the sole *ethos* and actual and says that the whole world created by the four stuffs such as *Kshiti*, *Ap*, *Tej* and *Marut*. Carvaka accepts only experiential and perceptual world. Whereas Berkeley considered as an idealist who claims that everything of the universe for their existence depends on observation. He denies existence of material things without perceive by someone and say mind and its ideas are the actuality in the phenomena.
- Carvaka asserts that certain and valid cognition comes from sensory perception and mind. So, Carvaka is basically pragmatic. While Berkeley says that existence of the all substances is based on observation and the Almighty is the permanent observer. He acknowledges divinity for reliable, faith and valid cognition.
- Carvaka do not accept the existence of unperceived and inexperience things like God, soul, afterlife ect. On the other hand, except mind and its ideas Berkeley never considered the physical objects.
- Carvaka admits the existence of physical world which is originates from the four principles like -earth, water, fire and air. While Berkeley stated that the nature is deign by demiurge and also the main perceiver of the nature which is the composition of ideas.
- According to Carvaka, creation, unity and harmony among the material things in the nature sustain by the different physical laws of matter. In contrast, Berkeley contend that nobody sees the substances but exist because gods perceive it anytime.

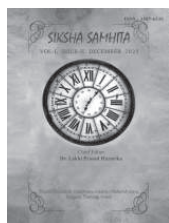
- According to Carvaka, the nature is emerged by inert and so, inert is the ultimate product. On the other hand, Berkeley say mind is the sole principle and it is only real.
- Carvaka describes the nature from materialistic point of view. While Berkeley elaborates the universe from the religious perspective.

**Conclusion :**

In conclusion, this paper analysis comparison between Carvaka philosophy and Berkeley theory of knowledge. Except observation Carvaka deny inference and supernatural concept are not valid, justifiable and authentic origin of the wisdom. In contrast, Berkeley's theory of knowledge mind is the centre point and he says knowledge originates by ideas whereas physical things are existed due to almighty continuously observed. According to Carvaka, experiential world is the actual in which we can see, hear, touch ect. and it is created by matter, consciousness is consisted by substances. While Berkeley do not accept physical object without being see and only human mind is the actual ant sole ethos. There are lots of differences between them but rarely analogous. Both are help to do critical, analytical, scientific observation of the world.

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## Globalisation and Green Growth in India: An Analysis of Trade, Investment, and Renewable Energy Transition

### Abstract

This study examines India's globalisation-environment relationship from 2015–2023, a period aligned with its Paris Agreement commitments and renewable energy expansion. Using annual data on Foreign Direct Investment, trade, CO<sub>2</sub> emissions, and renewable capacity, the paper applies trend analysis, CAGR calculations, and Spearman's correlation to understand how these indicators move together. Results show a strong positive correlation between trade and CO<sub>2</sub> emissions, while FDI exhibits weak and statistically insignificant associations with environmental indicators. Renewable energy capacity expanded at a CAGR of 15.34%, substantially outpacing trade (6.62%) and emissions growth (3.81%), and carbon intensity of trade declined by 2.61% annually, indicating relative decoupling. The findings suggest that trade-related expansion remains environmentally linked, whereas renewable growth has progressed steadily alongside economic integration. India's experience highlights the importance of sustained policy frameworks and sector-specific strategies in aligning globalisation with green transition objectives.

**Keywords :** Globalisation, green growth, renewable energy transition, carbon intensity, climate policy integration.

### Introduction

Globalisation, one of the widely researched topics and a modish subject of interest, essentially refers to the integration of states through innovation and technology. The IMF defines globalisation as a historical process that is the result of human innovation and technological progress. It not only refers to increased exchange of goods and services, but also exchange of ideas, knowledge and people (IMF, 2008). Globalisation is about including one culture into another, eroding the language and communication barriers for facilitating commerce and cooperation between different regions (Zhang et al., 2022). It is a continuous process of global integration through trade, investment and capital flows; political interaction; information and information technology; and culture (Panayotou, 2000). However, with increased economic growth, globalisation has also resulted in some negative impacts, mostly on the environment. Many empirical studies show the negative impacts of globalisation along with the positive ones. In response, the concept of the green economy has gained prominence. A green

economy is an economy that aims at achieving sustainable development by reducing environmental risks from economic development. UNEP Green Economy Initiative (GEI) defines a green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (Fedrigo-Fazio and Brink, 2012). With increasing environmental risks from globalisation and industrialisation, adopting a green economy strategy has become crucial.

The impact of globalisation on the environment is traditionally analysed through three theoretical channels:

- **Scale Effect:** Increased economic activity and trade volume lead to higher resource consumption and emissions.
- **Composition Effect:** Changes in a nation's industrial structure, i.e., shifting from heavy industry to services or green sectors, can alter its environmental footprint.

- **Technique Effect:** The diffusion of green technologies through foreign investment and trade can improve energy efficiency and reduce carbon intensity.

This study positions itself within the Environmental Kuznets Curve (EKC) and decoupling literature. The EKC hypothesis suggests that environmental degradation initially increases with income but eventually declines as a country reaches a certain level of development and adopts cleaner technologies. A key objective for emerging economies is relative decoupling, where economic indicators (like trade) grow faster than environmental pressures (like CO<sub>2</sub> emissions).

While theoretical linkages between globalisation and environment are well-established, analysis in the Indian context remains limited, particularly for the post-Paris Agreement period. This research fills this gap by analysing the data from 2015 to 2023 to explore the relationships between the economic globalisation of India (measured by the FDI inflows and total trade) and the environmental indicators (CO<sub>2</sub> emissions and renewable energy capacity). This research will concentrate on the period from 2015 to 2023, which corresponds to the Paris Agreement climate goals of India and its target of 175 GW of renewable energy capacity in 2035. The selected timeframe captures a full economic cycle, including growth, pandemic disruption, and recovery, enabling a robust assessment of how India's globalisation trajectory has interacted with environmental management under evolving climate-action frameworks. The research aims to answer: (1) How have India's globalisation indicators evolved alongside environmental indicators? (2) To what extent has renewable energy growth accompanied economic globalisation? (3) What policy lessons and balancing strategies can be derived from India's experience with economic globalisation and environmental management?

### **Review of literature:**

#### **Globalisation and its impact on the environment:**

Globalisation has contributed to economic growth and productivity by enabling industries to trade based on comparative advantage, benefiting from cheaper transportation and access to low-cost labour from developing countries. Consequently, consumers enjoy a greater variety of goods and services at reduced prices. Thus, due to globalisation, countries are absorbed into the universal economy through various activities like Foreign Direct Investment (FDI), trade, regional agreements, movement of labour and capital flows (Shahzadi et al., 2019). Basically, the net result of globalisation is the creation of a global village, a single market system with a global factory and a global office (Austine et al., 2014). Globalisation has fostered

interconnectedness among countries but has also caused significant environmental issues such as deforestation, pollution, resource depletion, biodiversity loss, and climate change. Infrastructure development necessary for improved connectivity typically results in tree removal, impacting ecosystems and leading to habitat loss and contamination (Zhang et al. 2022). Additionally, the rising demand for timber and agricultural products contributes to extensive deforestation, particularly in tropical rainforests, which are crucial for global biodiversity (Latif et al. 2023). Globalisation has also led to the overexploitation of natural resources like minerals, water, fossil fuels, etc. It has intensified pollution due to the growth of industries emitting harmful gases, severely impacting the ecosystem (Zhang et al. 2022). The expansion of global trade increases transportation and fossil fuel consumption, thereby raising greenhouse gas emissions and intensifying environmental problems such as climate change and resource overexploitation. However, the literature shows that the environmental impact of globalisation is mixed and context-specific. It operates through three main channels: It can expand economic activity and energy use (scale), worsening pollution; it can shift the structure of production toward dirtier or cleaner sectors (composition); and it can diffuse cleaner technologies and stricter standards, improving environmental quality (technique) (Aluko et al. 2021; Xue et al. 2021). The overall environmental outcome depends on which of these effects dominates in a country at a particular stage of development.

Empirical cross-country evidence shows no uniform relationship between globalisation and environmental outcomes. Some studies find that economic globalisation increases CO<sub>2</sub> emissions, while political and institutional integration may improve environmental performance (Farooq et al., 2022; Le & Le, 2022). For 19 OECD countries, Saud et al. (2020) show that globalisation generally enlarges ecological footprints, though integration reduces pressure in a few cases. Regional studies highlight stronger adverse effects in emerging and developing economies. In South Asia and E-7 countries, globalisation is linked to higher CO<sub>2</sub> emissions and ecological footprints due to expanded trade and integration (Rehman et al., 2023; Xue et al., 2021). For India, Sethi et al. (2020) find that financial development and globalisation boost growth but harm environmental sustainability in the short run. Wu et al. (2022) reveal contrasting effects among major emitters, with degradation in China but temporary improvement in the US and India. Studies also show industrialisation and resource extraction worsening environmental quality (Shahzadi et al., 2019; Austine et al., 2014; Zhang et al., 2022).

### **Green growth, renewable energy and economic globalisation:**

The green economy framework has increasingly been operationalised through renewable energy expansion, energy efficiency, and low-carbon industrial transformation. In emerging economies, renewable energy capacity is considered a central indicator of green growth because it reflects structural shifts in the energy mix and long-term decarbonisation commitments (Gielen et al. 2019; Elavarasan et al. 2020). Studies link higher renewable energy use with improved green growth or sustainable development across both advanced and developing economies (Lu et al. 2025). In many settings, economic growth, trade openness, and capital formation raise renewable energy consumption by easing financing and enabling technology transfer (JóŸwik et al. 2025; Gafsi, 2025). However, the effects of globalisation are context dependent; for instance, trade openness and FDI can channel clean technologies and lower costs, but in weaker institutional contexts, they also sustain fossil fuel-intensive growth or high emission technologies (Dai et al. 2025; Gafsi, 2025). Panel analyses show that while trade openness typically promotes renewables, some forms of financial globalisation can reduce renewable uptake if capital flows favour conventional energy (JóŸwik et al. 2025; Justice et al. 2024).

Post Paris, India adopted ambitious renewable targets (175/ GW then 500/ GW by 2030), positioning renewables as central to its green growth and coal phase down strategy (Singh et al. 2023; Chabhadiya et al. 2020). Solar and wind capacity expanded rapidly, with solar attracting around 80% of new investment (Singh et al. 2023; Elavarasan et al. 2020). Evidence points to global capital and domestic reforms working together: large post 2014 investment inflows, green finance instruments, and supportive policies (auctions, subsidies, green bonds, IREDA financing) have been critical to scaling renewables, though funding gaps and institutional bottlenecks remain (Kumar et al. 2022; Perwez & Safiuddin, 2025).

### **Green technologies and innovations:**

Available studies converge on the idea that green technologies and green innovation improve environmental indicators when appropriately supported by finance, regulation, and absorptive capacity (Ali et al. 2022; Sun et al. 2023; Islam et al. 2024). Technological advancements help in lowering CO<sub>2</sub> emissions, accompanied by energy conservation, and in the efficient use of conventional and renewable energy resources (Bilal et al., 2022). Much research supports that green technologies are an important means of energy-saving and emission-reduction (Wen

and Dai, 2021). Shan et al. (2021) emphasise the importance of green technology innovations (GTI) for sustainable development, demonstrating their superiority over traditional economic models in reducing environmental damage. Their research on the Turkish economy indicates a long-term negative correlation between GTI, renewable energy, and carbon dioxide emissions, while energy consumption, population, and per capita income contribute positively to emissions. In the short term, GTI and renewable energy significantly decrease carbon emissions, unlike the notable increases from other factors.

However, there are certain difficulties in adopting such green technologies. Key barriers include high implementation costs, insufficient information, the absence of alternative chemical inputs, unknown process technologies, uncertainty about performance impacts, and a lack of skilled human resources (Banerjee and Akuli, 2014). Addressing these barriers is essential for promoting the adoption of clean technologies, especially in developing and least developed countries. At the same time, FDI can either worsen or improve environmental quality depending on whether it is “green” and how it interacts with domestic innovation systems and policy frameworks (Ali et al. 2022; Brohi&Suzuki 2023; Castellani et al. 2022).

Recent empirical studies highlight context-dependent relationships. Research in emerging economies often finds initial negative environmental impacts from globalisation (Anser et al., 2021), while green economy mechanisms like renewable energy adoption can mediate these effects (Ahmad & Wu, 2021). This study contributes to this discourse by providing an India-specific trend and comparative analysis using recent data (2015-2023), focusing on the renewable energy transition as a key green growth strategy.

### **Methodology:**

This study employs a quantitative research design to analyse India’s globalisation and environmental indicators, using annual data for India from 2015 to 2023, a period covering post-Paris Agreement commitments and significant renewable energy expansion.

### **Data sources and variables**

The study utilises secondary data collected from reputable international and national organisations:

- Foreign Direct Investment (FDI): Annual FDI inflow data (in \$ million) were collected from UNCTAD World Investment Reports and are converted to US\$ billions.

- Trade Volume: Calculated as the sum of merchandise imports and exports, sourced from World Trade Organisation (WTO) datasets and converted to US \$ billion.
- CO<sub>2</sub> Emissions: Total annual carbon dioxide emissions measured in million metric tonnes, sourced from the International Energy Agency (IEA).
- Renewable Energy Capacity: Collected year-wise installed renewable energy capacity data (MW) from Ministry of New and Renewable Energy (MNRE) reports, calculated the cumulative RE capacity and converted it into gigawatts (GW).

**Analytical framework**

The analysis employs descriptive trend analysis, comparative growth rates, focusing on visualising relationships and identifying patterns that inform policy discussions and correlation analysis.

- Descriptive trend and ratio analysis

Initial patterns are identified through year-on-year trend visualisations. Additionally, the Carbon Intensity of Trade is calculated as a derived metric to assess environmental efficiency:

$$CR = \frac{CI}{RI} \text{ Eq. 3}$$

- Compound annual growth rate

To provide a standardised measure of sustained growth that accounts for compounding effects over the eight years, the CAGR is calculated for each indicator. The formula used is:

$$\text{Carbon intensity of trade} = \frac{\text{CO2 emissions (Mt)}}{\text{Total trade (B\$)}}$$

Where:

$V_{begin}$  = Value at the start of the period (2015)

$V_{final}$  = Value at the end of the period (2023)

$n$  = Total number of years (8)

- Correlation analysis

The Spearman’s Rank Correlation Coefficient ( $\tilde{r}$ ) is used in this research to analyse the associations between Foreign Direct Investment (FDI) inflows, trade volume, CO<sub>2</sub> emissions, and renewable energy capacity. Spearman’s correlation analysis is more robust compared to Pearson’s correlation analysis, as it does not require a linear relationship or normal distribution of data, especially when dealing with environmental and economic data that may have outliers.

The correlation coefficient values ( $\tilde{r}$ ) lie between -1 and +1, where:

+1 shows perfect positive correlation, 0 shows no correlation and -1 shows perfect negative correlation.

**Results and Discussions:**

To present a comprehensive analysis of the relationship between India’s key globalisation and environmental indicators over the years from 2015 to 2023, the data compiled in Table 1 serves as the foundation for the analysis, showing trends in FDI inflow, trade volume, CO<sub>2</sub> emissions and cumulative renewable energy capacity. The discussion will help in examining the relationship between India’s growing global integration, its environmental impact, and its slow progress toward sustainability goals by tracking changes in key economic and environmental indicators over time.

Table 1: India’s Globalisation and Environmental Indicators (2015-2023)

YEAR	FDI INFLOW (billion \$)	TOTAL TRADE (billion \$)	CO <sub>2</sub> EMISSIONS (Million tonnes)	CUMULATIVE RE CAPACITY (GW)
2015	44.064	662.082	2049.109	39.95
2016	44.481	626.191	2072.215	47.09
2017	39.904	749.166	2189.834	58.56
2018	42.156	839.242	2279.814	70.65
2019	50.558	810.399	2277.641	79.41
2020	64.072	649.612	2112.203	88.25
2021	44.763	968.518	2312.197	95.8
2022	49.38	1173.856	2527.9	109.89
2023	28.076	1105.488	2763.338	125.16

**Evolution of India’s globalisation indicators alongside environmental indicators:**

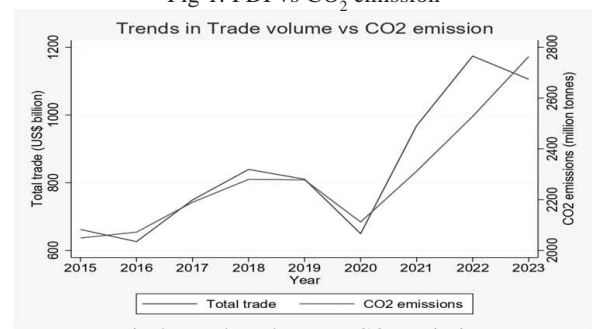
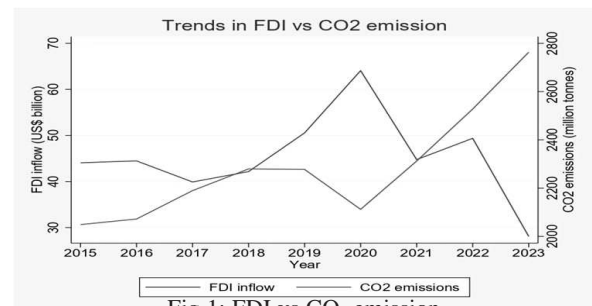


Figure 1 shows that FDI and CO<sub>2</sub> emissions do not move consistently together—when one rises, the other may fall or remain stable. From 2015-2019, both indicators generally trend upward, though with different slopes and fluctuations. And in 2020, FDI surged to its highest point (\$64.1 billion) while emissions dropped to a four-year low (2,112 million tonnes), which shows a clear divergence. And from 2021-2023, both decline, but FDI falls more steeply while emissions show a modest rebound in 2022-2023. Figure 2 reveals a clearer relationship: trade volume and emissions generally rise and fall in sync, particularly evident during the 2020 pandemic decline and subsequent recovery. The data in Table 1 confirms these visual patterns, with trade and emissions reaching simultaneous lows in 2020 and highs in 2023, while FDI follows a different trajectory.

The visual disconnect between FDI and CO<sub>2</sub> emissions suggests that foreign investment may be shifting towards less carbon-intensive sectors or that environmental regulations are effectively mitigating investment impacts. In contrast, the trade-emissions linkage indicates globalisation through goods exchange continues to exert environmental pressure, though renewable energy expansion may be moderating this relationship over time.

**Renewable energy growth and economic globalisation:**

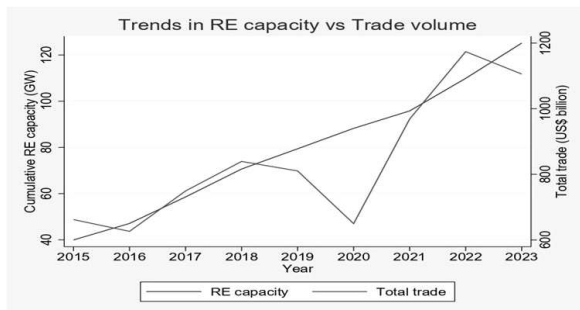


Fig 3: RE capacity vs Trade volume

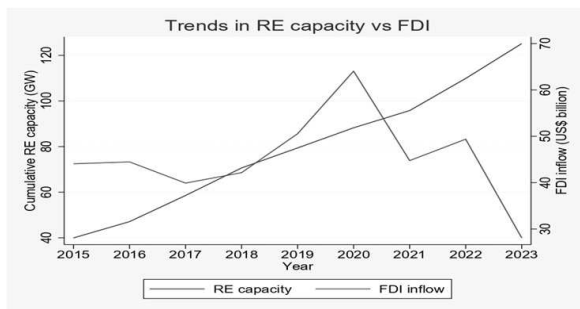


Fig Fig 4: RE capacity vs FDI

Fig. 3 shows how renewable energy (RE) capacity grew steadily and consistently from 2015 to 2023, indicating

stable and continuous investment regardless of outside economic factors. Conversely, trade volume has shown a highly volatile pattern, sharply declining in 2020 (likely due to the pandemic) before making a massive rebound to its peak in 2022 and then slightly declining in 2023. Overall, we can observe that both RE capacity and trade volume have shown a positive trend from 2015 to 2023, indicating expansion in economic activities. Trade works as a major facilitator for RE growth, enabling an increase in capacity by ensuring global trade of key components for renewable energy like solar panels, turbines and batteries.

Likewise, we can observe in Figure 4 that RE capacity is steady and continuous over the years, and FDI shows a volatile pattern, sharply declining in 2021 and 2023. Thus, there does not seem to be any dependence between the two, indicating a weaker association between FDI and RE capacity.

**Spearman Correlation analysis:**

The Spearman’s rank correlation coefficients ( $\tilde{r}$ ) were calculated to evaluate the connections between trade, CO<sub>2</sub> emissions, FDI, and RE capacity. Table 2 shows distinct patterns of statistical significance and association among the variables.

Table 2: Spearman correlation results

Variables Compared	Correlation (Spearman’s rho)	p-value
FDI – Trade	-0.183	0.6368
FDI – CO <sub>2</sub>	-0.183	0.6368
FDI – RE Capacity	0.133	0.7324
Trade – CO <sub>2</sub>	0.933	0.0002***
Trade – RE Capacity	0.767	0.0159**
CO <sub>2</sub> – RE Capacity	0.883	0.0016***

\*\*\*( $p < 0.01$ ), \*\*( $p < 0.05$ )

The results show that there is no statistically significant correlation between Foreign Direct Investment (FDI) and the other variables in the study. FDI has a very weak and negative correlation with trade and CO<sub>2</sub> emissions ( $\tilde{r} = -0.183$ ,  $p = 0.6368$ ). In the same way, it has a very weak but positive correlation with RE capacity ( $\tilde{r} = 0.133$ ,  $p = 0.7324$ ). Since these p-values exceed conventional significance thresholds ( $p < 0.10$ ,  $p < 0.05$ , or  $p < 0.01$ ), the null hypothesis of no correlation cannot be rejected. According to these findings, changes in FDI inflows are not consistently linked to shifts in trade volume, carbon emissions, or renewable energy capacity within the parameters of the current dataset. In other words, FDI does not appear to play a statistically meaningful role in shaping the environmental–globalisation nexus during the study period. In contrast to FDI, Trade, CO<sub>2</sub> emissions, and RE capacity display strong and statistically significant

positive associations. Trade and CO<sub>2</sub> emissions have a very strong positive correlation ( $\bar{r} = 0.933$ ), which is significant at the 1% level ( $p < 0.01$ ). This suggests a nearly proportional relationship in which rising CO<sub>2</sub> emissions are closely linked to increases in trade activity. The findings imply that increased carbon intensity may accompany trade expansion, perhaps as a result of rising industrial production and demand for transportation. Similarly, CO<sub>2</sub> emissions and renewable energy capacity have a very strong positive correlation ( $\bar{r} = 0.883$ ), which is significant at the 1% level ( $p < 0.01$ ). This relationship may be an illustration of a reactive policy dynamic, in which increasing carbon emissions encourage investments in renewable energy infrastructure as part of environmental mitigation plans. Furthermore, trade and renewable energy capacity have a strong positive correlation ( $\bar{r} = 0.767$ ), which is significant at the 5% level ( $p < 0.05$ ). This implies that the growth of renewable energy systems occurs concurrently with increased trade integration, possibly as a result of capital flows, technology transfer, or policy alignment with international sustainability standards.

Overall, the findings show that trade, emissions, and the development of renewable energy are structurally linked, but FDI seems statistically unrelated to these dynamics within the sample. The results highlight the significance of environmental externalities driven by trade and the possibility of compensatory growth in renewable energy capacity in response to rising carbon intensity.

**Policy Lessons from India’s Experience in Balancing Globalisation and Environment:**

Following the trend analysis, we calculate Compound Annual Growth Rates (CAGR) to assess the annualised growth trajectories of key indicators over the 2015–2023 period. This metric provides a standardised measure of sustained growth, accounting for compounding effects, and enables clearer comparison between economic globalisation indicators and environmental outcomes. Table 3 presents these CAGRs alongside the derived metric of carbon intensity of trade, offering insights into the efficiency of India’s globalisation pathway.

Table 3: Compound Annual Growth Rate (CAGR) of the indicators (2015-2023)

INDICATOR	CAGR
FDI INFLOW (billion \$)	-5.48
TOTAL TRADE (billion \$)	6.62
CO2 EMISSIONS (Million tonnes)	3.81
RE CAPACITY (GW)	15.34
CARBON INTENSITY OF TRADE (Mt/\$B)	-2.61

Addressing the third research objective, what policy lessons and balancing strategies can be derived from India’s experience with economic globalisation and environmental management (2015-2023), our analysis yields four evidence-based insights. These lessons emerge from the intersection of India’s established policy framework and our empirical findings, offering practical guidance for countries at similar development stages.

**Lesson 1: Stable Long-Term Policies Are More Important Than Variable Investment**

India’s renewable energy sector has shown robust growth, with a CAGR of 15.34% from 2015 to 2023, indicating that stable domestic policies are more crucial than fluctuating foreign investment, which declined at a CAGR of 5.48% in the same period. The National Action Plan on Climate Change (NAPCC) exemplifies India’s consistent policy framework, contributing to achieving a 24% reduction in emissions intensity by 2020, surpassing its target. This underscores that green growth is primarily driven by policy certainty rather than the volatility of foreign investments.

**Lesson 2: Developing Economies Can Realistically Achieve Relative Decoupling**

Relative decoupling of economic growth from carbon emissions is achievable for developing nations, as evidenced by India’s experience, which saw a 2.61% annual decrease in carbon intensity of trade despite a trade growth rate of 6.62%. This indicates that economic growth can surpass environmental pressures, underscoring the need for growth-oriented strategies aligned with sound environmental policies. India aims for a 33-35% emissions intensity reduction under the Paris Agreement, highlighting that efficiency improvements should be prioritised over abrupt emission reductions. Thus, intensity-based targets are more practical than absolute caps for countries in the early stages of development, supported by achievable annual efficiency gains of 2-3%.

**Lesson 3: Green Infrastructure Provides Environmental Benefits and Increases Crisis Resilience**

Green infrastructure, particularly in the context of renewable energy, proved crucial during the COVID-19 pandemic by aiding economic stability amid significant shocks. India’s renewable energy sector saw an 11% growth in 2020, continuing a steady trajectory with a 15.34% compound annual growth rate despite a 20% drop in trade and erratic foreign direct investment. The long-term nature of renewable projects, based on fixed tariffs, makes them resilient to short-term economic disruptions. This aligns with El-Ashry’s (1993) concept of “win-win policies,”

illustrating green infrastructure's dual role in promoting both environmental health and economic stability, especially in emerging markets susceptible to global fluctuations. Programs aimed at energy efficiency, such as those proposed in Mexico, exemplify how such investments can support environmental objectives while serving as stable economic anchors during crises.

#### Lesson 4: Integrated, Sector-Specific Policies Help Balance Globalisation and Environmental Goals

India's experience illustrates that varied aspects of globalisation uniquely affect the environment, necessitating a multidisciplinary policy approach. Trade volumes and CO<sub>2</sub> emissions demonstrated a correlation with both declining in 2020 and peaking in 2022, whereas foreign direct investment (FDI) displayed a weaker link with environmental outcomes. This complexity supports the need for the multidisciplinary approach emphasised by Bajjae (2014) to create a balanced ecological and economic system. The Indian policy framework reflects integration through mission-based, sector-specific strategies addressing areas such as solar energy, industrial efficiency, and sustainable agriculture. Emerging economies are advised to adopt targeted environmental strategies, including incorporating environmental standards into trade policies and directing FDI towards green technologies.

These observations support Huang's (2023) claim that when globalisation is deliberately matched with green transition objectives, a "healthy economy and a healthy environment" can develop together. Georgeson et al. (2017) point out that the Sustainable Development Goals provide a wide framework for incorporating green economic principles with sustainable development initiatives. For other emerging economies handling the intricate relationships between globalisation and the environment, India's recent experience offers useful advice and quantifiable benchmarks.

#### Conclusion :

This study analysed the relationship between globalisation and environmental performance in India during 2015–2023 within the Environmental Kuznets Curve and decoupling framework. The findings reveal that trade expansion is strongly associated with rising CO<sub>2</sub> emissions, indicating the continued presence of scale effects. In contrast, FDI inflows show weak and statistically insignificant relationships with environmental indicators. Renewable energy capacity grew substantially faster than both trade and emissions, while the carbon intensity of trade declined, suggesting the emergence of relative decoupling.

Overall, the results indicate that different channels of globalisation affect environmental outcomes differently. While trade remains closely linked to emissions, renewable energy expansion has progressed steadily alongside economic integration, reflecting the role of sustained policy direction.

However, the study is limited by its reliance on aggregate national-level data and a relatively short time period. The descriptive and correlation-based methodology does not establish causality. Future research may employ econometric techniques such as regression or causality analysis, extend the time horizon, and explore sectoral or state-level patterns to better understand the long-term dynamics of India's globalisation–environment nexus.

#### Acknowledgements :

The authors express their gratitude to colleagues and well-wishers for their valuable discussions and moral support during the preparation of this manuscript.

#### Conflict of Interest :

The authors declare no conflicts of interest.

#### Authors' Contribution :

Both authors contributed equally to the conceptualisation, data analysis, interpretation, and writing of this manuscript.

#### Funding :

No specific funding was received for this research.

#### Ethics Statement and Informed Consent :

Not applicable as the study is based solely on secondary data from publicly available sources; no human or animal subjects were involved.

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### The impact of social media on students learning and academic performance in secondary level students

#### Abstract

The rapid expansion of social media has significantly influenced learning processes and academic performance among secondary-level students. This study examines the impact of social media on students' learning behaviors, engagement, and academic outcomes. Social media platforms provide opportunities for collaborative learning, easy access to educational resources, and enhanced communication between peers and teachers. When used appropriately, these tools can promote critical thinking, creativity, and motivation, thereby supporting academic achievement. However, excessive and unregulated use of social media may lead to distractions, reduced concentration, time mismanagement, and exposure to inappropriate content, negatively affecting students' academic performance. The study highlights that the impact of social media on learning is largely dependent on students' usage patterns, self-regulation skills, and guidance from educators and parents. Findings suggest that integrating social media into educational practices with clear guidelines can maximize its benefits while minimizing adverse effects. Therefore, balanced and purposeful use of social media is essential to enhance learning outcomes and improve academic performance at the secondary education level.

Keywords : Social media, Learning behaviors, Academic performance, Secondary education, Student engagement, educational technology.

#### Introduction

Every aspect of our human life has been associated with education through which we can adjust to any situation by modifying our behavior and environment. Education can be regarded as an important tool which helps in transforming humans from biological beings to social beings.

In the words of Rousseau, "plants are developed by cultivation and men by education."

Education is a dynamic term because it is a continuous process which will never come to an end. It starts from the womb of the mother and continues till death.

Education in a general sense is the acquisition of knowledge or skills in a subject. Education is the acquisition of book knowledge and techniques in a specific subject through a pre-determined and pre-planned curriculum. However, the true meaning of

education is not limited to acquiring book knowledge. Education is a developing process. It enables the individual to acquire the necessary skills of life in ever new environments and circumstances. Education is the collection of experience gained at home, school, peers, neighborhood, temples, playground, libraries etc. Thus, we can say education is a process of acquisition of knowledge and experience as well as the development of skill, habits and attitudes which help a person to lead a worthwhile life in this world. We can simply have said that education is a life. Life without education is meaningless and like the life of the best.

#### Learning

Learning is the ability to change previous experiences and adapt to new situations. Learning helps to change the instinct behavior of organisms and enables them to adapt to new environments. A person's learning process begins after birth and continues until death.

In fact, the learning process involves acquiring habits, knowledge, attitude and skills. When a person reacts to a situation there are progressive changes in the person's behavior that help the person to adapt to the situation and achieve goals. Learning is one of the processes of acquiring knowledge about society as a whole.

### **Secondary education:**

Education is the most important tool that empowers an individual to achieve greater heights. Generally, the formal educational system is divided into three types: primary education, secondary education and higher education.

Secondary education is the phase of formal education that occurs after primary or elementary education. It generally includes middle school and serves students typically aged 11 to 18 years in 9th to 12th class.

Secondary education focuses on expanding students' knowledge and academic abilities. It offers a diverse range of students and allows students to delve deeper into specific areas of interest. This helps develop critical thinking skills, problem solving abilities and broader understanding of various fields.

### **Social media**

Media is the medium of expression and the various means of communication that reach a large number of people. Generally social media is a new innovation of technology. Present time social media are most widely used in various fields like education sector, business, politics, human resources management, retail, service industry etc.

Social media can be broadly defined as the set of interactive internet applications that facilitate collaboration or individual creation and sharing of user generated content. Social media refers to online or digital platforms and applications that allow users to create, share and interact with content they play a significant role in communication, networking and information exchanging. Examples of various social media platforms are- Facebook, WhatsApp, Twitter, Telegram, LinkedIn, Google, My space, Snapchat, Messenger, and Instagram etc.

### **Impact of social media :**

Social media is now integral to daily life, shaping how students learn and interact. While widely used—and sometimes addictive—it has both positive and negative effects on learning.

### **Positive impact of social media**

Positive impact of social media refers to the beneficial effects that social media platforms can have on individuals, communication and society as a whole.

This impact encompasses various aspects of life including communication, education, relationship, entertainment and activism.

### **● Enhancing communication and collaboration:**

Messaging apps, group chats and online discussion forms provide an avenue for students to ask questions, share ideas and collaborate on projects in real time. This enhancing communication among students encourages peer to peer learning and facilitates teamwork.

### **● Access to education content and resources:**

Social media platforms like YouTube, Google, ChatGpt and educational blogs grant secondary level students access to diverse educational materials from video to article, fostering independent learning. This accessibility empowers students to reinforce classroom lessons, explore niche subjects and deepen their comprehensive academic topics.

### **● Promotion of creative expression and engagement:**

Social media platforms empower secondary level students to express themselves creativity and engage with educational content in innovative ways. Platforms like YouTube, Instagram, Snapchat, and blogging websites allow students to showcase their creativity through art, video, writing and multiple projects.

### **● online learning has become an increasingly popular**

way for students to access education, and social media has played a big role in making this possible with platforms like YouTube, Coursera, Google meet, Zoom etc. students can access educational videos and tutorials on just about any topic imaginable.

### **● Social media create an awareness:**

Social media can raise awareness about social issues and encourage student's involvement in activism or community services promoting civic engagement and social responsibility.

### **Negative impacts of social media :**

Social media has become an essential part of modern society, offering us an easy way to communicate with others, connect with new people and share information. However, it has also been observed that social media has many negative effects on society.

### **● Impact on mental health:**

Excessive use of social media has been associated with various mental health issues among school students, including anxiety, depression, low self-esteem, and social comparison.

### **● Educational challenge and distraction:**

Social media platforms pose notable distractions for Students, hampering their focus and productivity.

The continuous flow of notification, endless scrolling feeds and the temptation of social interaction draw students away from their academic responsibilities to concentrate and experience diminished academic performance.

- **Misinformation:** and Academic Integrity concerns: While social media can be a powerful tool for learning and communication, it can also be a breeding ground of misinformation with the rise of fake news and propaganda. Students must be extra cautious when consuming information online. With so much content being shared on platforms like YouTube, Instagram, WhatsApp, Facebook, it can be difficult to separate fact from fiction.
- **Cyberbullying:** One of the most major detrimental effects of social media on students and education is cyberbullying. Bullies can target their victims with a degree of intensity and perseverance that would be challenging to achieve in person to the offered by online interaction. In severe circumstances, this could result in physical harm, long – lasting, emotional anguish, low self – esteem, and even death.

#### **Academic performance:**

Academic performance represents to the assessment of a student learning achievement and their abilities to complete their studies on time. Their abilities measured by grades, test scores and course work completion, standardized test scores, classroom perf

#### **Need and justification of the study:**

The purpose of this research is to examine the impact of social media on student learning at academic performance in secondary level students

This study is needed to find out how social media influences the academic performance among the secondary level students.

#### **Objective of the study:**

- To evaluate the effect of social media, use it on Academic performance.
- To examine the relationship between social media, use and students' learning outcomes.
- To analyze the frequency and nature of social media use among secondary school students.
- To identify factors moderating the impact of social media on academic performance.

#### **Hypothesis of the study:**

To achieve the above-mentioned objectives, the following hypothesis have been formulated

- $H_0$ : social media use has no significant effect on the academic performance of secondary school students.
- $H_1$ : There is no significant relationship between the use of social media and student learning outcomes or academic performance among secondary school students.

#### **Review of the Literature :**

Tarek A.El-Badawyl and Yasmin Hasheml (2015), "The impact of social media on the Academic development of school students" According to this paper, it is a true statement given that the students spend between one to more than six hours daily on social media platforms, such as Facebook and Google. In this paper it is concluded that there are no negative impacts from the use of social media on the academic performance of the school students, and it is proven by the frequency of using social media with the overall grade average, and with the number of hours spent daily on studying.

Kalra RK and Manani p (2013), "Effect of social networking sites on academic achievements among introverts and extrovert" The present study investigated the effect of use of social networking sites on academic achievements among introverts and Extrovert. Students are managing their time efficiently and hence, use of social networking sites does not harm their academic performance. Finding suggested that despite of spending time on internet or on using social networking sites, and even with the personality differences students are efficient enough for their studies that they do not face any deficiency in meeting their studies' requirements.

Tess, P.A. (2013), "The role of social media in higher education classes (real and virtual)-A literature review" social media are increasingly visible in higher education setting as instructors look to technology to mediate and enhance their instructions as well as promote active learning for students. Empirical evidence, however, has lagged in supporting the claim. Most of the existing research on the utility and effectiveness of social media in the higher education class is limited to self- report data (e. g, survey, questionnaire) and content analyses. This paper summarizes the scholarly writings as well as reviews the findings of empirical investigation.

#### **Research Methodology :**

A research methodology describes the techniques and procedures used to identify and analyze information regarding a specific research topic. Research methodology is a structured and scientific approach used to collect, analyze, and interpret quantitative or qualitative data to answer research questions or test hypotheses. A research methodology is like a plan for

carrying out research and helps keep research. A research methodology gives research legitimacy and provides scientifically sound findings.

Having a good methodology in place has the following advantages –

- Helps other researchers who may want to replicate your research, the explanations will be of benefit to them.
- You can easily answer any questions about your research if they arise at a later stage.
- A research methodology provides a framework and guidelines for researchers to clearly define research questions, hypotheses, and objectives.
- It helps researchers identify the most appropriate research design, sampling techniques, and data collection and analysis methods.

#### Null hypothesis

A hypothesis is an assumption that is made based on some evidence. The null hypothesis is a kind of hypothesis which explains the population parameter whose purpose is to test the validity of the given experimental data. This hypothesis is either rejected or not rejected based on the viability of the given population or sample. It is said to be a statement in which the surveyors want to examine the data. It is denoted by Ho.

#### Research methods:

In this research, a descriptive method was utilized to systematically analyze and interpret the data gathered from participants. This approach focused on providing a detailed examination of the responses, which helped to create a comprehensive understanding of the participants' perspectives and experiences. By employing both descriptive statistics and qualitative analysis, the study aimed to identify significant trends and patterns within the data, thereby enhancing our understanding of the research topic.

#### Design of the study:

The study on social media's impact on secondary students in Guwahati used descriptive and field-based methods, collecting data by questionnaires, interviews, and observations for a comprehensive analysis.

#### Population:

In the research, the population refers to the entire group of individuals, items or phenomena that the study aims to understand or draw conclusions about. The subject of my research study is "The Impact of social media on student learning and academic performance in secondary level students in Guwahati area of

Kamrup(M) District". So, all the students of 9th to 12th class of secondary level school in Guwahati area.

S.No	Name Of The School	Total Enrollment
1	Sankardev Sishu Vidya Niketan, Beltola	154
2	Ulubari H.S School	230
3	New Guwahati Adarsha High School	187
4	Pub Guwahati Adarsha High School	215
5	Dakhin Kamrup High School	198
6	R.G Baruah High School	170
7	Assam Jatiya Vidyalay	182
8	Guru Nanak Senior Secondary School	72

#### Sample:

In research, a sample is a subject of individuals or units chosen from a large population to represent that population in a study. The purpose of using a sample is to draw conclusions about the entire population based on observations from this smaller group.

The study aimed to investigate objective of the study:

- To Evaluate the effect of social media, use on Academic performance.
- To Examine the Relationship Between Social Media Use and Students Learning Outcomes.
- To Analyze the Frequency and Nature of Social Media Use Among Secondary School Students
- To Identify Factors Moderating the Impact of Social Media on Academic Performance.
- To Investigate Students' Perceptions of Social Media Influence on Their Learning.

To Compare the Academic performance of students with High and Low Social Media Usage.

SL NO	NAME OF The School	Total Number of Student IN CLASS 9TH	Total Number of Student IN CLASS 10TH	Total Number of Student IN CLASS 11TH	Total Number of Student IN CLASS 12TH	Total
1	GURU NANAK SENIOR SECONDARY SCHOOL.			30	25	55
2	ULUBARIHS SCHOOL.	35	31	25	27	118
3	DAKHIN KAMRUP HIGH SCHOOL.	28	24			54
4	NEW GUWAHATI ADARSHA HIGH SCHOOL.	42	33			75

In Guwahati, five out of ten secondary schools were randomly selected. Within these schools, 40 students from classes IX–XII were chosen using systematic sampling, ensuring a representative sample to study the impact of social media on learning and academic performance.

**Research Tools:**

Research Tools are essential instruments or methods used to collect, analyze, and interpret data in order to address research questions or test hypotheses. These tools can include surveys and questionnaires for gathering information from participants, interviews for in-depth understanding.

**Questionnaire:**

In research, a question is a structured tool designed to collect data from respondents through a series of questions. It serves as a primary method for gathering information about participant’s attitude, opinions, behavior, or characteristics. A comprehensive questionnaire consisting of 20 carefully crafted questions was developed and distributed to the participants. This survey aimed to gather valuable insights and feedback on various topics relevant to the study.

**Results and Analysis :**

**Introduction**

Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision making.

The impact of social media on student learning and academic performance in secondary level students.

**Objective:1-** To Examine the Relationship Between Social Media Use and Students Learning Outcomes.

**Objective:2-** To Analyze the Frequency and Nature of Social Media Use Among Secondary Level Students.

**Objective:3-** To Investigate Students’ Perceptions of Social Media’s Influence on Their Learning.

**Ho:** There is no Significant Relationship Between the use of Social Media and Students Learning Outcomes or Academic performance among Secondary Level Students.

The responses of students are shown with the help of tables. By applying the simple statistical methods that are diagrams, collected data were analyzed and interpreted.

❖ **Impact of social media in learning**

Table 4.1 gives a data description of impact of social media learning with percentage.

It was hypothesized that **There is no significant relationship between the use of social media and student learning outcomes or academic performance among secondary Level I students.** Table 4.1 Show that impact of social media learning in Secondary Level Students.

Questions No 1: Do you use in social media?

**Table No 4.1**

Questions No	Yes	No	Yes%	No%
1	30	10	75%	25%

**Questions No1** The table show in the percentage of impact of learning in social media for yes and No percentage options are 75% and 25% respectively. Based on our analysis we found that 75% students use social media and 25% students don’t use social media. Over all we can say that maximum of secondary level students uses social media.

Questions No 2: Do you use social media for academic purposes?

**Table No 4.2**

Questions No	Yes	No	Yes%	No%
2	27	13	67.5%	32.5%

**Questions No 2** From above table researcher has found that 67.5% students use social media for academic performance and 32.5% students don’t use in social media academic related performance. So we can say that high level of student uses social media in a academic Performance

Questions No 3: Do you parents encourage to use social media?

**Table No 4.3**

Questions No	Yes	No	Yes%	No%
3	12	28	30%	70%

**Questions No 3** Base on our analysis researcher found that 30% of parents encourage to students to use social media and 70% of parents don't encourage to students' use of social media. Maximum Parents don't like to your child use of social media.

Questions No 4: Do you agree social media helps to collect any information about school related events?

**Table No 4.4**

Questions No	Yes	No	Yes%	No%
4	25	15	62.5%	37.5%

**Questions No 4** From above table researcher has found that 62.5% students are agree social media helps to collect any information about school related events and 37.5% students are disagreeing social media don't help to collect any information about school related events.

Questions No 5: Do you believe social media can be a distraction from studying?

**Table No 4.5**

Questions No	Yes	No	Yes%	No%
5	20	20	50%	50%

**Questions No 5** From above table research has found that 50% students believe social media can be distraction from studying and 50% students don't believe that social media can be distracted from studying. So over all we found that equal students are response to.

Questions No 6: Do you think social media should be allowed during school hours?

**Table No 4.6**

Questions No	Yes	No	Yes%	No%
6	10	30	25%	75%

**Questions No 6** From above table researcher has found that 25% students are think that Social media should be allowed during school hours and 75% students are don't think that Social media should be allowed during school hours.

Questions No 7: Do you believe that social media can helps in networking for future career opportunities?

**Table No 4.7**

Questions No	Yes	No	Yes%	No%
7	29	11	72.5%	27.5%

**Questions No 7** From above table researcher has found that 72.5% students believe that social media can help in networking for future career opportunities and 27.5% students don't believe that social media can help in networking for future career opportunities. In present day students are known to various opportunity of social media in your future career

Questions No 8: Have you ever used social media to collaborate on a group project?

**Table No 4.8**

Questions No	Yes	No	Yes%	No%
8	32	8	80%	20%

**Questions No 8** From above table researcher has found that 80% students are used social media to collaborate on a group project and 20% students are don't used in social media to collaborate on a group project

Questions No 9: Have you ever had to manage your time due to social media use?

**Table No 4.9**

Questions No	Yes	No	Yes%	No%
9	15	25	37.5%	62.5%

**Questions No 9** From above table researcher has found that 37.5% students are even had to manage your time due to social media use and 62.5% students are don't ever had to manage your time due to social media use

Questions No 10: Do you school teachers encourage you to use social media during school hours?

**Table No 4.10**

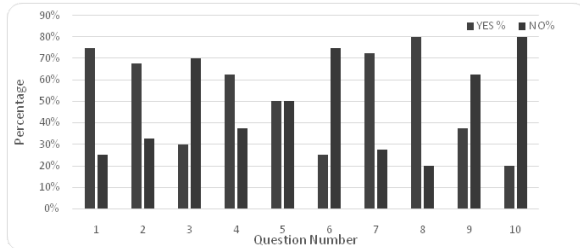
Questions No	Yes	No	Yes%	No%
10	8	32	20%	80%

**Questions No 10** From above table researcher has found that 20% student are agree school teachers encourage to use social media during school hours and 80% students are disagreeing.

Based on the analysis, social media use has both positive and negative effects on the academic performance of secondary level students. Negative impacts include distraction from studies and a decline in grades. However, social media also supports learning by facilitating group activities, project work, group communication, access to academic content, and problem-solving. The findings show that positive opinions about the effects of social media on academic performance are considerably higher than negative opinions. Therefore, the conclusion is drawn that social media use does not have a significant negative effect

on academic performance. Hence, the research hypothesis is accepted, and the null hypothesis is rejected.

Figure 4.1: The showing percentage of impact of social media in learning of secondary level students:



- Objective 4: To Evaluate the Effect of Social Media Use on Academic performance.
- Objective 5: To Identify Factors Moderating the Impact of Social Media on Academic performance.
- Objective 6: To Compare the Academic Performance of Students with High and Low Social Media Usage.
- Ho: Social Media use has no significant effect on the academic performance of secondary level students.

❖ Academic performance in social media

Table 4.2 gives a data description of Academic performance in social media with percentage.

Percentage showing the difference of academic performance in social media in secondary level students.

It was hypothesized that social media use has no significant effect on the academic performance of secondary level students. Table 4.2 show that academic performance in social media in secondary level students.

Question No 1: Do you think social media usage affects your academic performance?

Table No 4.11

Questions No	Yes	No	Yes%	No%
1	32	8	80%	20%

**Questions No 1** From above table researcher has found that 80% of student are think social media usage affects his/her academic performance and 20% students think social media usage don't affect his/her academic performance.

Questions No 2: Have you ever noticed a decline in you grades due to excessive social media use?

Table No 4.12

Questions No	Yes	No	Yes%	No%
2	20	20	50%	50%

**Questions No 2** From above table researcher has found that 50% students are noticed a decline in you grades due to excessive social media use and 50% students are don't noticed a decline in you grades due to excessive social media use.

Questions No 3: Do you use social media to follow educational or academic content?

Table No 4.13

Questions No	Yes	No	Yes%	No%
3	35	5	87.5%	12.5%

**Questions No 3** From above table researcher has found that 87.5% students are used social media to follow educational or academic content and 12.5% students are don't used social media to follow educational or academic content

Questions No 4: Have you found that social media helps you stay motivated with your studies?

Table No 4.14

Questions No	Yes	No	Yes%	No%
4	17	23	42.5%	57.5%

**Questions No 4** from above table researcher has found that 42.5% students are found that social media helps you stay motivated with your studies and 57.5% students found that social media don't helps you stay motivated with his/her studies.

Questions No 5: Do you believe that social media distracts you from completing assignments?

Table No 4.15

Questions No	Yes	No	Yes%	No%
5	27	13	67.5%	32.5%

**Questions No 5** From above table researcher has found that 67.5% students believe that social media distracts you from completing assignments and 32.5% students don't believe that Social media distracts you from completing assignment

Questions No 6: Have you ever used social media to seek help with academic problems?

**Table No 4.16**

Questions No	Yes	No	Yes%	No%
6	30	10	75%	25%

**Questions No 6** From above table researcher has found that 75% students ever used social media to seek help with academic problems and 25% students don't ever used social media to seek help with academic problems.

Questions No 7: Do you feel that social media negatively impacts your concentration during study session?

**Table No 4.17**

Questions No	Yes	No	Yes%	No%
7	22	18	55%	45%

**Questions No 7** From above table researcher has found that 55% students feel that social media negatively impacts your concentration during study session and 45% students don't feel that social media negatively impacts your concentration during study session

Questions No 8: Have you used social media to connect with study groups or academic communities?

**Table No 4.18**

Questions No	Yes	No	Yes%	No%
8	33	7	82.5%	17.5%

**Questions No 8** From an above table researcher has found that 82.5% students used social media to connect with study groups or academic communities and 17.5% students don't used social media to connect with study groups or academic communities.

Questions No 9: Do you think social media can provide valuable learning opportunities?

**Table No 4.19**

Questions No	Yes	No	Yes%	No%
9	19	21	47.5%	52.5%

**Questions No 9** From above table researcher has found that 47.5% students think that social media can provide valuable learning opportunities and 52.5% students don't think that social media can provide valuable learning opportunities.

Questions No 10: Have you ever needed to adjust your social media habits to improve your academic performance?

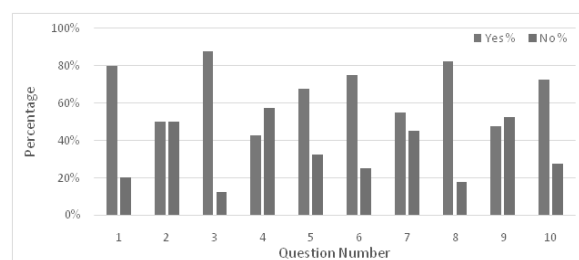
**Table No 4.20**

Questions No	Yes	No	Yes%	No%
10	29	11	72.5%	27.5%

**Questions No 10** From above table researcher has found that 72.5% students are needed to adjust your social media habits to improve your academic performance and 27.5% students don't need to adjust your social media habits to improve your academic performance.

The analysis shows that social media use affects secondary level students in both negative and positive ways. It negatively influences academic performance by distracting students and contributing to declining grades. However, it also supports learning through group activities, project work, communication, and access to academic content. Overall, positive effects were reported more frequently than negative ones. Therefore, the research hypothesis is accepted, indicating that social media use has no significant negative effect on academic performance among secondary level students, and the null hypothesis is rejected.

**Figure 4.2:** The showing percentage of Academic performance in social media secondary level students



**Finding and Conclusion :**

**Major Finding:**

Findings is the last step of research activities. After reviewing methodology and analysis of collected data the investigation finds findings of the present study. Findings are the key of a research activity. On the basis of findings, the investigation gives suggestions and also makes a suitable conclusion.

From the above study the researcher able to find out that the secondary level students' positive impact of social media in learning and academic performance

**Academic Content:** The benefits of social media scholars can connect with peers, share and collaborate on education content and many platforms provide access to academic article and webinar, and expert opinions, social media allows for interaction with various viewpoints, enriching academic discourse.

**Collect information:** The nature of social media helps secondary level students collect information in several ways. Social media platforms provide students wide range of content from various experts, organization, and institutions they can follow news outlets and

academic pages for the latest information and development in their student's interest fields.

**Future career opportunities:** Researchers found that social media provides a higher level of opportunities in future careers of secondary level students. Social media helps students for future connect with professional mentors and industry leaders, expand their professional network, and offer resources, tutorials, and webinars that help students acquire skills relevant to their desired careers.

**Academic problems solve:** Social Media extends beyond the academic related problems to solve for various education related topics, concept, skills, collect information, team work, institutions related information, curriculum, understanding problem, create interest in subject, communication problem are solved. Social media also helps solve academic problems with a diverse perspective on student needs.

**Valuable learning:** Social Media provides secondary level students a higher level of valuable learning opportunities. Students also access a wide range of educational content including articles, videos and photos, enhancing their understanding of various subjects and gaining knowledge of real-world application of their studies and current trends in their fields of Students interest.

From the above study the researcher able to find out that the secondary level students negative impacts of social media in learning and academic performance

**Distraction:** The major negative impact in social media is distraction, Excessive use of social media may reduce participation in class and collaboration learning activities, impacting overall academic involvement.

**Concentration problem:** The students use social media maximum time they have faced a big problem is concentration. Concentration exposure to a student's face-paced content can decrease the ability, interest, reducing attention to focus for longer periods in your studies or class time.

**Time management:** The immersive nature of social media can cause users to lose track of time, leading to longer usage than intended. Time management is the relation between learning and academic performance, students' time spent on social media detract from systematic work, organization and prioritizing tasks resulting in disorganized schedules.

**Decreases student's grades:** social media Use and academic performance are interring related, students due to excessive use of social media student may prioritize social media engagement over studying, causing delays in completing tasks and preparing for

exam, social media disrupts study sessions and homework leading to incomplete assignment and students become less engaged in classroom activities and discussion, which impact their understanding and retention of the material.

**Habits Formation:** social media disrupts student's daily routines, making it difficult to established consistent study or sleep habits and students may develop negative self-image and mental health.

**Poor Communication:** Effect communication between students and teachers, relying on digital interaction hinder the development of, Students face to face communication skills affecting interpersonal relationships.

#### **Suggestions:**

From the research a number of suggestions and recommendations can be raised, it should be based on the results -

- To teach students how to better manage their time so that they can devote more time to their studies and less time to social media and other electronic distraction. Students are scheduled at a specific time to check social media or set a timer to limit themselves to 20-30 minutes at a time.
- Students set clear, achievable academic goals to focus their efforts and minimize distractions.
- Encourage practices like meditation or Deep breathing to help students stay focused and manage distraction.
- Teachers create a structured environment encouraging students to set up a specific area for studying, free from social media distraction.
- Every school establishes clear rules or set guidelines that prohibit social media use during designated study periods.
- Encourage parents to have open conversations with their children about academic performance and the impact of social media.
- Parents should set specific guidelines regarding social media use, particularly during study time and homework.
- Encourage parents to attend workshops on managing technology use and supporting academic success.
- Parents regularly check in on their child's academic progress and adjust strategies as needed.

### Conclusion

In conclusion the impact of social media on society is undeniable. It has revolutionized the way we communicate, share information, and connect with others. However, it is important to recognize the potential drawbacks such as privacy concerns, misinformation, and the spread of fake news. Moving forward it is crucial for individuals to use social media responsibly and critically evaluate the information they encourage. We can harness the power of social media for positive change and meaningful connections by promoting digital literacy and online safety.

### Acknowledgements :

No financial support or personal assistance was received for the present work.

### Conflict of Interest :

Authors do not have any conflicts of interest.

### Authors' Contribution :

Both the authors have equal contribution in the present work.

### Funding :

Not Applicable“Ethics Statement: No experiment has been done on humans and animals.

### Informed Consent :

Proper consent was taken during collection of data, and the privacy rights of the subjects have been respected.

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## **Post-Colonial Construct of the Heroism of Lachit Barphukan and the Making of the Assamese Nationality Question : A Dialogic Intervention**

### **Abstract**

In the post-colonial construction of the past of the defined territorial objectivity, the terminological meaning of the past has been changed into the deductive paradigm of situating the march for a powerful formation of the nationality as well as in standardization of the basic norms of historical interpretations of the specific contents of the past has been hegemonized for the purpose of narration of the essence of the national present of the time that would eventually help in realization of the dreams of a perfect political society. The discovery of the characteristics of the struggle for freedom from the clutches of the mighty imperial power which was symbolized through the intervention of the *bangal* Mughals in the politics of the state in medieval Assam of the latter half of the seventeenth century in the idioms of great war successes of the Assamese alias the Ahom army under the leadership of the great war general Lachit Barphukan was the attempt by the modern educated Assamese intellectuals to reorganize the contents of history through the macro-realism of the colonialism for articulation of the disarticulated parts of knowledge about the historical fixity of a lost paradigm of a state into its modern algorithm of the modern state. The forms of post-colonial narration of the defined boundary of the sovereign state with its great relevance of the ideologies of the running state eventually have contributed in turning the image of the heroic manifestation of political astuteness of one of the greatest generals in world history into the making of a separate construct of power that would help in due course the idealization of the spirit of consciousness about the cultural positioning of the masses as continuous reification of the indigeneity as the source of nationalizing the everyday lives. Historical essentialities of the contributions made by the Lachit Barphukan has been tried to be analyzed with the forms of meranarrative of the dimension of the Assamese nationality.

**Keywords :** Post-colonial, nationality, deductive, ideologies, political society, macro-realism, colonialism.

*“Glory to the king ! Glory to the counselors ! Glory to the commanders! Glory to the country! One single individual leads all the forces! Even I, Ram Singha, being personally on the spot, have not been able to find any loophole and opportunity!” –Raja Ram Singha of Amber, summarizing his war -impressions in Assam(Bhuyan, 2010).*

### **Introduction**

The making and remaking of the modern Assamese identity as the outcome of its glorious historical past and transcendence of the cultural agenda of the past into the present in such a way that the great events and achievements of the history of this land has been

turned into the logic of aggravating the position of the lost horizon of the elite narrative of that past. Lachit's family lineage which had a great reputation of serving the Ahom monarchy and also, had the example of demotion of their family to the Lukhurakhan, one of the lowest rank in classification of the class system of the Ahom society. The subsequent elevation of the family to the stage of a good rank (La-Phima) (Phukan, 2012, p. iv) and bestowing the responsibility of leading the next Ahom army against the Mughal imperial force was itself a great decision at the royal level to intimidate the rising power of the Mughal force in the frontier as well as snatching the power of other officials of the feudal administration those were more conscious in aggrandizing their personal political animosities disregarding the larger concerns of the state (Barpujari, 2016, p. 205). The decision of selection for the Commander of the Ahom force and appointing him as one of the responsible officers of the Ahom state apparatus in the post of Barphukan or local governor of the Kamrup based at Guwahati was one of the last masterstrokes played by the Ahom state to stall the process of degradation of the routes of power relation which had become cumbersome to deal with in later period. So, behind the great war and extraordinary leadership of the Ahom Commander Lachit Barphukan (Gohain, 2012, pp. 123-128), there was also the attempt made by the Ahom administration to subsume the internal disorder which had already set during the last war against the Mughal empire (Baruah, 2015, pp. 266-268). On the other hand, the nationality question has been accentuated since the colonial modern phase of the Assamese society to invent the category of separate political language of the middle class led regional extraordinariness thus defining its identity as powerful one in comparison with other groups of the Indian federation (Bhuyan, 2010, p. 2). The essay will give emphasis on the evolution of the Lachit Barphukan as the most significant war hero of the history of Assam in due course of the post-colonial narration of history and how it signified the stage of development of the context of the Assamese nationality behind the evolution of the Lachit as representation of the Assamese to represent themselves against the worst political crisis.

**Post-Colonial Intervention in interpretation of the greatness of Lachit:** It was the historian Dr. Suryya Kumar Bhuyan who took up the noble challenge of orientation of the medieval Assam as the basic goal of defining the lost spirit of the Assamese masses and in his writings the heroic successes had been given a new shape to generate modern means of consciousness (Saikia, 2008, p. 86). The historical characterization of Lachit Barphukan in the post-colonial phase of Assam has been one of the most

powerful medium of reaching out to the lost world of a space which was earlier delinked from the mimesis of contradictions within the narration of national objectivity of reason (Loomba, 2005, p. 191). During the colonial phase of the Indian history, the colonial discourse of power produced in a sense 'a social reality which is at once an 'other' and entirely knowable and visible' (Bhabha, 2006, p. 101). The post-coloniality in history of the third world nations still has been at the stage of referring to the West or Europe as the sold point of emulation what the historian Dipesh Chakrabarty has written as the 'Europe works as a silent referent in historical knowledge' (Chakrabarty, 2000, p. 28). History and its functionalist approach of accomplishing a set of outlook for the rational diversification of the factual interpretations of a particular even or person are performed with two aims in view. One is to locate the paradigm of the past in a territory of power which would radiate the conscious cultural representation of the common masses through the process of linguistic abstraction of the reality from its past and other is the efforts of debunking the latent monopoly of the universality of speculation over the possibilities of an invented category of reason that would ultimately help in resuscitation of an energy long spoilt in the wave of politics over the language. It is very important to point out the fact of historical generalization of the past in order to situate the language of making abstractions with that process a continuous avenue of separating the present from its dialectical negation of the historical anomalies of the past. To define the historicity of the glory of the Saraighat and Lachit's brilliance in commandership against the mighty imperial power like the Mughals is also an act of rehabilitation of the past of the province which was hitherto has 'tenuous historical and geographical links with the rest of the country' (Dutta, 2012, p. xv).

Lachit Barphukan was not only a war hero but he was becoming an indispensable one in reconfiguration of the melancholy of the presence of a separate form of power long adduced to the forms of hegemonizing the people's patterns of living and thinking and through the reflexive conundrum that occurs between the history as the mere emblem of the past and the history as the mechanism of making abstractions in the act of search for truth which would be the holiest duty a citizen would have to play in the search for an identity of its nationality which was termed by Anderson as 'cultural artefacts of a particular kind' (Anderson, 2006, p. 4). There was never a continuous writing of the language of history in respect of the Lachit before the structural advancement of the British colonialism as one of the harbingers of a separate location of power and its imagined conspectus

had unraveled the paradigm of the colonial production of knowledge in such a way that the ruling ideology of the state had been transformed into the medium of representing the imagined praxis of the reason as symbolized by the writing of the past in the language of the philosophy of the colonized .

The Britishers first helped the Assamese intelligentsia to search for a method of modernity (as well as transformation of the whole North East into a frontier (Baruah, 2019, p. 21) that would only be able to analyze the ingredients of that point of departure particularly starting from the writings of Anandaram Dhekial Phukan when he tried to make points of medieval Assam for standardization of the modern forms of the state led by the British colonial state (Mills, 1984, p. 93) and its monopolization over the uses of systemic apparatus of reason and its language of thinking . There was a fundamental difference in writing of the significance of the medieval Assam as the condition of reifying the rights of the modernity as sought to be amplified through the colonial forms of knowledge with the histories of Holiram Dhekiyal Phukan (2008) and Kashinath Tamuli Phukan and Rashanath Borbarua (2013) or the history of Sadaramin Harkanta (2010) in the sense of interpretation of the essence of the specific medieval period in the history of Assam . The language used to explain the historical narrative of the past of Assam in the writings of those Assamese historians had not been conformed to the logistics of a modern social philosophy of development which would be nurtured and picked up only through the prism of colonial modernity where the ideological intervention in the forms of the indigenous production of knowledge would only be oriented towards the galvanization of the spirit of colonial hegemony over the cultural practices of the colonized. In order to search for the historical prerogatives of knowledge about the antecedents of Assam in its pre-colonial cultural phase then we will have to contextualize the essence of colonialism not only as the centre of deemphasizing the sovereign identity of its colonized occupants but also the point of retrieving the past as the point of departure also with principles of historicity (Chatterjee, 1997, p. 58).

**Alternative Narrative of History:** The colonial rulers always had been preoccupied with the notion of discovering an alternative narrative of the historical trajectories of the colonized society for the specific purpose of rehabilitation of the designs of rule over those people where the authenticity of ruling over the particular space could be legitimized through the provision of mode of resistance against the pre-existing power. The colonialists could write history

‘unproblematically’ (Kaviraj, 1993, p. 16). In nineteenth century political debacle the British colonialists came only to destroy the sovereign status of the Assamese and their announced goal was in great contrast to that they had come for the sole purpose of bringing peace to the country full of internal turmoil and external invasions (Barpujari, 1980, p. 13). Two specific contents had been developed because of the forms of production of knowledge in specific context of the colonial methods of segmentation of the sources of knowledge for the fundamental benefits of those who had the supreme rights to mould the discourse of power in a singular way apart from their hold over the general base of techniques of production . One was the right to define the sources of knowledge from the ideological exercises of reason as mediated through the colonial construction of interpreting the various textual heterogeneity of the past of the colonized that could be harnessed to positioning the modernity of the colonized as the mediation for higher forms of civilization by deciphering the old interpretation and textuality of history in the process of moulding the past as the signification of the Western forms of enlightenment only . The greatness about the heroic adventure of the war hero Lachit Barphukan was discovered partly in order to match up the energy or dedication against the mighty imperial enemy like the Mughals with the colonial military prowess only (Bhuyan, 2010, p. 1) and the other was discovery of a separate space for practices of regional discourse of identity and its unique cultural representations which had been thought to be neglected in the mainstream Indian discourse of culture (Gait, 2014, p. iv). The means of the ‘politics of subnationalism’ (Baruah, 2007, p. 125) was instrumental in making of the legends of Lachit a solace in the web of search for a strong political legitimacy of reaching out to the doctrines of nationalized space. Another point of fixing the identity of the great war leadership and its ultimate success was the important determinant produced by the colonial ruling apparatus which particularly emphasized on indigenous presence of the past and the means of strengthening its standpoints of uniqueness against the enthusiasts of the great practitioners of colonial knowledge system which had the aim of challenging the efficacy of colonial rule in India and there was the process of the ‘ordering of difference’ (Metcalf, 1998, p. 113) . On the one hand, we could say that he was one of the best products of Indian nationalism in its part of Assam .

**Middle class led Nationalism and the Transformation of the Lachit into Doctrinal sign of Patriotism:** The contributions of the mighty war head and one of the ablest military general ever produced in India had been resonated with the imagination of the specific question of nationality of the Assamese

people that was interpreted in the discursive practices of the middle class led nationalism not truly against the hegemony of the colonialist idioms of power but only in the interests of locating the culture of its indigeneity for unequivocal rapport with the representatives of the colonial state . The forms of the development of Assamese nationalism since the 1920s has exemplified the notion of existential crisis before the unwanted foreign nationals like the infiltration from the erstwhile East Bengal which mobilized in a great way 'distinctiveness' of the Assamese (Mahanta,2013,p.7) for which the invention of historical culture had been invented in a deep way. But in radical phase of the Indian national movement his sacrifices and contributions were changed into one of the indomitable spirit of the saga of the force of nationalists at the periphery of the country. was changed. In the historical presentation of the heroism of Lachit Barphukan , it was also taken into account the contemporary tale of the heroic defense of Chatrapati Shivaji (1630-1680) because of the later's involvement in starting a great form of war strategies in terms of his efforts in making out a sovereign space organized with the Marathi political essentialities against the imperial ambitions of the Mughals since the Mughal emperor Shah Jahan (1592-1666) (Gokhale,2022,p.xii). Although his gigantic military raids into the Mughal territory was huge successful in giving a great shock to the Mughal authority but it was not a permanent annexation to the rising Marathi expansionist state and on the contrary , the Maratha hero were bent upon securing some strategically located forts for the exclusive purpose of securing its rights against the Mughals and the powers of Bijapur and Golconda in South . His greatest contribution lied in enervating the zeal and passion of the segregated tribes and communities of the Maratha lineage to his suzerainty as the head of the Maratha rashtra and it did not mean that his own identity had been secured automatically because during his coronation he was accepted in his kingship only through the consent of a Brahmin named Gaga Bhatta who was said to have bribed by Shivaji to represent him as the kshatriya from Benares (Gordon,2012,p.87) .

What made the achievements of Shivaji historically more contiguous and divine had been the rise of the anti-colonial movement as well as in searching for a separate Marathi nationality to represent the middle class interests with a sufficient accord with the knowledge system of the colonialists . In a conscious move of intellectual retrospections , the groundwork of the intelligentsia had been prepared with a search for historical connection with the mighty powers like the Mughals in a spirit of defending the honour of the king of Assam thereby defending the future of the

Assamese nationality too (Gohainbaruah,2008,p.209) . The questions of defining the autonomous position of the Ahom king and the refusal or defying the conditions of the Ghiladhari Ghat (1663, 10 January) through a challenge to the great Mughals was a concerted outcome of the spirit of the Assamese and the outstanding role played by the Ahom bureaucracy despite its setbacks during the time of Mirjumla's invasion in 1662 (Baruah,2015,pp.268-269). In this context, Atan Buragohain had proved himself as the brilliant strategist in choosing the right person for the post of the General to lead the Ahom army during the point of extreme crisis of the Ahom state (Bhuyan,1957,p.1) . The reiteration of the demand over the lower Assam by the Mughal power was forthcoming with the arrival of the Rajput king Ram Singha (Raja of Amber and head of the Kachhwaha Rajput) a son of the great Rajput king Jai Singh who was playing a leading role during Aurangzeb's rule (Chandra, 2005,p.465) . The methods of war preparation and the combined spirit of the Ahom king with the top rung of the bureaucracy made the political background of defending the autonomy of the Assamese people which was represented by the Ahom kingship in the person of Swargadeo Chakradvaj Singha (1663-1670) and Swargadeo Udayaditya Singha (1669-1673). Lachit was fortunate enough of leading the Ahom force with the comradeship of top quality of officers like Champa Paniphukan, Laluki Namdayangia Phukan, Pelon Charingia Phukan , Deka Phukan , Gohain Phukan , Sadiyalhowa Rup Handiqui, Miri Handiqui (Bhuyan, 2007,p.55). The defeat of the Mughal force at Saraighat in 1671 amply proved the supremacy of the Ahom military skills as well as the skills deployed by the Ahom power in enthusing the subject people with the essence of removing the strains of losing the sovereign status of the Ahom state in the previous invasion of Assam led by the great Mughal general Mir Jumla . The brilliant strategy of leading the army with proper diplomacy and military prowess at the worst national crisis of Assam turned the battle of Saraighat one of the rallying points of the appeal for the regeneration of the Assamese for furthering the forms of resistance against the internal or external threats to the state system as a whole.

**Lachit and his Objectives of Fighting :** Lachit was making war against the Mughals with some major objectives and the first one was the contribution towards a development of an alternative discourse of power even beyond the supreme order of the head of the state and its institutions (Ibid,p.49) and another was the temperament of a crisis ridden nationality against the fear of complete decline of the forms and practices of the cultural polity of the definite political formation of the territorial integrity of the state of Assam. Through

, the brilliant generalship of the Lachit Borphukan and the eventual defeat of the Mughals, it was proved the mentality of the Ahom kingdom against the any foreign intervention in the activities of the state as well as well in generating a separate political will of going to the extreme end of resurrecting the dormant spirit of the people against the any untoward incident against the violation of the sovereign authority of the Ahom king (Dutta,2024,pp.6-7) .It did not mean that the joyous jubilation due to the victory at Saraighat ultimately helped in securing the discipline of the whole section of the feudal bureaucracy against the reigning monarch because we observe a different scenario in respect of the political turmoil which ensued after the killing of the Ahom king Udayaditya Singha by the lower official Debera Hazarika due to his proclivity towards the Paramanada Sanyasi (Barbauah,2013,p238) . These two political factors of development where the role of the state had been threatened by the external political incursion in the shape of loss of sovereignty of the Ahom state in 1663 and other was the grave internal crises due to the lack of proper political acumen among the Ahom princes since 1673 -1680 to tackle the problems faced by the climate of the political status of the realm as a whole. Both these crises were considered to be signifiers of the opportunity of rejuvenating the spirit of the Assamese at the worst moment of its deliverance and it was turned into a new hopeful adventure because if the leadership of the particular functioning paradigm of the state could steadfastly adduced to the principle of providing due environment in terms of legitimacy to the works of the officials with good intentions there the dedicated involvement of the works of the representatives of the state could make way for a strong enthusiasm among the common masses towards the final objectives of development led by a truly conscious production and reproduction of the forms of power of the state . And the other was that the weak mentality and lack of personal integrity in handling the affairs of a particular state could help in development of a political chaos and anarchy of political rudeness which would in turn help in creation of the unfaithful traitors to the cause of the balanced functioning of the state system .

**The Historicization of the Lachit as the Extreme End of Rejuvenation of the Latent Spirit of the People:** The distinct accentuation of political mobilization of the people during the colonial period and the post-colonial incarnation of the victorious journey of the great hero Lachit Barphukan as the savior from any external extremities or incursion which could derail the whole process of formation of the Assamese nationality .The great heroism as well as the stories of the extreme forms of sacrifices and the

master strategist of defining the exact spatial historicity of the personality of the Lachit Barphukan in post-colonial cum post-modern ideological statecraft has been initiated in order to bring a sense of categorical imperative of consciousness about the lost paradigm of nation building which could be posited as the great externalities of nationalism for situating the nation and its figment of imagination in its continuous process of idealization of the spirit of hallucination towards the forms of historical abstraction of knowledge about the contents of the lost horizon . So, in a sense we could say that the efforts made by the post-colonial political establishment in reconstituting the vision of historical anonymity of the personality of the Lachit with the methods of signifying the instance of propounding the supreme responsibility of the ideological apparatus of the state as well as the forms of warranting a great exercise of derivative discourse of social consciousness which would be catered to the essence of negating the spirit of dissensions for the dialectics of giving permanence to the logic of national hyper-reality of reason for all of its stake holders within a definite territory a tool of negotiating the irrelevance of the present . The nationalistic emphasis on the role of the Lachit Barphukan was also an act of ‘commemoration of the past’ as well as the ‘location of an Assamese past in a larger domain of literature; which helped in creating a ‘public awareness of the Assamese past that was liked with the present’ (Purakayastha,2021,p.182).

#### **Conclusion**

The context of the present in any national boundary of reason has to be positioned against the metanarrative of social dialectics of nature and the socialization of the spirit of the Lachit and his unified concentration in making out a truly respectable position for the practitioners of the ideas of the state and its organic camouflages in the shape of varied institutional heterogeneity could help in totalization of the spirit of history as the future of its citizens that turns the logical narration of the time as the most successful normalcy in individualizing the features of the state and its functioning rationality.

#### **Acknowledgement :**

This is an independent work and it owes nothing to any person or organisation.

#### **Conflict of Interest :**

Since this is a single authored research work, the question of conflict of interest does not arise.

#### **Author’s Contribution :**

This article is solely produced by Dr. Bikash Nath.

#### **Funding :**

Not any kind of financial or other perks have been received for this research work.

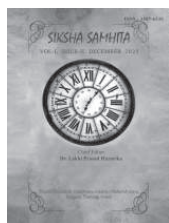
**Ethics Statement :**

This research article does not violate any ethical values related to human beings or animals.

**Informed Consent: N/A**

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## Market Survey on Wild Edible Vegetable Plant Species of Darrang District, Assam

### Abstract

The present study focuses on a market survey aimed at the documentation and identification of wild edible vegetable plant species utilized by local communities of Darrang District, Assam. A total of 34 wild edible vegetable species belonging to 21 families were recorded. Among these, 28 species belonged to dicotyledons, 7 to monocotyledons, and 1 to pteridophytes. Herbaceous plants constituted the dominant growth form (22 species), followed by climbers (5), trees (4), and shrubs (3). Leaves were the most frequently consumed plant parts (46%), followed by shoots (17%), stems (11%), flowers (11%), tubers (9%), petioles (4%), and seeds (2%). The most represented families were Araceae and Amaranthaceae (4 species each), followed by Apiaceae and Malvaceae (3 species each), and Fabaceae, Musaceae, and Brassicaceae (2 species each). In terms of culinary use, the highest number of species was utilized in the preparation of fish curry, followed by boiling, frying, and preparation as chutney or paste. The study highlights the nutritional, cultural, and economic importance of wild edible vegetables in local markets and emphasizes the need for their documentation and sustainable utilization.

Keywords : Ethnobotany, Wild vegetable, Darrang District

### Introduction

Wild edible plants occur in forests, protected areas, rural settlements, marshes, and grasslands, and can be used as food when collected, prepared, and preserved properly. According to Kallas (1996), “edible wild plants are wild plants endowed with one or more parts that can be used for food if gathered at the appropriate stage of growth and properly prepared. Throughout the Himalayan region, the edible wild plants are highly prized and provide indigenous tribes with a significant supply of unconventional food. The primary needs of human civilization—food, medicine, clothing, and shelter—are provided by a variety of plants. In addition to being a component of natural vegetation, wild edible plants also preserve the ecological balance of the natural world. All of the familiar fruits and vegetables of today were formerly wild plants that our ancestors cultivated and enhanced for their nutritious qualities. The earth is home to over 3,52,000 blooming plants (Paton et al., 2008). There are over 20,000 edible plants in the globe, in addition to a large number that are still unknown (Fern, 2007). 90% of the food we eat

every day comes from about 20% of edible species. Approximately 7000 species have been harvested or grown for food (Khoshbakht and Hammer, 2008). Thirty of the more than 150 species that are currently grown for commercial purposes provide 95% of the food and energy consumed by humans. The Brahmaputra and Barak valleys flank the Himalayan peaks that encircle India’s northeastern states. Because of its diverse geography, the area has a vast variety of habitats and ecosystems. North East India spans more than 2,62,379 square kilometers and is located between latitudes 220–300 N and longitudes 890–970 E. Takhtajan (1969) referred to this area as the “Cradle of Flowering Plants,” and it is home to around 8,500 species, or nearly half of India’s 17500 blooming species (Mao et al. 2009). According to Vavilov (1926), 152 cultivated plants originated in the northeastern region of India. The Northeast Region includes 163,799 square kilometers of forest, or almost 25% of the nation’s total forest cover, according to an estimate based on satellite pictures (Anonymous, 2000). Kumar (2003) recorded 278 leafy vegetables from North East

India, while Samant et al. (2001) reported around 675 wild edible plants from Himalayan regions. Approximately 15% of India's edible wild plant resources are comprised of 190 wild edible plant species that have been screened from the Sikkim Himalaya (Sundriyal & Sundriyal, 2004 a,b). The Northeast is one of the world's 34 hotspots, Takhtajan (1969). Hotspot regions contain a high level of endemism and are incredibly rich in species. Therefore, the diversity of food resources in this area has been greatly influenced by the subcontinent's great ethnic diversity and the long history of agriculture.

The center region of northeastern India is home to the Darrang district. The Brahmaputra River defines the district's southern boundary, and the area is primarily an alluvial plain with a gently sloping surface. The region is distinguished by swampy and flood-prone sections, as well as high and flat ground (dcmsme.gov.in). The Darrang district's flora is abundant and full of important wild species. Because of its biodiversity, human culture, and traditions, it is seen to be a promising place to investigate wild food plants. Certain wild food plants have higher nutritional contents than their produced equivalents. The number of species components is gradually decreasing as a result of extensive destruction of natural environment. Therefore, using wild edible plants sustainably is crucial for everyone today, especially in developing nations. Although it is well known that a wide variety of wild foods are regularly collected and eaten, their significance in the diet is typically thought to be minimal. An effective way to comprehend local, regional, and global flora is to systematically study wild edible plant species and other aspects of their use in the specific area or district. Generally speaking, the most important source of germplasm for creating new hybrid varieties is wild plants. Hence, traditional agro forestry systems may adapt the cultivation of wild edible species, which may lessen the strain on the natural forest and increase the supply of food for the impoverished who rely on wild species. The study has been conducted with this viewpoint.

### Review of Literature

A list of 33 green vegetables utilized by tribal people in and around Ranchi, Jharkhand, was created by Kumari and Kumar (2001). The local market frequently sells *Alternanthera sessilis* L., *Alternanthera philoxeroides* (Mar.) Griseb., *Amaranthus spinosus* L., *Achyranthus aspera* L., and *Celosia argentea* L. The first description of Jharkhand's indigenous people's edible weeds was provided by Sinha and Lakra (2007). According to Yesodharan and Sujana (2007), thirty angiosperm species are utilized as leafy vegetables, thirtyone for

fruits, sixteen for seeds, ten for food in the form of rhizomes, tubers, or corms, and six for food from the stem or shoot. Six tribal communities (Malappandaram, Urali, Malaarayan, Ulladan, Malavedan, and Malakurava) in the Parambikulam Wildlife Sanctuary in the Palakkad district of Kerala use *Amaranthus spinosus* L., *Centella asiatica* (L.) Urban, *Euphorbia hirta* L., *Oxalis corniculata* L., and *Mollugo pentaphylla* L. more extensively. Mango and jackfruit are the most often consumed wild fruits. *Ensete superbum* (Roxb.) Cheesm. and *Vigna vexillata* (A. Rich.) L. are used to reduce appetite. According to Kar and Borthakur (2008), the Karbi tribe in the district of Assam uses 57 different varieties of wild plants as vegetables. Four fruits, three rhizomes, three tubers, one corm, nine flower vegetables, one stem pith, one stem vegetable, twenty-one green vegetables, and sixteen shoot vegetables are among the fifty-seven plant species. Sharma & Mishra (2009) documented the variety, patterns of use, and native applications of 86 plant species as wild edibles or food. According to Bandyopadhyay and Mukherjee (2009), the ethnic people of Koch Bihar district in West Bengal state use 125 plant species from 102 genera and 54 families as wild foods on various occasions. Prabha et al. (2010) reported 42 plant species from 23 families that are consumed by the tribal people of the Melghat region, including Malappandaram, Urali, Malaarayan, Ulladan, Malavedan, and Malakurava. They noticed that only the elderly are aware of and utilize the wild vegetables. *Celosia argentea* L.'s pigmented leaves were favored above their green counterparts. Raw *Chlorophytum tuberosum* (Roxb.) Baker tubers are thought to be highly nutritious. These days, indigenous people gather them to sell to traders rather than using them themselves. According to Chowdhury and Mukherjee (2012), the various local and tribal peoples in the isolated regions of the Maldah district use 84 Angiosperm and 2 Pteridophyte species as green vegetables and wild fruits. Additionally, Gam and Gam (2012) found that the Mising (Miri) tribe of Assam employed some wild plant species in their traditional foods. According to Banik (2012), tribal people in the Bastar region of Chhattisgarh use 107 edible wild plants. There are 25 plants for roots and tubers, 33 for leaves, 3 for nuts, and 7 for stems, 9 for flowers. According to Vaishali and Jadhav (2013), nine uncultivated green leafy vegetables are utilized medicinally by rural residents in different parts of Maharashtra's Kolhapur District. According to Esther et al. (2013), the Zou tribe in Manipur uses 84 wild edible plants from 36 families. Of these 84 species, 70 are utilized as food and vegetables, 13 as condiments and spices, and 1 as famine food (*Dioscorea sativa*). Dipankar et al. (2013) identified 41 species of 36 genera and 22 families of wild edible plants among three ethnic

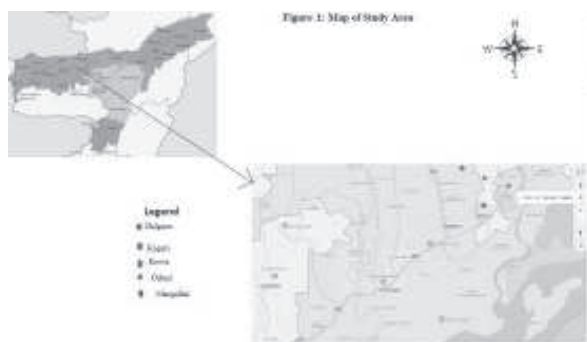
groups: the Tripuri, Molsom, and Rupini of Tripura. Eight distinct traditional recipes were found, the majority of which were made from 41 edible wild plants. Gudak and Chakhwi were discovered to be the traditional recipes that the tribes favored as diet complements. These ethnic tribes have historically employed these edible wild plants as major dietary supplements and medicines. According to Chauhan et al. (2014), the tribal and local people of Chhattisgarh consume 51 green vegetables and seven types of wild plants that produce fruits, roots, tubers, or bulbs. According to Singh and Kumar (2014), the Munda tribe of District Khunti has historically used 17 wild edible aquatic and marshy plants in various forms. According to Misra and Misra (2014), the tribal and rural residents of South Odisha typically eat 106 wild green vegetables based on their availability, however some are occasionally eaten. *Boerhavia diffusa*, a leafy vegetable, is taken internally to treat cough and asthma; *Commelina benghalensis*, when consumed, helps relieve constipation and rheumatic pain; *Tamarindus indicus*, a leafy vegetable, is used; children are given the leaf decoction as an antihelminthic. In the Dima Hasao district of Assam, India, Medhi et al. (2014) studied edible wild plants. Out of the 168 plant and fungal species they identified, 55 were used as leafy vegetables and fruits, 61 species' seeds were used either fresh or cooked, 19 species' tubers were boiled, 18 species were used as spices and condiments, 10 species were wild edible mushrooms, and 5 species were used as masticators and fumigators. The 168 species are divided into 74 families and 122 genera. Singh and Kumar (2014) listed fifty wild leafy vegetables from nine districts in Jharkhand that are used by the local tribal and other groups. These vegetables come from 31 families, 38 genera, and 50 species. According to Pradhan and Tamang (2015), Nepali, Bhutia, and Lepcha ethnic communities in Sikkim use 26 different varieties of wild leafy vegetables. Using semi-structured interviews and preference rating techniques,.. Furthermore, According to Saikia (2015), 51 wild vegetable plants from Assam's Dhemaji District have therapeutic applications. In the vicinity of a cement mill in the Himachal Pradesh district of Bilaspur, Nath (2015) investigated the edible wild plants utilized by different Western Assamese groups. Every feature of wild vegetables was noted, including its botanical name, local name, family, preparation method, and therapeutic qualities. The paper's goal was to list the wild plant species that different groups in Assam's western regions use as veggies. It was discovered that 72 wild plant species from 62 genera and 44 families were utilized as vegetables. The Amaranthaceae family had the greatest number of species that were eaten as vegetables. The wild leafy vegetables that the ethnic people of Manipur eat are surveyed by Konsam et al.

(2016). Indigenous cultures employ 68 wild edible vegetables from 42 families for both nutritional and medicinal purposes. Of these species, 54 are annual (19%) and 79% are perennial. The largest percentage of edible plants are herbaceous plants. The majority of edible parts are ingested through cooked cuisine, with leaves being the most common, followed by shoots and stems. Additionally, 11 species (16%) are uncommon and 57 species (84%) are widely accessible. Wild edible plant species in the Udampur area of J&K were recorded by Bhatia et al. (2018). Ninety plant species from 78 genera and 45 families were edible and used as wild phytofoods. Vegetables (46 species), fruits (37 species), and medicinal plants (36 species) have the highest species richness of wild edible species. *Diplazium esculentum*, *Fumaria indica*, *Taraxacum campyloides*, *Urtica dioica*, *Phyllanthus emblica*, *Punica granatum*, *Cordia dichotoma*, *Syzygium cumini*, *Ficus palmata*, and others were the most significant fruit and vegetable species in terms of culture (based on CI). Vegetables had the highest use-report (626), while fruits had the highest mean use-report (14.8). Each informant used an average of 20.7 wild edible species. For both raw and preserved veggies, the informant consensus index (Fic) ranged from 0.83 to 0.94. Kumar (2019) examined 103 species of wild edible plants. The majority of these species were consumed by the locals as fruit (40.77%), followed by leaves (17.47%), flowers (6.79%), seeds (5.82%), shoots (5.82%), roots (2.91%), gum (1.94%), and bulbs (0.97%). Plants were consumed as uncooked, cooked pot-herbs (such as "saag" or "bhujji"), vegetables, pickles, drinks (such as "chatni," "pakoda," and "rayata"), flavorings, additives, and special dishes (such as "bharuni" and "panjeeri"). Noor and Satapathy (2022) reported that *Achyranthes aspera* L., *Aerva lanata* (L.) Juss. Ex Schult., *Cleome viscosa* L., *Commelina benghalensis* L., *Dicliptera bupleuroides* Nees., *Euphorbia hirta* L., *Leucas cephalotes* (Roth) Spreng., *Portulaca oleracea* L. and *Rungia pectinata* (L.) Nees. are largely consumed as leafy vegetables by the tribal in Balasore district of Odisha. In the Loding district of Arunachal Pradesh, wild edible vegetables are sold in local marketplaces, according to Gogoi et al. (2023). The marketplaces in the Longding district were found to sell 43 different species of edible wild plants. *Piper betle* L., *Musa acuminata* Colla, *Colocasia esculenta* (L.) Schott, *Zanthoxylum oxyphyllum* Edgew., and *Dendrocalamus hamiltonii* Nees & Arn. ex Munro had higher market demand than other wild edible plants throughout the year, according to the Importance Value Index. Summertime saw the highest number of wild edible plants available in the market (38 species), followed by spring (33 species), autumn (29 species), and winter (22 species).

## Materials and Methods:

### Study area:

The study site is situated in the Darrang district of Assam, India, namely at Dalgaon, Kopati, Mangaldai, Rowta, and Oubari. The district consists of seven civil blocks, six revenue circles, and one subdivision, Mangaldoi. According to the 2011 census, there are 928500 people living in the district, with an average population density of 586 people per square kilometer. The district is home to 17 Moza, 6 Anchilik Panchayats, 1 Zila Parishad, 1 Municipal Board, and 1 Town Committee ([www.cgwb.gov.in](http://www.cgwb.gov.in)). The typical temperature is between 10° and 30°C. Over 1791 mm of rain fell on average in the region each year. The district is situated between latitudes 20°09' N and 26°95' N and longitudes 91°45' E and 92°22' E. It is bordered to the north by Arunachal Pradesh and to the south by the Himalayan ranges of Bhutan. The district measures 1,85,058 hectares in size ([www.darrang.gov.in](http://www.darrang.gov.in)). The range of altitude is 43 to 4,451 meters. People of various ethnic identities make up the socio-cultural diversity of the Darrang district. With its unique socio-cultural identity, the district can be considered a living anthropological museum. Its population is made up of Indo-Aryans, including Muslims and Hindus, as well as Indo-Mongoloid groups. Later, Aryo-Dravidian migrants from East Bengal and Aryo-Mongolian migrants from Nepal were added. The Indo-Mongoloids have greatly enhanced the Assamese language and culture. The predominant tribe in this area is the Bodo-Kacharis. The majority of them practiced Christianity and Hinduism in addition to the Bathou religion ([www.bkwac.in](http://www.bkwac.in))



### Collection and identification:

For this study, five daily and weekly markets in the Darrang district of Assam—Dalgaon, Kopati, Mangaldai, Rowta, and Oubari—were chosen (**Figure 1**). Standard questionnaires, such as market surveys, conversations with local vendors, and interviews, were used to gather primary data. Information was verified by repeated inquiries during various seasons. Secondary data was gathered from publications in journals. Authentic herbarium specimens, taxonomic literature, and taxonomic botanists were used to identify the collected species. All of the plants gathered during the

market survey were used to create herbarium specimens. The Jain & Rao (1977) standard methodology was used to prepare the herbarium.

## Results

An extensive field survey was conducted in the selected markets (daily and weekly) and a total of 34 wild edible vegetable species belonging to 21 families have been documented (**Table 1**)

Table 1: List of wild edible vegetable plant species found in the local markets of Darrang district, Assam

Botanical Name	Family	Local Name	Parts use	Method of consumption
<i>Alocasia indica</i> (Lour.) Spach.	Araceae	Nal kochu	Corm	A dish is prepared by corm with fish.
<i>Ipomoea aquatica</i> Forsk	Convolvulaceae	Komli xaak	Leaf, stem	Leaves and undershoot are boiled or fried
<i>Basella alba</i> L.	Basellaceae	Pui xaak	Stem, leaf	Young stems and leaves are boiled or fried
<i>Diplazium esculentum</i> Retz.	Athyriaceae	Dheki xaak	Leaf, shoot	Tender leaves and shoot are fried or boiled
<i>Amaranthus tricolor</i> L.	Amaranthaceae	Danga	Leaf, shoot	A dish is prepared by mixing shoot with fish and are consumed
<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Darmuja alu	Tuber	A dish is prepared from tuber with fish
<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Domkolosh	Leaf	Tender leaves are fried
<i>Lasia spinosa</i> Lour.	Araceae	Sengmora xaak	Leaf, shoot	A dish is prepared by tender leaves with fish
<i>Portulaca oleracea</i> L.	Portulacaceae	Nunia xaak	Leaf, shoot	Leaves with shoot are fried or boiled
<i>Xanthosoma sagittifolium</i> (L.) Schott	Araceae	Dudkochu	Leaf, petiole, tuber	A dish is prepared by mixing petiole and tuber with fish
<i>Lathyrus sativus</i> L.	Fabaceae	Khesari xaak	Shoot, leaf	Consumed either fried or boiled
<i>Paederia foetida</i> L.	Rubiaceae	Bedai lota	Leaf	Condiment is prepared from leaves
<i>Polygonum microcephalum</i> D. Don	Polygonaceae	Modhuphol xaak	Leaf	A dish is prepared by mixing leaves with fish.
<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	Thothoni xaak	Leaf, shoot	A dish is prepared from leaves
<i>Murraya koenigii</i> L.	Rutaceae	Norosing	Leaf	Leaves are used in dish, condiment and fritter
<i>Solanum violaceum</i> Ortega.	Solanaceae	Tita bhekuri	Seed	Seeds are used as a vegetable
<i>Alocasia macrorrhizos</i> (L.) G. Don.	Araceae	Bor kochu	Tuber	A dish is prepared by corm with fish or meat
<i>Eryngium foetidum</i> L.	Apiaceae	Mandhanian	Leaf	Leaves are used in various dish for its flavour
<i>Musa paradisiaca</i> L.	Musaceae	Koldil	Inflorescence	A dish is prepared by mixing inflorescence with fish
<i>Alternanthera sessilis</i> L. R. Br. ex DC.	Amaranthaceae	Maatikad-uri	Leaf, shoot	Leaves are fried or boiled

Oxalis corniculata L.	Oxalidaceae	Chingu tenga	Leaf, shoot	A dish is prepared by mixing leaves with fish or other vegetables
Amaranthus blitum L.	Amaranthaceae	Burburi xaak	Leaf, shoot	Leaves and shoot are boiled or fried and are consumed
Musa sapientum L.	Musaceae	Kol thor	Inflorescence	A dish is prepared by mixing flower with fish
Manihot esculenta Crantz.	Euphorbiaceae	Simla alu	Tuber	Tubers are boiled and are consumed
Hibiscus sabdariffa L.	Malvaceae	Tita mesta	Leaf, flower	Leaves are boiled or fried and are consumed; Condiment is prepared from flowers.
Carica papaya L.	Caricaceae	Omita phool	Flower	Flowers are fried and are consumed
Chenopodium album L.	Amaranthaceae	Bathua xaak	Leaf, shoot	A dish is prepared by leaves with fish and are consumed
Malva verticillata L.	Malvaceae	Lafa xaak	Leaf	Leaves are fried or boiled and are consumed
Corchorus capsularis L.	Malvaceae	Pat xaak	Leaf	Leaves are fried and are consumed
Centella asiatica (L.) Urban	Apiaceae	Bor manimuni	Leaf, stem	Leaves are eaten raw. A condiment is prepared by leaves with chilli and are consumed
Sinapis arvensis L.	Brassicaceae	Horu xaak	Flower, leaf, stem	A dish is prepared by mixing leaves with fish and are consumed. Leaves are also consumed after fried or boiled. Fritter are prepared by mixing flowers with gram flour.
Raphanus raphanistrum L.	Brassicaceae	Mula phool	Flower	Flowers are fried or boiled and are consumed. Fritter is prepared by mixing flowers with gram flour.
Pisum sativum L.	Fabaceae	Motor xaak	Stem, leaf, seed	Leaves are fried or boiled and are consumed
Hydrocotyle sibthorpioides Lam.	Apiaceae	Khud manik	Leaf, stem	Leaves are eaten raw. Chatni is prepared by mixing leaves with chilli and are consumed.



Figure 2 (i): 'A'- Portulaca oleracea L.'B'- Corchorus capsularis L.'C'- Chenopodium album L.'D'- Malva verticillata L.'E'- Centella asiatica L.'F'- Lasia spinosa Lour.'G'- Leucas aspera L.'H'- Amaranthus blitum L.

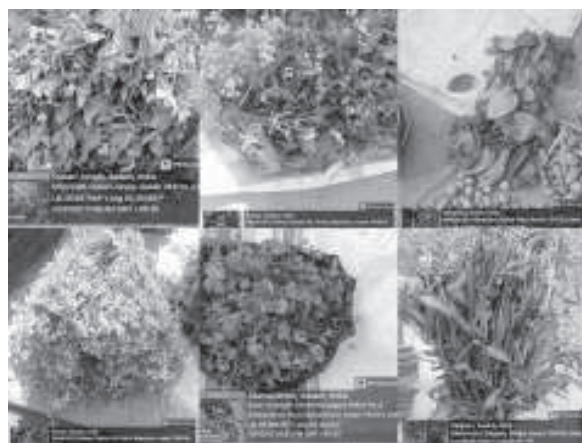


Figure 2 (ii): 'I'- Pisum sativum L.'J'- Sinapis arvensis L.'K'- Paderia foetida L.'L'- Raphanus raphanistrum L.'M'- Hydrocotyle sibthorpioides Lam.'N'- Lathyrus sativus L.

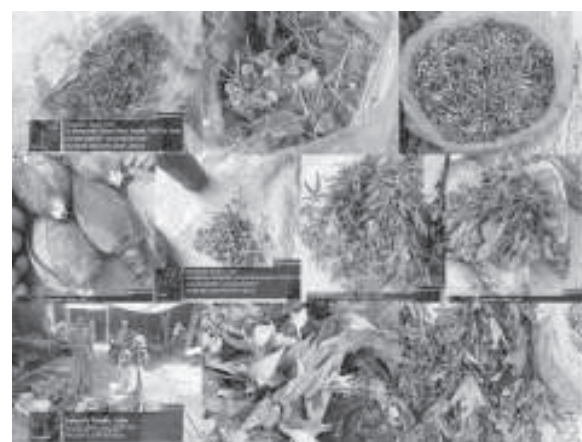


Figure 2 (iii): 'O'- Oxalis corniculata L.'P'- Stellaria media (L.) Vill.'Q'- Carica papaya L.'R'- Musa paradisiaca L.'S'- Solanum violaceum Ortega.'T'- Hibiscus sabdariffa L.'U'- Alternanthera sessilis L. R. Br. ex DC.'V'- Polygonum microcephalum D. Don.'W'- Hibiscus



Figure 3: Number of species based on habit

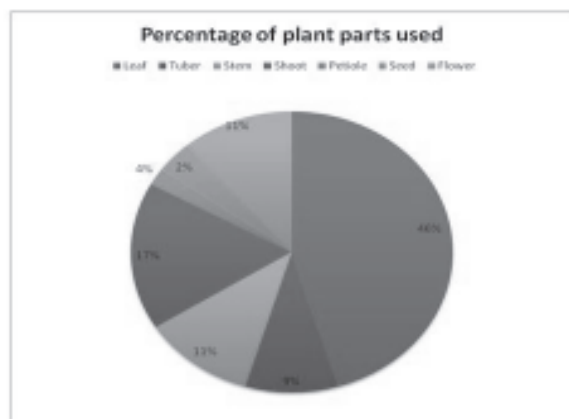


Figure 4: Percentage of plant parts used

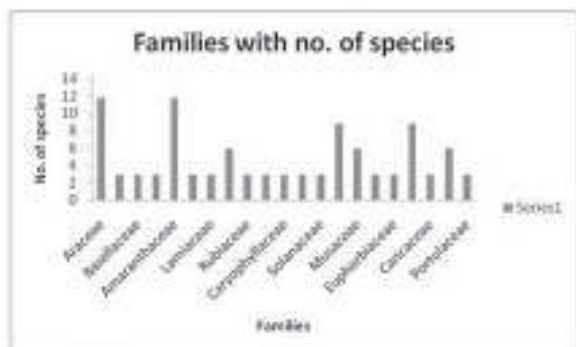


Figure 5: Families with number of species.

### Discussion

The primary needs of human civilization—food, medicine, clothing, and shelter—are provided by a variety of plants. In addition to being a component of natural vegetation, wild edible plants also preserve the ecological balance of the natural world. In order to close the gap left by the future scarcity of farmed crops, research on edible wild species is crucial. Numerous researchers have expressed interest in it because of its importance to market economics, health, and medicine. Singh & Arora (1978), Arora & Pandey (1996), Chandra (1997), Bora & Kumar (2003), Kumar (2003), and Patiri & Borah (2007) are a few examples of similar works. Wild edible plants can be used for a variety of purposes and are still capable of addressing some aspects of food scarcity. With its semi-evergreen forest,

small border hills, arable area, and tea gardens, the Darrang district is rich in biodiversity.

### Utilization pattern

Locals have started using wild edible plants more and more because of their easy accessibility, potential for homestead cultivation, and the reduced harmful effects of pesticides. Numerous surveys around the world have documented the nutritional content and health advantages of wild plants, despite their enormous agricultural production, market value, and eating customs (Ladio and Lozada, 2004; Pardo-De-Santayana et al., 2005; Lentini and Venza, 2007 and Debela et al., 2004). Wild edible plants are a valuable source of vitamins, minerals, and biologically significant compounds for nutritional supplements. According to Pardo-De-Santayana et al. (2007), the enjoyment of harvesting wild resources, reenacting customs, and savoring distinctive flavors currently influence the consumption of wild plants more than calorie intake. Researchers have mostly studied the medicinal and ethnomedical qualities of wild food plants from one or more tribes. The quality, palatability, commercial status, and sustainability of wild edible plants are all better understood thanks to these comparison research. The Darrang district is home to a variety of cultures and customs with a rich biodiversity. The main prominent communities associated with the utilization of wild vegetable species with a few additional broad groups are the Bodo-Kacharis. The current study lists the 34 species and finds that the various local communities use them in a variety of ways. Fish curry preparation is the category with the greatest number of species used, followed by boiling, frying, and chutney or paste.

### Conclusion

The Himalayan region and the rest of the world place a high importance on edible wild plants, which provide indigenous tribes with a significant source of unconventional food. In addition to being a component of natural vegetation, wild edible plants support the ecological equilibrium of the natural world. Generally speaking, the most important source of germplasm for creating new hybrid varieties is wild plants. For the majority of India's biological resources, Assam and the other states in the northeastern region are referred to as the Floristic "Gate Way." With the Brahmaputra Valley, the Barak Valley, the Karbi Anglong Hill Range, and the North Cachar Hills, Assam has the most distinctive physiographic layout in the nation. In the present study 34 wild edible vegetable plant species from 21 families were found in the Darrang district's edible species survey. There were 28 species of dicotyledons, 7 species of monocotyledons, and 1 species of pteridophytes identified. Herbaceous species

make up the majority of the investigated species (22), followed by climbers (5), trees (4), and shrubs (3). The highest percentage of plant parts ingested is the leaf (46%), which is followed by the stalk (17%), stem (11%), flower (11%), tuber (9%), petiole (4%), and seed (2%). The most prevalent family found is Araceae (4 species) (Figure 5), followed by Amaranthaceae (4 species), Apiaceae (3 species), Malvaceae (3 species), Fabaceae (2 species), Musaceae (2 species), and Brassicaceae (2 species).

#### Acknowledgements :

Authors are thankful for contributors of all the research papers and information cited in the paper and to all the informants who shared their knowledge with us. The authors are thankful to the college PDUAM, Dalgaoon for encouragement of the research work.

#### Conflict of Interest :

Authors declare that they have no conflict of interest.

#### Authors' contribution :

MKS conceptualized and designed the study. AF collected field data. Both the authors shared the data analysis responsibility. MKS drafted the manuscript and took part in approving the final manuscript.

#### Funding :

The research article has not been funded.

#### Ethics Statement :

The research work does not involve any kind of experiment on humans and animals.

#### Informed Consent :

The data collection and questionnaires were collected with the consent from the informer.

#### Data availability :

The manuscript involved all the dataset and no such supplementary files have been left out.

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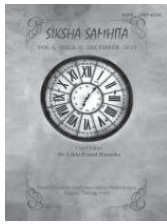
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## **The Role and Challenges of Asha Workers During the Covid 19 Pandemic in Assam, India**

### **Abstract**

The COVID-19 pandemic placed immense pressure on public health systems worldwide. In Assam, Accredited Social Health Activists (ASHAs) were central to the state's pandemic response, undertaking extensive community surveillance, contact tracing, health communication, and vaccination mobilisation. Despite their indispensable role in containing the virus at the grassroots, ASHAs operated within conditions of uncertainty, marked by exposure to infection, inadequate resources, delayed incentives and limited institutional support. This article examines the multifaceted role of the unsung heroes- ASHA workers in Assam during the COVID-19 pandemic and critically analyses the structural constraints shaping their labour. This study yields insights into community health governance in crisis.

Keywords : ASHA workers, COVID-19, Assam, community health, public policy, frontline workers.

### **Introduction**

The COVID-19 pandemic was one of the most severe public health crises of the twenty-first century, posing unprecedented challenges to healthcare systems globally. In India, the fight against the pandemic unfolded through a multi-layered public health response that relied heavily on decentralised community engagement. In Assam, a state characterised by geographically dispersed rural populations, recurrent flooding, and limited healthcare infrastructure, the frontline of pandemic management was substantially sustained by Accredited Social Health Activists (ASHAs). ASHAs were originally introduced in 2005 under the National Rural Health Mission (NRHM) to facilitate maternal and child health services, promote immunisation, and act as a link between rural communities and formal health services. Around nine lakh ASHAs work at various levels as part of the National Health Mission, often receiving less than one-third the salary of permanent health staff performing similar tasks (Shukla, 2020).

However, during the COVID 19 pandemic, their responsibilities expanded far beyond these initial mandates. ASHA workers in Assam became pivotal in household surveillance, symptom monitoring, contact

tracing, community education, and vaccination outreach. (Bhavani Kenche et al., 2023). Therefore, due to the dynamics associated with their job, ASHA workers are playing multiple roles namely of health care facilitators, health activists and service providers by putting their lives at risk (Bisht & Menon, 2020). Despite their essential contributions, ASHA workers operated within structural constraints marked by informality, gendered labour expectations, and limited institutional support. This article seeks to explicate the role of ASHA workers in Assam during COVID 19 and critically analyse the challenges that accompanied their labour. It argues that while ASHAs were indispensable to pandemic response, their work was shaped by systemic neglect and socio-institutional contradictions that problematise the sustainability of community health systems in crisis.

### **Conceptual Framework**

To contextualise the role of ASHA workers in Assam, this study employs a conceptual framework drawing from the political economy of health, feminist labour theory and the concept of street-level bureaucracy.

The *political economy perspective* elucidates how health systems are structured through economic, social, and policy processes that determine labour relations,

service provisioning, and resource distribution. In contexts where formal health infrastructure is limited, states often rely on informal or contract based labour to deliver essential services. The ASHA programme represents a centralised effort by the Indian state to expand rural health coverage cost effectively. However, this cost minimising approach often translates into labour precarity for ASHAs, who perform essential functions without commensurate labour protections or compensation. *Feminist labour theory* analyses the gendered nature of care work and its systematic undervaluation in policy and economic terms. ASHA workers are predominantly women drawn from marginalised socio economic backgrounds. Their labour is often framed as voluntary or community service rather than skilled professional work. This framing enables the state to extract intensive care labour without recognising it as formal employment deserving of wages, benefits, and social security. The notion of *street level bureaucracy* refers to frontline workers who implement public policies and interact directly with citizens. ASHAs function as street level bureaucrats, translating governmental guidelines into community practices. Their position places them at the nexus of state mandates and community realities, requiring negotiation, persuasion, and conflict management, often in the absence of formal authority or institutional protection. Together, these theoretical lenses allow for a critical assessment of ASHA labour during a moment of crisis, highlighting the interplay between gender, informality, and governance.

### Methodology

This study adopts a qualitative research design based on secondary data analysis. The analysis draws on the following secondary data sources:

- Reports and guidelines from the Ministry of Health and Family Welfare (MoHFW) and National Health Mission (NHM) specific to Assam,
- National and state level health documentation by the World Health Organisation (WHO),
- Research publications focusing on COVID 19 responses and community health labour,
- National and regional media accounts documenting ASHA work, protests, and government actions during the pandemic.

Thematic content analysis has been applied to identify recurrent patterns related to expanded roles and responsibilities, socio-economic and occupational challenges, gendered labour dimensions, policy gaps and governance issues.

### Covid 19 in Assam

Assam reported its first confirmed COVID 19 case in March 2020. Over the course of the pandemic, the state

witnessed multiple waves of infection, with significant rural spread compounded by mass migrations and porous borders. Assam's health infrastructure revealed critical shortages in hospital capacity, intensive care units, and specialised personnel, particularly in rural districts.

To address these constraints, the state government, in alignment with central public health directives, implemented a community surveillance programme leveraging the ASHA workforce. By mid 2021, ASHA workers had conducted surveillance of nearly 1.88 crore people across more than 26,000 villages (Choudhury, 2021). These activities were critical in early identification, referral, and containment of COVID 19 cases, revealing the centrality of ASHA labour in the state's pandemic strategy.

### Role of ASHA Workers During the Pandemic

During the COVID-19 pandemic, the role of Accredited Social Health Activists (ASHAs) in Assam evolved far beyond their routine responsibilities. While they were initially tasked with maternal and child health and routine health education, the pandemic forced them into a comprehensive public health response that required technical, organisational, and emotional labour. On March 29, 2020, the finance minister announced health insurance coverage of Rs 50 lakhs for all frontline health workers, including ASHAs, under the Pradhan Mantri Garib Kalyan Yojana (PMGKY) (Government of India, 2020). Their multi-dimensional role can be understood under the following headings:

#### Community Surveillance and Early Detection:

ASHAs were central to community-level surveillance which was a critical strategy for managing COVID-19 in rural Assam where access to formal healthcare facilities is limited. They conducted door-to-door surveys to identify households with symptomatic individuals, including those with fever, cough, or respiratory distress. Their local knowledge and embeddedness in villages enabled them to identify cases that formal health systems might have missed. ASHAs maintained detailed records of household members' health status, including travel history and exposure to confirmed cases. They coordinated with Primary Health Centres (PHCs) and Block Health Officers to ensure timely reporting and rapid response. In flood-affected districts such as Lakhimpur and Dhemaji, where accessibility was limited, ASHAs often had to walk several kilometers to complete surveillance, demonstrating their dedication and adaptability. The surveillance role was not only logistical but strategically critical, as early detection of symptomatic individuals helped authorities implement targeted quarantine

measures, allocate testing kits, and prepare health facilities for potential cases (Menon et al., 2025). ASHAs effectively became the first line of defence, mitigating rural COVID-19 spread.

**Contact Tracing and Quarantine Monitoring:**

Once a case was detected, ASHAs assumed the responsibility of contact tracing, mapping the individual's interactions within the household and village. This required detailed interviews, trust-building and sensitive negotiation, as some community members resisted disclosing contacts due to fear of stigma or quarantine-related loss of income. ASHAs also monitored individuals in home isolation, ensuring they adhered to government-prescribed quarantine protocols. They provided guidance on infection prevention measures, including mask use, hand hygiene, and social distancing within multi-generational households, which are common in Assam. Their monitoring extended to psychological support, as isolated individuals often faced anxiety, fear, and social stigma. ASHAs reassured households, explained procedures, and reported cases that required escalation to PHCs or COVID Care Centres. Their involvement was essential for reducing non-compliance and preventing community clusters.

**Health Education and Risk Communication:**

One of the most critical dimensions of ASHA work during the pandemic was risk communication and health education. Assam's rural population is diverse in language, literacy, and cultural practices, necessitating tailored messaging. ASHAs used local dialects to explain COVID-19 symptoms, preventive measures, and government protocols, making complex information accessible. ASHAs addressed widespread misinformation about COVID-19, including myths about transmission and vaccines. For example, in districts such as Karbi Anglong and Kokrajhar, where rumours about vaccine side effects circulated, ASHAs engaged in household counselling to build trust and encourage vaccination. Additionally, ASHAs facilitated community awareness campaigns, working with panchayat members, schools, and local NGOs to disseminate information through posters, loudspeakers, and small community meetings. Their efforts were critical in increasing compliance with preventive measures and reducing fear-driven behaviour, such as hiding symptomatic family members.

**Testing Facilitation and Referral Linkages:**

Testing was a cornerstone of COVID-19 containment but rural Assam faced logistical challenges including long distances to PHCs, limited transportation, and uneven testing infrastructure. ASHAs acted as facilitators, helping symptomatic individuals navigate the testing system. They coordinated travel to testing

centres, assisted with registration procedures, and followed up on results. In cases of positive results, ASHAs helped connect patients with COVID Care Centres or hospitals, sometimes accompanying individuals to ensure access. Their involvement reduced delays in testing and treatment, particularly for vulnerable populations, including the elderly, pregnant women, and those with chronic diseases. ASHAs effectively served as case managers at the community level, ensuring that formal health system services reached even remote villages.

**Vaccination Mobilisation and Demand Generation:**

During the COVID-19 vaccination campaign, ASHAs were central to identifying eligible beneficiaries and mobilising communities. They maintained registries of eligible individuals, including those above 45 years, frontline workers, and individuals with comorbidities. In Assam, vaccine hesitancy was a significant barrier. ASHAs employed culturally sensitive counselling, addressing fears about side effects, clarifying misinformation, and emphasising the benefits of vaccination as discussed earlier. They coordinated with sub-centres and community halls to organise vaccination drives, often bringing in older adults or those unable to travel. Beyond logistics, ASHAs contributed to follow-up for the second dose, monitoring for adverse reactions and reporting events to block health authorities. Their efforts directly improved vaccination coverage in rural and marginalized areas of Assam.

**Support for Vulnerable Populations:**

ASHAs also assumed an expanded social support role during the pandemic. They identified vulnerable households, including those below the poverty line, single-parent families, and elderly individuals living alone. In coordination with government relief programs, ASHAs helped distribute food rations, hygiene kits, masks, and sanitiser. In flood-prone districts during concurrent COVID-19 waves, ASHAs balanced pandemic responsibilities with disaster relief support, demonstrating their adaptability and resilience. They coordinated community isolation facilities, ensuring that households without space for quarantine had safe arrangements.

**Digital Reporting and Data Management:**

ASHAs were required to digitally report surveillance data, vaccination status, and COVID-19 monitoring activities using mobile applications provided by NHM. This represented a significant cognitive and logistical burden, as many ASHAs had limited prior exposure to digital tools. They often had to troubleshoot app errors, deal with poor network connectivity, and spend personal time ensuring accurate data entry. Nevertheless, these efforts ensured real-time

monitoring of COVID-19 cases at the block and district level, contributing to evidence-based decision-making by state health authorities.

**Emotional and Social Labour:**

Finally, the role of ASHAs during the pandemic involved substantial emotional labour. They mediated between frightened or resistant community members and strict public health guidelines. They handled social stigma, confronted hostility during quarantine enforcement, and often bore the emotional weight of dealing with illness, death, and fear within their communities. In addition, ASHAs themselves were at high risk of infection, creating persistent anxiety about personal and family safety. Despite these pressures, their work remained largely unrecognised institutionally, reflecting broader issues of gendered and informal labour in health governance.

**Challenges Faced by ASHA Workers in Assam**

Despite their indispensable role, ASHA workers faced severe challenges that reflected structural weaknesses in the health system:

**Occupational Exposure and Inadequate Protection:**

ASHAs were regularly exposed to potential infection due to repeated close contact with symptomatic individuals. Although protective equipment was distributed by government agencies, supplies were often insufficient, delayed, or unevenly allocated (Niyati & Mandela, 2020). Many ASHAs reported working with only basic masks and sanitiser, without gloves, face shields or protective clothing. This inadequate protection elevated the risk of infection, not only for the workers themselves but also for their families, particularly in multi generational households common in rural Assam.

**Workload Intensification and Task Creep:**

The pandemic led to an overwhelming expansion of ASHA responsibilities without corresponding increases in compensation or institutional support. In addition to traditional duties, ASHAs were expected to conduct surveillance, manage digital reporting, monitor isolation compliance, support vaccination drives, and respond to community queries often without additional training or logistical support. This phenomenon, known as task creep, resulted in extended working hours, physical exhaustion, and burnout (Jain, 2021). Many ASHA workers reported working long hours without formal rest days or leave provisions.

**Remuneration Issues and Payment Delays:**

ASHAs in Assam are compensated primarily through task based incentives rather than fixed salaries. During the pandemic, although state authorities announced additional COVID specific incentives, implementation

was inconsistent. Reports indicate that payments were delayed by several months, with some ASHAs receiving only partial or no compensation for COVID duties (Niyati & Mandela, 2020). This economic precarity was aggravated by lockdown induced disruptions to other income sources, compelling some workers to borrow money to sustain household needs.

**Psychosocial Stress, Stigma, and Emotional Burden:**

Beyond physical and financial burdens, ASHA workers experienced significant psychosocial stress. Constant fear of infection, anxiety over transmitting the virus to family members, and the emotional weight of enforcing public health measures took a psychological toll. Some ASHAs encountered social stigma including avoidance by neighbours or hostility during surveillance and vaccination efforts. Despite these pressures, few formal mechanisms existed to provide mental health support or counselling for frontline health workers in Assam.

**Technological Barriers and Digital Reporting Challenges:**

ASHAs were required to use mobile applications for daily data reporting. However, many faced technological barriers like limited access to smartphones or internet connectivity, low digital literacy, power outages in rural areas, etc. These challenges created additional unpaid labour, as ASHAs spent personal time learning applications, troubleshooting errors, or seeking assistance.

**Gendered Dimensions of ASHA Labour:**

The experiences of ASHA workers during COVID 19 were deeply shaped by gender norms. As predominantly women, ASHAs were expected to balance intensified professional duties with increased domestic care responsibilities, including childcare, eldercare, and household chores. This “double burden” exacerbated physical exhaustion and reduced opportunities for rest. Moreover, the framing of ASHA work as voluntary community labour reflected broader societal expectations that women’s care work is inherently altruistic and not deserving of formal wages or labour protections. This gendered logic underpinned the continued informality of the ASHA role despite its critical importance during the pandemic.

**Policy and Governance Gaps:**

The pandemic exposed significant governance gaps in the ASHA programme. The continued classification of ASHAs as volunteers allowed the state to mobilise extensive labour without extending labour protections such as minimum wages, paid leave, formal job security, or comprehensive insurance. Pandemic preparedness strategies lacked mechanisms to guarantee consistent PPE supply, timely and reliable

remuneration, mental health support for frontline workers and digital infrastructure support. These policy gaps reveal broader issues in health governance and underline the need for structural reforms to support community health workers during crises (Ballard et al., 2020).

### Conclusion

ASHAs played a central role in Assam's COVID 19 response, thereby mitigating the spread of infection and enabling community engagement with public health measures. Their contributions underscore the importance of community health workers in decentralised health governance, especially in contexts with limited formal infrastructure. However, the pandemic also revealed persistent structural challenges like occupational risk without adequate protection, intensified workloads without proportional compensation and gendered labour burdens without institutional support. It is to be noted that the ASHA workers refused the vaccine shot as a sign of protest against poor remuneration in the state of Assam (Kalita, 2021). They also refused to continue to work and demanded appointment letters and a minimum incentive of Rs 10,000 per month (ibid).

Addressing these issues is crucial for building resilient health systems capable of responding ethically and effectively to future crises. Formalising ASHA employment status, ensuring stable remuneration, strengthening occupational safety, and providing psychosocial support are necessary steps toward recognising and sustaining the vital labour of ASHA workers.

**Acknowledgment:** The author would like to thank her Ph.D. Supervisor, Dr. Shantanu Chakravarty, Retd. Professor, Dept. of Political Science, Cotton University, Assam for his support and guidance.

### Conflict of Interest :

Since this is a single authored research work, the question of conflict of interest does not arise.

### Author's Contribution :

This article is solely produced by Megha Choudhury.

### Funding :

Not any kind of financial or other perks have been received for this research work.

### Ethics Statement :

This research article does not violate any ethical values related to human beings or animals.

**Informed Consent:** N/A

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