

**Mapping Transport Disadvantages and emergence
of Intermediate Means of Transport in
Coochbehar District, West Bengal**

An Abstract Submitted

To

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1.1 Introduction

Transportation, the movement and exchange of people, goods, and services (Keeling, 2008), is an obligatory feature of modern life (Umoren et al., 2009) because of its multidimensional functions and importance. It keeps relations and integrations in every aspect of society ranging from local to global (Sarkar, 2013). Transportation is more than simply the means of survival. Thus, transportation is not only getting from A to B. It is undoubtedly about politics, money, people, and power (Goetz et al., 2009). Transportation is a central component of human life. Although transportation is not necessarily a sufficient component of growth and development, it plays a critical role in driving socio-economic changes.

The meaning of transportation has been explored by economists, planners, engineers, sociologists, and geographers (Dobruszkes, 2012; Keeling, 2007; Rimmer, 1978; Vaidya, 2003) with an inter-disciplinary framework (Curl & Davison, 2014; Hall, 2010). Transportation is inherently not only spatial (Shaw et al., 2008) but also social, and it is considered a measure of the relations between areas, peoples, and society. Consequently, it is an indispensable branch of geography in general (Dobruszkes, 2012; Keeling, 2007; Ullman & Mayer, 1954), especially human and economic geography. Transport geography lies at the interface between geography and transport studies (Curl & Davison, 2014).

Even against the backdrop of severe economic and physical hardship faced by many individuals in developing countries like India, transport remains a chief concern (Lucas, 2011; Pritchard et al., 2014). Growing per-capita income, GDP, improving the standard of living, and increasing transport facilities in the third-world countries of

Asia, Africa, and Latin America provide people with a more diverse and unprecedented opportunity for differential mobility. This leads to more social-spatial polarization. The adoption of the Anglo-American developmental strategy without questioning and its resultant unprecedented problems put forward myriad challenges to the transport geographer.

The economic reforms of 1991 (Chalam, 2011), thereby initiating neo-liberalism and privatization in India, have brought about significant social changes. The gradual decline of public transport provisions and the capitalistic improvement of the transport network led to higher levels of automobile dependencies. This resulted in more socio-economic segregation and greater inequalities in access to opportunities reducing the use of public transport. The denial of access to opportunities ultimately manifested as acute transport disadvantages. Transport disadvantage affects people and space differently, leading to transport-related social exclusion.

The decline of the public transport system and increasing demands for mobility encouraged the emergence and growth of intermediate means of transport to fill the gap. The intermediate means of transport services consist of (i) Para-transits; (ii) Intermodal transports; (iii) Unconventional transports, and (iv) Community transports. Although intermediate transport enhances mobility, the quality of its services is not beyond question (Tangphaisankun et al., 2009). The need for the mobility of the people of an area is not only primarily served by the intermediate means of transport, but also the pattern of travel, location, and duration of activity spaces, way of living, and daily life of the people are on the alert in a significant way.

Cooch Behar, a district of West Bengal, India, is associated with a unique historical background. The development of transportation and its utilization in the district have been configured by the intersections of its historical consequences and geographical locations. Like any other place, several ups and downs related to the socio-economic status of the people of the district have been mainly produced and reproduced as the result of the reconfiguration of the transport system in the area.

Unfortunately, till now, geographical research on transportation in India is trapped by narrowly emphasized network analysis and mechanistic models, which are largely disconnected from socio-economic ramifications. Thus, most of the research in India rarely explores these vital emerging issues from a perspective of transport geography in the light of the 'new mobilities paradigm.' Lack of clear understanding of all these emerging issues remains significant as a constraint for the country's overall development to establish equality, justice, and inclusive policy formulation. An attempt has been made to build a clear epistemological structure of transport disadvantage, impacts of intermediate means of transport on it, and people's perception of the role of intermediate means of transport with the help of emerging tools and techniques of transport geography from a perspective of a developing country.

1.2 Theoretical Framework

Transport studies considered that the transport-related problem could be solved technically. Transport researchers have rarely unravelled the shared meanings and representations of mobility, either at the individual or societal levels. Studies of

human mobility must be brought together with more local concern about everyday transportation.

The mobility turn of social sciences has been articulated into a 'new mobilities paradigm' by Sheller and Urry (2006) in their essay 'New Mobilities Paradigm'. The Mobilities Paradigm incorporates a new way of theorizing about how these mobilities lie at the center of the constellation of power, the creation of identities, and the micro-geography of everyday life (Cresswell, 2008). The new mobilities paradigm suggests questions, theories, and methodologies rather than a totalizing or reductive description of the contemporary world.

Cresswell (2010) moved forward with some of the insights of the 'new mobilities paradigm' and developed a meso-theoretical approach to the 'politics of mobility'. He argued that the politics of mobility is the way in which mobilities are both productive of social relations and produced by them. Mobility is a resource to which not everyone has equal access (Hannam et al., 2006; Morley, 2002; Skeggs, 2004). The politics of mobility observes society in terms of a hierarchy with the 'kinetic class at the top' (who can move from place to place with relative ease) and the 'kinetic underclass' (who are sometimes forced to move when they don't want to and other times prevented from moving when they do want to). Cresswell (2010) opined that there are six things that are central to the uneven movement and by which the hierarchy can be differentiated; (a) the reason why we travel; (b) speed of travel; (c) mobility rhythm; (d) the routes mobility takes; (e) experience; and (f) friction in mobility. Mobility is wrapped in power.

The ‘new mobilities paradigm’ and its associated theoretical framework, ‘politics of mobility’, provide a fresh and new perspective and have influenced recent research on transportation from a critical perspective. It is deemed appropriate for the proposed study as it intends to examine transportation disadvantages from a broader perspective that does not reduce the issue to a more instrumental one.

1.3 Statement of the Problems

Transportation is inherently not only spatial (Shaw et al., 2008) but also social (Keeling, 2008). Transportation is a measure of the relations between areas, people, and society (Dobruszkes, 2012; Keeling, 2007; Ullman & Mayer, 1954). It is undoubtedly about politics, money, people, and power (Goetz et al., 2009). Research in transport geography in India began rather late, that too in the form of descriptive research articles related to specific regions (Saxena, 2005), and rarely embraced the contemporary development of social theory, philosophies, and methodologies.

The economic reforms of 1991 (Chalam, 2011), followed by neo-liberalism and privatization in India, have brought about significant social changes. Gradual decline in public transport provisions and the capitalistic improvement of the transport network led to increasing levels of automobile dependency, thereby increasing socio-economic segregation, causing congestion, and creating greater inequalities in access opportunities, reducing the use of public transport. This ultimately manifested itself in the form of acute transport disadvantages. Transport disadvantage has multiple rippling effects, not only on accessibility but also on the genesis of inequalities and social well-being.

The study area Cooch Behar District is one of the poorest districts in the Indian state of West Bengal (Mandal & Mandal, 2017), with considerable inequalities in its socio-economic sphere and, in particular, on the levels of social development in general (Chisti, 2015; Ray & Rahaman, 2017; Roy & Sen, 2017). Low road density and minimal road networks in terms of connectivity and spatial efficiency have been the causes of the suffering of the residents of the district. The gradual decline of public transport services, service qualities, unequal accessibilities, unavailability, lower reliability, and increasing demand for mobility result in unprecedented hardship and thereby marginalize the inhabitants of Cooch Behar district from every aspect of their social participation.

The decline in public transport provision and increasing demands for mobility encouraged the emergence and growth of intermediate means of transport in the study area to fill the gap. The intermediate means of transport not only greatly served the need for mobility of the people of the district but also altered their pattern of travel, location, and duration of activity spaces, as well as their way of living and daily lives, in a significant way.

The issues of transport-disadvantage, the role played by intermediate means of transport in that context, and the perceptions of vulnerable people on the role of intermediate means of transport in their daily lives remain completely unaddressed, either in government policies or by academicians. In the context of the 'new mobilities paradigm', socially and politically embedded transport problems of third-world countries like India remain underexplored at the local and regional levels of transport geographical understanding. There is a need for transport geographers to problematize the relationship between transport and the socio-economic framework

about how a place or region in a third-world country like India is being affected by the dynamics of transportation.

Issues related to transport have been mostly dealt with in an instrumentalist and narrow approach. A critical understanding of transport-related issues that are situated within the larger social structure is limited in developing countries like India. Therefore, there is a significant gap in understanding which developed due to the underrepresentation of the issues. The present research is an attempt to bridge the gap with the help of newly developed methods and techniques of transport geography and a 'new mobilities paradigm'.

1.4 Research Questions and Objectives

This research work is designed to unravel transport disadvantages and intermediate transport nexuses in the context of a developing country, India. The study addresses four main research questions. Firstly, how did the transport system in Cooch Behar District evolve during the pre-independence and post-independence periods? Secondly, what are the spatial dimensions that influence the pattern of transport disadvantage in Cooch Behar? Thirdly, what types of intermediate means of transport are available in the study area? And lastly, how do intermediate means of transport impact the mobilities of people in their day-to-day lives?

The major objectives of the present work are as follows:

1. To analyze the evolution of the transport system in Cooch Behar District
2. To understand the spatial character of transport disadvantages in the study area

3. To assess the emerging modes of intermediate means of transport and their impact on transport disadvantage
4. To analyze people's perceptions of the role of intermediate means of transport in their daily lives

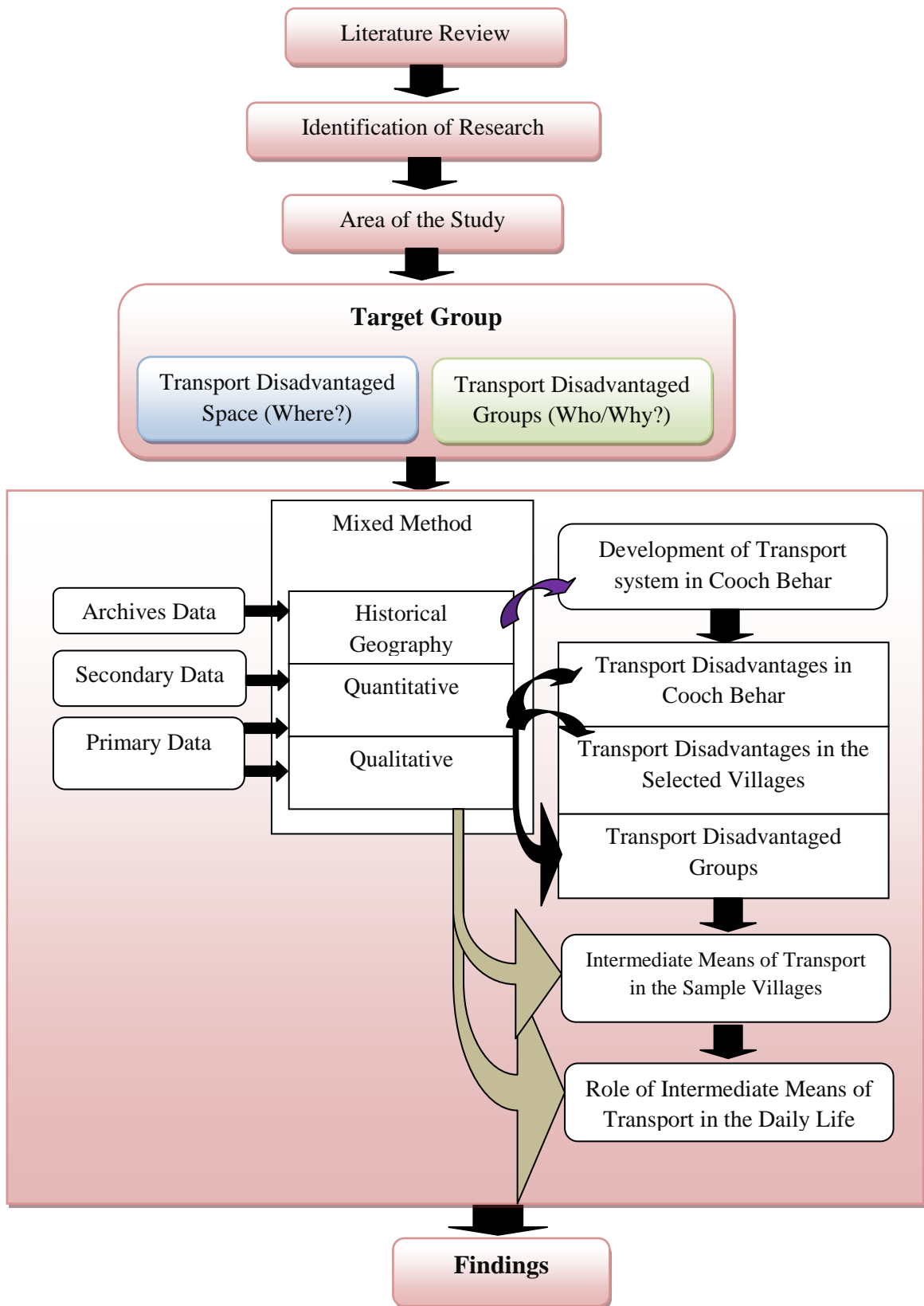
1.5 Methodology

Research is the art of scientific investigation, and research methodology is a way to solve the research problem systematically. In every research, a specific and logical methodology is required to make the study systematic and to better understand the way of inquiries.

1.5.1 Approach

Research in transport geography has shown significant progress in recent years. Such progress in transport geography has acquired a diverse nature in terms of analytical terms, issues, and techniques. Transport geography has been able to gear up from the earlier positivistic grounded quantitative tradition to a more diverse and critical one. Transport disadvantage is a multidimensional concept closely related to mobility, accessibility, location of living and activities, physical, social, and psychological characteristics of individuals. Transport disadvantage affects both people and space differently. Dimensions of transport disadvantage are grouped into 'objective' and 'subjective' aspects. The objective aspects include location and mobility-based measures, which are often carried out by various mathematical models, socio-spatial analysis, and statistical methods. On the other hand, subjective aspects of the transport disadvantage of certain social groups are often carried out by applying qualitative research methods.

Figure-1.1: Flow Chat of Research Methodology



The impact of intermediate means of transport on transport disadvantage and people's perceptions of the role of intermediate means of transport in their daily life can't be adequately understood by solely applying quantitative or qualitative research methods. Besides, the transport disadvantage of an area has been contextually rooted in its historical development of the transport system. Working solely with current data that often reflect temporary factors makes unsatisfactory understanding from the point of view of the organization (Iofa, 1963). Thus, without a historical-geographic approach, an understanding of a geographical concept like the evolution of the transport system and its specific characteristics will remain incomplete. The complex and overlapping nature of the research demands a more diverse methodological approach using quantitative, qualitative, and historical-geographical research methods. The use of one method may be insufficient because of the inherent weaknesses of each approach. Therefore, a mixed approach that entails both quantitative and qualitative facets is deemed appropriate for the study. The proposed research adopted the sequential transformative strategy as a mixed-method approach. The sequential transformative strategy is a two-phase project with a theoretical lens overlaying the sequential procedures. An initial phase (either quantitative or qualitative) is followed by a second phase (either quantitative or qualitative) that is built on the earlier phase, and weight can be given to either or distributed evenly to both phases (Creswell & Creswell, 2003). This sequential design is guided by a particular theoretical orientation or advocacy lens (Hanson et al., 2005), and findings are integrated during the interpretation phase. The theoretical lens, introduced in the introduction to the proposal, shapes a directional research question aiming at exploring a problem, creates sensitivity to collecting data from marginalized or underrepresented groups, and ends with a call for action (Creswell & Creswell, 2003).

1.5.2 Techniques of Data Collection and Analysis

As the research proposes a mixed methodology, it necessitates engaging multiple techniques. A mixed method, combining geospatial, quantitative, and qualitative research techniques, has been adopted in the present study. Both quantitative and qualitative data have been collected from primary and secondary sources. Quantitative primary data have been collected by a household travel survey. On the other hand, qualitative data have been collected by qualitative research techniques like focus group discussions, key informant interviews, and ‘participants while interviewing’ through open-ended and conversational communication to understand the social reality.

1.5.2.1 Household Travel Survey

For primary data collection, a household travel survey was conducted with a household travel survey questionnaire. Considering the large Indian families, lower literacy rate, and penetration of technologies, a single-day activity-travel survey has been executed. The method of asking the respondents face-to-face about their traveling and participation in activities in detail on the day they traveled the most in that week has been followed.

1.5.2.2 Note on Sampling

To execute the household travel survey questionnaire, a sample size of 319 individuals has been selected using purposively stratified random sampling from six villages within three blocks of the study area. Cooch Behar district has 12 CD Blocks and six municipality towns along with the district headquarter, Cooch Behar. Three

sample blocks have been selected on the basis of (a) the block having the highest relative mobility and accessibility opportunities, (b) the block having the lowest relative mobility and accessibility opportunities, (c) the block having moderate relative mobility and accessibility opportunities, and (d) the blocks located in the vicinity of other district headquarters have been excluded. Relative mobility opportunities indicate the road densities and availability of railway stations.

On the other hand, relative accessibility opportunities indicate the closeness to the district headquarter and, thereby, the self-sufficiency of the block in terms of service facilities. On the basis of the straight-line distance from the district headquarter, two concentric circles of 20 km and 40 km have been drawn on the district planning map of Cooch Behar (1 cm to 2500m). Within the zone of 20 km, Cooch Behar I and II blocks are the nearest blocks to the district headquarter. Cooch Behar I has been selected, and Cooch Behar II block has been excluded due to its vicinity to the district headquarter of Alipurduar. Eight blocks are located within the zone of 20 to 40 km. Sitai block has been selected due to its lowest accessibility and mobility options. Sitai is the poorest block in the district (Ray & Rahaman, 2017; Sarkar et al., 2014). Beyond a 40 km radius of the district headquarter, two blocks, i.e., Haldibari and Mekhliganj, are located. Haldibari has been excluded because of its vicinity to the district headquarter of the district of Jalpaiguri (Map-1.2). Two villages have been selected from each sample block based on the following conditions: (a) villages having a population of more than 500; (b) bus connectivity from the village should be available beyond 5 km; and (c) one nearest village and one remotest village from the respective sub-divisional headquarter or municipal town have been selected.

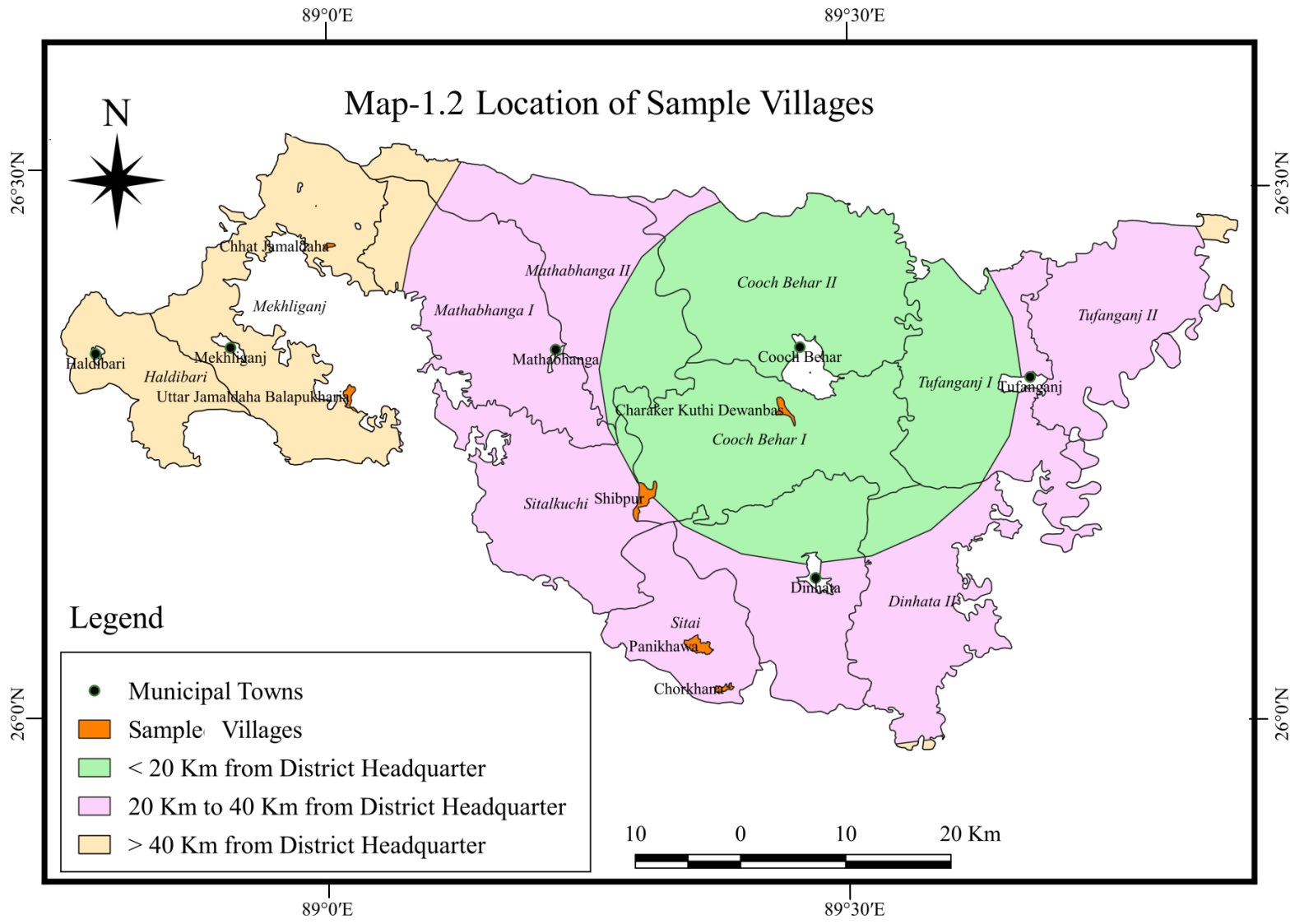


Table-1.1: Sample Selection to Execute Household Travel Survey

| Sample Block | Sample Village | Worker | | Non-Worker (Excluding 0 to 6 years population) | | Sample Individual | Remarks |
|---------------|------------------------------|--------|--------|---|--------|-------------------|---|
| | | Male | Female | Male | Female | | |
| Cooch Behar I | Charakerkuthi Dewanbas | 34 | 17 | 11 | 29 | 91 | Five percent sample size has been taken |
| | Sibpur | 18 | 3 | 9 | 21 | 51 | |
| Sitai | Panikhawa | 34 | 25 | 13 | 22 | 94 | |
| | Chorkhana | 15 | 10 | 5 | 10 | 40 | |
| Mekhliganj | Uttar Jamaladah Balapukhuria | 10 | 1 | 5 | 12 | 28 | |
| | Chhat Jamaladah | 7 | 2 | 5 | 1 | 15 | |
| Total | | 111 | 58 | 48 | 95 | 319 | |

Source: District Census Handbook 2011

To select the target population, the total population of each village was stratified into working male and female and non-working male and female populations based on census 2011 data. The 0-6-year-old population has been excluded from the non-working male and female populations. A sample size of five percent from each stratum has been taken as the target population for the present study (Table-1.1).

1.5.2.3 Focus Group Discussion

A focus group is a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research. As a research technique, the focus group employs guided, interactional discussion to generate the rich details of complex experiences and the reasoning behind an individual's actions, beliefs, perceptions, and attitudes (Cameron, 2005; Powell & Single, 1996). A focus group is composed of individuals with shared key characteristics pertinent to the study and comprises between six and ten participants who are strangers to each other. A session usually lasts one to two hours (Cameron, 2005).

Six focus group discussions have been conducted, using two from each of the sample blocks. Groups have been formed with six to seven members. For one FGD, respondents were recruited from the vulnerable, transport-disadvantaged groups identified in the quantitative study. For another FGD, respondents were recruited from transport service providers (owners and drivers). The help of the key informants and snowball sampling techniques were utilized in recruiting respondents for focus groups. Content analysis and critical discourse analysis techniques were applied to analyze the collected data (Table-1.2 and Annexure-B).

Table-1.2: Recruitment of Respondents for Focus Group Discussion

| Block | Villages | FGD of Transport Users | | FGD of Transport Service Providers | Total FGD | Remarks |
|---------------|--------------------------------|------------------------|---|------------------------------------|-----------|---|
| Cooch Behar I | Charakerkuthi Dewanbas | 1 | 2 | 1 | 3 | 6 to 7 people recruited to form the group |
| | Sibpur | 1 | | | | |
| Sitai | Panikhawa | 1 | 2 | 1 | 3 | |
| | Chorkhana | 1 | | | | |
| Mekhliganj | Uttar Jamaldah Balapukhuria | 1 | 2 | 1 | 3 | |
| | Chhat Jamaldah | 1 | | | | |

1.5.2.4 Key Informants Interview

Twelve key informants have been selected purposively covering all blocks of Cooch Behar. Key informants include geographers, historians, commuters, researchers, and private and public transport employees. Key informants are interviewed with the help of a GIS-based road network, railway network, and waterway map of the pre-and post-independence periods produced from archival data. Maps have been evaluated and rectified through in-depth interviews/interactions with key informants. Data have also been represented in tabular and graphical formats.

1.5.2.5 Participants while Interviewing

To analyze the people's perceptions of the role of intermediate means of transport in their daily life, 'participation while interviewing' techniques have been applied. 'Participation while interviewing' is a technique where researchers first participate in a pattern of movements and then interview the people, individually or in focus groups, to discover how their diverse mobilities constitute their patterning of everyday life (Novoa, 2015). It allows the researcher to observe people in situ and establishes a physical 'co-presence' that permits him(her) to undergo those same activities.

. Table-1.3: Participation to the Journey Followed by FGD/ in-Depth Interview

| Date | Route | Detail of the Journey |
|--|--|--|
| 7 th November 2021 to 9 th November 2021 | Dinhata to Panikhawa | Dinhata to Sitai on Auto Rickshaw Sitai to Chorkhana Toto (E-Rickshaws) Return Journey Chorkhana to Sitai on Toto (E-Rickshaws) Sitai to Dinhata on Auto Rickshaw |
| 24 th December 2021 to 27 th December 2021 | Cooch Behar to Charakerkuthi Dewanbas | Cooch Behar to Tapurhat on Bus; Tapurhat to the Village on E-Rickshaw From the village to Cooch Behar on E-Rickshaw |
| 31 th May 2022 to 1 st June 2022 | Chorkhana to Dinhata | Dinhata to Sitai on Auto Rickshaw Sitai to Chorkhana Toto (E-Rickshaws) Return Journey Chorkhana to Sitai on Toto (E-Rickshaws) Sitai to Dinhata on Auto Rickshaw |
| 6 th January 2022 to 8 th January 2022 | Chhat Jamaladah to Mekhliganj | Mekhliganj to Jamaladah on Bus; from Jamaladah to Bamnia More on E-Rickshaw; from Bamnia More to the village on feet. Return follows the same in reverse. |
| 8 th January 2022 to 10 th January 2022 | Mekhiganj to Uttar Jamaladah Balapukhari | From Mekhliganj to Dhapra on Bus from Dhapra to the Gate of Border Fencing on e Rickshaw. From the gate I was received by the Member of the Gram-panchayet and entered the villages walking 1.5 km. Returned from the village walking up to Border fencing gate, form gate to Dhapra on E-Rickshaw Dhapra to Mekhliganj on Bus |
| 14 th January 2022 to 16 th January 2022 | Cooch Behar to Shibpur | Cooch Behar to Chandamari on Safari from Chandamari to Shibpur E-Rickshaw Return Journey, from Shibpur to Pucca road on feet from pucca road to Chandamari on E-rickshaw. From Chandamari to Cooch Behar Bus. |

Source: Fieldwork, 2021-22

Under this study, ‘participation while interviewing’ has been done in small-scale geographies. For the purpose of the study, several journeys with the participants have been made over different periods of time, followed by in-depth interviews (Table-1.3). In each selected village, two interviews were conducted during and after journeys along the most popular route between the villages and the nearest municipal town. Altogether, 12 interviews were conducted in Bengali and *Rajbangshi* without a translator. Being a permanent resident of a bordering village in the district, the researcher had a prior understanding of the power relations in the socio-economic contexts in the villages of Cooch Behar.

Being a native Bengali speaker with good command of the *Rajbangshi* language, the researcher had no problem interacting with and understanding the respondents without the assistance of a third party like a local research assistant or interpreter. While travelling with the female respondents, a female assistant who is not a resident of the villages accompanied the researcher. Consequently, there was no extra reason for power conflicts during the interviews. Since December 2019, the researcher has travelled to the selected villages several times and interacted with the villagers and members of the gram-panchayat to build rapport.

Being a teacher by profession and residents of the same district, the villagers accepted the researcher quickly. The researcher spent a couple of days using several ‘entry and exit’ strategies within the selected village, participated in their daily life, and conducted several informal and formal discussions with the residents of the village. Primarily, transport-disadvantaged households in the villages are identified with the help of the household travel survey (November 2021 to January 2022). The household travel survey helped to convey the research process practically to the respondents and

enhanced the researcher’s acceptability by removing positional differences. Respondents were recruited from transport-disadvantaged households employing key informants and snowball techniques on the basis of their willingness to participate in the research voluntarily. All the respondents selected for the ‘participant interviews’ also participated in the FGDs. Besides, data have also been collected from nine focus group discussions. For the privacy of the respondents, pseudonyms were used.

1.5.2.6 Sources of Secondary Data

Secondary data have been collected from different websites, archives, plans, reports, maps, books, and journals published by various government and non-governmental organizations (Table-1.4).

Table-1.4: Sources of Secondary Data

| Document Name & Details | Reference Period and Sources |
|---|-------------------------------------|
| Annual Administrative Report of the Cooch Behar State. Cooch Behar: Cooch Behar State Press. | 1876-1936 |
| District Statistical Handbook Cooch Behar. Cooch Behar: Bureau of Applied Economics and Statistics, Government of West Bengal | 1985-2012 |
| Draft Development plan of Cooch Behar 2008-09 to 2012-13. Cooch Behar Municipality, Cooch Behar | 2008-2013 |
| Majumdar, D. (1977). West Bengal District Gazetteers, Cooch Behar (pp. 114–140). Government of West Bengal | Till 1977 |
| The Journals of Major James Rennell, Bengal Atlas containing Maps | 1764 To 1767 |
| Bengal in Maps: a Geographical Analysis of Resource Distribution in West Bengal and Eastern Pakistan, Chatterjee S. P. Published by Orient Longmans, Bombay, India (1949) | 1946 |
| Annual Administrative Reports of NBSTC | 1970-1990 |
| Annual Administrative Reports of West Bengal | 2012-2015 |
| Motor Vehicles – Statistical Year Book India, 1018, Working of Transport Undertakings | |
| Survey of India Map, Sheet No, 78, Scale 1:1000000 of 1917, Darjeeling | 1917-1947 |
| Survey of India Map, Sheet No, 78/B, 78/F, 78/G Scale 1:253440 of 1936, 1943, 1944 Cooch Behar, Jalpaiguri, Rangpur | |

| | |
|--|---|
| Map Prepared by Army Map services (RMBM), Corps of Engineers, US Army, Washington DC Compiled in 1955 from half inch series, 1:126720, Survey of India 1930-33, Sheet Number NG 45-8, Scale 1: 2500000 | |
| Arc Map, Google Map, Open Street Map fixed in 1:28000 | After 1947 |
| District census hand book of Cooch Behar, Census of India | 1951-2011 |
| Socio-Economic and Caste Census of India | 2011 |
| Geomorphological Map | https://bhukosh.gsi.gov.in/Bhukosh/MapView.aspx |
| Cooch Behar District Disaster Management Plan | 2015-2022 |
| Pradhan Mantri Gram Sadak Yojona | NRRDA, 2014, Obtained from http://omms.nic.in/# |
| Review of the Performance of State Road Transport Undertakings (SRTUs) | 1990-91 to 2016-17 https://morth.nic.in/performance-state-road-transport-undertakings-srtus |
| India Village-Level Geospatial Socio-Economic Data Set, v1 (1991, 2001) (Meiyappan et al., 2018). | https://sedac.ciesin.columbia.edu/data/set/india-india-village-level-geospatial-socio-econ-1991-2001/data-download |

1.5.3 Geospatial Techniques

Historical materials like text and map data have been obtained from the archives. Sources have been evaluated critically and contextually using content analysis, interpretation, and multi-temporal evaluation techniques. Using GIS techniques, historical data have been converted into maps of the road network, railway network, and waterways of the pre-independence period. Maps of the road network, railway network, and waterway maps of the post-independence period have been prepared in the GIS platform using different sources like Google Earth, open-street maps, and Arc-Maps. Sources were fixed in 1:25000 scale in the GIS platform, and all visible road and rail networks have been digitized. GPS surveys have been conducted to prepare waterway maps containing ferry ghats from the post-independence period. Maps of the road network, railway network, NBSTC routes, private bus route, Waterways, border areas, Geomorphological map, etc., are combined to form a composite map in an additive manner. The areas having higher flood probability and

rough physiographic areas with no road-rail network and bus route would suggest a greater risk factor of residents of that area experiencing transport disadvantage.

1.5.4 Statistical Techniques

A ‘Need gap analysis’ technique (Currie, 2004, 2010; Currie et al., 2010; Delbosc & Currie, 2011; Pyrialakou et al., 2016) has been applied to identify the transport-disadvantaged villages of Cooch Behar district. Transport-disadvantaged villages have been identified on the basis of an assumption, i.e., the villages having high needs with low supply (accessibility) are transport-disadvantaged (Pyrialakou et al., 2016). For analysis, a transport need index has been calculated based on socio-demographic variables, and a supply (accessibility) index has been calculated on the basis of the accessibility and mobility opportunities available in the villages of Cooch Behar using secondary data sources like the 2011 Census and the Socio Economic and Caste Census 2011.

As per the 2011 census, there are 1132 inhabited census villages in Cooch Behar district, out of which 1105 inhabited census villages have been taken into consideration for the purpose of need gap analysis, and the remaining 27 villages have been excluded due to a lack of a complete data set. Each observation value has been translated into a scale between 0 and 1 using the max-min scaling-up process (see Chapter 5 for details). The following indices are used:

Transport Need Index

$$NS^{raw}_{CV} = \sum (SI1_{CV} * W1) + (SI2_{CV} * W2) + \dots \dots \dots + (SI9_{CV} * W9)$$

Where NS^{raw}_{CV} is the not-normalized need score of the census village of Cooch Behar District, and W is the respective weight determined by the AHP method based on the pair-wise comparison matrix.

Transport Accessibility Index

$$TAi_{CV}^{raw} = (S_{POi} + S_{TOi} + S_{TIi})$$

Where TAi_{CV}^{raw} is the transport accessibility score of census villages. (S_{POi}) , (S_{TOi}) , and (S_{TIi}) are the normalized proximity to opportunity from the villages, public transport options, and transport infrastructure indices. Weights for the proximity to opportunities, Transport options, and transport infrastructure have been determined by the weighting technique adopted from Mishra and Chatterjee (2020).

Proximity to the Opportunities Index

$$POi^{raw} = (W *_{MDS} + W *_{MDH} + W *_{MDF} + W *_{MDM} + W *_{MDGs})$$

Where POi^{raw} is the unstandardized weighted aggregate of Mean Distance of Schools from Villages (MDS), Mean Distance of Health Centers from Villages (MDH), Mean Distance of Financial Opportunities from Villages (MDF), Mean Distance of Market Centers from Villages (MDM) and Mean Distance of Government Service Centers from Villages (MDG). Weights (W) are determined by AHP method based on the pair wise comparison matrix.

Mean Distance of Schools from Villages (MDS)
Mean Distance of Health Centers from Villages (MDH)
Mean Distance of Financial Opportunities from Villages (MDF)

$$\begin{aligned} &= \frac{1}{TV} (S_{PS} + S_{MS} + S_{SS} + S_{HS} + S_{DC}) \\ &= \frac{1}{TV} (S_{PHSC} + S_{PHC} + S_{AH}) \\ &= \frac{1}{TV} (S_{ACS} + S_{CoopB} + S_{ComB}) \end{aligned}$$

*Mean Distance of Market Centers
from Villages (MDM)*
*Mean Distance of Government
Service Centers from Villages
(MDG)*

$$= \frac{1}{TV} (S_{RM} + S_{WH} + S_{AMS})$$

$$= \frac{1}{TV} (S_{Angan} + S_{PDS} + S_{BDregi})$$

Transport Option Index

$$TOi^{raw} = (S_{TO1} + S_{TO2} + S_{TO3} + S_{TO4} + S_{TO5})$$

Where TOi^{raw} is a not-normalized transport option index value, and S is the score of weight assigned to a level of transport options.

Transport Infrastructure

$$TII^{raw} = (S_{TI1} + S_{TI2} + S_{TI3} + S_{TI4} + S_{TI5})$$

Where TII^{raw} is a not-normalized transport infrastructure index value, and S is the score of weight assigned to a level of transport infrastructure. A maximum weight of 1 is allotted to the transport infrastructure having maximum influence located within the village.

Index of Transport Gap

$$ITG = (NS_{CV} - TAI_{CV})$$

ITG is the index of transport gap. NS_{CV} and TAI_{CV} are transport need scores of census villages, and transport accessibility scores of census villages, respectively.

Transport-disadvantage is not always spatially concentrated. Consequently, the ecological fallacy may occur, as the areas likely to be transport-disadvantaged will not

prove that all residents of those areas are transport-disadvantaged. An important way forward is, therefore, to identify transport-disadvantaged groups.

Primarily, 37 variables have been selected under seven headings: (1) socio-demographic; (2) accessibility; (3) mobility; (4) time use; (5) safety and comfort; (6) affordability; and (7) the impact of a lack of access to transport, as determined by the literature review to identify transport disadvantage groups. Based on the pilot study followed by one-way ANOVA analysis, 26 variables have been used to construct a composite transport disadvantaged score based on the exploratory factor analysis technique using principal component analysis. All variables and values are assumed to have equal weights, and all variables are assumed to be scaled so that the downward (towards 0) values represent transport disadvantages and vice versa. Each observation value of the selected variables has been translated into a scale between 0 and 1 using a max-min scaling-up process. Variables are identified as positive when their observation values increase, and the other positions are identified as negative. Negative variables have been converted to positives simply by subtracting their scaled-up values from 1 to make all the variables unidirectional.

The transport disadvantage score has been calculated as weighted combined factor scores using the following formula

$$\text{TD Score} = (F_1 \times W_1) + (F_2 \times W_2) \dots \dots (F_n \times W_n) \text{ (Krishnan, 2010; Zhang, 2015)}$$

Where F is the factor score, and W is the weight of the respective factor obtained, dividing the percentage of the variance of the respective factors by the total variance explained. The weighted sum factor scores have been obtained by the sum total of

each multiplied item to the respective factor loading coefficient under any factor (DiStefano et al., 2009; Thomas et al., 2019).

Factor Score = $\sum_{k=0}^n$ Item * Factor Loading Coefficient (DiStefano et al., 2009; Thomas et al., 2019)

The mean value of the composite transport disadvantage score has been used as a threshold to identify transport disadvantages. Transport disadvantage scores have been recoded as NTD (0) and TD (1) as a binary dummy variable. Respondents with lower transport-disadvantaged scores than the mean are recoded as TD, and those with higher transport-disadvantaged scores than the mean are recoded as NTD. A binary logistic regression has been operated to identify the transport-disadvantaged groups, ascertaining the effects of explanatory variables like gender, age, types of vehicles available, travel alone, occupation, dependency ratio, and the number of vehicles available on the likelihood that respondents have transport disadvantages.

1.6 Limitation

Secondary data collected from the district census handbook of Cooch Behar 2011 and the Socio Economic and Caste Census 2011 have been extensively referred to in Chapter 5 since 2021 Census yet to be available. Being a bordering district, access to topographical maps, the open series map published by the Survey of India, and a few other secondary sources related to Cooch Behar District was restricted.

1.7 Findings

The overall research findings raise some critical issues that had previously been mainly neglected by the stakeholders, like academicians, policymakers,

politicians, the administration, and the people of the study area. Evidential literature and the field survey have explored these issues and gaps. There is a need to develop a holistic transport policy framework for the development of the study area.

There was no separate Cooch Behar before the middle of the sixteenth century. It was a part of Kamrup and Kamtapur. The area observed several changes in the political powers, the shifting of kingdoms, and the shifting of boundaries. Without any important urban centres, none of the early routes directly connects Cooch Behar. Initially, the transport system of Cooch Behar was dependent on inland navigation, complemented by a cart-based road transport system controlled by geographical and climatic limitations.

The road transport system in Cooch Behar developed around Kamtapur. With the decline of Kamtapur and the emergence of Cooch Behar, the gravitational point of the transport system in Cooch Behar shifted to the present-day Cooch Behar town. Roads were following the river banks in a north-south direction to avoid geographical limitations like river crossings and shifting river channels. The transport system of Cooch Behar was mainly developed to connect the road system of Rangpur to Calcutta. With the inception of technological innovation in the form of railways, the existing transport system in Cooch Behar was reorganized. The railways achieved primacy and subordinated the roads and inland navigation. Transport systems connecting the east and west started in Cooch Behar to provide sufficient traffic to the railways.

The gradual development of the transport systems in the district is not linearly sequential. Political and economic circumstances interrupted the flow of the evolution of transport systems. These interruptions brought a significant realignment of the

existing road network, followed by dormancy periods in transport development. Thus, the development of the transport system in the Cooch Behar district is not only the product of the social-economic and geographical environment but has also greatly influenced the region's political context. The development of the transport system in Cooch Behar has been deeply rooted in the historical and geographical context. It is argued that the prevailing geographical limitations, changes in foreign policies, and shifting of powers among the rulers in Cooch Behar have resulted in shifting the prioritization and development of transport systems.

India's independence, followed by the Radcliffe Line's origin as an international border between Cooch Behar (Indian Side) and East Pakistan (presently Bangladesh), divided the existing transport system in Cooch Behar. The redistribution of the boundaries with new dimensions and the shifting of the places of importance collectively led to the redirection of the mobility of the citizens of the area. Consequently, the existing colonial transport networks extending across the international border of the district have gradually lost their importance. Ultimately, the roads, railways, and waterways were withdrawn and abandoned. Many geographical areas of the district, like Haldibari, Mekhliganj, and Kuchlibari, become isolated from the main geographical territories. However, the road and rail distances and travel times of the places to be accessed from the district have also increased at the same time. For instance, the district has become remotest from the state capital of Kolkata due to the partition. For reasons of national security, the movement of people, goods, and vehicles is restricted in the district's border villages. Bordering blocks like Sitai, Sitalkuchi, Dinhata I and II, and Mekhliganj have comparatively lower transport infrastructures like road and

rail connectivity. As a result, the residents' rights to access service facilities at their preferred time and location are violated.

As part of the nation-building process, which started in the post-colonial era, India initiated the development and realignments of road and railway transportation as per the new demand that originated due to independence. Thus, road and railway lengths have been increasing within the district since independence. With the rapid development of the road system, both in terms of its length and quality, followed by the growth of motorized vehicles, the transport system of Cooch Behar significantly improved in the post-independence period. Both the quantity and quality of services provided by the railways have also increased. Consequently, Cooch Behar, once a region with good transport connectivity and accessibility compared to its time and place, became transport-disadvantaged. Thus, the current development of the transport system in Cooch Behar has been strategically ill-fitting and inefficient due to the presence of irregular international borders.

Transport disadvantage in the Cooch Behar district is a widespread phenomenon. It can be argued that the transport disadvantages in Cooch Behar resulted from the spatial mismatch between transport needs and supply (accessibility). The presence of an international border and the local geographical character of the district play a vital role in creating transport disadvantages.

The discussion reveals that out of the 1105 villages under study, 764 villages have been identified as transport-disadvantaged villages, which consist of 69.1 percent of the total villages in Cooch Behar District. A total of 1377812 (54.85 percent) residents of rural Cooch Behar have been identified as being transport disadvantaged. Out of 3184.73 sq km of inhabited areas in Cooch Behar district, 2014.34 sq km

(63.24 percent) are in transport-disadvantaged condition. The highest number of transport-disadvantaged villages can be found in Mekhliganj Block (78.2 percent of villages), and the maximum number of transport-disadvantaged populations can be found in Dinhata II Block (68.61 percent). However, the lowest number of transport-disadvantaged villages (48.6 percent) and transport-disadvantaged populations (34.46 percent) can be found in the Cooch Behar II block.

More than 70 percent of the total villages of the bordered blocks of the district, like Haldibari, Mekhliganj, Mathabhanga I, Sitai, Sitalkuchi, Dinhata I and II, and Tufanganj I, are in transport-disadvantaged condition. Besides, more than 55 percent of the rural populations of these blocks, except Haldibari, are in transport-disadvantaged conditions. It is found that 80.74 percent of the total bordered villages (130 villages) with 62.11 (270687 population) percent of the total rural population residing in those bordered villages covering geographical areas of 367.78 sq km (64.11 of the total bordered village area) belong to transport disadvantaged conditions.

Panisala Prathami Khanda; Dwarikamari Ratanpur; Uttar Jamaladaha Balapukharia; Bara Kuchlibari; Andaran Kuchlibari; and Chhota Kuchlibari of Mekhliganj Block; Uttar Chhat Lotafela; Bara Garol Jhora; Marnia Dwitia Khandi; Bilkalaighati; and Atialdanga of Dinhata II Block; Jarihallasadi; Daribash Prothamkhanda; and Haridaskhamar of Dinhata I block, Tattaram; and Dakshin Samilabas of Haldibari Block, Chenakata and Balarhat of Mathabhanga I Block, Gopalerkuthi of Tufanganj I Block, Chorkhana of Sitai Block and Sangarbari of Sitalkuchi Block are highly transport-disadvantaged and populated villages located along the India Bangladesh border.

Most of the transport-disadvantaged villages with more than 500 inhabitants are located in floodplain regions, which are subjected to being inundated during the rainy season every year. It is found that 23 transport-disadvantaged villages with a population higher than 500 (33.82 percent) are located in the older flood plain, and the remaining 22 transport-disadvantaged villages (32.35 percent) are located in the active flood plain. The active flood plains are very often flooded three to four times a year. Transport-disadvantaged villages located in active flood zones remain isolated from the rest of the world for a considerable time.

Proximity opportunities, social status, mobility infrastructure, transport options, affordability, psychology, and comfort etc. were the main factors that created a transport disadvantage in the sample villages. The study found that the villages located furthest from the sub-divisional headquarters, like *Uttar Jamaladah Balpukhari*, *Chorkhana*, and *Shibpur*, have comparatively higher transport disadvantaged than the villages located closest to the town. Thus, the transport disadvantage spaces in Cooch Behar are not evenly distributed.

The dependency ratio, travelling alone, types of vehicles available, age, and number of vehicles per family have significantly contributed to the transport disadvantage. On the other hand, the remaining two predictor variables, namely gender and occupation, have no statistically significant contribution to the production of transport disadvantages. It is found that older or middle-aged males with no personal vehicle who are not allowed to travel alone and belong to families with a higher dependency ratio and a higher number of vehicles in the family are transport disadvantaged.

It is evident that the geography of services provided by the NBSTC as a public sector has declined since the 1990s. Most of its decline occurred between 2010 and 2011.

Routes connecting rural areas were withdrawn. Consequently, the total number of routes was reduced to 207 in 2010-11, which was less than half that of the previous decade (440 routes in 2000-01). Goods transportation services were abandoned in 1997-98 and passenger transportation services were confined to urban areas and centers due to the continuous withdrawal of rural routes. 68.50 percent of the inhabited villages in Cooch Behar were left out of the bus connectivity, having higher transport needs with lower supplies.

Since the 1980s, the number of different types of private vehicles has started to increase. The impact of liberal economic policies in the 1990s opened the door to the private players in the transportation sector and Cooch Behar is not exception. In 2011, private vehicles (65516 registered vehicle in the district) outnumbered public vehicles by a 248.71 percent decadal growth rate.

A vacuum in the transport services in Cooch Behar has existed since 1991 due to the continuous failure of the NBSTC. People have to seek alternative means of transportation to satisfy their transportation needs. Small private players started to fill the gap. Ultimately, the created vacuum has been occupied by private players during the decade of 2011 as an intermediate means of transport to satisfy the unmet transportation needs of the people.

Toto (an e-rickshaw), *Vutvuti*, Auto, Maruti-vans, Maximos, Motorcycles, Van rickshaws, Cycle rickshaws, Bicycles, and animal-powered vehicles have been used by the residents of the district as an alternative means of transportation to satisfy their intermediate transportation needs. The study found that e-rickshaws are the primary available shared transport vehicles in the district, providing demand-responsive services at the last mile of connectivity. Residents of the studied villages prefer e-

rickshaws to access different service facilities like the nearest markets, bus stops, health centers, schools, and banks. Residents of the villages located beyond walking distance preferably use e-rickshaws to access the services. For instance, *Chorkahana* (10.8 km), *Panikhawa* (7.7 km), *Uttar Jamaldah Balapukhari* (7.1 km), *Sibpur* (3.5 km), and *Chhat Jamaldah* (3.9 km) are located more than three kilometers away from the nearest bus stop and use e-rickshaws.

Thus, it can be argued that the e-rickshaws have been emerging as an intermediate means of transportation in the rural areas of Cooch Behar district, providing smooth, demand-responsive shared transport facilities door to door. Due to the emergence of e-rickshaws as an intermediate means of transportation in rural Cooch Behar, van-rickshaws and cycle-rickshaws have disappeared from the roads of Cooch Behar. Very often, e-rickshaws play the role of conventional transport systems up to 24 km distances to connect rural areas with the nearest town.

The six villages under the current study are qualified to be considered under PMGSY (since 2001). But the villages like *Shibpur*, *Chorkhana*, *Uttar Jamaldah Balapukhari*, and *Chhat Jamaldah* are not considered to avail themselves of the scheme in their Gram Sabha or by the district authorities. The entire road network in the villages relies on non-metalled and *Kutcha* roads, where motorable mobility and goods movement are difficult. This has a serious impact on the residents' access to the village market for their agricultural products and their ability to avail themselves of the basic facilities of health care and educational services. The image data of the six villages during 2011–2021 indicates the failure of decentralised governance and district-level planning. Out of six, there are two villages that are situated within the borders, namely, *Uttar Jamaldah Balapukhari* and *Chorkhana*, which are supposed to

be receiving an additional grant under BADP. Yet the same situation persists in these villages too. In a nutshell, it is to be communicated that the state of West Bengal has implemented its three-tier panchayat governance as per the 73rd Amendment. The stable government for 35 years (1977-2011) and the current government have grossly failed to deliver village governance and infrastructural development as per the mandatory provisions of the 11th schedule of the 73rd Amendment. This failure has fueled the emergence of alternative means of transportation with the involvement of the private sector, which ultimately led to a complete reliance on intermediate means of transport.

The right to access service facilities has always been a serious issue for the marginalized section of the population of the study area. As a consequence of remote location, absence of public transportation, lack of road connectivity and road infrastructures, and socioeconomic marginalization, a section of people have been surviving at the frontier of society. The e-rickshaw has changed the mobility patterns of the residents of the study area. The e-rickshaw is included in the daily routine of the residents of the study area. In building social relations, accessing service facilities, and earning livelihoods, e-rickshaws have been preferred by the respondents. As a result, e-rickshaws became an integral part of the lives of the respondents in the study area.

Using the e-rickshaw, people are more mobile and traveling faster than before. Due to their weather friendliness, e-rickshaws have been comfortably usable during the rainy season. It has been used frequently by the people of the study villages to satisfy all kinds of daily requirements, ranging from marketing to goods transportation. Very often, it is used as a personal vehicle. Due to their flexibility, sometimes e-rickshaws

have played the role of conventional means of transportation. E-rickshaws have been providing transportation services for 24 hours, ranging from short to long distances.

The introduction of the e-rickshaw increased women's mobility and enhanced their participation in various aspects of society. Females travel more frequently to the market, banks, health centers, and other places, including educational institutions, without being hesitant or dependent on their male counterparts.

The impact of the *Toto* (e-rickshaw) deregulation and lack of government initiatives is seen in surging fares among different places, no coverage of accidents and casualties, and, in some cases, restricting the mobility of people due to unregulated fares. Therefore, a contradiction in their transport services using e-rickshaws is evident in the villages. In one sense, they have provided an opportunity to the people by reaching agricultural and household products in the rural markets, accessing educational services for children and adults, providing health care facilities for senior citizens and women, providing administrative service facilities, etc. On the other hand, there is an insecurity tag with this kind of mobility, as any insurance facility does not cover e-rickshaws.

1.8 Suggestions

Governmental Initiatives

1. Four transit corridors should be created through Bangladesh. The corridors will reduce travel distance, time, and cost to and from Cooch Behar.
2. Colonial railway systems like the Assam Bengal Railway line should be reopened to connect Dhubri in Assam with Cooch Behar in West Bengal via Gitaldaha, Bamanhat, and Vurungamari (located in Bangladesh).

3. The Haldibari–Chilahati railway line was already reopened by the government on December 17, 2020, connecting New Jalpaiguri with Dhaka. It should be expanded to connect Kolkata via Kaunia, Santahar, and Iswardi stations located in present-day Bangladesh.
4. Two local road transit corridors should be created to connect Mekhliganj with Mathabhanga via Patgarm (presently Bangladesh) and another to connect Sitai with Mekhliganj via Baura (located in Bangladesh).
5. The Bhamhaputra-Tista navigation system should be re-established based on the available navigability of the rivers.
6. The government should utilize the BADP fund to increase accessibility and overall development for 130 transport-disadvantaged villages located along the border areas covering 367.78 sq km areas. The construction of all-weather roads connecting the border villages will enhance social inclusion.
7. Integrated transport planning has to be formulated and implemented by incorporating railways, public, private, and intermediate means of transport systems for local and regional interests. Bus routes of the NBSTC and private buses should be increased, connecting more villages. The fleet strength of the NBSTC should be increased.
8. Services provided by e-rickshaws should be regularized and monitored. The government should provide registration for all e-rickshaws providing services. Under systemic government policy, the operating schedule, fares, and routes of such intermediate modes of transportation must be regularised. Time schedules and fare charts for different transport services must be made available to the users.

9. All settlements having more than 500 inhabitants have to be connected with the all-weather pucca roads (PMGSY). Governments must make new route permits available to connect the unconnected habitations.

Non-Governmental

Private transport service providers should ensure smooth and quality transport services and maintain proper time schedules and reasonable fares. E-rickshaw owners have to take the initiative to form registered organization to ensure the quality of their services by following a fixed schedule and routes.

Self-Help Method

Transportation-related issues like the failure and weaknesses of the transportation services offered by the public and private actors, including e-rickshaws, should be brought up in the gramme sabha meetings to direct their demands to the blocks and district authorities. Additionally, more people should ride bicycles. Passengers should maintain transportation-related rules and regulations transparently.

1.9 Conclusions

Therefore, from the entire discussion, it is evident that the development of the transport system in Cooch Behar has been deeply rooted in historical and geographical contexts. The gradual development of the transport systems in Cooch Behar is not linearly sequential. The development, distribution, and access to the transport system in the study area are embedded in the consequences of the intra- and interrelationships between the historical, geographical, social, economic, and political conditions.

The transport disadvantage in Cooch Behar is a widespread phenomenon. It is not evenly distributed. International border areas and other peripheral areas are the most disadvantageous. It is found that older or middle-aged males with no personal vehicle who are not allowed to travel alone and belong to families with a higher dependency ratio and a higher number of vehicles in the family are transport disadvantaged. Thus, people in Cooch Behar district belonging to different groups are not equally affected by the transport-disadvantaged condition.

Thus, the people of rural Cooch Behar can be observed in terms of hierarchy, with transport-non-disadvantaged people at the top who can move when they want, availing of transport and other facilities, and, on the other hand, transport-disadvantaged people at the bottom who can't move when they want. Evidently, "transportation is a resource to which not everyone has equal access," and the issues related to transportation are both technical and social, which need to be solved considering their social repercussions.

Due to the lack of adequate transportation facilities, people must seek alternative means of transportation to satisfy their needs. The e-rickshaw has been emerging as an intermediate means of transport, providing last-mile connectivity. The services of the e-rickshaw are not regularly and appropriately regularized, resulting in several transport problems for the users. The e-rickshaw is included in the daily routine of the residents of the study area. In building social relations and accessing service facilities to earn livelihoods, e-rickshaws have been preferred. Despite their shortcomings, the e-rickshaws became part and parcel of the lives of the people in the study area.

Unfortunately, Cooch Behar district lacks integrated transport planning to address the transport-disadvantaged condition. Lack of proper policy formulation has been the

central issue related to the misfortune of vulnerable people. Area-specific and case-specific policies need to be formulated to establish social justice and reduce deprivation in micro-geographies such as border areas. The present opens the door for further research on transport-induced spatial exclusion in bordered villages and the impact of borders on the transport geographies of post-colonial countries.