



Determine the regions of outmigration in North-East India: a cross-sectional analysis

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Abstract The present study explores the regional pattern in the process of out-migration. Presence of heterogeneity in ethnicity propagates North-East as an emerging region of outmigration in India. North-East India has experienced out-migration in all the areas but certain areas have experienced higher intensity in out-migration—which needs special attention. The study also tries to determine the source regions of out-migration in North-East India characterized by utmost regional contrasts in physiographic, cultural, and economic development. For the present study migration data has been collected from the census of India and the National Sample Survey Organization. Regions of out-migration have been demarcated with the help of the GIS techniques. The present study revealed that most of the parts of Mizoram, Arunachal Pradesh and some parts of

Nagaland, and parts of lower and upper Assam have experienced excessive out-migration as compared to the other parts of North-East as well as in India. Unemployment and education are the root causes of out-migration for both male and female migrants in North-East India. Besides, immigration and communal conflict are the hidden multipliers that accelerated out-migration from various parts of the North-East.

Keywords Communal conflict · Out-migration · Preferred regions · Tea garden · North-East India

1 Introduction

Out-migration is defined as “Any former member of a household who left the household, any time in the past, for staying outside the village/town, considered as out-migrant provided he/she was alive on the date of the survey” by NSSO [1]. Of late out-migration is acknowledged as a significant generator for socio-economic development and fundamental understanding of constantly changing population scenario in different developing countries like India [2]. Obstructive regional imbalance and disparate development in India motivate out-migration from the section of agriculturally and economically depressed rural areas. It was triggered by the economic reform of India during the 1990s and, as a consequence regional imbalance has occurred [3]. Out-migration is a livelihood strategy, received landless agricultural labours and poor rural people mostly from rural areas to urban areas [4–6]. Cebula [7] argued that income, quality of life, and cost of living are playing an important role in migration decisions. Moreover caste, custom and religion, etc. act as an important role for migration [8]. On the other hand, well transport and

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communication system, high employment opportunity and high agricultural wage rates are the basic factors for rural to urban out-migration [9–11]. Out-migration is greater in the poor developed agricultural areas and particularly high among the landless farmers [12]. An increase in agricultural productivity, as well as technological change in agriculture, provides a surplus for the transfer of labour to the growing industrial sector [13]. There are various migration theories and models introduced by several authors to explain the nature, patterns, causes and consequences of migration. Among them, one of the oldest models is that of Ravenstein's model [14]. He developed a theoretical basis for human migration. Some of the important assertions in the law of Migration outlined by Ravenstein are patterns, migratory streams and migration motives, characteristics of migrants and distance of migration. Lee [15] too postulated a general schematic framework for analyzing the volume of migration, development of streams and counter streams and the characteristics of migrants. Migrants consider the labour market opportunities available in the rural and urban sectors and the probability of obtaining an urban job [16]. Thus, economic theories can explain two different perspectives on migration [17]. These two contexts are Neo-classical Economics (NE) and the New Economics of Labour Markets (NELM) theory. According to these theories, migration is governed by geographical differences in the supply and demand for labour rich versus capital-rich countries.

Assam, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram and Tripura are the seven states situated in the North-Eastern part of India. North-East India has a long history of migration. During the British colonial period, groups of immigrants were come from central India and engaged in the tea gardens of North-East India [18–21]. But in recent past decades, a large number of people were migrated from these regions due to communal violence [19, 22, 23]. Each state experiences a specific pattern of out-migration. Most of the migrants in Mizoram are migrated to Aizawl (state capital) for searching work opportunity [24]. Another important reason is illegal immigration from Bangladesh to Mizoram which created tremendous pressure on the man-land ratio [25]. While, Arunachal Pradesh experienced a high rate of migration due to tribal traditional movement, shifting cultivation, lack of employment and educational facility [26, 27]. On the contrary, Meghalaya has witnessed a low rate of tribal out-migration since the historical era due to the fragile communication gap with mainland India and orthodox customary laws of tribes living in Meghalaya [28]. Assam is also experienced massive inter-state and inter-district migration due to communal violence and insurgency [19, 22, 23]. Similarly, Nagaland state also experienced

huge illegal infiltration which created communal conflict with Naga community and, the final result is out-migration for both the community [25]. The nature of migration or out-migration is discovered to be a complex phenomenon when viewed from different perspectives. One of the more important perspectives is a regional analysis as different regions display diverse potential. In the recent past, this region experienced a rapid increase of out-migration. The people from different places in North-East India have not only crossed district boundaries, but they have also gone much beyond crossing the state and international boundary too. This part of India had faced massive in-migration during the British colonial period due to the huge demand for wage labour in tea plantation factory and tea gardens. With time, the pattern of migration has changed with space and time due to policy implementation by the government. After the independence of India, some of them returned to their native region, but most of them did not come back. In the last few decades, some parts of North-East India came across communal conflicts which create tremendous out-migration flow. North-East India has experienced out-migration in all the areas but certain areas have experienced higher intensity in out-migration which demands special attention. Except for some parts of Brahmaputra Plain in Assam, entire North-East India revealed a high degree of backwardness i.e. hilly mountains, infertile soil, landlessness, illiteracy, low agricultural output, scarcity of industries and economic development which led to chronic propensity of out-migration. The study focuses on the inter-district, inter-regional flow of out-migration and identifies the migration predominance regions in North-East India.

2 Data and methods

The present study is based on secondary data that have been accumulated from the Census of India, migration table D and Unit Level Data of 64th round of National Sample Survey [1] which was conducted in 2008–2009. District wise information on migration and the related aspects have been collected from different secondary sources. The data are collected to portray the inter-district variations on the pattern, flow and destination of out-migration in North-East India. The study is both descriptive and analytical in nature.

The present study is based on descriptive and explanatory research. These approaches comprise quantitative techniques of measurement. The quantitative measure will determine the factors which control the intensity, duration and nature of out-migration in North-East India. The districts are taken as the basic unit of the study. The total number of 82 districts in the seven states of North-East India in 2011 are considered for this present study. The

secondary information is used for showing the inter-district spatial pattern and regional patterns, flows, destination place and reasons for rural out-migration as a whole in North-East India. Here, both male and female migrants have given equal importance.

The study classifies migrants based on place of birth to estimate the quantum of out-migration (Census of India, Migration table, D-11: Persons Born and Enumerated in Districts of the State/UT—2011). Whereas, Inter-state level out-migration has been calculated based on place of the last residence (Census of India, Migration table, D-2: migrants Classified by Place of Last Residence, Sex and Duration of Residence in the Place of Enumeration—2011). Percentage of total, male and female out-migration is calculated as total male and female out-migration to total male and female population respectively. Reasons for out-migration is analyzed based on NSSO data [1]. NSSO has provided reasons for out-migration at the household level.

For the calculation of the out-migration rate at the inter-district level, Clark [28] method is used. The rate of out-migration is calculated by the sum of the differences between the total out-migration of a particular place and the total population. The calculation is explained as [Eq. (1)]:

$$OM = \frac{O}{TP} \cdot K \tag{1}$$

where *OM* Out-Migration rate, *O* Number of Out-migrants, *TP* Total Population, *K* constant (usually 1000 or 100).

Rate of in-migration is calculated by the sum of the differences between total in-migration of a particular place and total population. The calculation is explained as [Eq. (2)]:

$$IM = \frac{I}{TP} \cdot K \tag{2}$$

where *IM* In-Migration rate, *I* Number of In-migrants, *TP* Total Population; *K* constant (usually 1000 or 100).

Migration balance is calculated by the sum of the differences between inter-districts out-migration and in-migration [29]. The balance of migration is calculated as [Eq. (3)]:

$$Bm = \frac{E}{I}$$

where *B m* Balance of migration, *E* Emigration/Out-migrants, *I* Immigration/In-migrants.

Inter-regional out-migration has been analysed by using the mean and standard deviation method. The range of out-migration has been classified by using mean and standard deviation method by following formula [Eqs. (4), (5)]:

$$\bar{X} = \frac{\sum x}{n}$$

$$\sigma = \sqrt{\frac{\sum (x - \bar{X})^2}{N}}$$

where \bar{X} denotes Mean, σ Standard Deviation, *N* Number of observation.

The volume of male out-migration and different socio-economic variables of inter-district out-migration has calculated by Karl Pearson’s method. The correlation co-efficient has been calculated as [Eq. (6)]:

$$r = \frac{\sum XY - \frac{\sum X \cdot \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

3 Results and discussions

Migration is a common phenomenon in different parts of India and phases a tremendous proportion of rural to urban migration. It creates rapid urban growth in any part of the nation. Many factors are responsible for such migration like economic, social, political, cultural and environmental. Inter-district out-migration rate is defined as the proportion of total out-migrants from the given region to the total population of that region in a specific period [30]. In the Indian Territory, the easternmost states are located in North-Eastern India. This part is also known as seven sisters of Himalaya (Assam, Arunachal Pradesh, Manipur, Nagaland, Meghalaya, Mizoram and Tripura). This region is different in terms of social and cultural traditions from the mainland of India. After the independence of India, this region has experienced massive changes in demographic, cultural and social phenomena. This was a major migration receiving region in India during the British colonial periods due to the enormous demand for tea garden workers. Though, in recent periods this region has emerged as one of the source regions of migrants in India.

3.1 Regional pattern

The pattern of out-migration in North-East India is peculiar in nature. Bandyopadhyay and Chakraborty [31] have divided the pattern of migration in North-East India into three groups i.e. foreign migrants, inter-state and intra-regional migration. This present study has covered 82 districts taken from seven North-Eastern states in India to show a regional pattern of out-migration. Census of India provides migration data based on place of birth and place of the last residence. The range of out-migration has been classified by using the mean and standard deviation

method. The rate of total out-migration varies from one district to another district; from one state to another. The census of India migration data suggested that four traditional excessive out-migration regions have been found in North-East India. The greater parts of Mizoram state experienced the highest inter-district out-migration in North-East India (Region-1). This region experienced an average of 18.34 percent out-migration rate. Almost all the districts from Mizoram state are experienced a high and very high rate of out-migration which is also highest in North-East India (Fig. 1). Champhai district experienced the highest rate (30.87%) of out-migration in this region followed by the Serchhip (23.04%) district. Out of total migrants in Mizoram, around 60% were intra-state and they are migrated in urban areas [24]. The population redistribution in Mizoram is strongly associated with rapid urbanization and working opportunity in urban areas. The continuous mountain track is not suitable for agriculture but Mizo society is largely associated with subsistence agriculture. The Mizo economy is largely dominated by subsistence ‘*shifting Cultivation*’ in the valley slope (Table 1). The Mizo tribes are engaged with ‘*shifting Cultivation*’ and they are migrated with the whole family as well as the entire group of people after a while. From this point of view, most of the districts of Mizoram are faced a high rate of inter-district out-migration in North-East India. Moreover, the lack of employment opportunities and education are effective factors behind the migration in

Mizoram. Most of the migrants in Mizoram are migrated to Aizawl (state capital) for searching work opportunity [24]. Another important reason behind the increasing migration rate is illegal immigration from Bangladesh to Mizoram which creates tremendous pressure on the man-land ratio [25].

Out-migration patterns are significant when this is explained at the regional level. Arunachal Pradesh experienced the second-highest out-migration region (Region-2) in North-East India. This region experienced an average of 17.97 percent out-migration rate. Most of the districts i.e. Lower Subansiri, West Siang, Upper Siang, Kurung Kumey, Anjaw and Dibang Valley experience high and very high rates of out-migration. In this region, the Dibang Valley district recorded 37.37 percent of out-migration which ranked highest in Arunachal Pradesh as well as in North-East India. Due to tribal traditional movement, shifting cultivation, lack of employment and poor educational facility are the dominant factors for out-migration [26, 27]. This region is located entirely in the eastern Himalayan hilly track. Extreme climate, heavy rainfall, undulating surface, lack of agricultural land and lack of work opportunity in the village level are the leading causes behind the high rate of out-migration.

The third highest migration region is found in between upper Assam and Nagaland state (Region-3). This region experienced an average of 12.43 percent out-migration rate. Two districts of Nagaland and three districts of Assam

Fig. 1 Regional pattern of out-migration in North-East India, 2011

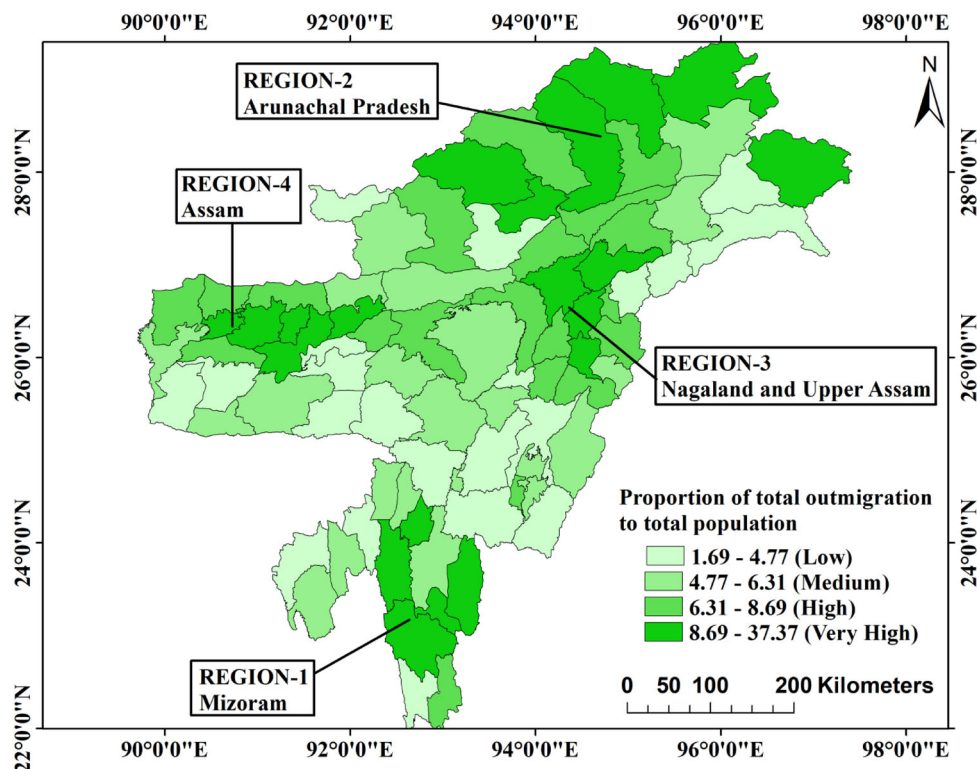


Table 1 Summary of details inter-district outmigration patterns in North-East India. Source: Census of India, Migration Table D 11: persons born and enumerated in districts of the state and data have been computed

Regions	State	Districts	Average percentage
Region-1	Mizoram	Mamit, Kolasib, Champhai, Serchhip, Lunglei, Saiha	18.34
Region-2	Arunachal Pradesh	Lower Subansiri, West Siang, Upper Siang, Dibang Valley, Kurung Kumey, Anjaw	17.97
Region-3	Upper Assam	Dibrugarh, Sibsagar, Jorhat	13.77
	Nagaland	Mokokchung, Zunheboto	
Region-4	Lower Assam	Marigaon, Bongaigaon, Barpeta, Nalbari, Kamrup, Darrang	12.43

experienced a high rate of out-migration (Table 1). Moreover, in Assam, two out-migration regions have been identified (Region-3 and Region-4). One region is located in lower Assam and another in upper Assam. Upper Assam out-migration region is separated from Arunachal Pradesh (Region-2) by the Brahmaputra River. Communal conflict is the chronic reason for out-migration in Assam. There are several studies related to conflict with the homeland; socio-ethnic, political and tribe-non-tribe issues provide enough evidence for migration in Assam. In some parts of Assam like Goalpara, Kamrup, Darrang and Nowgong districts are facing insurgency and violence for a long time. A large number of people are migrated due to communal violence from these regions [19, 22, 23]. Causes of immigrants in Assam from East Pakistan were linkage with co-religious groups in neighbouring districts of Goalpara, Kamrup, Darrang and Nowgong [32, 33]. Moreover, skilled migrants from Rajasthan, Punjab, Bihar played an important role in the management of the tea garden especially in Sibsagar and Lakhimpur districts [18]. Two major groups of immigrants in Assam were found. The first category was Bengali Muslim who mainly came from the Mymensingh district of Bangladesh. They gradually occupy the land for cultivation in Assam. On the other hand, the second group of immigrants came from central India [19]. They were engaged in tea gardens during the British period [20, 21]. After the independence of India, some were returned but most of them did not go back. In the last few decades, some parts of Assam faced communal conflict which creates tremendous out-migration. A similar migration pattern is also identified in Nagaland-Assam border areas. Nagaland is also experienced communal conflict due to huge illegal infiltration. In Nagaland, 30.29 percent of common men felt that illegal in-migration is a threat for them to sustain their ethnological identity which leads to communal conflict and the final result is out-migration for both the communities [25].

The migration data suggested that four traditional excessive male outmigration regions have found in North-East India (Fig. 2). The greater parts of Mizoram state experienced highest inter-district male outmigration in North-East India (Region-1). This region experienced an

average 17.45 per cent outmigration rate. In North-East India, six districts from Arunachal Pradesh (Region-2); three districts from Nagaland (Region-3) and three districts from lower Assam (Region-4) have experienced a high rate of male outmigration. Similarly, North-East India has experienced diverse nature of female outmigration in comparison to male. The study depicts the regional pattern of female outmigration in the North-East Indian state (Fig. 3). There are four dominant regions of female outmigration in North-East India. All the regions are experienced a similar pattern of outmigration as male outmigration. Among the North-Eastern states, Meghalaya is predominant on female outmigration than male counterparts. In Meghalaya, female is more migrated compared to male but the rate of out-migration is low compared to other North-Eastern states. Meghalaya has witnessed low rate of tribal out-migration since historical era due to fragile communication gap with the mainland India and orthodox customary laws of tribes living in Meghalaya [34]. As Meghalaya is a matriarchal society, therefore female doesn't practice migration after but do by the male. But on the other hand, the rest of the country faced overwhelmingly female migration due to marriage [34]. In North-East India, three districts from Mizoram; four districts from Arunachal Pradesh and Meghalaya, six districts from Nagaland has experienced a high rate of female out-migration compare to male.

The volume of different inter-state flow of out-migrants in North-Eastern states is shown in Fig. 4. The figure shows the pattern of inter-state out-migration. It denotes that Assam is the preferred destination region in North-East India. Inter-state out-migration flow revealed that about three-fourth of out-migration only received by Assam other in North-Eastern states India. Nagaland sends about 80.21 percent of the total migrants to Assam (Fig. 4). Similarly, Arunachal Pradesh sends about 88 percent of the total migrants towards Assam. Manipur sends about 30 percent out-migrants to Nagaland followed by Mizoram (26.07%) and Assam (25.99%) respectively. Tripura receives about 72.43 out-migrants from Mizoram. On the other hand, Assam received one-third of the total out-

Fig. 2 Regional pattern of male out-migration in North-East India, 2011

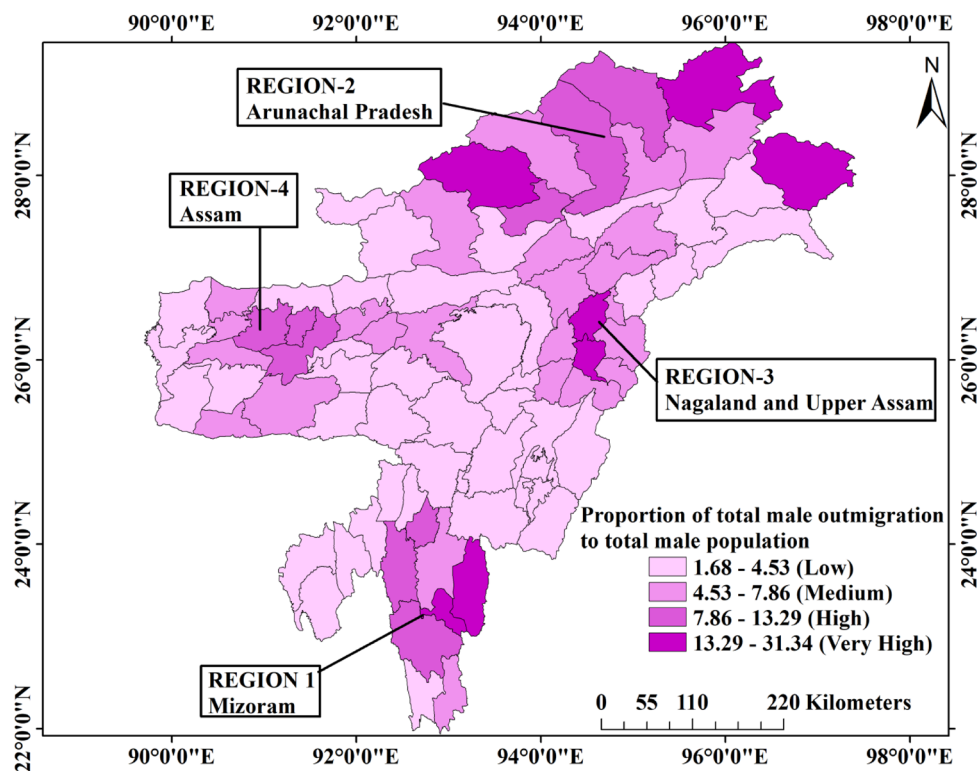
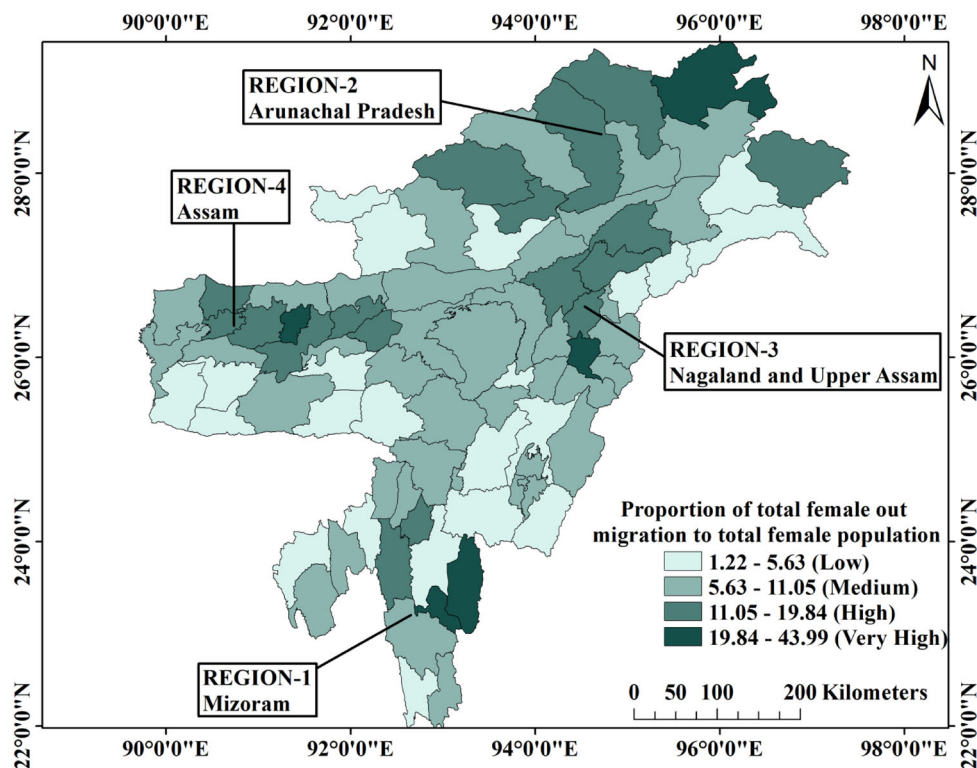


Fig. 3 Regional pattern of female out-migration in North-East India, 2011



migrants of Tripura. Meghalaya sends a greater proportion of out-migrants (84.65%) towards Assam. Though, a greater proportion of out-migrants from the North-Eastern states are moved towards Delhi, Mumbai, Gujarat, and

south Indian states. About half of the total migrants are moved towards western and northern India. The people of North-East India moved towards economically and industrially developed region outside North-East India.

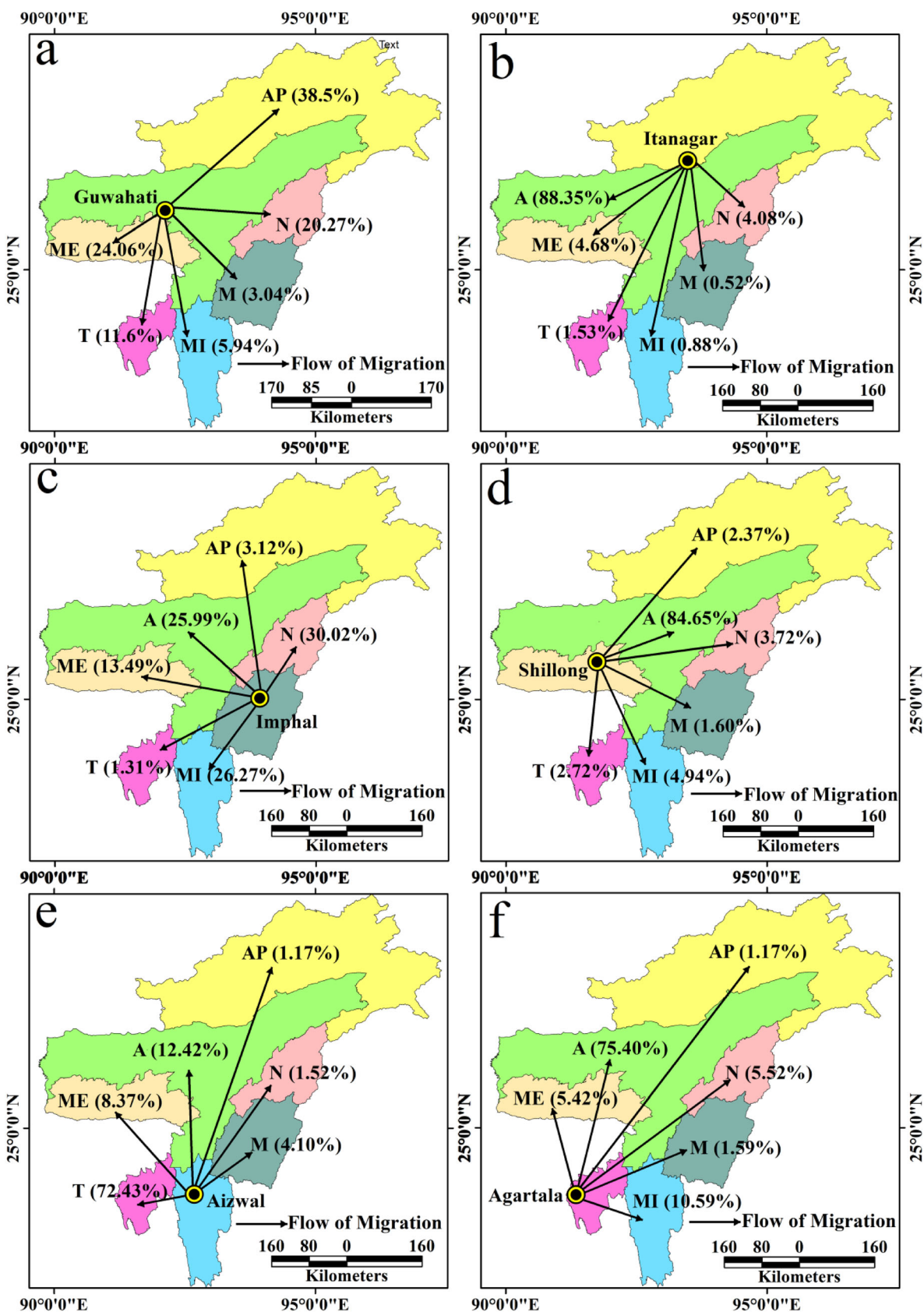


Fig. 4 Inter-state flow of outmigration in North-East India, 2011. Maps showing North-Eastern state as **a** Assam, **b** Arunachal Pradesh, **c** Manipur, **d** Meghalaya, **e** Mizoram, **f** Tripura

Moreover, education and employment are the leading reasons for the increasing rate of out-migration from North-East India.

3.2 Balance of migration

Migration balance is to be understood by the sum of the differences between inter-district out-migration and in-migration [29]. Migration balance could be positive or negative. Migration balance is negative when the calculated value is below 1 (one) and a positive balance is just the opposite of the negative balance [Eq. (3)]. A positive balance indicates the drawing capacity of the economic and demographic forces of the district concerned. On the other hand, a negative balance indicates the draining capacity of the economic, cultural and demographic forces [29]. The study shows that out of the total 82 districts 29 districts experienced a negative balance of migration (Table 2). These 29 districts received a higher number of in-migrants compared to out-migrants. That means these districts have pull factors that attract more migrants from the other districts in North-East India. Among the 16 districts in Arunachal Pradesh, only 5 districts are experienced a negative balance of migration. Only two districts from Nagaland observed a negative balance of migration out of 11 districts (Fig. 5). Kohima and Dimapur districts received a higher

number of in-migrants and send a lower number of out-migrants. These two districts have higher development in Nagaland which attracted a huge number of migrants. The negative balance of migration in Manipur was observed in four districts. Aizawl and Lawangtlai districts from Mizoram received a negative balance of migration. Similarly, two districts from Tripura and Meghalaya received a negative balance of migration. Out of 27 districts in Assam, 12 districts are observed a negative balance of migration which is highest in North-East India. The majority of the districts are situated along the Brahmaputra valley. A negative balance is confined to those districts and regions that receive a large number of in-migrants from other districts and regions. These regions have potential agricultural, economic and industrial forces for which they dispatch a lesser number of emigrants in different districts and regions. A positive balance is confined to regions and districts that receive a lesser number of in-migrants from other districts and regions and transmit a large number of emigrants to different districts and regions for deficient nature of economic and demographic forces.

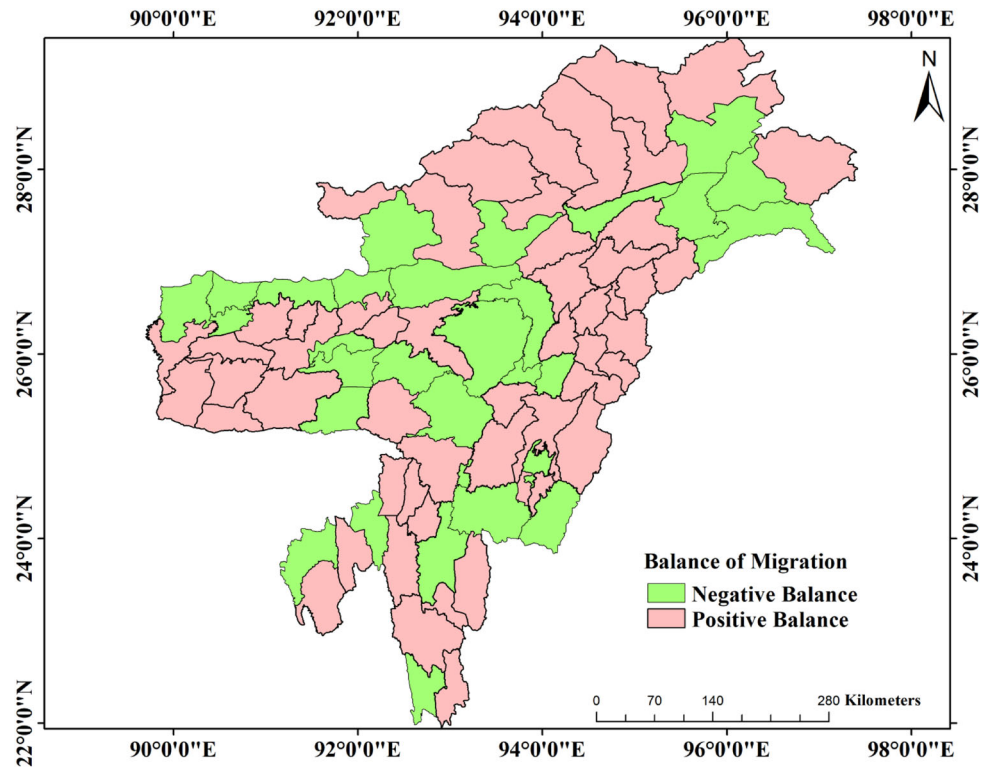
3.3 Reasons for migration

Census of India provides information about reasons for migration based on place of the last residence whereas

Table 2 North-East India: Balance of outmigration, 2011. Source: Census of India, Migration Table D-11: Persons born and enumerated in districts of the State/UT—2011

States	Districts	
	Positive balance	Negative balance
Arunachal Pradesh (AP)	Tawang (+ 1.21), East Kameng (+ 2.33), Upper Subansiri (+ 2.61), West Siang (+ 3.31), East Siang (+ 1.34), Upper Siang (+ 1.91), Tirap (+ 1.84), Lower Subansiri (+ 3.10), Kurung Kumey (+ 10.52), Dibang Valley (+ 5.87), Anjaw (+ 2.80)	West Kameng (− 0.79), Papum Pare (− 0.12), Changlang (− 0.62), Lower Dibang Valley (− 0.50), Lohit (− 0.49)
Nagaland (N)	Mon (+ 3.03), Mokokchung (+ 4.54), Zunheboto (+ 13.68), Wokha (+ 4.04), Phek (+ 4.24), Tuensang (+ 5.80), Longleng (+ 4.04), Kiphire (+ 3.16), Peren (+ 1.12)	Dimapur (− 0.09), Kohima (− 0.58)
Manipur (M)	Senapati (+ 1.54), Tamenglong ((+ 8.41), Bishnupur (+ 1.27), Thoubal (+ 1.53), Ukhrul (+ 4.23)	Churachandpur (− 0.91), Imphal West (− 0.66), Imphal East (− 0.68), Chandel (− 0.94)
Mizoram (MI)	Mamit (+ 1.84), Kolasib (+ 1.08), Champhai (+ 7.07), Serchhip (+ 2.51), Lunglei (+ 2.33), Saiha (+ 1.49)	Aizawl (− 0.25), Lawngtlai (− 0.92)
Tripura (T)	South Tripura (+ 1.46), Dhalai (+ 1.09)	West Tripura (− 0.87), North Tripura (− 0.69)
Meghalaya (ME)	West Garo Hills (+ 1.08), East Garo Hills (+ 1.27), South Garo Hills (+ 1.70), West Khasi Hills (+ 4.03), Jaintia Hills (+ 2.93)	Ribhoi (− 0.25), East Khasi Hills (− 0.55)
Assam (A)	Dhubri (+ 1.99), Goalpara (+ 1.04), Barpeta (+ 2.68), Morigaon (+ 1.36), Nagaon (+ 1.44), Lakhimpur (+ 1.17), Dibrugarh (+ 1.07), Sivasagar (+ 1.32), Jorhat (+ 1.40), Cachar (+ 1.19), Karimganj (+ 1.55), Hailakandi (+ 1.14), Kamrup (+ 2.25), Nalbari (+ 2.32), Darrang (+ 1.87)	Kokrajhar (− 0.88), Sonitpur (− 0.61), Tinsukia (− 0.61), Golaghat (− 0.74), Karbi Anglong (− 0.85), Dima Hasao (− 0.57), Bongaigaon (− 0.79), Chirang (− 0.82), Kamrup Metropolitan (− 0.12), Baksa (− 0.70), Udalguri (− 0.60)

Fig. 5 Balance of migration in North-East India, 2011



NSSO also provides reasons for migration at the household level. In 2011, Census has given seven broad reasons for migration i.e. work/employment, business, education, marriage, moved after birth, moved with household and others. NSSO has divided six main and several sub-categories of reasons for out-migration. The main reason for out-migration in rural villages for the male is a shortage of work opportunities [4, 35–37]. Table 3 depicts various reasons for male out-migration from North-East India based on NSSO data. Unemployment is the single most dominant reason for male out-migration in North-East India. At the national level, only 28.60 percent of males are migrated only for employment-related reasons. Whereas, Arunachal Pradesh (76.8%), Assam (94.9%), Nagaland (74.0%), Manipur (77.40%), Mizoram (79.5%), Tripura (90.70%) and Meghalaya (52.1%) states are experienced high proportion of employment-related male out-migration [37].

Education is another most important reason for male out-migration in North-East India. Except for Assam and Tripura, all other North-Eastern states are experienced education-related male out-migration higher than the national average. Lack of education facility and the absence of higher educational institutes in North-East India accelerate male out-migration [26, 27]. The reason for male out-migration at the national level denoted that only about 10 percent are migrated for education purposes. Thus, most of the North-Eastern states experienced a high rate of male

out-migration due to achieving a higher education facility. The highest proportion of male out-migration due to education was found in Meghalaya (35.4%) followed by Nagaland (23.7%). Other reasons like the acquisition of own house/flat, housing problems, health care, post-retirement, movement of parents/earning member; force migration are the other negligible reasons for male out-migration.

Rural India experienced that female migration is excessively related to marriage and family-related issues [3, 38–40]. National-level data depicts that only 0.70 percent of females are migrated due to employment. While entire North-East India unfolds that about one-fourth of the total female are migrated for employment. Meghalaya observed the highest proportion (39.20%) of employment-related migration followed by Manipur (27.03%), Arunachal Pradesh (26.20%) and Mizoram (22.40%) respectively. Education is another most important reason for female out-migration in North-East India. A similar pattern is also found in the case of education-related movement. The national average shows that only 0.50 percent of females migrated for achieving higher education facilities. On the contrary, North-Eastern states unfold that about one fourth are moved only for higher education. Meghalaya experienced the highest (54.20%) proportion followed by Arunachal Pradesh (32.70%), Manipur (27.43%), Mizoram (23.30%) and Nagaland (5.20%) respectively. North-East India experienced education-related female out-migration

Table 3 Reason for male outmigration in North–East India. Source: NSS Report (2010) No. 533: 64 Round, Migration in India: July, 2007–June, 2008 and data has been computed

Reasons for migration	Sub reasons	North–Eastern states							
		AP	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	India
1. Employment	A. In search of employment	76.8	94.9	77.4	52.1	79.5	74.0	90.7	28.6
	B. In search of better employment								
	C. Business								
	D. To take up employment/better employment								
	E. Transfer of service/contract								
	F. Proximity to place of work								
2. Studies	–	18.3	1.4	18.1	35.4	17.4	23.7	2.7	10.7
3. Force migration	A. Natural disaster	0.0	0.1	0.1	0.4	0.0	0.0	0.1	4.2
	B. Social/political problem								
	C. Displacement by development projects								
4. Marriage	–	1.6	0.8	0.4	10.4	2.7	1.2	2.5	9.4
5. Movement of parents/earning member	–	0.6	2.5	1.2	0.0	0.0	0.0	2.1	22.1
6. Others	A. Acquisition of own house/flat	2.8	0.3	2.8	1.7	0.4	1.1	1.8	24.0
	B. Housing problems								
	C. Health care								
	D. Post retirement								
	E. Others								
Total	–	100	100	100	100	100	100	100	100

Distribution (per 1000) of migrants by reason for migration for each state/UT, during 2007–2008 (NSSO)

AP Arunachal Pradesh, WB West Bengal

which has higher than the national average due to lack of education facility and absence of higher educational institute in North-East India [26, 27]. It is an established truth that a greater proportion of females is migrated due to marriage. National-level data support the same result. The greater proportion of females (91.66%) is migrated only for marriage at the national level. Though, North-Eastern states experienced that marriage-related female out-migration is significantly lower than the national average. Meghalaya experienced the lowest proportion of marriage-related migration (5.60%) followed by Manipur (27.13%), Arunachal Pradesh (33.10%), Mizoram (52.30%), Nagaland (82.40%), Tripura (84.14%) and Assam (87.98%) respectively. Nature, process, types and reasons behind the female out-migration are needed to understand [40–42]. Internal migration in India is highly inconsistent and associated with trends and forms of social and economic condition, cultural aspects, female behaviour and other related factors [43]. In recent times, females are also migrated for higher education, employment, better livelihood [3, 44, 45]. The proportion of female migrants is

increased due to the demands of the female as a worker in formal and informal sectors of urban areas. Now women are on their toes to go outside from their home to engage in the different workplace with increasing education level. Table 4 depicts that most of the North-Eastern states are experienced a comparatively low propensity of marriage-related female out-migration compare to the national scenario.

3.4 Determinants

The analysis of determinants of out-migration at the state level has been used with different socio-economic and demographic factors [6, 46–52]. Out-migration and different socio-economic and demographic variables such as education, literacy, caste, age, sex, economic status, and agricultural facility are important factors for rural development which create an ideal situation for rural people to migrate [6, 48, 53, 54]. North-East Indian states have witnessed unheard rural out-migration in the last two decades [55]. Table 5 provide valuable information and

Table 4 Reason for female outmigration in North-East India. Source: NSS Report (2010) No. 533: 64 Round, Migration in India: July 2007–June, 2008 and data has been computed

Reasons for migration	Sub reasons	North–Eastern states							
		AP	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	India
1. Employment	A. In search of employment	26.20	2.12	27.03	39.20	22.40	10.60	5.42	0.70
	B. In search of better employment								
	C. Business								
	D. To take up employment/better employment								
	E. Transfer of service/contract								
	F. Proximity to place of work								
2. Studies	–	32.70	0.40	27.43	54.20	23.30	5.20	0.50	0.50
3. Force Migration	A. Natural disaster	0.00	0.10	0.00	0.10	0.30	0.10	0.00	0.30
	B. Social/political problem								
	C. displacement by development projects								
4. Marriage	–	33.10	87.98	27.13	5.60	52.30	82.40	84.14	91.66
5. Movement of parents/earning member	–	4.10	9.39	14.11	0.90	1.00	1.00	6.43	4.42
6. Others	A. Acquisition of own house/flat	3.90	0.00	4.30	0.00	0.70	0.70	3.51	2.41
	B. Housing problems								
	C. Health care								
	D. Post retirement								
	E. Others								
Total	–	100	100	100	100	100	100	100	100

Distribution (per 1000) of migrants by reason for migration for each state/UT, during 2007–2008 (NSSO)

AP Arunachal Pradesh, WB West Bengal

show a significant relationship between the variables of out-migration by using Karl Pearson's method at the district level. The regression analysis has been done between the proportions of inter-state male out-migration (X1) about different socio-economic and demographic variables. Here certain socio-economic variables have been taken like Per capita income (V1), the Growth rate of rice production area (V2), Share of agriculture in SDP (V3), Cultivated area (V4), Male literacy rate (V5), Credit/Deposit ratio (V6), Female literacy (V7), Population per bank (V8), Female literacy (V9), Female work participation (V10) and Population per bank (V11).

The proportion of inter-state rural male out-migration (X1) is negatively correlated ($r = (-)0.651$) with the per capita income (V1). It means that if the per capita income of rural males increases then the rate of out-migration decreases. The growth rate of rice production area (V2) and the rate of male out-migration are negatively correlated ($r = (-)0.417$). It indicates that if the growth rate of rice production area increases then the rate of rural out-migration may decrease. The proportion of inter-state rural male

out-migration is negatively correlated ($r = (-)0.309$) with a cultivated area. It suggested that the higher cultivated area can reduce the proportion of male out-migration. The proportion of inter-state rural male out-migration (X1) is positively correlated with the percentage of literacy rate (V5) and the value of correlation coefficient is $r = 0.716$ which is statistically significant at a 0.05 level of significance. It means that males with a higher level of literacy have more probability of out-migration compare to illiterate males. It suggested that if the literacy rate of the male increases then the rate of out-migration also increases. The relation between female literacy (V7) and the proportion of inter-district female out-migration (X3) is positive ($r = 0.516$). It suggested that if the literacy rate of the female is increasing then the rate of out-migration also increases. The most significant factors for triggering out-migration are economic and demographic. Demographic pressure and economic conditions, particularly in rural areas, play a significant role in out-migration. However, as the analysis revealed, most of the out-migrants are now joining in the available works in the informal category of

Table 5 North-East India: correlation between migration and socio-economic variables

Dependent variable	Independent variable	r Value	Relation	Meaning of relation
The proportion of inter-state rural male out-migrants (X1)	Per capita income (V1)	- 0.651	Negative	More per capita income of rural male, less rural male migration
	Growth rate of rice production area (V2)	- 0.417	Negative	The increasing growth rate of rice production area, less rate of rural outmigration
	Share of agriculture in SDP (V3)	- 0.661	Negative	More share of agriculture in State Domestic Product, less share of male migrants
	Cultivated area (V4)	- 0.309	Negative	More cultivated area, less male out-migrants
	Male literacy rate (V5)	+ 0.716*	Positive	High literacy rate of male, a high proportion of rural male out-migration
	Credit/Deposit ratio (V6)	+ 0.427	Positive	More credit or deposit, more propensity of out-migrants
The proportion of Inter-District total out-migrants (X2)	Per capita income (V1)	- 0.620	Negative	If per capita income increase, inter-district total out-migration decrease
	Growth rate of rice production area (V2)	- 0.343	Negative	If the growth of rice production area increase, the rate of total out-migration decrease
	Share of agriculture in SDP (V3)	- 0.533	Negative	If the share of agriculture in State Domestic Product increases, the share of total out-migration decrease
	Female literacy (V7)	+ 0.554	Positive	More female literacy, more total out-migration
	Population per bank (V8)	- 0.471	Negative	More population per bank, less rate of total migration
	Credit/Deposit ratio (V6)	+ 0.506	Positive	More credit or deposit, less out-migration
The proportion of Inter-District Female out-migrants (X3)	Growth rate of rice production area (V2)	- 0.454	Negative	If rice production area increase, female out-migration also decrease because in India a large proportion of female engaged in agricultural activities
	Share of agriculture in SDP (V3)	- 0.516	Negative	More share of agriculture in SDP, less rate of female out-migration
	Female literacy (V9)	+ 0.516	Positive	The high rate of female literacy, a high rate of out-migration
	Female work participation (V10)	- 0.403	Negative	If female work participation is an increase, rate of female out-migration is decrease
	Population per bank (V11)	- 0.447	Negative	If the share of population per bank increase, the rate of female migrants decrease

*Correlation is significant at the 0.05 level (2-tailed)

the tertiary sector. It is not difficult to imagine that these people go out under distressed conditions and they only engaged in urban informal sectors.

4 Conclusion

The study focuses on the inter-regional flow of out-migrants and identifies the migration predominance regions in North-East India with the help statistical and mapped by GIS platform. The geographical perspective has taken into consideration for the of analysis of spatial patterns of out-

migration in North-East India. Four traditionally excessive out-migration regions have been found in North-East India. Both the male and female out-migration regions ranked highest are found in Mizoram state. Mizo society is largely associated with subsistence shifting agriculture. Almost all the districts from Mizoram state are experienced a high rate of male out-migration which is also highest in North-East India. The regional patterns and causes of out-migration in Assam are complex in nature. Two predominance out-migration regions have been identified in Assam. It is well-established fact that communal conflict is one of the prime reasons behind the out-migration in Assam. Nagaland also

faced a similar kind of migration pattern. The study revealed that lack of education facility and the absence of higher educational institute in North-East India accelerate a huge proportion of out-migration for both the sexes. Nature of female out-migration is different from the national level. Now women are on their toes to go outside from their home to engage in the different workplace with increasing education level. Arunachal Pradesh, Meghalaya, Nagaland and Mizoram have experienced one-fourth of female migration for employment-related reasons which are exceptionally higher than the national average. The most significant factors for triggering out-migration are social and economic mobility of the region. These factors when coupled with excessive population increase due to natural growth as well as illegal infiltration both propagate tremendous pressure on rural areas to migrate outside from their native place. Finally, North-East India has experienced out-migration in all the areas but certain areas have experienced higher intensity in out-migration which needs special attention for the policy makers.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. NSSO. (2010). Migration in India. Report No. 533 (64/10.2/2), 20072008, National Sample Survey Organisation. Ministry of Statistics and Programme Implementation, Government of India, New Delhi.
2. Gosal, G. S. (1961). International migration in India—A regional analysis. *Indian Geographical Journal*, 36, 106–121.
3. Bhagat, R. B., & Mohanty, S. (2009). Emerging pattern of urbanization and the contribution of migration in urban growth in India. *Asian Population Studies*, 5(1), 5–20. <https://doi.org/10.1080/17441730902790024>.
4. Bhagat, R. B. (2010). Internal migration in India: Are the underprivileged class migrating more? *Asia-Pacific Population Journal*, 25(1), 27–45.
5. Breman, J. (1996). *Footloose labour: Working in India's informal economy*. Cambridge: University Press.
6. Haberfeld, Y., Menaria, R. K., Sahoo, B. B., & Vyas, R. N. (1999). Seasonal migration of rural labour in India. *Population Research and Policy Review*, 18(5), 473–489. <https://doi.org/10.1023/A:1006363628308>.
7. Cebula, R. J., & Alexander, G. M. (2006). Determinants of net interstate migration, 2000–2004. *Journal of Regional Analysis and Policy*, 36(2), 116–123. <https://doi.org/10.22004/ag.econ.132323>.
8. Junankar, P. N., & Shonchoy, A. (2014). The informal labour market in India: Transitory or permanent employment for migrants? In: *Development economics*. Palgrave Macmillan, London. https://doi.org/10.1057/9781137555229_13
9. Bhattacharya, P. C. (1998). The informal sector and rural-to-urban migration: Some Indian evidence. *Economic and Political Weekly*, 33(21), 1255–1262. <https://www.jstor.org/stable/4406804>
10. Gupta, M. (1993). Rural-urban migration, informal sector and development policies: A theoretical analysis. *Journal of Development Economics*, 41(1), 137–151. [https://doi.org/10.1016/0304-3878\(93\)90040-T](https://doi.org/10.1016/0304-3878(93)90040-T).
11. Andrienko, Y., & Guriev, S. (2004). Determinants of interregional mobility in Russia. *Economics of Transition*, 12(1), 1–27. <https://doi.org/10.1111/j.0967-0750.2004.00170.x>.
12. Parganiha, O., Sharma, M. L., Paraye, P. M., & Soni, V.K. (2009). Migration effect of agricultural labourers on agricultural activities. *Indian Research Journal*, 9(3), 95–98. <http://www.seea.org.in/vol9-3-2009/22.pdf>
13. Barnum, H. N. (1976). The Interrelationship among social and political variables, economic structure, and rural-urban migration. *Economic Development and Cultural Change*, 24(4), 759–764. <https://doi.org/10.1086/450917>.
14. Ravenstein, E. G. (1885). The laws of migration. *Journal of the Royal Statistical Society*, 1(48), 167–235. <http://www.seea.org.in/vol9-3-2009/22.pdf>
15. Lee, E. S. (1966). A theory of migration. *Demography*, 3(1), 47–57. <https://doi.org/10.2307/2060063>.
16. Todaro, M. P. (1976). *Internal migration in developing countries*. Geneva: ILO.
17. Constant, A., & Massey, D. S. (2002). Return migration by German Guestworkers, neoclassical versus new economic theories. *International Migration*, 40(4), 5–37. <https://doi.org/10.1111/1468-2435.00204>.
18. Weiner, M. (1978). *Migration and ethnic conflict in India, sons of the soil*. New Delhi: Princeton University Press.
19. Hazarika, S. (2000). *Rites of passage: Border crossings, imagined homelands*. India's East and Bangladesh: Penguin Books India.
20. Bhuyan, J. C. (2002). Illegal migration from Bangladesh and the demographic change in the NE Region. *Dialogue Quarterly*, 3(3), 71–82.
21. Saikia, A., Goswami, H., & Goswami, A. (2003). *Population growth in Assam 1951–1991 with focus on migration*. New Delhi: Akansha Publishing House.
22. Singh, G. (2008). Illegal migration, insurgency and the political economy of Assam. *Strategic Analysis*, 32(2), 305–315. <https://doi.org/10.1080/09700160801994910>.
23. Nath, M. K. (2003). Bodo insurgency in Assam: New accord and new problems. *Strategic Analysis*, 27(4), 533–545. <https://doi.org/10.1080/09700160308450106>.
24. Vanlalhlana, B. (2001). Population redistribution and urbanization in Mizoram. Published Doctoral Dissertation, North-Eastern Hill University, Shillong, Meghalaya.
25. Singh, M. A. (2009). A study on illegal immigration into North-East India: The case of Nagaland. *Institute for Defence Studies and Analyses*, 8, 1–57.
26. Behera, M. C. (2016). Migration and tribal political organisation: Case of Arunachal Pradesh. *Asian Mirror-International Journal of Research*, 3(1), 40–52.
27. Reena, M. (2015). Migration and depopulation: A geographical analysis - A case study of Karga village in West Siang Dist of Arunachal Pradesh in West Siang. *International Journal of Interdisciplinary and Multidisciplinary Studies*, 2(8), 119–121.
28. Clark, W. A. W. (1986). *Human migration*. California: Sage.
29. Sharma, R. N. P., & Singh, D. P. (1981). Population of Ranchi (Bihar) on move. In R. B. Mandal (Ed.), *Frontiers of migration analysis* (pp. 455–470). New Delhi: Concept Publishing Company.

30. Nangia, S., & Kumar, S. (2007). *Determinants of rural male out-migration in Bihar, City, Society and planning* (pp. 279–303). New Delhi: Concept Publishing Company.
31. Bandyopadhyay, S., & Chakraborty, D. (1999). Migration in the North-Eastern region of India during 1901–1991: Size, trends, reasons and impact. *Demography India*, 28(1), 75–97.
32. Goswami, P. C. (1984). *Foreign immigration into Assam. NE Problems and Prospects of Development*. Chandigarh: Center for Research in Rural and Industrial Development.
33. Goswami, A., & Gogoi, J. K. (1985). Migration and demographic transformation of Assam (1901–1971). In B. L. Abbi (Ed.), *N.E. Region Problems and Prospects of Development*. Chandigarh: CRRID.
34. Nengnong, D. D. (1991). Rural urban migration in Meghalaya. Published Doctoral Dissertation, North-Eastern Hill University, Shillong, Meghalaya.
35. Bhatt, W. (2009). The Gender dimension of migration in India: The politics of contemporary space in Orissa and Rajasthan. *Development in Practice*, 19(1), 87–93. <https://doi.org/10.1080/09614520802576419>.
36. Piotrowski, M., Ghimire, D., & Rindfuss, R. (2013). Farming systems and rural out-migration in Nang Rong, Thailand, and Chitwan Valley, Nepal. *Rural Sociology*, 78(1), 75–108. <https://doi.org/10.1111/ruso.12000>.
37. Rele, J. R. (1969). Trends and significance of internal migration in India. *The Indian Journal of Statistics*, 31(3/4), 501–508. <https://www.jstor.org/stable/25051701>.
38. Banerjee, A., & Raju, S. (2009). Gendered mobility: Women migrants and work in urban India. *Economic and Political Weekly*, 44(28), 115–123. <https://www.jstor.org/stable/40279264>
39. Hoang, L. A. (2011). Gendered networks and migration decision-making in Northern Vietnam. *Social and Cultural Geography*, 12(5), 419–434. <https://doi.org/10.1080/14649365.2011.588800>.
40. Srivastava, R., & Sasikumar, S.K. (2003). An overview of migration in India, its impact and key issues. Paper Presented at the regional conference on migration, development and pro-poor policy choices in Asia, Dhaka, Bangladesh, 22–24 June, 2003.
41. Mazumdar, I., Neetha, N., & Agnihotri, I. (2013). Migration and gender in India. *Economic and Political Weekly*, 48(10), 54–64. <https://www.jstor.org/stable/23391360>
42. Premi, M. (1980). Aspects of female migration in India. *Economic and Political Weekly*, 15(15), 714–720. <https://www.jstor.org/stable/4368564>.
43. Singh, N., Kesari, K., & Bhagat, R. B. (2016). Gender dimension of migration in urban India. In S. Irudaya Rajan (Ed.), *India migration report 2015: Gender and migration* (pp. 176–190). New Delhi: Routledge.
44. Harttgen, K., & Klasen, S. (2011). A human development index by internal migrational status. *Journal of Human Development and Capabilities*, 12(3), 293–424. <https://doi.org/10.1080/19452829.2011.576819>.
45. Thapan, M., Singh, A., & Sreekumar, N. (2014). Women's mobility and migration: Muslim women migrants in Jamia Nagar, Delhi. *Economic and Political Weekly*, 49(23), 96–104. <https://www.jstor.org/stable/24479610>
46. Dyson, T., & Moore, M. (1983). On kinship structure, female autonomy, and demographic behaviour in India. *Population and Development Review*, 9(1): 35–60. <https://www.jstor.org/stable/1972894>
47. Kundu, A., & Gupta, S. (1996). Migration, urbanisation and regional inequality. *Economic and Political Weekly*, 31(52), 3391–98. <https://www.jstor.org/stable/4404940>
48. Mosse, D., Gupta, S., Mehta, M., Shah, M., Rees, J., & Krib, T. (2002). Brokered livelihoods: Debt, labour migration and development in western India. *Journal of Development Studies*, 38(5), 59–88. <https://doi.org/10.1080/00220380412331322511>.
49. Oberai, A. S., & Singh, H. K. M. (1980). Migration flows in Punjab's green revolution belt. *Economic and Political Weekly*, 15(13), A2–A12. <https://www.jstor.org/stable/4368516>
50. Rogaly, B. (1998). Workers on the move: Seasonal migration and changing social relations in rural India. *Gender and Development*, 6(1), 21–29. <https://doi.org/10.1080/741922628>.
51. Sengupta, A., & Ghosal, R. K. (2011). Short-distance rural-rural migration of workers in West Bengal: A case study of Bardhaman district. *Journal of Economic and Social Development*, 7(1), 75–92.
52. Yang, X. (1992). Temporary migration and its frequency from urban households in China. *Asia Pacific Population Journal*, 7(1), 27–50. <https://www.ncbi.nlm.nih.gov/pubmed/12343796>.
53. Keshri, K., & Bhagat, R.B. (2012). Temporary and seasonal migration: Regional pattern, characteristics and associated factors. *Economic and Political Weekly*, 47(4), 81–88. <https://www.jstor.org/stable/41419769>.
54. Mahanta, R., & Das, D. (2012). Common property resources degradation and migration: A case study of Assam. *Journal of Human Ecology*, 38(3), 223–230. <https://doi.org/10.1080/09709274.2012.11906491>.
55. Muktiar, P., & Sharma, C. K. (2019). In search of a better future: Nepali rural out-migration from Assam. *Indian Sociological Society*, 68(3), 307–324. <https://doi.org/10.1177/0038022919876407>.

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