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Out-migration from the Hills of Garhwal Himalaya: a Case Study

Saurav Kumar[1] and Vishwambhar Prasad Sati[2]

Abstract

Throughout history, out-migration has significantly impacted the Garhwal Himalaya. This is a common phenomenon, and people have used it to diversify their risk and livelihood options. This paper evaluates the extent of out-migration in the Garhwal Himalaya and examines the different types, patterns, reasons, and implications of out-migration. The study was conducted by gathering data from the 12 villages of the Garhwal Himalaya. A total of 560 households were surveyed from the villages, covering 100% sample from each village. The authors constructed a structured questionnaire and asked the heads of each surveyed household about the types of migration they practice, the locations of migration, the reasons for migration, and the consequences of such migration. In addition, the authors asked about migrants' age, sex, education, income, and occupation. The study reveals that out-migration in the Garhwal Himalaya has become a major problem since it has led to many socio-economic problems in the region. And if it is not addressed at its earliest, a large number of villages will become depopulated. Additionally, this study suggests some policy measures to curb out-migration from the Garhwal Himalaya.

Keywords: *Out-migration; Garhwal Himalaya; Livelihood; Risk Diversification; Depopulation*

Introduction

Migration has greatly affected the Garhwal Himalaya throughout history. This is a common phenomenon and people have used it as an alternative strategy for subsistence and risk diversification (Gautam and Andersen, 2016; Macchi, 2011; Machhi, 2010). In the Garhwal Himalaya, migration dates back to the 11th and 12th centuries, when large numbers of people in-migrated from the Indian sub-continent to hills to escape the atrocities of Muslim rulers (Nagalia, 2017). The second substantial wave of in-migration occurred in the 16th-century after the Mughals conquered India. People from the Indo-Gangetic plains and other parts of India migrated to Garhwal Himalaya and settled along rivers, on midslopes, and in the highlands. However, out-migration from the mountains mainly started during the colonial era with the establishment of the Garhwal and Kumaon regiments, which led to a large out-migration of young men to serve in the British Indian Army (Rural Development and Migration Commission, 2018). Out-migration reached its highest point in the 1980s and 1990s when youth started migrating out of state and across the nation in search of jobs. Out-migration from the Garhwal hills was mainly seasonal before 2000 when people migrated until their service periods were over. After 2000, when Uttarakhand became a state, the situation changed. Since then, many families have started to relocate permanently, abandoning their homes and properties (Mehta and Maikhuri, 2018).

[1] Saurav Kumar, Geography and Resource Management, Mizoram University, Aizawl 796004, India.
E-mail: sauravdubey2802@gmail.com
[2] Vishwambhar Prasad Sati (Co-author), Geography and Resource Management, Mizoram University, Aizawl 796004, India.
E-mail: sati.vp@gmail.com

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Out-migration in the Garhwal Himalaya has several causes; however, a search for better education and employment has been the biggest factor (Sati, 2021). Additionally, the lopsided growth of the region has forced youth from the hills to the industrialized plains. The Garhwal region has experienced phenomenal growth and development since Uttarakhand was formed from Uttar Pradesh. Nevertheless, this growth hasn't been equally distributed throughout the region, leading to massive regional inequalities. The Garhwal region has grown rapidly, but only within its plain districts, leaving the hill districts behind (Mamgain and Reddy, 2016). There have been a few growth poles in plains where industrial development has occurred. Among these growth poles are Haridwar, Rishikesh, and Dehradun. In the hilly areas of the Garhwal Himalaya, growth and development processes did not create viable employment and income opportunities. Consequently, hill districts grew slowly. Haridwar, a plain district, has a per capita income of ₹ 293,078. By contrast, Rudraprayag, a hilly district, has a per capita income of ₹ 88,987, less than one-third of Haridwar (Statistical diary Uttarakhand, 2019-2020). Despite the fact that Uttarakhand was created for the development of remote hill districts, its fundamental purposes have been ignored by every succeeding government (Hindustan Times, 2017). Two decades after its formation, the mountain districts still lack basic needs. As a result, people lack basic amenities like education, jobs, health care, infrastructure, etc. (Sati, 2016; Adebayo, 2020). The situation has also become worse due to decreasing agricultural practices and a lack of government support for farmers. Due to this, people have migrated from mountain regions in large numbers, and houses and agricultural lands have been abandoned. The term "ghost villages" has now become synonymous with Garhwal Himalaya.

Although many efforts were made to develop the Garhwal region after Uttarakhand became a state. But it could not make much impact. Additionally, agricultural growth has declined and it is no longer a remunerative sector. Further, unsuitable development programs and policies, large scale poverty, livelihood restrictions, lack of high-quality educational institutions, unplanned urbanization, limited industrial growth, changing climate, and increasing frequency and intensity of natural hazards and disasters (Sati and Kumar, 2022), and the growing risks of food and livelihood insecurity have contributed to accelerating rural out-migration from the Garhwal Himalaya.

Several scholars have attempted to understand the out-migration in the Garhwal Himalaya over the last two decades. Many scholars have observed that migration is a normal phenomenon in mountain regions, and people use it as an alternative livelihood strategy (Deshingkar and Start, 2003; Huddleston and Ataman, 2003; ICIMOD, 2009; Mamgain and Reddy, 2015). In 2015, Bhandari and Reddy argued that migration, mostly internal, helps to alleviate poverty since it involves poorer people. The migration of labour facilitates economic growth and guarantees food security (Hoermann and Kollmair, 2009; ICIMOD, 2011). According to Kandari (2013) mountain areas are not conducive to industrial development, and there are limited sources of employment, in addition to low agricultural output. The uneven development of mountain regions has further escalated the problems (Mamgain, 2003); and it has created unprecedented levels of out-migration which has resulted in the abandonment of lands and houses (Maithani, 1996; Tiwari and Joshi, 2015). Further, it has led to an increase in the workload of women and the feminization of mountain agriculture (Jain, 2010; Singh, 2015). In mountain areas, rural out-migration has a huge social and environmental impact (Grau and Aide, 2007; Bastianon, 2018). Extensive male migration

from the Himalaya has increased women's vulnerability while also providing them with economic stability, leadership, and decision-making power (ICIMOD, 1999; Tiwari and Joshi, 2016). Furthermore, the better means of transport networks and new economic opportunities in the plains have given rise to massive out-migration from the Garhwal Himalaya (ICIMOD, 2010).

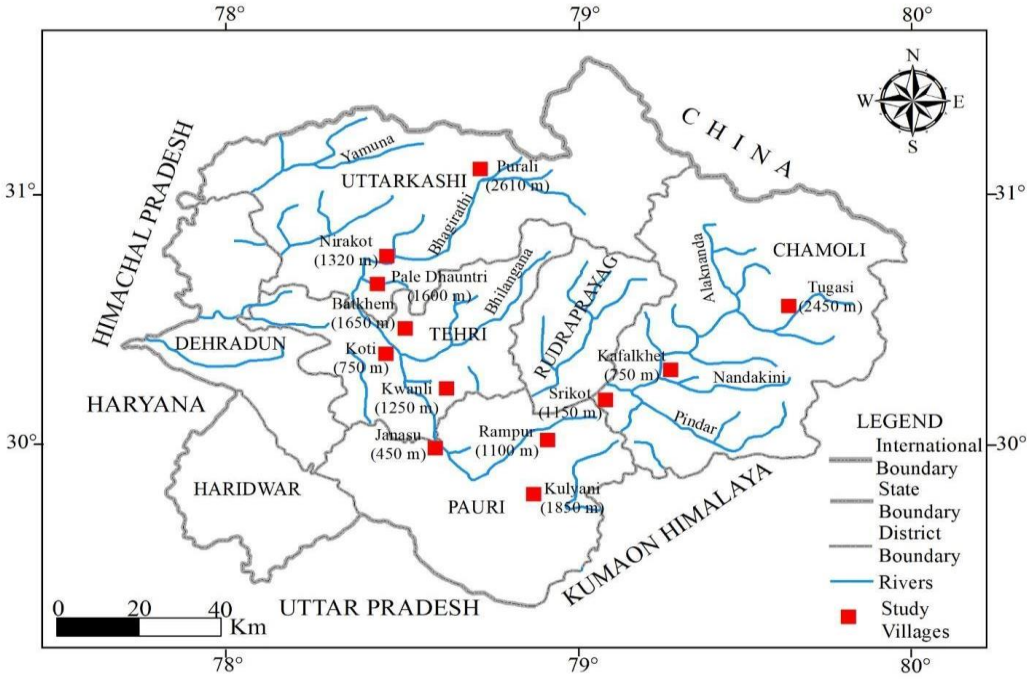
The review of the literature manifests that various research on migration related issues in the Himalaya has been done, but nearly no study explicitly on out-migration in the Garhwal Himalaya has been organised. Further, a systematic and precise study on causes and implications of out-migration in the Garhwal Himalaya is very few. This study is unique in that it is based on a comprehensive field investigation, with conclusions drawn from primary surveys done in several regions of the Garhwal Himalaya. The study's major goals are to look into different types and patterns of migration, as well as their causes and repercussions. Furthermore, to associate migration with several variables such as altitude, education, occupation, and income; and, finally, to propose various measures for curbing out-migration.

Study area

Garhwal Himalaya is situated in the western part of the Uttarakhand Himalaya between 29º31'9"N- 31º26´5"N latitude and 77º33'5"E- 80º6'0" E longitude. It is surrounded by the state of Himachal Pradesh in the North-West, Uttar Pradesh in the South, the districts of Pithoragarh, Bageshwar, Almora, and Nainital border it from the East and Tibet lies in the North. The total geographical area of the region is 32,350 sq. km. The region is almost hilly comprising 92.6 % hills and 7.4 % plains. Its altitude ranges from 200-7000 meters and encompasses three kinds of landscapes: the lower Himalaya or Shivalik range, the middle Himalaya, and the greater Himalaya.

Administratively, Garhwal Himalaya has been divided into seven districts: Haridwar, Dehradun, Rudraprayag, Tehri Garhwal, Uttarkashi, Chamoli, and Pauri Garhwal. Except for Haridwar and a part of Dehradun district, all other districts are hilly. The total population of the region according to the census of India 2011, is 5,857,294. Out of which, 61% of the total population lives in the two plain districts of Haridwar and Dehradun, which have only 17% of the total geographical area while the other 39% lives in the other 5 hill districts with 83% of the total geographical area. The highest population density was noticed in the plain district of Haridwar which was 801 persons per sq. km and the lowest population density was found in the hill district of Uttarkashi which was only 41 persons per sq. km (Census of India, 2011). The twelve study villages are situated in four hill districts (Pauri Garhwal, Tehri Garhwal, Chamoli, and Uttarkashi) of the Garhwal Himalaya at different altitudes (Figure 1).

Figure 1. Map of Garhwal Himalaya showing the case study villages



Methodology

A primary dataset was collected for the study in the months of July to September 2021. A total of twelve villages were selected from four districts in the Garhwal Himalaya. In every district, three villages were chosen from different altitudes (Table 1). The villages range in altitude from 450m-2650m. A total of 560 households were surveyed from the villages, covering 100% of households. The total population of all the villages was 2,622. Out of which, 68% were migrants, and 32% were non-migrants. Migrants were either semi-permanent or permanent. A structured questionnaire was framed. Questions were asked from the heads of the households about the types of migration they are practicing, the destination of migration, and the reasons for migration. Further, migrants' age, sex, education, income and occupation were also asked. In addition to this, the authors also inquired about migrants' perceptions regarding the impact of out-migration through group discussions and interviews. A global positioning system (GPS) was employed during the field survey for gathering data on the altitude, latitude, and longitude of the villages.

The collected data were analyzed through different statistical methods. The migration data were evaluated using a percentile, levels, and indices. For the graphical representation of data, several graphs, tables, and scatter plots were constructed. A correlation was carried out between migration and different variables such as altitude, education, income, and land abandonment. Further, the impact of out-migration in the region was examined. Finally, various policy measures and suggestions were given for minimizing the out-migration from the Garhwal Himalaya.

Table 1. Salient geographical and population features of the surveyed villages

Village	District	Altitude (meters)	Latitude	Longitude	Population				Distance from Road Head (km)	Distance from District HQ (km)
					Total Households	Total Population	Total Migrant Population	Migrants (%)		
Janasu	Pauri Garhwal	450	30°14'13"N	78° 41' 33"E	59	285	245	85.94	7	11
Rampur	Pauri Garhwal	1100	30°13'06"N	78° 52' 07"E	65	237	221	93.23	On Road	15
Kulyani	Pauri Garhwal	1850	30° 5' 23"N	78° 59' 04"E	45	263	184	69.96	8	90
Koti	Tehri Garhwal	800	30° 8' 47"N	78° 35' 0"E	95	425	380	89.41	10	90
Kwanli	Tehri Garhwal	1250	30° 21' 34"N	78° 37' 02"E	29	145	111	76.56	0.1	48
Watkhem	Tehri Garhwal	1825	30° 21' 11"N	78° 25' 10"E	41	241	153	63.48	2	8
Kafalkhet	Chamoli	950	30° 20' 16"N	78° 18' 20"E	35	125	70	56	4	24
Srikot	Chamoli	1150	30° 16' 18"N	79° 09' 29"E	39	161	124	77.01	0.5	56
Tugasi	Chamoli	2425	30° 29' 1"N	79° 38' 39"E	43	176	59	33.52	4	75
Nirakot	Uttarkashi	1320	30° 45' 23"N	78° 25' 56"E	23	107	52	48.6	3	5
Pale Dhauntri	Uttarkashi	1600	30°36'09"N	78° 30' 55"E	34	203	117	57.63	1	40
Purali	Uttarkashi	2650	31° 01' 49"N	78° 43' 10"E	52	254	75	29.54	2	70

Source: Primary survey

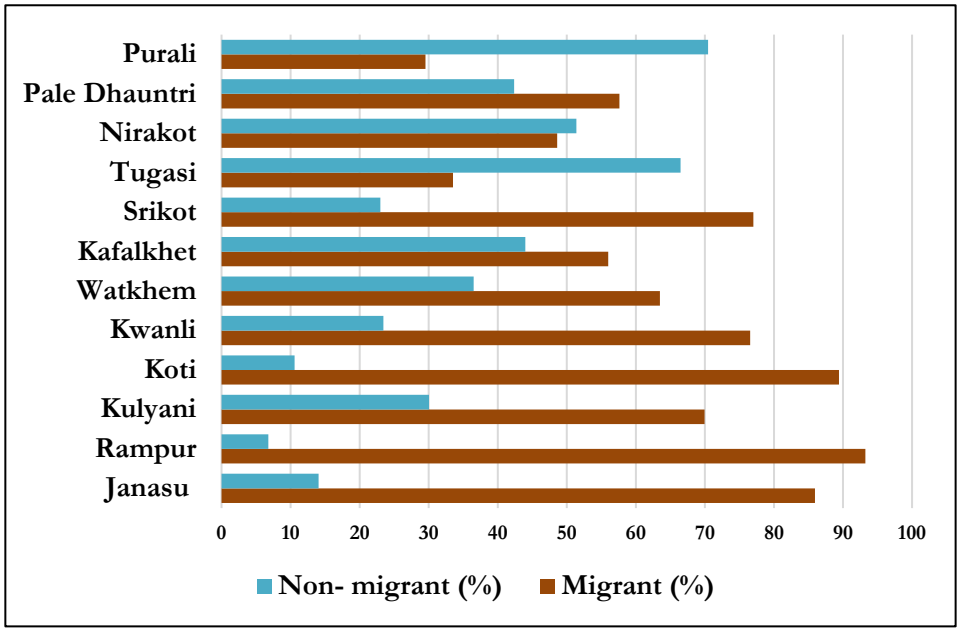
Results

Proportion of migrants and non-migrants population

In the mountainous rural districts of the Garhwal Himalaya, migration is a common phenomenon. The people who migrate are called migrants, while those who do not migrate are referred to as non-migrants. These migrants are either permanent migrants who leave their villages permanently or non-permanent migrants who migrate to different areas for various purposes. The semi-permanent/seasonal migrants have their dwellings in the villages where their family members practice subsistence farming. These seasonal migrants send remittances to other family members in their communities, which helps to supplement their income. However, permanent migrants completely abandon their properties and lands, and the houses they have left behind are referred to as ghost houses. The proportion of migrants and non-migrants in the sampled villages (n=12 villages) is depicted in figure 2. The percentage of migrants in six villages- Janasu, Rampur, Kulyani, Koti, Kwanli, and Srikot was over 70%, which was extremely high. In three villages- Watkhem, Kafalkhet, and Pale Dhauntri, there was a significant (>50 %) migrant population. In Tugasi, Nirakot, and Purali villages, fewer than 50% of the migrants were observed. Villages in the Pauri Garhwal (Janasu, Rampur, and Kulyani) and Tehri Garhwal (Koti, Kwanli, and Watkhem) districts had the highest out-

migration rates, followed by villages in the Chamoli district (Kafalkhet, Srikot, and Tugasi). However, the percentage of migrants was found to be the lowest in Uttarkashi district's villages (Nirakot, Pale Dhauntri, and Purali).

Figure 2. The percentage share of migrants and non-migrant in the villages (n=12 villages)



Types of migration

Permanent and semi-permanent migration are the two forms of migration. Long-term, short-term, monthly, weekly, and daily migration are all different types of semi-permanent migration. The percentage of permanent and semi-permanent migration from the surveyed villages was studied (Table 2). The data shows that out-migration is taking place in all of the villages, though not at the same proportion.

Table 2. Different types of migration (n=1791 migrants)

Village	Permanent Migration (%)	Semi-Permanent Migration (%)					
		Long Duration (More than 6 months)	Short Duration (2-6 Months)	Monthly (%)	Weekly (%)	Daily (%)	Total (%)
Janasu	60.82	22.04	3.67	0.41	0.82	12.24	39.18
Rampur	80.1	8.6	8.14	2.26	0	0.9	19.90
Kulyani	29.35	34.24	26.09	0	0.54	9.78	70.65
Koti	59.22	9.47	25.26	3.16	0	2.89	40.78
Kwanli	35.14	23.43	23.41	0.9	0	17.12	64.86
Watkhem	53.6	5.23	16.98	7.2	0	16.99	46.40
Kafalkhet	5.72	1.43	60	5.71	0	27.14	94.28
Srikot	25	22.58	23.39	1.61	0.81	26.61	75
Tugasi	0	0	30.51	8.47	0	61.02	100
Nirakot	0	0	21.16	26.92	13.46	38.46	100
Pale Dhauntri	0	24.79	32.48	0.85	0	41.88	100
Purali	0	1.33	54.67	0	0	44	100

Source: Primary survey

Permanent Migration is a type of migration in which a person or family leaves their village permanently and relocates to another place. The extent of permanent migration from the studied villages is shown in table 3. Four villages- Rampur, Janasu, Koti, and Watkhem had the highest rate of permanent migration, where more than 50% population permanently out-migrated. Permanent migration was moderate (25- 50 %) in three villages- Kulyani, Kwanli, and Srikot. In Kafalkhet, there was a low rate of permanent migration (<10 %). However, no one permanently moved away from Tugasi, Nirakot, Pale Dhauntri, and Purali village.

Table 3. Permanent migration from the surveyed villages

Permanent Migration from the Villages (%) (n=1791 migrants)		
Indices (%)	**Level**	**Villages and districts**
>50	High	Janasu (Pauri Garhwal), Rampur (Pauri Garhwal), Koti (Tehri Garhwal), Watkhem (Tehri Garhwal).
25-50	Medium	Kulyani (Pauri Garhwal), Kwanli (Tehri Garhwal), Srikot (Chamoli),
<10	Low	Kafalkhet (Chamoli),
0	Zero	Tugasi (Chamoli), Nirakot (Uttarkashi), Pale Dhauntri (Uttarkashi), Purali (Uttarkashi)

Source: Primary survey

Semi-permanent/seasonal migration includes long duration, short-duration, monthly, weekly, and daily migration. Seasonal migrants stay at the place of destination for a particular period and they keep visiting the villages where their family members live. Semi-permanent migration of the sampled villages was analyzed (Table 2). The four villages of Tugasi, Nirakot, Pale Dhauntri, and Purali had the highest percentage of semi-permanent migration (100%) because these villages had no permanent migration (Figure 3). In Kulyani, Kwanli, Kafalkhet, and Srikot villages more than 50% of seasonal migrants were observed. However, villages of Janasu, Rampur, Koti, and Watkhem registered less than 50% seasonal migrants. Further, Janasu, Rampur, Kulyani, and Kwanli were the villages where most people out-migrated for a long period of time. In Koti, Kafalkhet, and Purali villages short duration migration was observed to be the highest. The maximum daily migration ratio was found in four villages: Watkhem, Srikot, Tugasi, Nirakot, and Pale Dhauntri. These villages are quite close to the market town (<10km), so people move there for different purposes throughout the day and return home in the evening.

Figure 3. Proportion of permanent and semi-permanent migration in the villages

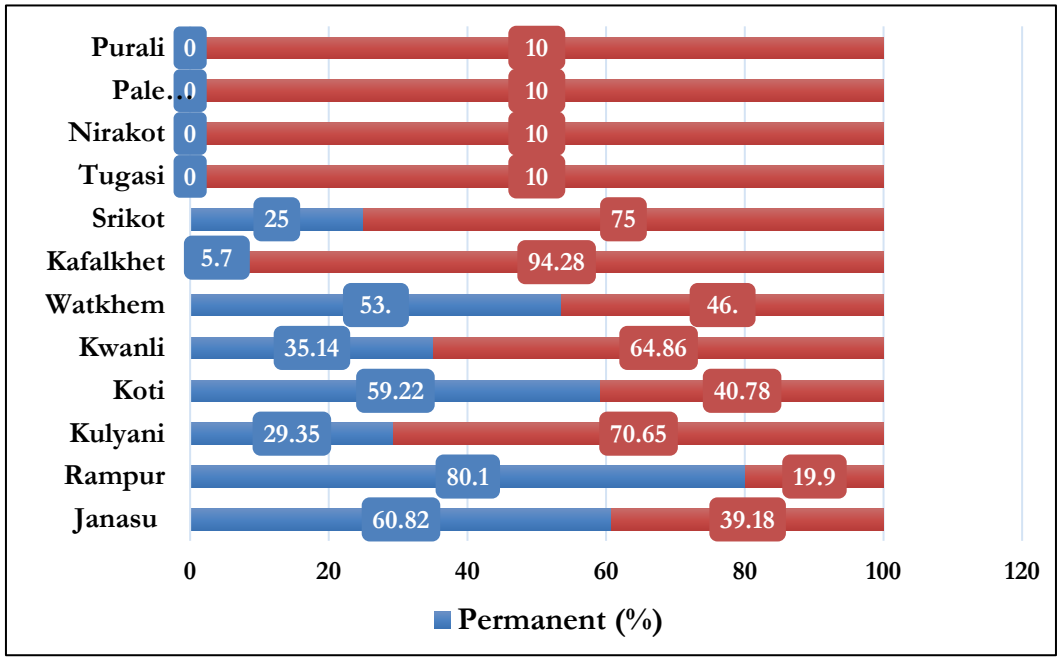
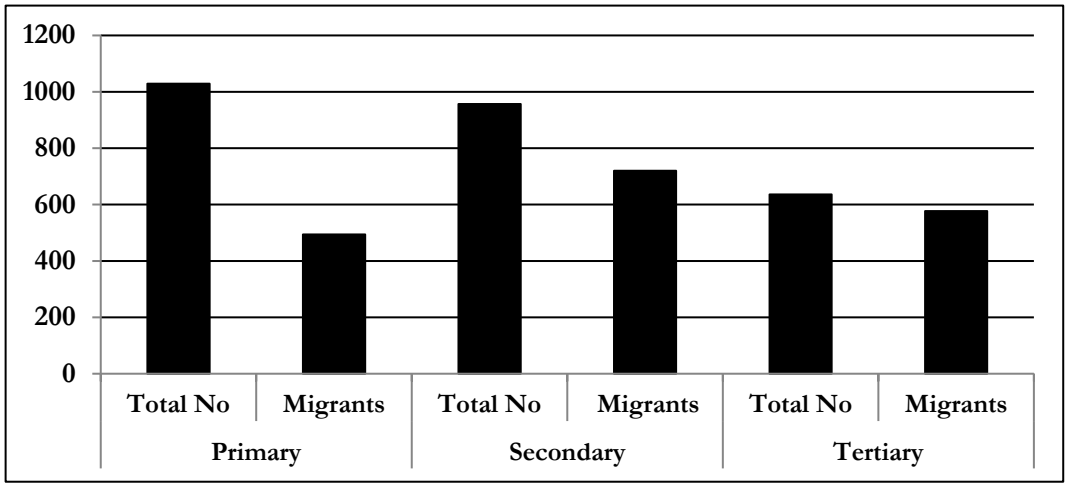


Figure 4. Educational level of migrants (N= 2622 persons)



Education and migration

Figure 4 shows the educational level of migrants. Although migration was found happening among people of all educational backgrounds, the largest out-migration rate was registered among people having tertiary education as 91% of them were practicing migration. It was followed by people having secondary education where 75% of people were migrants. The

least out-migration rate (48%) was noticed among people having primary education. Further, data reflects that the propensity for out-migration increases with rising education levels.

Correlation Migration (%), Income (INR), Altitude (m), Education (%), and Land abandonment (%).

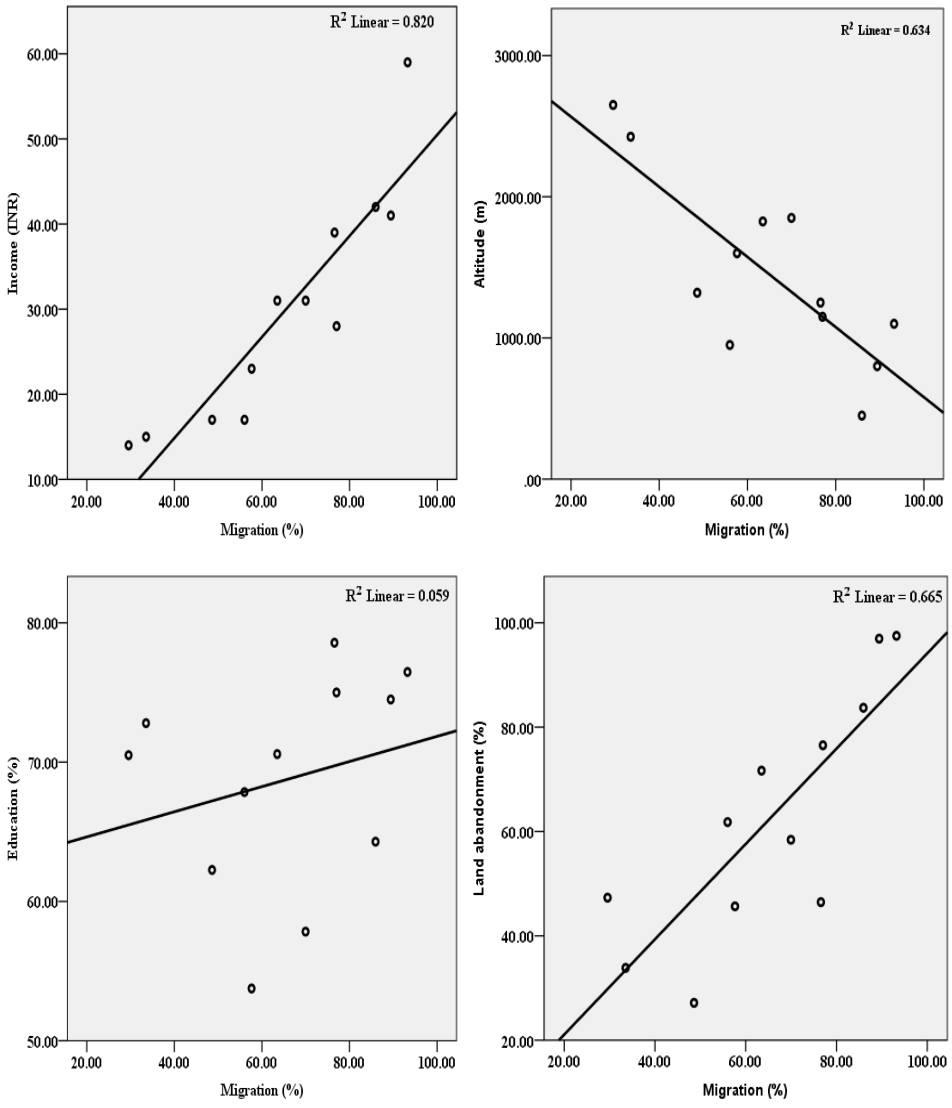
A correlation between migration and other variables such as income, altitude, education, and land abandonment was calculated (Table 4). Except for the correlation between migration and education, which was insignificant, the other variables showed significant correlations. It means that education does not have much impact on out-migration. In addition, it was observed that out-migration was positively correlated with income and land abandonment, but negatively correlated with altitude. It infers that when out-migration increases income, land abandonment rises, and altitude decreases. Out-migration had a strong positive impact on income level and land abandonment with an R-value of 0.905 and 0.861 respectively. However, it had a negative impact on altitude with a -0.796 R-value. In figure 5, a scatter plot illustrates the correlation between migration and different variables.

Table 4. Correlation among migration (%), income (INR), altitude (m), education (%), and land abandonment (%).

Variables		Migration (%)	Income (INR)	Altitude (m)	Education (%)	Land abandonment (%)
Migration (%)	Pearson Correlation	1	0.905**	-0.796**	0.243	0.816**
	Sig. (2-tailed)		0.000	0.002	0.446	0.001
Income (INR)	Pearson Correlation	0.905**	1	-0.576*	0.354	0.779**
	Sig. (2-tailed)	0.000		0.050	0.258	0.003
Altitude (m)	Pearson Correlation	-0.796**	-0.576*	1	-0.080	-0.591*
	Sig. (2-tailed)	0.002	0.050		0.806	0.043
Education (%)	Pearson Correlation	0.243	0.354	-0.080	1	0.355
	Sig. (2-tailed)	0.446	0.258	0.806		0.258
Land abandonment (%)	Pearson Correlation	0.816**	0.779**	-0.591*	0.355	1
	Sig. (2-tailed)	0.001	0.003	0.043	0.258	

Correlation is significant at the 0.05 level (2-tailed).
Correlation is significant at the 0.01 level (2-tailed).

Figure 5. Scatter plot and Correlation of migration (%) with other variables income (INR), altitude (m), education (%), and land abandonment (%).



Patterns of out-migration

A detailed analysis of the destination of migrants was conducted and diverse patterns of migration were observed (Figure 6). The destinations of migrants were nearby town/village, the district headquarter, the state capital, other districts of the state, out of state, and out of the country. The data showed that 28 percent of people moved to other states, followed by 24 percent to the state capital. Nearby town/village accounted for 23 percent of all migration.

13% of the people moved to other districts of the state and 11% to the district headquarter. Lastly, the smallest percentage (1%) of people moved abroad.

Figure 6. Destinations of migrants (n=1791 migrants)

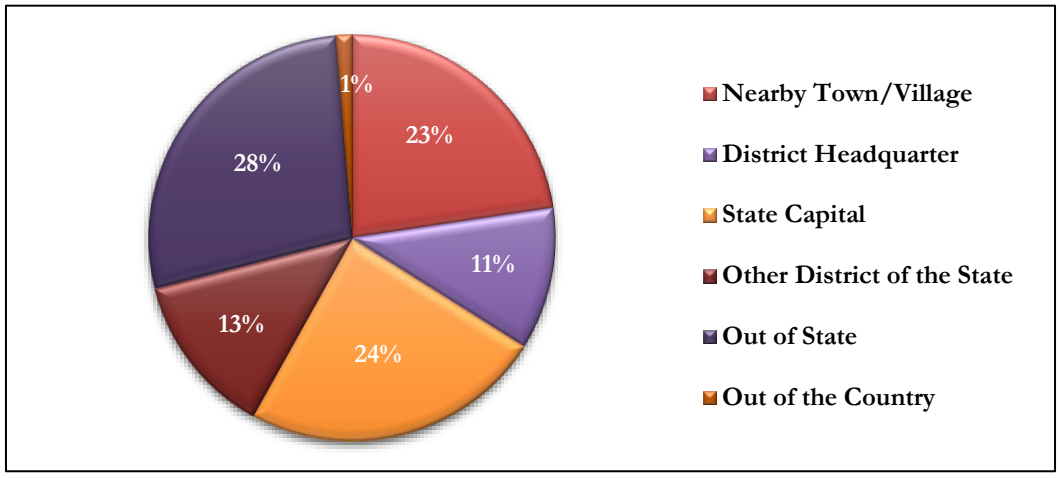
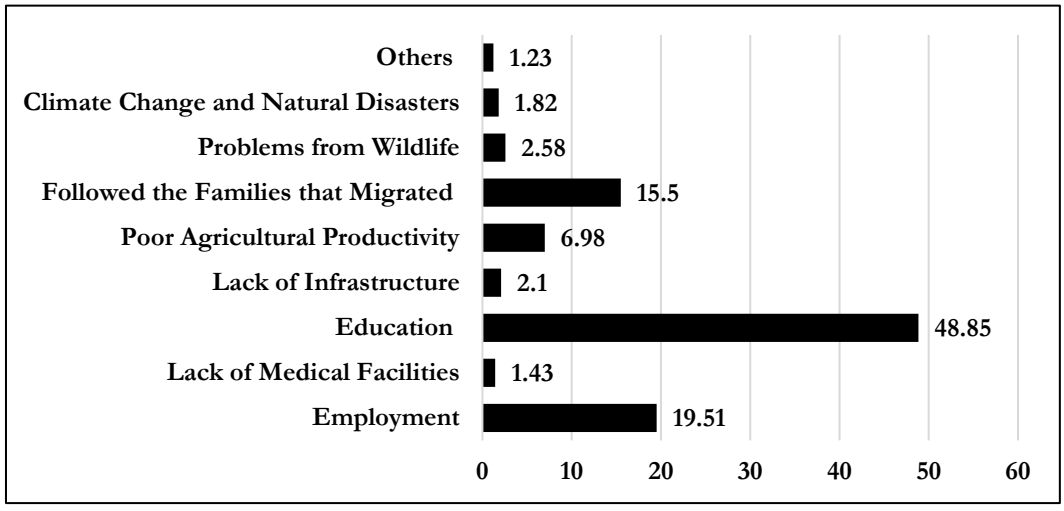


Figure 7. Reasons for out-migration (n=1791 migrants)



Reasons for out-migration

In the studied villages, several factors related to out-migration were examined (Figure 7). The most common reason people out-migrate (49%) is for education, followed by employment (19.51%). About 15.51 percent of people out-migrated with their family members, mostly wives, parents, and children. Migration due to poor agricultural productivity stood at 7%. Out-migration in the villages was also affected by other factors such as problems from wildlife (2.58%), inadequate infrastructure (2.1%), climate change and natural disasters (1.82%), inadequate medical facilities (1.43%), and others (1.23%).

Discussion

According to the study, out-migration from the Garhwal Himalaya is widespread, although not of the same magnitude. The villages in Pauri Garhwal and Tehri Garhwal suffered large-scale seasonal or permanent outmigration. It was noted by the authors that the quest for better livelihood and education were two major factors driving out-migration from these districts. They are also very easily accessible from the plains, and they have a long history of out-migration, with a large number of people also migrating following other people. Meanwhile, out-migration from villages in Chamoli and Uttarkashi districts was low. The reason is that agriculture is suitable, and the output is substantial compared to other mountainous districts. In addition, the area is inaccessible from the plains. Fruit cultivation at high altitudes is substantial enough to support life, and there is a short history of out- migration.

There are several types of migration practiced in the Garhwal Himalaya. The authors found that permanent migration was more prevalent in the hilly districts that were near the plains, such as Tehri Garhwal and Pauri Garhwal. However, seasonal migration was more prevalent in the districts far from the plains, such as Chamoli and Uttarkashi. In the villages that were close to the market town, such as Tugasi, Nirakot, Pale Dhauntri, and Purali, daily migration was noted high. People visit the town during the day for various purposes and return in the evening.

It was observed in the study that out-migration and the altitude of the villages are correlated in the Garhwal Himalaya. The authors found that the villages which were located at higher altitudes (>2000m) had a lower out-migration rate than the villages which were located <1500m. Significant agricultural production and tourism had played a significant role in arresting the outflow of people from the higher altitudes. Besides, people from higher altitudes engaged in various tourism jobs and did not migrate elsewhere in search of employment. However, the lower agricultural production and lack of tourism jobs in the local areas of Pauri Garhwal and Tehri Garhwal, where a large number of villages are located at lower altitudes, have pushed countless people to leave the area. Further, Out-migration hugely impacts the average income of the village. Villages that had the highest rate of out-migration also had the highest average income in the sampled villages. People who migrate send remittances to their families back home, which increases their income levels (Basu and Rajan, 2018). They spend this money for different purposes.

The out-migration has transformed the occupational structure of the people in the Garhwal Himalaya. It has transferred people from farms to off-farm activities (Mehta and Maikhuri, 2018). In the study, it was noticed that most people were employed in the service sector at the location, while few worked in other sectors. Even in the service sector hotel jobs were the most prevalent, where more than one-fourth of the total number of migrants were employed. The rest of the migrants were involved in different service sectors, including government teachers, defense personnel, other government employees, tourist guides, shopkeepers, businessmen, drivers, etc. Besides, the destinations of migrants were mostly internal, as 71% of the migrants were observed to be moving inside the state. The destinations of migrants were nearby towns/villages, the district headquarter, the state capital, other districts of the state. The authors observed that internal migration was mainly semi-permanent. However, a significant number of internally migrated families were found settled permanently in the state capital. Further, most of the permanent migrants moved out of the state. They moved with their families, leaving their farmlands and houses abandoned. A small number of people also

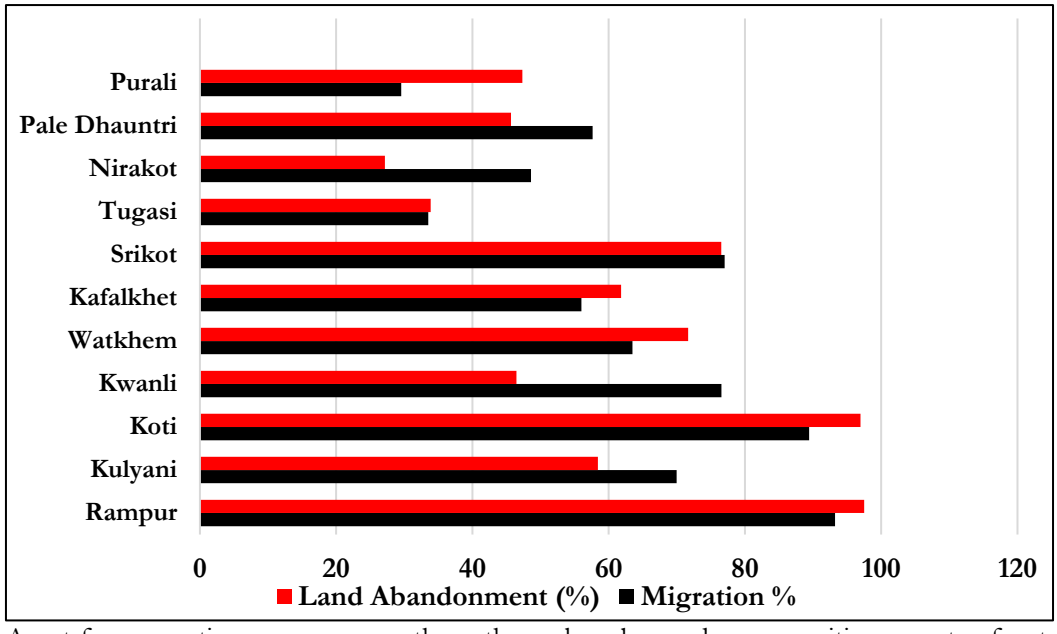
out-migrated abroad. The majority of youth who out-migrated abroad (Schlimbach et al., 2019) were found working in the hotel industries.

The lack of quality schools and higher education institutions in the hilly Garhwal region has become the largest cause of out-migration (within and outside the state). This has led to the out-migration of a large number of students from the mountains to the Plains and Terai regions of Uttarakhand and other parts of the country in search of better education. These students do not always migrate alone and sometimes their parents also migrate with them for the convenience of their children. Many times, parents' only reason to out-migrate is to educate their children. Further, young people after getting a better education, do not come back to their respective villages and they prefer settling and working in the bigger cities and towns. Employment is the second major cause of out-migration in the Garhwal Himalaya. Employment opportunities are not adequately available in the hills. Besides, restricted arable lands, small and fragmented landholdings, low agricultural outputs, and continuously diminishing traditional mountain agriculture have aggravated the problems. Further, due to fragile and rugged terrain, the possibility of industrial development is minimal. So, a large number of people out-migrated to the industrially developed cities of Terai and Plains and wherever better employment opportunities were available. Wildlife has become a major threat in the Garhwal region in recent years. In the farmlands, wild animals destroy the crops, which is the only source of livelihood for farmers. Sometimes these wild animals do not even leave a single grain in the field. Ultimately, people leave their non-remunerative agriculture and out-migrate in search of alternate livelihood options. Health facilities are also deficient in the Garhwal region, so some out-migrate in search of better health. Even after two decades of formation of the new state of Uttarakhand, there are many villages where roads, network connections, tap water, and other infrastructural facilities have not been reached yet and somehow numerous people have also out-migrated due to this. Last but not least, the rapidly changing climate and frequent natural and man-made disasters make life in the remote, fragile Himalaya extremely difficult for people. The recurring natural disasters have forced a lot of people to out-migrate in search of a better living place. The number of such people has risen after the massive disaster of 2013.

Out-migration from rural Garhwal Himalaya has many consequences. In the sending areas, permanent out-migration of people has resulted in the depopulation of villages and formation of 'Ghost Villages'. Several villages have been depopulated due to a large-scale exodus of people. In addition, there are numerous villages where more than 50% of the population has permanently out-migrated. Out-migration has also resulted in large-scale abandonment of land (Figure 8) and decline in traditional mountain agricultural practices. Natural springs are drying due to the abandonment of lands. Further, agricultural production is constantly diminishing due to the continuous outflow of people from the mountain's areas of Garhwal Himalaya. Moreover, depopulation has resulted in a shortage of male labor to work on the farmland and other sectors of the rural economy, and this has further hindered agro-productivity and slowed the process of socio-economic development (Herz et al., 2019) in the Garhwal region. The incessant land abandonment is undermining the food and livelihood security of the people living in the remote and marginalized areas of Garhwal Himalaya. The changing agricultural pattern has altered consumption behavior. Now people have been shifted from coarse grains like Baranaja (Twelve grains) to rice and wheat. With out-migration, the villages are losing their vibrancy. In addition, out-migration has resulted in erosion of rich traditional knowledge which Pahadi people have gathered over some time with their

experimentation with nature and changing climatic conditions (Joshi and Tiwari, 2014). In addition, human-animal conflict is increasing with the depopulation of people. The out-migration of males has led to an increase in the workload of women and that has led to the feminization of mountain agriculture. Over workload is affecting the overall health of the female population (Sherpa, 2007). De-population of people has enlarged the hill-plains divide and that undermines the socio-economic developments of the Garhwal region. While the plain districts of the Garhwal region are developing due to the continuous inflow of people, capital, and resources, the hill districts are suffering due to the endless outflow of human resources.

Figure 8. Migration and land abandonment



Apart from negative consequences the authors also observed some positive aspects of out-migration in the study area. The remittances sent by migrants enhance the income level of the migrants' families. It generates new demand for goods and services in the origin area that further expands the employment and income opportunities. Further, male out-migration has increased women's access to leadership and natural resources and decision-making power in the local panchayat. It has also contributed towards the social, economic, and political empowerment of women in the Garhwal Himalaya. Furthermore, out-migration has provided better opportunities for education and employment at the place of destination. It has exposed mountain people to the outside world, which has enlarged their public and social sphere.

Figure 9. (a) A ghost house in Janasu village (b) fallow land in Kulyani village (c) women bringing fodder from the jungle in Srikot village (d) women working in filed in Kwanli village (e) only left woman in house due to out-migration in Rampur village (f) langoors destroying fruits in Koti village.

(a)

(b)

(c)

(d)

(e)

(f)

Conclusion

In order to arrest out-migration and attract migrants back to their villages, several steps must be taken. Since agriculture provides livelihoods for about 70 percent of the population, it should be given priority. Cooperative farming should be promoted to increase agricultural production. Despite the potential of livestock farming in Garhwal Himalaya, the industry has declined over time and needs to be revitalized. There is a need to develop horticulture and the farming of medicinal plants on a broader scale. For the protection of crops from wild animals, the government should find a solution to deal with the destruction of wild animals or hire a guard for every village. Farmers who wish to diversify their farming operations should be given adequate support. The farmers need to be encouraged to use modern technology, and in order to do so, they need proper support and subsidies for farm equipment. This will boost yields and employment in the agricultural sector.

The tourism sector needs more attention. The Garhwal Himalaya has a wealth of natural resources, which could be harnessed for the development of tourism. However, it is mainly known for pilgrimage tourism where employment opportunities are available only for six months when the Char Dham Yatra is open (Sati, 2019, 2018, 2015, 2013). In order to further develop the tourism sector, new tourist destinations and sustainable eco-parks must be developed in remote and less travelled regions. Revitalizing older destinations is equally important. There is potential for eco-tourism. Supporting rural tourism and promoting homestays in villages would create new jobs for the locals.

There is a need for high-quality educational institutions in different parts of the region to prevent educational migration. In addition, youth need quality education and skill training (Kumar, 2021). Mountain-friendly industries are needed to create employment. Small-scale industries based on the Himalayan bio resources should be set up by the government, and traditional handicraft industries should be promoted at the local level to stop the exodus of people. The development of infrastructure and health facilities is also crucial to minimize outmigration.

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