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Depopulating Villages and Mobility of People in the Garhwal Himalaya

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Abstract

Rural out-migration is a worldwide phenomenon that is also visible in many mountainous regions, creating the impression of an abandoned landscape. In order to achieve sustainable mountain development, it is crucial to understand the various drivers and implications of out-migration in the mountains. Using both secondary and primary data on migration, this study examines different aspects of migration in the Garhwal Himalaya. Secondary data on migration were derived from a report published by the Rural Development and Migration Commission of Uttarakhand in 2018 that included migration statistics for the Garhwal region from 2011 to 2018. Primary data were collected through field surveys. Several types of migration were observed in the region, including semi-permanent migration, permanent migration, and in-migration. The study reveals that out-migration is a serious problem in the Garhwal Himalaya, as it has caused many socio-economic problems in the region. If these problems are not addressed immediately, the number of uninhabited/ghost villages in the region will increase rapidly, and the population of many villages will decline significantly. Finally, various policy measures were proposed to minimize the high rate of out-migration from the Garhwal Himalaya.

Keywords: Sustainable Mountain Development; Garhwal Himalaya; Migration; Livelihood; Ghost villages

Introduction

Migration is not a new phenomenon in the Indian Himalayan Region. People have been on the move since time immemorial. They migrate to improve their lives and the lives of their families, gain new experiences, get a quality education, develop new skills, find a better job, accompany their family, and flee insecurity, disaster, and famine (McKeown, 2004; Bernard and Bell, 2018). However, in recent years, the extent of migration from the region has increased manifold due to natural and anthropogenic factors, including climate change, natural disasters, declining agricultural practices, growing population, globalization, and infrastructure development (Tiwari and Joshi, 2015; Sati, 2019). Despite decades of development, the Indian

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Himalayan Region continues to suffer from low incomes, inadequate employment opportunities, lack of infrastructure, and limited access to basic amenities such as education and healthcare. The specific characteristics of mountain regions - poor accessibility, fragility, vulnerability, and marginality - have further exacerbated the impact of these changes. Moreover, people in mountain regions are more than ever before aware of the opportunities available elsewhere. Better communication technologies and declining transportation costs have enabled previously immobile people to migrate. The development of urban centers, located in mountain valleys and lowlands, has also created a high demand for cheap and flexible labor. Consequently, many people are migrating from hilly areas to these service centers (Sati, 2021; Biella et al., 2022).

Historically, people living in the Indian Himalayan Region have used migration to diversify their incomes and livelihood opportunities, reduce their dependency on natural resources, and adapt to social, economic, and ecological pressures (Singh, 2018; Kumar and Sati, 2022). People are not only moving away from the Indian Himalayan Region, but some have also migrated to the mountains, primarily in areas where promising conditions were available to pursue new livelihoods (ICIMOD, 2011). Additionally, there has been a significant shift in the pattern and dynamics of people's mobility in the past few decades, resulting in both positive and negative implications for mountain societies and ecosystems (ICIMOD, 2010, 2011).

This study is based on the Garhwal Himalaya, which is part of the Uttarakhand Himalaya. It has 5.8 million people (58.07% of the Uttarakhand Himalaya). It is one of the most geographically isolated, ecologically fragile, geologically sensitive, seismically active, and economically underdeveloped mountain ecosystems on earth (Sati, 2019, 2021). This region is inhabited by some of the most marginalized and poorest people in the world (Tiwari and Joshi, 2016; ICIMOD, 2011). Moreover, it sustains the livelihoods of millions of people both upstream and downstream (ICIMOD, 2010). However, geography and climate limit the carrying capacity of natural resources, reducing livelihood opportunities in the region (Sati, 2019). Additionally, over 70% of people in this region rely on rainfed subsistence agriculture to support their livelihood (Sati, 2016, 2019). Moreover, the Garhwal Himalaya is undergoing rapid changes due to many natural and anthropogenic factors. Due to these changes and limitations of livelihoods, many people are migrating to urban areas in search of employment and other services (Sati, 2021; Biella et al., 2022).

The Garhwal Himalaya has been a prominent region of migration for centuries (Kumar and Sati, 2023a; ICIMOD, 1999). The first large-scale in-migration in the region began in the 11th and 12th centuries when rulers from Central Asia invaded India (Sati and Kumar, 2023; Kumar and Sati, 2023b) and people from different parts of the Indian subcontinent settled in the Garhwal hills to escape their atrocities (RDMC, 2018). The second wave of in-migration started when the Mughals invaded India in the 16th century (Jain, 2010; Pathak et al., 2017). However, out-migration from the Garhwal Himalayas began mostly during the British era (Kumar and Sati, 2022). With the establishment of the Garhwal and Kumaon regiments, permanent jobs became available in the British Indian Army. This resulted in a huge out-migration of youth from the region to work for the British Army (Sati, 2019). Out-migration also increased during the first and second world wars, when soldiers were recruited to join the armed forces and sent around the world for training and combat (Pathak et al., 2017). Also, the industrially developed cities of Delhi and Mumbai attracted many people seeking jobs in

the private sector (Deshingkar and Start, 2003; Kumar, 2021). Exposure to the outside world changed the attitude of people, leading to the emergence of the "labor migration culture" in the Garhwal Himalaya. Additionally, it changed people's aspirations from farming-based livelihoods to salaried jobs (ICIMOD, 2010; Pathak et al., 2017).

The hilly area of Garhwal region failed to attract the attention of policy makers and planners after independence (Jain, 2010: Upadhyay et al, 2021). Its fundamental needs and requirements were overlooked due to other national priorities. As far as the Garhwal region is concerned, there were no powerful local parties that could take up the issue. The subject only gained attention during the Sino-Indian war (1960s). As a result, war-induced development began to take place (Pathak et al., 2017). In this period, roads were constructed on an extremely large scale especially in the border areas, and railway connectivity was enhanced in the Terai and Foothill regions. Further, Sino-Indian war of 1962, Indo-Pak war of 1965 and 1971 created a large demand for jobs in the defense sector, so people from Garhwal region migrated to work for the Indian Army. During the 1980s and 1990s, out-migration reached a record high as people began to migrate in large numbers to work in different cities and service centers within and outside the state (Sati, 2017; Kumar and Sati, 2022). This trend continued after Uttarakhand gained statehood in 2000.

In the past, several studies have been conducted on migration related issues in the Himalaya, but very limited studies have been done on the out-migration issues of the Garhwal Himalaya. Based on a recently published government report on migration and a comprehensive field investigation, this study analyses different aspects of migration in the Garhwal Himalaya. Further, it concludes by recommending various policy measures for minimizing the current extent of out-migration from the region.

Literature Review

Several scholars have studied the migration of people in the Garhwal Himalaya (Jain, 2010; Pathak, et al., 2017; Kumar and Sati, 2022). Some scholars noted that migration is a common phenomenon in the hilly Garhwal regions, and that people are using it as an alternative livelihood strategy (ICIMOD, 2009; ICIMOD, 2011). According to Sati (2021), the Garhwal region witnessed unprecedented out-migration since Uttarakhand became a state in 2000. Migration also shifted from seasonal migration to permanent family migration (Kumar and Sati, 2022). Earlier, migration was mainly seasonal, in which a member of a family would migrate for work, and the rest of the family would remain to cultivate the land (Tiwari and Joshi, 2015). However, after 2000, people started migrating permanently with their entire families (RDMC, 2018). Uttarakhand was created in 2000 as a result of the long-standing demand for statehood for Uttar Pradesh's hilly regions (Mamgain and Reddy, 2015). Its primary objective was to develop the hills of Uttar Pradesh (today's Uttarakhand) and fulfill the aspirations of the Pahadi people (Sati, 2021). Although, the state experienced a higher rate of economic growth than the national average (Mamgain and Reddy, 2016; Kumar and Sati, 2022). Yet these economic growths were concentrated mainly in the Terai and Plain regions of the Garhwal Himalaya, leaving hilly regions behind (Kumar and Sati, 2023b). Growth processes in the hills failed to create significant economic opportunities, leading to a massive exodus of people from the hilly regions (Mamgain and Reddy, 2015). It also created a huge income gap between people living in the plains and the mountains of the Garhwal Himalaya (Upadhyay et al., 2021). Similarly, Haridwar, a plain district, has a per capita income of 293,

078 INR, while Rudraprayag, a hilly district, has 88, 987 INR, which is less than one third of Haridwar (GoU, 2020). Moreover, large-scale permanent out-migration of people has resulted in the formation of ghost/uninhabited villages and the abandonment of agricultural lands (Tiwari and Joshi, 2015; Upadhyay et al., 2021). Besides, it has led to an increase in women's workload and feminization of hill agriculture (Mamgain and Reddy, 2015).

While Uttarakhand was created to develop its hills, its fundamental purpose seems to be ignored by every new government (Kumar and Sati, 2022). Even after two decades of development, the hilly regions still lack necessities such as employment, education, healthcare, and infrastructure (Jain, 2010; Bastianon, 2018; Adebayo, 2020). Thus, the region is seeing a huge out-migration of people (Tiwari and Joshi, 2016). Although many efforts were made to develop the hilly regions after Uttarakhand became a state (Sati, 2019). But it could not make much impact. Additionally, agriculture has declined in the hilly areas and it is no longer a remunerative sector (Sati, 2019, 2021). Furthermore, mounting population, 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 made the situation worse. In response, people are forced to migrate to find a better source of livelihood and other facilities (ICIMOD, 2010; Basu and Rajan, 2018).

Theoretical and Conceptual Framework

The term "migration" refers to the temporary or permanent movement of a person or a group of people from one place to another for a variety of reasons, ranging from better employment opportunities to persecution (Lee, 1966; Toney and Bailey, 2014). The Indian census states that "when a person is enumerated at a place other than his/her place of birth, he/she is considered a migrant" (ORGI, 2022).

Though human migration is as old as humanity itself, theories of migration are fairly new. There are several migration theories and models that have been proposed by various scholars to explain the patterns, drivers, and implications of migration. One of the oldest theories explaining modern migration is the Push-Pull Theory that was proposed by Lee (1966) and he conceptualized his theory based on four factors: factors associated with the place of origin, factors associated with the place of destination, intervening obstacles and personal factors which are associated with the decision to migrate (Keshri and Bhagat, 2010). Further, the 'Two Sector Model' (Todaro and Harris, 1970) explains migration as a result of positive income differentials between urban expected wage and rural obtain wage. It further asserts that migration increases when urban wages rise or the urban employment rate increases. In addition, neo-classical migration theories explain migration as a part of economic development. It emphasizes that internal migration occurs as an outcome of geographical differences in the supply and demand of labor, mainly between the rural agricultural sector and the urban industrial sector (Sati, 2021). However, it has been often criticized on the grounds that it downplays non-economic factors of migration (Kurekova, 2010). Besides, the New Economics of Labor Migration (NELM) theory suggests that migration is the result of a collective decision to maximize income and employment opportunities and minimize migration-related risks (Debnath, 2020).

Migration is a key livelihood strategy for mountain people that occurs across spatiotemporal scales and can range from temporary to permanent migration (Adger et al., 2009; Sati, 2021). Depending on cultural and socioeconomic characteristics, demographic structure, and contextual setting, each household responds differently to the multiple drivers associated with migration (Black et al., 2011; Maharajan et al., 2020). Many forms of migration, including seasonal, permanent, and semi-permanent, are used to adapt to changing environmental conditions and to reduce, mitigate, and diversify livelihood risks (Adger, et al., 2009). Several households use migration as a last resort to survive when adaptation to the local environment no longer works (Kumar and Sati, 2023c). Many people migrate to escape the hardships of mountain life and for family reasons, such as to provide better education for their children and better medical care for their elderly parents.

Earlier researchers viewed migration decisions as driven by the objective of maximizing individual or household profit and minimizing income losses due to crop failure, market volatility, and economic recession (Stark, 1985). However, recent studies have rejected this model to verify that migration decisions are influenced by a wide range of factors such as household capabilities (i.e., demographic composition, education levels, social networks), assets, individual aspirations, and external factors (Chapagain, et al., 2015) as well as climate change and variability, livelihood opportunities, and access to urban areas.

Recent years have seen a tremendous increase in interest in the links between migration and sustainable development (Srivastava 2012). At the international level, migration is no longer seen only from the risk perspective, but is increasingly acknowledged for its potential to deliver substantial benefits for the development of sending and receiving areas and their inhabitants (UNDP 2009). In addition, many studies have shown that remittances reduce poverty in the area of origin (Siddiqui and Mahmood 2015). But, migration of people from a region also represents a failure of the socioecological system to cope with local changes, resulting in the loss of valuable human resources (workforce), making mountainous rural areas more vulnerable (Singh, 2018; Upadhyay and Mohan 2014; Singh and Basu 2020). However, migration compensates for these losses through social and economic remittances, which increase the resilience of mountain societies (Kollmair, et al., 2006). Yet migration remains a largely untapped resource in Indian Himalayan development policy discourses.

The UN 2030 Agenda for Sustainable Development and the Global Compact for Migration are global frameworks that aim to reduce reasons for people to migrate, improve migrants' conditions, empower them to achieve their development potential, and facilitate migration governance from the local to international levels (UN, 2015). The sustainable development goals (SDGs) can be achieved more effectively through orderly, safe, and regular migration (IOM, 2018). However, this latter part has received less national and international attention in the developing countries, especially in mountain regions affected by internal and international migration (ICIMOD, 2011).

The study classified migration into two types: semi-permanent and permanent. Permanent migrants are people who have permanently left their villages and are now living somewhere else. Currently, their agricultural lands and properties, including houses, are abandoned, and they never visit their villages. In the Garhwal Himalaya, several villages have been completely depopulated due to permanent out-migration of people and these villages are called "Ghost Villages"(RDMC, 2018). On the other hand, semi-permanent migrants move alone or with their families for a certain period of time. Upon completion of their jobs (private/public) or

education, they return to their respective villages. Additionally, they have houses and family members in their villages, and they visit them regularly during holidays, festivals, and weddings. Migrant students studying in the city are also considered semi-permanent migrants. Moreover, semi-permanent migrants send remittances that enhance incomes of the receiving households.

Study Area

Garhwal Himalaya lies in the western part of the Uttarakhand Himalaya between 29°31'9"N and 31°26'5"N and 77°33'5"E and 80°6'0"E. Himachal Pradesh and Uttar Pradesh surround it from the north and south, respectively. To the east, it is bordered by Bageshwar, Almora, Pithoragarh, and Nainital districts. Tibet lies in its North. The total geographical area of the Garhwal Himalaya is 32,350 sq. km. It is almost hilly with 92.6 % hills and 7.4 % plains. Garhwal Himalaya ranges in altitude from 200 to 7,000 meters. It has three dimensional landscapes: the Shivalik Range, the Middle Himalaya, and the Greater Himalaya. The Greater Himalaya which is a snow-clad mountain lies above 3,500m. It is the source of three major river systems of the Garhwal region: the Bhagirathi River system, the Alaknanda River system, and the Yamuna River system.

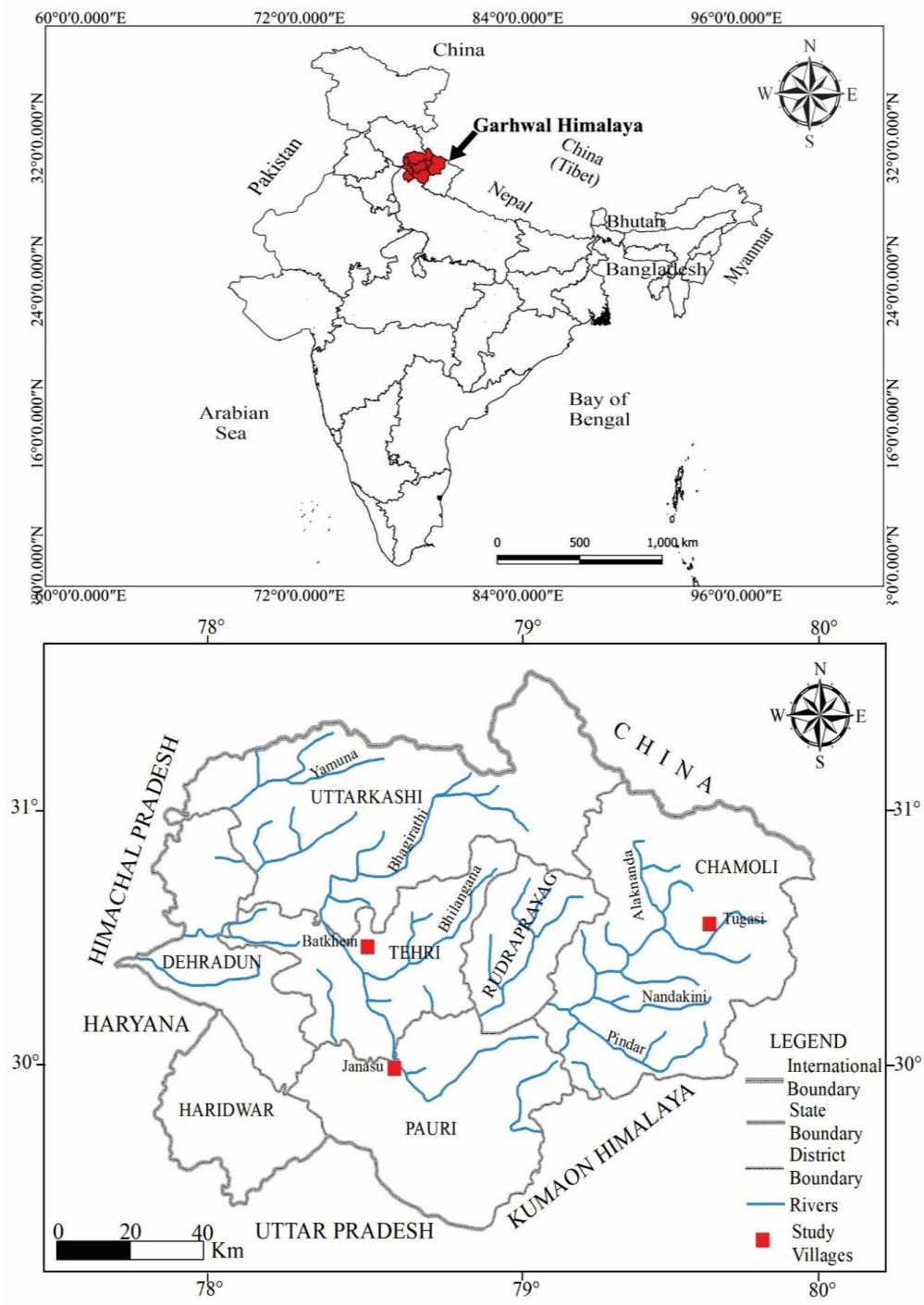
There are seven districts in the Garhwal Himalaya: Pauri Garhwal, Tehri Garhwal, Rudraprayag, Chamoli, Uttarkashi, Haridwar, and Dehradun. Except for Haridwar and a part of Dehradun, all districts are hilly. According to the census of India 2011, its population is 5,857,294. The majority (61%), however, lives in the two plain districts (Haridwar and a part of Dehradun), which have only 17% of the total area, while the rest (39%), lives in the other 5 hilly districts, which account for 83% area. Besides 33% of its population lives in urban areas, while the rest lives in rural areas. In the mountainous parts of the Garhwal Himalaya, however, almost 90% of the population resides in rural areas.

Methodology

The study was conducted by gathering primary as well as secondary data on migration. Secondary data were derived from a recent report published by the Rural Development and Migration Commission of Uttarakhand in 2018 which included migration statistics for the Garhwal region from 2011 to 2018. The migration data were analyzed using various statistical methods: percentile, indices, and levels. For graphical representation of the data various tables and figures were drawn. Several types of migration were analyzed at the district level, including semi-permanent migration, permanent migration, and in-migration. Further, the major types, patterns, drivers and implications of migration were examined. The association of age with migration was described in the study. To better understand migration at the village level, the author also incorporated a case study of three villages. The villages were selected from three different districts in the Garhwal Himalaya, ranging in altitude. One village was chosen from the river valley, one from the middle altitude, and one from the highlands. A total of 147 households were surveyed in April 2022, covering 100% of households from each village. The total population of the villages was 707, out of which 463 (65.49%) were migrants and 244 (34.51%) were non-migrants. In addition, different types, patterns, reasons, and implications of migration in the study villages were also examined. Additionally, a correlation analysis was performed between migration and other variables such as education, income, land abandonment, and altitude. All variables showed a significant correlation with migration.

Lastly, various policy measures were suggested to minimize the current rate of out-migration from the region.

Figure 1. Study area and the location of three study villages



Results

Types of out-migration

In the Garhwal Himalaya, migration is a common phenomenon, and people migrate for various reasons and for different periods of time. Further, migration differs from place to place and from person to person. Some people migrate semi-permanently, while others migrate permanently. Those who migrate for a specific period are considered as semi-permanent migrants, and those who leave their place of residence permanently are referred to as permanent migrants. Besides, semi-permanent migrants send remittances to their family members in the village where they practice subsistence farming. In contrast, permanent migrants do not remit money. They abandon their land and properties completely and the houses that they leave behind, i.e., houses with no occupants, are referred to as 'ghost houses'.

The data collected from Rural Development and Migration Commission Report showed that there were 5,837 (62.1%) villages out of 9,400 villages in the Garhwal Himalaya where migration occurred after 2011 (Table 1). Moreover, there were 3,591 villages (61.52%) where semi-permanent migration was recorded and 2,246 (38.58%) villages where permanent migration occurred. In all districts of the Garhwal region, the number of villages with semi-permanent migration was higher than those with permanent migration. The largest number of villages where semi-permanent migration was registered was found in Pauri Garhwal district followed by Tehri Garhwal, Chamoli, Uttarkashi, Rudraprayag and Dehradun. On the other hand, Haridwar district had the lowest number of villages with semi-permanent migration. In terms of permanent migration, the largest number of villages belonged to the Pauri Garhwal district, followed by Tehri Garhwal, Chamoli, Rudraprayag, Uttarkashi, and Haridwar. Dehradun recorded the least number of villages with permanent migration.

Table 1. Semi-permanent and permanent out-migration after 2011 (n=5,837 villages)

Districts	No of Villages with Semi-permanent Migration	%	No of Semi-permanent Migrants	%	No of Villages with Permanent Migration	%	No of Permanent Migrants	%
Uttarkashi	376	10.47	19,893	8.75	111	4.95	2,727	3.72
Chamoli	556	15.48	32,020	14.07	373	16.61	14,289	19.49
Rudraprayag	316	8.81	22,735	9.99	230	10.24	7,835	10.69
Tehri Garhwal	934	26.01	71,509	31.42	585	26.05	18,830	25.68
Dehradun	231	6.43	25,781	11.33	53	2.35	2,802	3.82
Pauri Garhwal	1,025	28.54	47,488	20.86	821	36.55	25,584	34.9
Haridwar	153	4.26	8,168	3.58	73	3.25	1,251	1.7
Total	3,591	100	227,594	100	2,246	100	73,318	100

Source: RDMC, 2018

In terms of number of migrants, the largest number of semi-permanent migrants recorded from Tehri Garhwal district, followed by Pauri Garhwal, Chamoli, Dehradun, Rudraprayag, and Uttarkashi. Haridwar district had the least number of semi-permanent migrants. On the other hand, the largest number of permanent migrants was noted from the Pauri Garhwal

District. It was followed by Tehri Garhwal, Chamoli, Rudraprayag, Dehradun and Uttarkashi. However, the lowest number of permanent migrants was found in Haridwar district.

Permanent out-migration from villages

Through the use of indices and level methods, the extent of permanent migration from the Garhwal Himalaya was examined (Table 2). It was found that Pauri Garhwal and Tehri Garhwal districts had the highest levels of permanent migration since more than 20% of the villages in these two districts experienced permanent migration of people. Chamoli and Rudraprayag were categorized into the medium levels as only 10-20% of the villages in these districts experienced permanent migration. Further, Dehradun, Haridwar, and Uttarkashi were categorized as low levels because in these districts the percentage of villages with permanent migration was below 10%. Similarly, the author calculated the percentage of permanent migrants from each district and found similar results as above.

Table 2. Permanent out-migration from villages after 2011

Permanent out-migration (number of villages in %) (n= 2,246 villages)		
Indices (%)	**Levels**	**Districts**
>20	High	Pauri Garhwal (36.55%), Tehri Garhwal (26.05%)
10-20	Medium	Chamoli (16.61%), Rudraprayag (10.24%)
<10	Low	Uttarkashi (4.95%), Haridwar (3.25%), Dehradun (2.35%)
Permanent out-migration (number of migrants in %) (n= 73,318 migrants)		
Indices (%)	**Level**	**Districts**
>20	High	Pauri Garhwal (34.9%), Tehri Garhwal (25.68%),
10-20	Medium	Chamoli (19.49%), Rudraprayag (10.69%),
<10	Low	Dehradun (3.82%), Uttarkashi (3.72%), Haridwar (1.7%)

Source: RDMC, 2018

Out-migration of people after 2011

There were 336 villages in the Garhwal Himalaya where the population decreased by 50% after 2011 (Figure 2). According to the data, the Pauri Garhwal district had the largest number of villages in this category with 112 villages registering a 50% decline in its population as a result of out-migration after 2011. It was followed by the districts of Tehri Garhwal (71), Uttarkashi (63), Dehradun (42) and Chamoli (18). Haridwar district, however, had the lowest number of villages (7).

Figure 3 shows the number of depopulated villages after 2011. The largest number of depopulated villages were found in Pauri Garhwal district where the whole population of 186 villages permanently out-migrated leaving their land and properties abandoned (these villages are referred to as 'Ghost Villages' in Uttarakhand). It was followed by Uttarkashi where 70 villages became depopulated after 2011. Similarly, in Tehri Garhwal 58 villages, in Chamoli 41 villages, in Haridwar 38 villages and in Rudraprayag 20 villages became depopulated. The least number of ghost villages was registered in Dehradun district.

Figure 2. Number of villages where population reduced by 50% after 2011 (n=336 villages)

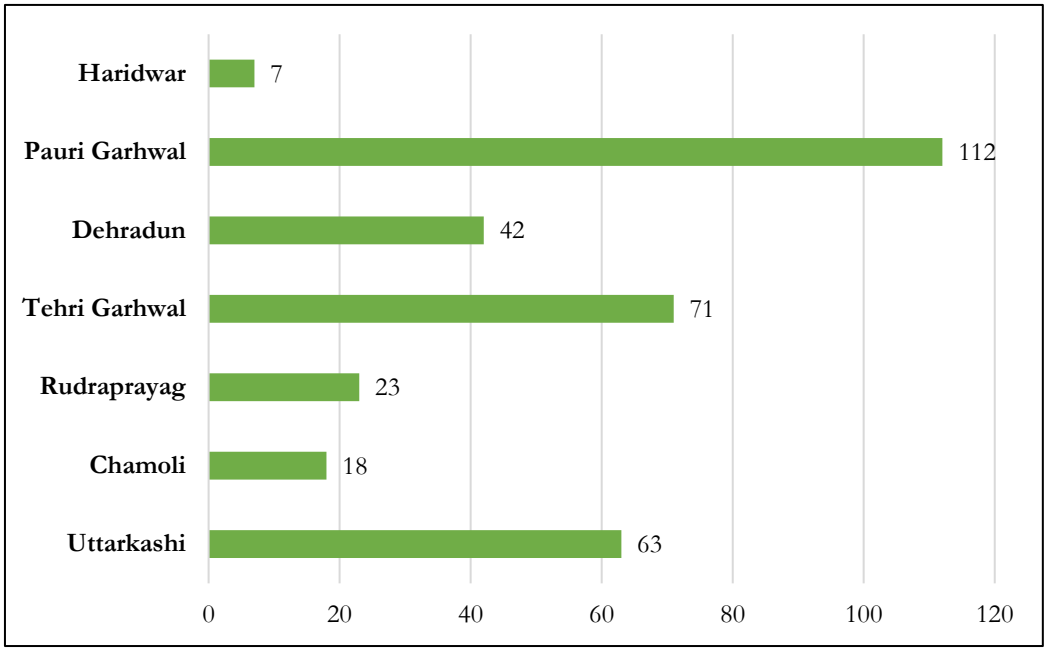
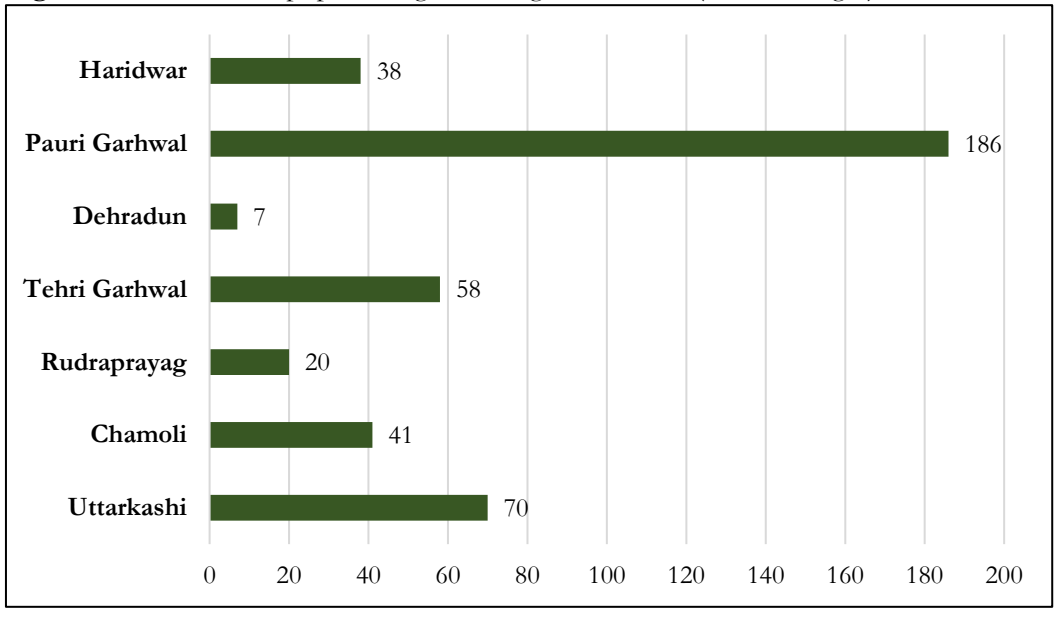


Figure 3. Number of depopulated/ghost villages after 2011 (n=420 villages)

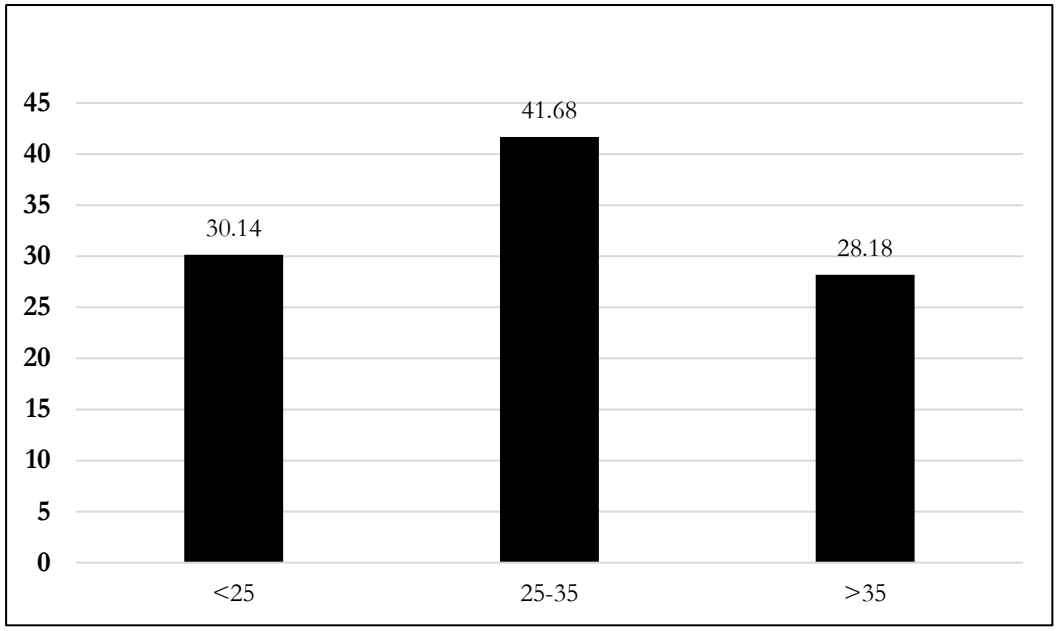


Age and out-migration

The migration of people is significantly affected by age, and the propensity to migrate tends to decrease with age since younger generation migrate more than older people. Figure 4 shows the percentage of migrants in the Garhwal Himalaya by age groups. Although migration was

very common in almost all age groups, the majority of migrants fell in the age group of 25-35 years, which was followed by the age group of <25 years. The lowest rate of out-migration was found in the age group of >35 years. The data precisely indicated that the younger generation which constitutes the main workforce of the economy was moving out, and it could seriously impact the economic development of the region.

Figure 4. Age of migrants (N=300,912 migrants)



Drivers of out-migration

There were a variety of reasons for the out-migration of people from the villages of the Garhwal Himalaya (Figure 5). The most common reason for migration from the Garhwal Himalaya was employment (54.53%). It was followed by education (14.59%). Further, 10.44% of migrants left the region for other reasons such as natural disasters, climate change, family tension, debt, etc. Additionally, 7.5% out-migrated due to lack of medical facilities. Besides, migration from the region was also impacted by other factors including lack of agricultural productivity (4.33%), destruction of crops by wildlife (3.61%), lack of infrastructure (2.72%), and followed the families that migrated (2.28%).

Patterns of out-migration

In the analysis of the destinations of migrants, different patterns of migration were found (Figure 6). The major destinations of migrants were: nearby towns, district headquarters, other districts of the state, out of state, and abroad/out of country. According to the data, the largest percentage of people (31%) out-migrated to their nearby towns, followed by other districts of the state where 30.64% people migrated. Out of state migration accounted for 21.91% of all migration. A total of 15.31% people migrated to district headquarters. Finally, only 1.14 percent of people emigrated abroad.

Figure 5. Reasons of out-migration (N=300,912 migrants)

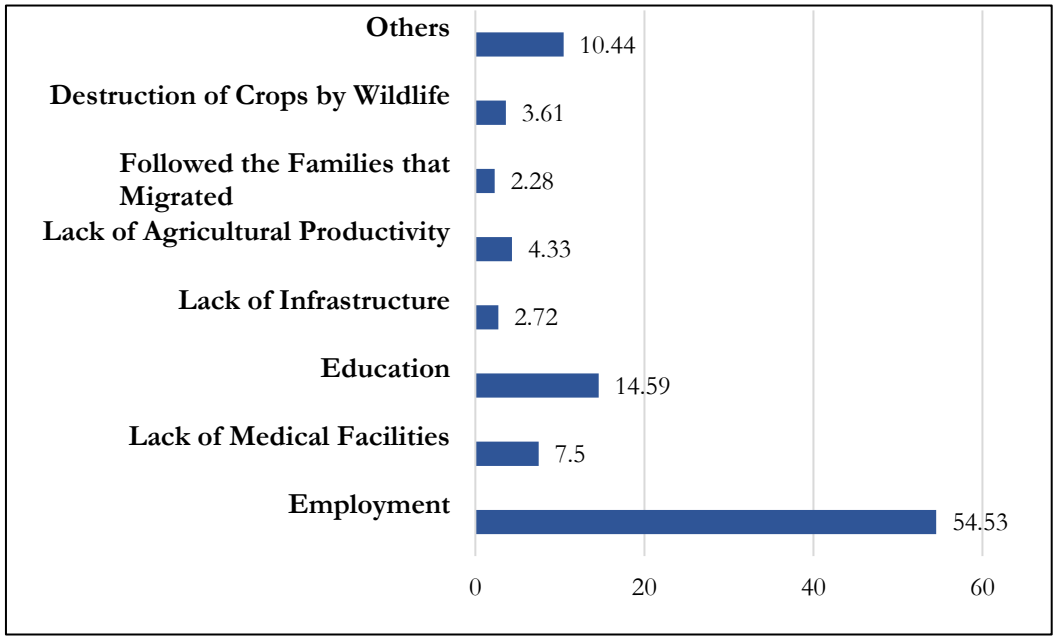
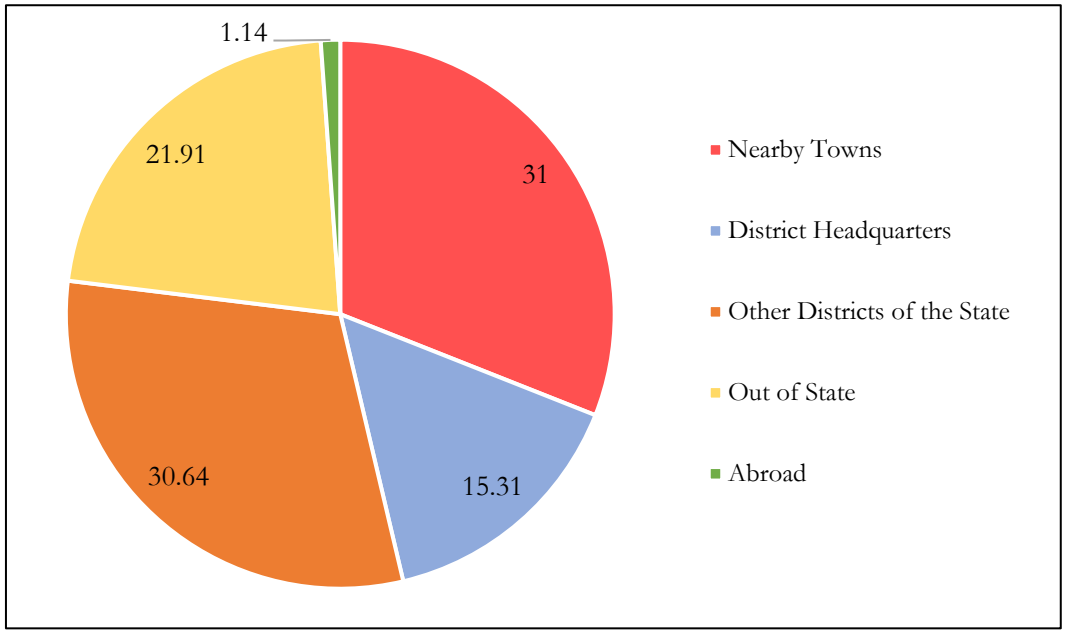


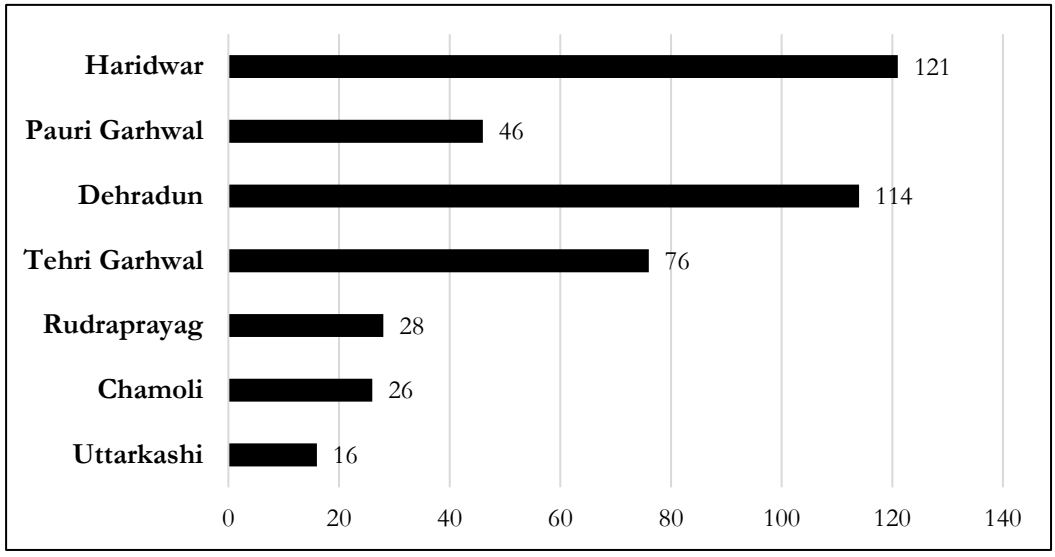
Figure 6. Destination of migrants (N=300,912 migrants)



In-migration in villages in the last 10 years

Despite large scale out-migration of people from the villages, there were number of villages where people from other villages/towns and hamlets had in-migrated and settled. A total of 850 villages in the Garhwal Himalaya witnessed the in-migration of people. Figure 7 illustrates the number of villages where in-migration occurred. The highest in-migration occurred in the Haridwar district where 121 villages received in-migrants, followed by Dehradun district (114), and Tehri Garhwal district (76). The least in-migration was recorded in Uttarkashi district where only 16 villages received in-migrants, followed by Chamoli district (26), and Rudraprayag district (28).

Figure 7. In-migration in the villages in the last 10 years (n=427)



Out-migration: A case study

In order to understand migration in the Garhwal Himalaya at village level, the author conducted a case study of three villages. It was found that migration was a common phenomenon in all the villages, but its extent was not the same in each. The largest migration rate (87.95%) was found in Janasu village which was located in Pauri district followed by Batkhem (Tehri district). However, the least migration (33.34%) was noted from the highland village of Tugasi (Chamoli district). In addition, permanent migration was only recorded in the villages of Tehri and Pauri districts. From the village of Chamoli district, no permanent out-migration was recorded. In addition, the data depicted that the rate of out-migration was higher in the village of Pauri and Tehri district than the village of Chamoli district.

Using the percentile method, the author also analyzed different reasons for migration, occupations of migrants, and their destinations (Table 4). Education (41.85%) was found to be the primary reason for out-migration from the study villages, followed by employment (26.51%). Further, the author noted that migrants from all three villages were employed in various occupations. Among all occupations, the majority of the people were employed in hotel jobs (26.11%) followed by labor jobs (18.34%). In addition, different patterns of

migration were observed in the villages. However, migration was mainly internal (77.45%) and the majority of people migrated to nearby towns (33.65%).

Table 3. Salient geographical and population features of the study villages

Villages	District	Latitude	Longitude	Altitude (m)	Total Households	Total Population	Total Migrant Population	Migrants (%)	Semi-permanent Migrants (%)	Permanent Migrants (%)
Janasu	Pauri Garhwal	30° 14' 15"N	78° 41' 34"E	550	60	282	248	87.95	38.14	61.86
Batkhem	Tehri Garhwal	30° 21' 10"N	78° 25' 11"E	1710	42	245	155	63.27	46.4	53.6
Tugasi	Chamoli	30° 29' 03"N	79° 38' 38"E	2450	45	180	60	33.34	100	0

Source: Primary survey

Table 4. Reasons, occupations and destinations of migrants in the study villages (n=463 migrants)

Reasons	**(%)**	**Occupations**	**(%)**	**Destinations**	**(%)**
Employment	26.51	Army/Police	14.90	Nearby Towns	33.65
Lack of medical facilities	3.43	Teaching	4.26	District Headquarter	15.2
Education	41.85	Other Government Jobs	7.21	State Capital	20.1
Lack of infrastructure	02.11	Doc./Eng. and other Tech Jobs	7.94	Other District of the State	8.5
Poor agricultural productivity	6.88	Hotel Jobs	26.16	Out of State	21.49
Followed the families that migrated	11.50	Drivers	5.39	Out of the Country	1.17
Problems from wildlife	2.58	Laborer	18.34		
Climate change and Natural disasters	3.81	Other Jobs	15.80		
Others	1.33				

Source: Primary survey

Correlation: migration (%), education (%), income (INR), land abandonment (%), and altitude (m)

A correlation analysis was carried out between migration and other variables (Table 4). All variables showed a significant correlation with migration. It means that the average income of the villages and land abandonment were higher in the villages with high education level and high migration rates. However, the negative correlation between migration and altitude means that as the altitude of the villages increased, migration declined. Moreover, migration was strongly correlated with education, income levels, land abandonment and altitude with R-values of 0.945, 0.999, 0.997., and -0.997.

Table 5. Correlation: migration (%), education (%), income (INR), land abandonment (%) and altitude (m).

Variable		Migration (%)	Education (%)	Income (INR)	Land Abandonment (%)	Altitude (m)
Migration (%)	Pearson Correlation	1	0.945*	0.999*	0.997*	-0.997*
	Sig. (2-tailed)		0.001	0.033	0.048	0.045
Education (%)	Pearson Correlation	0.945*	1	0.961*	0.967*	0.92
	Sig. (2-tailed)	0.001		0.009	0.014	0.256
Income (INR)	Pearson Correlation	0.999*	0.961*	1	1.000*	-0.993
	Sig. (2-tailed)	0.033	0.009		0.015	0.078
Land Abandonment (%)	Pearson Correlation	0.997*	0.967*	1.000*	1	-0.989
	Sig. (2-tailed)	0.048	0.014	0.015		0.093
Altitude (m)	Pearson Correlation	-0.997*	0.92	-0.993	-0.989	1
	Sig. (2-tailed)	0.045	0.256	0.078	0.093	

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

Discussion

The study showed that migration is a common phenomenon in the Garhwal Himalaya, occurring in all the districts. However, the rate of out-migration (both semi-permanent and permanent) varied across the districts. According to the data, districts of Pauri and Tehri located in mid-altitude region of the Garhwal Himalaya had the highest rate of out-migration and the largest number of migration villages (both semi-permanent and permanent). Besides, districts (Uttarkashi, Chamoli, and Rudraprayag) located in the higher altitude region experienced medium levels of out-migration. On the Other hand, Haridwar and Dehradun, two districts in the plains, reported the lowest out-migration.

In the plain districts (Haridwar and major parts of Dehradun), employment opportunities are high due to large scale urbanization and industrial development. They also have huge fertile land that produces substantial amounts of cereals and cash crops, which lowers the rate of out-migration from this region (Sati, 2021). The huge out-migration of people from Tehri and Pauri districts was due to various reasons. Both districts are easily accessible from the plains, and they have a long history of migration. People from these two districts have been out-migrating for their livelihoods for quite some time (Tiwari and Joshi, 2015). A large number of people from these districts have been out-migrating to work in the Indian Army, setting a trend of migration among youth. Many people have also out-migrated following other migrants of their villages. Additionally, agriculture has drastically declined in these two districts, which forced people to migrate in search of other sources of living (Upadhyay et al., 2021). In contrast, in districts like Chamoli, Rudraprayag, and Uttarkashi, the rate of out-migration is moderate. These districts are located far from the plains, deterring people from out-migrating. In addition, people from these districts have not historically served in the Army. Besides, there is no prevalent trend of out-migration among the people, i.e., people do not migrate following other migrants. Furthermore, they have good agricultural production, including fruits, which sustain the livelihoods of many people (Kumar and Sati, 2022). These

districts are also part of the Char Dham pilgrimage, which provides substantial employment opportunities for six months during the summer and monsoon seasons (Sati, 2019, 2018, 2015, 2013). Therefore, people are less likely to leave these areas than in Pauri and Tehri districts.

As a result of the exodus of people from the Garhwal Himalaya, many villages have become depopulated and ghost/uninhabited (RDMC, 2018). After 2011, the population of 336 villages in the Garhwal Himalaya declined by 50%. The largest number of such villages were located in the Pauri and Tehri districts. However, the lowest decline was noticed in Haridwar district. In addition, 420 villages in the region have become ghost/uninhabited villages. People have permanently left these villages. Pauri and Dehradun districts recorded the largest and lowest number of ghost villages, respectively. Additionally, the younger population was found out-migrating more than the older population, and the largest rate of out-migration was observed in the 25-35 age group. Nevertheless, the out-migration was least among the older population (>35 years).

People from villages in the Garhwal Himalaya migrated for a variety of reasons. However, most of the migrants were seeking employment (54.53%) and education (14.59%). In the Garhwal Himalaya, employment opportunities are scarce. More than 70% of the population depends on agriculture for their livelihood. But the region is mainly hilly, irrigation facilities are limited (around 10%) and the size of the landholdings is very small, with an estimated 87% of households possessing less than 1 hectare. As a result, agricultural production and productivity are less and it has become non-remunerative with time. Additionally, agriculture is a climate-sensitive activity, and it has been severely affected by climate change in recent years (Joshi and Tiwari, 2014). The continuous decline of mountain agriculture has led many people to migrate in search of other sources of livelihood (Sati, 2021). Further, because of the rugged and rough terrain of the Garhwal Himalaya the possibility of industrial development is minimal in the hilly areas and consequently all the industries are located in the Terai and Plains regions of the state (Mamgain and Reddy, 2015). Therefore, a large number of people migrated to the urban areas of Terai and the Plains as well as wherever better employment opportunities were available.

Large number of people also migrated to their local towns where they found some employment options. Similarly, people from the plains migrated to other parts of the state and country in better prospects of livelihood and quality of life. Furthermore, education was a primary reason for out-migration of younger people. There is a lack of good schools and quality higher educational institutions in the hilly regions of Garhwal Himalaya which has led to the out-migration of great number of students from the hills to nearby towns, state's capital, and other parts of state as well as India (Kumar and Sati, 2022). Students from plain regions of Dehradun and Haridwar have also out-migrated to other parts of the country as well as inside the state for the same reason. Few students emigrated abroad. In addition, these students after getting a quality education, do not go back to their villages and they prefer getting employment in bigger cities and towns which further affect the rate of out-migration in the region (Tiwari and Joshi, 2016). Besides, destruction of crops by wild animals has become very common in the Garhwal Himalaya. Many times, wild animals do not even leave a single grain in the farmland. Eventually, people leave farming and out-migrate in search of other source of livelihoods. Health services are also lacking in the Garhwal Himalaya, and some people migrated for better health facilities. Further, it has been more than two decades

since the formation of the state of Uttarakhand, but there are still several villages where basic infrastructure such as roads, electricity, telecommunications, tap water, and other facilities have not reached yet. Many people have left because of these problems. In addition, numerous people have out-migrated following others and some with their family members.

This study showed that most people (>75%) migrated internally. These people generally migrated to nearby towns, district headquarters and other districts of the state. The rest of the people migrated outside of the state, and 1% migrated out of the country. Further, it was found that there were number of villages where people from other villages/towns in-migrated and settled. There was a total of 850 villages in the Garhwal Himalaya that witnessed the in-migration of people. The highest number of villages where in-migration occurred belonged to the Haridwar district. It was due to its location in the plain and industrial development which attracted people. However, Uttarkashi registered the lowest number of such villages due to its remote location and inaccessibility from the plains.

The case study of three villages showed that migration was a widespread phenomenon in all villages, but the villages which were from Pauri Garhwal and Tehri Garhwal districts experienced the largest rate of out-migration. Further, education was the main reason for out-migration in the study villages, with about 42% of people out-migrated for education, followed by employment (26.51%). Additionally, most people were working in hotel industries (26.11%), and the lowest percentage was employed in teaching jobs (4.26%). Migration was mainly internal (>75%). Furthermore, a correlation analysis revealed a positive correlation between migration and education, income, and land abandonment, while a negative correlation was found with altitude. This means that the average income of the village and land abandonment were higher in the villages with high education level and high migration rates. However, the rate of out-migration was found declining with increasing altitude of the villages.

Out-migration has many implications in the Garhwal Himalaya. The out-migration of people has resulted in the depopulation of villages and the formation of ghost villages (RDMC, 2018; Sati, 2021). It has resulted in large-scale land abandonment, which has adversely affected traditional hill agriculture (Pathak et al., 2017; Upadhyay et al, 2021). As a result of the continuous out-migration of people from the hilly regions, agricultural production and productivity have drastically declined. This has negatively affected the rural economy. The declining agricultural production in the region has led to food insecurity (Joshi and Tiwari, 2014). With the out-migration of people, the human-animal conflict is rising (Kumar and Sati, 2022). Due to male out-migration, women's workloads have increased in rural areas, affecting their health (Mamgain and Reddy, 2015). Further, male out-migration has resulted in feminization of hill agriculture (Mamgain and Reddy, 2015). Out-migration from the hilly regions of the Garhwal Himalayas has widened the hill-plains divide, which undermines the socio-economic development of the region (Kumar and Sati, 2022). Moreover, the plain districts of the region are growing due to the endless inflow of people, capital, and resources. While the hilly districts are suffering from the exodus of human resources (Sati, 2019, 2021).

Despite this, the author observed some positive aspects of out-migration in the Garhwal Himalaya. Remittances sent by migrants increase income levels for the receiving families. In turn, this increases the demand for goods and services in the region, resulting in more employment opportunities. Male out-migration from the villages has improved the position of women in local village panchayats. Migration has also contributed to empowering women

in the region (Tiwari and Joshi, 2016). Further, migration has created better educational and employment opportunities for migrants at their destinations. Moreover, the region has also benefited through the social remittances.

Figure 8. (a) Ghost houses in Janasu village (b) ghost houses in Batkhem village (c) left behind old parents living in a house of Batkhem village due to out-migration of younger generation to cities (d) women bringing fodder from the jungle in Tugasi village (e) large abandoned agricultural land (f) highland village of Tugasi.

Policy Recommendations

In order to minimize out-migration from the region, several steps need to be taken. Since more than 70% of the population depends on agriculture for their livelihood, it should be the major priority. In the hilly Garhwal region only 10% of the agricultural land is irrigated, so to

protect farmers against unpredictable rains, more land should be brought under irrigation. The Garhwal Himalaya has a great potential for livestock farming, but it has declined over time. It must be revived. The cultivation of medicinal plants and horticulture can be promoted to a large extent in Garhwal Himalaya. This is because it is well suited for this, and it can improve farmers' incomes. The government should find ways to protect farmers' crops from the destruction of wild animals. Farmers who are willing to diversify their agricultural practices should be provided with adequate support. They must be encouraged to use modern technology and upgraded farm equipment, and to do this, they need abundant subsidies. This will boost crop production and productivity as well as employment opportunities in the agriculture sector. Moreover, the Garhwal Himalaya is rich in natural resources, which should be harnessed for tourism development. The region is largely known however for pilgrimage tourism, which provides employment only for six months a year during the time of the Char Dham Yatra. This sector must be expanded. Various tourist destinations need to be developed in different parts of the Garhwal Himalaya, remote locations should be prioritized. It is also imperative to revitalize older destinations. The potential of eco-tourism should be harnessed. The promotion of rural tourism and homestays could also provide jobs for rural populations.

Establishing high-quality educational institutions in different parts of the region is important for minimizing educational out-migration (Kumar, 2021). Further, the government should provide bus services to students from rural areas so that they can come to the city to study and then return home afterwards. This can limit the number of parents who migrate only to educate their children. Youth also need vocational/professional training. To create jobs, mountain-friendly industries can be built. Local mountain resources can be used to establish small-scale industries. Forest-based industries can be beneficial for the region because forest resources are abundant in the region and have not been properly utilized. Additionally, milk processing industries have great potential in the Garhwal Himalayas. However, these industries are very limited in the region and are located mostly in urban areas and district headquarters. If the government finds a way to collect milk from each village, it could increase the income level of many rural households. In addition, the development of health and infrastructure facilities is vital to minimize out-migration from the region.

In order to strengthen people's resilience and capacity to adapt to climate change, sustainable land management and ecosystem-based adaptation are essential. Further, while developing plans and strategies, it is also crucial to consider the specific needs and challenges of migrants' families who are left behind. Besides, enabling the integration processes of returnees and in-migrants is also vital. In addition, providing legal, administrative, and financial support to returning migrants who intend to invest newly acquired skills, knowledge, and financial resources in their local communities is essential for fostering innovation in the mountains.

Conclusion

The Garhwal Himalaya experienced exodus out-migration after independence, mainly during the 1980s and 1990s. It got momentum after Uttarakhand got statehood. After 2011, out-migration peaked. There were many driving forces which aggravated the rate of out-migration. The reason for out-migration was mainly the search for a better livelihood. A lack of better educational and medical facilities was also observed as a reason for out-migration. While migration has contributed substantially to the regional development of the Garhwal Himalaya through social and economic remittances, large-scale permanent out-migration has become a major concern since it has caused many socio-economic problems in the region. It is therefore

imperative to take several measures to minimize the high rate of out-migration from the region. If the migration processes are managed, regulated, and governed properly it could benefit the region greatly and can help in achieving sustainable mountain development.

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