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Seasonal Migration and Livelihood Resilience in the Face of Climate Change in Nepal

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Migration for work remains a livelihood strategy in subsistence farming communities globally, especially in view of unprecedented environmental change. Farmers in the high Himalaya migrate during the winter, when farming activities are reduced. This study examined the drivers of seasonal migration in the context of climate change and migration's role in food security and livelihood resilience in the district of Humla, Nepal. Focus group discussions and a household socioeconomic survey were conducted. The results suggest that rather than climate change impacts, structural poverty is the root cause of migration, such that men from poor households with small landholdings and high food insecurity, mainly belonging to low-caste groups, migrate for work during the winter. Focus group participants also presented a clear perception of climate variability and change and their negative impacts on crop production. In this context, the poorest households find cultivating their own land risky. Moreover, the traditional practice of sharecropping, which helped them reduce food shortages, has also become less profitable. Therefore, more households are likely to participate in seasonal migration in the context of climate change, and those already migrating are likely to do so for longer time periods. Currently, such migrants take up low-paying unskilled wage work, mainly in towns and cities in Uttarakhand, India, which enable them to make only modest savings, hardly enough to repay the debt their family has incurred during food shortages. Even in the future, these farmers are likely to be limited to the same migration pattern, because they lack the social ties, education, and financial capital needed to fulfill the administrative and monetary requirements for more economically promising long-term overseas migration. Thus, it is unlikely that migration will make a significant contribution to building livelihood resilience in the context of climate change in remote Himalayan farming communities.

Keywords: *Seasonal migration; food security; livelihood resilience; climate change; Humla; Nepal.*

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Introduction

Migration for work is one of the most common off-farm economic activities in subsistence farming communities in developing countries. Studies have found that migrants' remittances enable these communities to reduce poverty and improve their living standards (Adams and Page 2005; Acosta et al 2008). In Nepal, such remittances contributed 30% of the total gross domestic product in 2016, the second-highest such percentage in the world (World Bank 2017). In addition to rapid poverty reduction through remittances (Lokshin et al 2010; Wagle 2012), migration has also helped promote positive social changes, such as the empowerment of women and marginalized communities (Gartaula et al 2010; Adhikari 2013; Sunam 2014). Arguably, it is an important sector having potentials for economic and social development, and some of its negative impacts, such as a gradual decline of farming in migrant communities, are considered to be manageable by effective policy measures (Maharjan et al 2013; Adhikari and Hobley 2015; Jaquet et al 2016; Sunam and McCarthy 2016).

Despite the positive socioeconomic changes supported by off-farm activities such as migration, resource-dependent subsistence farmers have been increasingly challenged by unprecedented environmental changes over the last few decades (Morton 2007; Gentle and Maraseni 2012; Harvey et al 2014). In this context, the circumstances in which farmers decide to migrate, the pattern of migration, and its impact on livelihoods all change in an indeterminate way. Climate change and extreme events add stresses to farmers' livelihoods and eventually lead to their displacement or increased migration (Bardsley and Hugo 2010; McLeman et al 2015; Milan et al 2016). Most of the early literature on environmental migration conceptualized it as a failure to adapt to environmental changes and therefore portrayed it as a problem (Black, Bennett, et al 2011; Gemenne and Blocher 2017). However, environmental change is only one of many drivers of migration (Mortreux and Barnett 2009; Etzold

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et al 2014), and even when migration is directly driven by environmental change, it can still enhance migrant households' adaptive capacities and livelihood resilience through monetary and social remittances (Adger et al 2002; McLeman and Smit 2006; Gioli et al 2014; Gemenne and Blocher 2017).

Climate change and variability are among the major challenges facing farmers in Nepal (Xu et al 2009; Manandhar et al 2011; Bhatt et al 2014; Gaire et al 2014; Pandey and Bardsley 2015), where the massive flow of remittances can arguably help farmers to reduce climate-related risks. However, there is high disparity in the pattern of international labor migration and its utilization as a vulnerability-reduction strategy. The communities in the eastern and central regions of the country have the highest rate of international migration and consequently receive large amounts of remittances (GON 2014). However, the areas with the country's highest poverty and food insecurity rates, in the hill and mountain areas of the midwestern and far-western regions, have comparatively very low international migration rates (GON 2014; GON and UNDP 2014). Rather than long-term international migration, communities in these regions mostly engage in seasonal migration during the winter when there is little farm work (Bruslé 2008).

Remittances from short-distance seasonal migration are much lower than those from longer-term international migration (Hollema et al 2008). Nevertheless, the economic benefits of seasonal migration have been promising in other developing countries. In rural India, poor households that engaged in seasonal migration were found to have significantly higher income than nonmigrant households (Haberfeld et al 1999). Income from seasonal migration in rural Vietnam led to a significant improvement in the living standards of migrant families and made around one-fifth contribution to the overall poverty reduction between 1993 and 1996 (de Brauw and Harigaya 2007). In Ethiopia, cash earnings from seasonal migration indirectly compensated for the problem of land scarcity among migrant households and enabled them to invest in productive resources, for example, by buying cattle and starting new businesses, and to invest in human development through their children's education (Asfaw et al 2010). In addition to its household economic impacts, income from seasonal migration has also been found to directly contribute to early childhood development through improved nutrition among children in poor rural agrarian settings (Macours and Vakis 2010).

These experiences suggest that seasonal migration can make a significant economic contribution and enable farming households to move out of poverty in Nepal as well. Some studies have traced the socioeconomic factors and patterns of seasonal migration (eg Gill 2003); there is, however, a dearth of studies examining the determinants of seasonal migration and assessing its potential role in enhancing farmers' capacity to adapt to climate change in Nepal. To fill this gap, this study, conducted in Nepal's Humla District, attempted to answer the following research questions:

1. What are the patterns of seasonal migration in Humla?
2. What factors affect farmers' decision to migrate, and to what extent do climate change impacts play a role in that decision?
3. To what extent and in what ways does seasonal migration contribute to household food security and livelihood resilience?

Theoretical framework

This study draws theoretically on the concept of food security in the context of a rural farming economy. It analyzes how seasonal migration as a livelihood activity contributes to food security in the face of climate change. Food security is defined as the guarantee of access to sufficient and nutritious food for healthy and productive lives (FAO 1996). Self-produced food is the primary source of food security in subsistence farming households, and therefore food insecurity occurs when food production is negatively affected by factors such as climate change (Harvey et al 2014). However, food is only one of several needs in a household, and to fulfill nonfood needs, subsistence farmers adopt various nonfarm income-earning activities in addition to farming (Ellis 2000). Globally, farming communities earn more than half of their income from off-farm sources (IFAD 2010). Therefore, the combination of access to self-produced food and off-farm income opportunities determines the food security of subsistence farmers.

In this context, a conceptual shift has taken place "from a food first perspective to a livelihood perspective" (Maxwell 1996: 157–158), in which food security is conceptualized as the outcome of a sustainable livelihood. In the most common parlance, livelihood comprises the assets, capabilities, and activities required to support life. A livelihood is sustainable or resilient when it can cope with and recover from stresses and shocks and maintain its capabilities and assets (Chambers and Conway 1992; Tanner et al 2015). When livelihoods are not resilient, they become vulnerable. Vulnerability is a condition in which people or systems are unable to cope with environmental and other disturbances and therefore become susceptible to change to a more undesirable state (Turner et al 2003). Arguably, a vulnerable livelihood leads to food insecurity. Since livelihoods are earned in diverse sectors, the impact of climate change on food production cannot be regarded as the only factor affecting food insecurity. Rather, the impacts of multiple environmental and socioeconomic factors on both farming and relevant off-farm sectors lead to vulnerability and food insecurity

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(Morton 2007; Tschakert 2007; Gautam and Andersen 2017). Arguably, access to nonfarm economic sectors and successful farming capable of maintaining productivity despite environmental and other adversities determine food security and livelihood resilience.

The main way that migration can help subsistence farmers reduce their vulnerability and enhance their livelihood resilience is through remittances. Most subsistence farmers do not produce enough food to meet all their food needs (van Vliet et al 2015). Therefore, remittances have direct food security implications, as they can enable people to access adequate food as well as nonfood goods and services (de Brauw and Harigaya 2007). From a longer-term perspective and specifically in the context of climate change, the modernization of subsistence agriculture is considered a key aspect of future global food security (Herrero et al 2010). However, the ability of farmers in developing countries to modernize is constrained by their limited access to capital for agricultural investment and to productivity-enhancing financial, technical, and administrative support (Fan et al 2013). Financial remittances can reduce these constraints on agricultural development. In addition, social remittances—the ideas, skills, and knowledge that migrants bring home from their experiences abroad (Levitt and Lamba-Nieves 2011)—can also provide productivity-enhancing skills and facilitate innovation in agriculture (Scheffran et al 2012). Moreover, by enabling farmers to invest in nonfarm enterprises, both monetary and social remittances can strengthen the nonfarm sector, which is a key component of food security and livelihoods (de Haas 2010).

In this context, this study analyzed how climate change and migration are linked, and how migration-based income helps farmers to secure their food and nonfood needs, develop farming methods, and access nonfarm livelihood options to reduce vulnerability and enhance resilience. For reasons mentioned earlier, in the context of this study and paper, "migration" refers exclusively to short-term seasonal migration.

Methodology

Study area

This study was conducted in the Humla District in northwestern Nepal (29°35′–30°70′N; 81°18′–82°10′E; Figure 1). One of the largest in terms of total land area, Humla is also Nepal's most remote district; it has not yet been connected to the national road network. Its high elevation, poorly developed soil, harsh topography, and short growing season limit the availability of land and the capacity of local communities to support themselves through farming. The population of Humla comprises 3 major caste and ethnic groups. The high-caste Brahman and Chhetri and the low-caste Dalits are Nepali-speaking Hindus, while the Lama group are Tibetan-speaking Buddhists. In Nepal, Brahman and Chhetri are often regarded as a single group by virtue of their high-caste status and economic and political dominance. These 2 groups are taken as a single group in this paper. Although farming is the main livelihood source, all 3 groups undertake a number of off-farm income-earning activities as well, including seasonal migration (Gautam and Andersen 2016).

Data collection and analysis

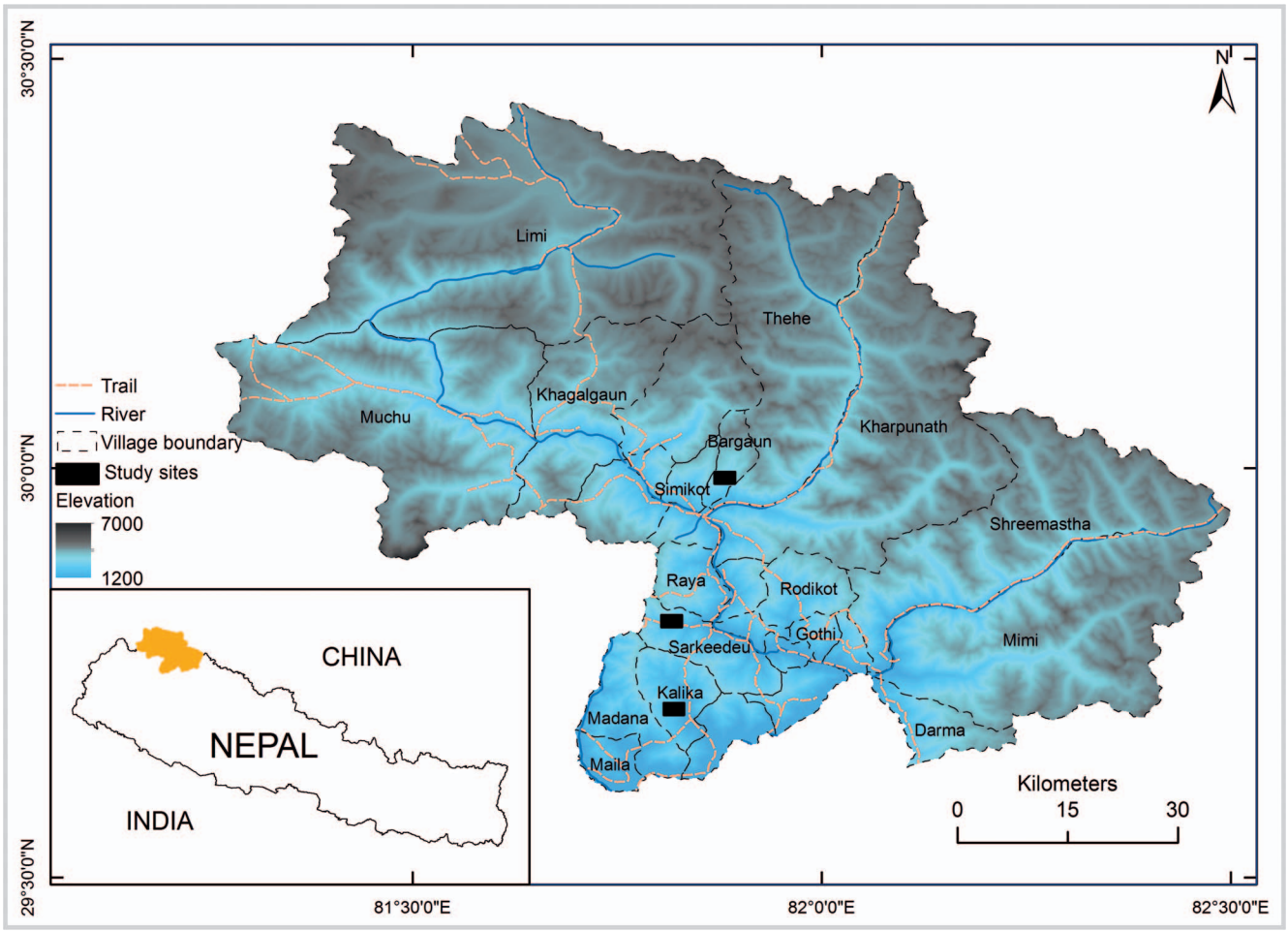
A 5-week pilot survey was conducted between September and October 2012, in which a basic understanding of farming systems, food security, livelihood risks, and farmers' involvement in off-farm sectors was gained through observation and informal interviews. Based on the preliminary information gained from the pilot survey, a checklist for focus group discussions and a questionnaire for a household socioeconomic survey were developed. The survey and focus group discussions were conducted between October and December 2013 and April and June 2014. The 3 dominant caste/ethnic groups (high-caste Chhetri and Thakuri, low-caste Dalit, and the ethnic group Lama) were included from 3 villages: Bargaun, Sarkeedeu, and Kalika (Figure 1).

In focus group discussions, participants discuss a topic specified by the researcher. Since group interactions facilitate the expression of different individual perspectives, such discussions produce data with greater depth than individual interviews (Cameron 2010). Based on the concept of "theoretical saturation" (Bryman 2004), 10 focus group discussions were held with a total of 74 participants including 33 women. Migration, the focus of this study, is only one of several off-farm activities adopted by communities in Humla. Similarly, climate change is only one of many factors that drive migration in such communities (Mortreux and Barnett 2009; Black et al 2013). Considering this, these issues were not raised at the beginning of the focus group sessions to avoid biases in responses.

After general insights were gained from the initial discussions of the farming system, livelihood stressors, and coping strategies, including off-farm income diversification, the participants were invited to focus on specific issues and discuss in more detail how climate change, migration, and food security are linked. General information on migrants' work destinations, type of work, wages and savings, and their contribution to household economies was also gathered. Apart from migration, the focus group participants also described their involvement in a number of other off-farm income sectors. Therefore, they were also prompted to discuss the factors that influenced people's decisions to migrate, stay, or take on other off-farm activities. After the focus group discussions, the household survey questionnaire was administered to 313 households. The survey sought information about household demographics, landholdings

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FIGURE 1 Map of Humla District, Nepal. (Map by Madan K. Suwal)



and agricultural production, involvement in off-farm activities including migration, and income and expenditure patterns.

The qualitative information gained from the focus group discussions was interpreted and supplemented by relevant quantitative data, which were analyzed by descriptive and inferential statistical procedures using Statistical Packages for the Social Sciences (SPSS, version 23, Armonk, NY, USA). Quantifiable socioeconomic differences between caste and ethnic groups were identified using analysis of variance; the Student's *t*-test was performed to analyze differences between migrant and nonmigrant households; and the chi-square test was performed to analyze group differences in categorical variables.

Results

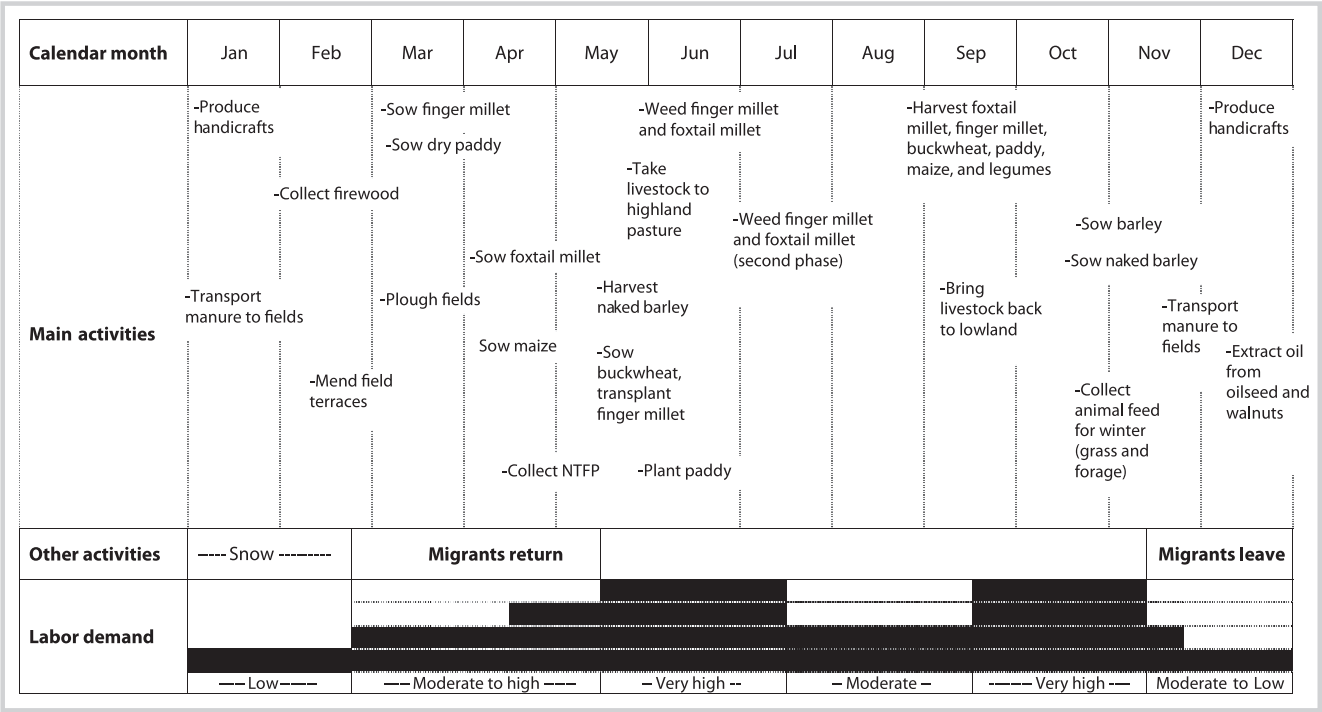
Pattern and drivers of migration

Of the households participating in the survey, 99 (32%) had at least 1 member who migrated in 2013. The average duration of migration was 3 months (89 days), including travel time. For the majority, cities and towns in the Indian state of Uttarakhand were the main destination. The adoption of seasonal migration showed a clear caste/ethnic dimension, in which Dalits had the highest tendency to migrate (46% in 2013), followed by the Chhetri caste group (36%); the Lama ethnic group had the smallest proportion of migrants (11%). The caste/ethnic difference in migration was statistically significant ($\chi^2 = 23.74$, df = 2, $P < 0.01$).

The focus group participants conceptualized migration as a traditional local livelihood activity adopted to exploit off-farm income opportunities during the agricultural lean season. Figure 2 depicts seasonal migration in the context of Humla's annual agriculture calendar. Farm labor demand is very high in Humla during 2 periods: mid-May to mid-July, and mid-September to mid-November. The demand is very low during the winter, when no agricultural work takes place in the fields, and livestock are stall-fed. In addition to the regular household chores such as cooking and child care, local people are engaged in a few nonfarming activities, such as handicraft making, oil extraction from oilseed and

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FIGURE 2 Humla agriculture calendar developed with the focus group participants ($n = 74$).



walnut, and firewood collection (depending on snow condition). The labor demand in such activities is inherently low. Moreover, due to a strong gender labor division, almost all winter activities are carried out by women and girls, and men have nothing to do.

A Chhetri female focus group participant said: "Men staying home during the winter are completely a burden to household consumption." This means that, for men, not to migrate is to be economically unproductive. Seasonal migration is therefore an exclusively male activity; no migrants in 2013 were women. However modest migrants' earnings are, migration has a double benefit: It reduces home consumption without reducing the labor available for farming, and remittances, whatever the amount, help fill the food deficit and meet nonfood needs.

Among the study households, migration was undertaken primarily by poorer households. Analysis of caste/ethnic patterns of migration in the context of their socioeconomic differences showed that the group in a better economic condition (Lama) had a lower tendency to migrate (Table 1). Nonmigrant households were better off than migrant households in terms of landholding size, food sufficiency, and income, as well as access to formal institutions (Table 2).

In addition to migration, trade and salaried work were activities common to local farmers. Present-day trade primarily includes transborder trade of non-timber forest products such as natural herbal products; to a lesser degree, it also includes trade of food and other commodities procured from outside the district. Salaried work mainly includes teaching jobs in local schools and secretarial jobs in local nongovernmental organizations. However, focus group participants highlighted that initial investment capital and a good trade network are required for successful trading. Salaried jobs also require education or formal professional skills. Therefore, households that have good social and trade networks and high investment capacity or members with higher education are more likely to access trade and salaried jobs, which are more profitable than wage migration. The household survey found a total of 27 households with family member(s) with higher education ($\geq$12 years of education). The majority of such households (22) did not migrate in 2013; rather, members took salaried jobs (19 households).

In contrast, as illustrated in Table 2, the poor and food-insecure households had low human and financial capital, and consequently their likelihood of finding profitable off-farm activities was low. Thus, they were left with the option to migrate (which incurs no significant initial cost) or to stay home. Thus, poorer farmers in Humla have stronger economic reasons, and evidently a higher tendency, to pursue migration.

Remittances

Remittances contributed 15% of the total annual income of the migrant households; it was not their primary source of income (Figure 3). Most migrants worked in road construction or agriculture or as porters or kitchen

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TABLE 1 Household characteristics and involvement in seasonal migration by caste/ethnicity ($n = 313$).

	Lama	Chhetri	Dalit	Total
Average household size	6.7	6.1	6.3	6.3
Dependency ratio	55	89	103	82**
Average landholding size (ha)	1.2	0.6	0.4	0.7**
Average irrigation coverage (% cultivated land)	6	24	14	17**
Average food self-sufficiency (%)	75	64	47	63**
Average annual household income (US$)	2515	976	516	1286**
Access to food aid (yes = 1, no = 0) (%)[a)]	58	31	10	33***
Social network (yes = 1, no = 0) (%)[b)]	70	26	10	34***
Seasonal migration (yes = 1, no = 0) (%)	**11**	**36**	**46**	**32****

[a)] Food transfer under food aid is not completely free, as the aid only covers the expensive cost of transport from the lowland to this remote district. Although the price is lower than the market price, acquiring it requires cash payment, and therefore it indicates being in a better economic condition.
[b)] A social network is defined as one or more close relatives, friends, or business partners outside the district with whom regular contact is made in connection with commercial or financial transactions.
** $P < 0.01$.
*** $P < 0.001$.

helpers and cleaners in restaurants. All these jobs are poorly paid; after paying for their own food and lodging, migrants were only able to save, on average, about 14,000 Nepali Rupees (approximately US$ 135) in 2013. Generally, most migrants preferred household goods to cash and therefore brought home clothes, utensils, or small electronic items such as radios and mobile phones. Therefore, some migrants were actually left with no money when they returned. A migrant who was interviewed soon after his return to the village said: "I had

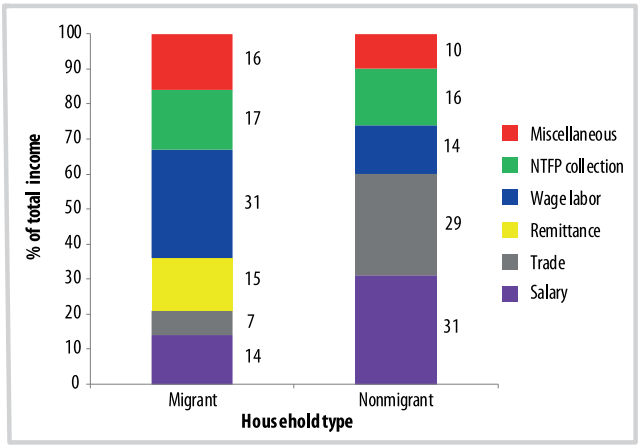
TABLE 2 Socioeconomic characteristics of migrant and nonmigrant households ($n = 313$).

	Migrant	Nonmigrant	Average
Dependency ratio	91	78	82
Household with educated member(s) (yes = 1, no= 0) (%)[a)]	5	10	9
Access to sanitation (yes = 1, no = 0) (%)[b)]	1	1.2	1.1
Household goods and facilities in 5 categories[c)]	1.58	2.63	2.3
Average number of livestock units	5.1	6.2	5.9
Average landholding size (ha)	0.6	0.8	0.7**
Average food self-sufficiency (%)	55	67	63*
Average annual household income (US$)	901	1474	1286***
Expenditure on food, % of total household expenditure	45	38	35*
Membership in a formal institution (yes = 1, no = 0) (%)[d)]	15	22	21
Access to food aid (yes = 1, no = 0) (%)	14	42	33**

[a)] This is defined as having one or more members with at least 12 years of school attendance.
[b)] This is defined as access to safe drinking water and latrines.
[c)] The categories are an improved cooking stove, telephone, radio, electricity, and a solar panel.
[d)] Membership in development nongovernmental organizations or self-help organizations.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

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FIGURE 3 Off-farm income sources for Humla households ($n = 313$).



almost no money left when I arrived home because I bought clothes for the entire family and a radio with my savings."

Even when the migrants are left with some savings, the amount is rather small and is spent mainly to fill the household food deficit. The bottom 25% of households in terms of food self-sufficiency do not meet more than 40% of their food needs from self-production in Humla. Therefore, they normally experience food shortages, especially between February and June, when the summer harvest has been consumed, and winter crops are not yet ready for harvest. The Dalit households receive grain under the traditional patron–client system referred to as Balighare, for which they provide different caste-based services and farm labor to the high-caste households. However, the amount is less than they need to fill their food deficit. Therefore, it is common among food-insecure Dalit households, and those of other castes/ethnicities too, to borrow food (or money to pay for food), and in extreme cases even to sell livestock to secure food. In this context, most migrants are likely to find their families in debt when they return from migration. Therefore, their small remittance is often spent to repay the debt. In an interview, a Dalit woman whose husband had migrated said: "We have some millet on credit. I am nearly running out of food to adequately feed the children and expect my husband to arrive soon. We will repay the debt with the remittance and will obtain another lot on credit to sustain us until the next harvest."

Under these circumstances, the 2 benefits of seasonal migration—the reduction in household food demand and the migrant's earnings—are barely enough to maintain food security and subsistence in Humla.

Climate change and migration

Focus group participants were asked to describe their perceptions of climate variability and change and their potential links with their migration decisions. They identified a decrease in the amount and a shift in the timing of annual precipitation. In the past, snowfall generally started in early December and reached peak accumulation in late January or early February. However, the farmers said that snowfall in recent years generally starts in late December and reaches peak accumulation in late February or early March. The timing of peak snow accumulation on the ground is the main factor determining the duration of snow cover. The snow that peaks in January/early February lasts longer on the ground than that which peaks in late February/early March. The changing snow pattern is decreasing the length of the snow cover period and, subsequently, the soil moisture (see also Paudel and Andersen 2011). It is also widely perceived that there has been a shift in the premonsoon precipitation from late April/early May to late May/early June in recent years. This often results in a dry spell during the spring, which is a period of high water demand for the start of the winter crop growth and the preparation of the seedling nursery for summer crops. Therefore, climate change is increasingly being considered as a significant stress on local farming. This perception of climate variability is consistent with other studies from the region (as is discussed in the following section).

Despite their critical effect on agriculture and household food security, climate variability and change were not described as having a major impact on farmers' decisions to migrate. Nevertheless, the focus group participants did consider that, since most migrants are poorer and more food-insecure than nonmigrants, increased food insecurity due to climate variability is likely to force a greater number of households to send member(s) into seasonal labor migration. Some households with small landholdings and high food scarcity gain access to additional land by entering sharecropping contracts with households that own more land. Of the households participating in the survey, 13% were in a sharecropping contract in 2013. Under such a contract, all farming activities, including the provision of seed and manure, are carried out by the sharecropper, and the total food produced is shared equally between the 2 parties. This adds to the sharecropper's annual food basket. However, sharecropping has become risky because climate variability can negatively affect crop production, and the sharecropper's portion of the harvest may be too little compared to the production costs.

This problem was clearly articulated in the focus group discussions. Most of the Lama participants, who had larger landholdings than the other groups, reported that they were willing to place some of their land into sharecropping contracts. However, the Dalit participants, despite having the smallest average landholding sizes and large food deficits, expressed reluctance to sharecrop because they perceived that the share they acquired barely met production costs under current climate conditions.

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In this context, some changes indicating the decline of agriculture were observed. The reduction in sharecropping contracts, in addition to decreasing crop productivity (due mainly to increased drought), have led to the abandonment of some farmland. Of land previously cultivated by households participating in the survey, about 12% had been abandoned in the last 3 decades. Some households that had abandoned farmland had also cleared forest area for new cultivation (the equivalent of about 20% of the abandoned land). However, due to the area's rugged topography and the limited availability of land suitable for farming, this is not a viable option for most people; rather, migration is a more common option for households facing increased food insecurity. Therefore, local farmers predicted that increased climate variability would lead to increased migration. Some of the migrants participating in the study also pointed to the possibility of a gradual increase in the duration of migration because the peak agricultural season at home has gradually shifted due to the shifts in the monsoon. Nevertheless, the nature of the jobs available to migrants, the opportunities for earning and saving, and the economic contributions of remittances are not likely to change substantially given the migrants' low human and financial capital.

Discussion and conclusion

In Humla, seasonal migration is a livelihood diversification strategy for farmers, organized according to the seasonality of local farming, which minimizes the negative impact on the local labor supply and supplements household incomes through remittances. Davies (1996, cited in Ellis 2000) divided diversification strategies into 2 categories: "necessity driven" and "choice driven." The latter is a proactive and voluntary act aimed at economic accumulation, which ultimately leads to upward economic mobility and increased wellbeing. When remittances enable households to escape poverty and increase their living standards (Adams and Page 2005; de Brauw and Harigaya 2007; Wagle 2012), migration can be classified as "diversification by choice." "Necessity-driven diversification," on the other hand, is an act of coping, which may be sufficient to escape livelihood deprivation but is not enough to enable capital accumulation. This type of diversification may sometimes lead a household into a more vulnerable livelihood system than the one adopted previously. It accords with the migration pattern of Humla, where the farmers migrate to escape food scarcity. Since they can access only low-paying jobs, all they can accomplish with migration is to reduce the household food deficit—not to fill it completely, and not to accumulate savings. Thus, seasonal migration is not likely to substantially contribute to food security and poverty reduction in Humla.

With regard to the relevance of climate change for migration decisions, the finding of this study is similar to that of others that have suggested that climate change is not necessarily the most significant factor in migration, even in areas where climate change impacts are acute (Mortreux and Barnett 2009; Black et al 2013; Etzold et al 2014; Sudmeier-Rieux et al 2017). Nevertheless, climate variability and change are widely felt in Humla. Similar to the local perception of climate change revealed by this study, other studies from Humla (Onta and Resurreccion 2011), Jumla (Gentle and Maraseni 2012; Gaire et al 2014), and Mustang (Paudel and Andersen 2011) have all found a decrease, over the last few decades, in the total precipitation both in the summer and the winter, and shifts in the onset of summer (monsoon) rain and winter snowfall. This has resulted in a prolonged dry period, which directly affects farmers' food security by negatively affecting their crop production. This is likely to create stronger economic reasons for migration (desperation rather than aspiration), and hence migration is likely to be more acutely driven by climate change in the future (Bardsley and Hugo 2010; Black, Adger, et al 2011). In this context, the analysis of the potential role of migration in the resilience of agriculture-based livelihoods is crucial.

Institutional and technological innovation for the development of agriculture is the most important pathway for food security and livelihood resilience in subsistence farming communities (Herrero et al 2010; Chhetri et al 2012; Fan et al 2013). To this end, the value of migration lies in the monetary and social remittances that enable local farmers to invest in agricultural technology and innovation, ultimately resulting in farming systems that are more resilient to environmental changes (Tiffen 2003; de Haas 2010; Scheffran et al 2012; Pant et al 2014; Gemenne and Blocher 2017). The contribution of remittances to the development of nonagricultural entrepreneurship is also crucial (de Haas 2010). However, the migrants in Humla make too little money to achieve these benefits. Moreover, the work they do abroad is similar to what they do at home, so they rarely have the opportunity to acquire new knowledge and skills. Thus, migration offers no significant potential for capital accumulation, agricultural investment, development of nonfarm entrepreneurship, or similar pathways to livelihood resilience.

Studies in other parts of Nepal (eg Adhikari and Hobley 2015) have found that migration has a negative effect on agriculture in the form of labor shortages and land abandonment. Land abandonment is evident in Humla, too; however, other factors, such as climate change and land degradation, drive it more acutely (Gautam and Andersen 2017). Therefore, the extent to which migration drives land abandonment and other negative agricultural impacts cannot be substantiated.

If international migration, rather than short-distance seasonal migration, is instrumental in poverty reduction

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(Wagle 2012), it is crucial to understand whether and how farmers from a poor and food-insecure region like Humla can exploit this opportunity. International migration is costly in terms of human, social, and financial capital. It involves complex administrative processes such as acquiring a citizenship certificate, passport, labor permit, and visa (Sunam and McCarthy 2016). A large part of the process takes place in Kathmandu, where the recruitment agencies function as intermediaries (Kern and Müller-Böker 2015). More than two thirds of the adult population in Humla is illiterate (GON and UNDP 2014). In addition, most Humla residents lack the social connections that could help them contact recruitment agencies and connect to the international job market. The monetary cost of international migration is also high, averaging between 70,000 and 150,000 Nepali rupees (US$ 680–1460; Sunam and McCarthy 2016). This amount is more than the total annual income of most households in Humla. Thus, the farmers of Humla are unlikely to become involved in this economically and socially lucrative practice in the near future.

This study leads to the conclusion that, rather than climate change impacts, structural poverty is the root cause of seasonal migration in Humla, and the potential of remittances to enable farmers in this district to enhance their livelihood resilience is dismal. The increasing impact of climate variability is likely to increase migration. The adaptive advantage of migration generally postulated in climate-change adaptation studies (Adger et al 2002; Scheffran et al 2012; Gemenne and Blocher 2017), however, is not likely to substantially materialize for this population. Because of their poor social networks, limited education, and lack of the financial capital required to access the more lucrative international migration, Humla farmers are likely to remain confined within their current low-paying seasonal migration patterns and hence unable to contribute significantly to livelihood resilience in the face of environmental changes.

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