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When the "Strong Arms" Leave the Farms—Migration, Gender Roles and Risk Reduction in Vietnam

Elisabeth Simelton *, Tuan Minh Duong and Ella Houzer

World Agroforestry (ICRAF), Hanoi, Vietnam; d.minhtuan@cgiar.org (T.M.D.); ellakhouzer@gmail.com (E.H.)
* Correspondence: e.simelton@cgiar.org

Abstract: For many family farms, migration is one strategy for reducing poverty and vulnerability to both natural hazards and economic risk. While more men typically migrate to work, the implications of this on the household are inconclusive, especially for the women who remain on the farms. This study employs a gender lens to examine the effects of economically driven migration on household decision-making, farm labor and disaster risk reduction, focusing on two disaster-prone regions with high poverty rates in Vietnam: Dien Bien (Northwest) and Ha Tinh (North Central Coast) provinces. Surveys of 228 households with at least one migrant worker showed a new generation of young male and female migrants, and that men over 30 years of age migrated for longer periods and more frequently than their spouses. Intrahousehold impacts differed according to risk strategies. In areas with a lower-risk coping strategy (Dien Bien), seasonal jobs coincided with periods of less intense farming activities. During the absence of male family members, women temporarily made more domestic decisions. In areas with a higher-risk adaptation strategy (Ha Tinh), farming was planned for longer absences; thus decisions remained largely unchanged. Remittances invested into agriculture contributed to shortening the recovery period after disasters and, in some cases, diversifying farming systems. The migrant's absence was offset by relatives and neighbors as essential labor reserves. New resilient farming systems need to be disaster proof, gender-sensitive and free up labor.

Keywords: adaptation; agroforestry; family farm; gender roles; off-farm; rural migration; youth

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1. Introduction

This study was carried out in two socioeconomically diverse settings in the disaster-prone, middle-income country of Vietnam. Here, farmers devise diverse ways to organize production and manage various risks facing the farm and the family [1]. A central component of this study examines the decisions regarding the management of these risks within the family. We therefore refer to "family farms", which are often characterized by predominantly family labor engaged in agricultural production, while performing "economic, environmental, reproductive, social and cultural functions"[2]. For many smallholder family farms globally, migration for employment [3] is a significant part of risk management strategies, where household members (often the strongest and healthiest) temporarily, cyclically or permanently leave farms to earn additional income. This can result in larger workloads for those who maintain the farm at home [4]. It should be noted that this paper is only concerned with economic migration and does not refer to migrants and refugees driven by war and unrest.

Causal factors driving labor migration can be compared across contemporary South and Southeast Asia. Labor migration is dominated by men and triggered by a combination of economic, environmental and land pressures [5–10]. However, when examining the consequences of men's migration for women who stay behind on farms, gender studies often reach two contrasting outcomes: increased decision-making power in the absence

of the husband [11,12], or increased workload and reduced opportunities to acquire salaried work [7,13]. Studies on the impacts of women's migration are scarce, and tend to focus on the use of remittances [14,15], rather than those left behind. Research on migration as a risk management strategy often indicate that remittances contribute to economic resilience for family members [15,16], rather than climate-resilient livelihoods. For example, migrant households in South Asia tend to adopt fewer resilient farming practices than non-migrant households [17], possibly because of the added labor burden for the women left behind [8]. Similar evidence from Southeast Asia on migration as a strategy to reduce risks in agriculture is limited and inconclusive. This research contributes to deepening the understanding around the impacts of migration in disaster-prone contexts and how farming systems can be better adapted for climatic hazards and new farm labor situations ahead.

The paper is structured as follows: First, the introduction employs a gender lens to frame migration within the context of Vietnam and introduces remittances as a risk management strategy. The methods section describes the two study sites that are compared, and the reasoning behind the use of mixed qualitative and quantitative methods. The results report on (1) the household labor division during migration and the importance of non-family labor resources, (2) disaster risks, and (3) the use of remittances after disasters for coping and adaptation. The discussion examines the impact of lost labor from migration against the gain of capital from remittances, especially in terms of labor burdens for those left behind. It also looks ahead to assess the role remittances can play in household investment into more resilient farming systems.

1.1. Migration—Causes and Consequences on Family Members

Rural migration patterns are influenced by several intertwined push and pull factors. Factors pushing migration include stagnated agricultural development, lack of rural credit [18], environmental stress [5], poverty and emergencies [6] in the place of origin. At the individual level, these are mirrored by pull factors, such as a desire to exit agriculture [18], rise out of poverty, make farm investments that reduce risks [19], or to simply cope [5,20]. With societal inequalities widening, relative deprivation theories can be used to describe migration patterns that are not necessarily pushed by absolute poverty, but instead by relative poverty. Typically, this has resulted in rural out-migration for work in non-agriculture sectors [21]. It has also led to a chain of farmers from relatively poorer countries migrating to become farm workers in relatively wealthier countries, such as Mexican farmers in the United States [22]. These events can create a gap to be filled by poorer farmers. For example, the exodus of Greek and Italian farmers in the 20th century created jobs for relatively poorer migrant farm workers, first from the dissolved Eastern Bloc [21] and more recently from Africa [23]. Similar domestic patterns have played out in China. Farmers from the poorer western regions have migrated to become farm workers in eastern China, where farmers had become entrepreneurs or factory workers [24,25]. Relative deprivation at the point of origin can also explain migration, as households may desire to improve their position within the community [22]. From this perspective, the expectations of migration (i.e., the process of evaluating chances to attain goals by staying or leaving) may differ, not only among poor and non-poor households, but also between women and men [6,26].

Against the backdrop of poverty and projected trends of urbanization among rural youth, many studies center around the economic benefits of migration [27,28], such as migrants becoming agents of change or development at the destination [4] and place of origin [29]. Studies present macrolevel win-wins where migrants may provide labor force at the destination and reduce environmental pressure at the origin, or microlevel cases where migration prompts innovations, livelihood diversification and new lifestyles [4]. There is a growing interest among development banks and academic circles in remittances as a potential financing mechanism for rural and agricultural development [5,19,27]. The focus on the economics of migration is motivated by the growing number of labor

migrants. According to the Migration Data Portal there was an estimated 164 million migrant workers worldwide in 2019, predominantly with origins in agricultural low- and middle-income countries. In mid-2019, 2.7 million of Vietnam's nearly 100 million citizens were abroad, with their remittances totaling 6.5% of the country's GDP (United Nations https://www.un.org/en/sections/issues-depth/migration/index.html; Migration Data Portal https://migrationdataportal.org/ ; https://migrationdataportal.org/?i=stock_abs_&t=2019&cm49=704. Accessed on October 26, 2020. The statistics include all emigrants, i.e. does not separate work, students and others.). To compare, the agriculture sector contributed 14% of Vietnam's GDP in the same year. With a majority of the migrants being younger than 24 years [30], these trends could result in rural depopulation and land transformation, but also in increased total income and consumption expenditures of rural households [16].

In South and Southeast Asian countries with a rapid annual urban population growth (about 3% or more in 2019), such as Nepal, Lao PDR, Cambodia and Vietnam, there is also an over-representation of females employed in agriculture. In contrast, there is a higher share of males employed in agriculture (WorldBank data for 2019 Urban population growth: https://data.worldbank.org/indicator/SP.URB.GROW?view=map, Females employed in agriculture: https://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS?view=map; Males employed in agriculture: https://data.worldbank.org/indicator/SL.AGR.EMPL.MA.ZS?view=map Accessed on January 28, 2021. The % females vs males employed in agriculture for Nepal, India, Lao PDR, Cambodia and Vietnam was 74-52%, 54-38%, 63-60%, 33-29%, and 38-35%. Philippines, Myanmar, Thailand, Indonesia, and China 13-28%, 43-52%, 28-34%, 25-29%, 22-28%.) in countries where urbanization has slowed down (the Philippines, Thailand and Indonesia), is slowing down (China) or has not yet taken off (Myanmar). Although the official gender gap in Vietnam is small compared to its neighboring countries, scattered studies show that men more often take temporary or permanent non-farm jobs, leaving their wives on the farm [7,31]. Skewed gender demographics can signal gendered vulnerability risks, as opportunities for women and men to maximize their contributions in agriculture are often unequal [32].

1.2. The History of Gender Relations in Asian Cultures

Ethnic groups in the mountainous regions of Vietnam migrated as shifting cultivation communities, until sedentarization policies were implemented in the 1980s. Non-farm migration opportunities evolved earlier in the lowlands for Kinh women and men through the location of factories and industry (especially during the socialist and war era) [33] and through opening policies that fueled migration [34]. Some scholars argue that the reinstatement of men as heads of the agricultural sphere and women as heads of the domestic sphere [35] began after the de-collectivization period. This was made acceptable through the presence of Asian Confucian culture, wherein the woman's sphere is considered inside and backstage and the man's sphere is outside and on stage. A woman may only enter the man's sphere representing him [36,37]. This culture has contributed to visibly reducing the mobility of women in modern society [38].

Despite many similarities with other South and Southeast Asian nations in economic development indicators, Vietnam differs in one important aspect. With the practice of family planning, childbirth has reduced to 2–3 children per woman. Theoretically, this should enable women to join or return to the workforce and earn their own income. On the other hand, fewer children can result in farm and household labor shortages, curtailing women's opportunities to seek non-farm jobs. In conventional, non-migrant situations, contemporary studies across Asia typically find gender-divided farm and household tasks. For example, in Vietnam and Nepal, women are largely responsible for housework [33,39], fields nearby the homestead and tasks such as weeding and planting [38,40–42]. Men, arguably having "the stronger arms", tend to manage forestry and distant fields [42]. Multi-country studies show that inequalities are cemented, as men are more likely to

attend training and meet extension workers; thus they have more opportunities to gain knowledge about agricultural adaptation and disaster risk management [43,44]. However, when it comes to the impacts of migration on intrahousehold dynamics, findings are inconclusive. When men migrate for non-farm jobs, contrasting narratives emerge. One body of literature from Asia posits that a response to migration is the increased participation of women in agricultural activities, referred to as the feminization of agriculture [7,45]. While this process may have resulted in increased decision-making authority among women in Nepal [12], studies in India have found women facing worsening poverty and additional unpaid workloads [45]. Conversely, other studies from Vietnam have found that migrant men retain control remotely, either directly or indirectly via male relatives [20]. In the Philippines, migrant daughters had little say on how their remittances were invested in agriculture, as farming decisions were controlled by their fathers [15]. In contrast, it was found that women in Tajikistan took control over more decisions as de facto female-headed households when men migrated [46]. These examples show that migration alters the dynamics and decision-making of patriarchal farming households in diverse and unpredictable ways, and that research increasing the visibility of women's and men's activities and authority over decisions [12,45,47] can contribute to an improved understanding of a household's resilience to stress.

1.3. Remittances for Risk Management

In the literature, migration decisions often play around the binaries "stay" or "go" [26]. However, in disaster-prone areas a decision about who stays or goes is also a decision about where the individual contributes best to minimizing risks at home [6]. For example, one family member may leave temporarily or permanently, to generate income [15] and send remittances to help the family farm recover from past disasters, cope with current hazards or invest in adaption strategies to manage future disaster risks [17,19]. Eventually, the family may decide whether some or all need to permanently leave as so-called "climate migrants" to escape future disaster risks [48]. Natural disasters cause sizeable direct and indirect damage to both agricultural production and smallholder homesteads on an annual basis. At the macrolevel, disaster impacts can be aggravated by lacking frameworks or awareness of the status of policy implementation [49], or a weak portfolio of concrete and feasible response mechanisms [13]. Where insurance is immature, economic risks and investment losses are taken on by farmers themselves [50,51]. At the microscale, limited access to credit becomes an obstacle for recovery and adaptation, particularly for smallholders who depend solely on farm incomes [31]. For example, a survey from Nepal showed that over 80% of 2300 households perceived changes in the climate, while less than one-third had made changes to reduce the negative impacts [52]. Recurring losses and the small scale of operations hinders the accumulation of precautionary savings to manage climate risks [53]. Additionally, single-headed and de facto single-headed households could risk lagging behind in both the preparation and recovery phases. Such situations may arise, including in Vietnam where, despite the fact that the overall household income increased when men migrated, women's labor burden increased and their income reduced [7]. While there is evidence for the contributions of remittances for coping and adaptation actions on family farms in African [19] and South Asian contexts [17], less is known about their impact on farm resilience in disaster-prone Vietnam. One study from the Central Highlands showed that remittances among the less capital-constrained households led to increased extraction of natural resources [30]. This suggests that in some contexts, remittances could lead to negative environmental effects, hampering ecosystem functions that contribute to the resilience of both communities and agriculture.

This paper aims to contribute to the inconclusive body of gender literature on economic migration from family farm contexts, addressing the implications of migration for domestic and farm labor and decision-making authority, and the role of remittances in risk management strategies. The research is driven by two key questions: (1) How are farms and households managed and decisions made while their physical labor force is

reduced during periods of migration? (2) To what extent do remittances contribute to agriculture risk reduction strategies?

2. Materials and Methods

To capture differences within the country and better understand the labor dynamics during migration, we compared two contexts of poverty and migration: one representing high poverty and domestic, more recent migration (Dien Bien); the other representing high unemployment and earlier, more diverse types of migration and non-farm incomes (Ha Tinh).

2.1. Study Context

The Northwestern uplands and the North Central coastal regions of Vietnam share a high dependency on agriculture and exposure to natural hazards. The Northwest region has a complex topography, vast areas of deforestation and monoculture, with agricultural productivity often limited by erosion, landslides, flashfloods and cold spells. The North Central coast region is particularly affected by tropical storms, flooding and landslides in the late summer and autumn. In springtime, both regions suffer from hot, dry foehn winds.

As neither province is situated in the deltas, they were not favoured by agricultural transformation policies in the 1980s–1990s, as state-led financial and technical support predominantly went to rice production for food security [54,55]. Despite the country's recent development, there are still above-average levels of poverty in both regions, which has resulted in a growing dependency on non-farm incomes for improving livelihoods. In 2010, the national average poverty rate was 14%, compared to 26% in Ha Tinh and 51% in Dien Bien. In the most recent statistics from 2016, the national average poverty rate decreased to 6%, compared to 11% in Ha Tinh and 26% in Dien Bien (General Statistics Office of Vietnam) (General Statistics Office of Vietnam 2019 https://www.gso.gov.vn/ Accessed on 26 October 2020).

In Dien Bien, a strategy to improve livelihoods among poorer households was to take on temporary or seasonal non-farm jobs, such as construction, to complement farm activities. Better-off youth migrated to provinces near Hanoi for permanent factory jobs after high school. In the study site, nobody had migrated abroad in seven years. For migrants in Dien Bien in the Northwest region, the main domestic destination was Hanoi. In Ha Tinh, which is situated in the North Central coastal region, unemployment rates were high (Unemployment rates among 15–24 year-olds in the North Central and the Central coastal area were at 7% in 2019, compared to 3.6% in the Northern midlands and mountain area and a 6.5% national average (General Statistics Office of Vietnam 2019 https://www.gso.gov.vn/ Accessed on 26 October 2020)). Provinces in the this region are well-known for high outmigration rates, with the largest number of overseas workers in the country [31]. Being situated in central Vietnam, domestic migrants from Ha Tinh could head north (Hanoi) or to southern provinces, including Ho Chi Minh City. At the time of this survey in 2019, at least 6% of the interviewed household's family members in Ha Tinh were based away from the farm, totaling 10 individuals living outside the province and 11 living abroad. Corresponding exact numbers are missing for Dien Bien, because of the temporary character of non-farm jobs in the region.

The composition of the core households differed between the two provinces (Table 1). Larger households lived together in Dien Bien, often with three to four generations (on average 5 people but up to 10). This is common among many ethnic communities in the country, including Thai people. In Ha Tinh, households were often composed of nuclear families, with two generations (on average four people and a few up to eight). This is more typical of the Kinh people. Migrating family members who were registered in the household were usually included in the headcount.

Table 1. Survey household information.

	Dien Bien	**Ha Tinh**
Total number of respondents		
Number of respondents who were the head-of-household figure (share women to men)	112 (49:51) 55 (10:45)	106 (62:38) 57 (19:38)
Birth year of respondent, average	1978	1969
Position of respondent, relative to the head-of-household individual	Head-of-household 50% wife 26%, daughter 12%, mother 8%, daughter-in-law 5%	Head-of-household 54% wife 38%, husband 6%
Education (% of respondents)		
Incomplete primary education	29	3
Primary education	31	9
Secondary education	37	67
High school (university)	4	22
Household size (people), min–max (average)	2–10 (5) Often three to four generations	1–8 (4) Often two generations
Ethnic group	Thai	Kinh
Household poverty status (Government standard)	48% poor, 29% near-poor, 20% non-poor (missing 3%)	11% poor, 9% near-poor, 79% non-poor (missing 1%)
Household main income source (share of total respondents per province)	89% agriculture 11% non-agriculture (of which 0% was remittances from abroad)	72% agriculture 28% non-agriculture (of which 16% was remittances from abroad)
Top three plots, median (average) area		
Paddy/lowland plain	500 (935) sqm	500 (1199) sqm
Upland plain	950 (1354) sqm	750 (9165) sqm
Upland sloping	1000 (2911) sqm	600 (10756) sqm

2.2. Data Collection and Analysis

The two provinces were selected as examples of their distinct poverty and migration situations. The findings contribute to ongoing projects, enabling a better understanding of gendered barriers to the adoption of climate-resilient agricultural practices, and options for resilient agricultural models in other areas of both regions. Participatory action research projects are designed to both communicate and generate new knowledge by reducing disconnects between science, policy and local interaction [56], and are common to sustainability and resilience research [57,58]. Here, rather than a quantitative inquiry seeking causal explanations on why migration happens, the inquiry is qualitative, examining the consequences of migration [59] with a gender perspective [43]. However, viewing the interplay between quantitative and qualitative data as complementary [60] and combining the two approaches can reduce the risk of introducing author-biased interpretations on either result and facilitate a deeper qualitative understanding of the quantitative results. While quantitative surveys are extractive on the respondents' part, participatory tools and

focus groups aim to leave something with the respondents and enable them to take a more active part in action research [61].

Structured surveys with 218 households were conducted in May and July 2019. The sample size was based on the small scope of the project; 100 households reflects about 5% of the average number of households in a commune. Through purposive sampling, the households were randomly selected from the communes' list of households who, at the time, had or previously had at least one family member working outside the province.

Only one respondent from each household, who was available at the time, was interviewed. Thus, we did not validate migrants' or couples' responses with other family members. Participation in the survey was voluntary, and each question had the option not to answer and the setting was chosen to be as private as possible. On the basis of previous experiences, the questionnaire was pre-tested and designed for a maximum time of 1.5 h. The interviews lasted about one hour; notes were taken on Open Data Kit (ODK) that allowed free-text comments. In parallel with the survey, a qualitative study with gender-segregated focus group discussions and semi-structured interviews that focused on migrating family members was conducted. These studies are discussed in separate publications for Ha Tinh [20] and Dien Bien (not yet published). The focus-group discussions served to add qualitative information to the survey and to tease out gendered particularities.

The survey included 112 households in Dien Bien (49% women and 51% men) and 106 households in Ha Tinh (62% women and 38% men). About half of the respondents considered themselves to be in the head-of-household (chủ nhà) role in both provinces (the head-of-household role here refers to the main decision maker, male or female, single or married). However, the gender ratio differed: in Dien Bien one in four in the head-of-household role was a woman, while in Ha Tinh every other head-of-household role was filled by a woman (Table 1), partly as a consequence of migration patterns. This study divided respondents by age group and did not apply a strict definition of "youth". Vietnam considers youth as aged 16–30 (Law 53/2005/QH11), while the UN statistics (General Assembly A/36/215 and resolution 36/28, 1981) considers youth as 15–24 and young adults as 20–24 years old. Household poverty levels are self-reported, following the Multidimensional Poverty Index (Decision no. 59/2015/QD-TTg), which assesses deprivation across 10 indicators within the categories of health, education and living standards. A rough estimate for a rural household to be considered poor is if per capita monthly income is below VND 700,000, equal to USD 30 [62,63].

The survey consisted of two sections with different sample sizes. First, the 218 results represent questions with one response per household. Second, in both areas it is common for households to have up to seven plots or more. For the section on adaptation measures and disaster impacts, rather than getting one response at the household level or asking about each plot, the survey was designed to obtain more detailed information about a maximum of three plots per household depending on topographic location: one plot each in the lowland, upland plain and upland sloping areas. This gave a dataset with a total of 427 fields, of which 205 were in Dien Bien (44% in lowland, 16% in upland plain, 35% on sloping uplands and 6% other) and 222 were in Ha Tinh (distributed as 44%, 34% and 22% in lowland, upland plain and sloping uplands, respectively).

Statistical analyses, including initial descriptive and frequency analysis and bivariate correlation, were performed in SPSS. Multivariate regression analyses were performed to ascertain the impacts of natural hazards, farm plot topography and intrahousehold dynamics on families' economic recovery time following loss due to disaster. The Wald Chi-Square test was employed to indicate that results were significant at the $p < 0.050$ level.

3. Results

The results are divided into two subsections: (1) task division and decisions on labor allocation in migrant households, and (2) decisions regarding disaster adaptation, land use and farm management.

3.1. Household Labor Division and Decision-Making Authority

3.1.1. Migrant Households and Tasks

In Dien Bien, temporary jobs were primarily taken by married adult men. Younger unmarried and married couples took longer-distance, longer-term jobs. This was partly because they could not get their own land, so they would otherwise remain as unpaid labor on their parents' land. Where there are annual cropping patterns, seasonal non-farm jobs were timed so household members could return for on-farm peak labor periods.

In Ha Tinh, married men in their 30s, unmarried women and men in their early 20s took work abroad, while married women in their 30s mostly took commutable jobs that could be combined with domestic tasks while the children were at kindergarten. Here, farming was adapted to the migration patterns, with more perennial and diverse land uses. Being in the central part of the country, domestic migrants in Ha Tinh have the option to go both north (Hanoi) and to industrial zones in the Southern provinces. In Dien Bien, common destinations for both women and men were construction sites or factories near Hanoi.

The interviewed households all had experiences of family members being away temporarily. Therefore, we wanted to capture the dynamics of farm and housework decision-making in general and before, during and after a period of absence (Section 3.1.2).

> "There are no jobs here […]. If I stayed at home, I wouldn't have enough income" (man, 33, Dien Bien, working at a construction site in Hanoi).

> "I would like to have a big farm, but there is not much land in this village" (woman, 18, Ha Tinh).

First, when asked about housework in general, all male respondents in Dien Bien said they did housework compared to 88% in Ha Tinh. Not only did almost all women say they did housework, but they also performed all listed housework tasks, while men usually performed 2–3 of them. When stating the time they spent on each task, women spent on average one more hour on housework than men: in Ha Tinh, women spent 4.4 hours per day on household tasks, whereas men spent 3.2 hours; in Dien Bien, women spent 3.8 hours on housework, whereas men spent 2.9 hours. Farm labor shortages thus appeared to be more of a challenge for women in Ha Tinh, who spent more time on housework and had fewer family members at home compared to in Dien Bien (Figure 1). Appendix A provides a section on gendered perceptions of labor burdens (Table A1) and whether tasks perceived as more of a burden were passed on to relatives, neighbors or hired labor (See Figure in Section 3.1.3).

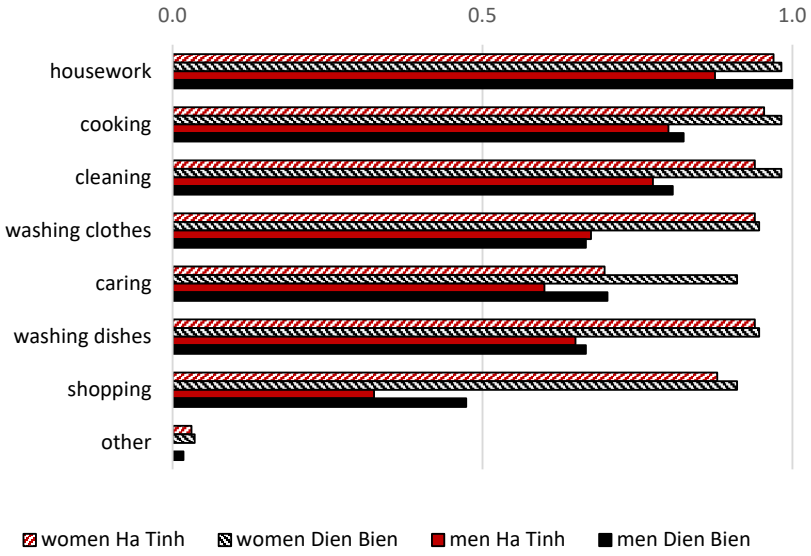

Figure 1. Respondents' housework tasks in Ha Tinh (red) and Dien Bien (black) provinces (women—striped pattern, men—single color). Unit: share of respondents per category, 1 = 100%. Self-reported by respondents, who were women and men in Ha Tinh (n = 66 and n = 40, respectively) and in Dien Bien (n = 56 and n = 57, respectively).

3.1.2. Intrahousehold Decisions

> "If I go away for work, my wife has to do all the farming by herself" (male, Ha Tinh).

Figures 2 and 3 show who made farm and domestic decisions before, during and after a family member migrated (multiple answers were possible). Before labor migration, respondents in Dien Bien indicated that about 80% of male head-of-household individuals and/or husbands made decisions, whereas between 54% and 64% of female head-of-household individuals and/or wives made decisions in both the farm and domestic spheres. During migration, the husbands' involvement in decisions started to decline and was not recaptured afterwards. The wives' involvement in decision-making remained largely unchanged, except for the domestic sphere, where some wives seemed to step back (42%). This suggests that some decisions were shared before migration. The influence of other family members over decisions was relatively minor and the survey did not capture changes. However, Dien Bien-respondents stated that various family members other than the two head-of-household figures were involved in decision-making, considerably more often than in Ha Tinh. Figure 2 indicates that decision-making changed only when the male head-of-household left, or when sons did not step in for their fathers. However, the cases may depend on individual households, and are too few to draw any major conclusions. For domestic decisions, the gap between the husband and wife was smallest during migration, while for farm decisions the gap was smallest after migration. Overall, gendered decision-making shifted to be more balanced over farm work than over domestic work.

> "A woman's role is building a prosperous home" (woman, Ha Tinh).

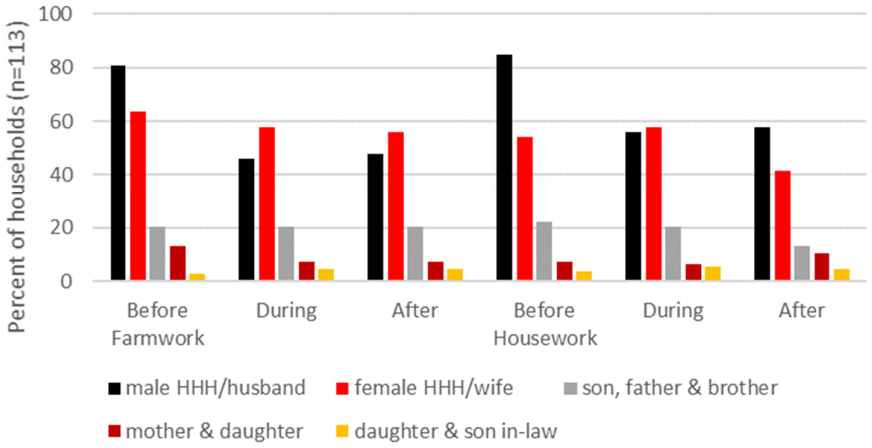

Figure 2. Decisions over farm and housework before, during and after job migration of one family member in Dien Bien. Unit: % of households, more than one response per household is possible. Source: Survey 2019. HHH stands for head-of-household.

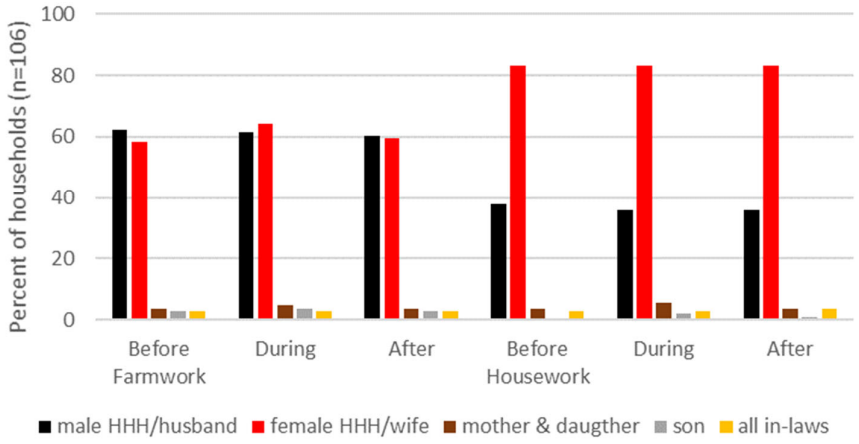

Figure 3. Decisions over farm and housework before, during and after job migration of one family member in Ha Tinh. Unit: % of households, more than one response per household is possible. Source: Survey 2019. HHH stands for head-of-household, all in-laws include the mother, father, daughter and son-in-law.

In Ha Tinh (Figure 3), decision-making was relatively unchanged by migration. Farm work decisions were fairly balanced, with the majority of decisions taken by the (male or female) head-of-household figure throughout the migration period. In the domestic sphere, women were responsible for decision-making in 80% of households compared to men in 40% of households. The results could indicate that households take joint decisions, with less involvement over decisions by other family members. Focus group discussions were conducted before the survey findings from both sites were analyzed, and further probing would have enriched the results presented in the graphs and Table A1. During a family member's migration, two patterns emerged.

In Dien Bien (Figure 2), the head-of-household individual (90% men in this survey) dominated decision-making in both agriculture and domestic spheres before migration.

The seasonal character of migration, and possibly larger household size, was also reflected in that women temporarily made more farm decisions during the migrant's absence and took comparatively fewer days of external help compared to in Ha Tinh. Focus groups revealed that the typical migrants, a male head-of-household and/or sons who had finished compulsory schooling would seek temporary jobs, particularly in construction. Young women and men with high school education aspired to obtain permanent factory jobs near Hanoi. The head-of-household individual or the husband delegated some farm tasks to the son (who would inherit the farm) during their absence, but not the decision-making power, and returned at times when their supervision and decision-making was most critical. When they returned, they reclaimed some power balance over domestic decisions, but not all. Some results indicated that mothers and daughters stepped in to make domestic decisions during migration in Ha Tinh, and daughters-in-law did the same in Dien Bien. The household set-up in Dien Bien, with more generations living together, explains the increased diversity among respondents and in decision makers, compared to in Ha Tinh.

> "Men prepare the soil and help the women apply fertilizer" (man, Ha Tinh).
> "Women select crop varieties and take care of crops … weeding" (woman, Ha Tinh).

In Ha Tinh (Figure 3), there were fewer evident changes in decision-making. This region has a longer history of seasonal jobs, commuting to permanent jobs, long-term domestic and overseas migration, and women taking public servant jobs. Here, young (typically unmarried) women and men are both increasingly seeking non-farm and overseas jobs and at an earlier age, compared to their parents. Reasons for these trends pointed out in this and our earlier focus group discussions in the province include economic push and pull factors related to farm size, frequent natural disaster damages and need of money to pursue other livelihood options. With a longer and more permanent absence of migrants, households had developed a clearer a priori division of decisions, where the head-of-household individual (about 75% men) decided over farm work and the wife made decisions about housework. The decisions remained fairly fixed during a family member's absence for two main reasons: (1) children migrated and left the parents on the farm; (2) some women stepped in to make farm decisions and coordinate labor in the absence of their husbands as the de facto head-of-household figure, as reflected by the higher share (25%) of women head-of-household figures; or (3) decisions were made by the absent (male) head-of-household individual via remote consultations (phone calls) with the wife or other relatives. This phenomenon is known as remotely controlling farm decisions [20]. In both provinces, before deciding to pursue off-farm jobs, various types of risk were weighted, including economic and personal safety. Anecdotal evidence suggests that migrating youth often have a migrating parent or relative. Similarly, villages with returning migrant workers with good experiences generate more migration and, as witnessed in both study sites, those with bad experiences put others off.

There was much agreement between men and women regarding the pros and cons of staying on the farm. For many, particularly women and men in Ha Tinh in their 40s and older, a clear advantage was that it was "easier to ask relatives and neighbors for help". In Dien Bien, responses relating to "taking care of" children and family members were more frequently stated as pros. Other advantages of staying included the fact that respondents enjoyed the "freedom to use time" and "being able to produce their own food". Twice as many women as men stated "hardships" as a disadvantage of staying. The most common disadvantages were cited by nearly all respondents: "low incomes" and the extent to which their livelihoods "depend on weather".

> "Farming is very hard work. It's not enough to feed ourselves. I have to work until it's dark" (woman, 44, Dien Bien).

Some responses helped to characterize marginalized groups, for whom migration may not be a viable option. As an advantage, many argued that they saved money by staying on the farm. Particularly among the poor and near-poor households in Dien Bien, "cooking their own food" saved money, indicating that the salaries they were expecting would not return on their investments into migration. Many of the respondents were in their 40s and 50s and few owned or had access to smartphones. Half of the women had incomplete primary education, and many spent at least half of the day with domestic work. All of the households had suffered losses to floods and flashfloods in the past two years and were preoccupied with repairing houses and checking dams.

3.1.3. Relatives and Neighbors

The shortage of adult family members was evident. The spouse was asked to step in for a migrant family member in less than half of the households (45% of households in Dien Bien, 21% in Ha Tinh). The lower number in Ha Tinh reflects the fact that many households were de facto single-headed for long periods during migration. Children represented only a small percentage, as they either were in school or already away working. Therefore, a possibility to reduce the farm or housework load would necessarily be through external help. The importance of this help was evident. The most frequent responses regarding the benefits of staying on the farm were: (1) that it was perceived to be easier to ask others for help, and (2) being close to the family. This begs the question of who would stand in if a household member left to pursue off-farm activities.

In both provinces, the two most common stand-in resources were relatives (74% of households in Dien Bien, 70% of households in Ha Tinh) and neighbors, often 2–3 people at the same time (61% in both provinces). Hired labor was a less common, tentative option (4% and 25% in Dien Bien and Ha Tinh, respectively), and at the time of the interview, even fewer actually utilized this resource.

> Mrs. Son, 27, Dien Bien, moved to the village two years ago to live with her parents-in-law. Her husband takes seasonal jobs and her brother-in-law works permanently off-farm, while the women work on the farm and share decisions. "We [the family] depend on relatives and neighbors and could not afford to hire labor."

Relatives and neighbors conducted a diversity of tasks (Figure 4). In Dien Bien, 69% of the households engaged relatives on a regular basis, 38% engaged neighbors and 3% hired labor for farm and housework. Relatives (n = 82) were one notable back-up labor source, especially during harvesting, planting and for cooking (Figure 4). Their engagements lasted on average 18 days per year (median 10 days). Additionally, neighbors (n = 41) helped each other during farm peak periods with planting (56%) and harvesting (80%). The compensation to relatives was predominantly exchanged labor (90%) and occasionally farm produce (4%). Similarly, neighbors were compensated through labor exchange (83%), or sometimes received no compensation (5%). No cash was exchanged between relatives or neighbors.

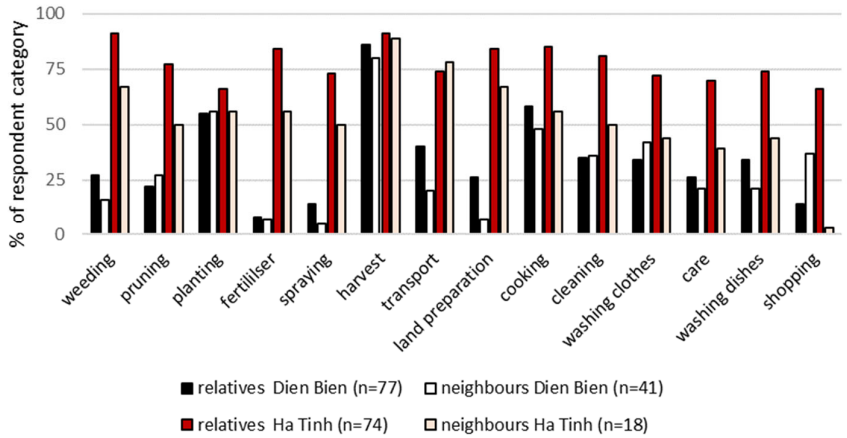

Figure 4. The contributions of relatives and neighbors in farm work (weeding to land preparation) and housework (cooking to shopping) in Dien Bien (black and white bars) and Ha Tinh (red and pink bars) provinces. Source: Survey 2019.

In Ha Tinh, 86% of the responding households engaged relatives, 17% engaged neighbors and 4% hired extra labor on the farm or in the household. Relatives (n = 69) performed various farm and housework tasks (Figure 4) and were engaged on average 65 days per year (median 30 days). Neighbors (n = 18) helped out with nearly all listed farm and domestic tasks, especially during planting (56%) and harvesting (89%). The compensation to relatives was labor exchange (51%), farm produce (12%) or cash (10%), while to neighbors it was labor exchange (83%) or other ways (6%). The larger share of relatives helping out in Ha Tinh may reflect that extended family members live in separate households, while in Dien Bien, some live in the same household. Similar to Dien Bien, neighbors were not compensated with cash, as this was considered a hire agreement, while offering cash to a relative would be considered a gift or help.

In both provinces, women and men relatives and neighbors were involved in both farm and domestic tasks. For domestic work, neighbors in Ha Tinh were more engaged in all listed tasks than in Dien Bien, except for shopping. This is likely due to the closer proximity of markets to households in Ha Tinh. Regarding agricultural work, a difference was observed for spraying, adding fertilizers and land preparation. These tasks were done by neighbors in over half of the cases in Ha Tinh, but not in Dien Bien. In Ha Tinh, relatives performed the most tasks, including the ones the remaining migrant household members wished to be released from, while in Dien Bien this occurred to a lesser degree (Figure 4). This may depend on whether family labor was readily available or the main decision maker over farm activities wanted to retain control over management and expenses. Furthermore, farm work was clearly a time-specific task, while housework was completed on less specific terms, such as "a few hours a day", or "when they have free time". In both provinces, the number of days of external help needed corresponded with the farm area, rather than factors such as household size.

3.2. Disaster Impacts and Response

3.2.1. Disaster Impacts

Nearly all responding households (80% in Dien Bien, 98% in Ha Tinh) had suffered impacts of extreme weather events within the past five years. In fact, the most commonly cited drawbacks of staying on the farm were dealing with disasters, hardship and low incomes. Natural disasters pose extra risks to family farming when family members are away and unavailable to help prepare beforehand or to take care of damages afterwards.

However, with the "strongest" and healthiest family members potentially absent at times when quick decisions and a readily available labor force are most urgently needed,

we explored the tentative tradeoffs between labor shortage and remittances as compensation from the perspective of risk response and recovery.

Agriculture loss and damage occurred across all topographic locations, with paddy fields and sloping upland fields significantly more affected than upland plains. The main impacts were crop loss (83% and 67% of interviewed households in Dien Bien and Ha Tinh, respectively) and reduced productivity (71% and 61% in Dien Bien and Ha Tinh, respectively). Other prominent impacts included: (1) livestock mortality (45% and 27% in Dien Bien and Ha Tinh, respectively, and higher in Dien Bien due to flashfloods, floods and cold spells); (2) shortages of drinking water (35% and 22% in Dien Bien and Ha Tinh, respectively); and (3) crops and property being washed away (11% and 26% in Dien Bien and Ha Tinh, respectively). Damage to houses was more common in Ha Tinh (87%, compared to 11% in Dien Bien) due to more frequent typhoons and higher storm intensity.

Additionally, we compared hazards and adaptation interventions associated with the locations of plots and the main decision maker for that plot (Table 2). Typically, the head-of-household individual (majority men) decided over most plots. For upland and larger plots, decisions were made by either the head-of-household individual or his wife. Head-of-household figures also made decisions regarding the most distant or least accessible plots, which were the most prone to natural disasters (here classified as over 60 min walking or 30 min by motorbike, required for reaching 38 of the plots in Dien Bien and 5 in Ha Tinh).

The susceptibility of these fields to disasters was better explained with the multivariate analysis (Table 3), which showed almost mirroring disaster impacts in the two provinces. In Dien Bien, flashfloods and soil erosion overshadowed the results because of the topography of the province, namely, steep terrain often cultivated with maize. Maize cultivation expanded rapidly in the Northern upland region, peaking in 2015. As monoculture practices have long been associated with disaster impacts, there is a growing argument for converting to sustainable sloping land technologies [64,65].

Table 2. Correlation between decision makers of each plot, disaster impacts and land use in the Dien Bien and Ha Tinh provinces combined. Spearman two-tailed bivariate correlation, significant at the 0.05 level.

Decision Maker	Positive Correlation with Resp. Decision Maker	Negative Correlation with Resp. Decision Maker
Head-of-household individual[a] (n = 245)	Uplands, larger area Drought, flashflood, erosion, cold spell Maize, monoculture	Cassava, sweet potato, other annual crops, other species rotation
Wife (n = 68)	Uplands, larger area Maize, monoculture	Hot spell, rotation
Husband (n = 22)	-	Cash crop, intercrop
Son (n = 19)	Uplands, larger area	-

[a] The gender ratio of head-of-household individual was one woman to two men in Ha Tinh and one woman to four men in Dien Bien (19:38 Ha Tinh, 10:45 Dien Bien). Source: Survey 2019.

Table 3. Multivariate analysis of recovery time (month) based on disaster impacts and land use in the Dien Bien (n = 178) and Ha Tinh (n = 218) provinces. Wald Chi-square test with significance level at 0.05. Source: Survey 2019.

	Dien Bien		**Ha Tinh**	
Significance	**0.000**		**0.000**	
Likelihood Ratio Chi-Square	**62.378**		**118.456**	
Parameter	Coefficient	p-value	Coefficient	p-value
Intercept	9.735	0.517	59.598	0.000

Household size (number of people)	0.222	0.816	−1.196	0.059
Migrant (0 = no, 1 = yes)	7.422	0.459	−11.351	0.000
(No) remittance (0 = yes, 1 = no)	−1.718	0.681	−0.710	0.746
Plot area (m^2)	0.001	0.217	<0.001	0.258
Plot topography (0 = lowland, undulating, 1 = sloping upland)	6.764	0.035	1.010	0.570
Plot land-use type (0 = diverse 1= monoculture)	5.444	0.438	0.888	0.625
Negative impacts from: Drought	−5.547	0.113	−8.229	0.000
Negative impacts from: Flood	−0.724	0.836	−7.223	0.000
Negative impacts from: Flashflood	−7.029	0.047	−1.143	0.570
Negative impacts from: Storm	−1.077	0.775	−0.427	0.832
Negative impacts from: Soil Erosion	−7.497	0.031	0.122	0.946
Negative impacts from: Cold spell	−2.212	0.670	1.987	0.475
Negative impacts from: Hot spell	0.964	0.864	−5.557	0.008
Negative impacts from: Pests	−20.761	0.031	1.846	0.697
Negative impacts from: Diseases	7.157	0.448	−5.603	0.245
Negative impacts from: Other	23.318	0.021	−20.887	0.016

3.2.2. Remittances and Post-Disaster Recovery

In Ha Tinh, drought, floods, flashfloods and monoculture all contributed significantly to longer recovery periods. Shorter recovery periods were significantly associated with households without migrants (Table 3). Similar patterns were repeated with best-fit models, where migrant households nested with certain disaster variables took a significantly longer time to recover than non-migrant households. This may be reflective of lost farm labor.

In Dien Bien, flashfloods, soil erosion and pests contributed to longer recovery periods. However, the multivariate analysis did not return a significant correlation between the recovery periods and remittances or migrants alone (Table 3). This may be due to the temporary character of migration and the fact that longer recovery was associated with cash shortages.

Economic recovery after disasters took years. In Dien Bien, the longest recovery periods lasted up to 72 months, with an average of 27 months ($p < 0.003$ $n = 102$), correlating with recent storm damage (Spearman bivariate correlation coefficient). Longer recovery periods were also observed among households with larger farm areas ($p < 0.050$, $n = 82$) and longer employment of relatives ($p < 0.001$, $n = 76$). In Ha Tinh, the longest recovery periods were up to 60 months, with an average of 14 months. This correlated with drought damage ($p < 0.004$, $n = 106$), reflecting an extended national El Niño drought in 2014–2016. Better-off households had longer recovery periods ($p < 0.016$ $n = 106$), although remittances contributed to shortening the recovery period in paddy fields ($p < 0.007$, $n = 38$) and sloping uplands ($p < 0.002$, $n = 23$). Recovery time reflected the loss of the actual stand, loss of investment and the extended period without income (i.e., from the planting of the initial stand to the next harvest, including factors such as difficulties in clearing and the reduced value of damaged wood).

> "Men, also married, from 40 years old and below, go to Japan, Taiwan, many countries…because incomes are higher than from agriculture." (man, 28, Ha Tinh).

Support mechanisms and credit are discussed below. There was no disaster insurance in either province. Instead, public safety nets and community funds were mobilized after major disasters. Village funds for food were utilized by 20% of all the responding households. Households received public food and cash transfers, especially after storm and flood damages, primarily from commune (58%), district (20%) and provincial (13%)

sources. Non-governmental or civil society organizations typically only intervened after severe disasters, such as the extended El Niño-related drought in 2015–2016 in Ha Tinh and a severe flashflood in Dien Bien in 2018. At the time of the study, support from such organizations had reached 6% of the responding households. Support received from local civil society organizations such as the Youth Union, who assist in clearing up after storms and floods, was likely underestimated. Although divisions of the provincial department of agriculture are involved in reporting agricultural loss and damage, only 7% of responding households had been assisted by the extension service after storm, drought or flood damages. Therefore, despite the community support, specific and time-consuming recovery activities were left to the individual households, including replanting (30% and 43% in Dien Bien and Ha Tinh, respectively), repairing (24% and 25% in Dien Bien and Ha Tinh, respectively), buying new (24% and 20% in Dien Bien and Ha Tinh, respectively) and, in some cases, not replacing losses (9% and 5% in Dien Bien and Ha Tinh, respectively).

Disaster losses were reflected in the households' loan structure. The majority of households (90% in Dien Bien, 70% in Ha Tinh) had taken loans in the previous year, with around every third household taking loans for farm investment and post-disaster reparations. The loans were used similarly: to buy livestock (59% in Dien Bien and 38% in Ha Tinh) and farm equipment (6% in both provinces), to pay for children's education (3% and 5% in Dien Bien and Ha Tinh, respectively) or to make a business investment (1% and 4% in Dien Bien and Ha Tinh, respectively). Households in Ha Tinh differed by also taking loans for forestry (4%), social expenses (2%) and overseas work (2%), which took years to repay. These findings demonstrate how repeated disaster losses can perpetuate a cycle of pushing back small gains and increasing recovery time, especially for single-headed, poor and physically weaker households. They also show why many able households are motivated to migrate or seek alternative incomes to diversify livelihoods.

3.2.3. Adaptation Strategies

For longer-term adaptation measures, 49% of the interviewed households in Ha Tinh said they had made changes in their farming systems over the past 10 years, compared to only 13% in Dien Bien. The primary reasons for the changes were to take advantage of new market opportunities (20%) and to adapt to disasters (15%–20%), while a few implemented changes to reduce labor input (5%). The main changes were between annual crops (42% in Ha Tinh and 8% in Dien Bien) and diversification, or a change from crops to forestry (16% in Ha Tinh and 9% in Dien Bien). In Dien Bien, beef cattle were becoming more important, therefore so was growing maize as feed. Animal husbandry is becoming more common in both provinces. In contrast to crops, animals provide a less seasonally sensitive return on investment that can be moved when natural hazards are forecasted. Sweet potato and cassava had previously been important food staples in both provinces but were decreasing in importance because of fluctuating market prices (especially cassava). Changing variety or changing to another annual crop shortened recovery periods ($p < 0.001$ $n = 66$, Table A2). In Ha Tinh, shifts and rotations included from peanut to cassava or fruit trees and from cassava to acacia or black pepper. Moreover, shifts from rice to maize production, and maize or cassava intercropped with peanut as a cover crop, were common on paddy fields with water shortages in the dry season.

"The slopes are only suitable for maize" (woman, Dien Bien).

The following presents a discussion of tenure and land use. The results showed no significant correlation between the main decision maker for the plot and its land use and tenure type; instead, the duration of tenure over the land was a more determining factor when it came to plot-level decisions. The majority of plots were allocated with tenure contract, i.e., Green Book (28% in Dien Bien, 68% in Ha Tinh), inherited (40%, 13%) or other types of land uses without a contract (19% in Dien Bien, 15% in Ha Tinh). Tenure in Dien Bien reflected customary rights and a time-determined use of community land, but many

respondents were unclear about the difference. Many respondents in both provinces did not know when the tenure terminated. Therefore, we analyzed the duration of the tenure up to the time of the interviews. If the tenure had started more recently, forestry and rotation practices using annual crops and other species, e.g., cassava for the first year(s) of timber plantation, were more likely (both $p < 0.001$, $n = 353$). It was more likely to find maize, rice and monoculture practices with older contracts ($p < 0.015$, $p < 0.001$ and $p < 0.001$, respectively, $n = 353$). This may be down to the fact that recent allocations had conditioned forest plantations, in order to manage soil erosion on sloping land [66]. Among the respondents who knew the end of their tenure, we found that the sooner the tenure was about to end, the more likely that sweet potato and other annual crops were cultivated. Towards the end of a tenure, annual or short-term rotations tended to be preferred. Conversely, recent or conditioned tenures provided more certainty, and thus, more reasons to invest in longer-term or sustainable farming systems. Such results are unsurprising, and often referred to in global recommendations for land tenure security [64,67,68].

> For example, with tenures secured to 2050 and 2067, Mr. Nam, 56, Ha Tinh, invested the remittances from two daughters (a public servant and a factory worker) in livestock and 1.3 ha of acacia and fruit trees. Grass strips and pruning are practiced to reduce storm and flood damage. Mr. Nam hires male and female laborers for about 120 days per year, for planting, adding fertilizer and pesticides, harvesting, tillage and transports. He decides over the use of remittances and farm work. His wife takes domestic decisions and performs most jobs, except cooking and washing up, which they share.

One hypothetical determining factor in family farms' decisions to convert to more sustainable and resilient land use is their investment capacity. This study showed clear links between land use and household income sources. Households in both provinces living primarily on farm incomes and without remittances from abroad generally had larger plots and grew cassava, rice or other annual crops ($p < 0.000$; $p < 0.013$, $p < 0.013$ and $p < 0.031$, respectively, $n = 427$). Overall, larger plot size correlated positively with maize, agroforestry and plantation forests ($p < 0.004$, $p < 0.002$ and $p < 0.003$, respectively, $n = 427$). Households with remittances were more likely to have cash crops or to intercrop ($p < 0.003$ or $p < 0.012$, respectively, $n = 427$) and not use monocultures ($p < 0.005$, $n = 427$). Anecdotal evidence on who decided over the spending of remittances in Ha Tinh gives a split picture: sometimes the migrant decided as it was "their" money, whereas in other cases the money was "kept" by the wife (although the male head-of-household figure may still have had the final say) [20]. Results show that savings from non-farm jobs are invested in higher value perennial plantations that require less daily management, such as fruit trees, tea or timber [20,69], which benefits the whole family.

4. Discussion

4.1. Migration Strategies on Family Farms

The results from both provinces reflect a generational shift of migrant workers, as the majority of migrants were young [30]. In an Asian context, a large share of youth migrants is unsurprising [17]. What contrasted more with other studies in Vietnam [7] was that youth migration appeared to be less male-dominated, especially in Ha Tinh. The "strong arms" that leave the farms belong increasingly to the youth, who compensate for their exit from the family farm with remittances. As pointed out by Kawarazuka *et al*. [20], earning money creates independence—for both women and men. It also changes the dynamics for those "left behind", which has various implications for smallholders and family farms.

This study showed that, in both provinces, labor migration served as a strategy for households to manage economic risk in agriculture, although disasters constantly eroded their savings. The regional differences reflected two phases of rural migration in Vietnam. In Ha Tinh, migration started earlier, paving pathways for a second generation of migrant workers abroad, while local unemployment rates remained high. As incomes were

relatively higher in Ha Tinh, so was the capacity to invest in longer-term migration [30]. In Dien Bien, where absolute poverty rates were relatively higher, temporary jobs made a considerable financial improvement to farm incomes at an affordable economic risk. Many still needed to save up the collateral for bank loans and the upfront fees required for job migration abroad. What differs strongly between the current migration patterns in Vietnam and recent patterns in China [24] and southern Europe [21,23] is that the labor gap left behind by Vietnamese rural migrants has not been filled by new, relatively poorer migrant farmers.

Low- and High-Risk Strategies

The two contrasting typologies of Dien Bien and Ha Tinh resemble certain aspects of migration pathways found in South Asia. Maharjan *et al.* [17] characterize migration for coping as short periods of often informal migration and adaptation measures, rendering short-term autonomous benefits and low remittances, similar to Dien Bien. Conversely, migration for adaptation is characterized by high remittances, formal sector jobs and access to planned adaptation, more similar to Ha Tinh. The authors argue the latter to be more desirable and achievable with policy support.

Attempts to define family farms have largely centered around the farm as a small business entity, with the core labor force being a family with its own intersectional dynamics [2]. Vietnam may follow economic and agricultural transition trends similar to other countries in Southeast Asia [55] and Europe [70], where farms are managed on part-time or hired labor supplements or other substitutes for family labor. Nevertheless, the likening of a family farm to a business entity remains ambiguous, as risk management in farming is profoundly different from other economic entities in terms of labor, capital and adaptation strategies (see Section 4.2 below). Viewing migration through the relative deprivation lens [22]can inform the relative levels of risk management strategies available to households, including that of migration. Adding to this, a gender lens (even if limited), can highlight different ways to deal with the labor shortage caused by migration, depending on who in the household migrates and who stays. Two relative risk levels played out in the study, particularly as a response to a male head-of-household migrating.

A relatively lower-risk strategy, as seen in Dien Bien, was to combine temporary off-farm jobs with low-intensity farming periods. Here, intrahousehold decisions, roles and tasks shifted and were passed on to other family members during migration. In particular, the male head-of-household individual would temporarily transfer domestic decisions to the female de facto head-of-household figure, whilst retaining the decision-making power over farm work. For the oldest son, who was generally expected to inherit the farm, the father's absence provided an opportunity to learn the job with his spouse.

A relatively higher-risk strategy, more common in Ha Tinh, was adapting farm and housework for long periods of absence. Work abroad requires a significant economic investment upfront, often including loans and contributions from relatives, and the migrant has little chance to terminate a contract prematurely in case of emergency. In cases where work had already been adapted, farm and domestic decisions and roles seemed to change less. The disruption caused by COVID-19 may have long-term impacts on the economics of households whose migrating members were repatriated prematurely or were unable to leave their foreign destinations. Women's decision-making power did increase in some cases over farm work during periods of absence, without a reduction in housework responsibilities. To balance some of the workload, the household depended on external support for longer periods.

These two risk strategy levels should not be viewed as the end points, but rather should be placed along a continuum of risk strategies. Adding relative comparisons from the Central Highlands, the Deltas [7,14,30,71] and other places would deepen the understanding and broaden the portfolio of possible risk management strategies pursued by family farms in Vietnam. Such knowledge can serve to better inform policy and support.

The two cases suggest that gendered intrahousehold decision-making and labor can vary depending on the type of migration. On family farms, the strength of interchangeable roles among family members is evident. In the multigenerational households, older generations took more domestic roles, while younger family members shared agriculture tasks, similar to Indonesian transmigrants [6]. Furthermore, both risk strategies have implications for what constitutes the "core family farm labor force", driving an argument for a wider definition of this concept. Typically, the permeable interactions with other family farms and the flux of labor between them are disregarded in definitions of the "core labor force" on family farms.

In contrast to many developing countries (e.g., Pakistan) [5], this study did not show any significant increased dependency on children for farm labor during migration periods. Instead, the findings emphasized a remarkable dependency on relatives and neighbors for both farm work and domestic tasks (Figure 4). Social norms built around labor exchange are often found in labor-intensive farming systems organized around community-based water management, such as rice cultures [72]. A back-of-the-envelope calculation of the total number of days that relatives worked in Ha Tinh amounted to a staggering 4500 days (which equals 12 years of daily work). However, these hours are biased and suggest that farm and domestic tasks were quantified or valorized differently. Neighbors' and relatives' contributions to farm labor (traditionally the male sphere) were readily estimated in days or hours, whereas domestic tasks (traditionally the female sphere) were quantified in less specific terms. Therefore, comparing labor exchange for the two types of spheres introduces bias. On the one hand, domestic tasks have less seasonal variation than farm work. On the other hand, they are more varied and scattered from day-to-day, and are sometimes multi-tasked. Agriculture tasks, as the "core business" of the family farm in the conventional economic sense, are more often single-tasked and need to be guesstimated as "man days", to ensure that tasks can be performed during absence. Scholars found that women underestimated the time they spend on farm work, while men tended to underestimate household labor [38,73], which reflects the results found in this study (Figure 1).

The different approaches to migration presented in this study confirm that multiple roles and identities intersect at the individual level [74,75] and also extend beyond the "core family". We demonstrated two reasons why a broader concept of the family farm is needed in the context of migration, gender dynamics and risk management.

4.2. Migration as Adaptation Strategy

Although far from all remittances were invested in agriculture, some results in this study indicated a positive relation between remittances and risk reduction. First, remittances quickly released emergency cash for recovery instead of having to wait for a harvest or selling an animal. Second, households with remittances were more likely to intercrop cash crops, rather than employ monoculture practices. This connects to the finding that remittances contributed to shortening the economic recovery period after disaster impacts.

Although the role of extension in promoting diversified land uses differed considerably between the two regions, the post-disaster support was rarely targeted towards changing faming systems or diversifying land uses in response to the hazards in either province. More often, the recommendations concerned the farming calendar, crop variety or inputs. Limited farm diversification may also be explained by perceptions about marginalized groups. For example, certain studies point to strong social norms that can restrict innovation and boundary crossing [25,72], especially among women and older generations [20]. Others indicate that women's innovation can be a powerful process to small-scale entrepreneurship [74].With longer migration periods, remittances in Ha Tinh were often used for perennial trees, typically acacia forests, tea or orange plantations. These common systems were familiar to neighbors if their help was needed. Previous findings from both regions have shown that trees on farms contribute significantly to shorter

recovery time after disasters [76]. There is a body of local and scientific knowledge confirming the role of trees in providing ecosystem services, disaster risk reduction [77–79], livelihood diversification and buffers when crop yields are low [80].

In both provinces, although more evident in Ha Tinh, non-farm incomes and remittances were invested in perennial systems with higher value trees, such as fruit trees and indigenous tree species. This may reflect the fact that in Ha Tinh, more frequent disasters contributed to female and male farmers actively testing and seeking advice on more climate-resilient land-use interventions, such as agroforestry, and the fact that women had more influence over the use of remittances and tree selection. For example, studies from Vietnam and Peru have shown that women give more importance to incorporating fruit trees in agroforestry systems and men prefer fast-growing timber species [78,81]. Somewhat similar to the Philippines, the use of daughters' remittances reflected the fathers' preferences for intensive cash crop production over more sustainable practices [15]. In Dien Bien, with lower and temporary non-farm incomes and more decisions dominated by (male) head-of-household individuals, farmers were motivated to raise cattle. This can be explained by inadequate land for cultivation, and the fact that livestock can readily be converted to cash [82]. Here, the need for fodder supply may have influenced (male) farmers' reluctance to transition from maize to more sustainable and climate-resilient practices. Such practices could help manage disaster risk, for example, intercrops and agroforestry systems with grass, fruit and timber trees [83], which may have been implemented if women were more included in farm decision-making processes [78]. However, shifting from monoculture requires intermediary investment. For some farmers in Ha Tinh, remittances could already fill this gap, contributing to self-funded adaptation investments [27]. Research shows that within seven years, maize-grass-fruit tree agroforestry systems tailored to the conditions in northwest Vietnam generated 2.4 times the income of monoculture maize because of their income diversification and risk reduction capacities [84]. The findings support evidence that both labor-saving activities and non-farm activities can be critical in building more resilient faming systems [32], but also that cultural and socioeconomic needs and barriers for adoption can be as diverse as biophysical contexts. Acknowledging practical challenges in implementing such policies, we suggest that examples from commune and district authorities where national policies have been adapted in response to varying local needs, are compiled and analyzed.

4.3. Remittances as Risk Insurance

The extent to which relatives and neighbors offset the young and strong arms that left the farms was unexpected, in terms of their contributions to both agriculture and housework. While it is true that "family farmers are embedded in territorial networks and local cultures, and spend their incomes mostly within local and regional markets" [85], results from the two sites in this study showed that while jobs were created when migrants left, most were unpaid. Non-commercial transactions, such as labor exchange, fulfill both economic and social functions in rural northern Vietnam [86]. However, this differs to a neighboring province in the North Central coast region, where hired labor and land exchange is common [87], and may indicate future steps in rural agrarian transformation. At the same time, the value of keeping land as a family reserve asset during economic downturns [71,88] was again revealed during the COVID-19 pandemic, when migrants returned to their place of origin. Meanwhile, in the absence of other safety nets, remittances and loans in both regions of Vietnam function as insurance, shortening recovery times for both farm and home loss and damages. This behavior can also be understood against the background that government support programs have been accused of promoting monoculture and have failed to address women's needs for reducing vulnerability [39]. Similar to other lower-middle-income countries where global climate funds have failed to deliver on adaptation needs [19,89], remittances bypass bureaucracy and enable individual households to take fast and unrestricted response actions.

In disaster-prone agrarian societies such as Vietnam, neighbors coming together to manage water resources [72,90] or exchanging farm labor during peak periods [87] also becomes a social safety net. However, underrating this labor exchange can have implications for extension programs and training. Tentative results from this study found that farms with longer periods of help from relatives and neighbors were associated with more disaster damage. This may be due to the fact that extension training programs tend to target the head-of-household individuals rather than those conducting the daily farm work, even though the head-of-household individual may be absent for significant periods of time. The question of who receives training and what training they receive becomes more important. In a project in central Vietnam, activities requiring regular attendance were resolved by the two head-of-household interchangeably attending meetings or training [91]. Evaluations showed that farmers appreciated this, as it helped the couple make more joint decisions [92]. Family farms could benefit if extension services and training also targeted those actually performing agricultural tasks, including relatives or neighbors. Despite documented local ecological knowledge elsewhere in both regions [76,93], respondents in Dien Bien felt restricted by the narrow range of crops and species they could diversify with. Here, participatory research plays an important role in revealing longer-term, landscape-level implications of household-level versus community-level risk strategies. For example, the scaling up of monocultures or livestock as a risk strategy for family farms needs to hold at a landscape-level resilience perspective.

The findings raise more questions about how exchange labor interfaces with several discourses. Firstly, does exchange labor contribute to a circular economy or lagging rural economic development? Second, from a gender perspective, whose labor among those remaining is compensated? Is help called in to free up time for farming, only for labor to shift to housework? Would more women, especially from ethnic communities, prefer non-farm jobs? Third, the cases demonstrated the need to consider labor intensity when introducing new farming systems. Studies suggest that not only work hours, but also agency over time and intensity of work [11] viewed through an intersectional lens, can give a more nuanced understanding on a variety of factors promoting or constraining resilience [94]. This has implications for policymakers and practitioners looking to adapt management recommendations for climate-resilient agricultural landscapes. Future studies should be designed to better characterize underlying cultural-ecological dimensions and triggers in gendered decision-making or labor roles on family farms, particularly what gendered roles persist and are negotiated in young migrants' family and work life.

5. Conclusions

This study of rural migration patterns in two regions with different types of poverty in Vietnam has shown that job migration can be a calculated strategy to manage risk, weighing social aspects of family and farm management against economic drudgery and hardships. The required up-front investments make long-term, long-distance migration an economic risk in itself, restricting mobility for certain groups, especially the older and less-educated groups, and affecting women more than men. Local jobs and temporary migration can offer short-term, lower-risk, lower-return solutions, to overcome immediate emergencies, diversify household income, or to build up capital for higher-risk, higher-return options, particularly longer-duration international migration to generate remittances. The higher-risk strategies are often open to the younger and better educated.

In the absence of insurance and safety nets, remittances contributed to faster economic recovery after disasters. Households with remittances were likely to diversify their land use and invest in perennial land uses. This contributed to reducing both labor inputs and disaster impacts.

Intrahousehold labor allocation was more influenced in larger households with temporary migration patterns (Dien Bien), where more women made agriculture decisions. Relatives and neighbors contributed significant labor, particularly in labor-restricted households with longer migration patterns (Ha Tinh), but farm exchange laborers were

rarely targeted in extension training programs. New, resilient farming system designs need to be disaster-proof and free up labor input requirements, according to the wishes of women and men farmers.

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Appendix A

Perceptions Concerning Labor Burdens

When a household member migrates to pursue off-farm work, there is an increase in labor burdens for those left behind. We were interested in how responsibilities over tasks shifted during migration, whether remittances were used to hire others for farm or household work, anticipating an opportunity to be released from the least preferred tasks. When respondents were asked what domestic tasks they felt burdened by and would rather be released from, the most cited in Dien Bien was washing clothes (44% of women in and 37% of men), compared to care-giving roles (23% of women) and sweeping leaves (28% of men) in Ha Tinh (Table A1). The common reasons were that these tasks were time consuming, tiring, or pointless, with some women simply pointing out "because it is women's tasks". Taking care of the elderly and sick was an emotional burden for those who "don't want to see others suffering". Sick family members also created concerns regarding medical expenses. This was cited as a reason for migration, especially among middle-aged married women in Ha Tinh. When asked what agricultural work respondents would rather be released from (Table A1), there was a broad agreement across provinces and gender: (1) spraying pesticides and herbicides (68% in Dien Bien and 77% in Ha Tinh); and (2) weeding (17% and 15% in Dien Bien and Ha Tinh). The reasons included: (1) concerns over health, as spraying involved toxic chemicals; and (2) both practices were tiring. Surprisingly, many respondents could not think of any housework to get rid of (up to 39% of the women and 35% of the men in Ha Tinh). They also did not mention the possibility of exchanging some manual housework, such as washing, for a machine.

Table A1. Housework and farm work tasks that most men and women wanted to get rid of, and theoretically could transfer to neighbor and relatives.

Sphere	Dien Bien (*n*= 113)	Ha Tinh (*n*= 106)

	Women (*n* = 56)	**Men (*n* = 57)**	**Women (*n* = 66)**	**Men (*n* = 40)**
Housework	washing clothes (44%), cleaning (11%) Nothing: 20%	washing clothes (37%), washing dishes (32%), cooking (10%), care of old, sick or children (10%) Nothing: 9%	care of old, sick or children (23%), washing clothes (17%). Nothing: 39%	sweeping leaves (28%), shopping (15%), washing clothes (12%) Nothing: 35%
Farm work	spraying agrochemicals (68%), weeding (17%)		spraying agrochemicals (77%), weeding (15%)	

Appendix B

Table A2. Bivariate correlation with duration of economic recovery after natural disaster impact (months). Spearman correlation coefficient, significance, sample size.

Variable		**Recovery Duration Months**
Assets		
Number of plots	Correlation Coefficient	0.225
	Sig. (2-tailed)	0.001
	N	208
Total size of three plots	Correlation Coefficient	0.108
	Sig. (2-tailed)	0.122
	N	208
Risk mitigation capacity		
Main income from agriculture	Correlation Coefficient	0.155
	Sig. (2-tailed)	0.025
	N	208
Main income from non-agriculture	Correlation Coefficient	−0.143
	Sig. (2-tailed)	0.040
	N	208
Main income from remittances	Correlation Coefficient	−0.149
	Sig. (2-tailed)	0.032
	N	208
Ownership of smartphone	Correlation Coefficient	−0.025
	Sig. (2-tailed)	0.725
	N	208
Exposure		
Typhoon damage	Correlation Coefficient	0.226
	Sig. (2-tailed)	0.002
	N	189
Storm damage	Correlation Coefficient	0.181
	Sig. (2-tailed)	0.013
	N	189
Flood damage	Correlation Coefficient	0.177
	Sig. (2-tailed)	0.015
	N	189
Forest fire	Correlation Coefficient	0.224
	Sig. (2-tailed)	0.002

	N	189
Drought damage	Correlation Coefficient	0.353
	Sig. (2-tailed)	0.000
	N	189
Cold spell	Correlation Coefficient	0.169
	Sig. (2-tailed)	0.020
	N	189
Land slide	Correlation Coefficient	0.384
	Sig. (2-tailed)	0.000
	N	189
Hot spell	Correlation Coefficient	0.186
	Sig. (2-tailed)	0.010
	N	189
Impact		
Reduced productivity	Correlation Coefficient	0.249
	Sig. (2-tailed)	0.000
	N	208
Loss of crops or trees	Correlation Coefficient	0.175
	Sig. (2-tailed)	0.012
	N	208
Loss of animals	Correlation Coefficient	0.334
	Sig. (2-tailed)	0.000
	N	208
Freshwater shortage	Correlation Coefficient	0.379
	Sig. (2-tailed)	0.000
	N	208
Adaptation		
Changed annual crops (or variety)	Correlation Coefficient	−0.298
	Sig. (2-tailed)	0.015
	N	66
Changed to monoculture	Correlation Coefficient	0.241
	Sig. (2-tailed)	0.074
	N	56
Diversification	Correlation Coefficient	0.106
	Sig. (2-tailed)	0.453
	N	52
Change to fruit trees	Correlation Coefficient	0.075
	Sig. (2-tailed)	0.596
	N	52
Change to more labor demanding farming system	Correlation Coefficient	0.303
	Sig. (2-tailed)	0.029
	N	52
Change to less labor demanding farming system	Correlation Coefficient	0.036
	Sig. (2-tailed)	0.800
	N	52

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