



Article

A Nuanced Analysis on Livelihood Resilience of Vietnamese Upland Households: An Intersectional Lens of Ethnicity and Gender

Phuong Thi Tran ^{1,2}, Tan Quang Nguyen ^{3,4} , Chuong Van Huynh ^{3,*} , Ty Huu Pham ² and Ulrike Schinkel ⁵

¹ Centre for Climate Change Study in Central Vietnam, University of Agriculture and Forestry, Hue University, Hue City 49000, Vietnam

² Faculty of Land Resource and Agricultural Environment, University of Agriculture and Forestry, Hue University, Hue City 49000, Vietnam

³ International School, Hue University, Hue City 49000, Vietnam

⁴ Graduate School of Environmental and Life Science, Okayama University, Okayama City 700-8530, Japan

⁵ Infrastructure and Municipal Development, IZES gGmbH, 66115 Saarbrücken, Germany

* Correspondence: huynhvanhuong@hueuni.edu.vn

Abstract: “How to gauge the resilience of a household’s livelihood?” and “who is resilience for?”; as the world’s volatility increases, especially with unprecedented changes in climate, interest in these questions continues to rise. While many previous conventional attempts to measure resilience at the household level have largely employed the “objective” top-down framework relying mostly on a macro observed socioeconomic dataset, this present work seeks to estimate household resilience through an alternative bottom-up method, called the “subjective” resilience approach. With specific reference to the context of two ethnic Pa Cô and Tà Ôi minorities living in upland areas of Central Vietnam, this study aims to (1) measure household resilience to climate change by scoring five livelihood capitals, financial, human, social, physical, and natural, by applying the Household Livelihood Resilience (HLR) framework; and (2) provide an intersectional lens of ethnicity and gender in relation to the household’s livelihood resilience. To achieve these goals, in addition to two focus group discussions and eleven in-depth interviews, an empirical survey of 236 households was conducted between September to December 2021. Our findings indicated that there are differences in observed livelihood resilience among the ethnic minority groups and, within that, between gender (sex, status) factors. Ethnic women and poor households have a lower resilience than other groups in society due to their lower human capital and limited access to public and financial resources, which are to some degree linked to the difference in the gender division of labor and the cultural norms of patriarch traditions. This study highlights the importance of considering gender and poverty in resilience-building efforts and offers insights for future programs in multi-ethnic developing countries such as Vietnam.

Keywords: climate change; gender; livelihood resilience; poverty alleviation; Vietnam



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1. Introduction

Climate change (CC) is already affecting every inhabited area across the globe. Unsustainable human-induced activities exacerbate this problem through many observed changes in weather events and climate extremes. According to the latest report of the Provisional State of the Global Climate report [1], between January and September 2022, the global mean surface temperature was 1.15 ± 0.13 °C warmer than the pre-industrial baseline (1850–1900); therefore, 2022 is likely to be the fifth hottest year on the historical record. The heating of the global climate system has promptly led to rising sea levels. The rate of ice-sheet melt was four times higher between the 1992–1999 and 2010–2019 periods [1]. While rising temperatures increase the likelihood of droughts across Asia and Africa, the

frequency and intensity of floods and heavy rains are tremendously forecasted in monsoon regions in Southeast Asia [2]. Undoubtedly, such adverse weather events seriously affect the livelihoods of millions of people, especially agricultural farmers in hazard-prone and difficult-to-reach locations such as remote mountainous regions. With CC becoming more obvious, its studies related to community livelihoods have been increasingly carried out at several levels [3,4]. Unfortunately, while recent works have massively focused on assessing the livelihood vulnerability of agricultural communities and risk-prone areas at both community and individual levels [5–8], studies embracing household livelihood resilience are still sparse, albeit with increasing numbers. Further, there is a paucity of integration of gender (sex, socioeconomic status, age) and ethnicity aspects in the resilience literature, and though this is beginning to be reconsidered recently [9], there is a lot of room to expand on it.

Resilience is popularly understood as a thinking framework of development, and it is thus often used for resilience-building works by international humanitarian agencies, development institutions, policymakers, and practitioners [10,11]. Basically, it is a response to the perception that increased shocks (both social and ecological), but especially climatic ones, are the main challenges for development [11]. Gender issues and ethnic minority groups have been examined in several climate works [5,12–16], but a focus on ethnicity has crowded out the cogitation of the gender lens across that [9]. Furthermore, such contributions seem to focus more on women rather than analyzing both male and female groups. It should be noted that the gender term is intricate because it not only refers to the characteristics of sexuality, such as women and men, and girls and boys, but also intersects with other factors, including socioeconomic status, age, geographic location, and disability, among others [17]. This is referred to as intersectionality.

As external shocks (e.g., climate events) become more unpredictable, resilience and community development programs must pay more attention to nuanced intersectionalities affecting individual and community adaptive capacity [18]. Reference [15] argued that the present social-economic disparities (between the poor and the wealthy) are likely to increase because of CC effects; it is thus crucial to perceive the entry points for these inequalities. Similarly, [19] claimed that research should be beyond the simple understanding of gender as a particular binary variable (men and women, girls and boys, and poor and non-poor); instead, it should consider gender as a dynamic social entity. It means that gender should be placed as an intersectionality among rights, roles, identities, and responsibilities. In short, as long as we lack a cross-sectional analysis of gender and ethnography in climate resilience, disproportionate impacts will persist, making it difficult to achieve sustainable development goals on gender equality and community development. On the contrary, understanding the variations in self-reported livelihood resilience at the nuanced intersectionality of ethnicity and gender may provide important entry points for future resilience-building programs both at meso and community levels [9,18].

With specific reference to the context of two ethnic minority communities in upland areas of Central Vietnam, this study aims to contribute to the evolution of this viewpoint. Specifically, this study examines the differences in Household Livelihood Resilience (HLR) between men and women (sex), between the poor and better-off households (socioeconomic status), among ethnic minority groups (ethnicity), and especially the intersection across these factors. In doing so, the contribution of this study can be twofold. Theoretically, it adds to the growing literature, but remains lower in volume on livelihood resilience with regard to gender and ethnicity. In practical terms, this study suggests implications for policymakers, development practitioners, and humanitarian organizations to deliver interventions in a more balanced and sustainable manner in disaster reduction and resilience-building programs. The novelty of this research lies in its use of an alternative bottom-up method, the “subjective” resilience approach, to estimate household resilience, which differs from the conventional top-down method that relies on macro-level socioeconomic data. Additionally, this study provides an intersectional lens of ethnicity and gender in relation to households’ livelihood resilience, which highlights the importance of consid-

ering these factors in resilience-building efforts. By using a mix of focus group discussions, in-depth interviews, and an empirical survey, this study offers a nuanced understanding of the differences in observed livelihood resilience among ethnic minority groups, specifically the Pa Cô and Tà Ôi in the upland areas of Central Vietnam, and within those groups based on gender and poverty status. These findings contribute to the current literature by offering insights into the role of gender and poverty in resilience-building efforts in multi-ethnic developing countries. In this work, the five capital livelihood framework, initially developed by Chambers and Conway (1992) and including human, financial, physical, social, and natural capital, was used to conceptualize household livelihood resilience. This approach has been effectively proven in previous studies of resilience and climate-related management programs [20].

2. Theoretical Background

2.1. Livelihood Resilience Theories

The concept of resilience originated from ecological science [21] and was then widely applied in contemporary debates about social sciences and global environmental challenges [10,22–24]. Although the term has not been agreed upon so far, it essentially emphasizes the ability to respond to a change or disturbance, both internally and externally. Due to its variety of applications, however, the theory of resilience has also been criticized because “there is still relatively little analysis of social difference and resilience, and there are continuing tensions between normative and analytical stances on resilience” [24]. In response to that call, Tanner et al. (2015, p. 23) proposed a perspective of livelihood resilience that is defined as “the capacity of all people across generations to sustain and improve their livelihood opportunities and well-being despite environmental, economic, social and political disturbances” [10]. In this vein, livelihood resilience obviously emphasizes the roles of humanitarian agencies, the rights and capacities of individuals, and the community’s preparedness against, adaptation to, and response to, stressors [9]. Further, many earlier works argued that resilience-building efforts or governmental interventions should address the question of “who is resilience for?” at the center and from the outset of any programs [24,25].

Conventionally, attempts to calculate resilience at the community and household levels have employed an “objective” framework, or rather a “top-down” approach relying mostly on a range of recorded macro socioeconomic datasets [23]. In this work, however, we seek to measure the so-called “subjective” resilience approach as suggested by [26], which germs from the idea that individuals and families are well aware of their own ability to adapt and cope with disturbance and change. In other words, this study uses households’ self-assessments (or self-perceptions) to quantify five livelihood capitals in order to support the HLR as a “bottom-up” style. However, it should note that though “subjective” considerations are important, some “subjective” inquiries that require recollections of factual information are not always accurate. Here, we systematically analyze the perception of the HLR—the term that attracts increasing attention for resilience-building programs and scholarly research, especially in mid- and low-income countries. Of particular relevance to this work, we apply [26]’s quantified “subjective resilience” framework, later adjusted by [23] but with minor adaptations, to examine the HLR between gender (sex) and economic household types (socioeconomic status) among groups (ethnicity), and more importantly, at the intersection of such factors. Accordingly, HLR scores are calculated from five livelihood capital sources which are made up of 28 indicators (Table 1). These indicators have been adjusted to fit the subjects and socioeconomic context of the study area. For example, compared to [9], we separate the “farm size” variables into specific “agricultural” and “forest” land since it is not possible to equate the use value of 1 ha of rice land with 1 ha of forestry land (of course, only within financial capital).

Table 1. Five livelihood capitals and 28 indicators for climate household resilience (adapted from [9,23,26]).

Livelihood Capitals ^a	Indicators	Measurement
Financial (7)	• Income sources	Numeric (total number of income sources)
	• Salaried job	Dummy (0 = no; 1 = yes)
	• Bank loans	Dummy (0 = no; 1 = yes)
	• Livestock values	Million VnD (total cash value of current livestock)
	• Annual income	Million VnD (total 1-year income of all family members)
	• Agricultural land	Hectare
	• Forest land	Hectare
Human (6)	• Labors	Number of family members aged 15–60 years old)
	• Graduated from higher education	Dummy (0 = no; 1 = yes) at least one family member graduated from university or college
	• Knowing the local warning system	Dummy (0 = no; 1 = yes)
	• Have attended at least one training course on disaster prevention	Dummy (0 = no; 1 = yes)
	• Have participated in at least one drill course on disaster risk prevention	Dummy (0 = no; 1 = yes)
	• Health insurance card	Dummy (0 = no; 1 = yes)
Social (4)	• Participation in agriculture groups	Dummy (0 = no; 1 = yes)
	• Participation in social groups	Numeric (total number of groups for all household members)
	• Residence period	Years
	• Media sources	Numeric (total number of media sources that household uses for climate-related information)
Physical (6)	• Residential land	Sao ^b
	• Semi- or concrete house	Dummy (0 = no; 1 = yes)
	• Access to irrigation	Dummy (0 = no; 1 = yes)
	• Access to public water system	Dummy (0 = no; 1 = yes)
	• Access to main road	Dummy (0 = no; 1 = yes)
	• Distance from house to school	Km
Natural (5)	• Agricultural land	Hectare
	• Forest land	Hectare
	• Agricultural land erosion	Hectare
	• Crop diversification	Numeric (total number of different crops planted)
	• Two rice crops	Dummy (0 = no; 1 = yes)

^a The parentheses are the number of indicators of the corresponding livelihood capital; ^b 1 sao = 500 m².

2.2. The Intersectionality of Ethnicity and Gender

Rapid changes to the global climate system are on a completely new frontier challenging marginalized groups' empowerment and gender equality. Women, the poor, and ethnic groups are always identified as the most vulnerable to CC. Although much progress has been made in terms of gender in recent decades, gender-related inequalities are pervasive in the third world. For example, 70% of the 1.3 billion people in developing countries living in poverty are women [27]. An obvious viewpoint from the case study in Vietnam indicated that women in South Vietnam would be affected more by CC than men in those countries [28]. More importantly, the CC consequences lead already marginalized sections of communities into further deprivation [27], a so-called endless poverty trap [6]. However, such issues have been sidetracked; as introduced, there is little evidence or field-based research to provide a reliable basis for gender-sensitive approaches (both ethnicity, sex, and economic status) in agricultural practices to respond to CC [25], while the failure or success

of a development program or intervention has often been explained in relation to gender issues [19].

Gender itself is dynamic and complicated as it regards characteristics of cultural and social norms, and psychological aspects [29]. Gender classification also intersects by sex, education level, location, status, and ethnicity [19]. Within the scope of this study, we separate the ethnicity variable to clarify the differences in ethnic groups in the HLR, and concurrently we only used two criteria of gender, including sex (male and female) and household economic status (poor and non-poor). Djoudi et al. (2016) argued that perception differences between men and women have been one of the rationales for gender analysis [30]. Further, gender is often linked to the different cultures, responsibilities, and rights associated with women and men [31]. Meanwhile, reviewing the socioeconomic status disparity is recognized as an important variable in CC analysis. For example, some empirical evidence from previous works indicates that significant inequalities exist between the poor and the wealthy in accessing climate-related information and household adaptive strategies, especially in the case of poor ethnic families in remote rural areas [32].

Furthermore, gender intersection is built from sociocultural norms; therefore, they may not be similar among ethnic groups [33]. Soetanto et al. (2017) claimed that members of different social groups may perceive diverging perceptions of CC impacts depending on their worldviews [34]. It is crucial to understand perceptions that reflect inequality through many lenses rather than stopping at the discursive level of inherent differences between social groups [30]. On closer examination of the resilience literature in relation to CC, it is obviously necessary to explore an intersectional approach to obtain a nuanced viewpoint of subjective self-assessment resilience at the household level. In this approach, ethnicity and gender (sex and status) are acknowledged as personal identities in the way in which they intersect with each other (Figure 1). Such an interdisciplinary approach should be apparently encouraged in future CC-related studies, as recommended by Thompson-Hall et al. (2016) [35]. For example, Nielsen and Reenberg (2010) conclude that CC adaptation differs between women and men in different ethnic groups or social contexts, even under similar ecosystems [36].

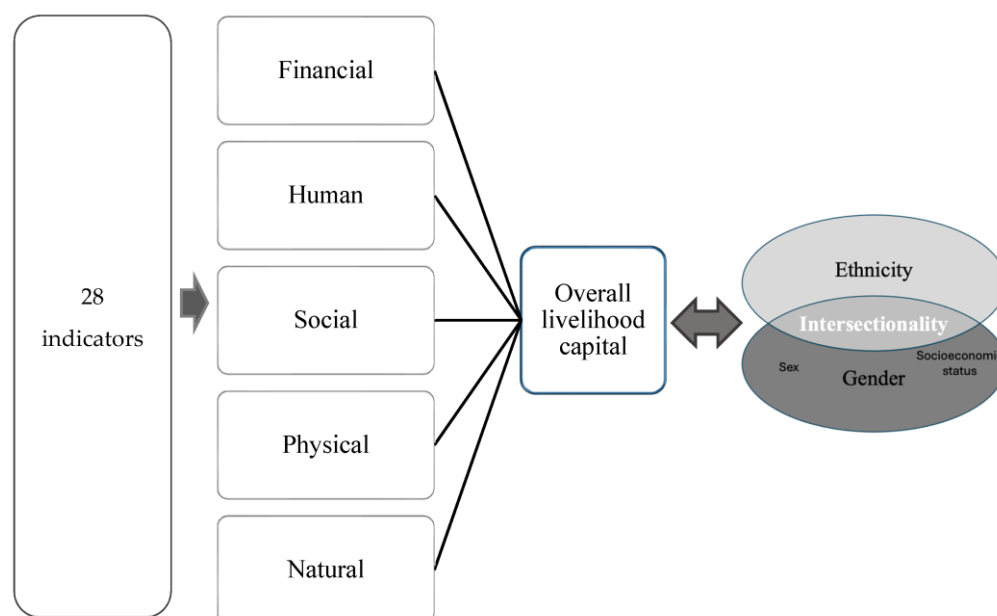


Figure 1. Conceptual framework of this study.

3. Methods

3.1. Description of Study Site

This study was carried out in A Luoi district, Thua Thien Hue province, Central Vietnam (Figure 2). With the disadvantage of topography and dependence on natural

resources, this province is one of the most disaster-prone regions in Vietnam, with especially high vulnerability to the impacts of rising sea levels, floods, storms, and tropical depressions [37–39]. A number of studies (e.g., [4,6,38]) showed that droughts in the upland and floods in low-lying regions were the main extreme events in the province. According to storm tracking data from 1952 to 2020 (69 years), there were 47 storms and tropical depressions that directly affected Thua Thien Hue. Among these, there were 5 strong and super strong storms (more than level 12 according to the national storm classification). Meteorological data also indicated that Thua Thien Hue is one of the provinces with the most rainfall in the country. The average annual rainfall in all regions of the province is over 2700 mm, and particularly in some places, such as A Luoi, Nam Dong, and Phu Loc districts, is over 4000 mm [40].

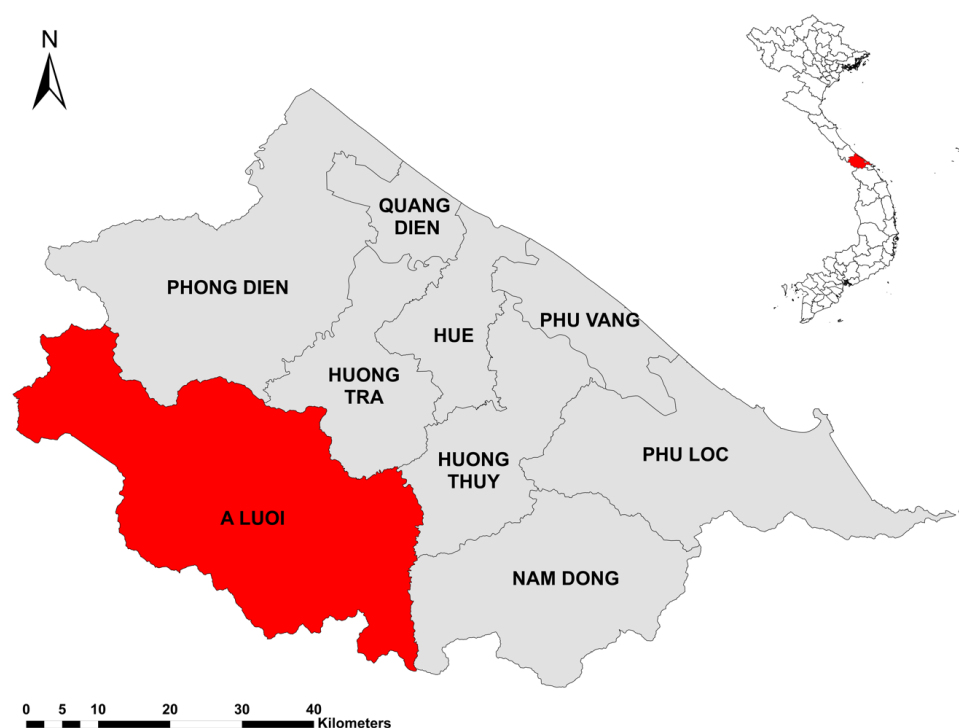


Figure 2. Map of the study site in A Luoi district, Thua Thien Hue province, Vietnam.

A Luoi district is located in the West of Thua Thien Hue province with the characteristics of a tropical monsoon upland climate that is identified as one of the localities most vulnerable to CC in this province [6]. Indeed, with altitudes ranging from 750 m to 1800 m, this region is considered a rain condensation area and is one of the highest rainfall regions in the province. However, rainfall distribution occurs erratically [12]; specifically, the concentration of heavy rain for a few days in the rainy season leads to serious flash floods and landslides, while droughts often happen in the summer season. In addition to the disadvantage of geographical location, this mountain district is highly vulnerable to intersectional pressures, including gender inequality, food insecurity, poverty, and inadequate access to public services [5,6,9,13,16]. The area is predominantly inhabited by ethnic minority communities such as Pa Cô, Tà Ôi, and Cơ Tu groups who are often framed as having lower education levels, higher poverty rates, and social exclusion [14]. The last report of this district indicated that the poverty rate peaked at nearly 50% [31]. Among those poor, around 90% are ethnic minority households. The livelihoods of upland people depend mainly on forest and agricultural resources, exacerbating their vulnerability to climate and environmental changes.

In this study, the Tà Ôi and Pa Cô ethnic minority farmers living in this district were chosen for the survey as they are the most dominant population. In 2021, the whole district had 14,050 households, of which 10,860 (or 77.3%) were ethnic minority households, with

22.7% remaining of the majority “kinh” people [31]. Among these ethnic groups, Pa Cô and Tà Ôi dominate, with 5867 and 3506 households, respectively, followed by Cơ Tu (1384 households) and Pa Hy (68 households). Although there have been many support programs for these communities, they are still considered at the bottom of society. As a result, their voices are often marginalized and less integrated into disaster risk reduction programs and development policies. Gender inequality due to social norms and their own customs exacerbates this problem in upland communities. To deal with these issues, it is important to consider how communities and individuals can better prepare and adapt for extreme climate events to understand individuals’ level of resilience under an intersectional lens of ethnicity and gender. This study contributes to this approach through a specific case study of two ethnic groups—the Pa Cô and Tà Ôi in the A Luoi district, Thua Thien Hue province, Vietnam.

3.2. Research Approach and Data Collection

In this study, the ontological assumption is that households have different levels of resilience to climate change, which is influenced by the intersection of ethnicity and gender. Meanwhile, the epistemology can be described as constructivist, as it employs a “subjective” bottom-up approach to estimate household resilience, which is initiated by [26]. This approach views knowledge as being constructed through the experiences and perceptions of the individuals being studied, rather than being objectively observed from a macro perspective. In summary, the ontology and epistemology of this study can be described as assuming that the resilience of households is a socially constructed reality influenced by ethnicity and gender, and that this reality can be understood through the experiences and perceptions of the individuals being studied.

Basically, the HLR approach assumes that livelihood resilience is formed by five livelihood capitals (financial, human, social, physical, and natural), which were estimated by the responses given by either the household male or female head. In rural Vietnam, the profile of the household heads and their roles are critical in decisions making of the household at both household and community levels. Thus, this study hypothesized that the householder’s answer is representative of their family’s estimations of livelihood resilience levels of their households and so can represent “subjective resilience” [26]. In this present work, we combined both quantitative and qualitative methods for collecting data. Quantitatively, the household survey was carried out between September to December 2021 in the A Luoi district through a semi-structured questionnaire. To ensure representativeness, the formula of Slovin (1960) was used to calculate the sample size, as in Equation (1):

$$n = \frac{N}{(1 + N \cdot e^2)} \quad (1)$$

where n is the sample size, N is the total population, and e is margin of error. The margin of error is calculated from the confidence level; for example, a confidence level of 90 percent (giving a margin of error of 0.1) may be accurate enough.

According to the 2021 population data in the A Luoi district, the total number of households of the Pa Cô and Tà Ôi residing in the region were 5867 and 3506, respectively. Following Equation (1), it was required to have at least 98 participating households per ethnic group. However, to avoid missing data, this study interviewed 120 farmers from each ethnic group. After cleaning, the initial data excluded 3 households due to lack of information (2 Pa Cô households and 1 Tà Ôi household); however, we finally removed 1 more Tà Ôi household to ensure equal population. This was frequently encouraged in gender-related studies. Finally, a list of 236 households (118 Pa Cô and 118 Tà Ôi households) was used for further analysis. The interviews were conducted with the help of a local assistant and began with icebreaking questions to build trust and encourage participants to open up. The interviews took place primarily in the respondents’ homes and sometimes in paddy fields or forests, which provided the researchers with an opportunity to observe local livelihoods and daily life. The length of an interview ranged from 60 to

90 min. The questionnaire was divided into 7 parts, starting with demographic information and covering questions related to the 5 main sources of livelihood capital of households. The final section consisted of 3 open-ended questions about the household's livelihood difficulties, suggestions, and future wishes. All the answers were noted on the questionnaire sheets, while the local assistant tried to interpret responses as originally as possible.

In addition to the household surveys, qualitative data were collected through focus group discussions (FGDs), in-depth interviews with key informants, field observations, and notes. Four FGDs were conducted, two for each ethnic group, including one FGD with women only and one with both men and women. This is a mandatory requirement for gender research to raise the voice of the voiceless in the community, especially in the public atmosphere. In the discussions, tools related to mapping, seasonal calendars, and village history were used to obtain an overview of the socioeconomic culture in the study area. We also cleverly incorporated gender questions in the FGDs and in-depth interviews: for example, the difference in household work distribution between men and women, “who keeps the money”, and “who is regularly the representative of the household participates in village meetings”. Eleven in-depth interviews with district officials (2), commune extension staff (4), village heads (3), 1 representative of the women's union, and 2 village patriarchs were also carried out. In addition, observations were made during daily walks through the villages to better understand the political-economic, cultural, and social norms of each ethnic group. The collected data were coded, screened, and entered into Excel and Word sheets for analysis.

3.3. Measurement of the Household Livelihood Resilience

According to the HLR method, the overall resilience score of each household is calculated based on the scores of the five composite capital components, which are made up of 28 indicators, as shown in Table 1. This research adopted the balanced weighted method to calculate the HLR as suggested by previous works [9,12,41]. Basically, this method assumed that each indicator equally contributes to the resilience index despite each major component (capital) having an unequal number of indicators [41]. The detailed calculation method is explained in three main steps below.

First, all sub-components were normalized as the same unit from 0 to 1, because the scale for each variable (question) is different. There are two ways to normalize indicators [12]. On the one hand, the factors (indicators) with a positive relationship with households' resilience, such as higher education level, income diversification, and available access to public system, were normalized as Equation (2):

$$\text{Index}_h = \frac{S_h - S_{\min}}{S_{\max} - S_{\min}} \quad (2)$$

where Index_h is a normalized value of a sub-indicator for h household, S_h is the observed sub-component for h household, and S_{\max} and S_{\min} are the maximum and minimum values for total sampling data, respectively.

On the other hand, the indicators expected to have a negative relationship to resilience, such as distance to the nearest school or livestock values, were standardized by using Equation (3):

$$\text{Index}_h = \frac{S_{\max} - S_h}{S_{\max} - S_{\min}} \quad (3)$$

Second, each component score of capital was calculated by averaging the related indicators as Equation (4):

$$M_h = \frac{\sum_1^n \text{Index}_{shi}}{n} \quad (4)$$

where M_h is indicators for each capital of household h , Index_{shi} demonstrates the indicator indexed by i that made up each of the major indicators, and n is the number of indicators.

Finally, after normalization, the values of the different indices in each component were averaged to calculate the score for each of the five components. The HLR is then calculated by the weighted mean of the five components using Equation (5):

$$HRL_h = \frac{7xM_Fin_h + 6xM_Hum_h + 4xM_Soc_h + 6xM_Phy_h + 5xM_Nat_h}{28} \quad (5)$$

where HRL_h is the resilience index of household h , M_Fin_h , M_Hum_h , M_Soc_h , M_Phy_h , and M_Nat_h refer to the five livelihood capitals (major components) of household h : financial, human, physical, social, and natural, respectively.

Basically, a household with a higher HLR score means a higher resilience, and vice versa. In addition, to gain a better understanding of the nuanced differences in livelihood resilience of small-scale farmers, component scores of each capital and overall HLR index were specifically compared among ethnic groups (the Pa Cô and Tà Ôi), among gender sex (women and men), gender status (poor and non-poor), and especially among the intersectional lenses of these. Independent T-tests in the SPSS software were used to determine the significance and correlations among these variables.

4. Results

4.1. Livelihood Resilience and Ethnicity

In general, the overall HLR scores showed that the level of resilience of both ethnic groups is low, around 0.3 (below the average threshold of 0.5) (see Table 2). Although the overall index of the Tà Ôi is higher than that of the Pa Cô, it is not statistically significant. A spider diagram of the difference between the two ethnic groups is shown more clearly in Figure 3. On considering each source of livelihood capital, the results indicated that while the Tà Ôi people have a higher social capital index than the Pa Cô ($p = 0.050$), the Pa Cô has a higher score in terms of physical capital ($p = 0.001$). Regarding social capital, Tà Ôi people have higher results because of three main factors: a broader social network, participating more in agricultural cooperation, and diversifying information devices. On average, the Tà Ôi participates in 1.6 local organizations, while this figure for the Pa Cô is only 1.2. Similarly, it was found that 4 out of 118 Tà Ôi households participate in agricultural cooperatives, whereas there are not any Pa Cô households in commune-level cooperatives. However, this rate is too low and alarming. Finally, the Tà Ôi people reported that they use more devices to collect weather information than Pa Cô households, with 2.9 sources compared to 2.6, respectively.

Table 2. Average and overall scores of livelihood capital among ethnicity.

Groups	Financial	Human	Social	Physical	Natural	Overall
Tà Ôi ($n = 118$)	0.176	0.358	0.314	0.399	0.429	0.328
Pa Cô ($n = 118$)	0.155	0.325	0.288	0.427	0.411	0.314
p -value	0.326	0.431	0.050 **	0.001 ***	0.14	0.287

, * denote statistically significant differences (T-test) at the 5%, and 1% levels, respectively.

Regarding physical capital, the Pa Cô people reported that they have more arable land, especially forest land. The results show that, on average, a Pa Cô household owns 933.72 m² of agricultural land and 8866 m² of forestry land. This figure for a Tà Ôi family is 831.2 m² and 4156 m², respectively. Another factor influencing this result is how the accessibility to public services such as schools and main roads is better for Pa Cô households than Tà Ôi households. This is, to some degree, linked with their customs. While the Pa Cô gradually migrated down to the central areas of the district, the Tà Ôi continued to live scattered in the remote canyon areas. An older woman said that “this is the ancestral land, we stay here to preserve it”. Attention to such matters will be discussed in more detail in the next section.

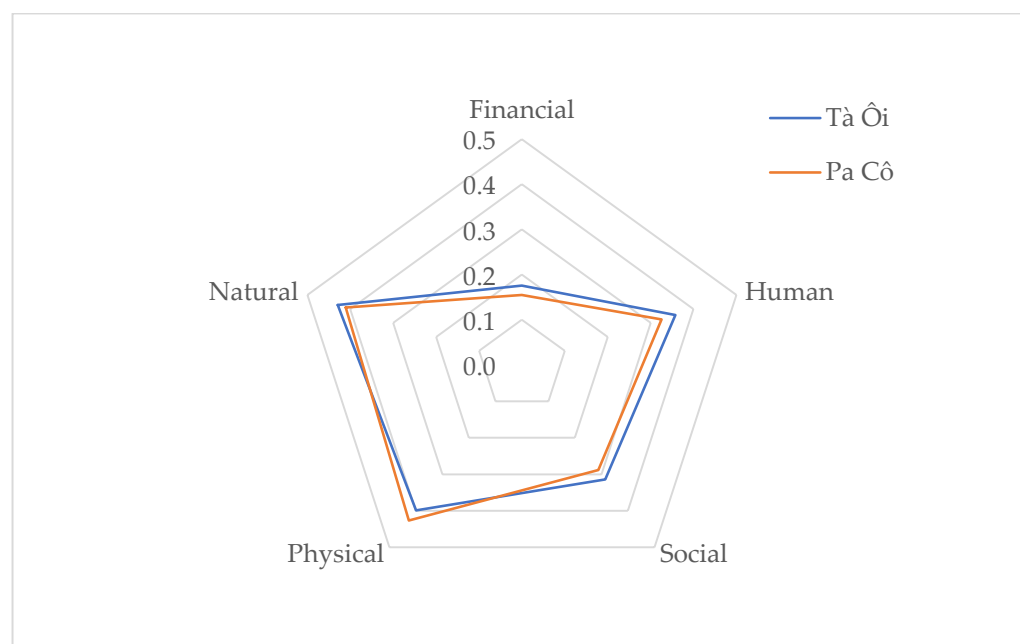


Figure 3. Ethnicity and livelihood capital scores.

4.2. Livelihood Resilience and Gender

As analyzed above, gender is complex and at the crossroads of many socioeconomic and cultural factors. In this study, two factors of sex (male and female head of household) and socioeconomic status (poor and non-poor) will be compared in terms of resilience.

Table 3 shows the difference in overall HLR and each source of livelihood capital between male and female heads of household. Although not statistically significant, men have a higher overall score than women, because all five capital components are higher. This implies that men are more resilient to changing weather and environmental conditions than female heads of households. When comparing the sources of livelihood capital between men and women, the largest difference is found in human capital, with a difference of 0.04 units (Figure 4), albeit not statistically significant. The differences in the remaining four sources of capital are minor, with disparities of less than 0.03 units. The interviewers reported that “in village meetings and training courses, the participants are mainly men, because they are the breadwinner of the family, they represent the family to decide everything”. Meanwhile, women reported that “if we participate, we just sit, and have no opinions”, “men often speak and give opinions among the villagers”, and “we are shy”.

Table 3. Average and overall scores of livelihood capital among sex.

Groups	Financial	Human	Social	Physical	Natural	Overall
Women ($n = 89$)	0.161	0.314	0.283	0.405	0.407	0.307
Men ($n = 147$)	0.163	0.350	0.306	0.424	0.423	0.326
p -value	0.925	0.154	0.162	0.303	0.248	0.119

Table 4 describes the difference between the poor and the well-off households in each source of livelihood capital and the overall HLR score. Not surprisingly, the overall score of the poor group is notably and statistically significantly lower than that of the better-off group ($p = 0.00$). This is easily explained because the scores of all five components of the poor group are lower than that of the non-poor group. Figure 5 clearly visualizes this difference.

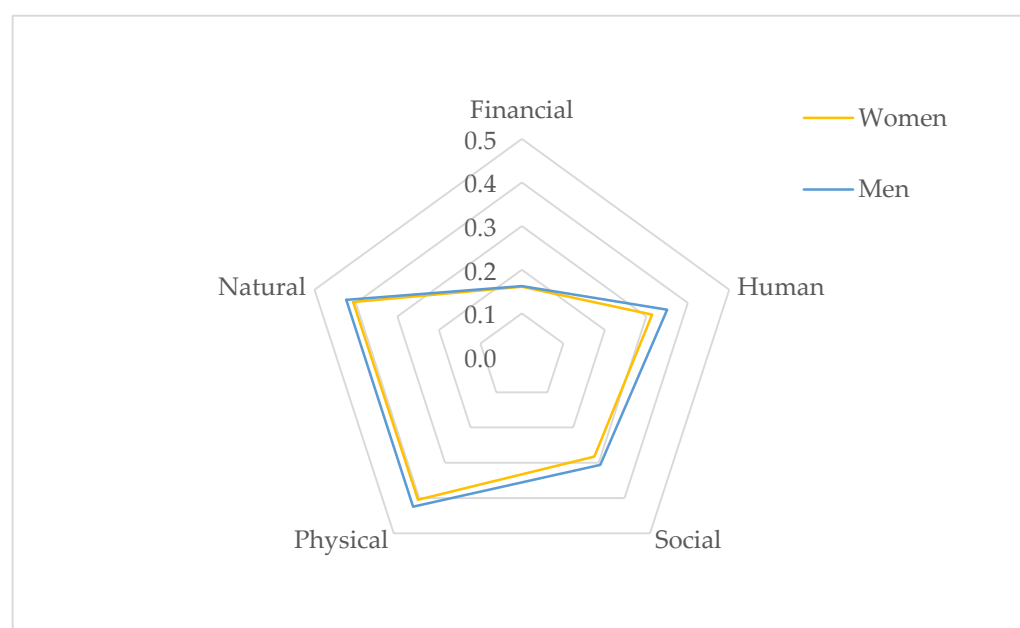


Figure 4. Sex and livelihood capital scores.

Table 4. Average and overall scores of livelihood capital among socioeconomic status.

Groups	Financial	Human	Social	Physical	Natural	Overall
Poor ($n = 70$)	0.1086	0.2429	0.2810	0.3773	0.4167	0.2746
Non-poor ($n = 166$)	0.1845	0.3763	0.3038	0.4338	0.4174	0.3376
p -value	0.000 ***	0.000 ***	0.202	0.005 ***	0.968	0.000 ***

*** denotes statistically significant difference (T-test) at the 1% levels, respectively.

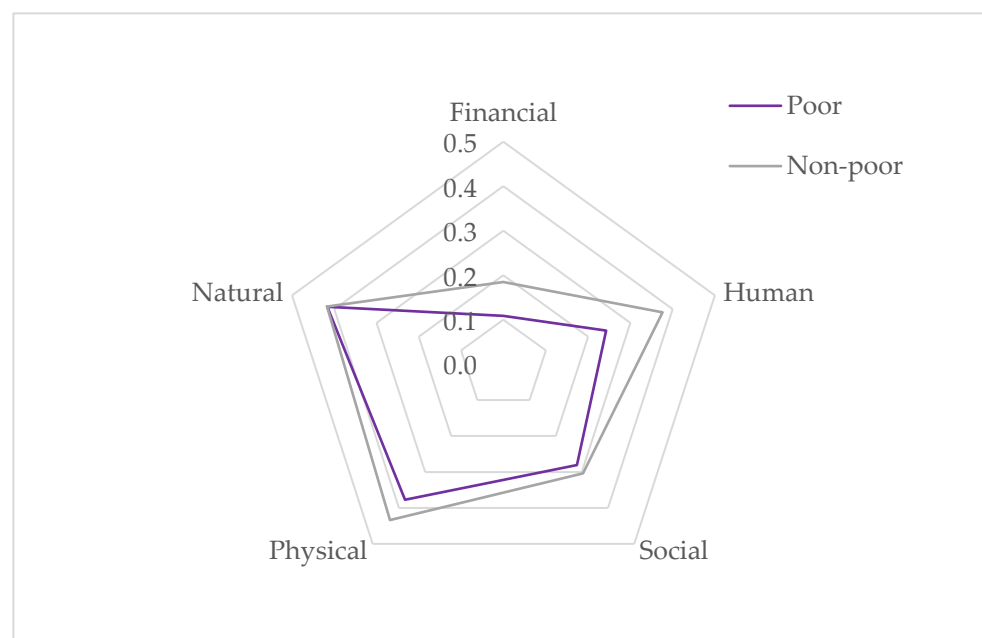


Figure 5. Socioeconomic status and livelihood capital scores.

In terms of financial capital, the better-off households score 0.08 units higher than the poor (statistically significant at 1%). The analysis results show that livelihood diversification and off-farm incomes are the two main factors affecting this difference. While the poor mainly rely on agricultural cultivation and non-timber forest product activities, the well-off

farmers diversify their incomes with livestock, wage employment, and small businesses. In terms of human capital, the average score of the well-off household outperformed the poor: 0.37 versus 0.24, a difference of 0.13 points. The better-off farmers report that they regularly participate in capacity-building courses and extension programs. The education level of non-poor households is also higher than that of poor households.

While there is no statistically significant difference between social and natural capitals, the well-off group has a much higher physical capital index than the poor group, 0.43 and 0.37, respectively. Good access to the public system and better housing conditions are the main reasons for this difference. Indeed, most of the better-off farmers live in the central area, close to the main road, which is also the reason why they can manage small businesses. The well-off households also have better housing conditions, with 45.6% reporting staying in permanent houses with concrete materials. Meanwhile, this figure is only 23.4% for poor households. Most poor households still live in semi-permanent houses made of bamboo materials, which are easily destroyed by weather events.

4.3. Intersectionality of Ethnicity and Gender

The intersectionality of gender and ethnicity varied among the scores of five household livelihood capitals and overall HLR scores (Table 5). In terms of overall resilience scores, the results showed that male leads in both ethnic groups are higher than female heads of households, although the difference is not statistically significant. The T-test results also indicated that there is a statistical difference between men and women of the Tà Ôi group in terms of physical capital, and between men and women of the Pa Cô group in terms of human capital. In the former, the results revealed that Tà Ôi men have a higher capital than women regarding physical assets, 0.407 and 0.351, respectively (Figure 6). In the latter, a male Pa Cô is 0.06 points higher than a female Pa Cô in relation to human capital. Some of the field-based evidence and specific arguments on these issues will be discussed in detail in the next section.

Table 5. Average and overall scores of livelihood capital between sex and ethnicity.

Groups		Financial	Human	Social	Physical	Natural	Overall
Tà Ôi (n = 118)	Women (n = 41)	0.162	0.319	0.309	0.351	0.410	0.301
	Men (n = 77)	0.151	0.331	0.315	0.407	0.437	0.319
	<i>p</i> -value	0.568	0.743	0.777	0.020 **	0.19	0.282
Pa Cô (n = 118)	Women (n = 48)	0.161	0.310	0.261	0.451	0.404	0.313
	Men (n = 70)	0.175	0.371	0.295	0.444	0.409	0.334
	<i>p</i> -value	0.539	0.081 *	0.146	0.807	0.822	0.225

*, ** denote statistically significant differences (T-test) at the 10% and 5% levels, respectively.

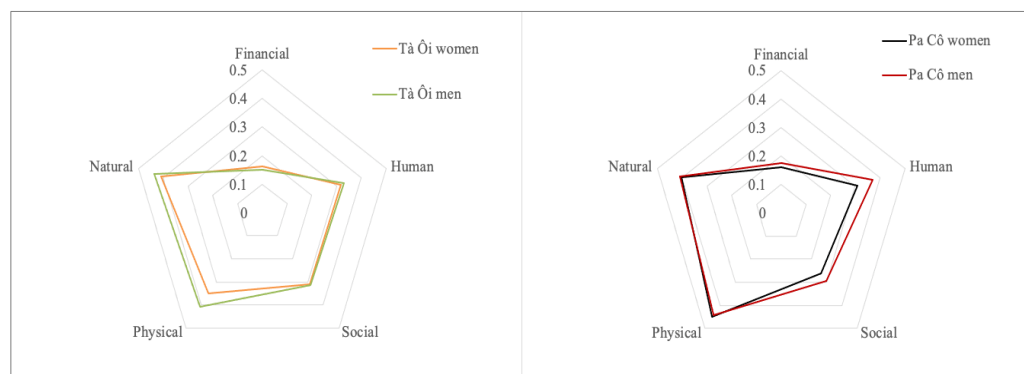


Figure 6. The difference in livelihood capital scores among sex and ethnicity.

Table 6 indicates the intersectionality of socioeconomic status and ethnicity in relation to overall scores and average scores of livelihood capitals. There is no doubt that the overall HLR scores of the better-off are higher than those of the poor in both ethnic groups

(statistically significant at 5%). Specifically, Tà Ôi wealthy households have 0.328 points, higher than Tà Ôi poor households (0.279). Similarly, the affluent Pa Cô households have a total score of 0.07 points higher than the poor Pa Cô farmers. These results imply that poor ethnic households in upland areas are less resilient than others to climate change. Attention to such issues in disaster reduction programs at the community and national levels will be a priority.

Table 6. Average and overall scores of livelihood capital between socioeconomic status and ethnicity.

Groups		Financial	Human	Social	Physical	Natural	Overall
Tà Ôi (<i>n</i> = 118)	Poor (<i>n</i> = 36)	0.107	0.257	0.311	0.362	0.423	0.279
	Non-poor (<i>n</i> = 82)	0.176	0.358	0.314	0.399	0.429	0.328
	<i>p</i> -value	0.000 ***	0.008 ***	0.897	0.136	0.772	0.004 ***
Pa Cô (<i>n</i> = 118)	Poor (<i>n</i> = 34)	0.110	0.228	0.249	0.394	0.410	0.270
	Non-poor (<i>n</i> = 84)	0.193	0.394	0.294	0.468	0.406	0.348
	<i>p</i> -value	0.001 ***	0.000 ***	0.090 *	0.015 **	0.834	0.000 ***

*, **, *** denote statistically significant differences (T-test) at the 10%, 5%, and 1% levels, respectively.

The analysis results showed that without natural capital, the remaining four capitals have a statistical difference between poor and non-poor households in the same ethnic group. Specifically, the better-off groups in both ethnic groups have higher scores of financial and human capitals than the poor group (all at a 1% significance level). Regarding social capital, there is no difference between poor and non-poor in the Tà Ôi ethnic group. Both have almost the same index (around 0.31 points). By contrast, the non-poor Pa Cô have a better social network than the poor ($p = 0.09$). Figure 7 illustrates in detail this difference. Similarly, while no difference in economic status was found in the Tà Ôi group, the results confirmed that the well-off Pa Cô have a significantly higher physical-asset index than the poor Pa Cô group (with a level of significance of 5%).

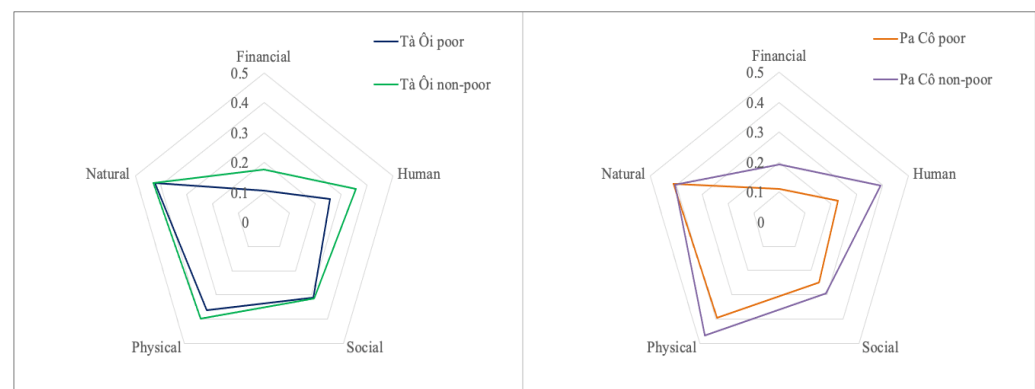


Figure 7. The difference in livelihood capital scores among socioeconomic status and ethnicity.

5. Discussion and Implications

“How to gauge the resilience of a household’s livelihood?” and “who is resilience for?”; as the world’s uncertainty increases (e.g., changes in climate and crises), interest in these issues continues to grow. While many previous conventional attempts to measure resilience at the household level have largely employed the “objective” top-down framework relying mostly on a macro observed socioeconomic dataset, this present work seeks to measure through an alternative bottom-up method, called the “subjective” resilience approach as initiated by [26]. With specific reference to the context of two small-scale farming ethnic Pa Cô and Tà Ôi minorities living in upland areas of Central Vietnam, the current work provided an intersectional lens of ethnicity and gender in relation to the household’s resilience. Our findings indicated that there are differences in observed livelihood resilience among the ethnic minority groups and, within that, between gender factors. In this section,

three extended discussions can be drawn from the earlier overall findings, which may serve as implications for the resilience capacity-building programs and disaster reduction policies at community and meso levels in Vietnam as well as developing countries.

First, we argue that there are differences in livelihood resilience between different ethnic groups, even though they share the same geographical environment and are equally affected by CC impacts. In this study, Tà Ôi people have a higher recovery index than Pa Cô people, although not statistically significant. It implies that the resilience of the Tà Ôi people to weather changes for their livelihood is better than that of the Pa Cô. The results also indicated that the Tà Ôi people have higher social capital, while the Pa Cô farmers have higher physical assets. This supports the conclusion of Thanh et al. (2021) and Phuong et al. (2023) that the ability to adapt to environmental change depends mainly on cultural and social factors, rather than on variables related to geographical location [6,16]. Similarly, Mullins et al. (2013) found that there are three different levels of resilience to floods, and all have opposed interaction with different ethnic groups [42]. The disparities may connect to the livelihood activities of different social groups. Each community has formed its livelihood options according to cultural practices and the socioeconomic context [43]. In this research, the Tà Ôi group lives in familial clusters in remote areas with less agricultural land and scattered distribution of cultivated areas, so growing maize and upland rice is their priority. In contrast, the Pa Cô people live in a lower area, and they have easy access to roads and schools, so in addition to farming, managing small businesses and participating in community tourism projects [44] becomes a supplementary livelihood for them. Therefore, all ethnic communities and social groups should not be equated in the same development program because they will have different vulnerabilities [6,16] and different livelihood strategies [14,37,45], leading to different resilience. Instead, if development programs are designed to build resilience to CC and reduce disaster risk, specifically targeting ethnic groups, it is important to understand their sociocultural context and customs first; then, there are specific priorities and resource allocations for each target group, and each ethnic minority.

Second, our findings revealed that, as hypothesized, better livelihood resilience was reported by men in both ethnic groups, especially in human and physical assets. This is, to some degree, connected to patriarchal traditions and social norms about perceived roles, rights, and responsibilities between men and women within a family and in front of the community, leading to gender-different opportunities. Men are often seen as “trụ cột của gia đình” (means “the breadwinner of the family” in English), so they often take on “important” jobs in the family, such as those of hired laborers and builders. Men also represent households in making decisions at household and community levels, for example, by taking part in training and extension courses, so unsurprisingly, men’s human capital is often higher than that of females. In contrast, women often take on “extra” roles, such as collecting firewood and raising livestock, and “family-centered” jobs, such as washing clothes, taking care of children, and preparing food for all members. They also reported that women rarely attend training courses or village meetings; if they do (when their husbands are too busy), “we just sit at the back, and listen”. These findings support previous arguments regarding gender inequality. For example, Zeleke et al. (2023) indicated that while Ethiopian upland women perform up to 75% of farm labor and represent 70% of households’ food production, they are more vulnerable to extreme climate events than men because of remaining sociocultural thoughts that prevented women’s access to public services [8]. In turn, Klasen et al. (2015), using a dataset of over 4000 rural farmers from Thailand and Vietnam, revealed that there is “strong evidence of heterogeneity among subgroups of female-headed households” [46]. More particularly, in comparison with male heads, women are more likely to be prone to more climate risks. In addition, Vietnamese female-led households are more vulnerable to poverty.

Notably, due to the gender-different division of labor, access to public resources is also dissimilar. For example, women usually only perform housework and work in agricultural areas, thus having limited access to schools and roads. Meanwhile, men often have to go

out of the village, and thus their chances of accessing social welfare are higher. In fact, 66.7% of men reported having a health insurance card, while that of women was only two-thirds. However, these figures are very low compared to the national average in 2021 (91.1%) [47]. We add that one of the reasons for lower human capital in women than in men is the education level factor. The results show that the proportion of men graduating from high school or higher is 34.5%, while this figure for women is only 13.3%, especially low in the Tà Ôi women. These issues are again related to social conceptions and masculinity ideas in ethnic minority societies in Vietnam. This is similar to the findings of Thanh et al. (2022), who discovered that the ethnic Dao and Hmong women believe “Getting married, having children, taking care of our children and doing domestic chores are the main priorities [9]. If we take education, it is likely to constrain us from finding love and getting married”. A wide range of the current literature, especially in rural third countries such as Ethiopia [8], Kenya [48], Thailand [18], as well as Vietnam [9], are of the same opinion that men generally achieve higher qualification levels of education than women. Therefore, rural development policies and resilience capacity-building programs at the community level should target the most disadvantaged groups in society, especially ethnic women in the uplands. Gender issues and social-cultural norms should be considered and gradually integrated into these plans. Further, raising awareness and knowledge for ethnic women through free literacy courses and training programs for each level, age, and group are activities that need to be prioritized to improve their human capital in resilience efforts. Of course, they should keep in mind that ethnic minorities have their own language and identity, so a middleman or a mediator between the community and outside facilitators (e.g., experts, NGOs) will be needed. As suggested by Chuong et al. (2023), the village head will be the intermediary in this case. The village women’s union president is also an optimal choice.

Further, we emphasized that gender inequalities could limit the resilience of farming upland households, especially in the face of adverse effects of CC. This strongly supports the viewpoints of Thanh et al. (2022). Ethnic women in this case study usually have fewer and different roles in social-political influence (such as in hamlet meetings), and limited access to public systems (such as roads and health) [49]. Therefore, their perceptions, needs, and attitudes may not be the same as those of men in building resilience for household livelihoods. In this regard, to address these persistent gender gaps, local policymakers, planners, and even scientists should attend to the two following aspects: (1) enhance the confidence and role of women in the community through the establishment of female-led small credit groups, or in association with the Red Cross and Women’s Unions at the commune level to propagate gender equality and promote ethnic girls going to school/college and working in cities; these would be specific suggestions in this case. (2) Scientific research projects (related or not gender issues) and rural development programs should incorporate gender equality issues and gender-sensitive approaches from the outset. This is to mobilize the participation of disadvantaged groups and promote their voices in the small groups first and then gradually expand to the whole community.

Third, we affirmed that there are gender disparities related to socioeconomic status. Specifically, the most resilient group is that of better-off farmers, followed by higher scores of financial and human assets, implying high-income, better-educated farmers. In contrast, the worst off are the poor farmers, who show dramatically low levels of income and access to basic services, especially the Pa Cô people. These findings support a range of previous studies. For example, [48] suggested that those with less livelihood diversity and less land ownership will be less resilient than the rest. Similarly, a series of studies (e.g., [5,6,45,50–52]) highlights the relationship between poverty and vulnerability and livelihood resilience to climate-related events. What these studies have in common is that CC pushes the poor into a vicious cycle of poverty traps, and consequently, poverty reduces adaptative capacity and resilience to disasters. Thus, we argued that local authorities and policymakers should pay considerable attention to poverty alleviation for upland farmers. Poverty alleviation through diversifying income sources, especially off-farm earnings and a combination of native and new high-yield varieties, is absolutely necessary. To achieve this,

local agriculture extension officials need to better understand the community's customs and environment and play the role of mentors, thereby outlining suitable approaches and programs within their boundaries [3,12,45]. In addition, Tran et al. (2021) suggested that livelihood diversification can be achieved through the encouragement of value-added industries such as handicrafts, small businesses, and state-supported job programs [16]. Diversifying local crop types into high-value crops (such as horticulture and coffee) as an adaptation option for water scarcity and to improve household income is proposed in many cases around the world [53–55]. Many studies (e.g., [6,9]) indicated that interest-free or low-interest credit programs for women's union members or the poor should be applied to increase the opportunity to access capital of these target groups. This leads to an increase in the ability to adapt to disaster risks, ultimately increasing the resilience of households.

In short, both changes and levels of resilience are intersectionally linked with levels of on-the-ground social inequality, gender division in labor in the family, roles and rights, unequal access to resources, poverty, limited access to infrastructure, lack of financial resources, inadequate plans of social welfare, and risk management. The disparity in these factors turns climate variability into a disproportionate concentration of suffering and loss. Therefore, as long as we understand that intersection systematically and apply it to practical policies, then equality and social justice can exist. To close this discussion, we borrow the argument of [10], which is also our call to action, who argues that “the resilience concept requires greater attention to human livelihoods if it is to address the limits to adaptation strategies and the development needs of the planet's poorest and most vulnerable people” [10].

6. Conclusions

In contrast to previous traditional studies, which used macroeconomic datasets to predict the livelihood resilience of communities and social groups to stressors, this study applied the alternative method: what [26] call “subjective household livelihood resilience” based on household heads' self-assessments. Specifically, using the context of two mountainous ethnic minority communities in the A Luoi district, central Vietnam, we assessed household resilience by scoring five livelihood capitals, then considered differences in resilience levels across ethnic groups and gender variables.

This study revealed that there is a difference in the degree of livelihood resilience to climate variability between ethnic groups and among gender groups. In our case, the Pa Cô ethnic group had a lower resilience score than the Tà Ôi communities; however, both groups had a low index of resilience (less than 0.5). We believe that three factors contribute to improving the ability of livelihood recovery, including financial capital (off-farm income, livelihood diversification), human capital (higher education levels of the family members and farmers' perception of climate shocks), and capital assets (access to government public resources such as electricity, schools, health systems). If future efforts are aimed at building livelihood resilience for disadvantaged groups, then (1) poverty alleviation through diversification of livelihoods; (2) raising awareness for households through tailor-made training programs; and (3) improving the infrastructure system will be the main focus and priority.

Further, to answer the question of “who is resilience for?”, in this study, our findings determined that the poor group of households and the female group of households of both the Pa Cô and Tà Ôi ethnic groups are considered to have the lowest resilience to climate change, compared with other groups. Therefore, paying attention to these two groups and integrating their cultural and social norms will be priorities in the design and allocation of resources in rural development plans and building-resilience programs, which are to be targeted at the most disadvantaged.

Finally, this study has its own limitations. First, this study mainly focuses on the two target groups, Tà Ôi and Pa Cô; therefore, it unintentionally omits the remaining ethnic groups, such as the Vân Kiều and others. Second, this study lacks a simultaneous meta-analysis of three aspects in terms of gender, ethnicity, and economic status of the household,

partly due to the small sample size. Therefore, future studies should pay attention to limiting these shortcomings.

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