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Reframing Climate Change Resilience: An Intersectional Perspective of Ethnicity and Gender from Vietnam

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Abstract: This study breaks away from traditional macroeconomic-data-based research that often overlooks the subjective experiences of communities and social groups in assessing their resilience to external stressors. Instead, we conducted a nuanced analysis of self-assessments provided by 364 household heads in the Nam Dong District, Thua Thien Hue Province, Vietnam, to gain a comprehensive understanding of household resilience. Our investigation focused on two upland communities—the Kinh majority and Co Tu ethnic minority households—evaluating their resilience levels in terms of the five livelihood capitals and identifying significant disparities among different ethnic and gender groups. Our findings reveal notable differences in livelihood resilience to climate change and variability among these groups, particularly for women, the poor, and ethnic minorities who exhibit lower resilience levels. This underscores the need for policies and programs designed to improve resilience capacity while taking into account these groups' cultural and social norms. We suggest focusing on improving financial, human, and social capitals to increase households' resilience to external shocks. Specifically, building resilience for disadvantaged groups must go hand in hand with promoting their overall well-being and alleviating poverty. Additionally, we recommend tailored training programs to raise awareness among households and strengthening institutional systems to enhance overall resilience.

Keywords: climate change and variability; intersectional perspective; livelihood resilience; Vietnam

1. Introduction

Climate change is an undeniable reality, causing significant impacts across the globe. Human activities have exacerbated the situation, resulting in observed changes in weather events and extreme climate phenomena. The global sea level has risen by an average of 3.7 mm per year over the past decade, which is twice the rate of sea level rise in the 20th century [1]. The concentration of carbon dioxide in the earth's atmosphere has risen to its highest level in at least 3 million years, as a result of human activities, such as burning fossil fuels and deforestation [2].

Climate change is leading to changes in the timing and distribution of rainfall, resulting in more frequent and severe droughts in some areas and more intense rainfall in others. For example, Asia and Africa face an increased likelihood of droughts, while monsoon regions in Southeast Asia are expected to experience more floods and heavy rains [3]. These catastrophic weather events have dire consequences for the livelihoods of millions, particularly for those living in remote mountainous regions who rely on agriculture. Research on the impact of climate change and variability on community livelihoods has increased in recent years, with a focus on assessing the vulnerability of agricultural communities and risk-prone areas [4–6]. However, there remains a significant lack of integration of status, ethnicity, and gender aspects in the resilience literature, although recent efforts have

been made to address this gap [7,8]. There is also a need to expand research on household livelihood resilience, an area that has received limited attention to date. With the impact of climate change becoming more apparent, it is crucial to study its effects on community livelihoods at multiple levels and to identify ways to improve resilience.

Resilience is a concept that has gained widespread use among international humanitarian agencies, policymakers, and development practitioners as a framework for sustainable development [9]. It is often employed in response to the perception that various shocks, including those related to climate change, present significant challenges to development efforts [10,11]. While gender issues and ethnic minority groups have been examined in several climate studies, ethnicity has often overshadowed gender analysis [4,12–14]. Furthermore, most studies have focused solely on women rather than exploring gender dynamics more broadly, even though gender is a complex concept that intersects with other factors, such as socioeconomic status, ethnicity, geographic location, and disability, among others [15]. This concept of intersectionality is crucial to understanding resilience, as climate shocks become increasingly unpredictable and communities face new challenges.

Recent studies suggest that the socioeconomic disparities between social groups are likely to widen due to the impacts of climate change [16,17]. As a result, it is essential to understand the factors that contribute to these inequalities. Gender, in particular, should not be viewed simply as a binary variable, but as a dynamic social entity that intersects with a range of factors, including rights, roles, identities, and responsibilities [18]. Without a comprehensive cross-sectional analysis of gender and ethnicity in climate resilience, disproportionate impacts will persist, hindering progress towards achieving sustainable development goals related to gender equality and community development [17]. The present investigation aims to scrutinize the variations in the resilience of livelihoods, based on distinct categories, such as economic status (poor and well-off households), sex (men and women), and ethnicity (Kinh majority and Co Tu minority groups), within two highland communities located in the Nam Dong District of the Thua Thien Hue Province in Central Vietnam. The study aims to contribute to the evolving understanding of climate resilience by exploring the intersectionality of these factors. By doing so, the study provides two noteworthy contributions: theoretically, it expands the existing literature on climate resilience with regard to gender and ethnicity, and practically, it proposes policy recommendations for development practitioners, planners, and humanitarian agencies to implement more equitable and sustainable interventions for disaster reduction and resilience-building programs.

2. Theory Background

2.1. Understanding the Concept of Resilience

Resilience is a term used across various fields, such as art, literature, psychology, and engineering [9]. In ecological sciences, resilience refers to the ability of a system to maintain its core functions while absorbing changes [11]. In contrast, social or livelihood resilience refers to the capacity of individuals and communities to prepare for and withstand shocks and stresses resulting from various hazards [19]. Recent conceptualizations have challenged the traditional framing of resilience by recognizing the potential need for systems to adapt and transform. Thus, the components that constitute resilience depend on the context, threat(s), and unit of analysis [9]. This evolution in the definition and conceptualization of resilience has made it challenging to agree on what constitutes a resilient human system, leading to confusion and conceptual ambiguity.

Despite these challenges, resilience is increasingly being used in development and humanitarian communities to guide their activities and create interdisciplinary connections [9]. With growing international commitments and programs dedicated to resilience building, measuring impact and tracking resilience on the ground is necessary. However, practical application and lack of consensus on its definition create confusion, particularly when designing measurement tools [9,20]. Efforts are underway to determine the most effective methods of measuring resilience. Basically, household livelihood resilience refers

to the ability of a household to cope with and recover from stressors, shocks, and changes in their environment. These include natural disasters, economic downturns, or changes in the availability of natural resources. To assess household livelihood resilience, researchers and policymakers examine various factors that contribute to a household's ability to recover from adverse events, such as their access to financial resources, human capital, social networks, and physical assets [21]. Understanding these factors can help identify vulnerabilities and strengths of households and communities and develop strategies to promote resilience to future shocks and stressors.

2.2. Household Livelihood "Subjective" Resilience

Resilience is a frequently discussed concept in contemporary social sciences and environmental discourse, yet it has been criticized for neglecting social differences and tensions between normative and analytical approaches [22]. In response, Tanner et al. (2015) proposed the Household Livelihood Subjective Resilience (HLSR) framework, which emphasizes the capacity of all individuals to sustain and improve their livelihoods despite disturbances [9]. This framework highlights the roles of humanitarian agencies, individuals, and communities in terms of their rights, capacities, and preparedness for and response to stressors. Resilience-building efforts and interventions should consider "who is resilience for?" from the outset of any program [8,9]. Traditionally, resilience has been measured using an "objective" framework based on macro socioeconomic datasets. However, this study adopts the "subjective" resilience approach suggested by Tanner et al. (2015), which acknowledges that individuals and families are aware of their own ability to cope with change [23]. The study employs households' self-assessments to quantify five livelihood capitals that support HLSR as a "bottom–up" approach [7]. It is important to note, however, that some subjective inquiries that require recalling factual information may not always be accurate.

This study rigorously applied the HLSR framework, which has gained increasing relevance for resilience-building programs and research in middle- and low-income countries. Specifically, the study utilizes Jones and Tanner's (2015) quantified HLSR framework, which has been widely adopted and adapted by others with minor modifications [7,8], to investigate HLSR among different social groups (ethnicity) and at the intersection of gender and economic status. To develop the indicators for this study, we initially reviewed the literature and created a list of 27 indicators. However, after conducting pilot trips and consulting with local agricultural officers and commune heads, as suggested by [4], we modified the list to better fit the local context. For example, to better capture the diverse uses of land in the study area, we separated the "farm size" variables into specific "agricultural" and "forest" land, as it is not possible to equate the use value of 1 hectare of rice land with 1 hectare of forestry land, as [8] suggested. Additionally, we considered the local customs and practices of the ethnic minority farmers, who made up half of our interviewees, and eliminated or softened some indicators that were too sensitive (e.g., customary-related indicators in social capital) but are still important for assessing climate change resilience. Ultimately, we used a list of 25 subindicators, which were categorized into five capitals contributing to the resilience of the surveyed households (Table 1). Prior to the survey, we pretested the questionnaire by interviewing five randomly selected households from each group to evaluate its clarity and identify potential issues. Based on the pretest results, we made necessary adjustments to finalize the questionnaire.

In this study, the financial capital was built from the five subindices of household income sources, salaried jobs, bank savings, economic status, and annual income of the household, as previous studies recommend [2–4]. It should be noted that the classification of poor households, as suggested by [14], was based on Decision No. 59/2015/QĐ-TTg dated 19 November 2015 by the Ministry of Labour, Invalids, and Social Affairs and utilized by the Commune People's Committee.

Table 1. Twenty-five indicators and five livelihood capitals for household resilience calculation.

Livelihood Capitals	Indicators	Measurement	Explanation
1. Financial	1.1. Income sources	Numeric	Total number of sources of income
	1.2. Salaried job	Dummy (0 = no; 1 = yes)	Having at least one income source from salaried job
	1.3. Bank savings	Dummy (0 = no; 1 = yes)	Having savings in the bank
	1.4. Economic status	Dummy (0 = no; 1 = yes)	Is your family a poor household?
	1.5. Annual income	Million VND	Total annual income of the household
2. Human	2.1. Human resources	Numeric	Total number of labor members aged 15–60 years old
	2.2. Higher education	Dummy (0 = no; 1 = yes)	At least one family member has completed higher education at a university or college
	2.3. Knowledge	Dummy (0 = no; 1 = yes)	Household head having knowledge of the local warning system
	2.4. Training course	Dummy (0 = no; 1 = yes)	At least one family member has attended a disaster prevention training course
	2.5. Drill course	Dummy (0 = no; 1 = yes)	At least one family member has taken part in at least one disaster risk prevention drill
	2.6. Food reserves	Dummy (0 = no; 1 = yes)	Having food reserves during natural disasters
3. Social	3.1. Agriculture cooperation	Dummy (0 = no; 1 = yes)	Member of an agriculture cooperation
	3.2. CSOs	Numeric	Total number of CSOs for all household members
	3.3. Residence period	Numeric (years)	Total time of residence
	3.4. Media sources	Numeric	Number of different media sources that household accesses for climate-related information
	3.5. Social platforms	Numeric	Number of social media platforms used by the household to access climate-related information
4. Physical	4.1. Residential land	Numeric (m^2)	Total of residential land
	4.2. Housing	Dummy (0 = no; 1 = yes)	Having a concrete house
	4.3. Land ownership	Dummy (0 = no; 1 = yes)	Having a certificate of land use right
	4.4. Water	Dummy (0 = no; 1 = yes)	Households are using the public water system
	4.5. Electricity	Dummy (0 = no; 1 = yes)	Households are using the public electricity
5. Natural	5.1. Agricultural land	M^2	Total of agricultural land
	5.2. Forest land	Hectare	Total of forest land
	5.3. Crop diversification	Numeric	Total number of crop varieties planted
	5.4. Two crops of rice	Dummy (0 = no; 1 = yes)	Can grow 2 crops of rice

Human capital is a vital factor in enhancing the resilience of households [24]. While the number of workers, education level of the household head, and food storage for the disaster season have been identified as important factors by scholars [7,8,25], this study emphasizes the crucial role of climate change knowledge and awareness of adaptation and disaster risk reduction. Participating in training courses on disaster risk reduction has been widely acknowledged by experts as an effective means of equipping households with useful skills to manage risks and respond to emergencies [8]. However, theoretical training alone may not yield optimal results. It is equally important to engage in drill courses and mock rehearsals to provide valuable opportunities for households to apply their knowledge and practice their response strategies in simulated disaster scenarios. To gather data on the effectiveness of such training programs, this study includes questions on the number of participants in training courses and the number of participants in real-life drill exercises among the respondents.

The study identifies five subindices that comprise social capital, as previously suggested [7–9]; participation in agricultural cooperatives; number of civil society organizations (CSOs) involved in households; duration of stay in the locality; and the number of media and social networks used to access weather and climate information. Agricultural cooperatives are separated from other CSOs due to their distinctiveness in structure and legitimacy, resembling joint-stock companies with a formal process for becoming a shareholder [26]. Joining an agricultural cooperative has many benefits, including access to facilities, funds, credits, consulting services, and support in production, business, and livelihoods [27]. In contrast, CSOs tend to have an informal structure, resembling clubs with shared interests, such as local small-credit groups. While CSOs also contribute to climate change adaptation and recovery, they do not provide the same level of legitimacy as agricultural cooperatives, and previous research (e.g., refs. [4,8,28]) has distinguished between members of agricultural cooperatives and members of CSOs due to these differences in structure and benefits. Thus, examining both formal and informal local networks to which local people belong will provide a more comprehensive view of their social networks, leading to a better understanding of their resilience to climate change.

Previous research (e.g., refs. [4,7,8,12]) and a pretesting questionnaire suggest that physical capital consists of five components: household residential land, housing status, land ownership, access to water, and use of public electricity systems. Physical capital is a critical component of climate change resilience at the household level, as it supports the development of sustainable and adaptive practices and helps households withstand and recover from the impacts of climate change [7]. However, the effectiveness of physical capital in building resilience also depends on other factors, including social capital, institutional support, and financial resources [10].

Finally, natural capital comprises four subfactors: total agricultural land, forestry land, crop diversification, and number of rice crops. The first three subfactors have been identified by various authors [7,8,12], while the inclusion of the number of rice crops is based on the latest work of Phuong et al. [8]. The number of rice crops is considered a component of natural capital because it reflects the efficient use of agricultural land, which is essential for ensuring food security, generating income, and sustaining the natural environment. These components are critical for enhancing the adaptive capacity of households and communities in the context of climate change resilience, as they contribute to the natural capital of a household.

2.3. An Intersectional Viewpoint of Gender and Ethnicity

The global climate system's rapid changes have posed new challenges to marginalized groups' empowerment and gender equality. Women, ethnic groups, and the poor are particularly vulnerable to the impacts of climate change. Despite progress, gender-related inequalities persist in many developing countries, with women making up 70% of the 1.3 billion people living in poverty [29]. In Vietnam, women in the south are more vulnerable to climate change impacts than men [30]. Climate change's consequences often exacerbate poverty and further marginalize vulnerable communities, leading to an endless poverty trap [4,5]. However, there is little reliable evidence or field-based research to support gender-sensitive approaches, including ethnicity, sex, and economic status, in agricultural practices to respond to climate change, despite the importance of considering these factors in the success of development programs and interventions.

Gender is a multifaceted and dynamic construct encompassing cultural, social, and psychological aspects [17]. In this study, we conceptualize gender as the intersection of sex (male and female) and household economic status (better-off and poor households) [31]. Djoudi et al. (2016) [32] contend that gender analysis is important due to the perception differences between men and women. Gender is often associated with distinct cultures, responsibilities, and rights assigned to women and men [33,34]. Additionally, socioeconomic disparities are crucial variables in climate change analysis, particularly for marginalized ethnic groups residing in remote rural areas, where evidence suggests significant inequali-

ties in accessing climate-related information and adaptive strategies between the poor and the affluent [30].

Gender intersections are built from sociocultural norms that can vary across social groups [30]. Individuals from different social groups may perceive the impacts of climate change differently based on their worldviews [31]. Thus, it is crucial to investigate perceptions that reflect inequality through multiple lenses, rather than solely relying on inherent differences between social groups [27]. A closer examination of resilience literature regarding climate change highlights the need for an intersectional approach to gain a nuanced understanding of subjective household-level resilience self-assessment. In this approach, personal identities, such as ethnicity and gender (including sex and status), intersect with each other. Future climate-change-related studies should promote such interdisciplinary approaches, as recommended by [32]. For instance, Nielsen and Reenberg demonstrate that climate change adaptation varies between women and men in different ethnic groups or social contexts, even within similar ecosystems [33].

3. Methodology

3.1. Description of Study Area

This study was conducted in Nam Dong, a mountainous and economically deprived district located in the Thua Thien Hue Province, Central Vietnam (Figure 1). This district was chosen due to its vulnerability to climate change, in terms of both its socioeconomic status and geographic location. First, the region is recognized as one of the poorest districts in the Thua Thien Hue Province, with its economy predominantly reliant on agriculture and forestry.
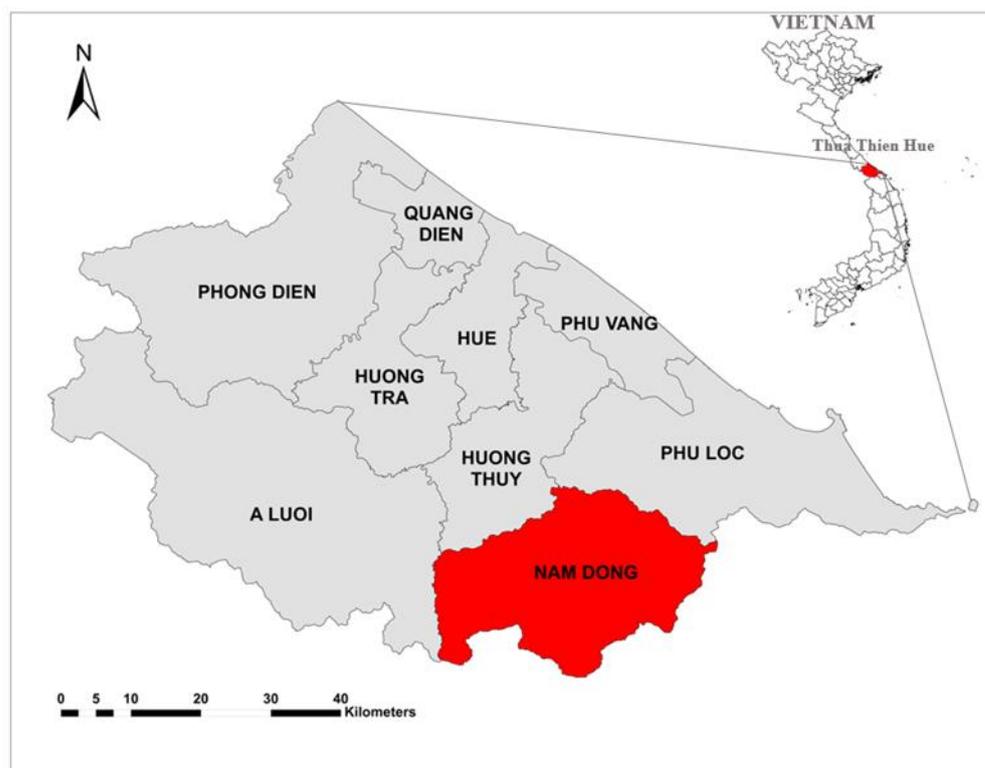

Figure 1. Map of the study area in the Nam Dong District, Thua Thien Hue Province, Vietnam.

First, Nam Dong comprises 10 communes and 1 town, with a total of 5935 households and a population of 25,729, of which nearly 45% are ethnic minorities, primarily the Co Tu ethnic group accounting for almost 70%. The majority of the population resides in rural areas, with 22,622 people representing 85% of the total population. Recent reports indicate that the poverty rate in the Nam Dong District has reached nearly 40%, with approximately

90% of the poor households belonging to ethnic minority groups [35]. The livelihoods of upland communities depend heavily on forest and agricultural resources, rendering them vulnerable to climate and environmental changes. In this study, the Kinh majority and the Co Tu ethnic group were selected as the primary interview subjects, as they are the most populous communities in the area. Despite numerous support programs aimed at these groups, they remain among the most disadvantaged in society, with their voices often marginalized in disaster risk reduction programs and development policies. Gender inequality, which is exacerbated by social norms and customs, further compounds these challenges in upland communities. To address these issues, it is crucial to explore how communities and individuals can better prepare and adapt to extreme climate events, while also examining their resilience levels through an intersectional lens of ethnicity and gender.

Second, due to its unfavorable geographic position, the Nam Dong District is situated in a mountainous area and experiences the highest annual rainfall in the region. Consequently, it is frequently impacted by different types of natural disasters, such as flash floods and storms. The topography of the Nam Dong District slopes downward from south to north, with the lowest absolute altitude of 40 m and the highest absolute altitude of 1712 m, located on Mount Mang [35]. The district is situated primarily upstream of the Ta Trach River and features a valley topography composed of mountain ranges, such as Truoi, Bach Ma, Mang, A Ring, and a portion of the Huu Trach River upstream. The hilly and mountainous terrain in the southeast extends in the direction of northwest–southeast, including the 1440 m high Bach Ma Mountain, which is dominated by Ta Trach River tributaries and surrounded by high and low hills, forming numerous valleys. The mountains have an average elevation of 200–600 m and feature many steep slopes. The terrain is highly divided by mountains and streams, with strong erosion and land loss in the rainy season, particularly in areas with lost vegetation cover. The district has a high annual rainfall of 4576 mm, making it one of the wettest areas in the country [35]. Rainfall is concentrated from October to December, accounting for 65% of the total annual rainfall. Excessive rain causes severe consequences, including erosion and floods each year. The district experiences numerous storms, with the highest frequency from June to October.

3.2. Data Collection

This study utilized a mixed-methods approach, combining qualitative and quantitative methods, to gain a comprehensive understanding of the nuances in livelihood resilience among small-scale farmers in the Nam Dong District. From September to November 2020, the research team conducted extensive fieldwork, including household surveys using a semistructured questionnaire to gather data from 364 households (182 Kinh and 182 Co Tu households). The research team ensured privacy and dignity for all participants by starting each interview with a detailed introduction and obtaining oral consent from respondents. A local guide and interpreter assisted as needed, further building trust between the research team and the villagers. To supplement the quantitative data, the study conducted three focus group discussions (FGDs), involving 6–8 individuals of both genders for each group, and one FGD with district-level representatives of extension officers, local authorities, and two local NGOs. Additionally, nine in-depth interviews were conducted with a socioeconomic-in-charge district official, two district extension staff, three village heads, one patriarch person, and two leaders of the communal women's union. The FGDs and interviews provided rich qualitative information and helped to understand the unique political–economic, cultural, and social norm contexts of each ethnic group. This study aimed to obtain a holistic view of small-scale farmers' livelihood resilience and the various factors that influence it.

3.3. Calculation of the HLSR Index

Based on the HLSR approach, the overall resilience score of a household is determined by calculating the scores of five composite capital components, each consisting of 25 indicators listed in Table 1. The present study utilized the balanced weighted method to

determine the HLSR, which is recommended in prior studies. This method assumes that each indicator equally contributes to the resilience index, irrespective of the number of indicators in each major component (capital). The calculation process involves three main steps. First, all subcomponents were standardized to a common unit of 0 to 1 because the scales for each variable (question) differ, as shown in Equation (1):

$$\text{Index}_h = \frac{S_h - S_{min}}{S_{max} - S_{min}} \tag{1}$$

where Index_h represents the normalized value of a subindicator for a given household h. S_h is the observed subcomponent value for the same household, while S_{max} and S_{min} correspond to the maximum and minimum values for the entire sample data, respectively.

After normalization, the component scores for each capital were calculated by taking the average of their related indicators, as shown in Equation (2):

$$M_h = \frac{\sum\limits_{1}^{n} \text{Index}_{Shi}}{n} \tag{2}$$

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

Finally, to calculate the HLSR, the scores for the five components were weighted and averaged using Equation (3):

$$\text{HLSR}_h = \frac{5 \ast \text{FinanceIndex}_h + 6 \ast \text{HumanIndex}_h + 5 \ast \text{SocialIndex}_h + 5 \ast \text{PhysicalIndex}_h + 4 \ast \text{NaturalIndex}_h}{25} \tag{3}$$

where, HLSR_h represents the resilience index of household h, while FinanceIndex_h, HumanIndex_h, SocialIndex_h, PhysicalIndex_h, and NaturalIndex_h correspond to the scores of the five livelihood capitals of household h—namely, financial, human, social, physical, and natural, respectively.

Essentially, a higher HLSR score implies a greater ability of a household to cope with climate shocks and adversities, while a lower score suggests lower resilience. The aim of this study was to gain a more nuanced understanding of the variations in livelihood resilience among small-scale farmers. Specifically, we compared the scores of each capital component and the overall HLSR index across various groups based on ethnicity (Kinh and Co Tu), gender (women and men), poverty status (poor and nonpoor), and the intersectionality of these factors. To determine the statistical significance and correlations among these variables, we conducted independent *t*-tests (for two comparative variables) and one-way ANOVA (for more than two comparative variables) using the SPSS software.

4. Results

4.1. The Differences in Livelihood Resilience across Groups

4.1.1. HLSR and Ethnicity

As expected, Kinh households have higher overall HLSR scores than Co Tu ethnic minority households, with scores of 0.376 and 0.339 ($p < 0.001$), respectively (Table 2). This indicates that the livelihood resilience of Kinh households is greater than that of Co Tu ethnic minority households. The component scores of the Kinh's livelihood sources are generally higher than those of the Co Tu, except for human capital. Specifically, Kinh households have higher average scores in financial, social, and physical indicators compared with Co Tu households, with statistical significance at the 1% level. The difference in the level of livelihood restoration ranges from 0.04 (social) to 0.07 (financial), and the results of this difference are presented in spider diagrams in Figure 2a below.

Table 2. The differences in livelihood resilience between the Kinh and Co Tu groups.

	Finance	Human	Social	Physical	Natural	Overall
Kinh (n = 182)	0.346	0.291	0.305	0.655	0.282	0.376
Co Tu (n = 182)	0.269	0.322	0.260	0.577	0.256	0.339
p-value	0.000 *	0.108	0.000 *	0.000 *	0.060	0.000 *

The symbols * indicates statistical significance at the 1% level.
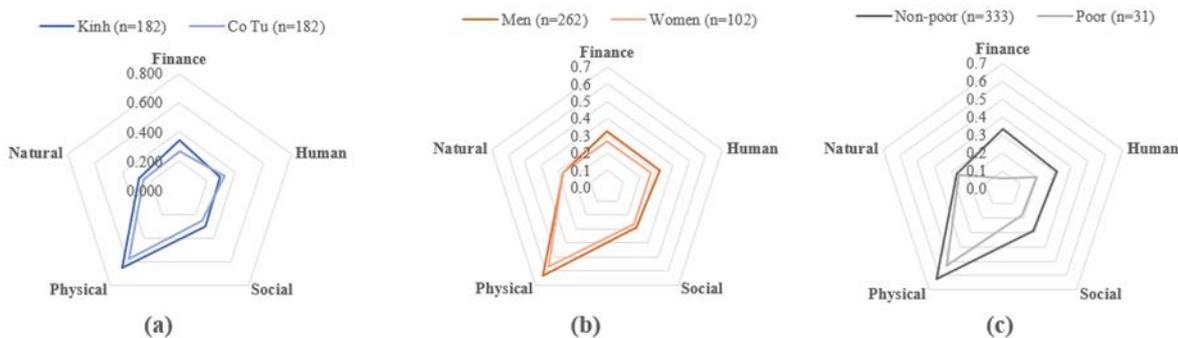

Figure 2. Spider chart of differences in livelihood resilience by (**a**) ethnicity, (**b**) sex, and (**c**) economic status.

Although not statistically significant, Co Tu people have a higher human index than Kinh people. A closer look at the five indicators contributing to human capital, including the number of employees, education level, awareness of climate change, participation in training, and participation in disaster preparedness drills, shows that Kinh people have a higher number of university students but lower scores than Co Tu people in the last three indicators. This may explain why Kinh people can be subjective and indifferent to climate change. They diversify their livelihoods through nonfarm income sources, and are therefore less interested in attending training or learning about the local disaster warning system. In contrast, Co Tu people have better awareness and are willing to participate in government-organized activities. These results will be discussed in detail in the next section.

4.1.2. HLSR and Sex

The study reveals differences in livelihood resilience to climate shocks between men and women. Men exhibit higher resilience than women, with a difference of 0.04 units (Table 3). When examining each source of livelihood capital, the results indicate that while natural capital is equal, male-headed households have higher scores than female-headed households across all four other sources of capital, with statistical significance listed. The largest difference is observed in the categories of physical capital (0.061 units) and human capital (0.060 units).

Table 3. The differences in livelihood resilience between men and women.

	Finance	Human	Social	Physical	Natural	Overall
Men (n = 262)	0.324	0.323	0.289	0.633	0.269	0.370
Women (n = 102)	0.265	0.263	0.265	0.572	0.269	0.327
p-Value	0.000 *	0.006 *	0.037 **	0.004 *	0.962	0.000 *

The symbols * and ** indicate statistical significance at the 1% and 5% levels, respectively.

In-depth interviews shed light on the fact that the majority of men own land and are the representatives of the family participating in village meetings. One woman respondent noted that "we sometimes attend meetings, but mostly just to show up." This could explain why men generally exhibit higher levels of livelihood resilience compared with women. However, it is important to note that this finding is not meant to suggest that women are

less capable of building resilience, but rather that social and cultural factors may limit their access to and control over resources, information, and decision-making power. These results highlight the need for gender-sensitive policies and interventions that consider the unique vulnerabilities and capacities of women and men in building resilience to climate shocks. The implications of these findings will be discussed further in the subsequent section.

4.1.3. HLSR and Status

As hypothesized, the findings suggest that households in better-off economic strata have higher resilience scores, indicating a greater likelihood of recovering their livelihoods after climate shocks compared with those in lower economic strata. Specifically, nonpoor households have an overall resilience score of 0.368, compared with 0.243 for poor households (Table 4). Component scores of all five sources of livelihood capital are lower for poor households than for better-off households, with the largest differences observed in financial capital (0.276) and human capital (0.118). These differences are depicted in Figure 2c.

Table 4. The differences in livelihood resilience between the poor and better-off households.

	Finance	**Human**	**Social**	**Physical**	**Natural**	**Overall**
Nonpoor (n = 333)	0.331	0.317	0.291	0.624	0.271	0.368
Poor (n = 31)	0.055	0.199	0.185	0.531	0.255	0.243
p-Value	0.000 *	0.001 *	0.000 *	0.007 *	0.564	0.000 *

The symbols * indicates statistical significance at the 1% level.

These results highlight the importance of financial support and human capital enhancement policies for poor households. Policies aimed at improving financial capital can help poor households better withstand and recover from climate shocks. Similarly, interventions to enhance human capital, such as education and training, can help build the capacity of poor households to adapt to changing climatic conditions.

4.2. The Intersection of Gender, Ethnicity, and Livelihood Resilience

Our findings indicate that men in both Kinh and Co Tu households have higher HLSR scores than other groups, with statistically significant differences at the 1% level (Table 5). This suggests that women in any social group are at a disadvantage when it comes to recovering their livelihoods after climate shocks. Surprisingly, our results also show that menstruating women have a lower recovery index than the Co Tu ethnic group, with scores of 0.253 and 0.328, respectively. The largest difference between these two groups is in the physical capital index, with a difference of 0.175 units (Figure 3a). These findings suggest that Kinh women may face double pressure in managing household chores and adapting to climate change. Therefore, it is imperative to design disaster reduction programs that integrate gender issues, not just for women or ethnic minorities, to avoid social exclusion of these vulnerable groups.

Table 5. The intersection of ethnicity–sex–resilience.

	Finance	**Human**	**Social**	**Physical**	**Natural**	**Overall**
Kinh men (n = 140)	0.349	0.296	0.301	0.686	0.280	0.383
Kinh women (n = 2)	0.226	0.217	0.262	0.401	0.146	0.253
Co Tu men (n = 122)	0.295	0.354	0.274	0.573	0.255	0.354
Co Tu women (n = 100)	0.265	0.264	0.265	0.576	0.272	0.328
p-Value	0.000 *	0.003 **	0.022 **	0.000 *	0.260	0.000 *

The symbols * and ** indicate statistical significance at the 1% and 5% levels, respectively.
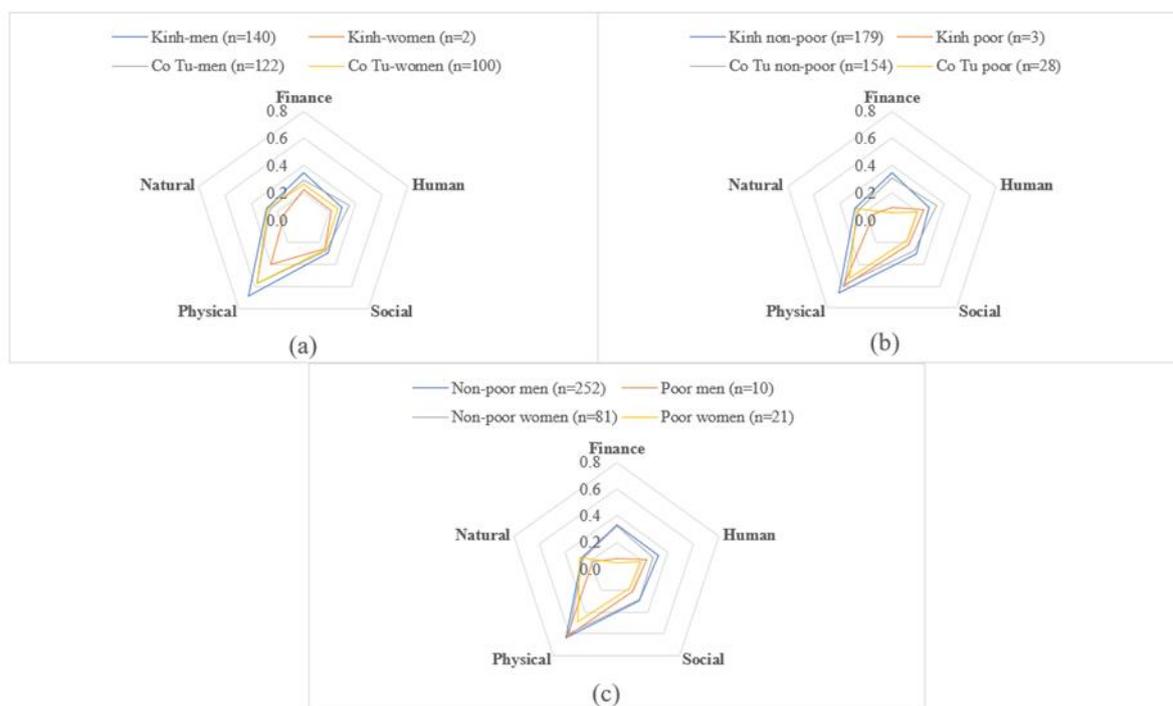
Figure 3. Spider chart of the intersection of (**a**) ethnicity–sex–resilience, (**b**) ethnicity–status–resilience, and (**c**) sex–status–resilience.

It is important to note that the intersectionality of gender with other social identities, such as ethnicity and economic status, must be taken into account when designing such programs. For example, poor women from ethnic minority groups may face additional challenges due to their limited access to resources and decision-making power. Therefore, policies and interventions should be designed with a nuanced and inclusive approach that recognizes the complex and intersecting vulnerabilities faced by different groups in the context of climate change. The implications of these findings will be discussed in detail in the subsequent section.

The households in our study are ranked by their HLSR scores in descending order, with the Kinh well-off households scoring the highest (0.378), followed by the Co Tu well-off households (0.357), poor Kinh households (0.264), and poor Co Tu households (0.246) (Table 6). Examining the factors that hindered recovery for the latter two groups, we found that poor Kinh households faced significant obstacles in financial and natural capital, with scores of 0.093 and 0.139, respectively. Meanwhile, for poor Co Tu households, the biggest hindrances were financial and social capital. These findings underscore the importance of conducting integrated studies that identify the specific needs and deficits of each community to enable targeted recommendations towards a more equitable society. In this case, the highest priority should be given to supporting the most vulnerable group.

Table 6. The intersection of ethnicity–status–resilience.

	Finance	Human	Social	Physical	Natural	Overall
Kinh nonpoor (n = 179)	0.349	0.291	0.306	0.657	0.285	0.378
Kinh poor (n = 3)	0.093	0.244	0.219	0.601	0.139	0.264
Co Tu nonpoor (n = 154)	0.308	0.345	0.274	0.587	0.253	0.357
Co Tu poor (n = 28)	0.051	0.194	0.181	0.524	0.268	0.241
p-Value	0.000 *	0.000 *	0.000 *	0.000 *	0.063	0.000 *

The symbols * indicates statistical significance at the 1% level.

The results indicate that well-off households headed by men have the highest HLSR score (0.374), followed by better-off households headed by women (0.351), poor male-

headed households (0.267), and lastly, female-led poor households (0.231). These differences are statistically significant at the 1% level (Table 7). Notably, the female-led poor households have a high physical capital index (0.487), but all the other sources of livelihood capital are very low, particularly financial capital (0.046) and social capital (0.183). These findings highlight the importance of prioritizing poverty reduction in capacity-building programs for local residents, especially for poor households led by women. Policymakers should take these results into account when designing effective interventions to improve the resilience of vulnerable communities.

Table 7. The intersection of sex–status–resilience.

	Finance	Human	Social	Physical	Natural	Overall
Nonpoor men (n = 252)	0.334	0.327	0.292	0.633	0.272	0.374
Poor men (n = 10)	0.075	0.233	0.210	0.623	0.183	0.267
Nonpoor women (n = 81)	0.321	0.284	0.289	0.594	0.264	0.351
Poor women (n = 21)	0.046	0.183	0.183	0.487	0.290	0.231
p-Value	0.000 *	0.002 *	0.000 *	0.003 *	0.190	0.000 *

The symbols * indicates statistical significance at the 1% level.

The findings regarding the intersectionality of gender, economic status, ethnicity, and livelihood resilience are presented in Figure 3 below. In summary, the results indicate that there are three groups of households that require special attention in disaster reduction and resilience-building policies. These groups include female-headed households, poor households (both Kinh and Co Tu), and especially poor households led by women. The next section will provide a series of recommendations to enhance the resilience of these groups.

5. Discussion and Implications

Our study yielded four significant findings related to the livelihood resilience of upland households in Vietnam. These findings have important implications for policies and programs aimed at enhancing the resilience of vulnerable communities.

First, our results indicate that men generally exhibit higher levels of livelihood resilience than women across all social groups, highlighting the need to address gender inequalities in disaster risk reduction and resilience-building efforts. This further supports previous findings [8,12]. To this end, policies and programs should strive to promote gender equality in access to resources, decision making, and leadership roles. We also found that Co Tu women have greater human capital than Kinh women, attributed to their knowledge of the impact of climate change on their lives, particularly in agriculture. Consequently, they actively engage in disaster prevention training courses and drills, which effectively build resilience and rehabilitate communities' livelihoods. Thus, we recommend expanding these training initiatives to include individuals from other sectors, not just agriculture. However, our study also reveals that the educational level of the Co Tu ethnic group, particularly women, is very low. Therefore, to increase the effectiveness of such training courses, it is essential to concurrently address the issue of education improvement [13,14]. Urgent tasks include opening free literacy classes for the elderly and encouraging ethnic minority students to attend school [7]. We also highlight the need to integrate social and ethical issues, such as local limitations and perceptions, and capabilities of the locality when designing any community-based resilience-building program.

Second, our study reveals that households belonging to better-off economic strata exhibit higher resilience scores for both Kinh and Co Tu households. This finding underscores the significance of addressing economic disparities to enhance the resilience of vulnerable communities. To this end, policies and programs should prioritize poverty alleviation and promote inclusive economic growth. Nonetheless, reducing poverty remains a formidable challenge that requires attention. In this article, we propose three main strategies to reduce poverty for upland farmers. First, increasing access to productive resources, such as land, credit, and technology, is essential. Previous research has demonstrated that providing small farmers with access to these resources can significantly improve their incomes and

reduce poverty [6,8]. Second, enhancing productivity and competitiveness through better production practices, value chain development, and market linkages can also increase incomes and reduce poverty [36,37]. This necessitates investment in infrastructure, research and development, and extension services. Furthermore, encouraging off-farm income and using potential resources in locals, such as rural community tourism or craft villages such as local silk products, can also be advantageous [7,38–40]. Lastly, strengthening governance and institutions is vital to improving access to resources, services, and markets [5]. Weak governance and institutions in upland areas can restrict access, thus hindering poverty reduction efforts. Strengthening governance and institutions through decentralization, participatory planning, and community-based natural resource management can enhance access and reduce poverty. It is also crucial to recognize the diversity of upland communities in terms of ethnicity, culture, and livelihoods. Policies and programs should be designed to address the specific needs and constraints of different upland communities to effectively reduce poverty.

Third, our study has revealed that poor Co Tu households and poor households led by women have the lowest climate resilience ability. This finding underscores the importance of tailoring disaster reduction and resilience-building policies to these groups [10,14,35,41]. Specifically, policies and programs should target these groups with tailored interventions that address their specific vulnerabilities and build their resilience. These results highlight the importance of financial support and human capital enhancement policies for poor households. Policies aimed at improving financial capital can help poor households better withstand and recover from climate shocks. Similarly, interventions to enhance human capital, such as education and training, can help build the capacity of poor households to adapt to changing climatic conditions. However, it is important to note that while economic status is a key factor in determining resilience, other factors, such as access to information, social networks, and cultural practices, also play important roles. Therefore, policies and interventions should be designed with a holistic and intersectional approach that considers the multidimensional nature of vulnerability and resilience. Additionally, several recent studies have suggested that providing interest-free or low-interest credit programs for women's union members or those living in poverty could enhance their ability to access capital, thereby increasing their capacity to adapt to disaster risks and ultimately improving the resilience of households [8,42,43].

Finally, our study indicates that financial, social, and human livelihood capitals are critical in enhancing the resilience of upland households in Vietnam. These findings have important implications for policymakers and practitioners working to enhance the resilience of vulnerable communities. Specifically, interventions should focus on improving access to financial, social, and human capital for the most vulnerable households, with an emphasis on ethnic minority communities. To operationalize this, we propose the following recommendations: First, microfinance programs can provide small loans to vulnerable households to establish or expand small businesses, improving their economic resilience [8]. Second, investing in education and skills development can equip vulnerable households, especially ethnic minorities, with the necessary skills and knowledge to access better job opportunities, hence improving their financial resilience. Third, social safety net programs, such as conditional cash transfers, can provide vulnerable households with a safety net during crises, such as natural disasters or economic shocks, thereby improving their social and financial resilience [43]. Fourth, community-based disaster risk reduction programs can prepare vulnerable households, including ethnic minority communities, to respond to and reduce the impact of natural disasters, improving their overall resilience [44,45]. Lastly, policies and programs that promote women's economic empowerment, such as providing access to credit, training, and support for women-led businesses, can enhance the economic resilience of vulnerable households, particularly those led by women in ethnic minority communities [46].

It is important to recognize that these interventions must be tailored to the unique needs and contexts of each community to achieve optimal effectiveness. Furthermore,

it is critical to prioritize women and the poor in these programs, given their lower levels of resilience. Additional suggestions for practice include strengthening community-based organizations and involving them in the design, implementation, and monitoring of resilience-building programs. These can enhance local ownership, promote sustainability, and ensure that the programs are culturally appropriate. Additionally, policy interventions should be complemented with measures to address underlying structural issues, such as inequality, marginalization, and discrimination. For example, land and forest reform programs can help address unequal land distribution, which is a major source of vulnerability for many upland households [13]. Finally, building partnerships between different actors, including the government, civil society organizations, and the private sector, can leverage their strengths and resources to enhance the resilience of vulnerable communities [47–49].

In brief, the intersection of social inequality, gender roles and rights, resource scarcity, poverty, inadequate infrastructure, limited financial resources, and ineffective risk management plans is closely tied to the level and fluctuations of resilience on the ground, potentially resulting in disproportionate suffering and loss from climate variability. Addressing these disparities is crucial for promoting equality and social justice, and requires an intersectional approach in practical policies. As noted by Jones and Tanner (2015), resilience must prioritize the livelihoods of vulnerable populations and incorporate development strategies to meet the needs of the planet's poorest and most marginalized communities [23]. Gender-related studies are widely published, but gender issues are often not integrated into climate change policies and programs in many developing countries [27,46]. This lack of consideration for marginalized groups' perspectives and experiences is due to a lack of comprehensive and reliable data on the gendered impacts of climate change, making it difficult to design effective policies and interventions. Additionally, intersectional research on climate change is still lacking [8], resulting in gaps in understanding the experiences of marginalized communities and how climate change intersects with other forms of discrimination. This study provides a valuable contribution to gender-related research by adopting a context-specific approach to assess household resilience and offering tailored recommendations for the studied communities. The study conducted a nuanced analysis of self-assessments provided by households from two upland communities, namely, the Kinh majority and the Co Tu ethnic minority, located in the Nam Dong District, Thua Thien Hue Province, Vietnam. Given that the study area is particularly vulnerable to climate change due to its disadvantaged economic and geographic conditions, the findings shed light on significant disparities in resilience levels among different ethnic and gender groups, offering critical insights into how policies and programs can better support disadvantaged groups and promote sustainable rural development. The study underscores the importance of addressing cultural and social norms specific to the studied communities and highlights the need to move beyond relying solely on macroeconomic data. By emphasizing the significance of enhancing financial, human, and social capitals; promoting overall well-being; and alleviating poverty, the study provides actionable recommendations for building resilience among disadvantaged groups in this specific context.

However, we recognize that the present study has certain limitations. First, it focuses primarily on two specific target groups, namely, the King majority and the Co Tu people, and thus excludes other ethnic groups, such as the Ta Oi and others, unintentionally. Second, this study lacks a meta-analysis integration of socioeconomic factors in the region, such as population growth rate or total area. Lastly, this study did not consider sensitive variables, such as social norms and customs, which can be crucial in building climate resilience in the Vietnamese rural community. Therefore, future studies should address these limitations to gain a more comprehensive understanding of the subject matter.

6. Conclusions

This study represents a groundbreaking departure from conventional macroeconomic-data-based research that typically overlooks the subjective experiences of communities and social groups in their assessments of resilience to stressors. To obtain a comprehensive

understanding of household resilience, we conducted a highly nuanced analysis of self-assessments provided by 364 household heads in the Nam Dong District, Thua Thien Hue Province, Vietnam. Our investigation focused on the two upland communities of the Kinh majority and Co Tu ethnic minority households, evaluating their resilience levels in terms of the five livelihood capitals and identifying significant disparities among different ethnic and gender groups.

Our findings reveal that women, ethnic minorities, and the poor exhibit notably lower levels of resilience to external changes caused by climate change, among other factors. This underscores the need for policies and programs designed to improve resilience and promote rural development, with an emphasis on these groups' cultural and social norms. In particular, we recommend a focus on improving financial, human, and social capitals to increase households' resilience to external shocks. Enhancing financial capital through off-farm income, local-resource-based initiatives, and livelihood diversification; increasing human capital by raising farmers' awareness of climate shocks and improving education levels; and expanding social capital through greater participation in local civil society organizations to strengthen households' social linkages can all contribute to enhancing livelihood recovery capacity.

Moreover, building resilience for disadvantaged groups must go hand in hand with promoting their overall well-being and alleviating poverty. Therefore, strategies for allocating poor households and encouraging them to actively raise their incomes should be top priorities. Tailored training programs to raise awareness among households, improving infrastructure, and enhancing institutional systems can also contribute to building resilience. Overall, our study highlights the importance of adopting a nuanced, subjective approach to assess household resilience and provides critical insights into how policies and programs can better support disadvantaged groups and promote sustainable rural development.

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