

## Research Article

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# Government support during COVID-19 for vulnerable households in Central Vietnam

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**Abstract:** The aim of this study is to investigate the characteristics of vulnerable households regarding their access to local government support during COVID-19 and assess how this support impacts their choices of livelihood strategies in Central Vietnam. Survey data were collected from 499 family businesses and farming households across the region's four provinces, and a propensity score matching technique was performed to examine the impacts. The results indicate that the age of the household head, poverty status, membership in agricultural cooperatives, and ownership of vegetable land all have a significant relationship with access to government support. In comparison to matched non-recipients, supported households markedly reduced their engagement in livelihood diversification, cultivation, and forest-based activities while simultaneously increasing their involvement in business. The access to government support significantly reshaped livelihood strategies among households. The findings from the study contribute to the literature on government social protection in response to COVID-19, specifically designing and implementing interventions to assist vulnerable households in developing countries like Vietnam.

**Keywords:** propensity score matching, government support, livelihood strategies, COVID-19, vulnerable groups, Vietnam

## 1 Introduction

The coronavirus disease (COVID-19), also known as the global pandemic since March 2020, has affected the lives and well-being of the people around the world. As of April 13, 2024, more than 704 million coronavirus cases and 7 million deaths have been confirmed globally [1]. The COVID-19 pandemic, along with various interventions aimed at curbing its spread, has major variations in socioeconomic consequences at individual, household, community, district, regional, national, and international levels [2,3], such as job and income losses, food insecurity, social relations, and safety nets [4–13]. Tanaka [13] believed that the economic impacts of the pandemic are large for all developing national economies. Even the pandemic's effects on the livelihoods of people are multidimensional, contributing to the long-term increase in vulnerabilities [14,15]. Enhanced government social protection is essential in addressing the pandemic's repercussions, particularly for vulnerable groups [16].

During the COVID-19 crisis, adverse socioeconomic consequences are significantly more prevalent among vulnerable populations than among the general population [12]. For instance, vulnerable populations include minorities, low-income households, women, and people with disabilities [17–19]. Rasul et al. [11] asserted that the pandemic has incurred significant direct costs for human health and economic activities, disproportionately affecting impoverished and vulnerable communities. Even the pandemic has revealed the difficulties encountered by vulnerable populations that frequently lack access to healthcare and are excluded from initiatives and social protection policies [19]. In this sense, increasing various assistance programs and support measures for vulnerable and marginalised groups is crucial for mitigating COVID-19-related challenges, enhancing resilience and adaptability, stabilising socio-economic conditions, and ensuring social security and inclusion

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[20,21]. However, there have been limited studies on government social protection effects during the pandemic, particularly in terms of economic interventions and which vulnerable group characteristics are targeted [16,22].

Furthermore, the COVID-19 pandemic has compounded challenges of sustainable livelihoods, particularly for vulnerable households in developing countries [11,23,24]. Social distancing measures during the pandemic caused disruptions to economic activities and led to higher unemployment and income loss [7,15,25,26]. In Vietnam, farm households experienced interruptions in agricultural activity and income loss owing to stay-at-home mandates, travel limitations, and the inability to transport or sell their products [24]. The COVID-19 restrictions disrupted agricultural supply chains, leading to decreased farm productivity, heightened production costs, and price volatility in outputs [14,25]. Family-based enterprises have had to shut down or reduce operational services and staff due to disruptions and negative influences of the pandemic [27,28]. The ability to receive support and guarantees from governments and stakeholders is identified as playing an important role in helping vulnerable populations respond to the pandemic as well as recover from it [27,29,30].

In response to the economic shocks induced by COVID-19, vulnerable households have had to adapt their livelihood strategies. For example, rural households reduced their spending, diminished the distribution of gifts and remittances, lent less money to others, and deferred loan repayments [17]. The agricultural sector, especially with respect to the expansion of farming, is expected to emerge as a more significant livelihood strategy for households [25]. The substantial dependence on natural resources serves as a crucial safety net during times of the crisis [10]. These variabilities underscore the necessity for tailored interventions that consider the unique challenges faced by different communities. However, there has still been limited evidence of the COVID-19-related effects, social supports, and livelihood strategies adopted to combat the pandemic, particularly among vulnerable households in developing countries [7,17].

Vietnam, a developing country with 97 million people, is among the most vulnerable countries to COVID-19 [26]. The country recorded the first case of the pandemic at the end of January 2020. Since then, the Vietnamese government has taken decisive steps to curb the pandemic, e.g., imposing social distancing measures under Directives 11, 15, 16, and 19. In this context, households have experienced a significant decline in income and employment, as well as deterioration in various quality of life categories [23,24,26]. In response to the pandemic's adverse effects, Vietnam has implemented social protection policies to assist people, specifically vulnerable populations, in overcoming the crisis. Nonetheless, vulnerable populations during the pandemic encountered obstacles in their ability to access social

services and support [29,31]. Consequently, examining government assistance and the responses of individuals during COVID-19 can enhance resilient livelihoods and strengthen social safety nets, as well as facilitate the planning and implementation of social protection measures to address analogous crises [22].

In light of these gaps, the aim of this study is to provide insights into how access to COVID-19-related government support influences the adaptive strategies of households during the pandemic, particularly with respect to local government assistance and the livelihoods of vulnerable households in Vietnam. This research focuses on family-business and agricultural households in Central Vietnam as examples of vulnerable groups in the context of COVID-19. The study examines the following research questions: (1) What household characteristics affect access to local government support (LGS), and (2) how do the coping strategy choices of households differ between those that receive this support and those that do not? The findings of the research will contribute to the literature on COVID-19 shock-responsive social protection policies by understanding the factors influencing households' access to government support. Furthermore, it explores the impact of receiving support on the adaptive livelihood strategies that households employed throughout the pandemic. The results will provide valuable information for policymakers and stakeholders to facilitate adaptive livelihood strategy options and develop appropriate social policy interventions aimed at supporting vulnerable households in developing countries, such as Vietnam, in response to COVID-19 and during their recovery from crises.

## 2 Literature review

Besides the health harms, the effects of COVID-19 on vulnerable households' livelihoods and their coping strategies have increasingly received the attention of studies [11,12,15,18]. Studies conducted in developing nations have demonstrated that the pandemic substantially affected the livelihoods of households, e.g., as evidenced by reductions in diverse income sources [25], job losses, and heightened financial pressures, in addition to disruptions in agricultural input supply and marketing systems [15]. Previous studies have also sought to explore and gain a deeper understanding of the livelihood strategies that households have employed to cope with the effects of COVID-19 [10,17]. Doan *et al.* [27] indicated that Vietnamese family businesses implemented a rapid adaptability and regular modification of their offerings, services, and operating procedures to address the epidemic's impacts [27]. Nevertheless, there is little understanding of how

vulnerable populations shifted dynamics of livelihood strategies and their responses to COVID-19, particularly in Central Vietnam. This is important because information about how vulnerable households responded to the pandemic can impact the design and implementation of relevant policies in developing countries that promote social safety nets and ensure human well-being.

In response to COVID-19, social protective systems have been taken by governments worldwide, particularly in supporting vulnerable households in times of crisis [4,16,21,32]. Many support programmes and policies, such as the “Next-GenerationEU” recovery fund, have been implemented by the European Union to mitigate the pandemic’s effects and promote recovery [33]. Several nations have used identification-linked bank accounts established for financial inclusion to offer direct assistance to poor people, as exemplified by India [21]. Tan et al. [32] indicated that many countries, including Vietnam, implemented vaccination campaigns, direct cash subsidies, and food assistance programmes as the predominant measures to aid disadvantaged groups during the initial phase of COVID-19. Strengthening social protection systems facilitates inclusive, equitable, and sustainable development, of which the socioeconomics of vulnerable households are an important part [16,33]. However, social protection regimes varied across countries, particularly in Southeast Asia, where assistance frequently fails to reach its intended recipients [34]. There is a shortage of information regarding the impact of social protection measures in COVID-19 times on the livelihoods of vulnerable populations in the Southeast Asia region. Here this study contributes to the literature on how vulnerable households in Southeast Asia, like Vietnam, accessed government support during the pandemic.

In Vietnam, the government and its affiliated entities have implemented significant social protection policies and systems to safeguard people and society as well as foster social development and advancement. In response to the multitude of negative socioeconomic effects of COVID-19 outbreaks and preventive measures [26,29], the Vietnamese government has implemented many social welfare policies to help vulnerable households cope with the pandemic [35,36]. For instance, at the onset of the COVID-19 pandemic in 2020, the Vietnamese government promulgated Resolution No. 42/NQ-CP on April 9, 2020, delineating measures to assist individuals adversely affected by the pandemic, and subsequently issued Resolution No. 154/NQ-CP on October 19, 2020, which revised and augmented Resolution No. 42/NQ-CP concerning beneficiaries (e.g., family businesses and poor households). Poor households would get a one-time payment of VND 250,000 per person every month for a duration of 3 months.

Moreover, to address the second wave of COVID-19 from July 2020 to January 2021, the government of Vietnam issued Resolution 68/NQ-CP on July 1, 2021, outlining policies to

support employees and employers facing difficulties due to the pandemic. Additionally, Resolution No. 126/NQ-CP, issued on October 10, 2021, amended and supplemented Resolution No. 68/NQ-CP and aimed to provide various forms of support, including financial assistance and training support programmes. These governmental support policies concentrate on the social protection system, encompassing insurance, social assistance, and the provision of social services. Local authorities have implemented numerous policies and programmes to support communities impacted by COVID-19, including financial and food assistance. Nonetheless, there is a paucity of research exploring the social protection system in Vietnam to assist disadvantaged communities [36,37], especially at-risk households during COVID-19.

Furthermore, previous research has identified social protection systems as a vital pillar of Vietnam’s COVID-19 context, contributing to the security of livelihoods and enabling affected individuals and households to better withstand the epidemic while revitalizing socioeconomic activities [35,37]. However, most measures assisting those affected by COVID-19 are unprecedented and have not been previously created or implemented, potentially resulting in challenges and delays in execution [31]. Numerous studies indicate that individuals and households affected by COVID-19 in various areas of Vietnam have not effectively accessed social protection policies, and the support provided is insufficient and untimely in addressing their needs [24,31,37]. Many vulnerable households also have implemented various self-initiated strategies to navigate challenges of the pandemic [27]. Different demographic and socioeconomic vulnerable groups’ strategies for coping have changed significantly, and external supports are necessarily required for households to cope with the consequences of the pandemic [15,20,23,25]. Therefore, this study contributes to gaining a better understanding of households’ access to government assistance and the changes in their livelihoods during COVID-19 in Vietnam, specifically Central Vietnam. It will provide supplementary evidence for preparing and carrying out efficient social protection policies and recovery programmes during crises, such as the pandemic, in developing nations like Vietnam.

## 3 Materials and methods

### 3.1 Context of the study site, sample, and data collection

The current study setting is Central Vietnam, which consists of 19 provinces with a total area of about 150,473 km<sup>2</sup> and a total population of nearly 30 million people [38]. Like

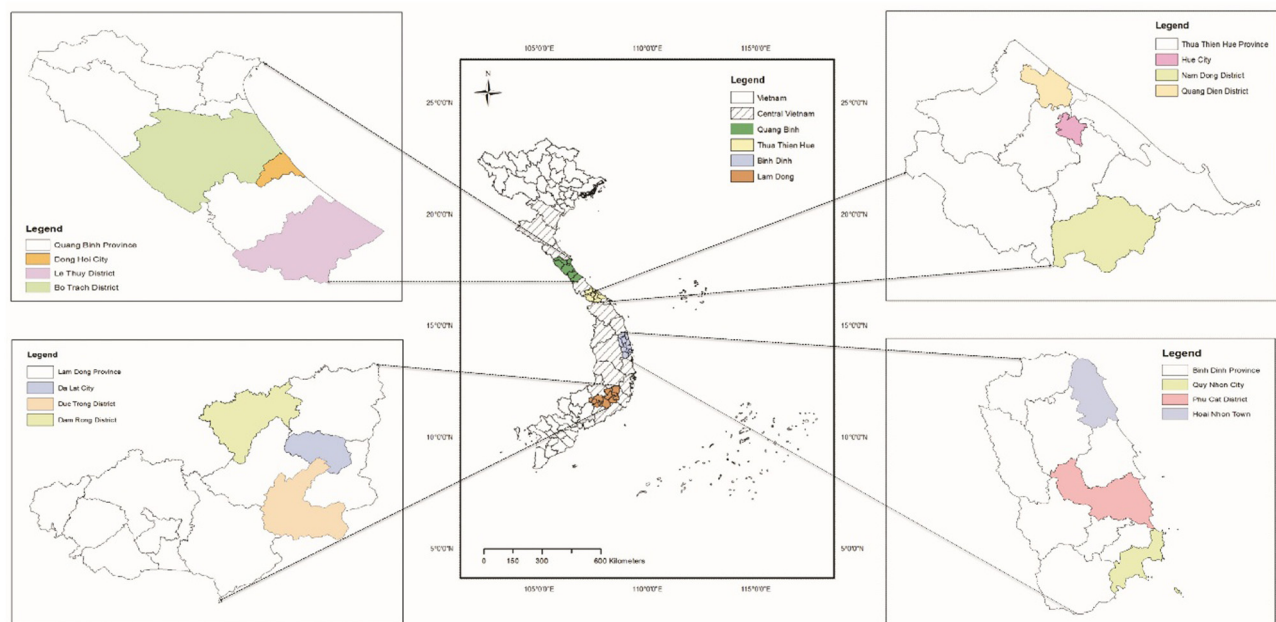
other parts of the country, Central Vietnam has seen heavy consequences marked by the adverse effects of COVID-19. More than 11 million coronavirus cases and 40 thousand deaths have been confirmed in Central Vietnam as of January 2025 [39]. In 2020, the economic growth of the central major economic area was recorded at  $-1.02\%$ , while the tourism sector experienced a decline of  $-2.65\%$  [38]. The pandemic resulted in a decline in income and quality of life for inhabitants [26]. Therefore, the Vietnamese government and authorities implemented social security policies for people, particularly vulnerable groups, to cope with the pandemic [29,35,40].

Moreover, local authorities play a crucial role in fostering government interventions and collaborating with stakeholders, thereby enhancing the capacity of communities to respond effectively to crises [6,8]. However, many beneficiaries in several provinces, including in Central Vietnam have not received government support during the pandemic, particularly from the state's social security packages [40]. There is still a lack of studies in Vietnam examining how households affected by COVID-19, which are considered vulnerable, access government support policies. Additionally, no study has examined whether livelihood strategies of households changed among households' access and no access to government support during COVID-19 in Central Vietnam's provinces in particular. Hence, this study focused on more understanding how various factors influence the ability of households in Central Vietnam to access LGS during the epidemic and the impact

of this support on households' livelihood strategies. Exploring access to government supports represents a vital pathway for assisting vulnerable households in mitigating the adverse effects of COVID-19 and bolstering their strategies to recover their livelihoods after the pandemic.

In this study, four provinces in Central Vietnam, including Quang Binh, Thua Thien Hue (North Central Coast), Binh Dinh (South Central Coast), and Lam Dong (Central Highland), have been selected to conduct the survey (Figure 1). This selection of provinces, where previous studies covered rarely these study sites, is expected to understand a multi-dimensional view of socioeconomic characteristics and COVID-19-related impacts on populations and their livelihood strategies in Central Vietnam. In particular, these sites predominantly consist of areas with significant rural populations: Thua Thien Hue (68%), Quang Binh (77%), Binh Dinh (80%), and Lam Dong (83%). The poverty rates in Quang Binh, Thua Thien Hue, Binh Dinh, and Lam Dong Provinces are 6.3, 3.9, 4, and 3.6%, respectively [38]. It suggests that the people at the study sites are expected to become more vulnerable under the impacts of the pandemic, especially from the perspective of livelihoods. This research focused on family-business and agricultural households as vulnerable households during COVID-19 [24,27].

A semi-structured questionnaire was used in the study, employing a stratified sampling strategy across the Central Vietnam's four provinces. To ensure that the respondents were vulnerable households due to the pandemic,



**Figure 1:** Location map of the study area in Central Vietnam. Source: Authors' compilation.



participants in the survey were chosen from households located in different districts within the four provinces. We carried out the questionnaire survey in person in 2023.

According to Vietnam's General Statistics Office [41], there are 1,323,314 households living in four provinces in 2019, including Quang Binh (224,277), Thua Thien Hue (305,905), Binh Dinh (434,379), and Lam Dong (358,753). Thereby, applying Yamane's method [42] with a designed margin of error of 5%, a total sample size of 400 households will be intended for this study. A multiple-stage stratified sampling procedure was implemented in the investigation. The initial phase involved selecting communes or wards from districts and cities within the study site, guided by 4 focus group discussions and 12 key informant interviews. In the second stage, a systematic random selection technique was employed to choose respondents from the household list provided by commune officials. The study site targeted 600 households for surveying. After eliminating no-response and incomplete questionnaires, 499 valid questionnaires were used for the current study's data analysis (Table 1).

**Ethical approval:** The research ethics and study protocol were approved by the Research Ethics Committee of Vietnam National Foundation for Science and Technology Development (ID: 504.05-2021.16).

**Informed consent:** Informed consent was obtained from all participants for their involvement in the study. The participants of the study did not provide written consent for the public sharing of their data.

## 3.2 Analytical framework and statistical methods

This research examined households' access to LGS during the COVID-19 pandemic and how access to the government assistance influenced their livelihood strategies. The government support variable used for the current study based on the question in the survey as "Did your household receive support from the local government due to COVID-19 during the pandemic (e.g., financial, credit, and cash assistance)?" If any member of the household received LGS, that is considered access to government support.

A set of control and outcome variables has been implemented in the investigation (Table 2). The selection process of variables was guided by a comprehensive review of existing literature, particularly concerning households receiving government support and the influencing factors involved [7,9,10,20,24]. Additionally, the availability of field information within the study's sites was taken into account. In this study, control variables refer to the demographic and socioeconomic characteristics of the interviewed household, including gender, age, access to credit sources, poverty status, COVID-19-related health risks, savings, social organization memberships (Women's Union, Farmers Union, and agricultural cooperatives), and rice, vegetable, and aquaculture land holdings. The household's livelihood strategies serve as outcome variables in the analytical model, encompassing cultivation, livestock, forest, aquaculture, business, and livelihood diversification.

Existing studies considered that the household's demographic features, such as the household head's gender and age, can impact not only access to government support but also the vulnerability and livelihoods of households [9,10,20,36]. In terms of gender equality, an exacerbation of gender stereotypes as well as an increased burden on women were observed during the pandemic [29]; therefore, women should be priority subjects in government supporting policies [31]. In addition, the household's socioeconomic characteristics, such as poverty status and membership in social organisations, were considered determinants that affected access to government support and the household's livelihood strategies during the pandemic [20,25]. For example, during the COVID-19 pandemic, poor households constitute a vulnerable demographic whose livelihoods have been profoundly affected, thereby requiring increased access to support compared to other groups [17,18,20]. Consequently, the study incorporated these variables in its analysis to explore their effects on the behaviour of households with enhanced access to support, which may facilitate their ability to cope with the pandemic. Households with access to support from local

**Table 1:** Overview of valid household questionnaires in the study

Province	Town/district/city	Sampled household
Quang Binh		121
	Dong Hoi City	43
	Le Thuy	40
	Bo Trach	38
Thua Thien Hue		120
	Hue City	43
	Quang Dien	39
	Nam Dong	38
Binh Dinh		132
	Quy Nhon City	46
	Hoai Nhon	44
	Phu Cat	42
Lam Dong		126
	Da Lat City	48
	Duc Trong	41
	Dam Rong	37
Total		499

**Table 2:** Descriptive statistics

Variables	Description	Mean value	SD
<b>Outcome variables</b>			
D_livelihood	The diversification of livelihood strategies (in number)	1.110	0.932
Cultivation	If the household has cultivation (1 = yes, 0 = otherwise)	0.545	0.498
Livestock	If the household has livestock (1 = yes, 0 = otherwise)	0.195	0.397
Forest	If the household has forests (1 = yes, 0 = otherwise)	0.137	0.344
Aquaculture	If the household has aquaculture (1 = yes, 0 = otherwise)	0.093	0.291
Business	If the household has business (1 = yes, 0 = otherwise)	0.362	0.481
<b>Treatment status</b>			
G_support	If the household has access to support from the local government during the COVID-19 pandemic (1 = yes, 0 = otherwise)	0.377	0.485
<b>Control variables</b>			
Age	Age of the household head (years)	53.385	8.957
Gender	Gender of the household head (1 = male, 0 = otherwise)	0.575	0.495
Access_credit	Access to credit sources (1 = yes, 0 = otherwise)	0.408	4.920
Type_household	If the household's poverty status is non-poor (1 = yes, 0 = otherwise)	0.792	0.407
Health_risk	If the household has family members affected with COVID-19 (1 = yes, 0 = otherwise)	0.263	0.441
Saving	If the household has savings (1 = yes, 0 = otherwise)	0.170	0.376
Wom_member	If the household has family members involved in Women's Union (1 = yes, 0 = otherwise)	0.305	0.461
Fam_member	If the household has family members involved in Farmers' Union (1 = yes, 0 = otherwise)	0.363	0.481
Coo_member	If the household has family members involved in agricultural cooperatives (1 = yes, 0 = otherwise)	0.180	0.385
Rice_land	Area of rice land (m <sup>2</sup> )	1559.500	3735.525
Vegetable_land	Area of vegetable land (m <sup>2</sup> )	405.333	2222.988
Aqua_land	Area of aquaculture land (m <sup>2</sup> )	929.333	3331.201

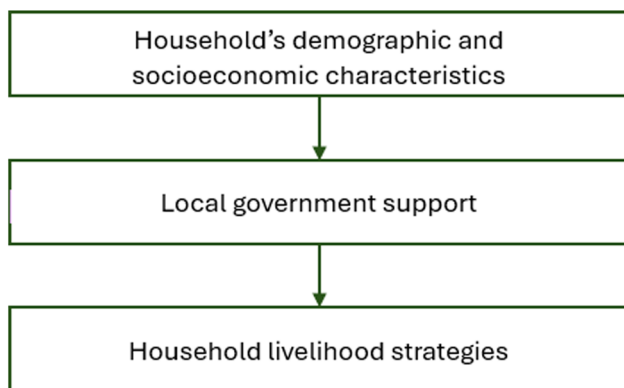
Notes:  $N = 499$ , SD = Standard deviation.

governments influence their livelihood strategy choices in response to the pandemic. Receiving assistance from local authorities provides vital resources, enabling families to adapt their income-generating activities and bolster resilience during the crisis. Figure 2 presents a research framework from the current study. This study employed Stata version 17.0 to calculate the average treatment effect on the treated (ATT), aiming to compare outcomes between households with and without LGS. Recognising that

support access was determined by individual choice rather than random assignment, posing a challenge of self-selection bias, we initially considered instrumental variables (IVs). However, given the inherent difficulty in identifying a valid instrument and the potential for a faulty IV to introduce greater bias than ordinary least squares, we chose to forgo this technique. Consequently, propensity score matching (PSM) was adopted as the most appropriate alternative, effectively mitigating selection bias by enabling comparisons between recipients and non-recipients who share analogous observed traits [30].

To apply the PSM method, the initial step involves estimating the likelihood of each household accessing LGSs during the COVID-19 pandemic. This estimation is performed using a logit model, incorporating a set of relevant explanatory covariates. The output of this process is a propensity score for every household, representing their estimated probability of receiving support, whether they are in the treated group (received support) or the control group (did not receive support). We performed the estimation utilising the STATA function `logit` and a logit model, as presented in equation (1).

$$\Pr(X) = \text{logit}(D = 1) = \alpha + \beta X, \quad (1)$$

**Figure 2:** The research framework.

where  $D$  represents the treatment status of households, indicating that they receive support from the local government. Observer variables that are not affected by this treatment are included in the vector  $X$ .

It is imperative to satisfy two critical prerequisites prior to the implementation of matching. First, defining a common support area where treated and control propensity scores overlap; outliers are excluded for comparability. Second, the balancing property test [43] demands identical observable variable distributions for observations with the same propensity scores, irrespective of access status.

The final phase entails matching recipients with non-recipients according to similar characteristics. The formula for ATT utilising PSM estimator is as follows:

$$\begin{aligned} \text{ATT}^{\text{PSM}} = E\{Y_{iA}|D = 1, P(X)\} \\ - E\{Y_{iN}|D = 0, P(X)\}, \end{aligned} \quad (2)$$

where  $\text{ATT}^{\text{PSM}}$  measures the average difference in outcomes between supported households and their observationally similar, non-supported counterparts; ATT quantifies the causal effect of LGS on the observed outcomes;  $D$  represents the treatment status of household  $i$  (1 for treated, 0 for control);  $Y_{iA}$  and  $Y_{iN}$  represent the potential outcomes for household  $i$  with and without support, respectively;  $X$  signifies a vector of observed household traits used in the propensity score estimation;  $\text{Pr}(X)$  represents the propensity score, which is the estimated probability of household  $i$  receiving support given its characteristics  $X$ .

## 4 Results

Of the 499 interviewed households, the descriptive statistics pertaining to the variables investigated in the study are detailed in Table 2. A slight majority of household heads were male (58%). The average age of the household head is approximately 53 years, indicating a predominantly middle-aged to older group. During COVID-19, approximately 26% of households had family members directly affected by it, indicating a substantial level of direct exposure to the virus within the community. Despite the majority of households being non-poor (79%), savings are low (17%), and access to credit is moderate (41%). The results showed significant inequality in land assets, with many households likely possessing very little or no land, while a few hold much larger areas. The participation of family members within households in social organisations varies: 31% have members in the Women's Union, 36% in the Farmers' Union, and 18% in agricultural cooperatives. This indicates a moderate level of engagement in formal community groups. Based on survey

data, only 38% of households reported receiving support from the local government during the pandemic.

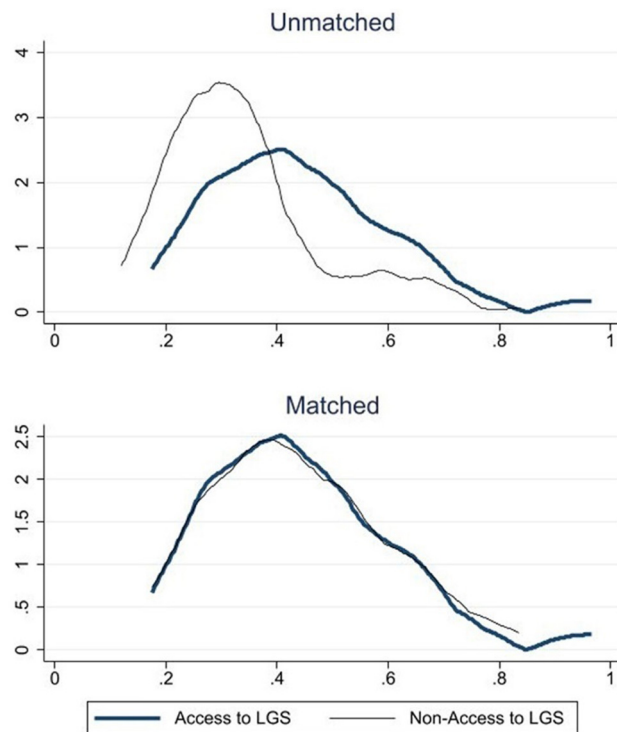
The outcome variables in the study consisted of the household's livelihood strategies, cultivation, livestock, forest, aquaculture (on-farm), and business (off-farm) activities adopted by households (Table 2). On average, households engage in only 1.110 different livelihood strategies, suggesting a relatively low diversity in the approaches they have taken to the pandemic. Among these tactics, the most prevalent activity was the adoption of cultivation, with 55% of respondents. In addition, households were involved in other livelihood strategies, including small businesses, livestock, forests, and aquaculture, with participation rates of 36, 18, 14, and 9%, respectively. The findings provide an understanding of the diverse livelihood strategies households adopted to adapt to the pandemic's impacts.

The results from a logit model used to estimate the propensity score for receiving support from the local government are given in Table 3. Analysis indicates that age,

**Table 3:** Factors associated with receiving support from local government using a propensity score estimation (logit model)

Variables	Receiving the local government support Coef.
Age	-0.028*** (0.011)
Gender	0.285 (0.202)
Access_credit	0.068 (0.045)
Type_household	-0.607** (0.277)
Health_risk	-0.132 (0.330)
Saving	-0.304 (0.418)
Women_member	-0.310 (0.232)
Farm_member	0.116 (0.205)
Coo_member	1.126*** (0.224)
Rice_land	-0.000 (0.000)
Vegetable_land	0.000*** (0.000)
Aqua_land	-0.000 (0.000)
Constant	0.583 (0.585)

Notes: Coefficient (coef.) is an estimate of equation (1) by using logit estimation (first stage of propensity score matching). Standard errors in parentheses. \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ .



**Figure 3:** Distributions of the propensity scores for households' access and non-access to LGS.

household poverty status, membership in agricultural cooperatives, and vegetable land ownership significantly influence access to support from the local government. The age of the household head has a significant and negative effect on access to support, suggesting that households headed by younger individuals were more likely to receive government support compared to those headed by older individuals. Particularly, the likelihood of receiving support decreased slightly ( $-2.8\%$ ) as the household head's age increased.

The status of poverty among households has a significant impact on access to LGS. Households classified as non-poor were significantly less likely to receive government support compared to those classified as poor. The evidence suggests that the government's social protection interventions are aimed at vulnerable populations, aligning with assistance

objectives in response to COVID-19. Households with members who participated in agricultural cooperatives exhibited an increased propensity ( $+1.126$ ) to seek assistance, empowering them to proactively mitigate risks associated with the pandemic. The ownership of land related to vegetable cultivation significantly affects access to support. This evidence indicates that households with larger vegetable plots are more likely to receive assistance. In the study, eight factors, i.e., gender, access to credit, saving, COVID-19-related health risk, women's union membership, farmer's union membership, rice land, and aquaculture land holdings, were found not to significantly predict the likelihood of receiving support from the government.

Moreover, the distributions of the propensity scores for the treatment (access to support) household groups and the control (non-access to support) household groups are examined for the overlap condition before and after the matching (Figure 3). The results indicated that the densities of the propensity scores are more similar after matching. In other words, there is no evidence of an infraction of the overlap assumption in this research. Table 4 shows the estimated impact of receiving support on the livelihood strategy choices that households adopted to mitigate the pandemic's effects. To mitigate potential selection bias, propensity score matching was utilised to assess the influence of receiving support vs not receiving it on individuals' decision-making concerning adaptive livelihood options. Prior to matching, households receiving support typically employed several adaptive livelihood strategies to mitigate the adverse effects of COVID-19. Results demonstrated statistically significant impacts of the LGS obtained via the forest and business, with coefficients of  $-0.030$  and  $0.103$ , respectively. However, the findings of post-PSM analysis indicated that households getting support for farming, forests, business, and livelihood diversification were more likely to use flexible strategies than those who did not get this support.

Furthermore, the matched results suggest that receiving LGS appears to have facilitated a shift away from on-farm activities such as cultivation and reliance on forests, towards non-farm activities. Households that

**Table 4:** Effect of receiving the LGS on the choices of household's livelihood strategies

Variables	Cultivation Coef.	Livestock Coef.	Forest Coef.	Aquaculture Coef.	Business Coef.	D_livelihood Coef.
Receiving the support (yes = 1; otherwise = 0) - Unmatched	$-0.045$ (0.039)	$0.045$ (0.032)	$-0.155^{***}$ (0.019)	$-0.030$ (0.018)	$0.103^{***}$ (0.036)	$-0.020$ (0.083)
Receiving the support (yes = 1; otherwise = 0) - Matched	$-0.164^{***}$ (0.046)	$0.040$ (0.039)	$-0.128^{***}$ (0.033)	$-0.009$ (0.026)	$0.149^{***}$ (0.045)	$-0.195^{**}$ (0.083)

Notes: Each coefficient (coef.) is a separate estimate of equation (2). Standard errors in parentheses.  $***p < 0.01$ ,  $**p < 0.05$ .



received LGS were less likely to engage in cultivation compared to similar households that did not receive any support. The receipt of support significantly reduced the likelihood of relying on forest-based activities. A statistically significant decline in the number of livelihood strategies employed by the household correlates with receiving support. This finding indicates that households receiving support tended to engage in fewer types of livelihood activities than their matched counterparts who did not receive assistance. Receiving government support is also associated with a significant increase in the probability of engaging in business activities, suggesting that supported households were more inclined to pursue business ventures.

## 5 Discussion

Provisioning social protection programs for people during the COVID-19 pandemic plays a crucial role in mitigating its adverse effects and fostering socio-economic development, particularly for vulnerable households [3,20,29,30]. By providing effective support packages to individuals affected by the pandemic, communities are better equipped to overcome the challenges it poses, thereby contributing to political, economic, and social stability [35]. Accessing support is regarded as a significant avenue that encourages individuals' capability to make adaptive decisions and fortifies their ability to cope with the pandemic [44]. Thereby, this study contributed to understanding the factors influencing household access to LGS during the pandemic and the subsequent impact of this support on livelihood strategy choices among households. The study's findings provide valuable insights into the dynamics of support distribution and its effects on household adaptation mechanisms.

The results of factors determining access to support (Table 2) indicated that government assistance during the pandemic was aimed at specific groups, particularly poorer households. Consistent with the objectives of social protection programs during crises [4], households classified as poorer had a significantly higher likelihood of receiving support compared to their non-poor counterparts. This finding confirmed that government interventions acted as social protection policies, targeting vulnerable individuals based on their economic fragility resulting from the impact of COVID-19. For instance, the Vietnamese government issued Resolution No. 42/NQ-CP, which outlines measures to assist those experiencing difficulties due to the pandemic, including cash aid for poor and near-poor families. Households headed by younger individuals were more likely to receive support from the

government. This outcome is contrary to the findings of Ali and Khan [20], who indicated that the age of the household head had a positive effect on access to food support during the pandemic. However, young groups often face disproportionate economic disruptions [5], and they may be prioritised for government support if they lose their jobs during the pandemic.

Our findings emphasised that households whose family members are derived from membership in agricultural cooperatives have a strong positive influence on access to support. This outcome underscores the vital role of social resources (e.g., connection between authorities and organisations) in facilitating access to various support sources to respond to the pandemic [6,27,28]. In this context, agricultural cooperatives in Vietnam likely functioned as essential information hubs and potentially facilitated the confirmation and application processes for their members seeking access to support from local authorities. In particular, this finding aligns with the COVID-19 support packages implemented by the Vietnamese government, such as Resolution No. 105/NQ-CP, which aimed to assist enterprises, cooperatives, and business households. These social protection policies highlight the restoration and enhancement of production and business operations for firms, cooperatives, and households, particularly post-pandemic. Furthermore, the significance of the household's vegetable land area, while small in coefficient magnitude, suggests potential targeting related to specific agricultural activities deemed vulnerable during the pandemic. The COVID-19 pandemic disrupted farm households' ability to perform normal agricultural activities [24]. In response to these challenges, local authorities, along with civil society organisations across regions and provinces of Vietnam, supported farm households (e.g., in Lam Dong Province) in marketing agricultural products to mitigate the adverse effects of the pandemic on the agricultural sector. In developing countries like Sri Lanka, vegetable farmers adversely affected by the pandemic require governmental financial assistance to offset their income losses [15].

The findings of the study indicated that the gender of the household head, access to credit, and membership in Farmers' Unions were positively correlated with access to support, and the factors were not deemed significant. The positive correlation between gender and access is likely due to the fact that female-headed households are at a disadvantage in terms of receiving pandemic-related support, such as cash benefits [20]. Farmers Union members are more informed than non-members, which improves their ability to access support policies. The positive correlation between access to credit sources and access to LGS is a consequence of Vietnam's social protection policies,

which were designed to provide monetary and credit support to households and businesses that were impacted by the pandemic. In this study, COVID-19-related health risks, membership in the Women's Union, and ownership of rice and aquaculture land were negatively correlated with access to the LGS; however, these factors were not significant.

Our study confirms that during COVID-19 outbreaks, the level of livelihood diversification (average 1.11 strategies) among households was low, with cultivation being the most common activity (Table 2). This finding is in line with the outcomes of Gupta *et al.* [6], who indicated that livelihood opportunities for households in rural areas are drastically reduced by the pandemic. The results from the propensity score matching analysis provide insights into how receiving LGS influenced these strategies (Table 4). The outcomes suggest that the government support facilitated a shift in livelihood activities, from on-farm towards off-farm. Households receiving support significantly reduced their engagement in cultivation and forest-based activities while simultaneously increasing their involvement in business activities. Thereby, households that possess agricultural land, particularly extensive vegetable areas, and are members of agricultural cooperatives have the potential to engage more actively in the agricultural business sector through government interventions. These interventions may encompass both financial and non-financial support, especially in market-orientated strategies and plans.

The local government's diverse support programs might assist households in shifting livelihood activities adopted in response to the effects of the pandemic and in promoting the recovery of their livelihoods post-pandemic, particularly with respect to business. A significant decrease in the total number of livelihood strategies among supported households might lead to an accumulation of livelihood resources toward a potential specialisation plan. Enhancing alternative techniques, providing financial assistance, promoting new technologies and service delivery, and implementing agile, flexible, timely, tailored plans for vulnerable households are crucial for improving their livelihoods, reducing vulnerabilities, and coping with the pandemic [3,15,24,35,44].

In the study, the comparison between unmatched and matched results underscores the importance of controlling for selection bias. The effects on crop cultivation and livelihood diversification only emerged as significant after matching, indicating that initial differences between supported and non-supported groups obscured the real effect of the local government's support. In other words, the impact of receiving support on the household's livelihood choices is shown in the investigation, which employs

propensity score matching to address selection bias and endogeneity issues.

## 6 Conclusion

This study investigated the factors associated with access to government support during the COVID-19 pandemic among vulnerable households in four provinces in Central Vietnam and assessed the impact of this support on their livelihood strategy choices. The study explored demographic and socioeconomic characteristics of households on access to LGS during the pandemic. Notably, poorer households and those headed by younger individuals were significantly more likely to receive assistance. Membership in agricultural cooperatives emerged as a strong positive determinant of access to this support. Involvement in specific agricultural activities, particularly vegetable cultivation, increased the likelihood of receiving government support. Our results also confirmed that receiving government support significantly influenced the household's livelihood strategy choices. Supported households were significantly more likely to engage in business activities and rely less on livelihood diversification, cultivation, and forest-based activities compared to similar non-supported households. Therefore, several implications may be drawn from the findings of this study.

The study significantly contributes to the literature on social protection policy, particularly in developing countries during COVID-19 like Vietnam, by examining the demographic and socioeconomic characteristics of households that access government support and the variations in livelihood strategy choices among vulnerable households. It contributes to the current understanding of the likelihood that vulnerable households reported accessing government support, as well as the impact of government social protection policies on their livelihoods during the pandemic. It can be affirmed that the socioeconomic features of vulnerable households, such as family businesses and farm households, should be considered a priority in designing and implementing government support programs for coping with crises, like COVID-19.

The results of this study underscore the importance of receiving targeted government assistance interventions during COVID-19, particularly for vulnerable households in Vietnam. It is recommended that enhancing government support policies' response to COVID-19 not only merely provide temporary support but also actively facilitate households' adaptive livelihood pathways. While government support interventions successfully reached poorer

households, the significant influence of cooperative membership suggests potential gaps in reaching households equally outside these networks. Extending outreach channels beyond existing formal structures to access information about support programs should be considered to ensure equitable access for all eligible, vulnerable groups, such as by potentially leveraging local community leaders and other informal networks.

Furthermore, local authorities should actively partner with and strengthen the capabilities of agricultural cooperatives and community-based organisations. This could serve as an effective intermediary for disseminating information, identifying beneficiaries, and potentially distributing support, thereby enhancing the efficiency and reach of support policies. Since expanding crops is important for gaining government support during COVID-19 and depends on farming, agricultural assistance programmes could include offering technical advice and facilitating market access. Policymakers and other stakeholders should encourage and support investments for younger household heads participating in business as startups. Integrating support packages (e.g., business development and skill training) with longer-term livelihood development initiatives for households could facilitate a shift towards farm and non-farm businesses, particularly during and after the pandemic.

While the study provides helpful information concerning the influence of household characteristics on access to LGS during COVID-19 and the subsequent effects of that support on livelihood strategies, it is crucial to acknowledge its limitations. First, traditional propensity score matching, which uses data from a single point, may only consider visible traits when making choices; it does not take into account hidden factors that could affect both receiving support and livelihood choices. To overcome the limitations and account for time-invariant unobserved variability, further studies may employ alternative methodologies or panel data. The current study only examined access to local government assistance during COVID-19; nevertheless, multiple outbreak waves transpired at different intervals, and the government's support interventions intended to aid vulnerable populations were temporally constrained and contingent upon numerous beneficiary selection criteria. Further longitudinal data analysis can reveal the effects of types of government support policies (e.g., cash, in-kind supports, selected criteria, and implemented periods) and household livelihood strategy changes before, during, and after the pandemic. A comparative analysis across districts, provinces and regions in Vietnam can improve the generalisability of the study's findings.

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