Analyzing the status of multidimensional poverty of rural households by using sustainable livelihood framework: policy implications for economic growth

Shah Fahad1 · Huong Nguyen-Thi-Lan2 · Dung Nguyen-Manh2 · Hiep Tran-Duc2 · Nguyen To-The2,3

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Abstract
Poverty is a multifaceted and location-based issue that cannot be quantified using monetary metrics alone. This study aims to evaluate the multidimensional poverty status of poor households in Ha Giang province, Vietnam, by using the DFID (Department for International Development) sustainable livelihood framework, an integrating technique for spatial recognition of multidimensional poverty, was developed and deployed to conduct a county-level poverty assessment in rural Vietnam. The multidimensional poverty standard is considered a novel approach to assess poverty, identify causes of poverty, and encourage poor households to sustainably escape poverty. A household survey was conducted in three rural districts, namely Dong Van, Hoang Su Phi, and Bac Quang in Ha Giang province, Vietnam, during 2016 to 2021. The results of the study show that surveyed households are deficient in all five main sources of livelihood, in which the three most deficient capital sources are natural capital, social capital, and financial capital. The findings revealed that the majority of farming households were classified as multidimensionally poor. The multidimensionally poor regions were not only poorer in single-dimensional and aggregate ratings than the income-poor and recognized poor regions, but they also had several vulnerabilities and insecurity. The assessment of multidimensional poverty, by distinguishing the poor, marginalized, and dispossessed dimensions, should be extremely beneficial for each region to design and execute poverty reduction programs accordingly, and it would contribute to improving the persistence of alleviating poverty. The article also proposes a number of sustainable poverty reduction measures, in which the root is to improve the spirit of self-raising to escape poverty of households.

Keywords Multidimensional poverty · Sustainable livelihoods · Financial growth · Geographic identification · Economic growth

Introduction
Poverty reduction is a primary goal of equitable and sustainable development, which has received extensive attention from the academia. Since the application of Decision No. 59/2015/QD-TTg issued by the Vietnamese government in 2015, multidimensional poverty standards have been widely applied to evaluate poverty. The multidimensional poverty standards help to clearly identify the causes of poverty, thereby supporting the poor to leave themselves out of poverty sustainably by themselves. After several years of implementing poverty reduction based on multidimensional poverty standards, Vietnam has achieved a decreasing overall multidimensional poverty rate, from 9.9% in 2016 to 4.5% in 2020 (Nguyen-Thi-Lan et al. 2021)

Ha Giang, a mountainous northern province of Vietnam, is among the poorest provinces in the country. Therefore, the
National Target Program for Sustainable Poverty Reduction has paid much attention and has provided support on sustainable poverty reduction and social security policies. Therefore, the poverty rate in Ha Giang province has decreased from 43.65% in 2016 to 22.53% in 2020. However, in addition to the achievements in poverty reduction, there are also some challenges posed by poverty reduction in Ha Giang. For example, the decreasing poverty rate is not sustainable, the number of new-poor households is still high, mainly in 6 districts under 30a Program (Fast and Sustainable Poverty Reduction Support Program for 61 Poor Districts), and many fall back to poverty after escaping. Another problem is that the poverty rate tends to increase (over 16% of the population) when applying the new poverty line for the period 2022–2025, since there are higher assessment standards. The problem is even more severe in the context of COVID-19, when the economy slows down and resources for poverty reduction are not available. Moreover, poor or re-impoverished households in this locality mainly are people who live in mountainous, remote, and isolated areas or those who are completely unaware of their goal of escaping poverty. They live mainly in rural areas and are ethnic minorities, so their livelihood is primarily focused on agriculture (Baloch et al. 2022; Nguyen-Anh et al. 2022). Finding new ways to raise incomes is vital in case main livelihood activities do not sustain their lives (Guo et al. 2022; Mao et al. 2020; Su et al. 2021a; Yang et al. 2022a; Wang et al. 2022a).

In the context of the above challenges, the most effective solution for sustainable poverty reduction actually comes from the household’s own resources. Sustainable livelihood approach (SLA) gives a better understanding of the livelihoods of poor households. It is a multidimensional, integrated, and rational approach to eradicating poverty, showing the variety of activities people usually do to earn a living, from which an overview can be drawn on human livelihood activities (Song et al. 2022a; Song et al. 2022b; Kamaruddin and Samsudin 2014; Su et al. 2021b). Poverty identification focuses primarily on individuals/households or regions of varying dimensions. Poverty assessments in regions and countries with marginal or dispersed communities of poor people tend to assess and target residents, whereas proceedings in regions and countries with dense populations of poor people consolidated in specific areas, such as Vietnam, generally prefer to identify spatial components. Due to the characteristics of rural poverty in Vietnam, the authorities must implement pro-government measures on the basis of geographical targeting data. As a result, this study will conduct a county-level locational assessment. Primarily, this study is aiming at increasing the effectiveness of poverty reduction initiatives in rural Vietnam by understanding problems of poverty from a multifaceted and dynamical perceptive. Furthermore, by asserting a progression in the multidimensional poverty assessment strategy, this study hopes to contribute to the global poverty assessment, particularly in developing regions with substantial persistent poverty and a relatively concentrated geographical distribution.

The remainder of this paper is organized as follows: the “Literature review” section reviews the current literature on multidimensional poverty and SLA; the “Materials and methods” section presents data collection and calculation methods; the “Results” section reports and discusses the results; and the “Discussion” section concludes the article.

**Literature review**

The concept of multidimensional poverty is defined as a state in which people do not meet the minimum basic needs of life, clearly showing a lack of capacity (Sabina Alkire and Foster 2011). Sustainable livelihood is a growing issue, especially in developing economies that have increasing levels of poverty, hunger, backward economic, and poor regional agricultural systems. Sustainable livelihoods as integrators will enable policies that address development, manage sustainable resources, and alleviate poverty (Krantz 2001). The SLA is one of the methods that increases our understanding of the livelihoods of poor households. SLA is a multidimensional, integrated, and rational approach to poverty eradication (Kamaruddin and Samsudin 2014; Liu and Xu 2016; Su et al. 2022). The concept and framework of SLA have been adapted by different organizations to accommodate a variety of contexts, problems, priorities, and applications. The main objective of the sustainable livelihood framework is to dive deeper into the real situation of the poor and identify suitable livelihoods for them by planning new programs for the sustainability of the livelihood. The SLA shifts the focus from outputs to people and requires consideration of the main concerns of the poor. Governments have an important role to play in sustaining livelihoods and dealing with economic and natural vulnerabilities, and education is of utmost importance in developing a sustainable livelihood program (Sati and Vangchhia 2017; Yang et al. 2022a, b). Specifically, measuring the shortfall in income assets (Lim and Mansur 2015; Pan et al. 2021) investigates the relationship between these assets and the poverty rate. Furthermore, the balance in these five assets plays an important role in the sustainability of farmers’ livelihoods to recover from shock or stress (Fahad and Wang 2019; Fahad et al. 2022; Wang et al. 2022b).

The five assets of SLA are related to each other as expanding in human and social assets would provide easier access to financial assets (Nguyen-Thi-Lan et al. 2021; Soltani et al. 2012).

The types of poverty and the factors that contribute to poverty show ways to alleviate this situation with a livelihood and its pentagonal property. According to Zhang et al. (2022) and Hu et al. (2022), the SLA is one of the efforts
to eradicate poverty and reduce poverty. There is a new approach in identifying the poverty types to assess multidimensional poverty under the DFID’s SLA method. By comparing the new rate of poor households with the old one, the authors show that there are differences between the current poverty classification in Vietnam and the multidimensional poverty classification according to the SLA method. The DFID livelihood approach includes a set of six foundational principles which are best practice in any intervention which are the following: (1) people-centered, (2) holistic, (3) dynamic, (4) building on strengths, (5) macro-micro link, and (6) sustainability. The livelihood approach should be applied in a flexible manner, but this does not mean that its core principles should be compromised. According to DFID (1999), the key feature of the sustainable livelihood framework is an analysis of five different types of assets or capital that individuals use to build their lives. These assets include the following: (1) human capital, (2) natural capital, (3) physical capital, (4) financial capital, and (5) social capital. The framework shows how a structural system emerges through resources in different contexts.

Human capital is defined as skills, knowledge, labor capacity, and good health that enable people to pursue various livelihood strategies and meet their livelihood objectives. Human capital is a factor of the amount and quality of labor available; the size, skill levels, leadership potential, health state, etc. are the factors that affect human capital at the household level. Human capital (knowledge and labor, or the power to command labor) is required to utilize any of the four other types of assets, in addition to having intrinsic worth. Therefore, it is necessary but not sufficient to achieve beneficial livelihood outcomes. Natural capital is important to all or part of the framework of sustainable livelihoods. Natural capital refers to the stocks of natural resources that generate resource flows and vital services for livelihoods. Natural capital resources can be different; they can be intangible public goods like biodiversity and atmosphere or can be dividable assets utilized directly for production. Natural capital is critical for those who make their living entirely or partially from resource-based activities.

Social capital is the social resources on which people draw when they pursue their livelihood goals. Social capital has a direct impact on the remaining four sources of capital, for example, social networks that facilitate innovation, and will develop knowledge and technology related to human capital. Using social capital, people can improve their financial capital through economic relations. In addition, this type of capital is an important factor that contributes to the happiness of each person. Financial capital refers to the financial resources that people use to achieve their livelihood goals: cash, bank deposits, loans, borrowing or credit, subsidies, giving, or transferring. Financial capital is most likely the most adaptable of the five asset classes, as it acts as an intermediary for exchange. Physical capital consists of the essential infrastructure and producer goods required to sustain livelihoods. Infrastructure refers to physical changes to the environment that enable individuals to meet their basic needs and be more productive, while producer goods are what individuals use to work more efficiently. Infrastructure components such as affordable secure shelter, transport, adequate water supply and sanitation, communications, and affordable electricity clean are needed for sustainable livelihoods. The SLA focuses on developing the appropriate infrastructure for the poor to help them achieve their livelihood goals. Finally, a livelihood is sustainable when all aspects are controlled, which have the potential to enhance livelihood options, and SLA are indispensable for sustainable poverty reduction. Figure 1 illustrates the sustainable livelihood framework.

**Materials and methods**

**Data**

A household survey was conducted in the three districts, representing the three economic subregions of Ha Giang province according to the classification in Decision 206/QD-TTg, which are lowland, western mountainous, and northern high-mountainous subregions. In this first stage by utilizing stratified sampling based on “Decision 206/QD-TTg.” three districts,

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Fig. 1 Sustainable livelihood framework (source: DFID 2005)
namely Ha Giang Bac Quang, Dong Van, and Hoang Su Phi, were selected from Ha Giang province. In the second stage, two communes from each district were selected based on the criteria of the largest population, and in the third stage, 130 households in each commune were randomly selected. However, due to difficult travel conditions, the total number of samples collected in the surveyed area was 744 households. Table 1 shows the number of households interviewed in the study areas.

The survey was carried out in local languages during June to August 2021 by 15 local interviewers who were trained prior to the investigation. A structured questionnaire was used to obtain information on socioeconomic characteristics of households, economic and livelihood status, and access to various livelihood capital. Respondents were household members, either the heads of household or member aged above 18 years, in a family that is a poor or near-poor household. In total, we collected 744 samples. Characteristics of the surveyed households are shown in Table 2.

Methods

Step 1: selection criteria

Based on the Oxford Poverty and Human Development Initiative Global Multidimensional Poverty Index (Alkire et al. 2020), the SLA framework (DFID 1999), and the Decree No. 07/2021/ND-CP by the Vietnamese Government on Multidimensional Poverty Standards, this study selects 18 criteria for evaluating the poverty. These criteria fall into five groups of livelihood assets (capital), including the following: (1) human capital (four indicators); (2) physical capital (eight indicators); (3) natural capital (two indicators); (4) social capital (two indicators); and (5) financial capital (two indicators) (Appendix Table 5).

Step 2: calculating the weight of the indicators

The weight of each criterion which is used in the $i$th dimension is calculated according to Eq. 1:

$$W_i = \frac{1}{m_i - m_j}$$

where $m_i$ is the total number of dimensions considered and $m_j$ is the total number of criteria of dimension $i$.

In this study, the total number of dimensions considered is 5, so each dimension is considered to have a weight of 1/5. In the human capital dimension, there are 4 indicators and each indicator has a weight of 1/20; in the physical capital dimension, there are 8 criteria and each criterion has a weight of 1/40; in the dimensions of natural capital, social capital, and financial capital, each of these dimensions has two criteria and each criterion has a weight of 1/10. To simplify the calculation, the study has a common denominator of 40, so the criteria that account for 1/10 of the weight will have 4 points, the criteria that account for 1/20 of the weight will have 2 points, and the criteria that account for 1/40 of the weight will have 1 point. Even accounting for 1/40 of the weight will have 4 points. The weight and point of each criterion are presented in Appendix Table 5.

Step 3: Calculating the total number of deficiency scores in each dimension of each surveyed household

Step 4: Calculating the total number of shortfalls in all dimensions and converting to the equivalent poverty level according to the framework of OPHI (2018) and the Ministry of Labor, Wars Invalids, and Social Affairs (MOLISA 2014). Table 3 presents the results of the multidimensional poverty assessment according to the SLA.

Results

Multi-dimensional poverty livelihood capital under the SLA

Figures 2 and 3 describe the five livelihood capital sources in three districts and overall 18 selected indicators. Explanation of data is described in Appendix Table 6.

The calculation results of deficiency rate show that there is a difference in the rate of deprivation of the livelihood resources of households in the three studied districts. Dong Van is the district with the highest rate of deficiency in
social and human capital, while Hoang Su Phi is the district with the highest rate of deficit in natural capital. The rate of physical and financial capital shortage is similar in all three districts. Generally, among the five livelihood resources, Ha Giang has the highest insufficiency in natural resources. Physical capital has the lowest shortfall rate. The deficiency rates of livelihood capital sources are greater than 27%.

According to 18 indicators corresponding to five sources of livelihood capital, two criteria that are most lacking are organizations (belonging to social capital) with a shortfall rate of 77.15% and water (belonging to natural capital) with a shortfall rate of 68.68%. The remaining capital sources also have high shortfall criteria, including fuel, 67.34% (physical capital); education, 65.19% (human capital); and forests, 58.87% (natural capital). Only the electric criterion is adequate. In general, the livelihood capital sources of the households here are limited. The insufficiency of forest resources in Hoang

### Table 2 Characteristics of surveyed households

| Characteristics                          | Proportion (%) | Characteristics | Value |
|------------------------------------------|----------------|----------------|-------|
| 1. Gender of household head              |                |                |       |
| - Male                                   | 86.02          |                |       |
| - Female                                 | 13.98          |                |       |
| 2. Household size                        |                |                |       |
| - Under 2 members                        | 12.23          |                |       |
| - 3 to 6 members                         | 75.40          |                |       |
| - 7 to 9 members                         | 12.37          |                |       |
| 3. Education level of household head     |                |                |       |
| - Did not go to school                   | 48.25          |                |       |
| - Attended school but did not graduate from primary school | 16.94 |        |
| - Graduated from elementary school       | 16.67          |                |       |
| - Graduated from secondary school        | 13.17          |                |       |
| - Graduated from high school and higher  | 4.97           |                |       |
| 4. The main job of household head        |                |                |       |
| - Working in the public sector           | 0.13           |                |       |
| - Working in businesses and economic organizations | 0.94 |        |
| - Farming                                | 91.53          |                |       |
| - Freelancing                            | 1.75           |                |       |
| - No main job                            | 5.65           |                |       |
| 5. Average age of household (age)        |                |                | 42.64 |
| 6. Average number of members in the household (people) | 4.42 |        |
| 7. Average household income (VND/person/month) | 424,000 |        |

### Table 3 Conversion table for multidimensional poverty assessment under SLA

| If deficient       | Corresponding score | Poverty level under the SLA |
|--------------------|---------------------|-----------------------------|
| >=3/5 total score  | >=24/40             | Severe poor                 |
| 2/5–3/5 total score| 16/40–24/40         | Poor                        |
| 1/5–2/5 total score| 8/40–16/40          | Near poor                   |
| <1/5 total score   | <8/40               | Non-poor                    |

Fig. 2 Deficiency rate of 5 sources of livelihood capital
Su Phi is the highest compared to other resources, at 82.59%. Furthermore, the fuel and water shortage rate in this area is also quite high, at 80.57% and 77.33%, respectively. The rate of paucity in organization capital in Dong Van is the highest among resources and among the three districts (at 98.98%). The lack of education and latrines in this region is also significantly high (at 79.59% and 68.03%, respectively).

**Multidimensional poverty assessment using SLA**

Results of assessing dimensional poverty using the SLA are presented in Table 4. According to the poverty line for the period 2016–2020, all of the 744 households studied are poor or near-poor, in which only 10 households (equivalent to 1.34%) are out of poverty. However, our findings show that 95.16% of the households surveyed are multidimensionally poor, while only 4.84% of the households are not in the poor group. Multidimensional poor households belong mainly to two groups, the poor group with 46.64% and the near-poor group with 42.27%, and only 6.05% of households in the severely poor group. This can be explained by the difference in the poor household classifying method for each approach. The assessment of poverty according to the old standards, which are based on classification by the government or self-identified, is no longer relevant and does not accurately assess the poverty status of households. The application of SLA for multidimensional poverty assessment is dominant, and it is more accurate to assess poor households because this method considers the lack of resources they have, including the internal resources of households and external support, rather than relying solely on state support.

Dong Van is the district with the highest percentage of poor and severe poor households among the three districts, while Bac Quang is the area with the highest percentage of non-poor and near-poor households.

Figure 4 shows the different poverty groups under the SLA. By assessing the degree of livelihood capital deficiency, this approach divides households into different poor groups based on their total poverty score (Appendix Table 7). Severely poor and poor groups are sorted in 17/18 criteria, near-poor groups are sorted in 16/18 criteria, and non-poor groups are sorted in 14/18 criteria; all 4 groups are not deficient in the criteria of Electric. Regarding the severe poor group, it is the group with the highest deficiency rate in most indicators, of which 45/45 severely poor households are deficient in the Organization criterion; more than 40 households (from 88.98% of households) are deficient in the criteria of water, education, latrines, land, and PCI. Regarding the poor and near-poor groups, the multidimensional poor households in these two groups have a high rate of deficiency, but still lower than that of the severe poor group, and there is no household in the near-poor group that is deficient.
in criteria of the Channel. Finally, about the non-poor group, all households in this group have no deficiencies in criteria of labor, equipment, electricity, and channel.

In summary, considering the deficiency rate of 5 livelihood capital sources under the SLA’s multidimensional poverty assessment, the severe poor group has the most shortages in social and natural capital, the poor group has the highest deficiency rate in natural capital and financial capital, while the near-poor group has the highest deficiency rate in financial capital, and finally, in the non-poor group, the greatest deficiency rate is in physical capital (Fig. 5).

**Discussion**

At the household level, human capital is the quantity and quality of household labor, and this type of capital varies depending on the members of the household, education and occupational skills, ability to manage management, health status, and knowledge. These factors have a direct impact on livelihood development (DFID 1999). The average rate of households lacking this source of capital is the lowest among the five sources of livelihood capital. However, the education level of the household head and members is a relatively high indicator of deprivation. The current educational programs in Ha Giang seem to be ineffective, as expected. As recently, Ha Giang province established 195 Community Learning Centers in 195 communes/wards/towns (Thuy and Thuy-Ha 2019). However, there are very few classes held every year, especially those related to fields that are considered characteristic of vulnerable areas such as primary education unification and illiteracy eradication. Physical capital includes the infrastructure and goods that producers need to develop their livelihoods (DFID 1999). In general, the average proportion of households lacking physical capital is the second lowest, after human capital, among the total surveyed households.

Ha Giang is the first border province in the country to have national grid power to 100% of commune centers, although it is not easy for electric light to reach each village, town, and household. Out of eight criteria, only the criterion of electricity, 100% of households have used electricity in daily life. This is a favorable point for eradicating hunger and alleviating poverty in Ha Giang. However, future electricity policies must consider issues such as increased energy-cost poverty and reliance on traditional energy sources such as coal and biomass from the poor and ethnic minority (Nguyen et al. 2019).

Social capital is the social resources that people use to pursue their livelihood goals, including relationships, networks, group membership, trust, interdependence, and the sharing of information on important informal security networks. Households with high social assets will facilitate innovation, knowledge development, and knowledge sharing, thus increasing human

| Table 4 | Results of multidimensional poverty assessment under SLA by research area |
|---------|--------------------------------------------------------------------------|
|         | Dong Van | Hoang Su Phi | Bac Quang | Total | Rate (%) |
|         | No. of household | Rate (%) | No. of household | Rate (%) | No. of household | Rate (%) | No. of household | Rate (%) |
| Severe poor | 28 | 9.52 | 9 | 3.64 | 8 | 3.94 | 45 | 6.05 |
| Poor | 158 | 53.74 | 126 | 51.01 | 63 | 31.03 | 347 | 46.64 |
| Near-poor | 104 | 35.37 | 107 | 43.32 | 105 | 51.72 | 316 | 42.47 |
| Non-poor | 4 | 1.36 | 5 | 2.02 | 27 | 13.30 | 36 | 4.84 |
| Total | 294 | 100 | 247 | 100 | 203 | 100 | 744 | 100 |

**Fig. 4** Deficiency rate by criteria of poor household under the SLA
capital (Omobowale 2014). According to statistics, social capital is the capital source with the third highest shortfall rate among the five sources of capital at 40.39% of the total surveyed households, the criterion of Organizations having the highest shortfall rate of 77.15%, while Channel is the criterion with a relatively low shortfall rate of only 3.63%.

Natural capital includes resources present in the natural environment that people use to perform livelihood activities such as geographic location, boundaries, soil, water, climate, rivers, mineral products, forests, and biodiversity. Our findings show that this is the capital with the highest shortfall rate among the five sources of livelihood capital in the study area. The hydrometeorological conditions in Ha Giang are similar to those of other mountainous areas. Because there is little or no rain throughout the dry season, groundwater is in short supply. The water shortage results in a high output of energy to fetch water. For this reason, watershed protection and management strategies should focus on the most disadvantaged households. Furthermore, effective groundwater delineation and utilization are crucial for long-term water supplies (Nguyen et al. 2013; Wang et al. 2022c).

The lack of important livelihood resources such as water, forests, and energy is one of the causes of poverty in Ha Giang. Forest resources in Ha Giang are not as abundant as in other mountainous areas of Vietnam and Southeast Asian countries, but that are a source of timber, firewood, mushrooms, fodder, medicinal plants, and some essential animals (Novellino and Bulletin 2000). Due to overexploitation, several rare and precious non-timber forest products and forest products here are in danger of disappearing (Turner and Pham 2015). This also explains the relatively high fuel shortage in the study area, since households here use fuel mainly from woods, which are collected from forests. Afforestation and community forest management programs are the recommended solution to utilize indigenous knowledge and integrate the rights and interests of households in the conservation and development of forest resources (Trang 2022). Hydrometeorological conditions in Ha Giang are similar to other mountainous areas. In the dry season, little or no rain is recorded; therefore, surface water is very scarce. The water shortage results in a high output of energy to fetch water. For this reason, watershed protection and management strategies should focus on the most disadvantaged households. Furthermore, proper delineation and exploitation of the groundwater resource is critical for sustainable water supply (N. T. Nguyen et al. 2013).

According to the results, financial capital has an average shortfall rate of the third highest among sources of livelihood capital. According to the poverty line in the 2016–2020 period for rural areas, the household income line is 700,000 VND/person/month while 78.49% of the surveyed households lack per capita income per month. However, in the 2022–2025 period, the poverty line will increase to 1,500,000 VND, more than two times higher than the previous poverty line. Currently, the average income/year of surveyed households is 424,000 VND/person/month. It is calculated that 38.04% of households will be deprived of this indicator. In the future, if household income is not improved and the gap score is maintained as at present, the number of households in the multidimensional poor group under the sustainable livelihood approach will increase. In our study, access to credit was not a high indicator of deprivation. This shows that credit policies for poverty reduction have reached households in the study area. However, there is not yet a unified credit policy for rural poor that has been promulgated in different documents (Do et al. 2015). This situation leads to fragmentation in credit allocation and overlapping of beneficiaries. Establishing a unified credit policy system through beneficiary planning and establishing a monitoring system based on local community participation is a recommended policy to accurately identify beneficiaries and effective use of credit.
Conclusion and policy implications

Conclusions

With the challenges posed by the reduction of poverty in Ha Giang, the SLA shows that sustainable poverty reduction can only be achieved when people are centered, resulting from the internal resources of each household. The study uses the SLA’s multidimensional poverty assessment criteria to assess the real situation of poor households in Ha Giang province using 18 criteria belonging to 5 sources of livelihood capital, therefore making some recommendations for sustainable poverty reduction. The results of the study show that surveyed households lack in all sources of livelihood capital, in which the three most deficient sources are natural capital, social capital, and financial capital. The rate of multidimensional poor households under the SLA assessment is 86.16%, mainly distributed in two groups, the poor and the near-poor; this figure is lower than the original poverty rate collected from household interviews. The severe poor group suffered the most from social and natural capital deficiency, the near-poor group suffered the most from natural capital deficiency, the near-poor group suffered shortfalls in financial capital, and lastly in the non-poor group, the greatest deficiency rate is in physical capital. The institutions, organizations, policies, and legislation that shape livelihoods are referred to as Transforming Structures and Processes within the livelihoods framework. These policies help people gain access to various types of capital, determine the terms of exchange between these capitals, and determine the returns of any particular livelihood strategy. Transforming Structures and Processes operate from the household to the national level and in all areas from the most private to the most public. At the household level, poor households in Ha Giang have changed their culture and manner of production, reducing forest exploitation and applying more sustainable livelihood activities, such as afforestation, specialty farming, and investing in high-quality breeds of livestock. In addition, the importance of schooling has been recognized among these communities, as more adults are willing to pay for higher education for their children. As a result, human capital has gradually improved in recent years. At the higher government level, the Vietnamese government, as well as local governments, has been assisting poor people in accessing all five above livelihood capitals. Decision No. 135/QD-TTg on Approval of the Socio-Economic Development Program in mountainous, remote, and isolated communes (referred to as Program 135) is one of the most significant attempts of the government to assist people in improving all five types of capital. In Ha Giang province, the local government has developed a plan to support rotational breeding cows for poor households to create motivation for households to develop production and escape poverty sustainably. With the idea of “Give the fishing rod, not the fish,” poor households have been supported with financial capital such as financial support and preferential loans to invest in machinery, facilities, seed, and livestock breeds, thereby improving their production capability. Regarding the attempt to improve physical capital, local governments give housing support to poor households, and also plan resettlement programs for people who live in vulnerable zones of natural disasters or polluted water sources. Furthermore, poor households received technical support to build biogas systems, as well as financial support in electricity prices. With livelihoods primarily based on agricultural and forest production, natural capital, or, in particular, land assets, has been and has always been a particularly important means of production for ethnic minorities and mountainous people. Therefore, the Vietnamese government has clear views and policies on solving the deficiency of residential and productive land to create maximum conditions for ethnic minorities to have residential land and land for production, ensure livelihoods, and rise out of poverty. Human capital, specifically improving the education level of people, has been a priority target of the government. The network of schools has grown widely from preschool to university. In particular, the scale of the network and the quality of education in specialized schools have increased.

Policy implications

However, to ensure sustainable livelihoods for poor households, it is also necessary to have mechanisms and policies to organize the management and organization of appropriate forms of production and business. Regarding the forms of livelihood organization, according to the experience of other countries, the most common forms of livelihood organization are investment projects, collective economy, household economy, and employment. Each form has certain advantages and limitations. Depending on the socioeconomic conditions of each province and each country, an appropriate form of production and business organization is selected to ensure the attraction and continuity of livelihood activities of poor households. Based on an assessment of the current situation in three districts of Ha Giang province, the study also shows that sustainable poverty reduction can only be achieved by synchronously implementing measures, taking the root of the spirit of self-improvement to escape the poverty of the household. To support, the state needs to create conditions for people to participate in the policy-making process to promote their role, “people know, people discuss, people contribute, people inspect, people manage, and people benefit.” In addition, the state must improve the access of households to credit, provide training programs and courses, strengthen agricultural extension, and provide information and communication to poor households. It is necessary for the state to continue to invest in infrastructure development in mountainous, remote and mountainous communes, and ethnic minority areas.
### Appendix

Table 5: Indicators used in multidimensional poverty assessment according to sustainable livelihood approach

| Capitals | Indicators | Weights | Points | Describe the deficiency | Explanatory notes |
|----------|------------|---------|--------|-------------------------|------------------|
| (i) Human | Labors | 1/20 | 2 | The household has not any person of working age or has at least an unable to work person of working age | Modified from Alkire et al. (2020) |
| | Education of household head (Household head Edu) | 1/20 | 2 | Households whose head has not graduated from primary school | Modified from Alkire et al. (2020) |
| | Education of households’ member (Labors Edu) | 1/20 | 2 | No member of the household has not graduated from high school | Modified from Alkire et al. (2020) |
| | Medical | 1/20 | 2 | Households with at least one person aged 6 or older do not have health insurance | Decree No: 07/2021/ND-CP |
| (ii) Physical capital | Equipment | 1/40 | 1 | Household does not own at least one equipment: TV/music system/refrigerator/air conditioner/washing machine/hot tub/computer, laptop, iPad/mobile phone, telephone | Adapted from Alkire et al. (2020) |
| | Production asset | 1/40 | 1 | Household do not own at least one property: buffaloes, cows, horses, pigs, goats, sheep, poultry, waterfowl, birds | Modified from Alkire et al. (2020) |
| | Vehicles of households | 1/40 | 1 | Household do not own at least one vehicles: Motorcycle, motor vehicle, car | Modified from Alkire et al. (2020) |
| | Electricity | 1/40 | 1 | Households have not electricity | Modified from Alkire et al. (2020) |
| | Cooking fuel | 1/40 | 1 | Households cook with solid fuels, such as manure, shrubs, wood, charcoal, coal | Adapted from Alkire et al. (2020) |
| | Housing quality | 1/40 | 1 | Households living in unstable house/apartment (one of the three main structures column/wall/roof has at least 2 structures made of non-durable materials) | Modified from Alkire et al. (2020) |
| | Latrines | 1/40 | 1 | Households have not hygienic latrines | Modified from Alkire et al. (2020) |
| (iii) Natural capital | Agricultural land area | 1/10 | 4 | The household’s agricultural land area is less than 550m² | Modified from Yuniarti (2017) |
| | Source of domestic water | 1/40 | 1 | Households do not have access to clean water sources for daily life (tap water, drilled wells, protected dug wells, rain water, bottled water) | Modified from Alkire et al. (2020) |
| | Forest asset | 1/10 | 4 | Households benefiting from the forest (with afforestation land) | Adapted Decree No: 07/2021/ND-CP |
| (iv) Social capital | Participation in political-social organization | 1/10 | 4 | Members of the household do not join any political-economic-socio organizations | Adapted Decree No: 07/2021/ND-CP |
| | Channels of accessing external information | 1/10 | 4 | Households do not access outside information through at least one channels: telephone, internet, TV, radio, communal radio, newspapers, posters, others | Adapted Decree No: 07/2021/ND-CP |
| (v) Financial capital | Income of household | 1/10 | 4 | Per capita income per month | Adapted Decree No: 07/2021/ND-CP |
| | Access to credit sources | 1/10 | 4 | Households do not have access to credit or accessible to credit but | Adapted Decree No: 07/2021/ND-CP |
| Capital  | Criteria   | Number of households | Percentage (%) |
|---------|------------|----------------------|-----------------|
|         |            | Dong Van | Hoang Su Phi | Bac Quang    | Dong Van | Hoang Su Phi | Bac Quang | Deficiency rate |
| Human   | Labor      | 18       | 5            | 13          | 6.12    | 2.02     | 6.4        | 4.84        |
|         | Education  | 234      | 142          | 109         | 79.59   | 57.49    | 53.69      | 65.19       |
|         | LE         | 188      | 71           | 101         | 63.95   | 28.74    | 49.75      | 48.39       |
|         | Medical    | 35       | 6            | 13          | 11.9    | 2.43     | 6.4        | 7.26        |
|         | Average    | 119      | 56           | 59          | 40.39   | 22.67    | 29.06      | 31.42       |
| Physical| Equipment  | 29       | 6            | 22          | 9.86    | 2.43     | 10.84      | 7.66        |
|         | Production | 39       | 3            | 23          | 13.27   | 1.21     | 11.33      | 8.74        |
|         | Transport  | 81       | 38           | 64          | 27.55   | 15.38    | 31.53      | 24.6        |
|         | Electric   | 0        | 0            | 0           | 0       | 0        | 0          | 0           |
|         | Fuel       | 181      | 199          | 121         | 61.56   | 80.57    | 59.61      | 67.34       |
|         | Housing    | 19       | 108          | 129         | 6.46    | 43.72    | 63.55      | 34.41       |
|         | Latrines   | 200      | 72           | 85          | 68.03   | 29.15    | 41.87      | 47.98       |
|         | Average    | 95       | 77           | 69          | 26.68   | 24.64    | 31.25      | 27.25       |
| Social  | Organization | 291   | 188          | 95          | 98.98   | 76.11    | 46.8       | 77.15       |
|         | Channel    | 16       | 11           | 0           | 5.44    | 4.45     | 0          | 3.63        |
|         | Average    | 154      | 100          | 48          | 52.21   | 40.28    | 23.4       | 40.39       |
| Natural | Forest     | 146      | 204          | 88          | 49.66   | 82.59    | 43.35      | 58.87       |
|         | Water      | 212      | 191          | 108         | 72.11   | 77.33    | 53.2       | 68.68       |
|         | Land       | 92       | 53           | 83          | 31.29   | 21.46    | 40.89      | 30.65       |
|         | Average    | 119      | 129          | 86          | 51.02   | 60.46    | 45.81      | 52.73       |
| Financial| PCI        | 203      | 221          | 160         | 35.88   | 36.74    | 41.5       | 38.04       |
|         | Credit     | 163      | 22           | 30          | 38.18   | 44.38    | 41.81      | 28.9        |
|         | Average    | 183      | 122          | 95          | 37.03   | 40.56    | 41.655     | 33.47       |
Table 7  Deficiency rate by criteria of poor household under the SLA

| Capital | Criteria      | Severe Poor |          | Poor       |          | Near Poor       |          | Non-poor     |          |
|---------|---------------|-------------|----------|------------|----------|-----------------|----------|-------------|----------|
|         |               | No. Obs     | % Group  | No. Obs    | % Group  | No. Obs         | % Group  | No. Obs     | % Group  |
| Human   | Labor         | 16          | 35.56    | 18         | 5.19     | 2               | 0.63     | 0           | 0        |
|         | Education     | 42          | 93.33    | 255        | 73.49    | 177             | 56.01    | 11          | 30.56    |
|         | LE            | 33          | 73.33    | 185        | 53.31    | 131             | 41.46    | 11          | 30.56    |
|         | Medical       | 12          | 26.67    | 26         | 7.49     | 16              | 5.06     | 0           | 0        |
|         | Average       | 26          | 57.22    | 121        | 34.87    | 81              | 25.71    | 6           | 15.97    |
| Physical| Equipment     | 19          | 42.22    | 27         | 7.78     | 11              | 3.48     | 0           | 0        |
|         | Production    | 13          | 28.89    | 37         | 10.66    | 14              | 4.43     | 1           | 2.78     |
|         | Transport     | 34          | 75.56    | 96         | 27.67    | 49              | 15.51    | 4           | 11.11    |
|         | Electric      | 0           | 0        | 0          | 0        | 0               | 0        | 0           | 0        |
|         | Fuel          | 43          | 95.56    | 290        | 83.57    | 154             | 48.73    | 14          | 38.9     |
|         | Housing       | 14          | 31.11    | 124        | 35.73    | 100             | 31.65    | 18          | 50       |
|         | Latrines      | 38          | 84.44    | 196        | 56.48    | 117             | 37.03    | 6           | 16.7     |
|         | Average       | 23          | 51.11    | 110        | 31.70    | 64              | 20.12    | 6           | 17.07    |
| Social  | Organization  | 45          | 100      | 327        | 94.24    | 196             | 62.03    | 6           | 16.7     |
|         | Channel       | 16          | 35.56    | 11         | 3.17     | 0               | 0        | 0           | 0        |
|         | Average       | 31          | 67.78    | 169        | 48.7     | 98              | 31.01    | 3           | 8.33     |
| Natural | Forest        | 43          | 95.56    | 264        | 76.08    | 130             | 41.14    | 1           | 2.78     |
|         | Water         | 40          | 88.89    | 283        | 81.56    | 167             | 52.85    | 21          | 58.33    |
|         | Land          | 40          | 88.89    | 152        | 43.8     | 35              | 11.08    | 1           | 0        |
|         | Average       | 41          | 91.11    | 233        | 67.15    | 111             | 35.02    | 8           | 20.37    |
| Financial| PCI           | 44          | 97.78    | 318        | 91.64    | 213             | 67.41    | 9           | 25       |
|         | Credit        | 14          | 31.11    | 101        | 29.11    | 99              | 31.33    | 1           | 2.78     |
|         | Average       | 29          | 64.44    | 210        | 60.37    | 156             | 49.37    | 5           | 13.89    |
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Data availability Data will be available upon request.

Declarations

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