

Impact of land-acquisition induced resettlement policy on the ethnic household income in mountainous Vietnam

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ABSTRACT

Land acquisition and resettlement issues related to hydropower and irrigation works have always been one of the hot issues in Vietnam mountainous areas for many years. Although the Government has introduced many policies to ensure the rights of resettled people, as well as protect their lives, the effectiveness of these policies seems to be still insignificant, because many resettled people still face many difficulties in their daily life, especially income. The research is conducted within the project titled “The urgent issues in resettlement implementation for the ethnic minorities in Vietnam mountainous areas” and funded by National Council for Science and Technology Policy in 2016-2020 (CTDT/16-20) under Committee for Ethnic Minority Affairs. Applying Likert-scale and Propensity Score Matching (PSM), this study shows that 34% of the resettled households have a lower income, specifically estimated to be 8.0 - 13.1 million VND/household/year or 1.7 - 3.0 million VND/person/year lower than the income of the controlled group. However, agricultural income is not significantly different between resettled households and controlled households. This article only focuses on clarifying the impact of the resettlement policy on the general income and agricultural income of ethnic minority households; while methods to create jobs, increase income, and reduce poverty sustainably for ethnic minority households in the resettlement sites should be conducted in another research in the future.

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1. Introduction

Resettlement is carried out due to the land acquisition for national or local community purposes, such as industrial zones, public works, new rural residential areas, forest protection and development, and especially reservoir constructions for irrigation and hydropower which have a large number of people directly affected, of which, 90% are ethnic minorities living in mountainous areas (Ministry of Agriculture and Rural Development, 2014). In the whole country, there are 152 hydropower and irrigation projects in 34 provinces involving in resettlement until 2020. Among them, 77,429 households have finished their resettlement, accounting for 95.1% of total households needed to be resettled. It is estimated that 81.7% of resettled households participated in concentrated resettlement, while 18.3% are scattered resettlement; and among these resettled households (Ministry of Agriculture and Rural Development (2017); Ministry of Agriculture and Rural Development (2020)).

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The Government policies on implementing land acquisition and resettlement always focus on the principle that the new living of resettled people must be ensured to be at least similar to before resettlement. However, some summaries that reflect the effectiveness of the resettlement program over the years indicated that numerous shortcomings are maintaining in the implementation process of the Government's resettlement policies (Committee for Ethnic Minority Affairs (2014); Ministry of Agriculture and Rural Development (2020)). So, do these shortcomings affect the income of resettled people? To answer this question, the research team has conducted a study for two years during 2018-2019 in 10 mountainous provinces that involve in concentrated resettlement. The study result is used for clarifying the actual impact of resettlement policy on ethnic minority households.

1.1 Literature review

Resettlement has myriads of negative impacts on local communities, such as lack of residential land, production land, public infrastructure, and livelihood (Thanh, 2004). Although resettlement provides new production sites, these places tend to be separate from the residential area. Besides, not all of the resettled households get enough production land. Even having enough land, its quality is not fully adequate with the previous one, which brings difficulties in producing agricultural products, then affects the household income (Nguyễn, 2009). Even in one of the most national key hydropower projects as Son La hydropower, the resettled people still lack production land, specifically, a low amount of 0.22 ha/household for agricultural land and 0.84 ha/household for forestry land on average (Nguyễn, Nguyễn, Trang, & Nguyễn, 2011).

The causes for causing the above situation seem to be:

- The capital for supporting the livelihood of the resettled people is not adequate (Lã, 2009). Most of the projects focus their capital on infrastructure construction, while neglect livelihood support for resettled people. The income restoration process needs long-term support; however, current policies have not mentioned a compulsory requirement towards projects for long-term support. It is a fact that there is no sustainable financial source ensuring support for a long time after completing relocation.
- The resettlement planning does not pay much attention to the consequences that the resettle people must face, which causes the lack of land, jobs, and trading sites and makes these people become poorer (Phạm, 2015; Nguyễn, 2014; Nguyễn, 2015). Indeed, the resettlement areas are usually far from the center and not fully invested with transportation infrastructure, which results in obstacles for both daily movements to the center and transaction development.
- The neglect of Local Government or the poor coordination between the Local Government and project investors in guiding income restoration methods for the resettled people lead to a negative impact on their living (Nguyễn Tiến Dũng & Đặng Khắc Anh, 2016).
- The education and training capacity of the resettled people is not high, which causes food security problems, income decrease, unemployment increase, and expansion of social issues (Nhưng & Thang, 2017). The low capacity also leads to the ineffective usage of compensation money, which indirectly makes the households lack resources for their economic development.

Most of the current studies on the resettlement analysis in Vietnam are qualitative studies, while there are not much of quantitative studies. The current quantitative studies on impact assessment of resettlement policies tend to apply common econometric methods as Ordinary Least Square (OLS) regression (Bui, Schreinemachers, & Berger, 2013), Cronbach Alpha reliability assessment, and exploratory factor analysis (Nguyễn, Đào, & Từ, 2016). However, these study results only help to identify the main impact factors without estimating the income gap between resettled households and unaffected households.

The most popular impact assessment method is the Propensity Score Matching (PSM). This method is introduced by Rosenbaum and Rubin (1983), then developed by Becker and Ichino (2002) and Khandker, B. Koolwal, and Samad (2009). The core of this method is comparing the treated and controlled group basing on propensity score which can be calculated from observed characteristics. Although PSM is an effective method, it has not been applied to compare the resettled group and the controlled group, especially in a wide range of many resettlement projects in the country. Therefore, this study will focus on filling this research gap.

2. Methodologies

This study performs the following sampling steps:

- To choose 10/34 typical provinces involving in hydropower and irrigation resettlement programs, of which, Son La and Lai Chau are in the Northwest region; Tuyen Quang in the Northeast region; Thanh Hoa and Nghe An in the North Central Coast; Quang Nam and Binh Thuan in the Southern Central Coast; Gia Lai and Lam Dong in the Central Highlands, and Binh Phuoc in the Southeast.
- In each selected province, the districts and communes involving the resettlement program for ethnic minorities were chosen. There are two groups selected in these research sites including the resettled group and the unaffected group, which are the people

living in the neighboring communities with the resettled group but not affected by resettlement. These two groups are both interviewed by structured questionnaires consisting of contents necessary for assessing the resettlement impact on economics, social, and living environment. However, it should be noted that in the scope of this article, only the economic side will be selected to represent.

The selection of resettled and unaffected groups was random based on the household lists provided by the Local Government. In each list, the households were numbered from 1 to the end. Then, the research team used a random function in Excel for choosing exactly which households would participate in the interview. In case a selected household did not want to participate, the next random households would be replaced.

The total number of surveyed households includes 1,110 resettled households and 1,200 unaffected ones. However, after cleaning the answer sheet, checking the completeness and reasonableness, only 751 cases of the resettlement households and 816 of the unaffected households (accounting for 67.7% and 68.0% of the interviewed households, respectively) were kept for analysis. Specifically, the sample size is in Table 1.

Table 1

The sample size used for the PSM model

Provinces	Resettled households	Unaffected households	Total by provinces
Son La	108	111	219
Lai Chau	81	120	201
Tuyen Quang	48	126	174
Thanh Hoa	49	66	115
Nghê An	94	54	148
Quang Nam	59	27	86
Gia Lai	70	12	82
Lam Dong	118	51	169
Binh Thuan	75	171	246
Binh Phuoc	49	78	127
Total samples	751	816	1,567

The study applied a 5-scale Likert which is a popular technique introduced by Likert (1932), which is useful for measuring people's attitudes. In this study, the scale is used for measuring the resettled households' attitude towards the income change compared to before resettlement. Of which, the rank from 1 to 5 represents the respective meaning as follows: Greatly Lower, Lower, Same, Higher, Greatly Higher. Then, the responses were summarized and calculated on both the provincial and national average. The project-impact assessment on households' income compared to the controlled group has been recommended to apply the PSM model by Baker (2000), Ravallion (2001), Becker and Ichino (2002), Caliendo (2009), Caliendo and Kopeinig (2008), Khandker et al. (2009), Heinrich, Maffioli, and Vazquez (2010). The specific steps for this method are as follows:

- **Step 1:** To collect similar information from the resettled and unaffected groups, which enables to compare the similarity in Step 3.
- **Step 2:** From the survey data, to run a Logit regression model with $Y(1,0) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$, where Y is the dependent variable (having the value of 1 if the respondents are resettled households, while equal to 0 if being unaffected ones), β is the coefficient and X_i is the independent variables that are detailed in Table 3.
- **Step 3:** From this model, the propensity score is the probability of being a resettled group. This indication has the range from 0 to 1. If a household has a similar propensity score to another one, these two households are considered to have similar characteristics. The calculation function is as follows:

$$P_{\text{score}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n)}}$$

- **Step 4:** Identify the common support for comparison. The impact is estimated from the difference between pairs of resettled and unaffected households with the similarity in observable factors (or propensity score). There are three matching techniques applied in this research, including Nearest-neighbor matching, Radius matching, and Kernel matching.

Nearest-neighbor (NN) matching: The resettled households are matched with the affected households having the most similarity. Specifically, an i resettled household will be matched with a j unaffected one having the nearest propensity score to the i household.

$$\min \| p_i - p_j \|$$

Radius matching: An i resettled household will be matched with a j unaffected one having the nearest propensity score to the i household but in a specific radius. This matching will reduce the bias caused by NN matching in case the propensity score distance within a matching pair is too wide.

$$\| p_i - p_j \| < r$$

Kernel matching: An i resettled household will be matched with a weighted average of all j unaffected ones, while weight and propensity score distance within a matching pair have an inverse relationship. The weight is calculated by the functions:

$$w(i, j) = \frac{K\left(\frac{p_j - p_i}{h}\right)}{\sum_{j=1}^{n_0} K\left(\frac{p_j - p_i}{h}\right)}$$

In which, h is a smoothing parameter called bandwidth, which is used to compute the common weight for all of the matchings.

- **Step 5:** To calculate the Average Treatment Effect (ATE)

ATE is the difference in the outcome (such as income, expenditure...) between the two groups and calculated by the functions:

$$ATE = \text{The average outcome of the resettled group} - \text{The average outcome of the unaffected group},$$

where the resettled and affected groups will be identified based on different matching methods, which means each different matching method will result in a different ATE value. After that, a simple t-test will be applied to checking if the ATE has a significantly statistical meaning or not. In case the ATE has significantly statistical meaning, especially across matching methods, it can be concluded that there is a real difference between the two groups.

3. Findings and Discussion

3.1 The impact assessment of the resettled households on their income measured by the Likert Scale

714/751 respondents are giving their assessment on the current income compared to before resettlement, accounting for 95.1% of the sample. The average response was 2.854 with a standard deviation of 0.916 (Table 2). This average shows that the resettled households seem to have a lower or similar income compared to before resettlement because 2.854 stays between 2 and 3 – the value representing for Lower and Same income, respectively. The lowest assessment was found in Quang Nam with an average of 2.377, and the highest in Binh Thuan with an average of 3.365.

Table 2

Descriptive statistics: Impact assessment on the income

Provinces	N	Min	Max	Mean	Std. Deviation
Binh Phuoc	47	1	5	3.085	0.905
Binh Thuan	74	2	5	3.365	0.821
Gia Lai	70	1	5	3.057	1.006
Lai Chau	80	2	4	2.688	0.880
Lam Dong	116	1	5	2.897	0.715
Nghe An	91	1	4	2.626	0.839
Quang Nam	53	1	4	2.377	0.713
Son La	86	1	5	2.860	1.139
Thanh Hoa	49	1	4	2.796	0.935
Tuyen Quang	48	1	4	2.729	0.869
Total	714	1	5	2.854	0.916

Source: Authors' calculation from the survey in 2018-2019

The rate of having a lower income is considerably high (Fig.1), which is 38% (34% with the assessment of 'lower' while 4% with 'greatly lower'). Lai Chau has the highest proportion (59%) of resettled households assessing that they have a lower income, the next ones are Nghe An (56% including 54% of 'lower' and 2% of 'greatly lower') and Quang Nam (56%, including 47% of 'lower' and 9% of 'greatly lower').

There are 36% of resettled households having an unchanged income compared to before resettlement, of which, Lam Dong gets the highest rate of 59%, while Son La owns the lowest rate of 15%. Only 26% of resettled households indicated that they have a higher income (including 23% of 'higher' and 3% of 'greatly higher'). Among provinces, Son La has the highest rate of higher-income assessment (40%, including 38% of 'higher' and 2% of 'greatly higher'). The next one is Binh Thuan (39%, including 30% of 'higher' and 9% of 'greatly higher'). It should be noted that Son La, the province with the highest rate of higher-income assessment, still has a significant lower-income assessment (44%, including 31% of 'lower' and 13% of 'greatly lower'). Binh Thuan although not having 'greatly lower', still has 12% of 'lower'.

This Likert Scale result implies that a large part of resettled households has a lower income compared to before resettlement. However, it is still not clear if this income gap between the two groups is significant or not. Therefore, the PSM model should be applied to answer these questions.

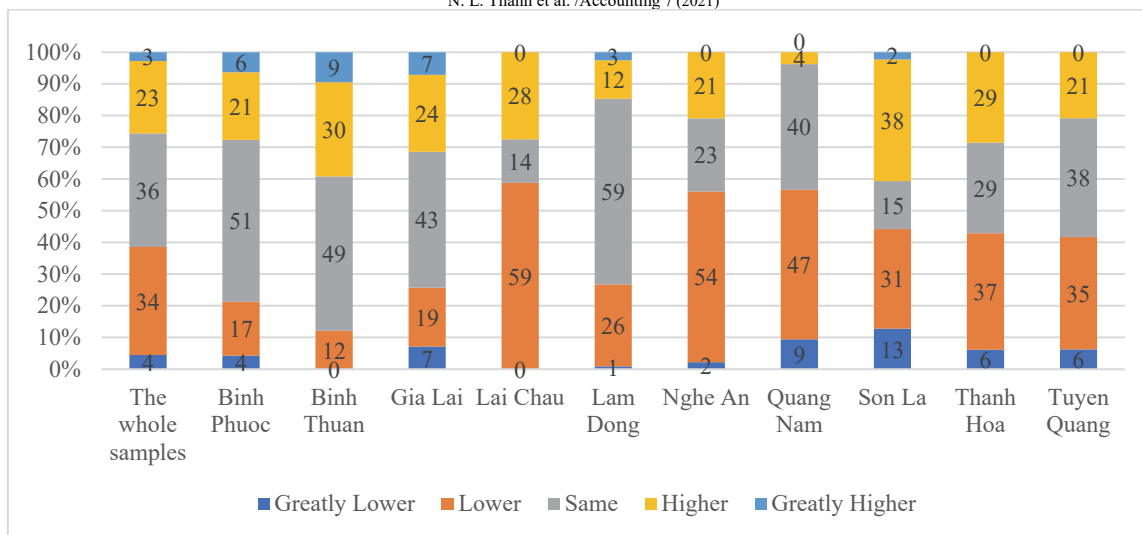


Fig. 1. Proportion of the impact assessment of the resettled households on their income by provinces

Source: Authors' calculation from the survey in 2018-2019

3.2 The impact assessment estimated by the Propensity Score Matching model

The statistical description of the factors affecting the income households, which are independent variables in the Logit model, is shown in Table 3. The t-test is also applied to identify if the difference between the two groups is significant or not. The significant result shows that resettled households have higher household member compared to unaffected on (4.948 people per household compared to 4.570 people); however, less proportion of household heads in working age (83.6% compared to 88.6%), less agricultural land (1.987 ha compared to 3.630 ha), more saving proportion (7.7% compared to 2.9%), less borrowing (40.5% compared to 53.7%), less investing in agriculture (37.2% compared to 46.7%), having fewer production assets (0.565 assets per household compared to 0.717).

Table 3

The statistical description: Factors affecting the income households

Independent variables	Unit	Resettled	Unaffected	Difference	p-value
Household member	person	4.948	4.570	0.378***	0.000
Education of household head	year	1.490	1.574	-0.084	0.142
Working age of household head	dummy	0.836	0.886	-0.05***	0.004
Agricultural land	ha	1.987	3.630	-1.644***	0.000
Saving	dummy	0.077	0.029	0.048***	0.000
Loan	dummy	0.405	0.537	-0.132***	0.000
Agricultural investment	dummy	0.372	0.467	-0.095***	0.000
Numbers of household living assets	number	5.244	5.283	-0.039	0.819
Numbers of household production assets	number	0.565	0.717	-0.152***	0.004

Note: *, **, *** indicate the significance level at 10%, 5%, 1% levels, respectively.

Source: Authors' calculation from the survey in 2018-2019

This study will evaluate the resettlement impact on households through three outcome variables: total household income, income per capita, and agricultural income.

The Logit regression (more detailed in Appendix), which enables to calculate propensity score later, shows that there are 6 independent variables has a significant relationship with the fact that a household is resettled or unaffected; of which, 2 variables have a positive correlation (Household member and Saving), while 4 variables have a negative correlation (Agricultural land, Loan, Agricultural investment, and Numbers of household production assets). There is no detection of multicollinearity and heteroscedasticity phenomena among these variables.

The propensity score is estimated from the Logit model above. Regarding resettled households, the propensity score value ranges from 0.139 to 0.893 and the propensity score mean of this group is 0.514. For the unaffected group, the propensity score value ranges from 0.177 to 0.858 and the mean is 0.448. Thus, the common support of the two groups ranged from 0.139 to 0.858. Inside the common support, there are 1,565 households, including 749 resettled households and 816 unaffected ones. Households inside the common support are matched along with three methods namely Nearest-neighbor (NN) matching, Kernel matching, and Radius matching. The most important point is that after performing the propensity score-based matching, the

difference between the two groups will be more accurate. The Average Treatment Effect (ATE) will be calculated from the average of the difference in each matching pair, which is shown in Table 4.

Table 4

The income difference identified by the PSM model

Outcome variables	Matching method	Resettled	Unaffected	Difference	SE	t-test	
Total household income (million VND/year)	Unmatching	60.230	66.113	-5.884**	2.812	2.09	
	Matching	NN	60.261	73.316	-13.055***	5.048	2.59
		Kernel	60.261	69.020	-8.759***	3.027	2.89
		Radius	60.199	68.201	-8.002***	3.106	2.58
Income per capita (million VND/person/year)	Unmatching	13.608	15.997	-2.388***	0.755	3.16	
	Matching	NN	13.611	16.632	-3.021**	1.345	2.25
		Kernel	13.611	15.349	-1.738**	0.811	2.14
		Radius	13.675	15.366	-1.691**	0.834	2.03
Agricultural income (million VND/year)	Unmatching	24.629	26.689	-2.060	2.131	0.97	
	Matching	NN	24.668	23.982	0.686	3.764	0.18
		Kernel	24.668	24.978	-0.310	2.300	0.13
		Radius	24.618	24.490	0.128	2.368	0.05

Note: *, **, *** indicate significance at 10%, 5%, 1% levels, respectively.

Source: Authors' estimation from the survey in 2018-2019

In NN and Kernel methods, the matching and comparison are conducted between 749 resettled households and 816 unaffected ones, but in the Radius method, the selection of 0.01 radius reduces the sample size to 714 resettled households and 816 unaffected ones. Because the propensity score distance within a matching pair is wider than 0.01, the resettled observation will be considered as unmatchable.

The total household income: The NN-matching shows that the difference between the two groups is 13.1 million VND/year, while Kernel matching shows 8.8 million VND/year, and Radius matching shows 8.0 million VND/year. All of these results have a 1% level of significance. Thus, the resettlement influences negatively the households' income with a reduction from 8.0 – 13.1 million VND/year.

The income per capita: The NN-matching shows that the difference between the two groups is 3.0 million VND/person/year, while both Kernel and Radius matching show 1.7 million VND/person/year. All of these results have a 5% level of significance. Thus, the resettlement influences negatively the income per capita with a reduction from 1.7 – 3.0 million VND/person/year.

This result is similar to many other domestic and international studies related to resettlement such as Scudder (2011), Bui and Schreinemachers (2018), Kura, Joffre, Laplante, and Sengvilaykham (2014), which affirmed that the income increase only occurs in the first year after resettlement when the resettled people receive a great amount of compensation money. However, after that, the income will decline. In the other words, in the long term, the income of the resettlement households is highly unsustainable.

The agricultural income difference in all of the three matching methods is insignificant. It is worth noting that agricultural income accounts for 40.8% of total income (resettled households) and 36.4% (unaffected households), which implies that the difference in total income mostly caused by the difference in non-agricultural income.

4. Conclusion and implications

In general, the economic goal of the “new place is better than the old one” policy has not been achieved in many provinces. According to the Likert Scale, a large part of resettled households rated their income as reduced or unchanged compared to before. This disappointment is even very high in some provinces such as Lai Chau, Nghe An, and Quang Nam.

Through the PSM model, the study also demonstrated that the implementation of the resettlement policy resulted in an income reduction to the resettled households compared to the unaffected households. The household income gap of 8.0-13.1 million VND/year or income per capita gap of 1.7 - 3.0 million VND/person/year is highly considerable. Especially for the poor and pro-poor households, this gap is even equal to a high proportion of their income. It can be said that although the Government has issued many policies to ensure the living of resettled people, these actions have not brought much effectiveness.

It should be noted that although the resettled households have less agricultural land, the agricultural income between the two groups is not significant. Therefore, the well-known suggestion about giving more agricultural land for the resettled households for helping them to increase their income should be considered, because possibly this suggestion may not create an effective result as expected. Indeed, the average agricultural income around 24.6 million VND/year as the current is quite low and unable to contribute to improving the resettled households' living and eradicating their poverty sustainably. However, agricultural income still accounts for a large part of the resettled households' income structure, so it is still highly worth upgrading the agricultural sector in the resettlement area. Unfortunately, this article just focuses on impact assessment of resettlement on the

income of ethnic minority households without analyzing opportunities to increase income, create jobs, and reduce poverty sustainably for these people, which need a greater effort into researching due to its complication and difficulties. In particular, the lack of qualified transport infrastructure systems that help to connect support services for commercial agricultural development, or the weak linkage between farmers and enterprises caused by unattractive investment into remote areas, which are hindering the production technology transfer and market connection for the resettled households, are all needed to be investigated carefully from a more comprehensive view. It is expected that in future researches this research gap will be sealed, which will highly contribute to helping the resettled people to attain a real better life.

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