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The influence factors analysis of households' poverty vulnerability in southwest ethnic areas of China based on the hierarchical linear model: A case study of Liangshan Yi autonomous prefecture

Mengtian Cao [a, b], Dingde Xu [a, b], Fangting Xie [a, b], Enlai Liu [a, b], Shaoquan Liu [a, *]

[a] Institute of Mountain Hazards and Environment, Chinese Academy of Sciences & Ministry of Water Conservancy, #9, Block 4, Renminnan Road, Chengdu, 610041 Sichuan, China
[b] University of Chinese Academy of Sciences, No.19A Yuquan Road, Beijing, 100049, China

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ABSTRACT

Currently, vulnerable poverty has become the main factor that constrains ethnic minority area development and the improvement of rural household living standards in China. This study examines the Liangshan Yi Autonomous Prefecture with reference to the existing research framework and employs a complete two-layer linear model to identify critical factors that affect rural household poverty vulnerability levels. The model results show that critical variables affecting poverty vulnerability at the household level include Laborers scale, Laborers education, House scale, Value of a house, Disease costs and Disaster loss. Of these, House scale has a negative effect on the dependent variable, while the remaining variables have positive effects. At the village level, critical variables of poverty vulnerability include Poverty village, Poverty proiect, Yi village, Village road mileage and The distance from villages to the center of towns. In using this method, a simultaneous measure for households that employs both family and village level variables was achieved, enabling an investigation of impacts across these two layers. These results are critical to the future of poverty alleviation in China's ethnic minority regions. Accordingly, some policy suggestions were provided based on this results.

1. Introduction

Poverty is a worldwide problem that hinders human survival and development. Poor areas in China are primarily rural regions that are characterized by harsh ecological environments, isolated geological locations insufficient public services and infrastructures, and ethnic minority populations. For instance, by the end of 2013, there were 11 poor counties in Liangshan Prefecture, occupying 64.71% of all administrative districts at the county level. Poor counties that are connected to one another in Liangshan Prefecture cover as much as 40,000 km^2, accounting for over 66% of the entire Prefecture and rendering the area one of few ethnic minority regions connected to poor areas (National bureau of statistics of China, 2014). Rural households in these ethnic minority areas not only suffer from poor livelihood assets but are also vulnerable to multiple risks such as natural disasters, market fluctuation, policy changes and diseases outbreaks, further trapping them in the vicious circle of long-term poverty (Dercon, 2009; Berg, 2010). Hence, vulnerable poverty has become the main factor that constrains ethnic minority area development and the improvement of rural households living standards in China.

The first conceptualization of "poverty vulnerability" (PV) was officially acknowledged by the World Bank in its 2000–2001 World Development Report. The concept refers to the degree of individual or family risk exposure to wealth loss or to living standard falling below a certain socially acceptable level (Mujumdar, 2001). As a dynamic process of gradual risk accumulation, it accounts for the two dimensions of poverty and vulnerability. In terms of poverty, it refers to the poverty at which basic human needs are not met (protection from starvation, physical health maintenance, etc.) (Alkire & Foster, 2011). Vulnerability, according to this definition, refers to an ex-ante analysis of family benefits, serving as an initial prediction of risks and impacts, whereas poverty is more of a post-estimation (Anyanwu, 2005; Howe & McKay, 2007; Osawe, 2013;

* Corresponding author.
E-mail addresses: caomengtian@imde.ac.cn (M. Cao), xudingde@imde.ac.cn (D. Xu), xiefangting@imde.ac.cn (F. Xie), enlailiu@imde.ac.cn (E. Liu), liushq@imde.ac.cn (S. Liu).

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Sricharoen, 2011). The PV analysis framework can be divided into three categories: the first is that of the Sustainable Livelihoods Framework (SLA) raised by the UK Department for International Development (DFID). This analysis involves rural household livelihood assets allocation research and seeks the optimal asset organization approaches and livelihood strategies through an analysis of the potential risk elements, thus promoting sustainable livelihood growth and limiting vulnerability (DFID, 1999). The second category is a research framework that stresses and that explores risks associated with assets, income and benefits in household production and living. This framework integrates various resources, sources of income, forms of consumptions and related policies on the rural households into one system (Dercon, 2002). The third category emphasizes internal processing abilities, which concern the degree of impact resistance, security and disasters insufficiency (Ellis & Bahiigwa, 2003; Ellis, Kutengule, & Nyasulu, 2003). Of these three categories, because the SLA serves as a consistent target for rural area development and poverty alleviation in developing countries, the third is the most widely applied. Several scholars have employed this framework when conducting vulnerability assessments in poor areas in Africa, South Asia and Pacific Oceans regions (Elasha, Elhassan, Ahmed, & Zakieldin, 2005; Nunan, 2010; Park, Howden, & Crimp, 2012; Siegel, 2005).

PV studies have focused on measuring PV and related impacting factors. In measuring PV, scholars mainly employ welfare change and family consumption variables to measure vulnerable risk and sensitivity levels (Glewwe, & Hall, 1998; Jalan & Ravallion, 1999); future consumption expectation effectiveness and poverty line are adopted as vulnerability measure values, and expected Epα values of the family FGT poverty indicator are used to estimate vulnerability. When $\alpha = 0$, Epα denotes the probability that income or consumption levels will be lower than the poverty line level, which is the most commonly used demonstration measure (McCulloch & Calandrino, 2003; Ligon & Schechter, 2004; Zhang & Wan, 2009). In macro scale impacting elements analysis, most researchers have examined effects of environmental change, policy reformation, market fluctuations and social security (Dercon, 2006; Gan, Xu, & Yao, 2007); At the micro level, scholars have examined family scales and structures, household features, family member professions, living conditions and family asset structures in exploring factors that affect PV (Chaudhuri, 2003; Kühl, 2003; Kurosaki, 2006; Abuka, Atingi-Ego, Opolot, & Okello, 2007; Hossain, 2007). In addition, there are scholars from natural disasters, climate change and ecological degradation research perspective to explore the influence factors of PV (Hahn, Riederer, & Foster, 2009; Zhang & Zhuang, 2011).

However, the studies on the PV and impacting factors described above have focused on the family scale while only considering a with few effects at the village level. Moreover, most scholars have chosen to filter impacting factors via qualitative analyses, general linear regression analyses, grouping and summary methods and variance analyses. These methods have not generated the simultaneous measures of family-level and village-level variables and have not been able to determine effects across two scales (Gumedze & Dunne, 2011; Mercado & Páez, 2009; Pan, 2013). Therefore, taking Liangshan Yi autonomous prefecture in Sichuan China as an example with reference to the existing research framework, this study employs a complete two-layer linear model to identify critical impacting factors that affect rural household PV. Then based on the analysis results, this research explores the approaches for reducing PV levels in Chinese ethnic minority areas.

2. Study area

Liangshan Yi Autonomous prefecture is located at 100°15′E−103°53′N and 26°03′-29°27′N. Within its territory, various landforms such as high mountains, deep valleys, plains, basins and hills intersect with higher topography in the northwest and with lower topography in the southeast, forming a relative height difference of as 5653 m. Seventeen counties and cities are situated within its region, covering a total of 60,423 km^2. However, several issues hinder development here, including a vulnerable ecological environment, a weak local economy, lagging infrastructure, severe levels of poverty and fragile livelihoods. According to the latest Chinese poverty alleviation standard, those living in "poverty" are persons who earn a net annual income of 2300 Yuan (about one dollar a day) or less (The State Council of the People's Republic of China, 2011). While this standard has increased by 81% since in 2010, it is still much lower than the standard of 1.25 dollars of daily income recommended by the World Bank (Lu, 2012). By the end of 2013, 4.58 million permanent residents occupied Liangshan Prefecture, with 3.18 million belonging to the rural population and 0.42 million belonging to the poor population. Moreover, the poverty incidence level here is 13.35%, rendering Liangshan Prefecture a major poverty alleviation region in China (Sichuan Provincial bureau of statistics of China, 2014).

3. Data source

Statistics used in this study is originated from field investigations of poor residents of Liangshan Prefecture in May of 2014. Detailed investigation items are presented in Table 1.

The study adopted stratified sampling and random sampling method in conducting our sample investigations. The process is described as follows: (a) record set down the sample county utilizing 16 construction indicators for the county, including economic development, industry structure, social development, social development, resource and environment condition, transportation and accessibility, in with combination with principal components analysis and hierarchical clustering method, and classify the 17 counties in Liangshan Prefecture into fours groups with one sample abstracted randomly from each group. The four sample counties are Dechang, Huili, Xide and Ganluo; (b) select the sample towns: categorize the 124 towns in the four sample counties into two groups with one sample town from each group. With one sample county including two sample towns, eight sample towns are selected in total; (c) select sample villages and sample peasant households: from rural economic development levels and distances from villages to town government employ hierarchical agglomerative methods to divide the 55 villages into two groups with one sample village abstracted from each group. In turn, with each sample town including two sample villages, 16 sample villages are studied. In addition, as studying peasant households living in the same village generates higher levels of homogeneity, select 25 households from each sample villages of the 4277 sample households to construct the questionnaire survey. Of the 400 questionnaires that were distributed, 367 questionnaires were valid with an effective rate of 95.57%. Sample county and village distributions are shown in Fig. 1.

For the sample village investigation, the participatory evaluation investigation method was adopted. In carrying out informal interviews with prominent village and town leaders, we sought to identify generalities and particularities of the current social economic development status of ethnic autonomous regions and to identify natural resources information, geological advantages, ethnic features, living standards, poverty status levels and poverty alleviation policies. In addition, we collected the local rural economic reports to facilitate further quantitative analysis on village level features and to promote discussion on village variables effects on PV.