

Impact of Targeted Poverty Alleviation on Sustainable Livelihoods of Farmers and Herders in the Upper Yellow River Region: Postprint

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Abstract

The Yellow River basin is a critical region for winning the battle against poverty. In particular, the upper reaches, located in the inland northwest, suffer from harsh climate and ecological conditions, lagging economic and social development, rendering poverty alleviation tasks even more formidable. Since the implementation of the targeted poverty alleviation policy, the livelihood capital of farmers and herders has increased significantly, disrupting the originally low-level yet relatively stable livelihood system. Whether the reconstructed livelihood system can generate stable income for farmers and herders is undoubtedly an important issue of widespread societal concern that requires urgent resolution. This study examines 501 sample farmer and herder households in the upper Yellow River region, drawing upon livelihood analysis theory and employing a difference-in-differences model to analyze the impact of targeted poverty alleviation policies on the sustainable livelihoods of farmers and herders. The results indicate that the targeted poverty alleviation policy exerts positive effects on poor households whose primary livelihood strategy is agricultural production and those dependent on policy subsidies as their main livelihood strategy, but its impact on poor households whose primary livelihood strategy is non-agricultural production is not significant, with substantial regional variations in effectiveness. Further analysis of factors influencing the effectiveness of targeted poverty alleviation reveals that household human capital, cultivated land and grassland resources, and social network relationships are critical determinants. Therefore, enhancing resource allocation efficiency, upgrading human capital, and constructing multi-participatory interpersonal communication networks constitute key measures for sustaining the effects of targeted poverty alleviation.

Full Text

Effects of Targeted Poverty Alleviation on the Sustainable Livelihoods of Farmers and Herdsmen in the Upper Reaches of the Yellow River

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Abstract

The Yellow River Basin represents a critical battleground in China's poverty alleviation campaign, particularly its upper reaches located in the inland northwest. This region suffers from harsh climatic conditions, fragile ecological environments, and lagging socioeconomic development, making poverty eradication exceptionally challenging. Since the implementation of targeted poverty alleviation policies, farmers and herdsmen have experienced significant increases in livelihood capital, disrupting previously stable but low-level livelihood systems. Whether these restructured systems can generate stable income for rural households has become a pressing concern for both policymakers and academic researchers. This study examines 501 sample households in the upper Yellow River region, employing sustainable livelihood analysis theory and a difference-in-differences (DID) model to assess policy impacts. Results indicate that targeted poverty alleviation positively affected poor households reliant on agricultural production and those dependent on policy subsidies, but showed insignificant effects on households primarily engaged in non-agricultural activities, with notable regional variations. Further analysis reveals that household human capital, farmland and pasture resources, and social networks are key determinants of policy effectiveness. Therefore, enhancing resource allocation efficiency, upgrading human capital, and building diverse participatory communication networks constitute essential strategies for sustaining poverty alleviation outcomes.

Keywords: targeted poverty alleviation; livelihood; farmers and herdsmen; upper reaches of the Yellow River

1. Study Area Overview

The upper reaches of the Yellow River generally refer to the areas along the river in Gansu, Qinghai, Ningxia, and Inner Mongolia. Wang Yiming [citation] first proposed the concept of "the first industrial belt along the upper Yellow River." Li Fuxian [citation] systematically analyzed the evolution of this concept. In 1988, Fei Xiaotong and Qian Weichang submitted a proposal to the Party Central Committee and State Council for establishing a "multi-ethnic economic development zone in the upper Yellow River," encompassing eastern Qinghai, central Gansu, western Inner Mongolia, and northern Ningxia. During the 1992 National People's Congress, leaders from Gansu, Qinghai, and

Ningxia discussed regional economic development and proposed establishing a multi-ethnic economic development zone. In 1993, the former State Planning Commission designated the upper Yellow River economic zone as one of China's ten major economic zones. Guo Wenqing et al. [citation] classified counties (banners, cities) in Inner Mongolia, Ningxia, and Gansu as part of the upper Yellow River region. Liang Xialin [citation] noted that Gansu Agricultural University and the Gansu Federation of Industry and Commerce jointly proposed establishing a "Lanzhou-Xining-Yinchuan Economic Zone." Cheng Xiaoxu and Xiao Guangpan [citation] discussed the foundations for constructing an upper Yellow River economic belt. The Gansu Provincial Political Consultative Conference website [citation] published recommendations for reviving the multi-ethnic economic development zone.

Examining the concept's evolution reveals its core objective: coordinating balanced economic, social, and ecological development in this region. The area is home to Han, Hui, Tibetan, and Mongolian ethnic groups whose livelihoods have historically depended on limited agricultural and pastoral activities, creating persistent tensions between resource utilization and ecological conservation. On September 18, 2019, President Xi Jinping [citation] explicitly identified the Yellow River Basin as a critical ecological barrier and economic belt, elevating its ecological protection and high-quality development to a national strategy and providing clear direction for sustainable livelihood research in the region.

2. Data and Methods

2.1 Data Sources This study utilizes panel data from tracking surveys conducted in Lintao County, Guanghe County, and Yongjing County (Gansu), and Ledu District, Gangcha County, and Jianzha County (Qinghai) in July 2015 (baseline) and July 2018 (follow-up). One-on-one structured interviews ensured data authenticity and validity. The sample comprised 501 households, including 251 registered poverty-alleviation households (treatment group) and 250 non-registered households (control group). Respondents were predominantly aged 40-49 (30.67%) and 50-59 (28.08%). Regarding education, 16.53% were illiterate, 41.83% had primary education, 31.27% had junior high education, and 10.15% had high school or above. Cronbach's alpha coefficient exceeded 0.7, and the KMO test value was above 0.75, indicating strong internal consistency and validity.

2.2 Descriptive Analysis Survey results show targeted poverty alleviation significantly impacted household total income, pure agricultural income, non-agricultural income, and policy-based income. Average household total income increased from 15,780 yuan before the policy to 23,650 yuan after implementation. Pure agricultural income rose from 8,240 yuan to 12,350 yuan, non-agricultural income from 4,560 yuan to 6,890 yuan, and policy-based income from 2,980 yuan to 4,410 yuan. Regional variations exist, with Qinghai showing more pronounced income growth effects than Gansu.

Livelihood capital changes were also significant. Natural capital perceptions of tree/grass quantity shifted from 0.25 to 0.75, and environmental perceptions from 0.25 to 0.75. Cultivated land area decreased from 1.48 hm² to 1.35 hm², while housing area increased from 78.24 m² to 99.36 m², with structures transitioning from adobe to brick-concrete. Financial capital improved substantially: household cash holdings rose from 0.25 to 0.75, and borrowing capacity shifted from “difficult” to “easy.” Human capital showed minimal change, with household heads’ education increasing slightly from 6.2 to 6.8 years and health status remaining stable. Social capital exhibited little change in neighborhood relations but significant improvement in participation in public affairs [Figure 1: see original paper].

3. Model Specification

3.1 Model Selection This study employs a difference-in-differences (DID) model to analyze policy impacts. The approach compares changes in outcomes between a treatment group (registered poverty households) and a control group (non-registered households) before and after policy implementation. The basic model is:

$$Y_{it} = \beta_0 + \beta_1 T_t + \beta_2 D_i + \beta_3 (T_t \times D_i) + \varepsilon_{it}$$

where i indexes households, t indexes time periods, Y_{it} represents income, D_i is a group dummy (1 for treatment, 0 for control), T_t is a time dummy (1 for post-policy, 0 for pre-policy), and ε_{it} is the error term. The interaction term coefficient β_3 captures the policy’s net effect.

For the control group ($D = 0$), the model reduces to $Y_{it} = \beta_0 + \beta_1 T_t + \varepsilon_{it}$, yielding pre- and post-policy incomes of β_0 and $\beta_0 + \beta_1$, respectively. The average change is $\Delta_{control} = \beta_1$.

For the treatment group ($D = 1$), the model becomes $Y_{it} = \beta_0 + \beta_1 T_t + \beta_2 + \beta_3 T_t + \varepsilon_{it}$, with pre- and post-policy incomes of $\beta_0 + \beta_2$ and $\beta_0 + \beta_2 + \beta_1 + \beta_3$, respectively. The average change is $\Delta_{treatment} = \beta_1 + \beta_3$.

The DID estimator (policy net effect) is $\Delta_{treatment} - \Delta_{control} = \beta_3$.

3.2 Variable Selection **Dependent Variables:** The study examines four livelihood outcomes: total household income (measuring overall policy effect), agricultural income (from cropping and livestock), non-agricultural income (from wage labor and tertiary industry), and policy-based income (government subsidies).

Control Variables: Based on sustainable livelihood theory, five types of capital are included: natural capital (per capita cultivated land, tree/grass quantity perception, environmental perception), physical capital (housing area, structure,

fixed assets), financial capital (cash holdings, borrowing capacity), human capital (education, labor quantity, health status), and social capital (neighborhood relations, participation in village meetings, infrastructure perception) .

4. Empirical Results

4.1 Basic Estimation Results The DID model estimation shows that the interaction terms for agricultural income and policy-based income are positive and significant at the 1% level, indicating that registered poverty households experienced significantly greater improvements in agricultural and policy-based incomes compared to non-registered households. However, the interaction term for non-agricultural income is significantly negative, suggesting that registered households' non-agricultural income grew slower than that of non-registered households .

4.2 Results with Control Variables After introducing control variables using a fixed-effects model, the interaction terms for total income, agricultural income, and policy-based income remain positive and significant, while the non-agricultural income term stays negative and significant .

Further analysis reveals that financial capital (cash holdings, borrowing capacity) and human capital (labor quantity, education, health) significantly affect non-agricultural income. Natural capital (cultivated land area) positively affects policy-based income (primarily subsidies), while education and health show negative effects—likely because better-educated, healthier households receive fewer subsidies. Financial, human, and social capital positively correlate with overall policy effectiveness, while natural, physical, and human capital strongly influence agricultural livelihood outcomes.

4.3 Robustness Tests To verify result stability, we conducted stepwise robustness tests using cropping income as the dependent variable and sequentially adding natural, physical, financial, human, and social capital controls. The interaction term coefficient remained stable across specifications (0.312 to 0.308), with a maximum difference of only 0.004, confirming model robustness .

5. Conclusions and Recommendations

5.1 Main Conclusions Targeted poverty alleviation significantly increased total household income for registered poor households, particularly benefiting those reliant on agriculture and government subsidies, while showing limited impact on non-agricultural livelihoods. Regional differences are pronounced, with Qinghai' s pastoral households experiencing stronger effects than Gansu' s due to larger pasture areas and higher subsidy levels.

Analysis reveals that human capital increments were minimal, primarily because young laborers showed little interest in agricultural training. Training

participants were mainly elderly and women with lower education levels, limiting technology adoption. However, human capital remains crucial for long-term sustainability. Financial capital significantly boosted agricultural households but not non-agricultural ones. While natural and physical capital changed substantially, their direct income effects were limited.

Overall, livelihood capital changes have been uneven: financial and physical capital improved markedly, natural and social capital increased moderately, while human capital remained largely unchanged. Balanced growth across all five capital types is essential for building sustainable livelihoods.

5.2 Policy Recommendations First, enhance training programs for upper Yellow River farmers and herdsman by shifting from classroom-based to field-based learning in agricultural production sites, poverty alleviation workshops, leading enterprises, and cooperatives. This approach would improve training effectiveness and promote balanced development across all five capital types, converting gains in financial and physical capital into advantages in human, natural, and social capital.

Second, continue implementing ecological compensation policies such as grain-for-green and grazing bans to consolidate poverty alleviation achievements. As awareness improves and livelihoods stabilize, gradually phase out direct subsidies while transforming ecological protection into voluntary behavior among farmers and herdsman.

Third, mobilize farmers' enthusiasm and creativity through paid participation in public activities and shared development initiatives. This approach addresses governance challenges stemming from low social cohesion, enhances human and social capital, strengthens collective village economies, and promotes high-quality rural development in the upper Yellow River region.

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