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Does Agricultural Heritage Designation Improve Rural Residents' Subjective Well-Being? Evidence from China

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Does Agricultural Heritage Designation Improve Rural Residents' Subjective Well-Being? Evidence from China

Abstract: Agricultural heritage conservation preserves traditional farming systems and supports rural development, but its implications for residents' subjective well-being remain insufficiently understood. Using China Family Panel Studies data from 2012 to 2022, this study examines designation under China's Nationally Important Agricultural Heritage Systems (China-NIAHS) programme through a difference-in-differences design with staggered treatment adoption. The results indicate that designation improves rural residents' subjective well-being. The finding is supported by imputation estimates and robustness checks. Additional analyses provide evidence consistent with potential pathways involving household income, agricultural employment, interpersonal relations, and confidence in the future. Subgroup point estimates are larger in areas with greater terrain ruggedness, major grain-consuming regions, and among men and middle-aged residents. Estimates also vary across heritage types, with the largest gains observed for farmland landscape systems. These findings suggest that subjective well-being should be included in assessments of heritage conservation, alongside measures that strengthen farmer participation and benefit sharing and address barriers faced by residents receiving fewer benefits. This study extends agricultural heritage policy evaluation to individual well-being and provides evidence on the welfare implications of conservation in rural communities.

Keywords: Agricultural heritage; subjective well-being; staggered difference-in-differences; rural revitalization

1. Introduction

Agrarian civilization emerged through long-term interactions between people and the land. The production knowledge, land-use practices, and traditions of social cooperation accumulated through these interactions continue to sustain livelihoods in many rural areas. Agricultural heritage embodies this historical continuity, encompassing traditional agricultural systems developed and transmitted across generations. These systems are essentially integrated socio-economic-natural ecosystems with multiple heritage attributes (Min, 2021). Unlike static historical remains, agricultural heritage depends on continued agricultural production and evolves in response to changing socioeconomic and ecological conditions (Agnoletti & Santoro, 2022). Its value extends beyond food provision and the maintenance of farming livelihoods to the conservation of agricultural biodiversity and the transmission of traditional knowledge and local culture, providing an important foundation for the sustainable development of rural communities (Liu et al., 2024; M. Wang et al., 2025). However, farmland abandonment, population aging, and climate change are increasingly undermining the foundations of traditional agricultural systems, making the integration of heritage conservation and rural development more urgent (Camporese et al., 2026). Recognizing these challenges, the Food and

Agriculture Organization of the United Nations launched the Globally Important Agricultural Heritage Systems (GIAHS) programme in 2002 to promote the identification and dynamic conservation of traditional agricultural systems of global significance (Piras et al., 2024). China's long agrarian history and diverse natural environments have given rise to a wide variety of distinctive agricultural heritage systems. Building on the GIAHS framework, China gradually incorporated these heritage resources into a national framework for systematic conservation and initiated the identification and designation of China's Nationally Important Agricultural Heritage Systems (China-NIAHS) in 2012. As of October 2026, China had 25 agricultural heritage systems inscribed on the GIAHS list, placing China first worldwide in the number of GIAHS sites.

As agricultural heritage designation and conservation have progressed, research has gradually shifted from resource identification and the interpretation of heritage values to the development effects of designation and the conditions under which these effects materialize. Studies of spatial patterns have revealed pronounced spatial clustering and regional variation in China-NIAHS, with their emergence and persistence jointly shaped by natural endowments, population characteristics, culture, and tourism development (Guo et al., 2024; Ju et al., 2025; C. Li et al., 2023). This geographical heterogeneity suggests that the policy effects of China-NIAHS designation depend on local conditions. Further research has shown that traditional farming practices can sustain agricultural biodiversity and ecosystem services, while cultural memory and identity help preserve local culture and enhance heritage brand

value, laying the foundations for translating agricultural heritage values into economic and social benefits (Agnoletti & Santoro, 2022; Yu & Chen, 2026; Zheng et al., 2023). Regarding the realization of these values, studies using county-level panel data have found that China-NIAHS designation can promote county-level economic growth by developing agricultural processing industries, improving infrastructure, attracting human capital, building regional brands, and fostering agricultural business entities. However, these effects vary considerably across regions (J. Li et al., 2023; Q. Li, Jian, et al., 2025). At the household level, industrial integration, non-agricultural employment, larger-scale farming, and the extension of value chains across production, processing, and marketing provide specific channels for increasing farm household income and improving livelihoods (Y. Li et al., 2026; Wang & Liu, 2026; Zhang & Bao, 2024). Nevertheless, agricultural heritage values do not automatically translate into benefits for residents following designation. Their realization depends on farmers' opportunities and capacity to participate, as well as the effective functioning of mechanisms for collaboration among multiple stakeholders, benefit sharing, and ecological compensation (Dong et al., 2024; Zhu et al., 2021). Compared with the extensive literature on spatial patterns, ecological functions, and economic performance, research directly examining residents' subjective well-being remains limited. Drawing on a case study of the Ziquejie Terraces, M. Wang et al. (2025) found that agricultural heritage conservation and tourism development can generate economic gains while potentially adversely affecting non-economic dimensions, including social relationships and education. These findings suggest that the welfare

effects of agricultural heritage are multidimensional and context dependent.

Overall, existing research has deepened the understanding of the multiple values of agricultural heritage and the conditions under which these values can be realized through analyses of spatial patterns, ecological functions, cultural continuity, and economic effects. This literature provides a rich theoretical foundation and useful insights for the conservation and adaptive use of agricultural heritage. However, most studies have focused on conservation models and macro-level outcomes, particularly economic performance and industrial development. Few have examined the welfare effects of agricultural heritage, and the available analyses have largely relied on qualitative discussions of small-scale case studies. Accordingly, this study draws on China Family Panel Studies (CFPS) data from 2012 to 2022, treats China-NIAHS designation as a quasi-natural experiment, and employs a difference-in-differences (DID) approach with staggered treatment adoption to assess its impact on rural residents' subjective well-being. Compared with the existing literature, this study makes three contributions. First, this study examines rural revitalization through the lens of China-NIAHS designation, linking the conservation and transmission of agrarian civilization to improvements in residents' lives. This perspective offers new insights into how traditional agricultural resources can support rural development. Second, using nationwide longitudinal microdata, this study provides causal evidence on the effects of China-NIAHS designation on individual subjective well-being and examines how these effects vary across topographic conditions, grain production zones, resident groups, and heritage types. This analysis extends an evidence base that

has predominantly relied on macro-level performance indicators and case studies of individual heritage sites. Third, this study examines four potential pathways-residents' income, agricultural employment, social networks, and expectations for the future-to elucidate the economic and psychosocial processes through which China-NIAHS designation influences residents' subjective well-being, providing a more specific explanation of the welfare effects of heritage conservation.

2. Policy Background

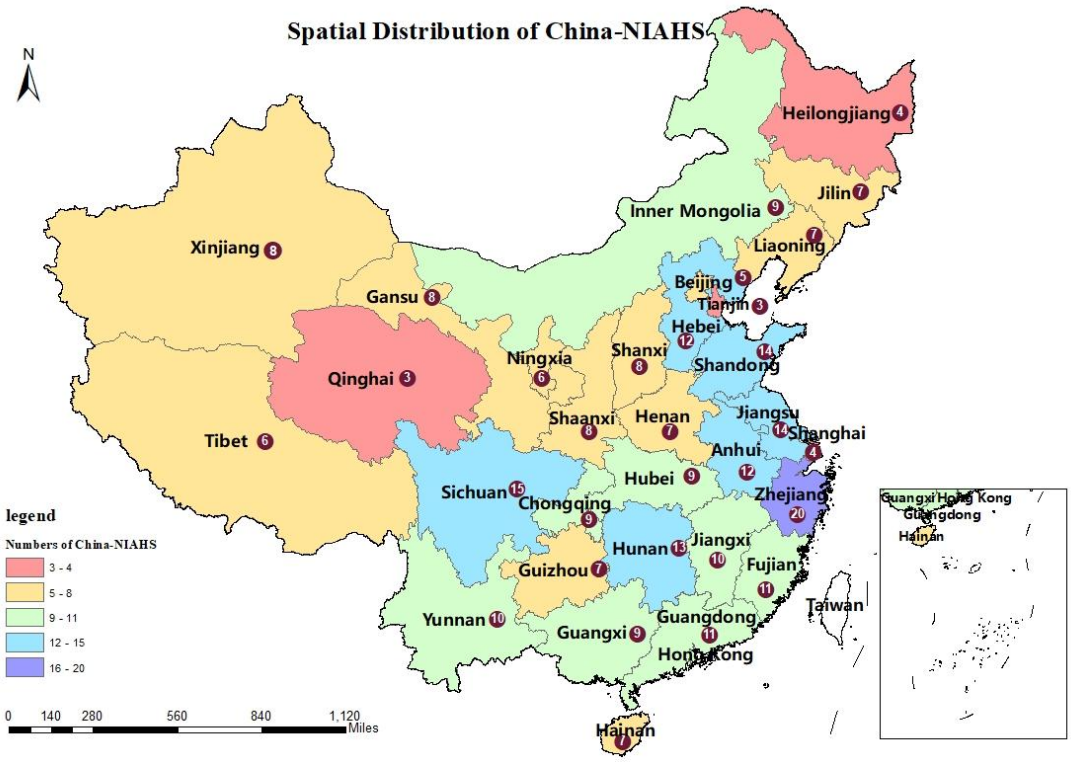
The conservation of China-NIAHS has evolved through three stages: international pilot initiatives, the establishment of a national designation system, and the strengthening of conservation management and legal safeguards. During the first stage, FAO launched the GIAHS initiative in 2002, and the Qingtian Rice-Fish Culture System in Zhejiang Province was selected as one of the first conservation pilot sites in 2005. These initiatives provided practical experience for China's exploration of the dynamic conservation of traditional agricultural systems. During the second stage, the former Ministry of Agriculture initiated the identification and conservation of China-NIAHS in 2012 and announced the first batch of designated sites in 2013, marking a transition from local pilot initiatives to a national designation system. During the third stage, the Measures for the Administration of Important Agricultural Heritage Systems, which took effect in 2015, established institutional arrangements for designation review, conservation planning, and supervision. Agricultural heritage conservation has subsequently been included in successive Central No. 1 Documents since 2016. The Law of the People's Republic of China on

the Promotion of Rural Revitalization, which took effect in 2021, explicitly established statutory responsibilities for agricultural heritage conservation, elevating its legal basis from ministerial regulations to national legislation. Through this progression, China-NIAHS has developed from an initiative for identifying traditional agricultural resources into a policy framework that integrates living heritage transmission, sustainable use, and rural development.

In terms of policy instruments, the China-NIAHS framework combines regulatory oversight, financial incentives, and guidance for capacity building into a comprehensive policy system (Q. Li, Qin, et al., 2025). Regulatory instruments govern heritage conservation practices through dynamic monitoring, annual evaluations, corrective action within specified deadlines, and local legislation. Incentive instruments rely primarily on fiscal subsidies, ecological compensation, and dedicated funding to reduce the opportunity costs of farmers' participation in agricultural heritage conservation. Guidance instruments focus on building brands for traditional agriculture, fostering specialty industries, integrating agriculture with culture and tourism, promoting agricultural technologies, and providing skills training. Together, these instruments extend agricultural heritage conservation from resource protection to the realization of heritage value, gradually establishing an institutional framework that coordinates conservation and use.

Meanwhile, China-NIAHS designation has continued to expand. As of October 2026, the Ministry of Agriculture and Rural Affairs had designated 276 China-NIAHS sites across eight batches, covering all 31 provincial-level administrative regions in

mainland China. Figure 1 illustrates considerable spatial variation in the distribution of designated sites, with Zhejiang, Sichuan, Shandong, and Jiangsu recording relatively high numbers. Figure 2 presents the temporal distribution of designations by type. Forestry and fruit systems account for a relatively large share in most batches, while the number of newly designated sites increased markedly in 2023 and 2026. This expanding geographical coverage and diversity of heritage types provide a basis for examining the effects of China-NIAHS designation on rural residents' lives and how these effects vary across contexts.



Note：This map is produced based on the standard map (Map Approval No.: GS (2023) 2767) obtained from the Standard Map Service Website of the Map Technical Review Center, Ministry of Natural Resources. The base map boundaries are unaltered.

Fig. 1 Spatial Distribution of China-NIAHS

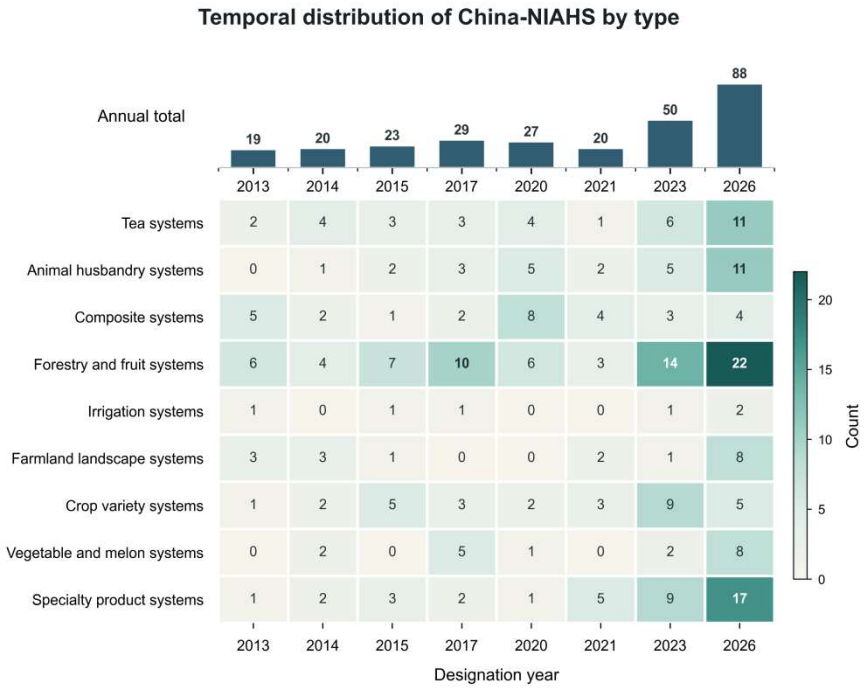


Fig. 2 Temporal distribution of China-NIAHS by type

3. Theoretical Framework

3.1 The Impact of China-NIAHS Designation on Rural Residents' Subjective Well-being

Subjective well-being represents an individual's overall assessment of their life circumstances, encompassing both satisfaction with material living conditions and affective experiences, including positive and negative emotions (Nugroho et al., 2022; Wijngaards et al., 2022). Among rural residents, subjective well-being is distinctly multidimensional, with income, employment status, social support, community environments, and psychological experiences all potentially shaping this assessment (Fu et al., 2022; Nanor et al., 2021). Accordingly, examining the impact of China-NIAHS on rural residents' subjective well-being requires attention to its combined effects on material living conditions and psychological and emotional experiences.

China-NIAHS constitute integrated rural resources comprising traditional agricultural production, biodiversity, local knowledge, cultural landscapes, and social organization, with multiple productive, ecological, cultural, and social values (Agnoletti & Santoro, 2022). Designation not only signifies public recognition of local traditional agricultural systems but may also expand farmers' business and income-generating opportunities by enhancing the brand value of heritage sites (Mo et al., 2025). Moreover, associated tourism development may increase opportunities for farmer participation, strengthen their sense of identity, and enhance their perceived benefits (Dong et al., 2024). China-NIAHS designation may therefore improve income, expand local employment, strengthen social networks, and improve expectations for the future, thereby enhancing rural residents' subjective well-being. Based on this analysis, this study proposes the following hypothesis:

H1: China-NIAHS designation significantly improves rural residents' subjective well-being.

3.2 Income Enhancement Effect

The core value of agricultural heritage extends beyond traditional agricultural production to its capacity to transform local agricultural products, ecological farming practices, traditional knowledge, and cultural landscapes into economic resources with a distinctive market identity. On the one hand, China-NIAHS designation can strengthen the branding of local agricultural products by combining geographical indications, green certification, and cultural narratives, thereby increasing their added value (Y. Li et al., 2026; Mo et al., 2025). On the other hand, improvements in

traditional farming practices following designation can significantly increase net agricultural returns and strengthen farmers' economic incentives to remain engaged in agricultural production (Zhang et al., 2017). The integration of agriculture, culture, and tourism can also extend agricultural activities beyond primary product provision to tourism, educational experiences, catering, rural accommodation, and cultural experiences, enabling farmers to diversify their business activities (Zhang et al., 2026).

Income may improve subjective well-being by easing budget constraints and financial stress (Khalil, 2025; La et al., 2021). For rural households, additional income supports essential consumption and investment in education, healthcare, and production, strengthening material security and prospects for household development (Tamberg et al., 2026). Income gains relative to other residents may also influence well-being through social comparison (La et al., 2021). When designation raises household income, these changes may lead to more favorable evaluations of life. Based on this analysis, this study proposes the following hypothesis:

H2: China-NIAHS designation enhances rural residents' subjective well-being by increasing their income.

3.3 Local Agricultural Employment Effect

Agricultural heritage is deeply embedded in local contexts, with its conservation, transmission, and development typically relying on local natural resources, traditional knowledge, and rural labor. As heritage projects are implemented, new labor demand may emerge in traditional agricultural production, ecological landscape maintenance,

and agricultural product processing. These jobs are inherently local, requiring workers familiar with local production practices and cultural traditions while providing rural residents with opportunities to participate in heritage conservation and industrial development close to home. Employment has already been incorporated as an important component of agricultural heritage monitoring systems (Jiao et al., 2022). China-NIAHS designation may also create local agricultural employment opportunities by engaging local farmers in agricultural technology adoption and the expansion and industrialization of agricultural operations (Wang & Liu, 2026; Zhao et al., 2023), providing the economic conditions for farmers to remain in their communities and continue agricultural production.

The effects of local agricultural employment on subjective well-being should be understood in relation to the hidden costs of migrant employment. Although working away from home may increase monetary income, it can also entail family separation, unstable living environments, reduced capacity to fulfill caregiving responsibilities, and weakened community ties. Local employment enables rural residents to earn income in familiar surroundings, reducing the housing, transportation, and adjustment costs associated with migration. The autonomy and stability associated with local employment can also improve residents' subjective well-being (Cheng & Xu, 2021; Nanor et al., 2021). For rural residents, employment embedded in local social relationships provides income while enabling them to live with their families, maintain interactions with neighbors, and participate in community life. By preserving social ties that might otherwise be disrupted by migration, reducing family separation,

and strengthening community participation, local agricultural employment can enhance residents' sense of security, belonging, and subjective well-being. Based on this analysis, this study proposes the following hypothesis:

H3: China-NIAHS designation enhances rural residents' subjective well-being by expanding local agricultural employment opportunities.

3.4 Social Network Reinforcement Effect

The social network effects of China-NIAHS operate primarily through cooperation within communities and linkages with external actors. Within communities, agricultural heritage conservation and adaptive use typically require sustained cooperation among village collectives, farm households, traditional knowledge holders, and grassroots organizations, rather than efforts by individual households alone. Multi-stakeholder participation is an important condition for agricultural heritage tourism management and landscape maintenance (Zhu et al., 2021). Maintaining terrace landscapes, managing irrigation systems, transmitting traditional skills, organizing agricultural festivals, receiving tourists, and presenting local culture all require substantial community cooperation and public participation. Regarding external linkages, agricultural heritage tourism development can increase opportunities for interaction between farmers and governments, businesses, and visitors (Zhang et al., 2026). Cultural memory, identity, and host–guest interaction can also facilitate value co-creation and strengthen social ties both within heritage communities and between these communities and external groups (Zheng et al., 2023).

Social networks influence subjective well-being by providing emotional support, information, and practical assistance. First, trust, norms of reciprocity, and relationship quality provide important foundations for emotional support (Tuominen & Haanpää, 2022; Xu et al., 2022). Such support can alleviate the psychological burdens associated with production risks, family pressures, and uncertainty in daily life, strengthening rural residents' sense of security, belonging, and perceived support. Second, network density, connectivity, and patterns of interaction facilitate the flow of knowledge, opportunities, and resources within and across groups (Durante et al., 2025; Núñez-Naranjo et al., 2024). Cooperative organizations, cultural activities, tourism businesses, and market linkages associated with agricultural heritage projects can improve residents' access to information about policies, markets, employment, and business opportunities. Finally, practical assistance takes the form of mutual help and resource support, including short-term financial assistance, labor exchange, equipment sharing, business cooperation, and collaboration in community affairs. Reciprocity, trust, and practical assistance embedded in social capital can facilitate cooperation and coordination (Bartolini et al., 2023). Social capital can also strengthen individuals' capacity to access resources, manage risks, and participate in development (Nugroho et al., 2022), thereby enhancing rural residents' subjective well-being. Based on this analysis, this study proposes the following hypothesis:

H4: China-NIAHS designation enhances rural residents' subjective well-being by strengthening their social networks.

3.5 Future Expectations Improvement Effect

Subjective well-being is influenced not only by current living conditions but also by individuals' expectations regarding future income, employment, and living environments. Confidence in future life can enhance subjective well-being by fostering favorable expectations and positive emotions. Agricultural heritage systems serve multiple functions, including ensuring food and livelihood security, transmitting traditional knowledge, conserving cultural landscapes, and sustaining community organizations (Agnoletti & Santoro, 2022). Moreover, China-NIAHS designation confers institutional recognition on local traditional agricultural systems, farming knowledge, and cultural landscapes. It also signals the possibility of greater access to policy resources, market attention, and opportunities for industrial development, fostering expectations of long-term development through brand building and the cultivation of agricultural business entities (Q. Li, Jian, et al., 2025).

A key factor linking future expectations to subjective well-being is whether residents believe that their existing production practices and ways of life offer prospects for sustained improvement. When farmers perceive that traditional agriculture retains market value, local culture can serve as a development resource, and rural living conditions can continue to improve, they are more likely to view their own work, household development, and the future of their communities positively. A sense of identity can strengthen farmers' willingness to participate in agricultural heritage tourism development, suggesting that recognition of heritage value shapes both participation and development expectations (Dong et al., 2024). Cultural memory and cultural identity can also enhance agricultural heritage brand value and

emotional connections, enabling residents to develop a stronger sense of pride and belonging as their local culture gains external recognition (Liang et al., 2024). Based on this analysis, this study proposes the following hypothesis:

H5: China-NIAHS designation enhances rural residents' subjective well-being by improving their expectations for the future.

The theoretical framework of this study is presented in Figure3.

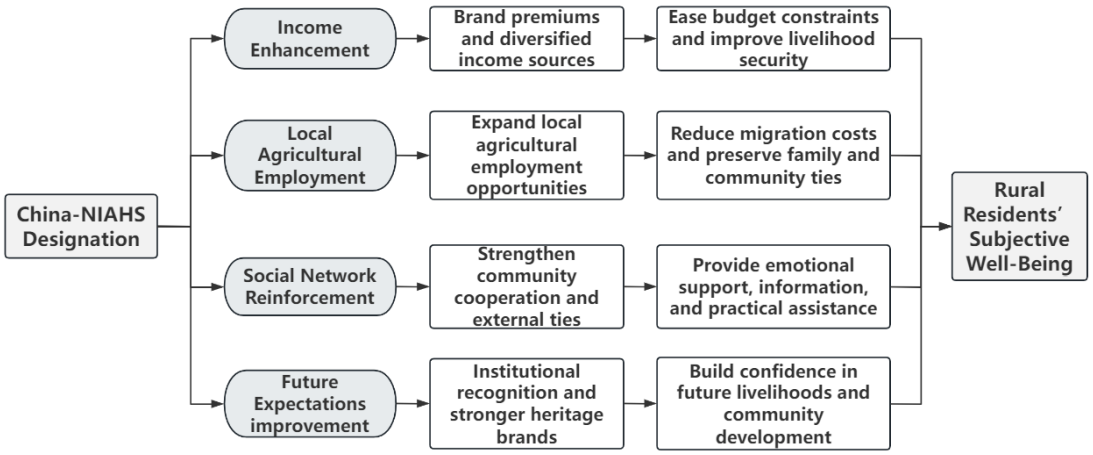


Fig. 3 Theoretical Framework

4. Data and methods

4.1 Data Sources

This study uses CFPS data from 2012 to 2022. Conducted by Peking University's Institute of Social Science Survey, the survey covers 25 provinces, autonomous regions, and municipalities in China and systematically collects socioeconomic information at the individual, household, and community levels. This study selects rural residents from the survey and extracts variables on subjective well-being and individual and household characteristics.

Data on China-NIAHS projects are drawn from the designation lists published by the Ministry of Agriculture and Rural Affairs. This study manually compiles the

county location and designation year of each project and matches these records with CFPS data by county and year. For counties containing multiple projects, the earliest designation year is used as the timing of policy implementation. Observations from designated counties are classified as treated from the year of designation onward, while observations from counties that have not yet received designation serve as controls. Following data matching and the treatment of missing values, the final dataset forms an unbalanced panel. This study treats the staggered designation of China-NIAHS as a quasi-natural experiment to identify its impact on rural residents' subjective well-being.

4.2 Variables

Dependent variable The dependent variable in this study is the subjective well-being of rural residents(SWB).Responses to the CFPS item "How happy do you feel?" are missing in some survey years, this study adopts the respondents' ratings on the question "How satisfied are you with your life?" as a proxy indicator for subjective well-being (Chen, 2026; Ruan et al., 2026), drawing on previous relevant research. Higher scores on this indicator represent stronger levels of subjective well-being among rural residents.

Independent variable Heritage equals one when the respondent's county has received its first China-NIAHS designation by the survey year and zero otherwise. For counties containing multiple designated projects, the earliest designation year defines treatment onset.

Control variables Drawing on existing studies, this study includes controls at

the individual, household, and county levels. Individual characteristics comprise sex, age, years of schooling, and marital status. Household controls include household size, total household assets, and the old-age dependency ratio. County-level controls comprise economic development and the scale of local government intervention.

Table 1 defines the variables and reports descriptive statistics. Mean subjective well-being is 3.747, with a standard deviation of 1.069. The sample is approximately balanced by sex, average schooling is 6.221 years, and 78.5% of respondents are married or cohabiting. Average household size is 4.6 members. Household assets, county economic conditions, and household age composition vary across observations.

Table 1 Descriptive statistics of main variables

Variables	Definition	Mean	SD	Min	Max
SWB	Life satisfaction measured on a scale from 1 to 5	3.747	1.069	1	5
Heritage	Equals 1 if the county is designated by that year, and 0 otherwise	0.014	0.118	0	1
Gender	Equals 1 for men and 0 for women	0.499	0.500	0	1
Age	Respondent's age in years	46.22	16.97	16	104
Spouse	Equals 1 if married or cohabiting, and 0 otherwise	0.785	0.411	0	1
Eduy	Completed years of schooling	6.221	4.550	0	22
Familysize	Number of household members	4.600	2.069	1	21
Estate	Natural logarithm of total household assets	11.470	1.378	4.605	15.61
Elder	Number of household members aged 65 or above divided by the number aged 15–64, multiplied by 100	30.86	90.09	0	1300
Lngdp	Natural logarithm of county-level gross domestic product (GDP).	13.97	1.026	10.5	18.0
Fiscal	County general budget expenditure divided by county GDP	0.302	0.261	0.02	2.60

4.3 Econometric Model

To identify the effect of China-NIAHS designation on rural residents' subjective well-being, this study employed a multi-period DID model as the baseline estimation strategy. The baseline regression equation is specified as follows:

$$SWB_{ict}=\alpha+\beta Heritage_{ict}+\gamma control_{ict}+\mu_c+\delta_t+\varepsilon_{ict} \quad (1)$$

where i, c, and t index individuals, counties, and survey years, respectively. SWB_{ict} denotes the subjective well-being of individual i residing in county c in year t. $Heritage_{ict}$ equals one if county c where individual i resides is designated as an area of China-NIAHS in year t, and zero otherwise; $control_{ict}$ denotes the control variables; μ_c captures time-invariant county fixed effects for the county where individual i resides; δ_t is the time fixed effect; and ε_{ict} is the random error term.

5. Results

5.1 Baseline Regression Results

5.1.1 Baseline Results of TWFE

To identify the net effect of China-NIAHS designation on rural residents' subjective well-being, this study constructed a multi-period DID model using CFPS panel data. The baseline results are presented in Table 2.

Column (1) includes only the core explanatory variable and two-way fixed effects. The results indicated that China-NIAHS designation increased rural residents' subjective well-being by 0.119 points, with the estimated effect statistically significant at the 1% level. Column (2) additionally includes individual-level controls. The estimated effect increased to 0.125 points and remained significant at the 1% level,

indicating that the main finding held after accounting for observed individual characteristics. Age was positively associated with subjective well-being, whereas schooling was negatively associated with it. Marital status was positively and significantly associated with subjective well-being in Column (2), but this association was not statistically significant in Columns (3) and (4). One possible explanation is that more highly educated rural residents have higher expectations for their lives and may therefore be more susceptible to relative deprivation, which can reduce their subjective well-being. After household-level controls were added in Column (3), the coefficient on China-NIAHS designation increased slightly. Column (4) further includes controls for county-level economic development and fiscal expenditure. The core coefficient remained positive and statistically significant at the 1% level, suggesting that the estimated effect was robust to accounting for regional macroeconomic differences. These findings support H1.

Table 2 Baseline Results of TWFE

Variables	（1）	（2）	（3）	（4）
	SWB			
Heritage	0.119***	0.125***	0.127***	0.112***
	(0.024)	(0.024)	(0.026)	(0.028)
Gender		-0.057***	-0.046***	-0.047***
		(0.011)	(0.012)	(0.013)
Age		0.004***	0.004***	0.004***
		(0.000)	(0.000)	(0.001)
Spouse		0.047***	0.024	0.021
		(0.014)	(0.015)	(0.015)
Eduy		-0.003**	-0.006***	-0.006***
		(0.002)	(0.002)	(0.002)
Familysize			0.012***	0.012***
			(0.003)	(0.003)
Estate			0.057***	0.057***
			(0.005)	(0.006)
Elder			0.000***	0.000***
			(0.000)	(0.000)
Lngdp				-0.105**
				(0.051)
Fiscal				0.027
				(0.127)
Constant	3.746***	3.567***	2.897***	4.368***
	(0.000)	(0.028)	(0.069)	(0.722)
County FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
N	77037	73369	67733	60233
Adj R^2	0.1072	0.1163	0.1199	0.1209

Notes: (1) ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. (2) Standard errors are robust and clustered at the county/district level. Both conventions apply to all subsequent tables.

5.1.2 Baseline Results of Imputation Estimates

To further assess the reliability and robustness of the empirical findings, this study employed the imputation estimator proposed by Borusyak et al. (2024). The estimator first fits a two-way fixed effects model using untreated observations, uses

this model to impute untreated potential outcomes for treated observations, and then aggregates the resulting treatment effects. Table 3 reports the estimates. The estimated coefficient on China-NIAHS designation remained positive and statistically significant as control variables were added sequentially, consistent with the baseline results. These findings suggest that the main conclusions of this study are robust to the use of an alternative estimator designed to address potential bias in conventional DID estimation under staggered treatment adoption.

Table 3 Baseline Results of Imputation Estimates

Variables	(1)	(2)	(3)	(4)
		SWB		
Heritage	0.135***	0.133***	0.142***	0.122***
	(0.019)	(0.019)	(0.019)	(0.019)
Gender		-0.059***	-0.048***	-0.050***
		(0.011)	(0.012)	(0.012)
Age		0.004***	0.004***	0.004***
		(0.000)	(0.000)	(0.001)
Spouse		0.045***	0.021	0.018
		(0.014)	(0.015)	(0.015)
Eduy		-0.003**	-0.006***	-0.006***
		(0.002)	(0.002)	(0.002)
Familysize			0.013***	0.012***
			(0.003)	(0.003)
Estate			0.057***	0.057***
			(0.005)	(0.006)
Elder			0.000***	0.000***
			(0.000)	(0.000)
Lngdp				-0.110**
				(0.052)
Fiscal				0.024
				(0.128)
N	77096	73427	67809	60258

5.2 Parallel Trends Test

The primary identifying assumption underlying the DID approach to policy evaluation is that the trends in rural residents' subjective well-being for the treatment

and control groups were parallel before the designation of China-NIAHS. Therefore, this study adopts an event-study framework and specifies the following econometric model for the parallel trends test:

$$SWB_{ict}=\alpha+\psi DID_{ict}\times period_t+\gamma control_{ict}+\mu_c+\delta_t+\varepsilon_{ict} \quad (2)$$

where $period_t$ is a set of event-time indicators, with the observation two years before designation omitted as the reference category. The coefficients ψ trace differences in subjective well-being between treatment and control groups before and after designation. All other terms are defined as in Equation (1).

Figure 4 presents the event-study estimates. The pre-designation coefficients were statistically insignificant and fluctuated around zero, supporting the parallel trends assumption. Following China-NIAHS designation, the estimated effects on rural residents' subjective well-being were positive and statistically significant at four, six, and ten years. This pattern suggests that the welfare benefits of designation may emerge over time.

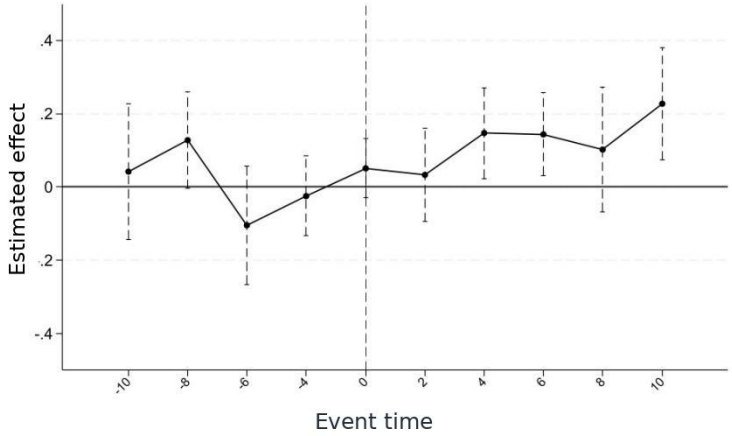


Fig. 4 Parallel trends test

5.3 Robustness Test

5.3.1 Placebo Test

To assess whether the baseline estimates could be driven by random factors, this study conducted a placebo test by randomly assigning treatment status to construct placebo treatment groups and repeating the estimation 500 times. If the baseline results reflect the actual policy effect of China-NIAHS designation, estimates obtained under random treatment assignment should predominantly cluster around zero. Figure 5 displays the distribution of the 500 placebo estimates, with the vertical dashed line indicating the baseline regression coefficient. The placebo estimates were centered around zero and approximately normally distributed, all lying to the left of the baseline coefficient. The baseline estimate was therefore clearly separated from the concentration of placebo estimates. These results indicated that random treatment assignment rarely generated positive effects comparable to the baseline estimate, providing further support for the robustness of the finding that China-NIAHS designation enhances rural residents' subjective well-being.

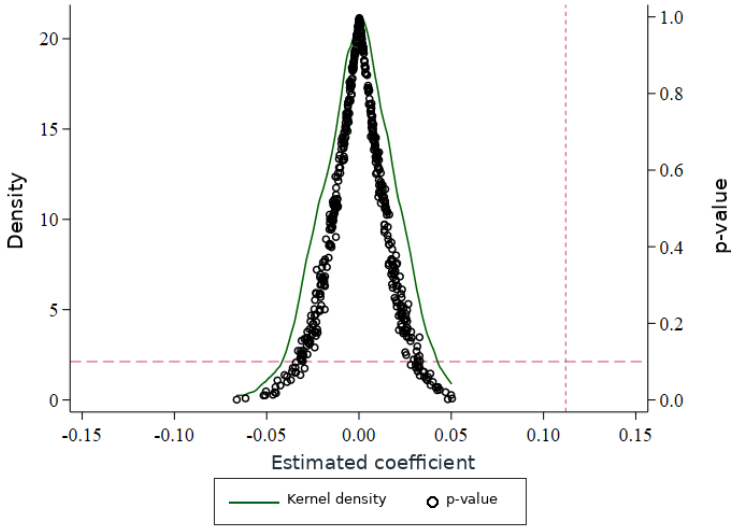


Fig. 5 Placebo Test

5.3.2 Matching-Based DID Estimates

To mitigate potential bias arising from functional form misspecification

involving observed covariates, this study combined matching methods with DID estimation. Baseline controls served as matching covariates. This study implemented 1:1, 1:2, and 1:4 nearest-neighbor matching, kernel matching, caliper matching, and Mahalanobis distance matching to select control observations comparable to the treatment group. DID models were then estimated using the matched samples. Table 4 shows that the coefficients on China-NIAHS designation remained positive and statistically significant across all matching specifications, supporting the robustness of the main findings.

Table 4 Matching-based DID estimates

Panel A:TWFE						
	(1) 1:1 nearest neighbor	(2) 1:2 nearest neighbor	(3) 1:4 nearest neighbor	(4) Kernel	(5) Caliper	(6) Mahalanobis distance
Heritage	0.0749*	0.0827**	0.0975***	0.1083***	0.1081***	0.1185***
	(0.0450)	(0.0323)	(0.0347)	(0.0276)	(0.0276)	(0.0413)
Constant	3.7062***	4.6212***	4.6008***	4.5812***	4.5839***	5.9797***
	(1.2484)	(1.0669)	(1.0397)	(0.7735)	(0.7733)	(1.2828)
Control Variables	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
N	4871	7126	10983	55466	55404	4502
Adj R^2	0.1232	0.1253	0.1200	0.1200	0.1202	0.1297
Panel B. Imputation estimates						
	(1)	(2)	(3)	(4)	(5)	(6)
heritage	0.0764**	0.0753***	0.0989***	0.1143***	0.1154***	0.0834**
	(0.0352)	(0.0291)	(0.0294)	(0.0193)	(0.0194)	(0.0387)
Control Variables	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
N	4683	6927	10783	55266	55084	4319

5.3.3 Controlling for Contemporaneous Policies

To account for potential confounding effects from concurrent agricultural

policies, this study constructed policy dummy variables for the National Modern Agricultural Industrial Park policy, the Incremental Incentives for Agriculture-Related Loans, and the Comprehensive Demonstration Programme for E-commerce in Rural Areas. These variables were added to the baseline regression separately and then jointly. Columns (1)–(8) of Table 5 present the results. The coefficients on China-NIAHS designation remained positive and statistically significant, indicating that the baseline findings were robust to controlling for these contemporaneous policies.

Table 5 Controlling for contemporaneous policies

	TWFE				Imputation estimates			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Heritage	0.117***	0.111***	0.094**	0.099***	0.126***	0.122***	0.108***	0.114***
	(0.027)	(0.027)	(0.037)	(0.035)	(0.019)	(0.019)	(0.020)	(0.020)
National Modern Agricultural Industrial Park	0.075			0.066	0.074			0.065
	(0.077)			(0.094)	(0.078)			(0.094)
Incremental Incentives for Agriculture-Related Loans		0.033		0.034		0.033		0.035
		(0.046)		(0.048)		(0.047)		(0.049)
E-commerce in Rural Areas			0.031	0.027			0.034	0.031
			(0.039)	(0.037)			(0.039)	(0.038)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Constant	4.381***	4.401***	4.499***	4.511***	-	-	-	-
	(0.728)	(0.722)	(0.782)	(0.785)	-	-	-	-
Observations	60233	60233	58773	58773	60258	60258	58795	58795
Adj R^2	0.1209	0.1209	0.1217	0.1217	-	-	-	-

5.3.4 Restricting the Estimation Sample

This study assessed sensitivity to alternative sample restrictions. First, observations with ages above 70 were excluded. Second, observations from

municipalities directly under the central government were excluded, given their distinctive administrative status, agricultural endowments, and policy implementation conditions. Third, the 2020 survey wave was excluded to assess sensitivity to the COVID-19 shock. Finally, observations from locations with agricultural heritage systems that had not received China-NIAHS designation were excluded from the control group, leaving only locations without agricultural heritage systems as controls. This restriction assessed whether the baseline findings were sensitive to the inclusion of agricultural heritage locations without China-NIAHS designation in the comparison group. Table 6 reports the results. The coefficients on China-NIAHS designation remained positive and statistically significant under all four restrictions and both estimation approaches, supporting the robustness of the main findings.

Table 6 Restricting the estimation sample

	TWFE				Imputation estimates			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Age <= 70	No municipalities	No 2020 wave	Excluding heritage controls	Age <= 70	No municipalities	No 2020 wave	Excluding heritage controls
heritage	0.123***	0.111***	0.142***	0.107***	0.143***	0.121***	0.152***	0.108***
	(0.035)	(0.028)	(0.027)	(0.028)	(0.018)	(0.019)	(0.021)	(0.019)
Constant	4.335***	4.434***	4.497***	4.452***	-	-	-	-
	(0.712)	(0.722)	(0.827)	(0.821)	-	-	-	-
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
N	57270	59561	52649	55217	57306	59581	52729	54843
Adj R^2	0.1172	0.1210	0.1206	0.1195	-	-	-	-

5.4 Heterogeneity Analysis

5.4.1 Regional Heterogeneity

Regions with greater terrain ruggedness generally have more fragmented farmland and fewer opportunities for large-scale mechanized agricultural production. Rural households in these areas may therefore rely more heavily on traditional farming practices, suggesting that China-NIAHS designation could generate greater improvements in subjective well-being. By contrast, relatively flat regions tend to offer more favorable conditions for modern agricultural production, potentially limiting the marginal benefits of China-NIAHS designation.

Following Zhang and Li (2026), this study used a terrain ruggedness threshold of 0.5 to divide the sample into high and low ruggedness groups. Columns (1)-(4) of Table 7 report the subgroup regression results. The estimated effects of China-NIAHS designation on rural residents' subjective well-being were positive and statistically significant in both groups, with larger point estimates in the high-ruggedness group. One possible explanation is that regions with greater terrain ruggedness face development constraints associated with limited transportation accessibility and inadequate infrastructure. In these settings, the traditional ecological knowledge and local cultural resources embedded in agricultural heritage systems may help alleviate geographical constraints by supporting rural livelihoods and strengthening community identity and cultural pride. These factors may explain the larger estimated gains in subjective well-being in the high-ruggedness group.

Table 7 Heterogeneity by Terrain Ruggedness

	TWFE		Imputation estimates	
	(1)	(2)	(3)	(4)
	Ruggedness >= 0.5	Ruggedness < 0.5	Ruggedness >= 0.5	Ruggedness < 0.5
heritage	0.189***	0.114***	0.185***	0.112***
	(0.064)	(0.032)	(0.029)	(0.024)
Constant	3.373***	5.574***	-	-
	(1.195)	(1.289)	-	-
Control Variables	YES	YES	YES	YES
County FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
N	35213	25020	35143	25115
Adj R^2	0.1078	0.1388	-	-

Differences in resource endowments, industrial structures, and policy priorities across grain production zones may lead to heterogeneous effects of China-NIAHS designation. Following Lu et al. (2025), this study divided the sample into major grain-producing and major grain-consuming regions for subgroup analysis. Table 8 reports the corresponding regression results. The estimated effects of China-NIAHS designation on rural residents' subjective well-being were positive and statistically significant in both groups, with larger point estimates in major grain-consuming regions. One possible explanation is that these regions generally have stronger economic foundations and more developed markets, which may facilitate the translation of heritage brand value and revenues from cultural and tourism activities into household income gains. These activities may also enhance residents' cultural fulfillment, contributing to greater improvements in subjective well-being. By contrast, major grain-producing regions remain primarily oriented toward grain

production. Although China-NIAHS designation may help optimize cropping structures and expand local employment opportunities in these regions, the scope for generating additional benefits through diversified heritage-based activities may be more limited. These differences may explain the smaller estimated effects in major grain-producing regions.

Table 8 Heterogeneity across grain production zones

	TWFE		Imputation estimates	
	(1)	(2)	(3)	(4)
	Major producing regions	Major consuming regions	Major producing regions	Major consuming regions
heritage	0.106***	0.213***	0.109***	0.209**
	(0.028)	(0.075)	(0.028)	(0.082)
Constant	5.766***	6.688***	-	-
	(0.861)	(2.405)	-	-
Control Variables	YES	YES	YES	YES
County FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
N	28451	6150	28395	6172
Adj R^2	0.1152	0.1623	-	-

5.4.2 Individual Heterogeneity

Gender differences in agricultural labor allocation, household decision-making, and social participation may lead to heterogeneous effects of China-NIAHS designation on subjective well-being. Table 9 reports the subgroup regression results. The estimated effects were positive and statistically significant for both male and female rural residents, with larger point estimates for men.

One possible explanation is that, under traditional gender roles, men may be more involved in agricultural production and market-oriented activities, giving them greater access to the economic benefits generated by heritage-related industries.

Women may also benefit from heritage conservation and increased community interaction through stronger cultural connections and psychological support. However, their access to income-generating opportunities associated with agricultural heritage development may be more limited. Caregiving responsibilities and domestic workloads may further constrain their participation in these activities and the benefits they receive. These factors may help explain the smaller estimated improvements in subjective well-being among women.

Table 9 Heterogeneity by Gender

	TWFE		Imputation estimates	
	(1)	(2)	(3)	(4)
	Men	Women	Men	Women
heritage	0.161***	0.092**	0.226***	0.058***
	(0.054)	(0.038)	(0.022)	(0.019)
Constant	4.281***	4.427***	-	-
	(0.775)	(0.802)	-	-
Control Variables	YES	YES	YES	YES
County FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
N	29818	30256	29929	30323
Adj R^2	0.1335	0.1121	-	-

Differences across age groups in labor capacity, farming experience, and cultural identity may lead to heterogeneous effects of China-NIAHS designation on subjective well-being. This study divided rural residents into three age groups—young adults (aged under 45), middle-aged adults (aged 45-59), and older adults (aged 60 and above)—and conducted subgroup regressions. Table 10 reports the results. The estimated effects of China-NIAHS designation were positive and statistically significant for young and middle-aged residents, with the largest coefficients observed in the middle-aged group. For older residents, the estimated effect was statistically

insignificant under conventional DID estimation but negative and statistically significant under the imputation estimator.

One possible explanation is that middle-aged residents combine relatively strong labor capacity with extensive traditional farming experience, enabling them to use agricultural heritage resources to increase household income and improve subjective well-being. Younger residents may have less farming experience but greater adaptability to emerging rural industries, allowing them to benefit from new heritage-related activities. Older residents, by contrast, may face constraints associated with declining labor capacity and greater concerns about investment and market risks, limiting their participation in heritage-related commercial activities. Changes in traditional production practices and rural lifestyles associated with heritage development may also impose psychological adjustment costs on some older residents. These factors may help explain the limited or negative estimated effects in this group.

Table 10 Heterogeneity by Age

	TWFE			Imputation estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
	Young	Middle-aged	Older	Young	Middle-aged	Older
heritage	0.119***	0.227***	-0.161	0.088***	0.240***	-0.098***
	(0.037)	(0.030)	(0.119)	(0.025)	(0.022)	(0.038)
Constant	4.167***	3.651***	5.010***	-	-	-
	(0.729)	(1.020)	(1.550)	-	-	-
Control Variables	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
N	27032	20257	12874	27142	20272	12839
Adj R^2	0.1050	0.1304	0.1546	-	-	-

5.4.3 Heterogeneity by Heritage-System Type

Different types of agricultural heritage systems exhibit substantial variation in ecological structure, production modes, and industrial characteristics, leading to heterogeneous effects on the subjective well-being of rural residents. Based on the classification criteria of the China Agricultural Museum and the coverage of the CFPS sample, this study classified the heritage systems represented in the sample into three categories: farmland landscape systems, forestry and fruit systems, and composite systems. Table 11 reports the subgroup regression results. The positive point estimates were largest for farmland landscape systems, followed by forestry and fruit systems, while the coefficients for composite systems were smaller.

Several factors may explain this pattern. Farmland landscape systems combine landscape value with opportunities for community cooperation. Alongside employment and income gains, collective landscape maintenance may strengthen community cohesion and neighborhood relationships, contributing to improvements in subjective well-being through multiple channels. Forestry and fruit systems may provide opportunities to diversify household income through fruit sales, agricultural product processing, and agritourism, thereby enhancing residents' subjective well-being. By contrast, although composite systems offer ecological diversity, realizing their economic value may require coordinated management, substantial labor inputs, and longer development periods. These requirements may constrain short-term income gains and help explain the smaller estimated improvements in subjective well-being associated with this heritage type.

Table 11 Heterogeneity by Heritage-System Type

	TWFE			Imputation estimates		
	(1)	(2)	(3)	(4)	(5)	(6)
	landscape	fruits	composite	landscape	fruits	composite
heritage	0.153***	0.143***	0.094***	0.152***	0.109***	0.100***
	(0.036)	(0.042)	(0.024)	(0.025)	(0.033)	(0.018)
Constant	4.397***	4.419***	4.432***	-	-	-
	(0.736)	(0.734)	(0.738)	-	-	-
Control Variables	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
N	59650	59389	59631	59859	59602	59847
Adj R^2	0.1205	0.1203	0.1207	-	-	-

5.5 Tests of Mechanisms

The theoretical framework identifies income, agricultural employment, interpersonal relations, and confidence in the future as potential pathways linking designation to subjective well-being. Following the regression sequence described by Baron and Kenny (1986), this study examines whether designation is associated with each mechanism variable and whether the mechanism variable is associated with subjective well-being conditional on designation and the controls:

$$SWB_{ict}=\alpha_1+\beta_1 Heritage_{ict}+\gamma_1 control_{ict}+\mu_c+\delta_t+\varepsilon_{ict} \quad (3)$$

$$Z_{ict}=\theta+\varphi Heritage_{ict}+\sigma control_{ict}+\mu_c+\delta_t+\varepsilon_{ict} \quad (4)$$

$$SWB_{ict}=\alpha_2+\beta_2 Heritage_{ict}+\gamma_2 control_{ict}+\eta Z_{ict}+\mu_c+\delta_t+\varepsilon_{ict} \quad (5)$$

In this model, Z_{ict} represents the four mechanism variables, namely household per capita income (*Lnfin*), nonagricultural employment (*Jobtype*), social

connectedness (*Relation*), and confidence in future prospects (*Confidence*). All other variables and parameters are defined as in Equation (1).

The traditional agroecological knowledge and living heritage value embedded in China-NIAHS can support agricultural development through brand premiums, ecological compensation, and value-chain extension. These channels may help address the limited returns from conventional agriculture and increase farm household income. Following Z. Wang et al. (2025), this study calculated household per capita income by dividing total household income over the past 12 months by household size. This study then took its natural logarithm to construct Lnfin for the mechanism analysis. Columns (1) and (2) of Table 12 report the regression results. The coefficient on China-NIAHS designation in the income equation was positive and statistically significant at the 1% level. After household per capita income was included in the subjective well-being equation, the coefficient on China-NIAHS designation remained statistically significant. These results indicate that designation increased rural household income and are consistent with the proposed pathway through which improved material living conditions contribute to higher subjective well-being.

Regarding the local agricultural employment effect, agricultural heritage conservation and transmission rely on local land resources, traditional knowledge, and agricultural labor, potentially expanding labor demand in specialty agricultural production, ecological maintenance, and related activities. Given the strong geographical embeddedness of agricultural employment, residents' engagement in agricultural work may provide an indication of the contribution of heritage projects to

local agricultural employment. Following Hu et al. (2025), this study constructed an employment-type variable (Jobtype) based on the CFPS item on “job nature”, coded as one for non-agricultural employment and zero for agricultural employment. Columns (3) and (4) of Table 12 report the results. China-NIAHS designation significantly reduced rural residents’ probability of engaging in non-agricultural work, implying a corresponding increase in the likelihood of agricultural employment. Non-agricultural employment was also negatively and significantly associated with subjective well-being. Together, these findings are consistent with the proposed local agricultural employment pathway. By expanding opportunities to work locally in agriculture, designation may help reduce family separation and preserve social ties that could otherwise be weakened by employment away from home, thereby enhancing rural residents’ subjective well-being.

Turning to the social network reinforcement effect, agricultural heritage is sustained through intergenerational transmission within rural communities. Its conservation and associated industrial development can strengthen interaction, cooperation, and interpersonal trust among residents, reinforce rural social networks, and improve neighborhood relations. Following Xiong and Zhou (2025), this study used respondents’ self-rated interpersonal relations as a proxy for social connectedness (Relation). The variable was measured on a scale from 0 to 10, with higher scores indicating better interpersonal relations. Columns (5) and (6) of Table 12 report the results. China-NIAHS designation improved rural residents’ self-rated interpersonal relations, with the estimated coefficient positive and statistically

significant at the 1% level. After Relation was included in the subjective well-being equation, the statistical significance of the coefficient on China-NIAHS designation weakened. These findings suggest that social connectedness may be an important channel through which designation influences rural residents' subjective well-being. By promoting social integration and fostering harmonious interpersonal relationships within rural communities, China-NIAHS designation may enhance subjective well-being through social and psychological benefits.

Regarding the future expectations improvement effect, China-NIAHS not only support agricultural production but also embody rich historical and cultural values and resources embedded in local social networks. Their traditional farming knowledge and ecological principles can strengthen residents' cultural identity and local pride, fostering more favorable expectations for the future. Following Hu et al. (2026), this study used respondents' confidence in their own future (Confidence) as the mechanism variable. The variable was measured on a scale from 1 to 5, with higher scores indicating greater confidence. Columns (7) and (8) of Table 12 report the results. The coefficient on China-NIAHS designation in the confidence equation was positive and statistically significant at the 1% level, indicating that designation increased rural residents' confidence in their future lives. After Confidence was included in the baseline subjective well-being model, its coefficient was positive and statistically significant at the 1% level, while the coefficient on China-NIAHS designation remained statistically significant. These findings are consistent with the proposed future expectations pathway, suggesting that designation may enhance rural

residents' subjective well-being partly by strengthening confidence in the future and improving their psychological outlook.

Table 12 Tests of mechanisms

Panel A. TWFE								
	Lnfin	SWB	Jobtype	SWB	Relation	SWB	Confidence	SWB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
heritage	0.123***	0.115***	-0.035**	0.123***	0.287***	-0.013	0.129***	0.053**
	(0.041)	(0.030)	(0.016)	(0.025)	(0.032)	(0.041)	(0.047)	(0.027)
Z_{it}		0.025***		-0.040***		0.111***		0.454***
		(0.006)		(0.015)		(0.003)		(0.007)
Constant	6.147***	4.203***	1.032***	3.709***	4.106***	3.929***	4.509***	2.374***
	(1.326)	(0.752)	(0.297)	(0.693)	(1.548)	(0.814)	(0.693)	(0.509)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
N	61242	58400	50465	49570	36905	36846	60055	60038
Adj R^2	0.2877	0.1190	0.3291	0.1256	0.0284	0.1057	0.0921	0.3028
Panel B. Imputation estimates								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
heritage	0.127***	0.127***	-0.023**	0.127***	0.288***	-0.025	0.167***	0.044**
	(0.032)	(0.020)	(0.010)	(0.019)	(0.031)	(0.021)	(0.026)	(0.019)
Z_{it}		0.025***		-0.040**		0.111***		0.453***
		(0.006)		(0.016)		(0.003)		(0.007)
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
N	61242	58400	50521	49617	36660	36601	60081	60064

6. Conclusion and Discussion

6.1 Conclusion

Agricultural heritage conservation seeks to sustain traditional farming systems while supporting rural development. Its implications for rural residents' subjective well-being remain insufficiently understood. Using CFPS data from 2012 to 2022, this study matched county-level China-NIAHS designation records with individual observations and employed a DID design with staggered treatment adoption.

China-NIAHS designation significantly improves rural residents' subjective well-being, with the finding supported by imputation estimates and robustness checks. These results connect agricultural heritage conservation with individual welfare and the broader objectives of rural revitalization.

6.2 Discussion

This study extends evidence on the economic effects of China-NIAHS designation to residents' subjective well-being (J. Li et al., 2023; Q. Li, Qin, et al., 2025). Complementing M. Wang et al. (2025), the findings suggest that economic performance and residents' welfare are related but distinct conservation outcomes.

The potential pathways connect material conditions with social experiences, complementing research on heritage-based livelihoods (Wang & Liu, 2026) and rural social capital (Nugroho et al., 2022). Income, agricultural employment, interpersonal relations, and confidence in the future suggest that welfare gains depend partly on integrating economic opportunities into community life. Regional patterns support differentiated heritage management (Guo et al., 2024). The negative imputation estimate for older residents, alongside an insignificant baseline estimate, highlights potential participation barriers and the relevance of benefit sharing (Zhu et al., 2021).

Several limitations qualify these interpretations. Excluding the 2010 CFPS wave leaves counties designated in 2013 with only one pre-designation wave, preventing direct assessment of their pre-designation trends. The imputation estimator accommodates treatment-effect heterogeneity (Borusyak et al., 2024), but cannot resolve this information constraint. Unobserved county-specific shocks related to

designation timing and life satisfaction may also remain despite controls for contemporaneous policies.

The employment-type variable distinguishes agricultural from non-agricultural work but does not establish whether designation created additional local jobs. More generally, the mechanism regressions indicate potential pathways rather than their separate causal contributions. Finally, life satisfaction captures only part of subjective well-being; affective measures could reveal whether improved life evaluations coexist with adverse emotional experiences.

7. Policy Implications

Based on these findings, this study offers five policy recommendations. First, subjective well-being should be incorporated into assessments of China-NIAHS conservation outcomes. Dynamic monitoring of income, employment, and community participation can inform conservation investment and implementation while maintaining conservation standards. Second, farmer participation and benefit sharing should be strengthened. Support for specialty agricultural production, traditional farming system maintenance, processing, and marketing, alongside cooperatives linking smallholders with markets, can expand participation. Clear rules governing collective operations, heritage brand use, and tourism development can help translate heritage value into household benefits. Third, community participation should strengthen social networks and confidence in the future. Traditional skills transmission, agricultural cultural activities, and public facility maintenance can sustain interaction and cooperation. Participation in project planning and benefit

allocation, transparent support measures, and timely responses to residents' concerns can improve expectations for the future. Fourth, development priorities should reflect local resource conditions and heritage types. Areas with greater terrain ruggedness should improve access to production sites and markets. Grain production zones with favorable market conditions can strengthen branding and distribution. Farmland landscape systems should balance landscape maintenance with agricultural production, while forestry and fruit systems can expand processing and marketing. Composite systems require gradual development consistent with conservation requirements and local management capacity. Fifth, inclusive policies should address participation barriers facing women and older residents. Flexible training and opportunities close to home can support women's participation. Traditional skills transmission, social interaction, care services, and community benefit sharing can extend benefits to older residents and those with limited labor capacity.

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