Research Paper: Explaining the Socio-Economic Impacts of Expanding Small-Scale Agricultural Activities (Case Study: Villages of Astaneh-ye Ashrafiyeh County)

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ABSTRACT

Purpose: Small-scale agricultural activities represent an important source of supplementary income for rural households. The income generated from these activities plays a crucial role in strengthening both the economic viability and social sustainability of rural communities. Accordingly, the present study aims to explain the socio-economic impacts of small-scale agricultural activities in the villages of Astaneh-ye Ashrafiyeh County.

Methods: This research employs a descriptive-analytical method. Data were collected through a combination of documentary research and field surveys. The statistical population consisted of agricultural households in 16 villages with the largest cultivated areas in the Central and Kiashahr districts of Astaneh-ye Ashrafiyeh County. A total of 350 individuals engaged in these small-scale activities were selected using a stratified random sampling method.

Results: Small-scale agricultural activities are carried out on a relatively limited scale when compared to villagers' primary livelihood, namely, rice production. Nevertheless, their economic impacts, such as improvements in household welfare and financial security, as well as their social impacts, including job sustainability and population retention in villages, are significant. These activities have contributed to economic welfare (mean = 4.03), economic security (mean = 4.02), and the quality of household employment (mean = 3.99). There is a statistically significant correlation ($r = 0.64$, $p < 0.05$) between economic impacts (measured through welfare and security indicators) and small-scale agricultural activities at a 95% confidence level. Furthermore, a strong and significant correlation ($r = 0.76$, $p < 0.05$) was found between social impacts and the expansion of small-scale agricultural activities in the studied villages.

Conclusion: The findings indicate that small-scale agricultural activities, such as the cultivation and production of vegetables and herbs, serve as supplementary livelihoods alongside the main economic activities of rural households. These activities yield substantial socio-economic benefits that contribute to community resilience. Therefore, integrating the promotion and support of such activities into rural development planning is essential for achieving long-term sustainability.

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1. Introduction

The economic status of any region depends on the performance of its economic sectors—agriculture, industry, and services (Riahi et al., 2017: 41). Achieving economic development in a country requires harnessing the full potential of these various sectors (Riahi et al., 2020: 269). Among them, agriculture plays a key role in national and regional development. It not only meets food demands and provides raw materials for industries but also significantly contributes to political independence (Moradi et al., 2018: 312–313). The importance of agriculture in both wealthy and developing nations highlights its fundamental role in supplying the basic needs of human life and supporting other economic sectors.

Rural areas, as centers of agricultural production, should not be viewed merely as "production machines" by planners (Ghanbari et al., 2019: 69–70). These areas are among the most vital economic hubs of the country, contributing notably to the national gross domestic product (GDP), food security, and overall economic growth (Azizpour et al., 2019: 161). Strengthening the agricultural sector has always been a focus of national development plans, especially given its undeniable role in creating sustainable rural employment (Rahimian et al., 2022: 785). Agriculture forms the backbone of rural economies. In 2020, it accounted for 7% of the national GDP and contributed 2.68% to the country's total economic growth of 3.08%, ranking third in terms of impact after industry, mining, and services (Ghasemi & Kahnooji, 2021: 81).

Furthermore, agricultural development within the framework of rural development enables the and efficient use of water, land, and human resources in rural areas and contributes significantly to building a sound economic structure and promoting national development (Momenpour Akardi et al., 2023: 149). As the main source of livelihoods and job creation, agriculture is crucial to rural survival and development. In many rural communities, it is considered the cornerstone of political, social, and economic stability (Ghanbari et al., 2019: 68).

Given the close link between rural areas and agriculture, the economic consequences of developing small-scale farmland become evident over time in rural livelihoods. Continued reliance on such development leads to shifts in rural economic functions and livelihood models (Mohammadzadeh et al., 2019: 267). In recent years, emphasis on food security, self-sufficiency, job creation, and poverty reduction has driven the expansion of small-scale agricultural activities in different parts of Iran. However, this growth has often overlooked resource sustainability and regional advantages, leading to inefficient resource allocation and inappropriate agricultural planning (Salami et al., 2019: 150).

Therefore, it is essential to assess the level of development or underdevelopment in small-scale agricultural regions to plan effectively for sustainable agricultural development. Since the challenges facing small-scale agriculture vary by region, it is necessary to adopt context-specific planning approach to accurately identify and prioritize each area's unique needs (Moradi et al., 2015: 68). Given its importance in food security, raw material supply, employment, and income generation, the continuity and stability of small-scale agriculture are considered vital to social stability and economic growth. Economists argue that a strong and progressive agricultural sector is indispensable for economic development, and without addressing its developmental challenges, other sectors will not flourish (Moradi et al., 2018: 312).

In small-scale agriculture, land is often used inefficiently—meaning that land and water resources are not utilized according to their full potential. This inefficiency results from unsystematic land use practices. Evidence from countries with successful sustainable agriculture demonstrated that effective environmental resource planning and evaluation are critical for progress. Today, the development of small-scale agriculture in various parts of Iran faces numerous institutional and infrastructural challenges (Moradi et al., 2018: 312).

One such area where small-scale agricultural activities are common in rural settlements is Astaneh-ye Ashrafiyeh County in eastern Gilan Province. Thanks to favorable geographic conditions and agricultural development potential, this region has benefited from the growth of small-scale farming. The expansion of these activities can be analyzed through their economic impacts. In many villages of Astaneh-ye Ashrafiyeh, as in other parts of Gilan, fragmented farmlands are a major factor driving the prevalence of small-scale agriculture.

Hence, explaining the socio-economic impacts of expanding small-scale agricultural activities—as a form of family-based livelihood—in the rural households of Astaneh-ye Ashrafiyeh County is necessary. Accordingly, the present study seeks to answer the main research question: What are the most significant economic and

social impacts of small-scale agricultural activities on the villages of Astaneh-ye Ashrafiyeh County?

2. Literature Review

The literature review is structured around two major components: previous empirical research on the subject and theoretical foundations. In this context, Jimenez et al. (2019), in their study titled A Scalable Framework for Implementing Data-Driven Agriculture for Smallholder Farmers, found that small farms in developing countries often face significant financial and infrastructural constraints. Hornby (2020) explored the social and cultural dimensions of small-scale agricultural production and the implications of land reforms linked to labor-intensive employment, concluding that small-scale farmers face multiple and persistent limitations.

Abegunde et al. (2020), in their study Mainstreaming Climate-Smart Agriculture in Smallholder Farming Systems: A Non-Parametric Evaluation, found that smallholder farmers demonstrated high priority in terms of economic adaptation and strong performance in social adaptability. Paudel et al. (2020) investigated small-scale farm mechanization in the hills of Nepal and concluded that land, information, markets, training, extension services, and agricultural credit performed relatively better in small-scale farming systems. However, the adoption of agricultural technologies, particularly mechanization, produced mixed results, sometimes with negative effects.

Zhang et al. (2020) analyzed Labor Productivity in Small-Scale Rice Farming and Its Role in Landscape Conservation in Mountainous Areas of China, revealing that rural workers continually explore new production options within small-scale farming. They noted, however, that broader social issues in rural areas often decrease long-term interest in small-scale farming. Marcacci et al. (2020), in a study comparing large-scale versus small-scale farming, stated that the advantage of small-scale farming lies in its flexibility regarding production factors and environmental and climatic conditions. Their findings further suggested that farmland biodiversity in Africa tends to support the viability of small-scale farming.

Wenz et al. (2020), through simulation modeling of adaptation decisions in smallholder agriculture in response to drought risk in semi-arid Kenya, showed that awareness of drought variability over time is more pronounced in small-scale farming. Socio-economic transitions and adaptive behaviors were more effectively regulated in smallholder contexts.

Woodhill et al. (2020), examining the Future of Smallholder Agriculture, found that there are no inevitable outcomes regarding the direction of food systems in small-scale agriculture. However, such systems align closely with public health priorities. Onifade et al. (2021) studied the Challenges Faced by Smallholder Farmers in Marketing Agricultural Products in Rural Areas and emphasized that the small-scale farming sector is the most vital segment of the economy, involving a large population. Marketing was identified as an inseparable component of a successful small-scale farm. Most agricultural products sold in rural markets were basic food commodities.

In Iran, Pourramzan (2016) studied the Role of Family-Based Farming in the Household Economy of Astaneh-ye Ashrafiyeh County and found that such farming has a long history in the region, typically occurring on very small, privately owned farms. These are considered supplementary activities and have brought moderate-to-high levels of economic satisfaction to villagers, contributing positively to their income and livelihood.

Khosravipour et al. (2021) investigated the Motivations of Rural Women in Establishing Small-Scale Agricultural Businesses in Gilan and Mazandaran Provinces, showing that the primary motivator was the pursuit of greater control over life with an economic orientation. These findings underscore the potential of small-scale businesses in enhancing rural household economies and overall well-being. Other studies have shown that small-scale agriculture in developed countries is effective in producing high-value perishable crops, such as vegetables, particularly in areas near consumption centers.

Monjame lahijani et al. (2025) examined The Impacts of Small-Scale Agricultural Activities on the Economic Development of Rural Settlements in Astaneh-ye Ashrafiyeh, finding substantial effects, with weighted means in economic welfare, economic security, and employment quality indicators being 4.00 or above. A statistically significant relationship was observed between small-scale agriculture and income ($r = 0.315$) and employment ($r = 0.293$), at a 99% confidence level and 0.01 margin of error. The impact of small-scale agriculture as a supplementary activity on rural economic development was thus notable.

Barriers to launching small-scale industries in rural areas include individual and infrastructural economic

challenges, a weak sense of place attachment, a lack of suitable employment opportunities, insufficient capital, low-risk employment alternatives, and the possibility of job switching. The major obstacles for small industries were policy-infrastructural, economic, marketing, managerial, educational, and socio-cultural issues. According to Lekhanya (2016), other inhibitors included unfamiliarity with appropriate advertising methods, lack of liquidity, absence of supportive institutions, high utility tariffs, lack of technical and engineering consulting services, and unhealthy competition among producers.

Lekhanya and Veeser (2016) added that a limited local market for rural small industry products, poor infrastructure, lack of trade access, strict government regulations, and indistinct product differentiation further constrained the growth of rural small-scale industries. Maleki et al. (2017) emphasized structural socio-cultural weaknesses that hinder rural entrepreneurship and technical, market-related, and legal challenges. Salehi Kakhki et al. (2019) identified economic, infrastructural, cultural, social, and individual constraints as the main barriers.

Jimenez et al. (2019) also demonstrated that agricultural mechanization, when properly applied, can improve productivity on small farms. Productivity improvements in smallholder agriculture depend heavily on income and contextual conditions. Two essential measures for rapid productivity growth include land reform and small-scale mechanization.

Van Nuppen (2021) affirmed the vital role of small-scale agriculture in food security and livelihoods in many countries. Most households depend on small-scale farming for sustenance. Mtshali and Akinola (2021) found that climate change and variability significantly affect smallholder farming. In most countries, small-scale agriculture is rain-fed. Climate variability also affects runoff levels and soil erosion. They concluded that innovations in mechanization could provide appropriate models for small-scale farming.

Fola et al. (2021) defined efficiency as the ability to produce a given output at the lowest cost, which in smallholder contexts is classified as technical and allocative efficiency. Technical efficiency refers to the farm's ability to produce the maximum output with a given set of inputs.

Mizik (2021) showed that household size, seed diversity, spouse's education level, and main occupation positively influenced technical efficiency in small-scale farming, while gender, farm size, severe drought, and market sales (mainly on-farm) had significant negative impacts. Gerbitus (2021) stated that public development is a major source of services for smallholder farmers in developing countries, although it is often hindered by administrative and structural challenges.

Tesfaye et al. (2021) revealed that conservation agriculture has been increasingly promoted among smallholder farmers in tropical and semi-tropical regions. Outcomes from smallholder adoption studies range from highly beneficial to disappointing. Although smallholder farming is frequently recommended as part of sustainable agriculture, low adoption rates in sub-Saharan Africa and South Asia are mainly due to the lack of economic incentives and the high cost of machinery. Muzekenyi et al. (2022) confirmed that smallholder farmers face difficulties implementing dense planting methods due to limited investment in herbicides and mechanization. Generally, small landholders have limited options regarding planting density.

3. Methodology

Study area

Astaneh Ashrafiyeh County, with an area of 423 square kilometers, comprises two districts (Kiashahr and Central), two cities (Kiashahr and Astaneh Ashrafiyeh), and rural districts (Dehka, Kiashahr, Fourteen Dahshal Gorka, and Kisem). The county is located in the eastern part of Gilan province at the geographical location of 49 degrees and 49°46′ to 59°11′ east longitude and 37°11′ to 37°28′ north latitude. According to the Gilan Provincial Management and Planning Organization (2022: 27), the total population is 105,525 people, of which 54,479 reside in urban areas and 51,047 in rural areas.

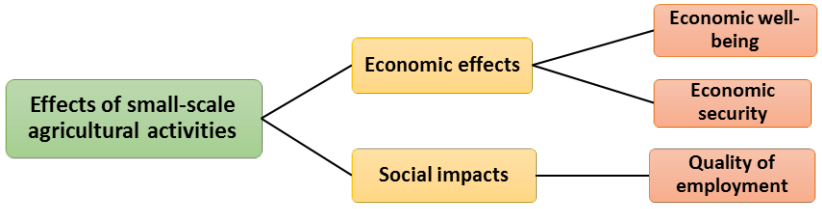

Figure 1. Conceptual research model

Research Methodology

This study employs a quantitative approach, is applied in a purpose, and is descriptive-analytical in design. The theoretical foundations and literature review were obtained through documentary methods, while the required data were collected using survey questionnaires and fieldwork techniques. The statistical population includes villages in Astaneh-ye Ashrafiyeh County where small-scale agricultural activities are practiced. From the 8 villages in the Kiashahr District, 4 villages were selected, and from the 26 villages in the Central District, 12 villages-representing 50% of those with the largest cultivated areas and the highest number of beneficiaries, were chosen.

To ensure content validity, the questionnaire was reviewed and validated by experts in agriculture and rural development planning. The reliability of the instrument was assessed using Cronbach's alpha coefficient, which was calculated at 0.83, indicating high internal consistency. A total of 350 individuals involved in small-scale agricultural activities were selected as the sample population through a random-stratified sampling method. For data analysis, statistical methods including the Kolmogorov–Smirnov test, t-test, and multiple regression analysis were applied.

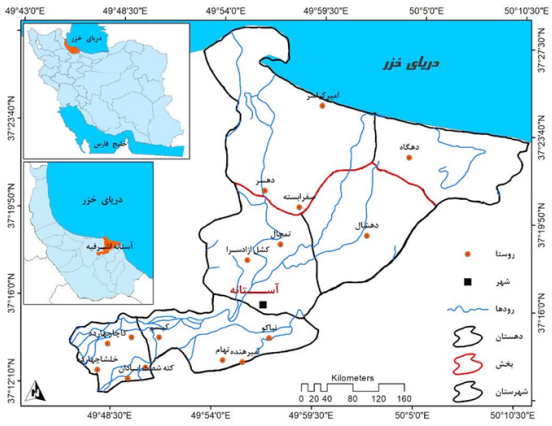

Figure 2. Geographical location of the study area. Source: Management and Planning Organization of Guilan Province, 2022

Table 1. Frequency distribution of participants by place of residence

Village	District	Frequency	Frequency Percentage
Amirkiasar	Kiyashahr	28	8
Dehsar	Kiyashahr	18	5.14
Dehka	Kiyashahr	31	8.86
Safra Beshte	Kiyashahr	30	8.57
Collection	–	14	4
Dehshal	Markazi	19	5.43
Kism	Markazi	39	11.14
Chardeh	Markazi	4	14.1
Kashl Azad Sara	Markazi	22	29.6
Tamchal	Markazi	25	14.7
Toham	Markazi	5	43.1
Amirhandeh	Markazi	28	8
Nyako	Markazi	28	8
Kacha Chardeh	Markazi	28	8
Taze Abad Marzban	Markazi	8	29.2
Katshasat Abadan	Markazi	13	71.3
Khalsha Chardeh	Markazi	10	86.2
Collection	Markazi	350	100

4. Findings

In the findings section, the results are presented descriptively, focusing on individual and general characteristics of the respondents, the features of small-scale agricultural activities, and the economic and social effects and consequences of their expansion in the villages of Astaneh Ashrafieh County. This is followed by the analytical findings.

Descriptive Findings

Individual and General Characteristics of Respondents

The analysis of the respondents' demographic and general characteristics shows that out of a total of 350 individuals surveyed, 67.1% were male and 32.9% were female. The largest proportion of respondents (64.3%) fell within the 40–60 age group, Most respondents, with 64.3%, were in the age group of 40 to 60 yearsindicating that middle-aged individuals dominate small-scale agricultural activities. In terms of education, 72.3% had a diploma or lower, reflecting the prevalence of lower formal education among participants. Regarding occupation, 86.8% reported farming as their main livelihood, while 13.2% engaged in small-scale agricultural activities in addition to salaried employment or freelance work.

Characteristics of Micro-Agricultural Activities

The characteristics of micro-agricultural activities in the villages of Astaneh-ye Ashrafiyeh County have been examined using seven components, as presented in Table 3.

Analytical Findings

Since the significance level of all research variables in the Smirnov-Kolmogorov test was greater than 0.05, the data distribution was confirmed to be a normal distribution, allowing the use of parametric regression analysis. In the next step, regression estimation was performed to examine the socio-economic effects of expanding small-scale agricultural activities in the villages of Astaneh-ye Ashrafiyeh. Table 4 shows the status of this statistic.

Since the significance level of each of the research variables for the Smirnov-Kolmogorov test is higher than 0.05, the distribution of data related to the research variables is normal and the parametric regression test can be used. In the next step, regression estimation is performed to examine the socio-economic effects of the expansion of small-scale agricultural activities in the villages of Astaneh Ashrafiyeh.

Table 2. Personal and general characteristics of respondents

description		Frequency	percentage
gender	Male	235	1.67
	Female	115	9.32
age	Under 20 years	2	6.0
	21-40 years	115	9.32
	41-65 years	225	3.64
	65 years and above	8	3.2
Education	Illiterate	56	0.16
	Under diploma	212	6.60
	Diploma	41	7.11
	Associate degree	24	8.6
	Bachelor degree	14	4
	Master's degree and above	3	9.0
ocuupation	Agriculture	299	8.86
	Employee	17	9.4
	Freelance	29	3.8

Table 3. Characteristics of small-scale agricultural activities

Description		Frequency	Percentage
Cultivation history	Under 5 years	49	0.14
	10-6	42	0.12
	11-15	54	4.15
	20-16	44	6.12
	21-25	51	6.14
	26-30	49	0.14
	31 years and above	61	4.17
Land ownership	Private ownership	180	4.51
	Rented	162	3.46
	Cooperative	8	3.2
Cultivated area (square meters)	Less than 1000	121	6.34
Cultivation motivation	1001-2000	122	9.34
Production cost	3000-2001	98	28
	4000-3001	4	1.1
	4001 and above	5	4.1
How to sell products	More income and meeting basic needs	164	9.46
	Enjoying a better life	71	3.20
	Prejudice and continuing the practices of the past	62	7.17
	Staying in the village	53	1.15
Income amount (Toman)	Less than 2 million Tomans	71	3.20
	1.2 to 4 million Tomans	68	4.19
	1.4 to 6 million Tomans	72	6.20
	1.6 to 8 million Tomans	75	4.21
	1.8 to 10 million Tomans and more	64	3.18

Source: Research findings, 1402

Table 4. Smirnov-Kolmogorov test for research variables

Row	Varaboles	Smirnov-Kolmogorov test statistic	level
1	Economic impacts (economic well-being)	0.043	0.2
2	Economic impacts (economic security)	0.045	0.09
3	Social impacts (social cohesion, unemployment reduction, population sustainability)	0.047	0.06

Economic Effects of Micro-Agricultural Activities

The economic impacts of micro-agricultural activities have been measured using two indicators: economic well-being and economic security, assessed through the t-test. The level of economic well-being derived from micro-agricultural activities in the villages of Astaneh-ye Ashrafiyeh County was evaluated using 12 items on a Likert scale, with option values ranging from 1 (lowest) to 5 (highest).

As a form of family-based livelihood, micro-agricultural activities—engaging rural inhabitants for 9 to 10 months per year—play an essential role in their livelihood. In this regard, the cultivation and production of agricultural products show an average score of 3.99 on

the housing type component, indicating that such practices have had a significant yet secondary influence on the type of rural housing. Likewise, their impact on housing quality is evident, with an average score of 3.97, demonstrating the substantial influence of these farming practices on housing conditions.

The impact on housing age was stronger with a mean score of 4.01, suggesting that micro-agricultural activities have had a notable role in enabling villagers to maintain or improve their homes. Given that these side agricultural activities are practiced throughout most of the year, villagers often travel to historical and religious sites during the off-season when weather conditions hinder agricultural work. The average score of 3.96 indicates that micro-agricultural production has significantly influenced the frequency of family travels.

Access to transportation is critical for commuting and marketing agricultural goods to urban areas. The impact on vehicle ownership received a high average score of 4.02, which confirms villagers' approval. In recent years, due to increasing urban-rural interactions and improved rural living standards in Gilan Province, the use of consumer durables such as refrigerators and televisions has increased—especially in economically diverse villages like Niako and Amirehendeh. Here, the cultivation of secondary crops had a relatively significant effect on ownership of durable consumer goods, with an average score of 3.97. These activities have also influenced the consumption of red and white meat in the studied villages. Protein intake is directly related to income levels; households with higher incomes showed higher consumption. The average scores were 3.98 for red meat and 4.00 for white meat, indicating a correlation between engagement in micro-agriculture and protein consumption.

Rural areas, as production hubs, play an essential role in supplying agricultural and industrial goods while mitigating rural-to-urban migration. Unemployment remains one of the most pressing challenges in Gilan Province, pushing youth toward unstable urban jobs. By creating limited but meaningful employment opportunities, micro-agriculture has helped retain young villagers. Its impact on employment generation scored 4.05, confirming its role in addressing rural job shortages.

Unemployment is one of the most pressing issues in rural areas of Gilan Province, leading many young people to migrate to cities and engage in unstable jobs, thus undermining rural development.

Micro-agriculture has created limited but valuable job opportunities, helping to retain youth in villages. Since these activities are family-based and rely on household labor, their impact on employment generation scored a high 4.05, confirming that such activities can meet rural employment needs. Moreover, by diversifying agricultural production, micro-agriculture has enhanced rural household welfare, with a mean score of 4.06, indicating its significant contribution to improved living conditions.

Field surveys and interviews further emphasize that, while secondary in scale compared to rice farming, micro-agriculture holds an important complementary role in the economic structure of farming households. Despite being the second-ranking livelihood activity in terms of land use, production volume, and income, it has significantly improved household welfare in Astaneh-ye Ashrafiyeh.

Finally, results of the t-test at a 0.05 significance level and 95% confidence interval (see Table 5) confirm that micro-agricultural activities, practiced as family-based horticultural production, exert a significant positive effect on the economic well-being of rural households.

The economic security index of rural households in Astaneh-ye Ashrafiyeh County was assessed using six components, as detailed in Table 6. Based on the results of field studies and completed questionnaires, the most significant impact of micro-agricultural activities on the economic security of rural households with supplementary activities is attributed to two factors: bank support through loan provisions and the impact of small-scale agricultural production on household savings, with average scores of 4.10 and 4.07, respectively. According to the villagers, these two factors play the most important role in ensuring their economic security.

Agricultural insurance emerged as another critical component, contributing to farmers' peace of mind and reducing income losses during seasons affected by drought, insufficient rainfall, or animal attacks. This component received an average score of 3.99, highlighting its significant role in the economic security of rural households.

In contrast, price fluctuations of orchard products caused by unstable market conditions in nearby cities were identified as the fifth most influential factor, with a weighted average of 3.97. This volatility was particularly impactful following a decline in horticultural income.

Table 5. Results of the t-statistic of the economic effects of small-scale agricultural activities (economic welfare)

Research variables	t-statistic	Degrees of freedom	Significance level	Mean difference	Low confidence level	High confidence level
The impact of small-scale agricultural activities on housing type	65.614	349	0.00	1.84286	1.79	1.90
The impact of small-scale agricultural activities on housing quality	57.338	349	0.00	1.94857	1.88	2.02
The impact of small-scale agricultural activities on housing age	57.199	349	0.00	1.95143	1.88	2.02
The impact of small-scale agricultural activities on housing unit size	57.199	349	0.00	1.95143	1.88	2.02
The impact of small-scale agricultural activities on travel frequency	65.273	349	0.00	1.84571	1.79	1.90
The impact of small-scale agricultural activities on vehicle ownership	55.653	349	0.00	1.98857	1.92	2.06
The impact of small-scale agricultural activities on consumer goods ownership	50.662	349	0.00	1.48857	1.43	1.55
The impact of small-scale agricultural activities on red meat consumption	65.796	349	0.00	1.76857	1.72	1.82
The impact of small-scale agricultural activities on white meat consumption	56.551	349	0.00	1.96571	1.90	2.03
The impact of small-scale agricultural activities on increasing rural household welfare	60.308	349	0.00	1.58857	1.54	1.64
The impact of small-scale agricultural activities on improving rural household livelihoods	59.970	349	0.00	1.58286	1.53	1.63
The impact of small-scale agricultural activities on rural household employment generation	67.079	349	0.00	1.83143	1.78	1.89

JSRD

Following the reduction in income from horticultural production, the price fluctuations of orchard products—due to unstable market conditions in nearby cities—were identified as the fifth most influential factor, with a weighted average of 3.97.

Findings from the completed questionnaires and interviews with villagers engaged in micro-agricultural activities, presented as descriptive results (i.e., weighted averages), all indicate the important role of micro-agriculture in the economic security of rural households in Astaneh-ye Ashrafiyeh County. Additionally, results from analytical findings based on the t-test, calculated with a 0.05 margin of error and 95% confidence level (as shown in Table 6), confirm the above conclusions and demonstrate that micro-agricultural activities have positively influenced the economic security of rural households in this region.

Next, the coefficient of determination and correlation coefficient were used to calculate the amount of change in economic effects with the expansion of small-scale agricultural activities.

According to Table 7, the correlation coefficient is 0.64, indicating that up to 64% of the variations related to the expansion of micro-agricultural activities can be predicted based on their economic effects.

It can also be stated that the value of the F-statistic is significant at the 0.001 level, indicating that the regression related to the economic effects on the expansion of micro-agricultural activities is statistically significant.

Finally, based on the result of the regression model, it can be concluded that the expansion of micro-agricultural activities is positively and significantly affected by economic well-being, with a regression coefficient of 0.55. In other words, a one-unit improvement in economic well-being is expected to increase the level of micro-agricultural activity expansion by 55%. Similarly, economic security also has a positive and significant impact on the expansion of micro-agricultural activities, with a regression coefficient of 0.28. This means that a one-unit improvement in economic security could lead to a 28% increase in the expansion of micro-agricultural activities in the villages of Astaneh-ye Ashrafiyeh County.

Table 6. Results of the t-statistic on the economic effects of small-scale agricultural activities (economic security)

Research variables	t-statistic	Degree of freedom	Significance level	Average difference	Low level of confidence	High level of confidence
The impact of agricultural product price fluctuations on farmers' economic security	57.332	349	0.00	1.53143	1.48	1.58
The impact of reduced income from crop cultivation on farmers' economic security	62.966	349	0.00	1.62857	1.58	1.68
The impact of bank support through the payment of facilities on farmers' economic security	42.416	349	0.00	2.02286	1.93	2.12
The impact of agricultural product insurance on creating farmers' peace of mind	54.934	349	0.00	1.840	1.77	1.91
The level of satisfaction with income from agricultural production	51.680	349	0.00	2.12857	2.05	2.21
The impact of small-scale agricultural production on rural household savings	47.122	349	0.00	2.23714	2.14	2.33

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Table 7. Coefficient of determination and correlation coefficient for economic effects

Model	Correlation coefficient	Coefficient of determination (R^2)
Economic effects	0.64	0.41

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Table 8. Results of Analysis of Variance (ANOVA) for Economic Effects

Model	Degrees of freedom	Sum of squares	F-statistic	level	Degrees of freedom
Regression	23.686	2	11.843	120.834	0.00
Residual	34.01	347	0.098		
Total	57.696	349			

JSRD

Table 9. Regression related to economic effects

Model	Unstandardized beta	standard error	Standard beta	t-statistic	Significance level
Fixed coefficient	0.274	0.186		1.471	0.142
Economic effects (economic welfare)	0.601	0.045	0.555	13.436	0
Economic effects (economic security)	0.317	0.046	0.287	6.942	0

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Social Impacts of Small-Scale Agricultural Activities

The social impacts of small-scale agricultural activities have been investigated using three components: (1) rural household employment level, (2) the effect of small-scale agricultural activities on the job diversity of rural households, and (3) its role in reducing unemployment in rural households.

As mentioned in the descriptive findings of the study, the cultivation and production of secondary agricultural products, which are carried out alongside their main activity, namely rice cultivation, since it keeps villagers busy almost all year round and earns them a relatively good income, has led to sustainable employment for villagers and has brought them relative satisfaction with an average of 4.05. The cultivation and production of small-scale agricultural products, which are diverse throughout the year and according to weather conditions and changes, and have provided farmers with job diversity in addition to their main activity through the production of dif-

ferent products, have undoubtedly had an impact on the quality and job security of the villagers in the study area. The impact of small-scale agricultural activities on the job security of villagers through the creation of diverse job opportunities has been considered and emphasized, with an average of 4.04.

Furthermore, small-scale agricultural activities have reduced rural unemployment by providing employment opportunities for rural households and job diversity, which has been confirmed by farmers with an average of 3.87. Also, the results obtained from the analytical findings of the desired components using the t-test to confirm the social effects of small-scale agricultural activities, which are presented in Table 10 and calculated with an error of 0.05 percent and a confidence level of 95 percent, also confirm the accuracy of the above and show that small-scale agricultural activities in the form of family exploitation methods and based on the production of garden products have had an impact on the quality of employment of rural households in Astaneh Ashrafieh County.

After calculating the t-statistic of the social effects of small-scale agricultural activities, the coefficient of determination and the correlation coefficient for social effects have been calculated. Accordingly, it can be stated that there is a relationship between the expansion of small-scale agricultural activities, unemployment reduction, social cohesion, and population sustainability, and the correlation coefficient of this relationship is 0.76.

In other words, n other words, up to 76% of the variations in small-scale agricultural activities can be explained by the variables proposed in the hypothesis. This relationship is positive, meaning that improvements in unemployment reduction, social cohesion, and population sustainabilityultimately lead to positive changes in small-scale agricultural activities.

Table 12 shows the results of the analysis of variance for the social effects of small-scale agricultural activities. The results indicate that the F-statistic value of 157.83 is significant at the 0.001 level, which is statistically acceptable. This finding demonstrates a strong and significant relationship between the expansion of small-scale agricultural activities, reduction of unemployment, social cohesion, and population sustainability.

Table 10. Results of the t-statistic for the social impacts of small-scale agricultural activities (quality of the sample)

Research variables	T-statistic	Degrees of freedom	Significance level	Mean difference	Low level of confidence	High level of confidence
The impact of small-scale agricultural activities on rural household employment	67.079	349	0.00	1.83143	1.78	1.89
The impact of small-scale agricultural activities on rural household job diversity	60.656	349	0.00	2.59429	1.54	1.65
The impact of small-scale agricultural activities on reducing rural household unemployment	57.306	349	0.00	1.61429	1.56	1.67

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Table 11. Coefficient of determination and correlation coefficient for social effects

Model	Correlation coefficient	Coefficient of determination
Small-scale agricultural activity	0.76	0.578

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Table 12. Result of ANOVA of social effects

Model	Mean square	Degrees of freedom	Sum of squares	F-statistic	level	Degrees of freedom
Regression	45.052	3	15.017	157.831	0.001	3
Residual	32.921	346	0.095			346
Total	77.974	349				349

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Finally, the regression output shows that reducing unemployment has a significant effect on the development of small-scale agricultural activities, and this effect is positive and significant, with a coefficient of 0.08. In other words, it is expected that a one-unit improvement in reducing unemployment can increase the level related to the improvement of small-scale agricultural activities by 8 percent.

Similarly, social cohesion shows a strong and positive significant effect with a coefficient of 0.59. In other words, a one-unit improvement in social cohesion can improve small-scale agricultural activities by 59 percent. Also, social sustainability can have a positive and significant effect on the development of agricultural activities, and this effect is positive and significant. Its effect coefficient is 0.18. This means that a one-unit improvement in population sustainability can improve the development of small-scale agricultural activities by 18 percent. The correlation coefficient was used to show the predictive power of economic effects.

5. Discussion

This study analyzed the economic and social effects of the expansion of small-scale agricultural activities in the villages of Astaneh Ashrafieh County. Small-scale agricultural activities, as a supplementary activity alongside the main livelihood of rural households, namely rice cultivation—have a long history, with over 76% of farmers reporting more than 10 years of experience in these activities. Land ownership in this practice is 51.4% private and 46.3% leased. Small-scale agricultural activities are conducted on small plots of land, ranging from less than 1,000 to 5,000 square meters, with 69.5% of such lands being under 2,000 square meters. The motivation for cultivation for 67.2% of the operators was to earn a higher income, meet basic needs, and enjoy a better life.

Production costs —including plowing, seed purchase, and transportation of products such as peanuts, vegetables, peppers, cucumbers, squash, and other cucurbitaceae—varied from less than 2 million to 10 million tomans with an average cost of about 5 million tomans per year. . According to the results, the average production cost in the studied villages was approximately 5 million tomans. Agricultural products are marketed and sold in various ways by villagers, with 62.5% of these products sold by intermediaries along the west-to-east main road of Gilan province. Sustainable income and improved welfare are the primary goals of rural households engaged in small-scale agriculture. The income from selling agricultural products ranged from less than 10 million to over 50 million tomans annually.

To assess the economic effects of small-scale agricultural activities in the rural settlements of Astaneh Ashrafieh County, two indicators were used: economic welfare and economic security. For social effects, the quality of employment was employed as an indicator. Economic welfare is a critical factor influencing production methods in rural economies. Increased income and financial well-being can enhance agricultural productivity and stimulate investment and motivation for technical and technological improvements. This can lead to the development of modern irrigation systems, the adoption of advanced technologies, and the improvement of planting and maintenance methods, ultimately boosting production and improving rural farmers' livelihoods.

To measure the impact of small-scale agricultural activities on the economic welfare of rural farmers, 12 survey items were used. The results indicated a high impact of these activities, with the top three factors being: the effect of cultivation and production on increasing family welfare (mean 4.06), the effect on family employment creation (mean 4.05), and the effect on family income increase (mean 4.04).

Table 13. Regression related to social effects

Model	Unstandardized beta	standard error	Standard beta	t-statistic	Significance level
Constant coefficient	0.425	0.069		6.162	0
Reduction of unemployment	0.076	0.039	0.084	1.929	0.05
Social cohesion	0.588	0.044	0.597	13.458	0
Population stability	0.176	0.04	0.185	4.448	0

Economic security—meaning the maintenance and assurance of economic stability and growth, increases confidence and trust among individuals and institutions in transactions and investments. In rural areas, economic security directly affects production methods. The impact of small-scale agricultural activities on economic security was assessed using 6 survey items. According to results, bank support through loan facilities had the highest effect (mean 4.10), and product price fluctuations ranked fourth in impact (mean 3.97).

Regarding the social effects of small-scale agriculture, the quality of employment among farming households was studied. Employment quality in rural economies greatly affects production approaches. Stable and high-value-added jobs provide rural farmers and laborers opportunities to upgrade skills and improve living conditions, whereas insecure or unsuitable jobs reduce investment willingness and optimal land use. Employment quality was measured by three indicators related to small-scale agricultural activities: impact on villagers' savings (mean 4.07), job diversification created through cultivation and production (mean 4.04), and satisfaction with income from agricultural production (mean 3.97). These indicate the significant positive influence of small-scale agriculture on employment quality.

A multivariate regression analysis was used to evaluate the impact of small-scale agricultural activities on rural households' economic welfare. The decision criterion was below 0.05, indicating a significant relationship at the 95% confidence level between small-scale agriculture and economic welfare (regression coefficient = 0.64). In other words, there is a statistically significant relationship between the independent variable (small-scale agricultural activities) and the dependent variable (economic welfare) at the 0.00 significance level. Additionally, 41% of the variance in economic welfare can be explained by small-scale agricultural activities. Similarly, to measure the impact on economic security, multivariate regression analysis showed a significant relationship (coefficient = 0.64, $p < 0.05$), explaining 28% of the variance in economic security. Furthermore, the expansion of small-scale agricultural activities was positively correlated with reduced unemployment, social cohesion, and population retention, with a correlation coefficient of 0.76. This means changes related to small-scale agriculture can predict up to 76% of changes in these variables, indicating a positive relationship.

Small-scale agriculture has a significant positive effect on reducing unemployment, with an effect coefficient of 0.80—meaning a one-unit improvement in unemployment reduction can increase small-scale agriculture development by up to 8%. Social cohesion also has a significant positive effect (coefficient 0.59), implying that a one-unit increase in social cohesion can improve small-scale agriculture activities by 59%. Population retention similarly has a positive and significant effect (coefficient 0.18), meaning a one-unit improvement in population retention can enhance small-scale agricultural development by 18%.

These results align with previous studies such as Tarikigan et al. (2023), who found that constructing storage facilities alongside home-based initial processing can extend small-scale agricultural businesses into other seasons; Shouket (2022), who identified small-scale agriculture expansion in Lahore as a useful tool for local potential growth; PourRamazan (2016), who reported small-scale agriculture as a supplementary activity providing moderate economic satisfaction to villagers; Khosravipour et al. (2021), who noted rural women's motivation to start small-scale agricultural businesses contributed significantly to rural household economies in Gilan and Mazandaran provinces; Akhshini (2022), who found that increased migration to cities expanded marginal neighborhoods and informal settlements in Iran; and Monjami Lahijani et al. (2025), who reported a significant relationship between small-scale agricultural activities and rural economic development in Langarud County. The present study demonstrated that small-scale agricultural activities—primarily vegetable and fruit cultivation—as a supplementary activity to the primary livelihood of rice production by rural farmers have significant economic and social effects, making planning to expand these activities essential for sustainable rural development. Increasing cultivation and production of various products can enhance the income and living standards of rural people. Also, creating job opportunities and marketing linkages for agricultural products boosts economic activities and local industry development in Astaneh Ashrafieh's villages. Therefore, attention to cultivating and producing agricultural products as a strategy to increase rural economic growth is crucial. Based on the results, the following recommendations are proposed to expand small-scale agricultural activities and enhance their economic and social impacts in Astaneh Ashrafieh County:

- To promote economic development and employment in Astaneh Ashrafieh's villages, it is recommended to support small-scale agricultural activities through low-interest bank loans with long repayment periods and easy collateral conditions.

- Considering environmental conditions, indigenous knowledge, stable income, and new job creation in rural farming households, it is suggested to expand small-scale agricultural activities in other villages of Astaneh Ashrafieh County.

- Establish local markets and marketing networks to improve the sale and distribution of agricultural products in the villages.

- Develop processing and complementary industries related to small-scale agricultural activities and value chains to foster rural economic development.

- Conduct training and extension courses for farmers in Astaneh Ashrafieh County to increase productivity per unit area and improve both the quantity and quality of agricultural products.

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Conflict of Interest

The authors declared no conflicts of interest.

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