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Research Paper

Problems and Prospects of Agriculture among Small and Marginal Farmers in Mahabubnagar District of Telangana

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Abstract
Agriculture remains a major source of livelihood for rural households in Telangana, particularly for small and marginal farmers whose income depends on limited landholdings, seasonal rainfall, irrigation access, labour availability, institutional credit, and market prices. Mahabubnagar district of Telangana provides an important context for studying the problems and prospects of agriculture because of its rural character, dryland farming conditions, and dependence on crops such as paddy, jowar, groundnut, cotton, castor, pulses, and maize. Telangana's official crop profile identifies crops such as rice, maize, red gram, green gram, jowar, castor, cotton, groundnut, soybean, and black gram as important crops in the state, with red gram, groundnut, and castor specifically associated with Mahabubnagar among other districts. The present study examines the agricultural constraints and development opportunities among small and marginal farmers in Mahabubnagar district. The study is based on an assumed empirical survey of 100 farmers selected from five mandals. The findings reveal that water scarcity, high input cost, unstable crop prices, labour shortage, pest incidence, credit limitations, and lack of storage are the major problems faced by farmers. At the same time, the study identifies several prospects, including crop diversification, soil-test-based fertilizer use, organic manure, integrated pest management, drip irrigation, sprinkler irrigation, crop insurance, farm mechanization, Farmer Producer Organisations, and digital agricultural advisory services. The study concludes that agriculture in Mahabubnagar can become more sustainable and profitable only through climate-resilient farming, improved institutional support, better market linkage, and farmer-oriented extension services.

Keywords: *Agriculture, small farmers, marginal farmers, Mahabubnagar, Telangana, water scarcity, crop diversification, rural livelihood.*

I. Introduction

Agriculture is the backbone of rural India and continues to provide livelihood, food security, employment, and socio-economic stability to millions of households. In states like Telangana, agriculture is not merely an economic activity but a central part of rural social organisation. The well-being of farmers directly influences rural income, consumption, migration, education, health expenditure, and local markets. However, the agricultural sector is marked by several structural challenges, especially for small and marginal farmers. Small and marginal farmers occupy a very important place in Telangana's agrarian structure. According to Telangana's Census of Land Holdings 2021–22, marginal holdings accounted for 68.65% and small holdings accounted for 22.66% of total holdings in the state. Together, marginal and small farmers formed 91.31% of the total holdings, while the average size of holdings declined from 1.00 hectare in 2015–16 to 0.89 hectare in 2021–22. This shows that the agrarian economy is dominated numerically by small landholders, but their limited resource base makes them highly vulnerable.

Mahabubnagar district, popularly associated with dryland and semi-arid agricultural conditions, is a suitable area for examining the problems of small and marginal farmers. The district has several mandals and a large rural population dependent on agriculture and allied activities. The official district portal mentions that Mahabubnagar consists of **17 mandals**, and the local administrative machinery collects crop, rainfall, population, and agricultural information through mandal-level officers. (Mahabubnagar District) Agriculture in the district is influenced by rainfall uncertainty, irrigation limitations, soil fertility variation, credit access, input cost, labour availability, and crop-market fluctuations. The Agriculture Department of Mahabubnagar identifies several field-

level agricultural interventions, including organic manure, green manure, soil-test-based fertilizer application, reduction of excess nitrogen, balanced phosphorus and potassium use, biofertilizers, integrated pest management, biological agents, reduction of pesticide use, water management, crop substitution, and cropping intensity improvement. (Mahabubnagar District) These interventions show that agricultural development in the district requires both production improvement and sustainability-oriented practices.

Small and marginal farmers in Mahabubnagar face a double challenge. On one side, they have to produce enough to maintain household livelihood. On the other side, they must manage increasing cultivation costs, market risks, water scarcity, and climate variability. A farmer with less than two hectares of land cannot easily absorb crop failure, price crash, pest attack, or rising input cost. Therefore, even small shocks may push rural households into debt, distress migration, or dependence on informal labour. The present paper focuses on the problems and prospects of agriculture among small and marginal farmers in Mahabubnagar district of Telangana. The term "problems" refers to production, financial, technological, institutional, environmental, and marketing constraints faced by farmers. The term "prospects" refers to future possibilities for improving agriculture through scientific farming, crop diversification, irrigation efficiency, farmer organisations, value addition, market reforms, and better government support.

II. Review of Literature

The literature on Indian agriculture indicates that small and marginal farmers are highly vulnerable to production and market risks. Their landholdings are limited, and they often lack access to assured irrigation, machinery, institutional credit, storage, crop insurance, and scientific advisory services. Although small farmers may use family labour efficiently, they face serious difficulty in achieving economies of scale. Fragmented landholdings restrict mechanization and make resource management difficult. Studies on dryland agriculture show that rainfed regions are more vulnerable to climate variability. Irregular rainfall, delayed monsoon, prolonged dry spells, and moisture stress directly affect sowing, crop growth, and yield. In semi-arid districts, crop selection becomes a crucial decision. Farmers may prefer drought-tolerant crops such as millets, pulses, oilseeds, and castor; however, market incentives often push them towards commercial crops or water-intensive crops. This creates a conflict between ecological suitability and economic expectation.

Research on Telangana agriculture highlights the importance of irrigation expansion, crop support schemes, agricultural extension, input subsidies, soil health management, and farmer welfare policies. However, the benefits of such interventions vary across regions and farmer categories. Farmers with larger landholdings and better irrigation access are usually in a stronger position to adopt improved technologies. In contrast, marginal farmers may be aware of improved methods but may not adopt them due to financial constraints. Agricultural marketing literature shows that small farmers usually sell produce immediately after harvest due to urgent cash needs. They often lack storage facilities, grading facilities, transport access, price information, and collective bargaining power. As a result, they may depend on middlemen and local traders. Market price instability affects their income and creates uncertainty in crop planning.

The literature also suggests that the future of agriculture depends on sustainable practices. Soil testing, organic manure, green manure, biofertilizers, balanced fertilizer use, integrated pest management, drip irrigation, sprinkler irrigation, crop diversification, and collective marketing are important strategies for improving farm sustainability. However, the adoption of these practices requires awareness, training, credit, extension support, and farmer confidence. Thus, previous studies clearly show that agricultural problems are multidimensional. They are not limited to crop production alone. They include landholding size, irrigation, input cost, labour, credit, market access, technology adoption, risk management, and policy delivery. Therefore, a district-level empirical study on small and marginal farmers in Mahabubnagar is academically relevant.

III. Statement of the Problem

Small and marginal farmers in Mahabubnagar district depend heavily on agriculture, but their farming conditions are affected by several constraints. Many farmers cultivate small plots of land and depend on rainfall or limited groundwater. Rising input costs, labour shortage, crop diseases, unstable market prices, and limited access to formal credit reduce their profitability. At the same time, sustainable agricultural practices such as soil testing, crop diversification, water-saving irrigation, crop insurance, farm mechanization, and Farmer Producer Organisations offer future opportunities.

The central problem of the study is therefore:

What are the major problems faced by small and marginal farmers in Mahabubnagar district, and what are the future prospects for improving their agricultural livelihood?

4. Objectives of the Study

1. To study the socio-economic profile of small and marginal farmers in Mahabubnagar district.
2. To examine the major agricultural problems faced by small and marginal farmers.
3. To analyse the awareness and adoption of improved agricultural practices.

4. To assess the relationship between irrigation access, landholding category, awareness, and agricultural outcomes.
5. To identify the prospects for sustainable and profitable agriculture in Mahabubnagar district.
6. To suggest suitable measures for improving the condition of small and marginal farmers.

5. Hypotheses of the Study

H01: There is no significant relationship between landholding category and adoption of improved agricultural practices.
H02: There is no significant relationship between irrigation access and agricultural income.
H03: There is no significant relationship between awareness of government schemes and use of institutional support.
H04: There is no significant difference between small and marginal farmers in the severity of agricultural problems.

6. Research Methodology

The present study follows a descriptive and analytical research design. The descriptive part explains the socio-economic conditions, cropping pattern, agricultural practices, and major problems of farmers. The analytical part examines relationships among variables such as landholding category, irrigation access, adoption of improved practices, income level, and awareness of government schemes. The study area is Mahabubnagar district of Telangana. For the purpose of this model empirical paper, five mandals are considered: **Mahabubnagar Rural, Hanwada, Koilkonda, Devarakadra, and Nawabpet**. These mandals are selected to represent mixed agricultural conditions, including rainfed farming, borewell irrigation, tank irrigation, and semi-commercial cropping.

The sample consists of **100 farmers**, including **62 marginal farmers** and **38 small farmers**. Marginal farmers are considered those having land up to one hectare, while small farmers are considered those having land above one hectare and up to two hectares. The study uses assumed survey data for academic drafting purposes. A structured questionnaire is used as the main tool of data collection. The questionnaire includes questions on age, education, landholding, crops grown, irrigation source, annual agricultural income, credit source, major problems, adoption of improved practices, and perception of future prospects. The data are analysed using percentage analysis, mean score ranking, cross-tabulation, and chi-square test. A five-point scale is used to measure the severity of agricultural problems, where 1 indicates very low severity and 5 indicates very high severity.

7. Profile of Respondents

Table 1
Distribution of Farmers by Category

Farmer Category	Number of Farmers	Percentage
Marginal farmers	62	62%
Small farmers	38	38%
Total	**100**	**100%**

The sample shows that marginal farmers constitute the majority of the respondents. This reflects the general agrarian structure of Telangana, where marginal and small holdings dominate total operational holdings. The dominance of marginal farmers also indicates the need for agricultural policies that are sensitive to small landholders.

Table 2
Age-wise Distribution of Respondents

Age Group	Number of Farmers	Percentage
Below 35 years	18	18%
35–50 years	48	48%
Above 50 years	34	34%
Total	**100**	**100%**

The data show that nearly half of the respondents belong to the 35–50 age group. This indicates that agriculture is mainly managed by middle-aged farmers. Younger participation is comparatively lower, which may be due to migration, education, or preference for non-farm employment.

Table 3
Education Level of Respondents

Education Level	Number of Farmers	Percentage
Illiterate	24	24%
Primary education	30	30%
Secondary education	32	32%
Intermediate and above	14	14%
Total	**100**	**100%**

The table shows that a large proportion of farmers have only primary or secondary education. Education influences awareness of government schemes, adoption of technology, record keeping, and access to digital agricultural information. Farmers with higher education may adopt improved practices more easily.

8. Cropping Pattern and Irrigation Sources

Table 4
Major Crop Cultivated by Respondents

Major Crop	Number of Farmers	Percentage
Paddy	32	32%
Cotton	18	18%
Groundnut	16	16%
Castor	10	10%
Jowar / millets	11	11%
Pulses	8	8%
Maize / vegetables	5	5%
Total	**100**	**100%**

The data show that paddy is cultivated by the highest proportion of respondents, followed by cotton, groundnut, jowar/millets, castor, pulses, and maize/vegetables. Paddy cultivation may be preferred where irrigation is available, while crops such as jowar, groundnut, castor, and pulses are more suitable under dryland or limited-water conditions. Telangana's crop profile also recognises crops such as rice, maize, red gram, green gram, jowar, castor, cotton, groundnut, and black gram as important crops. (pjtau.edu.in)

Table 5
Irrigation Source of Respondents

Irrigation Source	Number of Farmers	Percentage
Rainfed cultivation	41	41%
Borewell irrigation	35	35%
Tank irrigation	14	14%
Canal / lift irrigation	10	10%
Total	**100**	**100%**

The table shows that 41% of farmers depend mainly on rainfall. Borewell irrigation is available to 35% of farmers, while tank and canal/lift irrigation are available to a smaller proportion. This indicates that irrigation inequality is an important issue. Farmers with assured irrigation are better positioned to cultivate paddy and commercial crops, while rainfed farmers face higher production risk.

9. Agricultural Income and Credit Access

Table 6
Annual Agricultural Income of Respondents

Annual Agricultural Income	Number of Farmers	Percentage
Below ₹50,000	36	36%
₹50,001–₹1,00,000	44	44%
Above ₹1,00,000	20	20%
Total	**100**	**100%**

The data show that most farmers earn below ₹1,00,000 annually from agriculture. This indicates that agriculture alone may not provide sufficient income security for many small and marginal households. Farmers may depend on wage labour, livestock, seasonal migration, or non-farm work to supplement income.

Table 7
Source of Agricultural Credit

Credit Source	Number of Farmers	Percentage
Institutional credit	48	48%
Informal credit	31	31%
Both institutional and informal	13	13%
No credit used	8	8%
Total	**100**	**100%**

The table shows that less than half of the farmers depend only on institutional credit. A significant number still depend on informal credit sources such as moneylenders, traders, relatives, or input dealers. Informal credit is often quicker but may involve higher interest rates or tied selling of produce. This increases the vulnerability of farmers.

10. Major Problems Faced by Farmers

Table 8
Mean Score Ranking of Agricultural Problems

Problem	Mean Score	Rank
Water scarcity / irregular rainfall	4.46	1
High input cost	4.38	2
Price fluctuation	4.21	3
Labour shortage	3.96	4
Pest and disease incidence	3.88	5
Difficulty in getting timely credit	3.64	6
Lack of storage facilities	3.55	7
Inadequate extension support	3.42	8
Soil fertility decline	3.31	9
Crop insurance claim difficulty	3.12	10

The most severe problem reported by farmers is water scarcity and irregular rainfall. This is followed by high input cost and price fluctuation. These three problems together form the core crisis of smallholder agriculture: uncertain production, expensive cultivation, and unstable returns. High input cost is a major burden because farmers need to spend on seeds, fertilizers, pesticides, labour, machinery rental, diesel, transport, and irrigation. When market prices are low, farmers are unable to recover cultivation costs. Price fluctuation is especially harmful because small farmers generally sell their produce soon after harvest due to urgent cash needs.

Labour shortage is another important problem. During sowing, weeding, harvesting, and threshing seasons, labour demand increases. Small and marginal farmers may not afford higher wages. Farm mechanization can reduce labour dependence, but small farmers cannot usually purchase machinery individually. Therefore, custom hiring centres and machinery rental services are important. Pest and disease incidence is also a serious problem, particularly in cotton, groundnut, pulses, vegetables, and paddy. Farmers often depend on pesticide dealers or neighbouring farmers for advice. This may lead to excessive or inappropriate pesticide use. Integrated Pest Management can help reduce this problem, and the Mahabubnagar Agriculture Department also lists IPM, bio-agents, and pesticide-use reduction among its agricultural interventions. (Mahabubnagar District)

11. Adoption of Improved Agricultural Practices

Table 9: Adoption of Improved Practices among Respondents

Improved Practice	Farmers Adopted	Percentage
Soil testing	28	28%
Organic manure / green manure	46	46%
Integrated Pest Management	31	31%
Drip / sprinkler irrigation	22	22%
Crop insurance	54	54%

Improved Practice	Farmers Adopted	Percentage
Crop diversification	38	38%
Mobile-based market/weather information	41	41%
FPO membership	16	16%

The adoption of improved practices is moderate but not satisfactory. Crop insurance has the highest adoption level, followed by organic manure, mobile-based information, and crop diversification. However, soil testing, IPM, drip/sprinkler irrigation, and FPO membership remain low. The low adoption of soil testing is a concern because soil-test-based fertilizer use helps farmers apply nutrients scientifically and reduce unnecessary expenditure. The Agriculture Department of Mahabubnagar specifically promotes fertilizer application including micronutrients based on soil test data, reduction of excess nitrogen use, balanced phosphorus and potassium fertilizers, and biofertilizer use. (Mahabubnagar District) Low adoption of drip and sprinkler irrigation may be due to initial investment cost, technical maintenance, lack of awareness, or suitability concerns. However, water-saving technologies are essential for a district where irrigation access is uneven. Similarly, low FPO membership shows that collective marketing and input procurement are still underdeveloped among small and marginal farmers.

12. Hypothesis Testing

Table 10: Relationship between Landholding Category and Adoption of Improved Practices

Farmer Category	High Adoption	Low Adoption	Total
Marginal farmers	15	47	62
Small farmers	21	17	38
Total	**36**	**64**	**100**

Chi-square value: 8.57
p-value: 0.003
Since the p-value is less than 0.05, the null hypothesis is rejected. Therefore, there is a significant relationship between landholding category and adoption of improved agricultural practices. Small farmers show higher adoption compared to marginal farmers. This may be because small farmers have slightly better land resources, investment capacity, and risk-bearing ability.

Table 11: Relationship between Irrigation Access and Agricultural Income

Irrigation Status	Low Income	Moderate/High Income	Total
Rainfed farmers	25	20	45
Irrigated farmers	15	40	55
Total	**40**	**60**	**100**

Chi-square value: 7.11
p-value: 0.008

The p-value is less than 0.05. Therefore, the null hypothesis is rejected. There is a significant relationship between irrigation access and agricultural income. Farmers with irrigation access are more likely to earn moderate or higher agricultural income. Irrigation enables better crop planning, multiple cropping, and cultivation of commercial crops.

Table 12
Relationship between Scheme Awareness and Institutional Support Use

Awareness Level	Used Institutional Support	Not Used	Total
High awareness	34	16	50
Low awareness	18	32	50
Total	**52**	**48**	**100**

Chi-square value: 9.01
p-value: 0.003

The p-value is less than 0.05. Hence, the null hypothesis is rejected. Awareness of government schemes is significantly associated with use of institutional support. This shows the importance of extension services, farmer meetings, digital information, and local agricultural officers.

Table 13: Farmer Category and Severity of Problems

Farmer Category	High Problem Severity	Moderate/Low Severity	Total
Marginal farmers	47	15	62
Small farmers	20	18	38
Total	**67**	**33**	**100**

Chi-square value: 4.72
p-value: 0.030

The p-value is less than 0.05. Therefore, there is a significant difference between marginal and small farmers in the severity of problems faced. Marginal farmers experience greater problem severity due to lower landholding size, limited capital, weak irrigation access, and lower bargaining power.

13. Discussion

The findings show that agriculture in Mahabubnagar district is shaped by a combination of ecological, economic, technological, and institutional factors. Water scarcity emerges as the most serious problem. This affects sowing decisions, crop selection, yield, income, and farmer confidence. Rainfed farmers are particularly vulnerable because they cannot control moisture availability during critical crop stages. High input cost is the second major problem. Small and marginal farmers invest in seeds, fertilizers, pesticides, labour, irrigation, and machinery rental. However, crop prices are uncertain. This creates a cost-price squeeze. When input cost rises and output price falls, farmers face debt and income instability. For marginal farmers, this problem is sharper because their output volume is small.

Price fluctuation is another major concern. Small farmers often sell immediately after harvest because they need money for household expenditure, repayment of loans, and preparation for the next crop season. Lack of storage prevents them from waiting for better prices. This weakens their bargaining power. Farmer Producer Organisations can solve part of this problem by enabling collective storage, grading, transport, and marketing. The adoption of improved practices remains uneven. Organic manure and crop insurance have moderate adoption, but soil testing, IPM, drip irrigation, sprinkler irrigation, and FPO membership remain low. This suggests that awareness alone is not enough. Farmers need practical training, subsidy access, technical support, follow-up visits, and confidence-building demonstrations.

The relationship between irrigation access and income is statistically significant. This finding is expected because irrigation allows better crop planning and reduces rainfall risk. However, irrigation expansion must be sustainable. Excessive dependence on borewells may increase groundwater stress. Therefore, water management should include farm ponds, tank restoration, watershed development, drip irrigation, sprinkler irrigation, mulching, and rainwater harvesting.

Crop diversification is one of the most important prospects. Farmers should not depend only on paddy or cotton. Depending on soil and water availability, farmers may shift towards millets, pulses, oilseeds, fodder crops, vegetables, and horticulture. Jowar, groundnut, castor, red gram, green gram, and black gram may be suitable in dryland conditions. Crop diversification can reduce risk and improve income stability. The study also shows that awareness of schemes is significantly related to use of institutional support. This indicates that agricultural extension plays a crucial role. Village-level farmer meetings, field demonstrations, mobile advisories, local-language pamphlets, and regular visits by agricultural officers can improve scheme utilisation. Extension must be practical, continuous, and farmer-friendly.

14. Major Findings

1. The majority of respondents are marginal farmers, showing that small landholding is a major feature of the study area.
2. Water scarcity and irregular rainfall are the most serious problems faced by farmers.
3. High input cost and unstable crop prices reduce agricultural profitability.
4. Rainfed farmers are more vulnerable than irrigated farmers.
5. Institutional credit is used by some farmers, but dependence on informal credit remains significant.
6. Soil testing, IPM, drip/sprinkler irrigation, and FPO membership are still low among respondents.
7. Crop insurance, organic manure, mobile-based information, and crop diversification show moderate adoption.
8. Landholding category significantly influences adoption of improved agricultural practices.
9. Irrigation access has a significant relationship with agricultural income.
10. Awareness of government schemes significantly influences the use of institutional support.
11. Marginal farmers experience higher problem severity than small farmers.
12. Sustainable agriculture in Mahabubnagar requires water management, crop diversification, soil health improvement, extension support, and market linkage.

15. Suggestions

First, water management should be given top priority. Rainwater harvesting, farm ponds, check dams, tank restoration, drip irrigation, sprinkler irrigation, and watershed development should be promoted. Small and marginal farmers should receive technical and financial support for adopting water-saving practices. Second, crop diversification should be encouraged. Farmers should be guided to cultivate crops suitable to local soil and water conditions. Millets, pulses, oilseeds, castor, groundnut, fodder crops, and horticultural crops can improve income stability and reduce climate risk.

Third, soil health management should be strengthened. Soil testing should be made more accessible at the village level. Farmers should be trained to apply fertilizers based on soil-test results. Organic manure, green manure, biofertilizers, and balanced nutrient application should be promoted. Fourth, institutional credit should be made easier and timely. Banks and cooperative societies should simplify procedures for small and marginal farmers. Credit should be available before the crop season, not after the farmer has already borrowed from informal sources.

Fifth, Farmer Producer Organisations should be strengthened. FPOs can help farmers purchase inputs at lower cost, aggregate produce, access better markets, reduce middlemen dependence, and improve bargaining power. Sixth, custom hiring centres should be expanded. Small farmers cannot purchase tractors, harvesters, seed drills, sprayers, or threshers individually. Rental-based mechanization can reduce labour dependence and improve efficiency.

Seventh, integrated pest management should be promoted. Farmers should be trained to identify pest thresholds, use bio-agents, reduce unnecessary pesticide use, and follow scientific crop protection methods. Eighth, market infrastructure should be improved. Storage facilities, grading units, drying platforms, transport support, and price information systems can help farmers avoid distress sales. Ninth, digital agriculture should be made farmer-friendly. Mobile-based weather alerts, market price information, pest warnings, and crop advisories should be provided in Telugu and in simple language.

Tenth, women farmers should be actively included in agricultural training. Women play an important role in sowing, weeding, harvesting, livestock care, seed selection, and post-harvest activities. Their contribution should be recognised in extension programmes.

16. Conclusion

The study concludes that small and marginal farmers in Mahabubnagar district face serious agricultural problems, but the future of agriculture is not without hope. The major problems include water scarcity, high input cost, price fluctuation, labour shortage, pest incidence, credit difficulty, storage limitations, and low adoption of scientific practices. These problems are more severe among marginal farmers because their landholding size and investment capacity are limited. The empirical analysis based on 100 assumed farmer responses shows that irrigation access, landholding category, and awareness of government schemes significantly influence agricultural outcomes. Farmers with irrigation access earn better income. Small farmers adopt improved practices more than marginal farmers. Farmers with better awareness are more likely to use institutional support. These findings show that agricultural development must focus on resource access, awareness, and institutional delivery.

The prospects of agriculture in Mahabubnagar lie in climate-resilient farming. Water-saving irrigation, crop diversification, soil-test-based fertilizer application, organic manure, integrated pest management, farm mechanization, crop insurance, FPOs, and digital advisory services can improve farm sustainability. The official agricultural interventions listed by the Mahabubnagar Agriculture Department also support these directions through soil-test-based fertilizer use, organic manure, IPM, pesticide reduction, water management, and crop substitution. (Mahabubnagar District). Agriculture in Mahabubnagar should move from risk-prone subsistence farming to sustainable, diversified, and market-linked farming. Policy support must be targeted especially towards marginal farmers, rainfed farmers, and farmers with low awareness. With proper water management, scientific extension, affordable credit, and better market linkage, small and marginal farmers can improve productivity, profitability, and livelihood security.

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