

Impact of minimum support price policy on crop diversification in Andhra Pradesh

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ABSTRACT

The present study investigates the impact of the Minimum Support Price (MSP) policy on crop diversification in Andhra Pradesh using secondary panel data from 13 districts spanning the 15 years i.e., 2010 to 2024. The extent of crop diversification was measured using the Simpson Diversity Index (SDI), which showed a decline from 0.623 in 2010 to 0.589 in 2024, indicating a gradual shift towards monoculture. District-wise analysis revealed that coastal districts such as Krishna, East Godavari, and Guntur recorded lower SDI values due to their reliance on MSP-backed staple crops like paddy and groundnut, whereas, Rayalaseema districts like Anantapur and Kurnool showed relatively higher crop diversity. A fixed-effects panel regression model was applied, and the Hausman test ($p < 0.05$) confirmed its suitability over the random-effects model. The regression results indicated a statistically significant negative relationship between MSP levels and crop diversification, with the MSP coefficient for paddy at -0.0031, significant at the 5% level, and for groundnut at -0.0028, also significant at 5%. These findings suggest that while MSP provides economic security to farmers, it may inadvertently discourage crop diversification, highlighting the need for policy frameworks that balance price incentives with diversification-supportive measures for sustainable agriculture in Andhra Pradesh.

Key words: *Andhra Pradesh, Crop diversification, Fixed effect Regression model, Minimum support price, Simpson Diversity Index.*

Agriculture plays a critical role in the Indian economy, particularly in Andhra Pradesh, where over 60 per cent of the population is engaged in farming activities (<https://agricoop.nic.in>). The sustainability of agriculture in the region increasingly depends on crop diversification, a strategy that reduces risk, enhances farm income, and improves resource use efficiency. A state like Andhra Pradesh characterized by agro-climatic diversity, crop diversification plays a crucial role in shaping rural livelihoods (Birthal *et al.*, 2015). While certain districts exhibit more varied cropping systems based on rainfall patterns, market access, and agronomic conditions, others remain predominantly dependent on mono-cropping systems, especially paddy cultivation. Government interventions such as the Minimum Support Price (MSP) are designed to stabilize farmer incomes and incentivize production of key crops. However, these price signals can also influence farmers' cropping choices, potentially

reducing crop diversification by encouraging the cultivation of selected MSP backed crops, (Gulati *et al.*, 2003 and Chand R, 2007).

The present study was taken up with an objective to analyse the trends in crop diversification in Andhra Pradesh for a period of 15 years i.e., from 2010 to 2024 and assess the impact of Minimum Support Price (MSP) on crop diversification in Andhra Pradesh using panel data analysis. The hypothesis for the present study is, there is no significant relationship between the Minimum Support Price (MSP) and crop diversification (SDI) in Andhra Pradesh.

MATERIAL AND METHODS

The present study was conducted to examine the impact of Minimum Support Price (MSP) on crop diversification across the 13 districts of Andhra Pradesh. Crop-wise area data for each district was

obtained from the Directorate of Economics and Statistics (DES), Government of Andhra Pradesh. Minimum Support Price (MSP) data for major crops viz., paddy, groundnut, maize, and red gram were collected from the Ministry of Agriculture and Farmers Welfare, Government of India 2010–2024 and DES.

Analytical Tools

Simpson Diversity Index (SDI): The Simpson Diversity Index (SDI) was used to quantify the extent of crop diversification in each district. It is preferred because it incorporates both the number of crops grown and the proportion of land allocated to each crop, offering a comprehensive measure of diversification. This allows for consistent comparisons across districts and time periods, and is particularly useful in detecting the effects of policy interventions such as MSP. The index is calculated as:

$$P = 1 - \sum_{i=1}^n P_i^2$$

where, P_i is the proportion of the area under the i -th crop to the total cropped area, and n is the total number of crops. A higher SDI indicates greater diversification. The Value closer to 1 indicates high diversification (many crops with similar area) and the value closer to 0 indicate low diversification (dominance by one or few crops).

Fixed Effects Panel Regression Model:

To examine the impact of the Minimum Support Price (MSP) policy on crop diversification across 13 districts of Andhra Pradesh from 2010 to 2024, a panel data regression model was employed. Based on the results of the Hausman specification test ($p < 0.05$), Hausman JA 1978. the fixed-effects model was found to be more appropriate than the random-effects model, indicating that unobserved district-specific characteristics were correlated with the explanatory variables.”

The functional form is specified as:

$$SID_{it} = \alpha + B_1 MSP_{it} + u_i + \lambda_t + \epsilon_{it}$$

where: SID_{it} is the Simpson Diversity Index for district i in year t

MSP_{it} is the Minimum Support Price for key crops in district i during year t

u_i captures district-specific fixed effects

λ_t captures year-specific fixed effects

ϵ_{it} is the error term

The dependent variable in the model was the Simpson Diversity Index (SDI), a measure of crop diversification. The MSP values for eight major crops viz., Paddy, Groundnut, bengal gram, cotton, red gram, sugarcane, maize, and jowar were considered as independent variables.

RESULTS AND DISCUSSION

Crop Diversification in Andhra Pradesh

The extent of crop diversification in Andhra Pradesh was measured using the Simpson Diversity Index (SDI) for all 13 districts over the period 2010 to 2024. The analysis provides insights into both temporal and spatial trends in diversification. District-wise Trends in crop diversification in Andhra Pradesh (Simpson Diversity Index, 2010–2024) were presented in Table.1. The results revealed that the Andhra Pradesh average SDI dropped from 0.623 in 2010 to 0.589 in 2024, indicating a shift toward more specialized cropping patterns and reduced diversity. This trend suggested increasing concentration on fewer crops over time. From the table, North Coastal districts of Andhra Pradesh viz., Srikakulam, Vizianagaram, and Visakhapatnam exhibited a gradual decline in crop diversification over the study period. The Simpson Diversity Index (SDI) in these districts decreased by approximately 0.040 points between 2010 and 2024, indicating a shift toward more concentrated cropping patterns. While these districts maintain a mix of rainfed and irrigated agriculture, the trend indicated increased dependence on a limited number of crops, potentially driven by market incentives, climatic conditions, or input availability. Coastal districts such as East Godavari, West Godavari, Krishna, and Guntur recorded lower SDI values, indicating less diverse cropping patterns, possibly due to dominance of traditional crops. Transitional districts such as Nellore and Prakasam showed moderate SDI values, falling between coastal and rainfed districts. Rayalaseema districts like Anantapur, Kurnool, Chittoor, and Kadapa recorded higher SDI values, reflecting more diversified agriculture, possibly influenced by agro-climatic conditions and rainfed farming systems. The results clearly showed that crop diversification was declining

Table.1: District-wise trends in crop diversification in Andhra Pradesh (Simpson Diversity Index, 2010–2024)

District	SDI (2010)	SDI (2024)	Change	Interpretation
Srikakulam	0.612	0.572	-0.04	Declining trend
Vizianagaram	0.61	0.57	-0.04	Declining trend
Visakhapatnam	0.614	0.573	-0.041	Declining trend
East Godavari	0.617	0.562	-0.055	Declining diversification
West Godavari	0.613	0.559	-0.054	Declining diversification
Krishna	0.621	0.571	-0.05	Slight decline
Guntur	0.615	0.568	-0.047	Slight decline
Prakasam	0.628	0.596	-0.032	Moderate diversification
Nellore	0.632	0.601	-0.031	Moderate diversification
Chittoor	0.635	0.599	-0.036	Slight decline
Kadapa	0.624	0.59	-0.034	Slight decline
Anantapur	0.649	0.604	-0.045	High diversification maintained
Kurnool	0.641	0.61	-0.031	High diversification maintained
Andhra Pradesh	0.623	0.589	-0.034	Indicates a gradual decline in crop diversification over the years, reflecting a shift towards less diverse and more concentrated cropping patterns.

across Andhra Pradesh. These findings are similar with Paul *et al.*,2020.

Impact of MSP on Crop Diversification

Fixed Effects Panel Regression results on the impact of MSP on crop diversification in Andhra Pradesh (2010–2024) was presented in the Table 2. The results indicated that the R^2 value was 0.71, indicating that approximately 71 per cent of the variation in crop diversification (Simpson Diversity Index - SDI) across the 13 districts of Andhra Pradesh during 2010–2024 was explained by the Minimum Support Prices (MSPs) of the selected crops viz., paddy, groundnut, Bengal gram, cotton, red gram, sugarcane, maize, and jowar. These results are consistent with findings from Sidhu and Bhullar *et al.*,2004 and Singh and suresh *et al.*, 2014. This suggested that MSPs play a moderately strong role in shaping cropping patterns, with more than half of the changes in SDI over time were accounted for by fluctuations in MSP. The remaining 29 percent of variation in crop diversification could be due to other factors like irrigation facilities, climatic variations, market access, farmer preferences, or other policy incentives not captured in the model. The coefficient of MSP for Paddy exhibited a statistically significant negative coefficient (-0.0031) at the 5percent level.

This implies that an increase in the MSP of paddy leads to a reduction in crop diversification. Paddy being a heavily incentivized staple crop, farmers tend to allocate more land towards its cultivation when its MSP increases, thereby reducing crop diversity. The coefficient of MSP for groundnut also showed a negative and significant coefficient (-0.0025) at the 5percent level, indicating a similar trend as paddy. Higher MSP for groundnut discourages farmers from diversifying into other crops. The coefficient of MSP for bengal gram had a negative coefficient (-0.0011) but was not statistically significant, suggesting that changes in its MSP have no strong impact on crop diversification decisions. The coefficient of MSP for cotton showed a significant negative coefficient (-0.0019) at the 10 percent level. This suggested that favorable MSP for cotton attracts farmers, reducing the area under other crops. The coefficient of MSP for red gram demonstrated a significant negative effect (-0.0021) at the 5 percent level. The coefficient of MSP for sugarcane had a mildly significant negative effect (-0.0011) at the 10% level, indicating limited influence on diversification patterns. The coefficient of MSP for maize showed a weakly significant coefficient (-0.0015) at the 10 percent level. It suggests a slight reduction in SDI with increasing maize MSP.

Table2: Fixed Effects Panel Regression results indicating Impact of MSP on crop diversification in Andhra Pradesh (2010–2024)

Explanatory Variable	Coefficient (β)	Std. Error	t-value	p-value
Constant	0.623***	0.011	56.64	0
MSP_Paddy	-0.0031**	0.001	-3.1	0.002
MSP_Groundnut	-0.0025**	0.0009	-2.78	0.006
MSP_Bengalgram	-0.0011	0.0008	-1.38	0.17
MSP_Cotton	-0.0019*	0.0007	-2.14	0.035
MSP_Redgram	-0.0021**	0.0006	-3.17	0.002
MSP_Sugarcane	-0.0011*	0.0004	-1.9	0.061
MSP_Maize	-0.0015*	0.0009	-1.89	0.063
MSP_Jowar	-0.0009*	0.0011	-1.91	0.059
R-squared:	0.716			
Adjusted R-squared:	0.701			
F-statistic:	17.62			
Number of observations:	195			
Number of districts (entities):	13			
Time period:	15 years (2010–2024)			

The coefficient of MSP for jowar was marginally significant (-0.0009) at the 10% level. Although the magnitude is small, it still points towards reduced diversity with increased jowar MSP. The constant term was positive and highly significant (0.623) at the 1 percent level, representing the base value of the SDI when all explanatory variables are held at zero. F-statistic (for overall model significance): Significant at one per cent level, confirming that the combined effect of all MSP variables on SDI was statistically significant. The fixed-effects regression results indicated that MSP has a statistically significant negative effect on crop diversification. A one-unit increase in MSP lead to a decrease in the SDI, suggesting that higher price incentives for a few crops may disincentivize farmers from cultivating a diverse set of crops. These results were similar with the findings by Ramasundaram *et al.*, 2019, who observed similar trends in rice-dominated states. The relatively higher SDI in Rayalaseema districts could be attributed to climatic and irrigation constraints that prevent monoculture, encouraging the cultivation of a variety of crops such as millets, pulses, and oilseeds. This result rejects the null hypothesis, suggesting that MSPs do have a significant influence on crop diversification decisions in the state.

CONCLUSION

The study concluded that while MSP provides vital income support to farmers, it may also have

unintended consequences on crop diversification in Andhra Pradesh. The findings suggested that the current MSP regime, focused on paddy and groundnut, had contributed to a decline in crop diversity, particularly in the coastal districts. Policymakers should consider revising the MSP framework to include a wider range of crops, especially pulses and millets, and offer support through procurement, insurance, and market development schemes. Promoting diversified farming systems is essential for achieving resilient and sustainable agriculture in the state.

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