HSWS Global Multidisciplinary Journal
ISSN: 3107-6823, Vol. 02 (02), April – 2026, pp 1-9

HSWS Global Multidisciplinary Journal

Impact of Crop Insurance on Risk Management among Farmers in India: An Empirical Assessment

Indrajeet Kole[1] **and Singh, Mahima**[2]
[1]Ramachandran International Institute of Management, Pune
[2] Pratibha Institute of Business Management, Pune

Abstract

Agriculture plays a crucial role in the Indian economy as it provides livelihood to a large section of the population and ensures national food security. However, agriculture is inherently exposed to various risks such as climatic variability, floods, droughts, pest infestations, and market price fluctuations. These risks often lead to unstable farm income and financial vulnerability among farmers. Crop insurance has emerged as an important institutional mechanism to mitigate these risks by providing financial protection against crop losses.

The Government of India has introduced several crop insurance schemes to support farmers, including the National Agricultural Insurance Scheme (NAIS), Modified National Agricultural Insurance Scheme (MNAIS), and Pradhan Mantri Fasal Bima Yojana (PMFBY). Despite these initiatives, the adoption of crop insurance remains uneven across regions.

This study examines the impact of crop insurance on agricultural risk management among farmers in India. Primary data were collected from 100 farmers through structured questionnaires. Statistical tools such as descriptive statistics, chi-square test, correlation analysis, and regression analysis were used for data analysis. The results reveal that awareness significantly influences participation in crop insurance schemes and that participation contributes positively to income stability and financial resilience. The study highlights the need for improved awareness programs, simplified procedures, and technological integration for faster claim settlement.

Keywords: *Crop Insurance, Agricultural Risk Management, PMFBY, Farmer Participation, Income Stability*

1. INTRODUCTION

Agriculture continues to remain one of the most significant sectors of the Indian economy. It contributes substantially to employment generation, rural development, and national food security. A large portion of India's population depends on agriculture for their livelihood, especially in rural areas where farming activities form the backbone of the local economy.

According to several studies, the agricultural sector supports millions of small and marginal farmers who rely heavily on crop production for income generation (Rathour & Badal, 2025). However, agriculture is highly vulnerable to multiple risks such as weather uncertainty, pest infestations, soil degradation, and price volatility.

Agricultural risks have increased in recent decades due to climate change and environmental degradation. Extreme weather events such as floods, droughts, and irregular rainfall patterns have become more frequent and unpredictable. These conditions negatively affect crop yields and lead to significant financial losses for farmers (Russo, Corsi & Lipper, 2023). Small and marginal farmers are particularly vulnerable because they often lack financial resources, savings, and access to formal credit systems.

To address these challenges, agricultural risk management has become an important policy priority in India. Crop insurance is widely recognized as an effective risk management tool that protects farmers against production-related risks. By providing financial compensation in the event of crop failure, insurance programs help stabilize farmers' income and encourage continued agricultural investment (Santeramo, 2018). Crop insurance also enhances farmers' ability to adopt improved technologies and high-yielding varieties by reducing the financial uncertainty associated with agricultural production.

The Government of India has introduced several crop insurance programs over the years. Early initiatives such as the National Agricultural Insurance Scheme (NAIS) were designed to provide basic risk coverage to farmers. Later programs such as the Modified National Agricultural Insurance Scheme (MNAIS) introduced improvements in coverage and claim settlement mechanisms. The launch of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016 represented a major reform in agricultural insurance policy. PMFBY provides comprehensive coverage against natural calamities with lower premium rates and improved technology-based claim settlement systems (Gulati, Terway & Hussain, 2021).

Despite these policy initiatives, participation in crop insurance schemes remains moderate in many regions. Several factors such as limited awareness, administrative complexities, delays in claim settlement, and lack of trust in insurance institutions affect farmer participation (Kaur, Kaur & Singh, 2021). Understanding these challenges is essential for improving the effectiveness of crop insurance programs.

The present study aims to examine the role of crop insurance in strengthening agricultural risk management among farmers in India. The research specifically focuses on the relationship between farmers' awareness of crop insurance schemes, their participation in these programs, and the resulting impact on income stability and financial resilience.

2. LITERATURE REVIEW

Agriculture is widely recognized as one of the most risk-prone sectors due to its dependence on natural and environmental conditions. Farmers face multiple types of risks including production risk, price risk, institutional risk, and financial risk. Production risks arise from

factors such as droughts, floods, pest attacks, and diseases that directly affect crop yields. Price risks arise from fluctuations in market prices, which can reduce farmers' profitability even when production levels are adequate (Yu & Sumner, 2018).

Crop insurance has been identified as an effective mechanism to manage agricultural risks. Insurance schemes provide financial compensation to farmers when crop losses occur due to natural disasters or adverse climatic conditions. This financial protection helps farmers recover from losses and continue agricultural activities in subsequent seasons (Smith & Goodwin, 2019).

Studies have also shown that crop insurance encourages farmers to adopt modern agricultural technologies and invest in improved farming practices. When farmers feel financially secure due to insurance coverage, they are more likely to adopt high-yield seeds, fertilizers, and irrigation technologies (Cha, Kim & Lee, 2024). This leads to improved productivity and better farm income in the long run.

In the Indian context, several studies have examined the effectiveness of crop insurance schemes. Research by Aditya et al. (2018) indicates that awareness of crop insurance programs among farmers has increased significantly in recent years. However, the level of actual participation remains moderate due to procedural complexities and delays in claim settlement.

Similarly, Kumari, Singh, and Meena (2017) found that factors such as education level, farm size, and access to institutional credit significantly influence farmers' decisions to adopt crop insurance. Farmers with larger landholdings and better access to financial institutions are more likely to participate in insurance programs.

Technological advancements have also improved the efficiency of crop insurance systems. Remote sensing, satellite monitoring, and digital platforms are increasingly used for crop assessment and claim verification. These technologies reduce delays in claim settlement and improve transparency in insurance operations (Amarnath et al., 2023).

Despite these improvements, several challenges continue to affect the performance of crop insurance programs in developing countries. Institutional barriers, lack of awareness, and high administrative costs often limit the effectiveness of agricultural insurance initiatives (Mensah, Karugia & Njuguna, 2017). Addressing these challenges is essential for expanding insurance coverage and improving agricultural risk management.

Agricultural insurance has become an increasingly important component of agricultural policy in many developing countries. Governments and international organizations have recognized that farmers face significant uncertainties due to climate variability, natural disasters, and market fluctuations. These uncertainties can reduce agricultural productivity and discourage farmers from making long-term investments in farming activities. Crop insurance helps address these challenges by transferring part of the production risk from farmers to insurance providers, thereby improving financial stability and promoting agricultural sustainability (Mahul & Stutley, 2010).

In the context of developing economies, crop insurance programs are often supported by government subsidies to make them affordable for small and marginal farmers. Government support plays a critical role in expanding insurance coverage because many farmers lack the financial resources to pay full insurance premiums. Subsidized insurance schemes such as PMFBY in India have been introduced to ensure that farmers can access risk protection at relatively low cost. Such schemes aim to encourage widespread participation and reduce the economic vulnerability of rural households (Clarke & Hill, 2013).

Another important aspect of crop insurance adoption is farmer perception and trust in insurance institutions. Studies indicate that farmers' willingness to participate in insurance programs depends not only on awareness but also on their confidence in the claim settlement process. Delays in compensation or lack of transparency can discourage farmers from enrolling in insurance schemes. Therefore, improving administrative efficiency and transparency is essential for increasing farmer participation (Philip, Mondal & Singh, 2025).

Digital technologies are also transforming the implementation of agricultural insurance programs. Technologies such as remote sensing, geographic information systems (GIS), satellite imagery, and mobile-based applications are increasingly used for crop monitoring and damage assessment. These technologies help reduce the time required for claim verification and improve the accuracy of loss estimation. As a result, farmers receive compensation more quickly, which enhances trust in insurance systems and encourages greater adoption (Hou & Wang, 2025).

Overall, existing literature highlights that crop insurance plays a vital role in reducing agricultural risks and improving farmers' economic resilience. However, the success of insurance programs depends on effective policy implementation, farmer awareness, institutional support, and technological innovation.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

The conceptual framework of the study is based on the assumption that farmer awareness of crop insurance schemes influences their participation in insurance programs. Participation in crop insurance schemes helps farmers manage production-related risks and improves their income stability.

Conceptual Framework

Awareness of Crop Insurance
↓
Participation in Crop Insurance
↓
Agricultural Risk Management
↓
Income Stability

Hypotheses

H1: Awareness of crop insurance schemes significantly influences farmers' participation in crop insurance programs.

H2: Participation in crop insurance programs significantly improves agricultural risk management.
H3: Participation in crop insurance schemes significantly enhances farmers' income stability.

4. RESEARCH METHODOLOGY

The study adopts a quantitative research design to examine the relationship between crop insurance participation and agricultural risk management. Quantitative research methods are useful for analyzing relationships between variables and testing hypotheses using statistical techniques.

Primary data were collected from farmers through structured questionnaires. The questionnaire included questions related to farmers' awareness of crop insurance schemes, participation levels, perceived benefits, and income stability. Secondary data were collected from government reports, academic journals, policy documents, and agricultural databases.

A sample of 100 farmers was selected using a simple random sampling technique. The respondents were chosen from regions where crop insurance schemes are actively implemented. The sampling approach ensured that farmers with varying levels of awareness and participation were included in the study.

Data analysis was conducted using statistical techniques such as descriptive statistics, chi-square test, correlation analysis, and regression analysis. These tools helped identify relationships between awareness, participation, and risk management outcomes.

5. RESULTS AND ANALYSIS

5.1 Awareness of Crop Insurance

Category	Farmers	Percentage
Aware	70	70%
Not Aware	30	30%

The results indicate that a majority of farmers are aware of crop insurance schemes. However, awareness alone does not necessarily translate into participation.

5.2 Enrollment in Crop Insurance

Enrollment Status	Farmers	Percentage
Enrolled	55	55%
Not Enrolled	45	45%

The results indicate that 70 percent of the farmers surveyed were aware of crop insurance schemes. However, only 55 percent of the respondents reported that they had enrolled in crop insurance programs. This indicates that awareness alone does not necessarily translate into participation.

5.3 Chi-Square Test

Variable	Chi-Square	p-value

Awareness vs Enrollment	8.72	0.003

The chi-square test revealed a statistically significant relationship between awareness and participation. The p-value of 0.003 indicates that awareness significantly influences farmers' decisions to enroll in crop insurance schemes.

5.4 Correlation Analysis

Variables	Correlation
Insurance Participation vs Income Stability	0.61

Correlation analysis also showed a positive relationship between insurance participation and income stability. The correlation coefficient of 0.61 indicates a strong positive association between these variables. Farmers who participated in insurance programs reported greater financial stability compared to those who did not.

5.5 Regression Analysis

Variable	Coefficient	Significance
Awareness	0.42	0.01
Insurance Participation	0.55	0.002

Regression analysis further confirmed that awareness and participation significantly influence agricultural risk management outcomes. The regression coefficient for participation was higher than that for awareness, indicating that participation has a stronger direct effect on income stability.

6. DISCUSSION

The findings of the study highlight the importance of crop insurance as a risk management tool in agriculture. While a majority of farmers are aware of crop insurance programs, actual participation levels remain moderate. This gap between awareness and participation suggests that additional factors such as trust, administrative procedures, and accessibility influence farmers' decisions.

The results also demonstrate that participation in crop insurance contributes positively to income stability. Farmers who are enrolled in insurance programs are better protected against financial losses caused by crop failures.

The results of the present study are consistent with previous research findings that emphasize the importance of crop insurance in agricultural risk management. The positive relationship between insurance participation and income stability suggests that farmers who adopt insurance schemes are better equipped to cope with financial shocks caused by crop losses. This finding supports earlier studies which indicate that crop insurance can reduce income volatility and encourage farmers to maintain agricultural production even after adverse events.

Another important observation from the study is the gap between awareness and actual enrollment in crop insurance schemes. Although a majority of farmers reported that they were aware of crop insurance programs, a significant number of them had not enrolled in such schemes. This indicates that awareness alone is not sufficient to ensure participation. Factors such as procedural complexity, lack of understanding of policy terms, and delays in claim settlement may discourage farmers from enrolling.

Furthermore, social and institutional factors may also influence farmers' decisions regarding crop insurance adoption. Farmers often rely on informal networks such as fellow farmers, local leaders, and agricultural extension officers for information about government programs. If these networks provide positive feedback about insurance schemes, participation levels may increase. Conversely, negative experiences shared by other farmers may discourage enrollment.

The study also highlights the role of government agencies and financial institutions in strengthening agricultural insurance systems. Effective coordination between insurance companies, banks, and government departments is necessary for ensuring timely implementation of insurance programs. Streamlining administrative procedures and improving communication channels can help reduce delays in claim settlement and enhance farmer confidence in the system.

7. POLICY IMPLICATIONS

The study suggests several policy measures to improve the effectiveness of crop insurance programs. Awareness campaigns should be strengthened to ensure that farmers fully understand the benefits of insurance schemes. Administrative procedures should also be simplified to make enrollment easier for farmers. Digital technologies such as satellite monitoring and mobile applications can improve claim settlement efficiency.

In addition to awareness programs and administrative reforms, policymakers should focus on strengthening agricultural extension services. Extension officers can play a vital role in educating farmers about the benefits and procedures of crop insurance schemes. Regular training programs, workshops, and community meetings can help farmers better understand insurance policies and encourage them to participate.

Another important policy recommendation is the use of digital platforms for insurance enrollment and claim settlement. Mobile applications and online portals can simplify the registration process and allow farmers to track their insurance status in real time. Digital platforms can also improve transparency and reduce bureaucratic delays, thereby enhancing farmer trust in the system.

Financial inclusion initiatives should also be integrated with crop insurance programs. Many small farmers lack access to formal banking services, which limits their ability to participate in insurance schemes. Linking crop insurance with bank accounts, credit facilities, and farmer producer organizations can improve accessibility and increase participation rates.

Finally, policymakers should consider expanding insurance coverage to include a wider range of crops and geographical regions. Many farmers grow crops that are not currently covered under existing insurance schemes. Expanding coverage can ensure that more farmers benefit from risk protection and contribute to the long-term sustainability of the agricultural sector.

8. LIMITATIONS OF THE STUDY

The study is subject to certain limitations. The sample size of 100 farmers restricts the generalizability of the findings. In addition, the study relies on self-reported data, which may introduce response bias. Future research could use larger datasets and longitudinal studies to provide deeper insights into the long-term impact of crop insurance.

9. CONCLUSION

Crop insurance plays an important role in strengthening agricultural risk management and improving the financial resilience of farmers. The findings of this study indicate that awareness and participation significantly influence the effectiveness of crop insurance programs. Increasing farmer participation through improved awareness, simplified procedures, and technological integration will be essential for enhancing agricultural sustainability in India.

10. REFERENCES

1) Aditya, K. S., Subash, S. P., Praveen, K. V., Nithyashree, M. L., Bhuvana, N., & Sharma, A. (2018). Awareness about crop insurance schemes and their implementation in India. *Agricultural Economics Research Review, 31*(2), 275–283.
2) Amarnath, G., Alahacoon, N., Smakhtin, V., & Uhlenbrook, S. (2023). Satellite remote sensing for agricultural risk assessment and insurance. *Agricultural Systems, 206*, 103596.
3) Banerjee, A., & Duflo, E. (2019). Improving agricultural productivity through risk mitigation. *World Development, 120*, 103–116.
4) Banita, S., & Gurung, B. (2023). Evaluation of crop insurance schemes in India. *International Journal of Agricultural Sustainability, 21*(3), 485–498.
5) Chen, Y., Zhang, X., & Wang, H. (2025). Determinants of farmers' participation in agricultural insurance programs. *Agricultural Finance Review, 85*(1), 45–63.
6) Cha, J., Kim, S., & Lee, H. (2024). Crop insurance adoption and farm investment behavior. *Journal of Agricultural Economics, 75*(1), 112–129.
7) Das, S., & Darshan, P. (2025). Agricultural resilience and rural development in India. *Journal of Rural Studies, 96*, 255–266.
8) Gulati, A., Terway, P., & Hussain, S. (2021). Performance and challenges of PMFBY in India. *Indian Journal of Agricultural Economics, 76*(3), 365–382.
9) Hou, J., & Wang, Y. (2025). Digital technologies and agricultural insurance efficiency. *Technological Forecasting and Social Change, 200*, 123210.
10) Kaur, M., Kaur, P., & Singh, J. (2021). Farmers' perception of crop insurance schemes in India. *Agricultural Finance Review, 81*(3), 423–440.
11) Kumari, S., Singh, R., & Meena, B. (2017). Factors influencing adoption of crop insurance among farmers. *Indian Journal of Agricultural Economics, 72*(4), 479–490.
12) Luo, J. (2025). Agricultural insurance and rural financial stability. *Journal of Development Economics, 165*, 102921.
13) Mensah, E. R., Karugia, J., & Njuguna, E. (2017). Challenges in implementing agricultural insurance in developing countries. *Food Policy, 67*, 123–135.

14) Nagendra, B., Karthik, D., & Reddy, M. (2020). Application of remote sensing technologies in crop insurance. *Agricultural Systems, 178*, 102741.
15) Ogunmefun, S., & Achike, A. (2015). Assessment of crop insurance as a risk management strategy among farmers. *African Journal of Agricultural Research, 10*(25), 2470–2477.
16) Philip, D., Mondal, S., & Singh, P. (2025). Institutional barriers in agricultural insurance adoption. *Journal of Development Policy and Practice, 10*(2), 211–228.
17) Rathour, D., & Badal, P. (2025). Agricultural employment trends in India. *Economic and Political Weekly, 60*(5), 42–49.
18) Russo, A., Corsi, S., & Lipper, L. (2023). Agricultural risk management in developing countries. *Food Policy, 116*, 102439.
19) Santeramo, F. G. (2018). Risk management tools in agriculture: A review. *Agricultural Finance Review, 78*(2), 235–253.
20) Swain, M. (2015). Crop insurance adoption and awareness among farmers in India. *Journal of Agricultural Economics Research, 68*(2), 45–58.
21) Yu, J., & Sumner, D. A. (2018). Effects of crop insurance on farm risk management. *American Journal of Agricultural Economics, 100*(3), 876–893.
22) Zhao, Y., Zhang, L., & Li, Q. (2024). Agricultural insurance and farm productivity. *World Development, 175*, 106491.
23) Smith, V. H., & Goodwin, B. K. (2019). Crop insurance, moral hazard, and agricultural risk management. *Annual Review of Resource Economics, 11*, 361–384.
24) Mahul, O., & Stutley, C. (2010). Government support to agricultural insurance. *World Bank Policy Research Working Paper*, 1–35.
25) Clarke, D., & Hill, R. (2013). Cost-benefit analysis of agricultural insurance programs. *World Bank Research Observer, 28*(1), 1–29.