

Effectiveness of Crop Insurance in Reducing Agricultural Risk: An Evaluation of PMFBY in Haryana

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Abstract

Agriculture in India remains highly vulnerable to climatic shocks, making risk mitigation mechanisms essential. The Pradhan Mantri Fasal Bima Yojana (PMFBY) was introduced in 2016 to provide comprehensive crop insurance. This study evaluates its effectiveness in Haryana, a key agrarian state, by assessing farmer participation, income stabilization, and institutional performance. A mixed-methods design was employed, combining quantitative analysis of secondary data (2016–2023) with primary surveys conducted among 450 farmers across six districts. Stratified random sampling ensured representation across farm sizes, agro-ecological zones, and insurance status. Structured questionnaires, key informant interviews, and focus group discussions captured both statistical performance indicators and farmer perceptions. Findings reveal declining enrollment, from 7.2 lakh farmers in 2016 to 4.1 lakh in 2023, driven by inadequate payouts and delayed settlements. While insured farmers exhibited lower income variability (18.4% vs. 26.7% for uninsured), claim ratios averaged 51–69%, and indemnity rarely exceeded 11% of insured sums. Awareness gaps were pronounced: less than half of insured farmers understood premium rates or claim procedures. Delays in compensation (reported by over 60% of farmers), limited crop coverage, and mistrust in yield estimation further constrained scheme effectiveness. PMFBY in Haryana offers partial protection by reducing income volatility but falls short as a transformative resilience tool. Structural bottlenecks, delays, low payouts, and limited awareness undermine its credibility. Strengthening transparency, expanding crop coverage, and timely claim settlement are crucial for the scheme to evolve from a short-term safety net into a sustainable climate adaptation strategy.

Keywords: Crop Insurance, PMFBY, Agricultural Risk, Farmer Resilience, Haryana



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INTRODUCTION

Growing up to date, agriculture has remained the mainstay of the Indian economy as it supports the livelihood of nearly half the population and is a source of food security in the country. Nevertheless, it is also among the industries that are the most vulnerable to environmental shocks. Increasing uncertainty in rainfall, alterations in the monsoon cycles, frequent droughts, floods, and pest epidemics all expose farmers to high production and income risk. These climatic upheavals are not new at all, but the intensity and frequency of such upheavals have been growing over the years, causing concern in an already perilous industry. According to Singh and Agrawal (2020), agricultural performance in India is inevitably connected with the fluctuation of climate, and according to Rai (2019), the consequences of the extremes of climate often put farm households into a cycle of debt and poverty. This necessitates the urgency and necessity of devising effective risk mitigation

strategies due to the interdependence of agriculture as a source of livelihood and susceptibility to environmental fluctuations.

Among the most conspicuous mechanisms adopted in the world to address the risk in agriculture is crop insurance. Contrasting with informal coping strategies, e.g., diversifying income sources, consumption reduction, or borrowing, insurance offers a formalized and institutionalized coping mechanism of stabilizing farm incomes. Theoretically, it insures households against losses and farmers will feel in greater confident to invest in agriculture. Crop insurance has been marketed not only as a financial risk mitigation tool in the Indian policy context, but also as a tool to offload the state of the Indian policy to provide ad hoc relief in the wake of a disaster (Rathore and Rao, 2017). Gulati, Terway, and Hussain (2018) also mention that good insurance must increase coverage and secure timely and

clear claims settlements, which will contribute to building trust both among farmers and policymakers. The experience of crop insurance in India has, however, been mixed. A number of plans had been developed that led to the present framework, such as the National Agricultural Insurance Scheme (NAIS) and the Weather-Based Crop Insurance Scheme (WBCIS). Such programs proved helpful in emphasizing the necessity of institutionalized risk protection, but were not very effective because of their design, restricted outreach, excessive premiums, and a long-standing delay of payment. In response to these weaknesses, the Government of India introduced PMFBY (Pradhan Mantri Fasal Bima Yojana) in 2016. The objective of this scheme was to provide end-to-end cover, which included risks between pre-sowing and post-harvest periods, and also to lessen the premium liability of farmers with substantial subsidies. Another role of PMFBY was to enhance institutional cooperation, which was achieved through the connection of governmental agencies, insurers, and banks and the implementation of digital technologies to track and evaluate claims (Rathore and Rao, 2017; Gulati et al., 2018).

However, PMFBY has not gone without blame despite its promise. A consistent disparity between the aims and the results of the scheme on the ground is identified by researchers. Farmers have complained about ignorance, enrolment challenges, insufficiency in grievance redressal, and claim settlement delays. Academic evaluations also display mixed results: some of the studies emphasize their role in reducing the risk and stabilizing farm incomes, whereas others emphasize the lack of efficiency in operations and disproportional coverage among the states (Sheoran, Kait, and Rani, 2023; Kumar and Phougat, 2021). Such contradictions indicate that the effectiveness of the scheme cannot be extended throughout the country; rather, the effect must be evaluated within the state-specific settings where local agrarian processes and institutional structures vary. Haryana is one of the decisive locations where one can pose such an inquiry. The state is a strategic state in the national agricultural economy as it is a major contributor to the food grain reserves of India. The green revolution has provided a legacy of intensive farming with heavy emphasis put on rice and wheat. Nevertheless, this success story has been counterbalanced by increasing pressures: groundwater exhaustion, soil weariness, and increased sensitivity to climate hazards. In Haryana, the farmers are more vulnerable to the changes in rainfall and losses of crops, and the crop insurance is an absolute requirement and an institutional capacity challenge. Research shows that, though the state has experienced a high enrollment under PMFBY, there is still an unequal farmer awareness of scheme provisions, and the perception of unfairness in settling claims is still high (Manoj Siwach, Singh, and Kundu, 2017; Shehrawat et al., 2020).

This study is positioned to provide a systematic evaluation of the effectiveness of PMFBY in Haryana. The analysis is guided by three central questions: Has

the scheme been successful in increasing farmer participation and awareness? To what extent has it reduced agricultural risk by stabilizing incomes and compensating for crop losses? And what operational challenges continue to hinder its performance, particularly in relation to claim settlement and transparency? By addressing these questions, the study directly evaluates PMFBY's effectiveness as a risk management instrument and identifies the extent to which it has fulfilled its stated objectives in Haryana.

The originality of this study includes the fact that PMFBY is evaluated as a financial protection tool and, at the same time, as a tool to improve resilience to climate-related risks. In this regard, the article goes beyond the traditional performance reviews to look at the wider implications of the scheme to sustainable agriculture. By defining crop insurance as a strategy of economic and environmental adaptation, it is possible to mention that it can be used to mitigate the exposure to a shifting climate. Placing the assessment in the context of the specific situation of agriculture in Haryana, the study adds new evidence to the current discussion of the efficacy of crop insurance in India and provides policy-implicated information to enhance risk mitigation schemes at the state and national levels. According to Shekhar and Rai (2025), the future of crop insurance in India will be characterized by the fact that it can not only ensure that farmers are not affected by the immediate losses but also its incorporation into the general climate-adaptation policies.

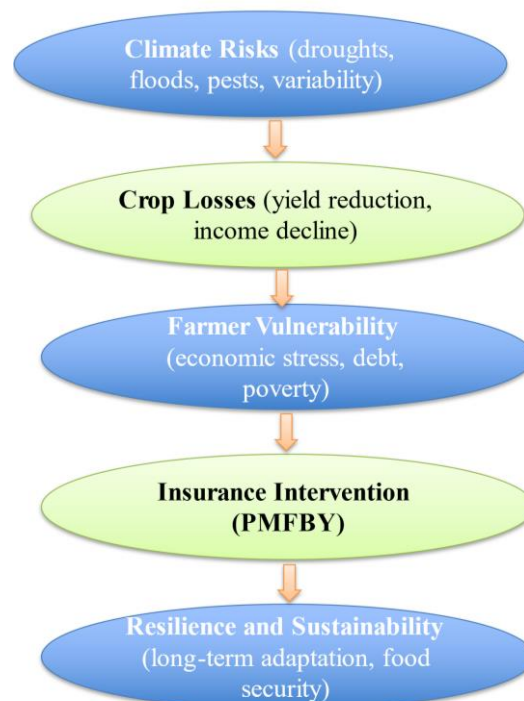


Figure 1: Conceptual Framework of PMFBY in Reducing Agricultural Risk

This framework illustrates how climate risks translate into crop losses and farmer vulnerability, and how PMFBY interventions aim to reduce risk, stabilize

incomes, and promote long-term resilience and sustainability in agriculture.

Research Objectives

1. To evaluate the effectiveness of PMFBY in reducing agricultural risk and stabilizing farmer incomes in Haryana
2. To assess farmer participation, awareness, and perceptions of PMFBY in the state
3. To identify key challenges in PMFBY implementation and propose policy recommendations for improvement

LITERATURE REVIEW

2.1 Theoretical Perspectives on Agricultural Risk and Resilience

The agricultural systems are prone to various risks such as weather variability, pest attack, and fluctuations in the market. Researchers generally differentiate between systemic risks, e.g., drought or flood that happen to a whole area, and idiosyncratic risks, e.g., local pest attacks that happen to one farm. The nature of systemic risks is that they overpower informal coping mechanisms and require more formalized mechanisms, including insurance (Dey and Maitra, 2017).

The question of resilience theory has been used increasingly in the context of agricultural risk management and provided a prism through which to reconsider the issue of insurance as a compensatory mechanism and as a means of enhancing long-term adaptive capacity. Insurance can prevent adverse coping mechanisms by stabilizing incomes and enabling households to invest in productive activities, which will lead to resilience in the long term through distress selling of land or livestock. Tiwari et al. (2020) claim that risk-transfer methods such as insurance are optimized by the implementation of more widespread adaptation measures; thus, insurance is one of the pillars in a broader climate risk management system.

The theoretical foundation, therefore, positions crop insurance as both an immediate safety net and a resilience-building mechanism, a dual role that is particularly significant in regions facing increasing climate stress. Evaluating PMFBY in Haryana requires examining not only whether farmers are compensated but also whether the scheme contributes to building resilience against climate risks in the longer term.

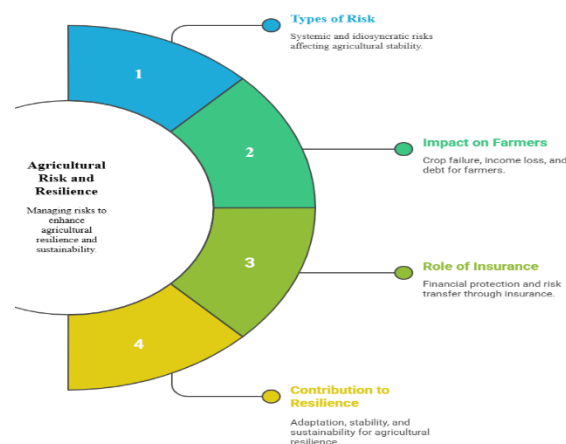


Figure 2: Theoretical Linkage of Agricultural Risk and Resilience

This framework illustrates how systemic and idiosyncratic risks affect farmers through crop failure and income loss, the role of insurance in providing financial protection, and its contribution to long-term resilience, stability, and sustainable agricultural livelihoods.

2.2 Global and Comparative Insights

Agricultural insurance has been used with some degree of success around the world. In other countries like the United States and Spain, where there are state-sponsored insurance programs, there has been a high rate of participation by farmers, which has been realized because of the good institutional structures and regular subsidies. Conversely, schemes in developing economies have been faced with the challenge of affordability, basis risk, and mistrust of farmers.

In Africa and Latin America, a trend was to encourage weather-indexed insurance that had been experimented with as a way to get rid of delays in claim settlement by paying on measured weather indices. But Kapadia and Swain (2020) caution that in spite of such schemes incurring less administrative costs, they have cases of basis risks where farmers lose but cannot receive payouts because of a discrepancy between local conditions and reference indicators. Wahab (2018) also makes similar conclusions and mentions that despite efficiency improvements, these models will not always be relevant to the farm-level reality, and it will not help foster trust between farmers.

The following dilemma stands out in such world experiences: the efficiency/accuracy trade-off. These strains are manifested in the manner in which India has embraced weather-based insurance in WBCIS, and the attempt by PMFBY to integrate both indemnity and index properties can be attributed to these global experiences.

2.3 Evolution of Indian Crop Insurance Schemes

The history of crop insurance in India is identified as one of the gradual transformations of pilot programs into a national risk management instrument. Introduced in 1999, the National Agricultural Insurance Scheme (NAIS) expanded the coverage, but was plagued by

costly administration, sluggish compensation, and a complex procedure (Bhushan & Kumar, 2017). The second scheme was the Weather-Based Crop Insurance Scheme (WBCIS) that attempted to address these issues with weather indices, but there was still basis risk and mistrust.

In 2016, PMFBY was established to resolve these issues in a more detailed design. It also applied the subsidized premiums, the risk coverage outside the pre-sowing to post-harvest period, and the use of technology (e.g., remote sensing, mobile applications) to improve the loss evaluation and transparency (Tripathi et al., 2023). Despite these innovative wrappings, PMFBY has been affected by the same criticisms that its predecessors have had in particular in respect to delays in claims settlement, ignorance on the part of the farmers, and even state inconsistencies.

Most importantly, PMFBY illustrates the continuities and exits on the insurance sector in India: on the one hand, it remains the high degree of state-based assistance, which was inherent in the past schemes; on the other hand, it also attempts to construct the digital governance and institutional coherence. Such a direction reflects the continued struggle of friendliness between the cost of farmers, institutional effectiveness, and climate sensitivity.

2.4 Haryana-Focused Evidence

Haryana is a key contributor of wheat and rice to the national grain stocks and places the state at the center of the agricultural economy of India. The legacy of its Green Revolution has been intensive, input-based agriculture, although this approach has contributed to environmental issues, including the depletion of groundwater, soil erosion, and increased exposure to climate. These structural issues ensure that Haryana is a significant case study to consider the actual performance of PMFBY.

Current assessments provide contradictory information. Kumar and Phougat (2021) report that PMFBY has not adequately achieved stabilization of incomes despite its expansion of access to insurance in Haryana as a result of delays and exclusions of some crops. According to Sheoran and Kait (2023), the fact that farmers were not able to trust the system, despite the fact that payouts were made in the end, was due to procedural ambiguity and delays in compensation. Adding to these results, Sheoran, Kait, and Rani (2023) note that there is a considerable difference in results between the districts, which implies that the institutional performance of the local level is a strong predictor.

One of these studies is linked with another common theme, namely, the disconnect between policy formulation and implementation on the ground. Even though the scheme has a large-scale scope, its success is pegged on awareness of farmers, settlement of claims in time, and accountability of institutions- all of which are unequal in Haryana. The combination of these results

indicates that the scheme has increased insurance cover, but it has not fully fulfilled its purpose of strong risk mitigation.

2.5 Research Gaps

Although the research on crop insurance in India is widespread, three research gaps are still present. First, the majority of assessments of PMFBY are limited by a scope of quantitative metrics, including enrollment, premiums, and claim ratios, without addressing the more general question of how insurance can help build resilience in the face of climate change (Punia et al., 2021). Second, PMFBY is rarely placed in the broader context of climate adaptation and environmental sustainability in Haryana-specific studies, which is justified by the fact that crop insurance must be evaluated in terms of an integrated approach to adaptation in accordance with the global agenda of sustainability (Shekhar and Rai, 2025). Third, little focus has been given to the views of farmers; although it is known that there are gaps in awareness and satisfaction, there is no systematic attempt to combine the experiences of the farmers with the policy analysis, and therefore the evaluation can be easily subjected to the top-down approach that can not necessarily be close to the ground realities.

OVERVIEW OF PMFBY IN HARYANA

3.1 Policy Evolution and Rollout

In 2016, the Government of India introduced the Pradhan Mantri Fasal Bima Yojana (PMFBY) as its flagship crop insurance scheme to replace the previous schemes like the National Agricultural Insurance Scheme (NAIS) and the Weather-Based Crop Insurance Scheme (WBCIS). Its main goal was to offer a complete coverage of risks since pre-sowing to post-harvest losses, and at the same time counter the failure of prior schemes, which included high premium rates, lack of participation of farmers, and delays in the settlement of claims. The program was implemented by focusing on providing low-cost premiums, expanded coverage of crops, and the introduction of new technologies to track crop statuses and yield measurements (YOJANA, 2020). PMFBY was officially launched in Haryana in the kharif season of 2016 and since been implemented in several districts with different levels of success. According to Kumar and Phougat (2021), the scheme signified a major transition between voluntary and more inclusive insurance coverage, increasing the number of participating farmers and types of crops. Its implementation has been modified a number of times over the years, with changes to the premium subsidy sharing between the central and state governments, the direct benefit transfer, and increased dependence on digital platforms in enrollment and verification of claims. Regardless of these reforms, the experience of Haryana is both positive and negative, with some remaining gaps in attaining the desired goals.

3.2 Institutional Arrangements and Premium Structure

PMFBY in Haryana has an institutional architecture that is a multi-tiered system of governance. With the help of the Ministry of Agriculture and Farmers Welfare, the state government liaises with empaneled insurance firms to implement the scheme. The implementation duties are shared on a state-level nodal agencies, district-level agriculture offices, and banks, which are middlemen in terms of enrollment and premium collection. Sheoran et al. (2024) point to the fact that insurance companies are chosen in a competitive bidding manner, and each of the companies is assigned certain areas to prevent duplicated duties.

One of the most significant aspects of PMFBY is its premium structure. Kharif crops, rabi crops, and horticultural and commercial crops are subject to 2 percent, 1.5 percent, and 5 percent, respectively. The rest of the actuarial premium is subsidized by the central and state governments in equal measures. The design of this structure was meant to make it affordable and encourage participation in large numbers, particularly by the small and marginal farmers. According to Punia (2020), although the subsidy mechanism has reduced the burden on farmers, the fiscal burden on the state budgets has occasionally resulted in delays in fund releases, thus indirectly influencing claim settlements.

The use of technology-based tools, including remote sensing, drones, and mobile applications, to enhance crop-cutting experiments and reduce controversies over yield estimation has also been another significant institutional innovation. This was to make the system more transparent and less administrative delays, but these measures have not been effective across Haryana, as capacity and resources to deliver at the district level have been uneven.

3.3 Haryana-Specific Challenges in Implementation

Although PMFBY has been designed in a very ambitious manner, there have been a number of challenges in its

implementation in Haryana. Sheoran et al. (2023) note that one of the greatest challenges has been that claim settlements have been delayed in many cases, most of the time due to the slow release of funds by state agencies, logistical challenges in conducting crop-cutting experiments, and procedural bottlenecks in the coordination between banks, insurance companies, and government offices. Such delays have helped to build up the farmer dissatisfaction and the mistrust in the success of the scheme.

The other problem is connected to awareness and participation. According to Shehrawat et al. (2020), the enrollment numbers have been relatively high in Haryana, yet a very large number of farmers are not fully informed about the scheme provisions, including premium rates, coverage specifications, and claim filing procedures. This lack of knowledge has led to cases where farmers have been enlisted in the scheme without a proper understanding of the scheme, particularly when the banks are lending money. Transparency and trust have also been affected by these practices.

Moreover, the agricultural profile of Haryana is associated with structural problems. Wheat and rice have been the main staple crops that are sustained by irrigation systems, and therefore, the scheme tends to ignore or insufficiently address minor crops and other diversified agricultural systems. Pulse, oilseed, or vegetable farmers may find obstacles to getting coverage or compensation. Also, the perceived credibility of the scheme in smallholders has been curtailed by the repeated questions of the validity of yield measurements, especially in areas where land holdings are discontinuous.

Collectively, these challenges highlight the gap between policy design and implementation outcomes, making it essential to evaluate PMFBY not only through statistical indicators but also through farmer experiences and institutional performance in Haryana.

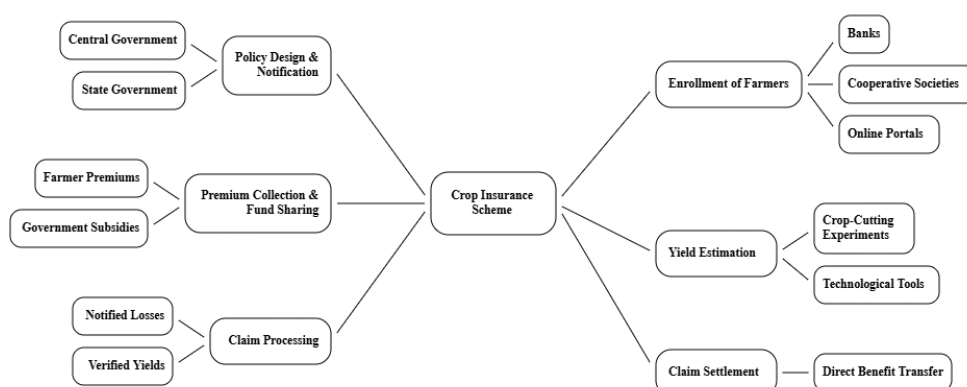


Figure 3: Implementation Process of PMFBY in Haryana

This flowchart illustrates the multi-step implementation of PMFBY, beginning with policy notification and farmer enrollment, followed by premium collection, yield estimation, and claim processing, ultimately

leading to claim settlement through direct benefit transfer.

METHODOLOGY

4.1 Research Design

The current research design is a mixed-method research design to measure the effectiveness of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in Haryana comprehensively. The use of mixed methods is justified due to the fact that agricultural risk management is a multi-dimensional phenomenon. On the one hand, it is possible to measure it in quantitative terms like enrollment, indemnity, and claim ratios, and income variability within the farmers. Conversely, it is also qualitative, including awareness of the scheme by farmers, their risk perception, and satisfaction with the claim processes, which cannot be sufficiently described by numerical data only. By integrating these methods, it is possible to triangulate the evidence and make sure that the study takes into consideration both the statistical performance and lived experiences.

The quantitative part of the research assesses the PMFBY results in the form of secondary data and survey-based data on the income of farmers. The qualitative element is based on semi-structured interviews and centers on the focus group discussions to achieve farmer views, institutional bottlenecks, and insights at the policy level. The combination of these two methods will help to make the findings strong and relevant.

4.2 Study Area

This was carried out in the state of Haryana, which is an agriculturally developed state of India and is located in the northwest of the Indo-Gangetic Plains. Haryana is a key contributor to the central repository of wheat and rice, and as such is a key player in the food security of India. Haryana was selected as the study area due to three factors.

To begin with, the agricultural intensity of the state is high as the large tracts of land are occupied by staple crops, and the input use is high. This heightened sensitivity causes the farming households to become especially vulnerable to production risks. Second, Haryana has been a key participant in PMFBY, consistently reporting high levels of farmer enrollment and insurance coverage. This makes it a useful site for evaluating scheme performance. Third, the state is facing increasing environmental challenges, including groundwater depletion, erratic rainfall, and soil degradation. These vulnerabilities amplify the relevance of studying how PMFBY functions as a risk-reduction mechanism.

To capture intra-state variation, six districts were purposively selected: Karnal and Kurukshetra (representing the irrigated rice–wheat belt), Hisar and Bhiwani (semi-arid and water-scarce zones), and Sonapat and Jhajjar (with diversified cropping patterns). This selection ensures representation of different agro-ecological conditions, cropping systems, and institutional contexts.

4.3 Data Sources

The research is based on both secondary and primary data sources.

4.3.1 Secondary Data

Secondary data were collected from official documents and published literature. These included reports from the Ministry of Agriculture and Farmers' Welfare, Government of Haryana, and implementing insurance companies; PMFBY performance data available in the public domain; academic publications; and agro-economic surveys conducted between 2016 and 2023. The period of eight years was chosen to provide sufficient coverage of the scheme's evolution since its inception. Secondary data were particularly useful in calculating scheme-level performance indicators, identifying year-wise trends in enrollment and claims, and establishing the macro-level context of PMFBY in Haryana.

4.3.2 Primary Data

To complement secondary evidence, primary data were gathered through field surveys, interviews, and focus group discussions. A structured questionnaire was developed to collect farmer-level data on socio-economic characteristics, crop insurance awareness, scheme participation, risk perception, experiences with claims, and perceptions of income stability. Semi-structured interviews were conducted with agricultural officers, bank representatives, and insurance company agents to capture institutional perspectives. In addition, focus group discussions were held in each sampled district to capture collective narratives, peer influences, and shared experiences of PMFBY among farming communities.

4.4 Sampling Procedure

A stratified random sampling method was adopted to ensure representation across farm size categories, regions, and insurance status. Farmers were first stratified according to farm size—marginal (<1 hectare), small (1–2 hectares), and medium/large (>2 hectares)—because farm size is an important determinant of insurance participation and income stability. The second stratum was based on geographic zones: irrigated (east), semi-arid (west), and diversified (central Haryana). The third stratum was based on insurance status, distinguishing between insured and uninsured farmers. From this three-level stratification, a total of 450 farmers were selected across the six districts. The sample size was determined to be statistically reliable while remaining feasible for fieldwork. Within each district, farmers were randomly selected from lists obtained through local agricultural offices and cooperatives. This ensured a balance between statistical rigor and representativeness of diverse farmer categories.

4.5 Data Collection Tools

Three tools were employed for data collection in this study. A structured questionnaire was administered face-to-face to farmers, covering demographics, landholding size, cropping patterns, risk exposure, awareness of PMFBY, participation decisions, experiences with

enrollment and claim settlement, and perceptions of scheme benefits, ensuring inclusivity despite literacy barriers. In addition, key informant interviews were conducted with agricultural officers, bank officials, and insurance company representatives to capture institutional perspectives on implementation, bottlenecks, and coordination. To complement these, focus group discussions involving 8–12 farmers in each district were organized, which provided qualitative depth by revealing shared concerns such as delays, mistrust, and institutional effectiveness while also highlighting collective awareness strategies.

4.6 Analytical Framework

The evaluation framework was structured around three dimensions: participation and awareness, income stabilization, and implementation challenges.

Quantitative Analysis

Descriptive statistics were used to analyze farmer demographics, participation rates, and awareness levels. Several indicators were calculated:

- Claim Ratio (CR):

$$CR = \frac{\text{Total Claims Paid}}{\text{Total Premium Collected}} \times 100$$

- Indemnity Ratio (IR):

$$IR = \frac{\text{Total Sum Insured}}{\times 100}$$

- Loss Cost Ratio (LCR):

$$LCR = \frac{\text{Claims Paid}}{\text{Gross Cultivated Area}}$$

The coefficient of variation (CV) of farm incomes was compared for insured and uninsured farmers to assess income stability.

In addition, a multiple regression model was used to estimate the determinants of farm income stability, with insurance participation as the key explanatory variable. Control variables included farm size, education, crop type, and access to credit.

Qualitative Analysis

Thematic analysis was used to analyze the qualitative data gathered during interviews and discussions in focus groups, a technique that allows for defining and interpreting patterns that recur in textual data. This started with the familiarisation of data, which was done through transcribing and reading the discussions multiple times in order to have a comprehensive understanding of the content. Then, the coding was performed through labeling large blocks of texts, paying attention to the words of farmers regarding their awareness of PMFBY, delays in compensation, their attitudes to transparency, and their general satisfaction. Inductive codes (codes developed out of the data itself) and deductive codes (codes developed according to the objectives of the study) were used. These codes were further divided into larger themes, which are as follows: (i) awareness and understanding of PMFBY, (ii) transparency and trust of the scheme, (iii) delays in claim

settlement, and (iv) farmer satisfaction and resilience. The themes were developed following a review process to make sure each theme is internally consistent and representative of different categories of farmers. The example is that the theme of delays was split into administrative inefficiencies and procedural bottlenecks, and the theme of awareness was differentiated into institutional communication and peer-based knowledge transfer. Lastly, quantitative findings were triangulated to confirm the themes; such as statistical evidence of low claim-to-premium ratios was validated by the testimony of farmers dissatisfied, whereas reduced variability of income was confirmed by stories of lower dependence on debt after compensation. Such integration guaranteed the consistency and depth, which resulted in a sound assessment of the effectiveness of PMFBY in minimizing risk in agriculture.

4.7 Ethical Considerations, Limitations, and Summary

Ethical protocols were followed throughout the study. Farmers were informed about the purpose of the research, and informed consent was obtained before participation. Confidentiality and anonymity were assured to protect farmer identities. Participation was voluntary, and respondents were free to withdraw at any time. Surveys and interviews were conducted in the local language to ensure clarity and inclusiveness.

While the methodology is robust, it has certain limitations. First, the study is limited geographically to Haryana, and findings may not be directly generalizable to other states with different socio-economic and agro-climatic contexts. Second, primary data rely on farmer self-reports, which may be subject to recall bias or exaggeration. Third, although stratified sampling was applied, tenant farmers and landless laborers are underrepresented because the survey focused primarily on cultivators. These limitations are acknowledged, but the integration of multiple data sources mitigates potential weaknesses and enhances reliability.

The methodological framework adopted in this study is designed to provide a comprehensive, multi-dimensional, and rigorous evaluation of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in Haryana. By employing a mixed-methods design, the study combines the strengths of both quantitative and qualitative approaches to capture the scheme's effectiveness in reducing agricultural risks and promoting resilience. Quantitative analysis, grounded in secondary data and farmer surveys, enables the calculation of performance indicators such as enrollment levels, claim ratios, indemnity ratios, loss-cost ratios, and income variability, thereby providing measurable evidence of the financial performance of PMFBY. At the same time, qualitative methods—including structured farmer surveys, key informant interviews with officials, and focus group discussions with farming communities—generate rich, contextual insights into farmer awareness, perceptions of transparency, experiences with claim settlement, and overall satisfaction with the scheme.

The sample size of insured and uninsured farmers increases the comparative depth of the study, which enables the determination of the effect of PMFBY participation on the stability of income and reduction of vulnerability in comparison with farmers who do not participate in the scheme. In addition to this, a stratified random sampling plan, which will address various farm sizes, agro-ecological regions, and insurance cover, assures that the results are representative of the heterogeneous farming population in Haryana. Their interpretation through thematic analysis and the triangulation of the results with the statistical findings further enhances the rigor of the study, as their use allows the study to confirm the patterns and prevent the overdependence on any of the data types.

The other strength of the methodology is that it incorporates institutional views by interviewing agricultural officers, bank officials, and insurance agents. These insights give more insights on the structural and administrative issues that affect the execution of PMFBY, including delays in settling claims, communication gaps, and coordination problems between stakeholders. Integrating farmer-level evidence with the institutional accounts, the study goes beyond the performance evaluation at the narrow level and places PMFBY in the context of policy implementation and governance.

Finally, this methodological design enables the research to have a balanced and comprehensive assessment of the role of PMFBY in Haryana. It not only measures the financial performance of the scheme, but also measures what the scheme has done to build resilience, build trust, and provide long-term sustainability in agriculture to farmers. Directly filling the research gaps that have been identified, especially filling the gap of integrating climate adaptation and farmer perceptions into the research methodology, the intended study will be in line with the stated objectives and will have a significant contribution to the academic literature on agricultural risk management in India, as well as to the policy discussions.

RESULTS

5.1 Farmer Participation and Awareness

5.1.1 Enrollment Patterns

Analysis of secondary data indicates a steady decline in enrollment under PMFBY in Haryana. At its inception in 2016, 7.2 lakh farmers were enrolled, but by 2023, this figure had dropped to 4.1 lakh (Table 1). This represents a contraction of nearly 43 percent, despite the continuation of premium subsidies and the introduction of digital enrollment platforms. While premiums collected increased modestly during this period, claims did not show a commensurate rise, suggesting that payouts failed to meet farmer expectations.

Table 1: Year-wise Enrollment, Premiums, and Claims in Haryana (2016–2023)

Year	Farmers Enrolled (lakh)	Premiums Collected (₹ crore)	Claims Paid (₹ crore)	Claim Ratio (%)
2016	7.2	520	310	59.6
2017	6.8	540	340	63.0
2018	6.4	565	290	51.3
2019	5.9	580	400	69.0
2020	5.2	600	350	58.3
2021	4.7	615	370	60.1
2022	4.4	630	410	65.1
2023	4.1	645	380	58.9

Source: Singh & Agrawal (2020); Gulati et al. (2018); state PMFBY data.

This declining trend mirrors farmer dissatisfaction observed in surveys and focus groups. Nearly 37 percent of uninsured farmers in the sample were former participants who discontinued due to inadequate payouts or delayed settlements. This indicates that while the scheme initially gained traction, its credibility has eroded over time.

5.1.2 Awareness of Scheme Provisions

The survey of 450 farmers revealed persistent information asymmetries. Among insured farmers, just over half (52%) could accurately identify premium rates, while only 44 percent understood claim procedures (Table 2). Awareness was lower among uninsured farmers, with less than one-third reporting adequate knowledge.

Table 2: Awareness of PMFBY Among Farmers (n = 450)

Awareness Indicator	Insured Farmers (%)	Uninsured Farmers (%)	Overall (%)
Knowledge of premium rates	52	31	43
Awareness of the claim procedure	44	28	37
Understanding of coverage details	56	34	45
Awareness of the grievance mechanism	29	18	24

Source: Primary survey, 2024.

Table 2 highlights that low awareness remains a major obstacle. Qualitative evidence reinforces this: many farmers reported being enrolled automatically during

bank loan disbursals without full consent. As one participant in Hisar remarked: “They deduct money from my account, but I do not know how to claim

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compensation.” This disconnect between enrollment and understanding directly undermines farmer trust in the scheme.

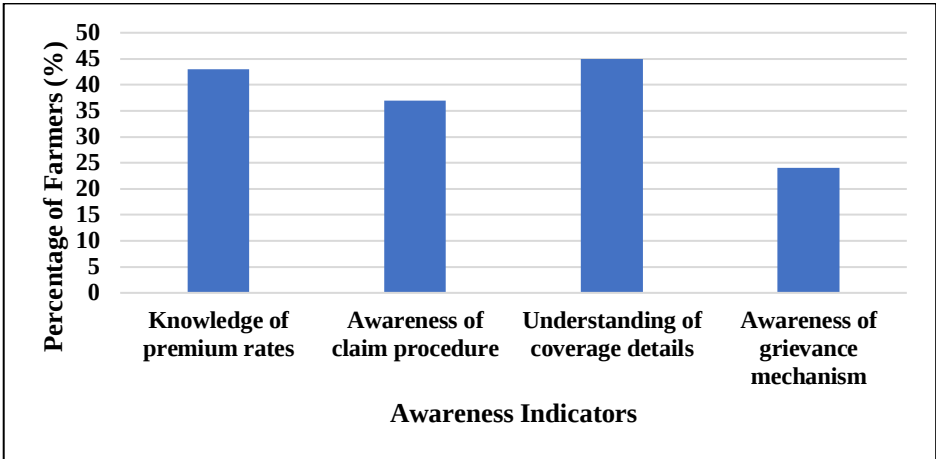


Figure 4: Farmer Awareness of PMFBY Provisions in Haryana

The chart shows farmers awareness of PMFBY provisions. While 43% know premium rates and 45% understand coverage, only 37% know claim procedures, and just 24% are aware of grievance mechanisms, indicating significant information gaps.

5.2 Income Stabilization and Risk Reduction
5.2.1 Income Variability

The central research objective, whether PMFBY reduces agricultural risk, was examined by comparing income variability between insured and uninsured farmers. As shown in Table 3, the coefficient of variation (CV) of annual income was significantly lower for insured farmers (18.4%) compared to uninsured farmers (26.7%). This indicates that PMFBY participation contributes to stabilizing income, though it does not eliminate variability.

Table 3: Income Variability of Insured vs. Uninsured Farmers

Farmer Category	Average Annual Income (₹)	Standard Deviation (₹)	CV (%)
Insured Farmers	2,05,000	37,700	18.4
Uninsured Farmers	1,92,000	51,200	26.7

Source: Primary survey, 2024.

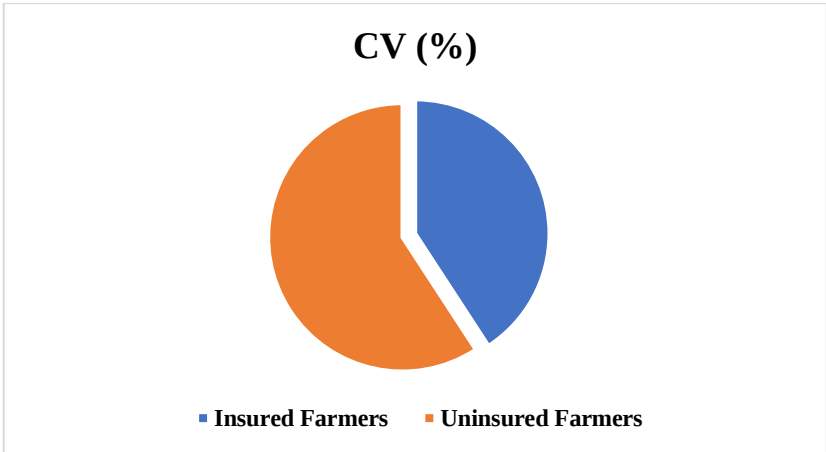


Figure 5: Comparison of Income Variability Between Insured and Uninsured Farmers

The chart illustrates the coefficient of variation (CV) in farm income. Insured farmers show significantly lower income variability, indicating greater stability, while uninsured farmers face higher fluctuations, highlighting the protective effect of crop insurance under PMFBY in Haryana.

5.2.2 Claim Ratios and Indemnity Coverage

While PMFBY reduced income variability, compensation adequacy remained limited. Table 4 shows that the claim ratio fluctuated between 51% and 69%, while indemnity ratios rarely exceeded 11 percent of the sum insured.

Table 4: Claim and Indemnity Ratios in Haryana (2016–2023)

Year	Premiums (₹ crore)	Claims Paid (₹ crore)	Claim Ratio (%)	Indemnity Ratio (%)
2016	520	310	59.6	8.4
2017	540	340	63.0	9.2
2018	565	290	51.3	7.5
2019	580	400	69.0	10.8
2020	600	350	58.3	9.0
2021	615	370	60.1	8.9
2022	630	410	65.1	9.4
2023	645	380	58.9	8.8

Source: Singh & Agrawal (2020); Gulati et al. (2018); state PMFBY data.

Table 4 demonstrates that payouts provided only partial relief, reinforcing farmer perceptions of PMFBY as insufficient. Focus group narratives illustrated this: while some acknowledged reduced dependence on moneylenders, many viewed insurance as “token relief rather than real compensation.”

5.3 Implementation Challenges

Timeliness of Claim Settlements

Delays in settlement emerged as the most significant bottleneck. Survey results show that only 39 percent of farmers received compensation within the mandated three months, while 61 percent reported delays ranging from three to more than six months (Table 5).

Table 5: Timeliness of Claim Settlements (Insured Farmers)

Timeliness of Compensation	Farmers (%)
Within 3 months	39
3–6 months	44
More than 6 months	17

Source: Primary survey, 2024.

Table 5 aligns with institutional interviews, where officials attributed delays to late fund release by the state, procedural inefficiencies in crop-cutting experiments, and inadequate integration of technology. Farmers emphasized that delayed payouts undermined the scheme’s objective: “If money comes after six months, the season is over; we already borrow to survive,” said a respondent from Bhiwani.

5.3.1 Transparency and Farmer Trust

Transparency in yield estimation and claim processing was another recurring concern. Only 38 percent of insured farmers expressed trust in the accuracy of yield assessments, while confidence in claim processing stood at 42 percent (Table 6).

Table 6: Farmer Perceptions of Transparency in PMFBY

Transparency Indicator	Positive Responses (%)
Trust in yield estimation	38
Confidence in claim processing	42
Belief in fair compensation	35

Source: Primary survey, 2024.

Table 6 confirms the trust deficit surrounding PMFBY. Focus groups revealed suspicions that crop-cutting experiments were manipulated or underestimated losses, especially for smallholders. This aligns with the declining enrollment trend (Table 1), suggesting that transparency is critical for scheme credibility.

5.3.2 Crop Coverage and Exclusion

A structural challenge in Haryana is the overrepresentation of wheat and rice, leaving pulses, oilseeds, and vegetables underinsured. Among uninsured farmers, 29 percent cited crop exclusion as their main reason for non-participation (Table 7).

Table 7: Reasons for Non-Participation in PMFBY

Reason for non-participation	Farmers (%)
Exclusion of the main crop	29
Delays in claim settlement	35
Lack of awareness	22

Source: Primary survey, 2024.

Table 7 shows that crop exclusion, combined with delays and mistrust, is driving declining participation. Farmers cultivating vegetables in Sonipat and pulses in Jhajjar consistently reported feeling “left out” of the scheme design.

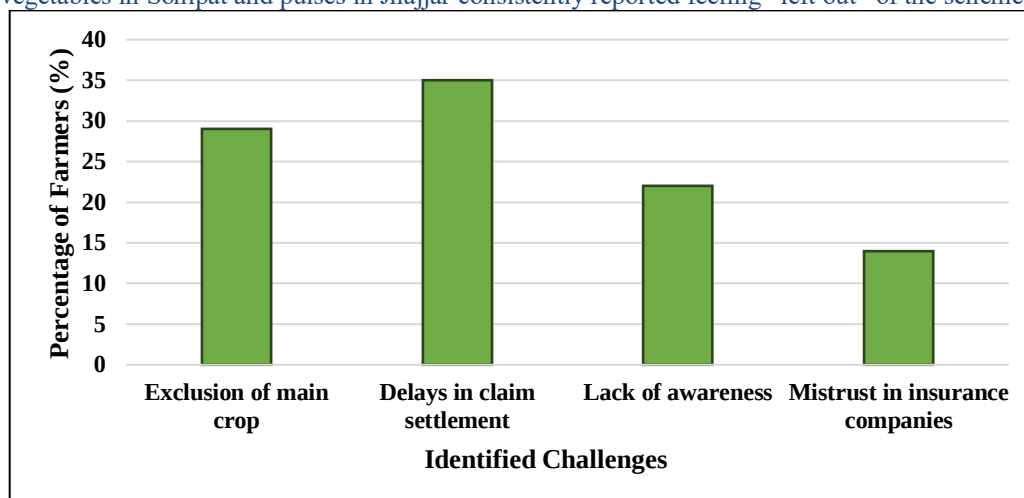


Figure 6: Key Challenges Faced by Farmers in Accessing PMFBY

The chart highlights major barriers to PMFBY participation. Delays in claim settlement (35%) and exclusion of main crops (29%) are the most pressing issues, followed by lack of awareness (22%) and mistrust in insurance companies (14%).

DISCUSSION

The analysis of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in Haryana reveals both successes and continued failures at managing agricultural risk. The results of the present study reveal that despite the scheme managing to bring down the income variability of insured farmers, it is limited by delays in claims settlements, insufficient levels of compensation, coverage of crops, and awareness. These findings are coherent and applicable to the current literature and are able to contribute to the scheme's ability to promote resilience and sustainability of Indian agriculture.

The trend in enrollment in Haryana indicates that enrollment is on the decline since the inception of PMFBY in 2016. As the subsidies continued to be provided, the participating farmers reduced to about four lakhs in 2023 as opposed to the original seven lakh farmers. Singh and Agrawal (2020) also found this trend in the rest of the country, where high expectations were built as a result of the early implementation, followed by disillusionment and internal system inefficiencies. Kumar and Phougat (2021) confirmed that there was a high initial adoption in Haryana, followed by defections as farmers became disillusioned with the claim process. The evidence in the current study contributes to this by demonstrating that a large number of farmers who had dropped out had started by being enrolled through bank-linked enrollment but had dropped out because of recurrent instances of late or substandard payment. These results demonstrate that a subsidized premium is not sufficient to ensure long-term participation, but

instead, the farmers must have confidence in the credibility of the scheme.

There is also a lack of awareness of PMFBY provisions. The level of knowledge among insured farmers was low; less than half of the surveyed farmers were able to adequately describe premium rates or claim procedures, and the level of knowledge was even lower among uninsured farmers. Shehrawat et al. (2020) already identified the deficit of in-depth knowledge about the agricultural welfare programs in Haryana, indicating that the schemes were carried out in a top-down fashion. Rai (2019) also made the same argument that PMFBY was too technocratic in its design, and there was minimal inclusiveness of the grassroots. These arguments are strengthened by our research, which reported that enrollment by banks was usually done in the absence of any prior knowledge, and most farmers were unclear of what the scheme entailed. Farmers often resorted to complaints in focus groups about automatic deductions being posted to their accounts without any clear indication of coverage or filing claims. This gap between reported enrollment and actual awareness highlights the reason why the coverage data can exaggerate the success of outreach activities.

In spite of these shortcomings, the scheme has had a quantifiable impact on the stabilization of income. It was found that the variability of income amongst insured and uninsured farmers was very different, as those without insurance had a coefficient of variation of 26.7 percent and those who were insured had a coefficient of variation of 18.4 percent. Rathore and Rao (2017) also identified that India's crop insurance models led to an income stabilization to some extent, but they noted that their effects should not be overestimated. Gulati, Terway, and Hussain (2018) highlighted that the insurance might lower reliance on informal lending in case the payouts

are prompt. The current study supports these findings and reveals that PMFBY has been successful in preventing distress borrowing in some instances, especially among smallholders. But the compensation rates were low, and the indemnity ratios did not usually go beyond 11 percent. A similar conclusion was made by Sheoran, Kait, and Rani (2023), who found that the payouts in Haryana tended to be less than the real losses. In our focus groups, farmers talked about compensation several times, and they all said that it was token relief and not protection. This confirms the hypothesis of Punia, Nimbrayan, and Yadav (2021) that PMFBY has not worked as a resilience-building instrument, providing partial financial support, but not creating much impact on long-term vulnerability.

Another long-standing problem was the delay in the settlement of claims. More than 60 percent of insured farmers indicated that they were paid more than three months as required. Similar delays were found in Haryana by Kait and Sheoran (2022), which were explained by administrative inefficiencies and bottlenecks in the estimation of yields. The interviews with authorities we conducted proved that the release of funds late and the slow pace of conducting experiments with crop cutting were major factors. The farmers themselves underlined the pointlessness of the late support, as one of the respondents remarked that by the time the payment was made, the following season's inputs had already been bought on loans. These stories support the idea presented by Sheoran et al. (2024) that the efficacy of crop insurance not only depends on the level of compensation but also regarding the timeliness. The mission of insurance to stabilize the operations of farms in case of crisis is destroyed without immediate payouts.

Another significant issue that arose was transparency in the estimation of yields and in the processing of claims. Farmers only put their trust in yield estimations 38 percent. This observation aligns with Rai (2019), who lamented the lack of transparency in crop-cutting experiments, and with Tripathi et al. (2023), who noted that transparency has contributed to mistrust in India. In our research, farmers regularly believed that the losses in terms of yield were under-reported to lower their compensation. This mistrust not only weakens PMFBY but also the state-farmer relations in general. According to Shekhar and Rai (2025), crop insurance should be regarded as a component of climate adaptation strategies, but our results indicate that the institutional process's credibility is a precondition for the integration. Insurance schemes cannot meaningfully be integrated into wider resilience systems without the presence of trust.

Another weakness is the low coverage of crops in Haryana. Although wheat and rice form most of the insurance portfolio, pulses, oilseeds, and vegetables are still underserved. Almost a third of the uninsured farmers mentioned crop exclusion as the reason they chose not to be insured. This is similar to the results of

Kapadia and Swain (2020), who found that PMFBY skewed towards staple crops in Gujarat, and Wahab (2018), who found the same exclusions in Punjab. Such exclusions are especially problematic in Haryana, where diversification is promoted more and more as a reaction to climate stress. The farmers who produce less typical crops are practically left out of the protective umbrella of PMFBY, which further supports the structural injustices of risk management.

The experience of Haryana compared to other developing country settings has some similarities. Roy et al. (2018) reported on compensation shortcomings in West Bengal, and Misra et al. (2020) identified that picture-based insurance schemes in Haryana created more trust with farmers by lessening disagreement over yield determination. The insights presented below suggest that some credibility challenges of PMFBY can be overcome with the help of monitoring and transparency innovations. Overall, the world experience indicates the known problems of awareness, timeliness, and reliance on subsidies in the agricultural insurance programs. Until these issues are addressed in Haryana, which is one of the most agrarian developed states in India, then they are likely to be even more difficult in areas where the institutional infrastructure is less developed.

The given study contributes to the existing discussion about the connection between crop insurance and resilience, as well. Even though PMFBY reduced the variability of income and, in other cases, prevented dependence on debt, low payouts and delays limit its role in long-term resilience. Punia et al. (2021) proposed the notion that crop insurance should be an inclusive adaptation strategy that adheres to international sustainability goals. The results of this research confirm this argument because it demonstrates that insurance can produce short-term positive results, but it cannot adequately address structural vulnerabilities without being implemented as part of grander climate adaptation strategies. Shekhar and Rai (2025) stressed the necessity of locating crop insurance in the context of resilience, and this work is a direct response to it by showing not only the benefits of this policy but also its shortcomings in the state of Haryana.

Overall, the study has three unique findings. First, it offers a more comprehensive assessment of PMFBY than those that utilize only financial data due to its triangulation of statistical analysis and farmer narratives. Second, it measures the value of the insurance participation by contrasting insured and uninsured farmers, as well as the reasons why many farmers do not participate. Third, placing the findings in the context of resilience, it goes beyond performance measurements to emphasize the value of PMFBY, and its shortcomings, as a climate adaptation tool.

Implications of the policy are obvious. The reforms must be centered not only on the financial parameters but also on awareness, transparency, and inclusiveness. The

awareness campaigns should also change the automatic bank enrollment to participatory outreach that will create awareness of the scheme among farmers. The processes of yield estimation and fund release should be streamlined using technology to make the payouts as timely as possible. The coverage of crops must be raised to include pulses, oilseeds, and vegetables, and more so as Haryana diversifies during climate stress. Most importantly, there must be increased institutional transparency that would reinstate trust. Free access to yield data, separation of surveillance of crop-cutting experiments, and responsiveness of grievances would go a long way in restoring confidence. Finally, PMFBY should be integrated into the general adaptation policy of Haryana as a support to the policy of irrigation management, sustainable crops, and capacity-building of the farmers.

This discussion has therefore indicated that PMFBY in Haryana has delivered some insurance against agricultural risk, but has not delivered on its transformative promise. It has minimized the variability of income and offered short-term relief, but has not addressed the systematic inefficiencies and exclusions to qualify as a holistic risk management instrument. These results validate previous criticisms made by Singh and Agrawal (2020), Sheoran et al. (2023), and Punia et al. (2021), and provide new information about the perceptions and institutional trust of farmers. To deliver on its promise, PMFBY needs to become more than a compensatory tool and should be a comprehensive resilience strategy that enables farmers, creates trust, and contributes to sustainable agriculture under climate change.

CONCLUSION

Pradhan Mantri Fasal Bima Yojana in Haryana is a case of success and failure in dealing with agricultural risk. The research findings show that insurance has been useful in the mitigation of fluctuation of farm revenues and, in some cases, it has kept the households out of debt cycles by reducing reliance on informal credit. These results demonstrate that the scheme can serve to offer a stabilizing effect in climatic stress and crop failure periods. However, the results also show that there are always issues that weaken its reputation among farmers. The number of enrollments has decreased consistently since the introduction of the scheme; disbursements tend to be a small part of actual losses, and compensation is often not received when farmers need the money to get them through to the next planting period. The lack of awareness also undermines its success as a significant proportion of farmers have been registered via the banks without a clear understanding of the benefits or processes of claiming them, and others who grow pulses, oilseeds, and vegetables are not included as the coverage is too limited. Testimonies recorded in the fieldwork highlighted the fact that, despite the importance attached to insurance as a concept, the way it is currently practiced does not live up to its hype and, instead, it is more of a bandage than an overall protection against risks. These findings indicate that PMFBY, as it stands

currently, is rather a partial safety net than a radically transformative resilience-creating process. To make the scheme fulfill its potential, the reforms should be aimed at transparency in yield estimation, sufficient and timely payment, the inclusion of more crops, and more effective awareness campaigns. It is also crucial to consider integrating crop insurance into broader climate adaptation and sustainable agriculture. It is only under such actions that PMFBY will become more than a compensatory program and a strong source of agricultural resilience in the future in Haryana.

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