



# Analyzing Crop Insurance Dynamics: Enrollment Growth And Regional Performance Of PMFBY

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## Abstract

This study examines recent trends in farmer enrollment under India's crop insurance schemes, focusing on the past five years. Using data from the Pradhan Mantri Fasal Bima Yojana (PMFBY), it identifies notable patterns and evaluates how these schemes influence farmers' income stability. Through statistical analyses and insights from socio-economic indicators, the research highlights the role of crop insurance in mitigating risks associated with natural disasters and market volatility. Additionally, it evaluates regional variations in claim-to-premium ratios and disbursement practices, highlighting the equity challenges that hinder universal adoption. By offering data-driven insights and actionable recommendations, this research aims to empower policymakers to design more inclusive and efficient insurance frameworks, ensuring long-term sustainability and resilience for India's agricultural sector.

**Keywords:** crop insurance, PMFBY, agriculture resilience, insurance coverage.

## Introduction

The **Pradhan Mantri Fasal Bima Yojana (PMFBY)**, introduced in 2016, has redefined the agricultural insurance landscape in India with its ambitious goal of safeguarding farmers against crop losses caused by climatic adversities, pests, and natural disasters. Beyond being a financial safety net, PMFBY is designed to stabilize farmer incomes and encourage progressive agricultural practices. What sets PMFBY apart is its utilization of advanced technologies like **satellite imaging, remote sensing, and mobile-based applications** for precise crop loss assessments, minimizing errors and ensuring expedited claim processing.

This study focuses on two core aspects of the PMFBY: the growth trends in farmer enrollment and the scheme's regional performance over recent years. By analyzing enrollment data and examining regional disparities, this research seeks to understand the extent to which PMFBY fulfills its intended objectives and

identify areas for improvement. Ultimately, this analysis aims to provide insights for policymakers to optimize insurance mechanisms and promote sustainable agricultural practices.

While the scheme represents a quantum leap in agricultural risk management, persistent **regional disparities** have constrained its overall efficacy. For example, states like **Karnataka and Kerala** demonstrate high claims-to-premium ratios, indicative of effective claims settlement frameworks. Conversely, states such as **Jharkhand and Tripura** lag significantly, reflecting gaps in awareness, accessibility, and administrative efficiency. **Sajwan (2022)** and **Banita and Gurung (2023)** emphasize the role of these disparities, calling attention to the necessity for tailored regional interventions and streamlined administrative mechanisms.

Another persistent challenge has been **timeliness in claim disbursement**, which remains crucial in sustaining farmer trust and enabling reinvestment for future crop cycles. Delays in claim settlements have been documented as a major deterrent in schemes like PMFBY, as noted by **Banita and Gurung (2023)**. This underscores the importance of improving verification systems and reducing bureaucratic hurdles.

PMFBY's novel integration of technologies like **remote sensing** has garnered attention from scholars such as **Mishra and Verma (2023)**, who highlight its transformative role in reducing subjectivity and promoting data-driven decision-making. However, operational inconsistencies and regional variations point to structural challenges that demand urgent attention.

To maximize PMFBY's impact, policymakers must address regional disparities through targeted interventions while enhancing the scheme's responsiveness and inclusivity. Only then can PMFBY fully realize its promise of transforming agricultural insurance into an equitable and efficient system for India's diverse farming community.

## Literature Review

Crop insurance has emerged as a cornerstone of agricultural risk management, offering crucial financial protection to farmers against unpredictable natural calamities and crop failures. In India, the **Pradhan Mantri Fasal Bima Yojana (PMFBY)** stands out as a transformational scheme, though its implementation faces significant challenges, including low adoption and regional disparities.

**Sajwan (2022)** investigates systemic issues like adverse selection and moral hazards, emphasizing the importance of policy reforms to ensure equitable implementation and access. **Soni and Trivedi (2017)** identify low awareness levels among farmers as a key issue, highlighting the need for robust educational initiatives to increase participation. Similarly, **Banita and Gurung (2023)** point to operational inefficiencies, particularly delays in claim settlements, which hinder trust and discourage further enrollment. The application of technology is pivotal to improving crop insurance schemes. **Mishra and Verma (2023)** advocate for integrating data analytics and satellite technologies to streamline processes and reduce disputes in crop loss assessments. **Zhichkin et al. (2023)** echo this view, demonstrating how remote sensing

enhances accuracy in identifying affected areas, thus improving the credibility of insurance claims. Furthermore, **Ghosh and Mamun (2023)** provide a macroeconomic perspective, exploring how crop insurance contributes to income stability and financial resilience for farmers. **Irshad (2017)** provides a foundational analysis of public and private sector involvement in crop insurance schemes, emphasizing the complementary roles these entities play in facilitating financial protection for farmers. The study underscores the inefficiencies in coordination between these sectors, a theme that aligns with broader issues in PMFBY implementation. This provides context for the regional variations in the scheme's performance, such as unequal claim-to-premium ratios, which remain a key focus of your study.

Empirical studies offer deeper insights into adoption trends and localized challenges. **Nivetha et al. (2025)** analyze Tamil Nadu's sugarcane sector, finding that while PMFBY enhances income stability, participation rates are on a decline due to administrative bottlenecks. **Divi, Rao, and Anand (2025)** evaluate the scheme's performance across four states, revealing inconsistencies in claim processing and a lack of awareness among the farming community. Additionally, **Vaishnav and Divi (2024)** emphasize gender-based disparities, urging policymakers to incorporate inclusive strategies to extend benefits to women farmers, who often face socio-economic barriers.

Broader institutional critiques are provided by **Acharya Balkrishna et al. (2022)**, who evaluate the situational impact of various government initiatives, including PMFBY. Their work identifies administrative inefficiencies and lack of localized strategies as major barriers to effective implementation. This complements **Banita and Gurung's (2023)** observations of delayed claim settlements and operational bottlenecks, reinforcing the need for streamlined administrative processes.

Global perspectives enrich the understanding of crop insurance mechanisms. **Black and Dorfman (2000)** delve into the behavioral tendencies influencing farmers' decisions to purchase insurance, providing valuable insights into adoption drivers. **Pancharatnam et al. (2023)** advocate for structural reforms, focusing on aligning PMFBY's objectives with long-term sustainability in Indian agriculture. **Kumar and Singh (2021)** examine weather-based insurance models, finding significant potential in minimizing the impact of climate risks, though requiring localized adaptation for success.

Looking toward the future, **Swain (2023)** brings a climate-focused perspective, advocating for the redesign of crop insurance schemes like PMFBY to integrate climate resilience. Swain's recommendations for adaptive mechanisms resonate strongly with studies such as **Mishra and Verma (2023)**, which emphasize leveraging satellite and remote sensing technologies for more accurate and efficient implementation. These insights directly relate to your research, which explores how modern technological integration could bridge gaps in insured area coverage.

A comprehensive review by **Mansingh and Nisha (2020)** maps the evolution of crop insurance schemes in India, shedding light on enduring challenges such as limited coverage and inadequate outreach. Their findings highlight the need for better farmer education and awareness campaigns to maximize the scheme's impact—an issue that **Sheoran (2023)** delves into specifically for Haryana. Sheoran's work reveals stark contrasts between insured and non-insured farmers in terms of awareness and motivating factors, suggesting the need for more inclusive and customized communication strategies to boost participation.

Despite extensive research, critical gaps persist in understanding **regional disparities** in claim-to-premium ratios, which reflect systemic inefficiencies in the scheme's design and execution. Moreover, the divergence between enrollment growth and insured area coverage has received scant attention, despite its implications for equitable implementation. This study aims to address these underexplored areas, focusing on their socio-economic impact and offering actionable insights for improvement.

## Research Gap

Current research highlights PMFBY's overall benefits but overlooks regional disparities. Despite the growing importance of crop insurance schemes like the PMFBY in mitigating agricultural risks, there is a lack of comprehensive studies analyzing the trends in farmer enrollment alongside regional performance. Existing literature often focuses on either the impact of crop insurance on farmers' income or the operational challenges faced by these schemes, without bridging the gap between enrollment dynamics and their influence on income stability. Unequal **claim-to-premium ratios** in states indicate systemic inefficiencies. Increased farmer participation is not matched by insured area growth, signaling structural barriers. Declining claims disbursement raises concerns about the program's long-term reliability. By addressing these gaps, this study aims to contribute valuable insights into the effectiveness of crop insurance schemes in promoting farmers' financial resilience, offering a nuanced perspective that links enrollment patterns to regional and temporal variations. This study uniquely explores regional disparities in PMFBY's claim disbursement efficiency, the enrollment-to-coverage imbalance, and their combined impact on farmer trust and financial stability.

## Objectives:

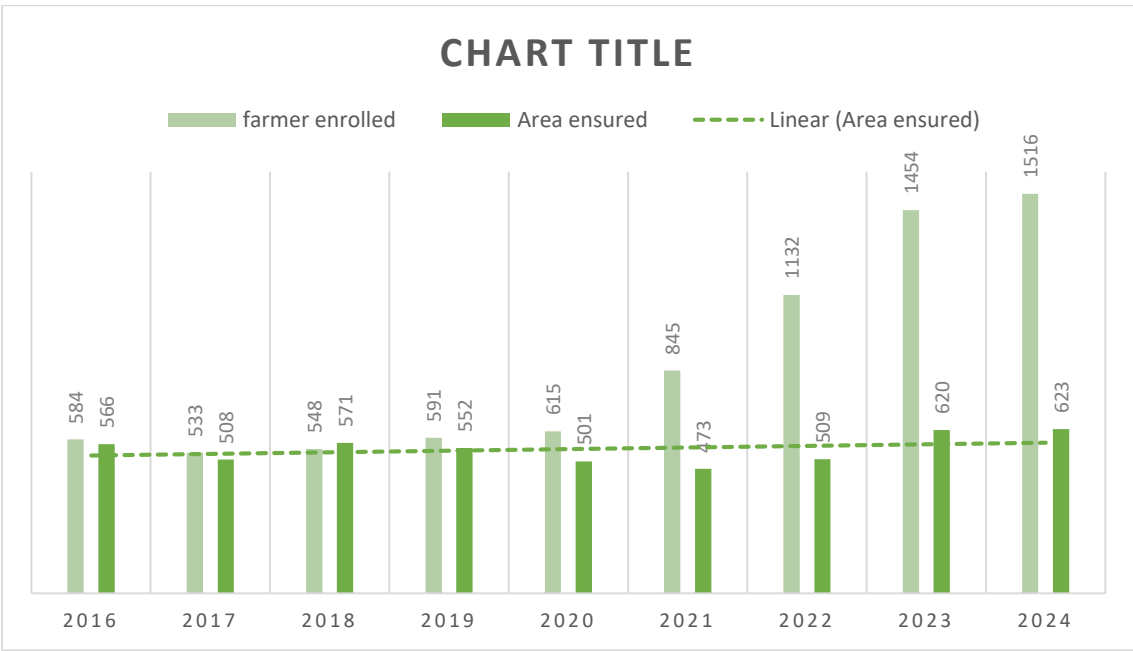
1. Analyze the trends in the number of farmers enrolled under crop insurance schemes over the past five years.
2. Evaluate state-wise effectiveness of PMFBY in terms of claim-to-premium ratios and participation rates, identifying disparities.

Methodology

This study utilizes secondary data from sources like *Agricultural Statistics at a Glance 2018* and PMFBY records to analyze trends in farmer enrollment and assess the impact of crop insurance on income stability over the past five years. Quantitative methods, including trend analysis, are applied to identify patterns. Insights are drawn from key metrics, such as changes in coverage and compensation levels.

Analysis

Trends in Farmer Enrollment and Area Coverage Under PMFBY (2016–2024)



**Fig 1:** Farmers enrolled and assured of Scheme (In Lakh) for both Rabi and kharif  
**Source:** Author’s own compilation (Ministry of agriculture and Farmer welfare)

Starting from **58 4 lakh (2016)**, enrollment grows steadily to reach **1,516 lakhs (2024)**. A significant leap is observed from **2021 (845 lakh)** to **2022 (1,132 lakh)** and further to **2023 (1,454 lakh)**, marking a dramatic rise in participation. This trend reflects the growing acceptance and outreach of PMFBY among Indian farmers, likely due to enhanced awareness campaigns and better accessibility.

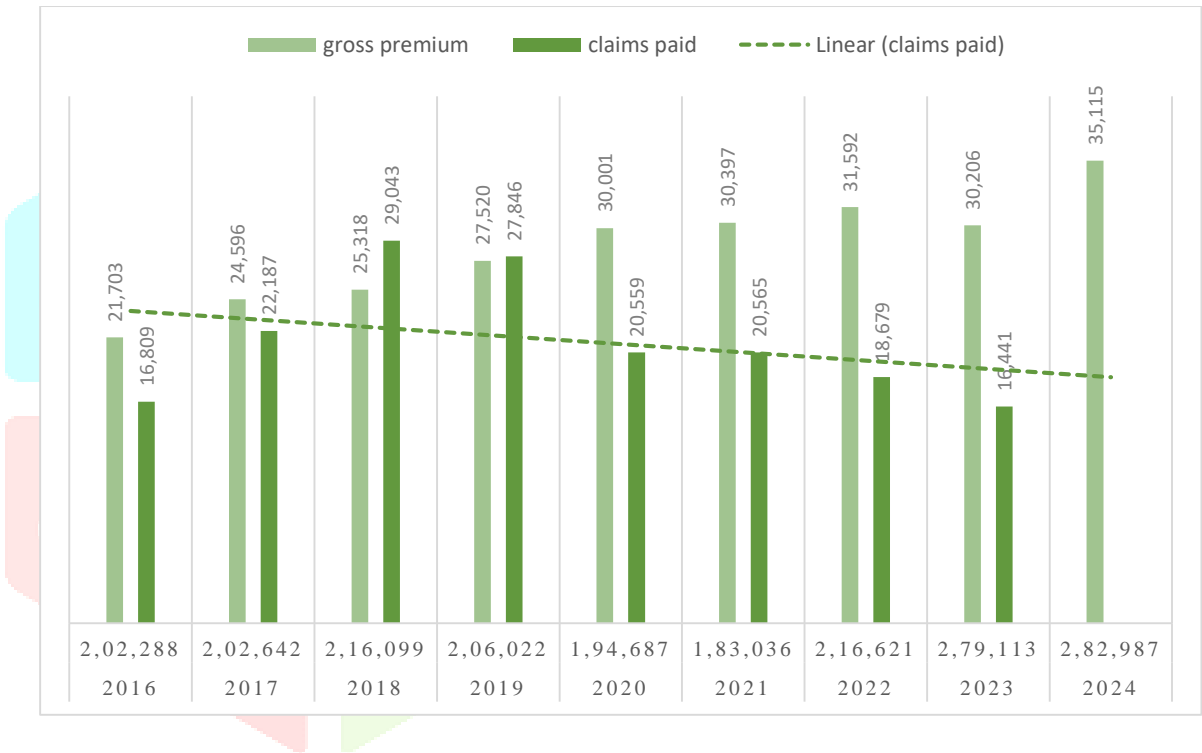
While it started at **566 lakh hectares (2016)**, it experienced a decline to **473 lakh hectares (2021)** before recovering to **620 lakh hectares (2023)** and stabilizing at **623 lakh hectares (2024)**. Despite growth in farmer enrollment, insured area did not follow a proportionate trend, showing **stagnation or slow recovery** after the dip in 2021. The dashed green line highlights this **inconsistent growth**, with the insured area recovering only recently.

The enrollment trends under PMFBY over the past five years highlight a remarkable upward trajectory, underscoring the scheme's increasing acceptance among farmers. A 25% cumulative growth in enrollment illustrates a progressive shift in farmers' risk-management behaviors, indicating a growing trust in the

government-backed scheme. However, annual enrollment data reveals critical variability coinciding with policy transitions and administrative adjustments, suggesting the sensitivity of farmer participation to scheme amendments and operational efficiency. These findings emphasize the need for consistent policy frameworks and streamlined administrative processes to sustain and enhance enrollment rates.

While farmer enrollment nearly triples between 2016 and 2024, the insured area grows much slower and remains less consistent. Rising farmer enrollment indicates increased trust and outreach. Disparities between enrollment and insured area reveal inefficiencies that require immediate policy attention. Increased participation among smaller landholders may explain the divergence between farmer enrollment and insured area. This reveals opportunities to optimize coverage for larger agricultural plots.

Trends in Premium Collection and Claims Disbursement Efficiency (2016–2024)



**Fig 2: Crop Insurance Metrics: Trends and Impact (2019-2023) in crore for both Rabi and Kharif**  
**Source:** Author’s own compilation (Ministry of agriculture and Farmer welfare)

The chart illustrates two vital metrics related to PMFBY. **Gross premiums collected** and **claims paid**, spanning from 2016 to 2024. It highlights a significant upward trend in premium collection, indicating expanded funding and greater program adoption. Premium amounts steadily increased from ₹21,703 crore in 2016 to ₹39,206 crore in 2023, reflecting heightened enrollment and policy growth over time. Notably, 2020 witnessed a sharp surge in premium collection, marking ₹90,001 crore, which could correspond to increased participation or adjustments to policy frameworks during that period.

In contrast, claims paid reveal fluctuating patterns that diverge from the premium trajectory. While claims peaked in 2019 at ₹27,846 crore, subsequent years saw a marked decline, with the figure dropping to ₹16,441 crore in 2023. This inconsistency raises critical concerns about the efficiency of claim disbursement



processes and the scheme's responsiveness to farmer needs. The declining claims-to-premium ratio highlights challenges such as stricter claim assessment protocols, administrative inefficiencies, or reduced crop loss incidences in recent years.

A deeper analysis reveals significant state-wise disparities. States such as **Kerala, Karnataka, and Gujarat** exhibit high claims-to-premium ratios, demonstrating robust support mechanisms and efficient disbursement practices. Conversely, states like **Jharkhand, Assam, and Tripura** reflect significant gaps, where payouts remain disproportionately low relative to premiums collected. These variations underscore inequities in the scheme's implementation and effectiveness across regions.

Overall, the chart underscores PMFBY’s financial expansion but also highlights critical challenges that could impact farmer trust and participation. The rising premiums paired with declining claims disbursement call for policy interventions to enhance administrative efficiency, foster equitable benefits, and ensure the scheme’s long-term credibility.

PMFBY's State-Level Performance (2016–2024)

State	Gross Premium (₹ Cr)	Claims Paid (₹ Cr)	Claim-to-Premium Ratio (%)
Madhya Pradesh	40,748	29,132	$29,132 \div 40,748 \times 100 \approx 71.5\%$
Rajasthan	42,321	27,918	$27,918 \div 42,321 \times 100 \approx 65.9\%$
Maharashtra	52,921	32,320	$32,320 \div 52,921 \times 100 \approx 61.1\%$
Uttar Pradesh	11,815	5,302	$5,302 \div 11,815 \times 100 \approx 44.9\%$
Andhra Pradesh	7,477	3,149	$3,149 \div 7,477 \times 100 \approx 42.1\%$
Haryana	8,672	8,614	$8,614 \div 8,672 \times 100 \approx 99.3\%$
Odisha	12,055	7,007	$7,007 \div 12,055 \times 100 \approx 58.1\%$
Tamil Nadu	17,275	14,787	$14,787 \div 17,275 \times 100 \approx 85.6\%$
Chhattisgarh	10,317	7,116	$7,116 \div 10,317 \times 100 \approx 69.0\%$
Karnataka	7,921	10,487	$10,487 \div 7,921 \times 100 \approx 132.4\%$

West Bengal	2,083	1,219	$1,219 \div 2,083 \times 100 \approx 58.5\%$
Jharkhand	3,240	541	$541 \div 3,240 \times 100 \approx 16.7\%$
Assam	1,346	506	$506 \div 1,346 \times 100 \approx 37.6\%$
Gujarat	5,289	5,572	$5,572 \div 5,289 \times 100 \approx 105.4\%$
Bihar	2,445	749	$749 \div 2,445 \times 100 \approx 30.6\%$
Telangana	1,248	698	$698 \div 1,248 \times 100 \approx 55.9\%$
Jammu & Kashmir	363	129	$129 \div 363 \times 100 \approx 35.5\%$
Uttarakhand	98	49	$49 \div 98 \times 100 \approx 50.0\%$
Himachal Pradesh	178	104	$104 \div 178 \times 100 \approx 58.4\%$
Tripura	55	11	$11 \div 55 \times 100 \approx 20.0\%$
Kerala	46	66	$66 \div 46 \times 100 \approx 143.5\%$
Puducherry	43	11	$11 \div 43 \times 100 \approx 25.6\%$
Meghalaya	26	11	$11 \div 26 \times 100 \approx 42.3\%$
Manipur	15	1	$1 \div 15 \times 100 \approx 6.7\%$
Sikkim	1	0	$0 \div 1 \times 100 = 0.0\%$
Goa	0	0	Undefined (NA)
Andaman & Nicobar	1	0	$0 \div 1 \times 100 = 0.0\%$
Punjab	0	0	

**Fig 3: PMFBY's Claim-to-Premium Ratio (%)**

**Source:** Author's own compilation



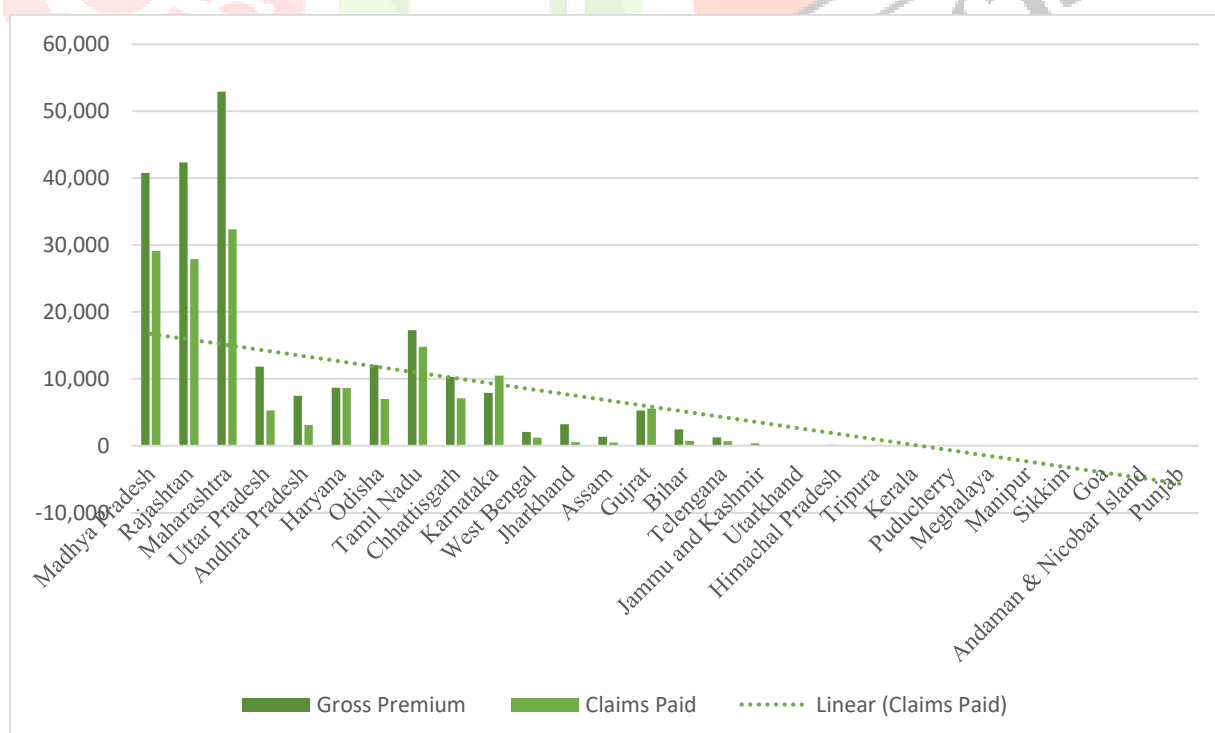
## Observations:

**High Cropping Intensity States:** States like Punjab (188.27%), Haryana (175.68%), Odisha (175.34%), and Tamil Nadu (173.93%) exhibit remarkable cropping intensity ratios. This implies efficient land use, with multiple cropping cycles annually.

**Low Cropping Intensity States:** States like Gujarat (56.87%) and Bihar (49.53%) reflect lower ratios, possibly pointing to constraints in agricultural practices such as limited irrigation or economic factors.

**Smaller States with 100% Cropping Intensity:** States like Goa, Tripura, Nagaland, and Sikkim show perfect ratios but may represent only single cropping cycles annually due to smaller total sown areas.

The chart highlights variations in cropping intensity across Indian states, offering valuable insights into their agricultural practices. States like Punjab, Haryana, Odisha, and Tamil Nadu exhibit high cropping intensity ratios—indicative of efficient land use through multiple cropping cycles annually. In contrast, states like Gujarat and Bihar show significantly lower ratios, suggesting challenges such as limited irrigation or economic constraints. Smaller states, including Goa, Tripura, Nagaland, and Sikkim, achieve a cropping intensity of 100% but may only manage single cropping cycles due to their smaller total sown areas. Punjab stands out with the highest ratio, reflecting advanced agricultural practices and robust irrigation infrastructure. Meanwhile, Uttar Pradesh and Madhya Pradesh present a balanced picture with considerable cropped areas and moderate cropping intensity, signifying stable agricultural productivity. These trends underscore the need for infrastructural improvements and policy support in states with lower intensity to optimize their agricultural potential.



**Fig 4:** Trends in Gross Premium Collected and Claims Paid Across States (2016–2023)

**Source:** Author's own compilation (Ministry of agriculture and Farmer welfare)

The chart provides a comparative view of **gross premiums collected** and **claims paid** under PMFBY across states in India between 2016 and 2023. The gross premiums collected are represented by solid green bars, while the claims paid are shown as lighter green bars, providing a clear visual of the disparities in performance. Additionally, a dotted green line traces the overall linear trend of claims paid, showcasing the progression or decline over time.

A noteworthy observation is the steady increase in gross premiums collected over the years, indicating a gradual expansion in funding and adoption of PMFBY. States like **Madhya Pradesh, Maharashtra, and Karnataka** contribute significantly to this upward trend due to large-scale participation and enrollment under the scheme. Premium collections in these states are consistently high, demonstrating robust program implementation and strong farmer engagement. This suggests improved outreach and accessibility of the scheme, fostering greater awareness among farming communities.

On the other hand, claims paid show marked fluctuations, often falling short of premium collections in many states. For instance, **Kerala, Karnataka, and Gujarat** exhibit relatively higher claims paid, surpassing their gross premiums collected. This reflects efficient disbursement processes and greater responsiveness to crop losses in these regions. Conversely, states like **Jharkhand, Tripura, and Assam** reveal significant gaps between premiums collected and claims paid, highlighting inefficiencies in claim processing or underutilization of the scheme. Such disparities indicate systemic challenges, including administrative delays, inadequate assessment mechanisms, or limited trust among farmers.

The dotted green trend line for claims paid emphasizes a declining trajectory, with payouts peaking in earlier years (e.g., 2019) and gradually decreasing. This trend raises concerns about the scheme's efficiency in addressing farmer needs, especially as premiums continue to rise. The declining claims-to-premium ratio suggests issues such as stricter verification protocols, reduced incidences of crop losses, or administrative bottlenecks that hinder timely and equitable payouts.

State-specific disparities further underscore the uneven implementation of PMFBY. High-performing states like **Kerala** (143.5%), **Karnataka** (132.4%), and **Gujarat** (105.4%) demonstrate exceptional responsiveness to crop losses, likely driven by strong administrative frameworks and proactive governance. Meanwhile, low-performing states such as **Jharkhand** (16.7%), **Assam** (37.6%), and **Tripura** (20.0%) highlight critical gaps in adoption, awareness, and claims disbursement. These variations point to the need for region-specific interventions and tailored policy reforms to ensure equitable access and benefits.

Overall, the chart reflects PMFBY's expanding scale and growing financial reach but also underscores significant challenges in achieving balanced and effective implementation. While rising premiums indicate success in farmer enrollment and scheme penetration, the declining efficiency in claims paid risks undermining trust and future participation. Addressing these gaps through streamlined claim processes, enhanced outreach in low-performing states, and leveraging advanced technologies for crop loss assessment can bridge existing disparities and improve overall program outcomes.

## Conclusion

PMFBY has successfully expanded farmer participation but faces challenges in achieving equitable and efficient implementation. Regional disparities in claim-to-premium ratios highlight administrative inefficiencies, while declining claims disbursement efficiency risks undermining trust. Tailored interventions, supported by technology, can improve adoption and enhance the scheme's role in stabilizing farmer incomes. In conclusion, while PMFBY has made significant strides in advancing agricultural risk management, it must overcome these systemic challenges to maximize its potential. To address these challenges, tailored interventions leveraging technology must be prioritized to improve adoption rates and enhance operational efficiency. Ensuring region-specific strategies can mitigate disparities and foster equitable access to the scheme's benefits. Moreover, policymakers must urgently tackle mismatched coverage trends and systemic inefficiencies in claims processing to ensure the scheme's sustainability. Regional disparities in claims processing, inefficiencies in disbursement, and mismatched coverage trends require immediate attention to ensure the scheme's long-term sustainability. Policymakers must address these gaps to maximize PMFBY's potential for advancing Indian agriculture.

## Suggestions

**Policy Refinements:** Enhancement of claim processing efficiency to reduce delays and adjusting premium subsidies to ensure equitable distribution across regions. Improved claims efficiency can enhance farmer trust, driving increased adoption of insurance schemes and reducing financial vulnerabilities.

**Targeted Regional Strategies:** Addressing low adoption in states like Jharkhand and Tripura with awareness campaigns and better administrative support. Accumulate leverage lessons from high-performing states like Kerala and Karnataka for further efficiency. State-specific awareness campaigns and administrative improvements can enhance adoption and benefit marginalized farming communities.

**Expand Coverage:** Promoting insurance uptake for larger landholdings. Also, including marginal farmers and underserved crops to broaden inclusivity.

**Leverage Technology:** Incorporating advanced technology into PMFBY operations ensures timely claim settlements, fostering farmer satisfaction and participation. Such as satellite imaging and data analytics may be used to refine loss assessments and disburse claims swiftly.

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