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Performance of Pradhan Mantri Fasal Bima Yojana (PMFBY) in Tamil Nadu, India during the Rabi Season: A Time-Series Analysis

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Abstract

The Pradhan Mantri Fasal Bima Yojana (PMFBY) is an agricultural risk-management programme that seeks to protect farmers financially against crop losses. This study assesses the performance of PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025 using state-level administrative data. It considers farmer participation, insurance coverage, premium contributions, claim settlement and the distribution of applicants across social and farmer categories. Participation rose considerably until 2022, when the number of applicants reached 61.42 lakh, before falling in the following years. Non-loanee applicants remained the largest participant group throughout the period and accounted for 92.40 per cent of applicants in 2025. The insured area rose from 1,374.52 thousand hectares in 2018 to 1,541.43 thousand hectares in 2022, its highest level during the period, while the sum insured was highest in 2021 at ₹9,98,426.80 lakh. Premium contributions also reached their highest level in 2022 at ₹2,96,624.23 lakh and then fell markedly in the following years. Claim settlement showed substantial variation, with the claim ratio standing at 30.03 per cent in 2018 and 27.60 per cent in 2020 before falling to 2.08 per cent in 2025. Applicants were concentrated mainly in the OBC and General categories, while small farmers formed the largest group among the farmer categories. A paired sample t-test gave a p-value of 0.105, showing no statistically significant difference between total premium collected and total claims paid during the study period. PMFBY maintained substantial insurance coverage in Tamil Nadu, although participation, premium mobilisation and claim settlement varied considerably from year to year during the Rabi season.

Keywords: Pradhan Mantri Fasal Bima Yojana, Crop Insurance, Rabi Season, Tamil Nadu, Claim Settlement

1. INTRODUCTION

Global demographic shifts such as population growth, urbanisation, migration and changing dietary preferences are reshaping agricultural markets and increasing pressure on food production systems to ensure long-term food security and sustainable agricultural development [1]. Agriculture is exposed to considerable production and income risks because crop output depends on climatic conditions, water availability and the occurrence of pests and diseases. Droughts, floods, cyclones, irregular rainfall and other adverse events can lead to substantial crop losses and reduce the income of farming households. Such economic vulnerability may also have wider implications for access to essential socio-economic opportunities, particularly among poorer households. Poverty can constrain educational opportunities and human-capital development, reinforcing the vulnerability of economically disadvantaged groups [2]. Crop insurance serves as an important means of managing agricultural risk by providing financial compensation when insured crops are affected by specified risks. In a country such as India, where a large section of the rural population continues to depend directly or indirectly on agriculture, the effectiveness of crop insurance matters not only for individual farmers but also for the stability of the agricultural sector [3-4].

The Pradhan Mantri Fasal Bima Yojana (PMFBY) was introduced in 2016 as a major crop insurance programme of the Government of India. The scheme was designed to provide financial support to farmers who suffer crop losses or damage due to unforeseen events, stabilise farm income and encourage them to continue cultivation. It also aims to promote the adoption of modern agricultural practices, maintain farmers' creditworthiness and support the wider development of the agricultural sector [5-6]. PMFBY covers specified risks associated with crop production and provides insurance protection based on the notified crop and area. The sum insured for a crop is linked to the applicable Scale of Finance and the insured area.

One of the important features of PMFBY is its subsidised premium structure. Under the scheme, farmers pay only a prescribed portion of the premium, while the remaining eligible premium is supported through government subsidy. For foodgrain and oilseed crops, the maximum premium payable by farmers is 2 per cent of the sum insured for Kharif crops and 1.5 per cent for Rabi crops, while a maximum of 5 per cent applies to annual commercial and horticultural crops. This arrangement is intended to keep crop insurance affordable for farmers while allowing the government to share the financial cost of providing insurance protection. The performance of PMFBY can therefore be examined through several measures, including participation, area covered, value of insurance protection, premium contribution and claims paid [7-8].

The reach of public programmes is also closely linked to their ability to address inequalities in access among socially and economically disadvantaged groups. Evidence from India's education sector highlights the importance of universal access and reducing disparities across social categories, particularly among disadvantaged and rural populations [9]. A similar concern is relevant to agricultural insurance, where the distribution of participation across social and farmer categories can provide an indication of the inclusiveness of the scheme. The participation structure of the scheme also provides useful information about its reach. PMFBY administrative statistics distinguish between loanee and non-loanee applications, allowing participation to be examined in relation to agricultural credit. The official PMFBY dashboard provides separate Rabi-season data on farmers, loanee applications and non-loanee applications across different years. It also reports information on insurance units, insured area, premium and claims, making it possible to examine changes in scheme performance over time. When interpreting administrative data, however, the number of farmers should be distinguished from the number of applications. In this study, the loanee and non-loanee figures are treated as applicants, following the terminology used in the source data and are not automatically considered to represent unique individual farmers [10-11].

Tamil Nadu provides an important setting for examining PMFBY because agricultural production in the state is affected by variations in rainfall, water availability and other climatic conditions. Agricultural conditions also differ across seasons and locations, making a season-specific assessment useful for understanding how crop insurance operates. The present study therefore focuses specifically on the Rabi season rather than combining data from all agricultural seasons. A separate analysis of Rabi is useful because participation, insured area, premium collection and claims may differ according to the crops cultivated, production conditions and risks experienced during a particular season [12-13]. The official PMFBY database also reports Rabi as a separate season and provides annual observations for the period covered by this study.

The Rabi season is also relevant when examining insurance premiums and risk coverage. Under PMFBY, the prescribed maximum farmer premium for Rabi food grain and oilseed crops is lower than that for Kharif crops, reflecting the different premium structure across seasons. The operational guidelines also recognise seasonality in the notification, enrolment and implementation of crop insurance. Rabi enrolment is linked to crop calendars and state-level decisions regarding notified crops and areas. These features make it useful to examine PMFBY performance during Rabi separately rather than treating it simply as part of an aggregated annual figure [5-6].

A time-series approach is useful for assessing the performance of a public crop insurance programme because the figures for a single year may be influenced by unusual climatic conditions, crop losses, enrolment patterns or claim settlement cycles. Examining successive years makes it possible to identify changes in participation and insurance coverage and to understand whether the scheme has expanded, contracted or fluctuated over time. The present study covers eight Rabi seasons from 2018 to 2025, providing a consistent period for examining changes in applicant participation, insured area, sum insured, premium contributions and claims paid in Tamil Nadu. The official PMFBY administrative dashboard provides Rabi-season observations for these years, supporting a longitudinal assessment at the state level [7, 13].

The issue becomes particularly relevant when participation and claim settlement are examined together. An increase in the number of applicants or the area insured indicates wider coverage of agricultural risk, but it does not by itself show whether the insurance mechanism is working effectively from the farmers' perspective. Similarly, the premium collected needs to be examined alongside the claims paid and the value of insurance protection provided. The distribution of applicants across social categories and farmer types offers another way of assessing the reach of the scheme. An assessment based on several indicators can therefore provide a fuller understanding of PMFBY performance than an analysis based only on enrolment or claims [14-15].

The present study examines the performance of PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025. It considers the state as a whole rather than individual districts and traces changes in participation, insurance coverage, premium contribution and claim settlement throughout the study period. The study also examines the distribution of applicants across social and farmer categories to understand the composition of scheme participation. By considering these indicators within a time-series framework, the study provides a focused assessment of changes in the performance of PMFBY in Tamil Nadu during the Rabi season [16].

1.1 Objectives of the Study

1. **To analyse the overall coverage and participation of farmers under PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025.**
2. **To evaluate the claim settlement performance and distribution of benefits under the scheme.**

1.2 Statement of the Problem

The implementation of PMFBY has expanded crop insurance coverage, but its performance has varied across years. Changes in the number of applicants, insured area and sum insured have occurred alongside changes in premium contributions and claim payments. The presence of insurance coverage alone, therefore, does not provide sufficient evidence of the effectiveness of the scheme. A meaningful assessment requires an examination of participation and financial coverage over time, along with the extent to which these patterns are reflected in claim settlement. In Tamil Nadu, these issues need to be examined specifically during the Rabi season. The available administrative data show variations in loanee and non-loanee applications, insured area, sum insured, premium contributions and claims paid during the study period. These variations raise questions about changes in the reach of the scheme and the consistency of claim settlement. The distribution of applicants by social category and farmer type also needs to be examined to understand the extent to which participation reaches different sections of the farming population. The central problem addressed by this study is the lack of a consolidated state-level assessment of PMFBY performance during the Rabi season that examines participation, insurance coverage, premium contribution, claims and applicant distribution together over a sustained period. Analysis of the 2018-2025 period provides an opportunity to identify the major changes and fluctuations in the performance of the scheme in Tamil Nadu.

1.3 Research Gap

Existing studies on crop insurance and PMFBY have examined issues including farmer participation, insurance coverage, premium subsidies, claim settlement and the role of crop insurance in managing agricultural risk. The geographical and seasonal focus of these studies, however, differs considerably. Some studies assess PMFBY at the national level, while others focus on particular states, districts or specific aspects of implementation. Many analyses also combine Kharif and Rabi seasons, which can make it difficult to identify patterns that are specific to a particular season in terms of participation, coverage and claims.

A gap remains in state-level time-series evidence on PMFBY in Tamil Nadu during the Rabi season. Limited attention has been given to examining loanee and non-loanee participation, insured area, sum insured, farmer and government premium contributions, claims paid and the distribution of applicants across social and farmer categories over a continuous eight-year period within a single analysis. Bringing these indicators together helps examine both the extent of insurance coverage and the changes in the financial and beneficiary dimensions of the scheme.

The present study addresses this gap by analysing Tamil Nadu's Rabi-season PMFBY data from 2018 to 2025. It combines participation and coverage indicators with premium and claim measures and examines the distribution of applicants by social and farmer categories. The study further applies a paired sample t-test to assess whether the difference between total premium collected and total claims paid is statistically significant over the study period. In doing so, the study provides a focused longitudinal assessment of PMFBY performance at the state level and contributes evidence on the changing pattern of crop insurance participation and claim settlement in Tamil Nadu during the Rabi season.

2. RESEARCH METHODS

2.1 Research Design

The study adopts a descriptive and analytical research design to assess the performance of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in Tamil Nadu during the Rabi season. The analysis covers eight annual observations from 2018 to 2025, with Tamil Nadu treated as a single state-level unit. A time-series approach is used to examine changes in applicant participation, insurance coverage, premium contribution and claim settlement throughout the study period. The study uses secondary data obtained from PMFBY administrative statistics. The dataset includes loanee applicants, non-loanee applicants, insured area, farmer premium, State Government premium, Government of India (GOI) premium, sum insured, total claims paid and the distribution of applicants by social and farmer categories. Loanee and non-loanee figures are treated as applicants, following the terminology used in the source data. Since application figures may not necessarily refer to unique individuals, they are not treated as a direct count of distinct farmers.

2.2 Data Analysis

The data are analysed using percentage analysis, ratio analysis and a paired sample t-test. Percentage and ratio measures are used to examine applicant participation, insurance coverage, premium contributions, claim settlement and the distribution of applicants across social and farmer categories. Year-wise comparisons are made to identify changes and trends during the study period. The total premium and claim ratio are calculated

from the relevant components of the dataset. A paired sample t-test is used to determine whether a statistically significant difference exists between total premium collected and total claims paid across the eight Rabi seasons. The observations are paired by year from 2018 to 2025. The null hypothesis states that there is no significant difference between total premium collected and total claims paid under PMFBY in Tamil Nadu during the study period. The test is evaluated at the 5 per cent level of significance.

3. DATA ANALYSIS AND DISCUSSION

Table 1 Year-wise Distribution of Applicants under PMFBY in Tamil Nadu during the Rabi Season (2018-2025)

Year	Loanee Applicants	Non-Loanee Applicants	Total Applicants	Loanee (%)	Non-Loanee (%)
2018	4,33,382	18,86,646	23,20,028	18.68	81.32
2019	7,73,966	27,86,958	35,60,924	21.73	78.27
2020	5,47,802	47,33,381	52,81,183	10.37	89.63
2021	5,11,340	52,65,513	57,76,853	8.85	91.15
2022	6,28,668	55,12,944	61,41,612	10.24	89.76
2023	4,75,678	49,82,744	54,58,422	8.71	91.29
2024	4,01,307	46,55,113	50,56,420	7.94	92.06
2025	3,99,123	48,50,275	52,49,398	7.60	92.4

Source: PMFBY Administrative Statistics, Government of India

The figures reported in Table 1 show a clear predominance of non-loanee applicants in PMFBY participation in Tamil Nadu during the Rabi season from 2018 to 2025. In 2018, the state recorded 23,20,028 total applicants, including 4,33,382 loanee applicants (18.68 per cent) and 18,86,646 non-loanee applicants (81.32 per cent). Participation increased considerably in 2019, reaching 35,60,924 applicants. During the year, loanee applicants rose to 7,73,966, while non-loanee applicants increased to 27,86,958. Despite the increase in loanee applicants, their share was 21.73 per cent of the total, compared with 78.27 per cent for non-loanee applicants. The increase became more pronounced in 2020, when total applicants reached 52,81,183. Non-loanee applicants rose sharply to 47,33,381, making up 89.63 per cent of total participation. In 2021, total applicants increased further to 57,76,853, with 52,65,513 non-loanee applicants, representing 91.15 per cent of the total. Participation reached its highest level in 2022, when 61,41,612 applicants were recorded. Of these, 55,12,944 were non-loanee applicants (89.76 per cent). The number of applicants then declined to 54,58,422 in 2023 and 50,56,420 in 2024 before rising modestly to 52,49,398 in 2025. Non-loanee applicants continued to form the larger group and reached their highest share of 92.40 per cent in 2025. Loanee applicants represented 7.60 per cent in the same year, compared with 18.68 per cent in 2018 and their highest share of 21.73 per cent in 2019. Their number also declined from 7,73,966 in 2019 to 3,99,123 in 2025. The year-wise figures indicate that changes in PMFBY participation during the Rabi season were largely driven by non-loanee applicants. The declining number and share of loanee applicants also point to a change in the composition of participation over the study period. The fall in total applicants after 2022 further shows that the reach of the scheme varied across years, despite the continued predominance of non-loanee applicants.

Table 2 Year-wise Insurance Coverage under PMFBY in Tamil Nadu during the Rabi Season (2018-2025)

Year	Area Insured (000 ha)	Sum Insured (₹ lakh)
2018	1,374.52	8,45,644.10
2019	1,272.88	8,46,226.41
2020	1,522.29	9,00,691.89
2021	1,525.32	9,98,426.80
2022	1,541.43	9,89,497.64
2023	1,391.29	9,15,995.59
2024	1,324.90	8,61,655.15

2025	1,351.15	9,72,611.82

Source: PMFBY Administrative Statistics, Government of India

Changes in PMFBY insurance coverage in Tamil Nadu during the Rabi season from 2018 to 2025 can be seen through the year-wise figures for area insured and sum insured reported in Table 2. The area insured stood at 1,374.52 thousand hectares in 2018 and declined slightly to 1,272.88 thousand hectares in 2019. From 2020, the coverage expanded considerably, reaching 1,522.29 thousand hectares in 2020 and 1,525.32 thousand hectares in 2021. The increase continued in 2022, when the area insured reached the highest level of 1,541.43 thousand hectares, indicating wider geographical coverage of crop insurance in Tamil Nadu during the Rabi season. After this peak, the insured area declined to 1,391.29 thousand hectares in 2023 and further to 1,324.90 thousand hectares in 2024, before recovering modestly to 1,351.15 thousand hectares in 2025. The sum insured followed a broadly similar pattern, although its movement was not directly proportional to changes in the insured area. It increased from ₹8,45,644.10 lakh in 2018 to ₹8,46,226.41 lakh in 2019 and then rose substantially to ₹9,00,691.89 lakh in 2020. The sum insured reached ₹9,98,426.80 lakh in 2021, the highest value recorded during the study period, before declining slightly to ₹9,89,497.64 lakh in 2022. The subsequent fall in insured area was accompanied by a reduction in the sum insured to ₹9,15,995.59 lakh in 2023 and ₹8,61,655.15 lakh in 2024. Despite the modest recovery in area insured in 2025, the sum insured increased considerably to ₹9,72,611.82 lakh, coming close to the level recorded in 2021. The difference between movements in insured area and sum insured suggests that the value of insurance coverage was influenced not only by the physical area covered but also by changes in the value of crops or the level of insurance protection per unit of area across years. PMFBY coverage in Tamil Nadu expanded substantially between 2019 and 2022 before contracting in the following years, while the sum insured recovered strongly in 2025. The Rabi-season figures show considerable year-to-year variation in both the physical extent and financial value of crop insurance coverage in Tamil Nadu.

Table 3 Year-wise Premium Contributions under PMFBY in Tamil Nadu during the Rabi Season (2018-2025)

Year	Farmer Premium	State Premium	GOI Premium	Total Premium
2018	14,394.37	71,872.16	71,872.16	1,58,138.69
2019	14,976.73	84,345.30	84,345.30	1,83,667.33
2020	15,081.70	1,71,091.83	1,06,481.55	2,92,655.08
2021	16,242.25	1,75,538.34	91,835.32	2,83,615.91
2022	16,206.19	1,75,468.34	1,04,949.70	2,96,624.23
2023	14,945.33	47,583.22	47,476.86	1,10,005.41
2024	14,087.76	29,279.22	29,070.33	72,437.31
2025	15,603.58	38,654.01	38,196.65	92,454.24

Source: PMFBY Administrative Statistics, Government of India

Changes in premium contributions under PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025 are shown in Table 3. The figures indicate considerable variation in total premium during the study period, while the farmer contribution remained within a relatively narrow range. In 2018, the total premium stood at ₹1,58,138.69 lakh, comprising ₹14,394.37 lakh from farmers and ₹71,872.16 lakh each from the State Government and the Government of India. In 2019, total premium increased to ₹1,83,667.33 lakh, with the farmer contribution rising slightly to ₹14,976.73 lakh and both State and GOI contributions increasing to ₹84,345.30 lakh each. A substantial increase was recorded in 2020, when total premium reached ₹2,92,655.08 lakh, mainly because of the sharp rise in the State Government contribution to ₹1,71,091.83 lakh and the GOI contribution to ₹1,06,481.55 lakh. Total premium remained high in 2021 at ₹2,83,615.91 lakh and reached its highest level of ₹2,96,624.23 lakh in 2022, while the farmer contribution remained almost unchanged at ₹16,206.19 lakh. From 2023 onwards, lower government contributions led to a marked reduction in total premium, which fell to ₹1,10,005.41 lakh in 2023 and further to ₹72,437.31 lakh in 2024. In 2025, total premium increased moderately to ₹92,454.24 lakh, with a farmer contribution of ₹15,603.58 lakh, while the State Government and GOI contributions stood at ₹38,654.01 lakh and ₹38,196.65 lakh, respectively. The major changes in total premium during the study period were therefore driven mainly by variations in government contributions, while farmer contributions remained within a relatively narrow range of ₹14,087.76 lakh to ₹16,242.25 lakh. The premium pattern during the Rabi season shows a strong dependence on

government financial support, with the highest levels recorded between 2020 and 2022 followed by a notable decline in the subsequent years.

Table 4. Year-wise Claim Settlement under PMFBY in Tamil Nadu during the Rabi Season (2018-2025)

Year	Claim Paid (₹ lakh)	Sum Insured (₹ lakh)	Claim Ratio (%)
2018	2,53,930	8,45,644.10	30.03
2019	1,09,662	8,46,226.41	12.96
2020	2,48,669	9,00,691.89	27.6
2021	79,311	9,98,426.80	7.94
2022	92,151	9,89,497.64	9.31
2023	76,293	9,15,995.59	8.33
2024	78,694	8,61,655.15	9.13
2025	20,239	9,72,611.82	2.08

Source: PMFBY Administrative Statistics, Government of India

Claim settlement under PMFBY in Tamil Nadu during the Rabi season varied considerably between 2018 and 2025, as shown by the figures in Table 4. The amount of claims paid changed substantially across the study period, while the sum insured remained relatively high. In 2018, ₹2,53,930 lakh was paid as claims against a sum insured of ₹8,45,644.10 lakh, resulting in a claim ratio of 30.03 per cent. In 2019, the sum insured remained almost unchanged at ₹8,46,226.41 lakh, but claim payment fell substantially to ₹1,09,662 lakh, bringing the claim ratio down to 12.96 per cent. Claims increased sharply in 2020 to ₹2,48,669 lakh, raising the claim ratio to 27.60 per cent against a sum insured of ₹9,00,691.89 lakh. Claim payments then declined to ₹79,311 lakh in 2021 and ₹92,151 lakh in 2022, with corresponding claim ratios of 7.94 per cent and 9.31 per cent. In 2023, claims paid fell further to ₹76,293 lakh, while the claim ratio stood at 8.33 per cent. A slight increase was recorded in 2024, when ₹78,694 lakh was paid and the claim ratio rose to 9.13 per cent. The sharpest decline occurred in 2025, when claims paid fell to ₹20,239 lakh and the claim ratio reached its lowest level of 2.08 per cent, despite the sum insured increasing considerably to ₹9,72,611.82 lakh. The figures show that claim settlement did not change in direct proportion to the value of insurance coverage. The highest claim ratios occurred in 2018 and 2020, while the ratios in the following years remained below 10 per cent. The marked fall after 2020, particularly in 2025, points to substantial variation in claim settlement across the study period. Although PMFBY maintained a high level of insured value during the Rabi seasons, the amount of claims paid differed considerably from year to year, showing that insurance coverage and claim settlement did not follow the same pattern.

The sharp decline in the claim ratio after 2020 may be associated with differences in crop loss conditions across Rabi seasons, changes in the extent of insured losses and the timing of claim assessment and settlement. Since agricultural losses are influenced by rainfall, water availability and other climatic conditions, variations in seasonal conditions may have affected the number and value of claims arising in different years. The high claim ratio of 27.60 per cent in 2020, followed by ratios below 10 per cent in most subsequent years, suggests that the level of claims paid was not determined simply by the size of the insured portfolio. The reduction in the claim ratio may therefore partly reflect lower eligible losses or differences in the incidence and assessment of insured risks in the post-2020 period. The decline may also reflect differences in the timing of claim processing and settlement. Delays in loss assessment, submission and verification of claims, coordination among implementing agencies and insurers, or other administrative procedures may influence the amount of claims recorded as paid in a particular year. This possibility is particularly relevant for 2025, when the claim ratio fell sharply to 2.08 per cent despite the sum insured increasing to ₹9,72,611.82 lakh. However, the present study is based on state-level administrative data and does not contain year-wise information on climatic losses, pending claims or settlement delays. These factors should therefore be considered as possible explanations rather than direct causal findings.

Table 5 Social Category-wise Distribution of PMFBY Applicants in Tamil Nadu during the Rabi Season (2018-2025)

Year	SC (%)	ST (%)	OBC (%)	GEN (%)
2018	10.87	0.21	44	44.92

2019	9.55	0.18	43.43	46.84
2020	10.55	0.13	46.88	42.44
2021	9.84	0.16	47.24	42.76
2022	10.06	0.21	47.6	42.13
2023	10	0.13	46.69	43.18
2024	10.27	0.12	45.37	44.24
2025	9.64	0.21	46.73	43.42

Source: PMFBY Administrative Statistics, Government of India

The social category-wise distribution of PMFBY applicants in Tamil Nadu during the Rabi season from 2018 to 2025 is shown in Table 5. Participation was concentrated mainly in the OBC and General categories throughout the study period, while the shares of SC and particularly ST applicants remained comparatively low. In 2018, OBC applicants represented 44.00 per cent of total applicants, followed closely by the General category at 44.92 per cent. SC and ST applicants represented 10.87 per cent and 0.21 per cent, respectively. In 2019, the General category recorded the highest share at 46.84 per cent, while OBC participation stood at 43.43 per cent and the shares of SC and ST applicants fell to 9.55 per cent and 0.18 per cent. From 2020 onwards, OBC applicants formed the largest group, with their share rising to 46.88 per cent in 2020 and reaching a high of 47.60 per cent in 2022. The share remained relatively high in the following years at 46.69 per cent in 2023, 45.37 per cent in 2024 and 46.73 per cent in 2025. The General category, which had the highest share in 2019 at 46.84 per cent, declined to 42.44 per cent in 2020 and remained between 42.13 and 44.24 per cent from 2021 to 2025. SC participation changed only slightly during the period, ranging from 9.55 per cent to 10.87 per cent. ST participation remained below 0.25 per cent in every year, varying between 0.12 per cent and 0.21 per cent. The relatively stable share of SC applicants and the very small proportion of ST applicants indicate little change in their representation over the study period. OBC and General applicants together made up more than 86 per cent of PMFBY participation in every year. The social composition of applicants therefore remained broadly stable during the Rabi season, with participation concentrated largely in the OBC and General categories.

Table 6 Farmer Category-wise Distribution of PMFBY Applicants in Tamil Nadu during the Rabi Season, 2018-2025

Year	**Marginal (%)**	**Small (%)**	**Others (%)**
2018	12.13	79.23	8.64
2019	11.76	81.84	6.4
2020	9.88	86.05	4.07
2021	9.13	87.59	3.28
2022	9.33	87.48	3.19
2023	9.53	87.32	3.15
2024	9.68	86.95	3.37
2025	9.16	87.33	3.51

Source: PMFBY Administrative Statistics, Government of India

The figures in Table 6 show that PMFBY participation in Tamil Nadu during the Rabi season from 2018 to 2025 was concentrated among small farmers. In 2018, small farmers represented 79.23 per cent of applicants, while marginal farmers and other farmers represented 12.13 per cent and 8.64 per cent, respectively. The share of small farmers increased to 81.84 per cent in 2019 and rose further to 86.05 per cent in 2020, showing a clear shift in the composition of applicants towards this category. The increase continued in 2021, when small farmers represented 87.59 per cent of applicants, the highest proportion recorded during the study period. Their share remained high in the following years, at 87.48 per cent in 2022, 87.32 per cent in 2023, 86.95 per cent in 2024 and 87.33 per cent in 2025. The proportion of marginal farmers declined from 12.13 per cent in 2018 to 9.13 per cent in 2021 and remained below 10 per cent in the following years, except in 2024 when it stood at 9.68 per cent. The share of other farmers also fell considerably from 8.64 per cent in 2018 to 4.07 per cent in 2020 and remained below 4 per cent thereafter, reaching 3.51 per cent in 2025. The sustained

high share of small farmers, together with the lower proportions of marginal and other farmers, shows that PMFBY participation in Tamil Nadu during the Rabi season became increasingly concentrated in the small-farmer category. Small farmers represented more than four-fifths of applicants from 2019 onwards and more than 86 per cent from 2020 onwards. The distribution has remained relatively stable in recent years, with small farmers continuing to form the dominant group among PMFBY applicants in Tamil Nadu.

4. TESTING

A paired sample t-test was conducted using the year-wise observations from 2018 to 2025 to determine whether a statistically significant difference existed between the total premium collected and the total claims paid under PMFBY in Tamil Nadu during the Rabi season. The total premium for each year was paired with the corresponding claims paid in the same year.

Hypothesis (H_0): There is no significant difference between total premium collected and total claim paid under PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025.

Table 7 Analysis of Mean Differences between Premium Income and Claims Paid under PMFBY in Tamil Nadu from 2018 to 2025

Year	Premium	Claim	Mean Difference	Std. Deviation	t-value	df	Sig.
2018	158138.69	253930	66,331	1,00,945.16	1.86	7	0.105
2019	183667.33	109662					
2020	292655.08	248669					
2021	283615.91	79311					
2022	296624.23	92151					
2023	110005.41	76293					
2024	72437.31	78694					
2025	92454.24	20239					

Source: Computed from PMFBY Administrative Statistics, Government of India

The paired sample t-test was used to examine whether a statistically significant difference existed between the total premium collected and the total claims paid under PMFBY in Tamil Nadu during the Rabi season from 2018 to 2025. The analysis was based on eight year-wise paired observations, with the total premium and the corresponding claims paid for each year treated as a pair. The mean difference between total premium and total claims paid was ₹66,331 lakh, with a standard deviation of ₹1,00,945.16 lakh. The relatively high standard deviation reflects the considerable variation in the difference between premium and claims across the individual years.

The calculated t value was 1.86 with 7 degrees of freedom and the corresponding p-value was 0.105. Since the p-value is greater than the 5 per cent level of significance (0.05), the result is not statistically significant. The null hypothesis (H_0) that there is no significant difference between total premium collected and total claims paid under PMFBY in Tamil Nadu during the Rabi season over the study period is therefore not rejected. This result needs to be considered alongside the descriptive findings presented in the earlier tables. The claim settlement figures varied considerably across years, with the claim ratio reaching 30.03 per cent in 2018 and 27.60 per cent in 2020 before remaining below 10 per cent in most of the following years. Total premium also increased substantially between 2020 and 2022 and declined thereafter. These changes show that premium collection and claim settlement did not follow a consistent annual pattern. The paired t-test, however, indicates that the differences observed across the eight annual pairs were not sufficiently consistent to establish a statistically significant difference at the 5 per cent level. This result does not mean that premium and claims were equal in every year. It indicates that the difference between the two measures, when examined across the study period as paired annual observations, does not provide sufficient statistical evidence of a significant difference. The test therefore complements the descriptive analysis by showing that although PMFBY experienced considerable annual variation in premium collection and claim settlement during the Rabi season, these variations did not result in a statistically significant difference between the two measures over the period 2018-2025.

5. CONCLUSION

The study concludes that PMFBY has maintained substantial coverage among farmers in Tamil Nadu during the Rabi season over 2018-2025, although its performance has shown considerable year-to-year variation. Farmer participation increased from 23.20 lakh applicants in 2018 to a peak of 61.42 lakh in 2022, after which it declined, while non-loanee applicants consistently formed the major share and reached 92.40 per cent in 2025, indicating their increasing importance in the participation structure of the scheme. Along with participation, insurance coverage expanded during the initial years, with the insured area reaching its highest level of 1,541.43 thousand hectares in 2022, while the sum insured reached ₹9,98,426.80 lakh in 2021 and remained at a substantial level thereafter. The premium structure, however, displayed marked fluctuations, with total premium increasing to ₹2,96,624.23 lakh in 2022 before declining considerably in the following years, mainly reflecting changes in government contributions, whereas the farmer contribution remained comparatively stable. Claim settlement also varied considerably, with the claim ratio reaching 30.03 per cent in 2018 and 27.60 per cent in 2020 but remaining below 10 per cent in most subsequent years and falling to 2.08 per cent in 2025, showing that changes in insurance coverage were not accompanied by a similar pattern in claims paid. In terms of beneficiary composition, OBC and General Applicants together represented the major share of participation, while small farmers consistently accounted for the largest proportion of farmer categories, reaching 87.33 per cent in 2025. Further, the paired sample *t*-test produced a *p*-value of 0.105, indicating that the difference between total premium collected and total claims paid was not statistically significant at the 5 per cent level. Taken together, the findings suggest that PMFBY has achieved substantial reach and financial coverage in Tamil Nadu during the Rabi season, particularly among non-loanee and small-farmer applicants, but the fluctuations in participation, premium mobilization and claim settlement point to the need for greater consistency in implementation and continued attention to the effective delivery of crop insurance benefits. From a policy perspective, the findings highlight the need to strengthen the timeliness, transparency and consistency of claim settlement under PMFBY. Greater coordination among the State Government, Government of India, insurance companies and local implementing agencies can help reduce delays in claim assessment and disbursement. Regular monitoring of year-wise claim settlement, particularly where substantial differences arise between insured value and claims paid, can also help identify operational gaps at an early stage. Since small farmers constitute the dominant share of applicants, policy measures should give particular attention to ensuring that this group receives timely information, transparent claim decisions and effective access to insurance benefits. From a managerial perspective, implementing agencies and insurers should strengthen digital monitoring, maintain clear records of pending and settled claims, and improve communication with farmers regarding claim status and settlement procedures. The substantial variation in claim ratios observed during the study period indicates the importance of closer monitoring of seasonal performance rather than relying only on aggregate annual coverage indicators. Such measures can improve the effectiveness of PMFBY implementation and strengthen farmer confidence in crop insurance as a mechanism for managing agricultural risk.

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