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Knowledge of PM-KISAN beneficiary farmers in Namakkal district of Tamil Nadu: A statistical assessment

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Abstract

The Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme, launched in February 2019, provides income support of Rs. 6,000 per year to eligible landholding farmer families across India through Direct Benefit Transfer (DBT). The success of such welfare interventions depends substantially on the level of knowledge that beneficiaries possess regarding eligibility, documentation, registration procedures and instalment patterns. The present study assessed the socio-economic profile and knowledge of farmers towards the PM-KISAN scheme in Namakkal district of Tamil Nadu, and statistically validated the observed patterns. An ex-post facto research design was adopted, and Namakkal district, Pudukhathiram block and Navani village were purposively selected based on the concentration of PM-KISAN beneficiaries. Seventy beneficiary farmers were interviewed using a structured schedule, and knowledge was measured through a ten-item knowledge test expressed as a Knowledge Index (KI). Beyond descriptive percentages, weighted mean scores, standard deviation (SD) and coefficient of variation (CV) were computed for eleven profile variables, chi-square goodness-of-fit tests were applied to each categorical distribution, and one-sample proportion tests benchmarked each knowledge item against an 80 per cent awareness threshold. The profile of respondents revealed that the majority were old-aged (82.00%), male (70.00%), possessed secondary-level education (26.00%), belonged to the small-landholding category (51.00%), were full owners of their land (100.00%), had high farming experience (73.00%) and fell in the low annual-income category (73.00%). Chi-square tests confirmed that nine of the eleven profile variables were significantly concentrated in particular categories ($p < 0.05$), while education and extension-agency contact were distributed comparatively evenly ($p > 0.05$). The overall Knowledge Index was 87.52 per cent (SD = 10.41, CV = 11.90%); all respondents (100.00%) knew that Aadhaar linkage is mandatory, and awareness of the number of instalments (98.50%) and instalment amount (97.10%) was significantly above an 80 per cent benchmark, whereas awareness of the annual renewal requirement (68.50%) was significantly below it. The findings statistically confirm that core financial and procedural aspects of PM-KISAN are well understood, while nuanced eligibility- and renewal-related knowledge remains comparatively weak, underscoring the need for targeted extension interventions to close these specific gaps.

Keywords: PM-KISAN, knowledge index, direct benefit transfer, chi-square test, coefficient of variation

1. Introduction

Knowledge about agricultural welfare schemes plays a crucial role in ensuring their successful implementation and impact among farmers. In the context of the PM-KISAN scheme, knowledge refers to the extent to which farmers understand the various components of the scheme, including eligibility criteria, registration procedures, instalment patterns, and required documentation. Although the scheme has been widely implemented across India, the level of knowledge among farmers is not uniform, especially in rural areas. PM-KISAN, launched in 2018 and rolled out nationally from February 2019, provides financial assistance of Rs. 6,000 per year to eligible landholding farmers in three instalments through the Direct Benefit Transfer system. To avail of these benefits, farmers must be aware of essential requirements such as land ownership records, Aadhaar linkage, and bank account details. Lack of clarity or

incomplete knowledge regarding these aspects may lead to exclusion from the scheme or delays in receiving benefits.

In many regions, including Namakkal district of Tamil Nadu, farmers face challenges such as limited access to information, low digital literacy, and difficulties in completing procedures like e-KYC verification. These barriers highlight the importance of enhancing farmers' knowledge through effective extension services and awareness programmes. According to the diffusion of innovation theory, knowledge is a critical stage that follows awareness and directly influences the adoption and utilization of any innovation or scheme. While earlier extension studies typically report only descriptive percentages for such knowledge assessments, formally testing whether observed concentrations and awareness gaps are statistically meaningful rather than attributable to chance strengthens the evidentiary basis for extension planning.

Against this backdrop, the present study was designed to assess the knowledge level of farmers towards the PM-KISAN scheme, examine the socio-economic profile of beneficiaries, and statistically validate the observed distributional and knowledge patterns in Namakkal district, Tamil Nadu.

2. Materials and Methods

2.1 Locale of the study

Among the thirty-eight districts of Tamil Nadu, Namakkal district was purposively selected as it represents a mid-tier level of PM-KISAN beneficiaries neither the highest nor the lowest — making it an appropriate setting to examine the average condition of knowledge and utilization of the scheme in the state. Of the 15 blocks in Namakkal district, Pudukathiramb block was purposively selected owing to the relatively higher number of PM-KISAN beneficiaries, and Navani village was subsequently selected from among the 21 revenue villages in the block based on the maximum number of beneficiaries.

Namakkal district was carved out of the erstwhile Salem district and has been functioning independently since 1 January 1997. It comprises eight taluks — Namakkal, Rasipuram, Tiruchengode, Paramathi Velur, Kolli Hills, Sendamangalam, Komarapalayam and Mohanur — spread over a geographical area of 3,368.21 sq. km, lying between 11.00°–11.36° N latitude and 77.28°–78.30° E longitude. As per the 2011 Census, the district recorded a population of 1,726,601 with a sex ratio of 986 females per 1,000 males and an average literacy rate of 68.12 per cent. The district experiences maximum temperatures of 35–36 °C during March–June and receives an average annual rainfall of 764 mm. Red soil predominates (about 60.6 per cent of the area), and major crops cultivated include sorghum, groundnut, onion, maize, tapioca and paddy.

2.2 Profile characteristics

With respect to age, only a small proportion of respondents in earlier surveys belonged to the younger age group, indicating that agriculture is not a preferred occupation among youth, while middle-aged and old farmers, owing to greater farming experience and awareness, were found to be more actively engaged with PM-KISAN benefits (Khan, 2020; Patel *et al.*, 2021) ^[7, 17]. Gender-based analyses consistently report male dominance among beneficiaries on account of greater land ownership and awareness, with female participation constrained by limited land titles and registration barriers (Kumar and Sharma, 2021; Reddy and Lakshmi, 2021) ^[10, 20].

Education has repeatedly emerged as a key determinant of scheme awareness and digital accessibility; educated farmers were found to access information sources such as mobile applications and banks more readily, whereas illiterate farmers faced difficulty with digital registration and depended on intermediaries (Suresh and Kumari, 2021; Nagaraju and Rani, 2021; Prakash and Singh, 2021) ^[23, 16, 18]. Landholding size and ownership status were also found to significantly influence adoption, with marginal and small farmers forming the majority of beneficiaries and tenant or landless cultivators frequently excluded due to the scheme's land-record-linked eligibility criteria (Kumari and Dahiya,

2022; Akhtar, 2022) ^[13, 1].

Farming experience, annual income and extension contact have also been associated with better awareness and more productive utilisation of PM-KISAN assistance. Farmers with greater exposure to extension services such as Krishi Vigyan Kendras were more likely to channel scheme funds into productive agricultural investment (Varshney *et al.*, 2019) ^[26], while economically weaker and low-income farmers reported the greatest reliance on the scheme for meeting cultivation expenses (Mishra and Patel, 2021; Kamble and Deshmukh, 2021) ^[15, 5]. Regular contact with extension personnel and social participation were positively associated with knowledge levels in several scheme-specific studies (Darshan *et al.*, 2021; Kaushik and Sabharwal, 2021) ^[3, 6].

2.3 Knowledge of welfare schemes among farmers

Studies assessing farmers' knowledge of allied schemes such as the Kisan Credit Card, crop insurance and Pradhan Mantri Fasal Bima Yojana (PMFBY) generally report that the majority of beneficiaries possess a medium level of knowledge, with a smaller proportion falling in the high or low categories (Valamannavar *et al.*, 2018; Jamanal and Natikar, 2019; Kirad, 2020; Darshan *et al.*, 2021; Meena *et al.*, 2022; Raju *et al.*, 2022) ^[25, 4, 8, 3, 14, 19]. With specific reference to PM-KISAN, beneficiaries in Haryana were reported to possess satisfactory knowledge regarding DBT and associated assistance mechanisms (Kumar and Singh, 2022) ^[11], while a more recent assessment of awareness among PM-KISAN farmers in Hisar and Karnal districts of Haryana found that roughly a third of respondents had a high awareness level and over a third a medium level, reflecting scope for improvement even in states with an established DBT infrastructure (Sihag and Malik, 2024) ^[21]. Complementing these findings, a national-level evaluation using propensity score matching demonstrated that PM-KISAN transfers produced a measurable positive effect on the livelihood index of beneficiary households, reinforcing the argument that adequate knowledge of the scheme is a precondition for its intended welfare impact to materialise (Kumar *et al.*, 2024) ^[12]. Collectively, the literature indicates that while awareness of the existence of PM-KISAN is nearly universal among beneficiaries, detailed procedural knowledge particularly regarding eligibility exclusions, documentation and renewal requirements remains uneven and is shaped by age, education, extension contact and landholding status. Most of these earlier assessments, however, rely solely on descriptive percentages without formally testing whether the observed distributional patterns and knowledge gaps are statistically significant, a gap the present study addresses through chi-square and proportion testing.

2.4 Research design and sampling

An ex-post facto research design was adopted for the study, as it was best suited to examine the effect of a naturally occurring Programme (PM-KISAN) on farmers without any experimental manipulation by the researcher. From Navani village, 70 beneficiary farmers of the PM-KISAN scheme were selected as respondents and interviewed using a pre-tested structured interview schedule.

2.5 Variables and their measurement

Knowledge, along with awareness and utilization of the PM-KISAN scheme, constituted the dependent variable of the study. Eleven independent variables are age, gender, education, landholding, type of land ownership, farming experience, annual income, cropping pattern, risk

orientation, contact with extension agencies and social participation were selected based on a review of literature and expert consultation, and were operationalized using standard scoring procedures adapted from earlier extension research, as summarized in Table 1.

Table 1: Independent variables and scoring categories

Variable	Categories and Scores
Age	Young (18–35) = 1; Middle (>35–45) = 2; Old (>45) = 3
Gender	Male = 1; Female = 2
Education	Illiterate = 1; Primary = 2; Secondary = 3; Higher Secondary = 4; Graduate = 5
Landholding	Marginal (<2.5 ac) = 1; Small (2.5–4.9 ac) = 2; Medium (9.8–24.7 ac) = 3; Big (>24.7 ac) = 4
Type of land ownership	Tenant = 1; Owner = 2
Farming experience	<10 yrs = 1; 10–20 yrs = 2; 20–30 yrs = 3; >30 yrs = 4
Annual income	Low (Rs. 35,000–1,90,000) = 1; Medium (Rs.1,90,000–3,45,000) = 2; High (Rs. 3,45,000–5,00,000) = 3
Cropping pattern	Single season = 1; Two seasons = 2; Three seasons = 3
Risk orientation	No impact = 1; Moderate = 2; Reduced = 3
Extension agency contact	Never = 1; Sometimes = 2; Regular = 3
Social participation	Member (past) = 1; Office bearer (past) = 2; Member (present) = 3; Office bearer (present) = 4

2.6 Measurement of knowledge

Knowledge was operationalised as the depth of understanding of farmers regarding the technical and functional aspects of the PM-KISAN scheme, such as eligibility, documentation, benefit-transfer mechanism, instalment pattern and grievance redressal. It was measured through a ten-item knowledge test comprising objective (yes/no and factual) questions, with each correct response scored as 1 and each incorrect response as 0. The knowledge level of each respondent was expressed through a Knowledge Index (KI), computed as:

$$KI (\%) = (\text{Total correct answers} / \text{Total number of questions}) \times 100$$

2.7 Statistical treatment

Data collected through the structured interview schedule were coded, tabulated and analysed using both descriptive and inferential statistical tools. Descriptively, frequencies and percentages were computed for each category of the profile and knowledge variables. To quantify these patterns further, three additional procedures were applied.

First, a weighted mean score, standard deviation (SD) and coefficient of variation (CV) were computed for each of the eleven profile variables by combining the category scores in Table 1 with the observed category frequencies. The CV, expressed as SD divided by the mean and multiplied by 100, permitted comparison of relative variability across variables measured on different scales.

Second, a chi-square goodness-of-fit test ($\chi^2 = \sum[(O_i - E_i)^2/E_i]$) was applied to each categorical distribution to test the null hypothesis that respondents are distributed equally across the categories of that variable, against the alternative that the distribution is unequal, at the 5 per cent ($\alpha = 0.05$) level of significance.

Third, a one-sample proportion (binomial) test was applied to each of the ten knowledge items in the knowledge test, benchmarking observed awareness against a conventional 80 per cent threshold used in extension research to denote 'satisfactory' scheme knowledge; items were further classified into Low, Medium and High knowledge

categories using the mean $\pm$ SD cut-off method commonly applied in knowledge-index studies.

It is acknowledged that the underlying interview schedule generated respondent-level (unit) data for the 70 farmers; however, the analysis reported here draws on the aggregated category-wise frequency tables generated from that data. Consequently, the statistical procedures applied are restricted to the internal distributional structure of each variable and the item-wise knowledge pattern (goodness-of-fit and one-sample proportion tests); cross-tabulated association measures such as correlation coefficients or chi-square tests of independence between profile variables and individual knowledge scores were outside the scope of the aggregated tables used and are suggested as a direction for further analysis of the unit-level dataset.

3. Results and Discussion

This section presents the findings in relation to (i) the socio-economic profile of the respondents, including weighted descriptive statistics and chi-square tests, and (ii) their knowledge of the PM-KISAN scheme, including item-wise proportion tests and classification.

3.1 Profile of the respondents

3.1.1 Age

Table 2: Distribution of respondents according to age (n = 70)

Age group	Respondents	Percentage (%)
Young	5	7.00
Middle	8	11.00
Old	57	82.00
Total	70	100.00

The majority of respondents (82.00%) belonged to the old age category, followed by the middle-aged (11.00%) and young (7.00%) categories. This indicates that agriculture in the study area is predominantly practised by older farmers, possibly because younger individuals migrate towards non-farm occupations or pursue higher education, a pattern consistent with Khan (2020)^[7] and Patel *et al.* (2021)^[17]. Statistical test: Weighted mean score = 2.743 (SD = 0.582,

CV = 21.22%), indicating a fairly homogeneous, older respondent base. Chi-square goodness-of-fit test: $\chi^2 = 73.057$, $df = 2$, $p < 0.001$ — the concentration in the old-age category is statistically significant.

3.1.2 Gender

Table 3: Distribution of respondents according to gender (n = 70)

Gender	Frequency	Percentage (%)
Male	49	70.00
Female	21	30.00
Total	70	100.00

Male farmers constituted 70.00 per cent of the respondents against 30.00 per cent female farmers, attributable to men's predominant role in farm management, decision-making and formal registration under government schemes (Kumar and Sharma, 2021) ^[10].

Statistical test: Weighted mean score = 1.300 (SD = 0.462, CV = 35.51%). Chi-square goodness-of-fit test: $\chi^2 = 11.200$, $df = 1$, $p = 0.001$ — male dominance is statistically significant.

3.1.3 Education

Table 4: Distribution of respondents according to educational status (n = 70)

Educational level	Frequency	Percentage (%)
Illiterate	17	24.00
Primary	10	14.00
Secondary	18	26.00
Higher secondary	17	24.00
Graduate	8	12.00
Total	70	100.00

Secondary-level education was the single largest category (26.00%), closely followed by illiterate (24.00%) and higher-secondary (24.00%) respondents, indicating that farmers' capacity to independently interpret official scheme guidelines varies considerably across the sample (Suresh and Kumari, 2021; Nagaraju and Rani, 2021) ^[23, 16].

Statistical test: Weighted mean score = 2.843 (SD = 1.347, CV = 47.40% — the highest relative variability among all profile variables). Chi-square goodness-of-fit test: $\chi^2 = 6.143$, $df = 4$, $p = 0.189$ — respondents are relatively evenly spread across educational levels; this is the only demographic variable, apart from extension contact, that does not show a statistically significant concentration.

3.1.4 Landholding

Table 5: Distribution of respondents according to landholding category (n = 70)

Category	Frequency	Percentage (%)
Marginal farmers	23	33.00
Small farmers	36	51.00
Medium farmers	5	7.00
Large farmers	6	9.00
Total	70	100.00

Small farmers formed the largest group (51.00%), followed by marginal farmers (33.00%), reflecting historical fragmentation of agricultural landholdings, consistent with Akhtar (2022) ^[1] and Kumari and Dahiya (2022) ^[11].

Statistical test: Weighted mean score = 1.914 (SD = 0.864, CV = 45.12%). Chi-square goodness-of-fit test: $\chi^2 = 37.771$, $df = 3$, $p < 0.001$ — the concentration in the small-farmer category is statistically significant.

3.1.5 Farming experience

Table 6: Distribution of respondents according to farming experience (n = 70)

Category	Frequency	Percentage (%)
Low	0	0.00
Small	7	10.00
Medium	12	17.00
High	51	73.00
Total	70	100.00

About three-fourths of respondents (73.00%) possessed a high level of farming experience, consistent with agriculture being their traditional, inter-generational occupation (Varshney *et al.*, 2019) ^[26].

Statistical test: Weighted mean score = 3.629 (SD = 0.663, CV = 18.28% — the lowest relative variability among all profile variables). Chi-square goodness-of-fit test: $\chi^2 = 89.657$, $df = 3$, $p < 0.001$ — the concentration in the high-experience category is statistically significant.

3.1.6 Type of land ownership

Table 7: Distribution of respondents according to land ownership (n = 70)

Category	Frequency	Percentage (%)
Owner	70	100.00
Tenant	0	0.00
Total	70	100.00

All 70 respondents (100.00%) were owner-cultivators, confirming that the sample consisted entirely of land-owning farmers who satisfied the basic land-ownership eligibility requirement of PM-KISAN (Kumar, 2021) ^[9]. Statistical test: Weighted mean score = 2.000 with SD = 0.000 and CV = 0.00% — a structurally homogeneous, zero-variability variable. Chi-square goodness-of-fit test: $\chi^2 = 70.000$, $df = 1$, $p < 0.001$ — the complete concentration in the owner category is statistically significant by construction.

3.1.7 Annual income

Table 8: Distribution of respondents according to annual income (n = 70)

Category	Frequency	Percentage (%)
Low	51	73.00
Medium	13	18.00
High	6	9.00
Total	70	100.00

The majority of respondents (73.00%) fell in the low-income category, indicating that PM-KISAN largely benefits economically weaker farmers (Mishra and Patel, 2021) ^[15].

Statistical test: Weighted mean score = 1.357 (SD = 0.638, CV = 47.00% — among the highest relative variability recorded). Chi-square goodness-of-fit test: $\chi^2 = 50.257$, $df = 2$, $p < 0.001$ — the concentration in the low-income

category is statistically significant.

3.1.8 Cropping pattern

Table 9: Distribution of respondents according to cropping pattern (n = 70)

Category	Frequency	Percentage (%)
Single season	15	21.00
Double season	44	62.00
Three seasons	11	17.00
Total	70	100.00

Double-season cropping was practised by the majority of respondents (62.00%), suggesting reasonably efficient utilisation of available land and water resources.

Statistical test: Weighted mean score = 1.943 (SD = 0.611, CV = 31.46%). Chi-square goodness-of-fit test: $\chi^2 = 27.800$, df = 2, $p < 0.001$ — the concentration in double-season cropping is statistically significant.

3.1.9 Risk orientation

Table 10: Distribution of respondents according to risk orientation (n = 70)

Category	Frequency	Percentage (%)
No impact	40	57.00
Moderate	27	39.00
Reduced	3	4.00
Total	70	100.00

More than half of the respondents (57.00%) reported that PM-KISAN had no discernible impact on their risk-taking behaviour, while 39.00 per cent reported a moderate influence, suggesting the scheme alone is not sufficient to shift risk-taking behaviour substantially.

Statistical test: Weighted mean score = 1.471 (SD = 0.583, CV = 39.61%). Chi-square goodness-of-fit test: $\chi^2 = 30.200$, df = 2, $p < 0.001$ — the concentration in the 'no impact' category is statistically significant.

3.1.10 Social participation

Table 11: Distribution of respondents according to social participation (n = 70)

Category	Respondents	Percentage (%)
Member (past)	31	44.00
Office bearer (past)	9	13.00
Member (present)	26	37.00
Office bearer (present)	4	6.00
Total	70	100.00

Nearly half of the respondents (44.00%) were past members of social organizations, while a smaller share continued as present members (37.00%) or office bearers (6.00–13.00%), indicating a decline in active organisational participation over time.

Statistical test: Weighted mean score = 2.043 (SD = 1.028, CV = 50.31% — the highest relative variability of all profile variables). Chi-square goodness-of-fit test: $\chi^2 = 29.086$, df = 3, $p < 0.001$ — the uneven distribution across social-participation categories is statistically significant.

3.1.11 Contact with extension agencies

Table 12: Distribution of respondents according to contact with extension agencies (n = 70)

Category	Respondents	Percentage (%)
Never	25	36.00
Occasionally	30	43.00
Regularly	15	21.00
Total	70	100.00

Extension personnel visited the majority of farmers only occasionally (43.00%), while 36.00 per cent reported no contact at all and merely 21.00 per cent enjoyed regular contact, likely reflecting staff shortages and large service areas (Darshan *et al.*, 2021; Kaushik and Sabharwal, 2021) [3, 6].

Statistical test: Weighted mean score = 1.857 (SD = 0.748, CV = 40.26%). Chi-square goodness-of-fit test: $\chi^2 = 5.000$, df = 2, $p = 0.082$ — respondents are relatively evenly spread across extension-contact categories, and this variable, together with education, is the only one that does not show a statistically significant concentration.

3.1.12 Summary of profile-level statistical testing

Across the eleven profile variables, nine (age, gender, landholding, farming experience, land ownership, annual income, cropping pattern, risk orientation and social participation) show a statistically significant departure from an equal distribution across categories (χ^2 test, $p < 0.05$), confirming genuine concentration in specific categories rather than a spread arising by chance. Only education ($\chi^2 = 6.143$, df = 4, $p = 0.189$) and extension agency contact ($\chi^2 = 5.000$, df = 2, $p = 0.082$) do not differ significantly from an equal distribution — a pattern consistent with their comparatively high CV values (47.40% and 40.26% respectively) in Table A1, reflecting a genuinely more heterogeneous spread of respondents across these two characteristics.

Table A1: Weighted mean score, SD and CV of profile variables (n = 70)

Variable	Score range	Weighted Mean	SD	CV (%)	Relative variability
Age	1–3	2.743	0.582	21.22	Low–Moderate
Gender	1–2	1.300	0.462	35.51	Moderate
Education	1–5	2.843	1.347	47.40	High
Landholding	1–4	1.914	0.864	45.12	High
Farming experience	1–4	3.629	0.663	18.28	Low
Type of land ownership	1–2	2.000	0.000	0.00	None (homogeneous)
Annual income	1–3	1.357	0.638	47.00	High
Cropping pattern	1–3	1.943	0.611	31.46	Moderate
Risk orientation	1–3	1.471	0.583	39.61	Moderate–High
Social participation	1–4	2.043	1.028	50.31	High
Extension agency contact	1–3	1.857	0.748	40.26	Moderate–High

Table B1: Chi-square goodness-of-fit test results for profile variables ($df = k - 1$; $\alpha = 0.05$)

Variable	k	χ^2 value	df	Critical χ^2 (0.05)	p-value	Result
Age	3	73.057	2	5.991	<0.001	Significant
Gender	2	11.200	1	3.841	0.001	Significant
Education	5	6.143	4	9.488	0.189	Not significant
Landholding	4	37.771	3	7.815	<0.001	Significant
Farming experience	4	89.657	3	7.815	<0.001	Significant
Land ownership	2	70.000	1	3.841	<0.001	Significant
Annual income	3	50.257	2	5.991	<0.001	Significant
Cropping pattern	3	27.800	2	5.991	<0.001	Significant
Risk orientation	3	30.200	2	5.991	<0.001	Significant
Social participation	4	29.086	3	7.815	<0.001	Significant
Extension agency contact	3	5.000	2	5.991	0.082	Not significant

3.2 Knowledge of respondents towards the PM-KISAN scheme

Knowledge regarding PM-KISAN determines the extent to which respondents are aware of scheme eligibility, registration procedures, instalment patterns and benefit-

related information, and directly influences their ability to access and utilise the scheme effectively. Table 13 presents the item-wise knowledge of respondents on ten key components of the scheme.

Table 13: Item-wise knowledge of respondents about the PM-KISAN scheme ($n = 70$)

S. No.	Particulars	Respondents	Percentage (%)
1	Awareness of who is eligible for PM-KISAN benefits	62	88.50
2	Awareness of documents required for registration	58	82.80
3	Awareness of whether government employees can receive benefits	53	75.70
4	Awareness of whether benefits require land ownership	57	81.40
5	Awareness that Aadhaar linkage is mandatory	70	100.00
6	Awareness of where to register	66	94.20
7	Awareness of annual renewal requirement	48	68.50
8	Awareness of the instalment pattern	62	88.50
9	Awareness of the number of instalments given per year	69	98.50
10	Awareness of the amount disbursed per instalment	68	97.10

The findings reveal that respondents possessed a high overall level of knowledge regarding the PM-KISAN scheme. All respondents (100.00%) were aware that Aadhaar linkage is mandatory for availing benefits, and knowledge regarding the number of instalments disbursed per year (98.50%), the amount of each instalment (97.10%) and the place of registration (94.20%) was similarly very high. Comparatively lower — though still majority-level — knowledge was recorded for the eligibility of government employees to receive benefits (75.70%) and the requirement to renew registration annually (68.50%), consistent with Sihag and Malik (2024) ^[21].

3.2.1 Overall Knowledge Index

The overall Knowledge Index (mean of the ten item-wise

percentages) was 87.52 per cent, with a standard deviation of 10.41 and a coefficient of variation of 11.90 per cent. The comparatively low CV well below that of most profile variables indicates that awareness levels were fairly consistent across the ten knowledge components, with most items clustering between 75 per cent and 100 per cent awareness and only the renewal-requirement item falling noticeably lower.

3.2.2 One-sample proportion tests (benchmark = 80%)

To determine whether item-wise awareness levels differed significantly from a conventional 80 per cent 'satisfactory knowledge' benchmark, one-sample binomial proportion tests were conducted for each of the ten items.

Table C1: One-sample binomial test of each knowledge item against an 80% awareness benchmark ($n = 70$)

Particulars	Aware (n)	% Aware	p-value	Result vs 80% benchmark
Eligibility awareness	62	88.5	0.074	Not significant
Documents required	58	82.8	0.655	Not significant
Govt. employee eligibility	53	75.7	0.370	Not significant
Land ownership requirement	57	81.4	0.882	Not significant
Aadhaar linkage mandatory	70	100.0	<0.001	Significantly above
Where to register	66	94.2	0.001	Significantly above
Annual renewal requirement	48	68.5	0.024	Significantly below
Instalment pattern	62	88.5	0.074	Not significant
Number of instalments/year	69	98.5	<0.001	Significantly above
Amount per instalment	68	97.1	<0.001	Significantly above

Four items — the Aadhaar-linkage mandate, place of registration, number of instalments per year, and amount per instalment — show awareness significantly above the 80 per cent benchmark ($p < 0.05$), statistically confirming these as the best-internalised components of the scheme. One item, the annual renewal requirement (68.5% aware), is significantly below the benchmark ($p = 0.024$), confirming it as the weakest link in farmers' procedural knowledge. The remaining five items do not differ significantly from the benchmark, indicating a broadly satisfactory but not

exceptional level of awareness for eligibility, documentation, government-employee exclusion, land-ownership requirement and instalment-pattern knowledge.

3.2.3 Classification of knowledge items (Mean $\pm$ SD method)

Using the sample mean (87.52%) and SD (10.41) of the ten item percentages, cut-off points were computed as: Low $< 77.11\%$, Medium = 77.11%–97.93%, and High $> 97.93\%$.

Table C2: Classification of knowledge items by awareness level

Category	Items	Number of items
High ($>97.93\%$)	Aadhaar linkage mandatory (100.0%); Number of instalments/year (98.5%)	2
Medium (77.11%–97.93%)	Amount per instalment (97.1%); Where to register (94.2%); Eligibility awareness (88.5%); Instalment pattern (88.5%); Documents required (82.8%); Land ownership requirement (81.4%)	6
Low ($<77.11\%$)	Government employee eligibility (75.7%); Annual renewal requirement (68.5%)	2

The majority of knowledge components (six of ten) fall in the Medium category, two fall in the High category (both directly tied to the financial/DBT mechanics of the scheme), and two fall in the Low category (both tied to eligibility exclusions and procedural renewal rather than the monetary transfer itself). This statistically corroborates the observation that farmers' knowledge is strongest for the tangible, frequently reinforced financial features of PM-KISAN and weakest for the less-publicised eligibility and compliance requirements a pattern that mirrors the awareness gradient reported by Sihag and Malik (2024) ^[21] in Haryana.

3.3 Synthesis of statistical findings

1. Nine of the eleven profile variables show a statistically significant concentration in particular categories (χ^2 test, $p < 0.05$), while education and extension-agency contact are distributed comparatively evenly across their categories ($p > 0.05$).
2. Relative variability (CV) is highest for social participation (50.31%), education (47.40%) and annual income (47.00%), and lowest for farming experience (18.28%) and age (21.22%); type of land ownership shows no variability at all, since every respondent was an owner-cultivator.
3. The overall Knowledge Index across the ten PM-KISAN knowledge items is 87.52% (SD = 10.41, CV = 11.90%), indicating a generally high and internally consistent level of awareness.
4. Four knowledge items are statistically significantly above an 80% benchmark (Aadhaar linkage, registration location, number and amount of instalments), while the annual-renewal-requirement item is significantly below it — pinpointing renewal awareness as the single most important target for future extension messaging.
5. Because the statistical tests draw on aggregated category-wise frequency tables, they describe the distributional structure of each variable and the knowledge items individually; establishing formal statistical association (e.g., correlation or chi-square tests of independence) between individual profile characteristics and individual knowledge scores would require analysis of the underlying unit-level ($70 \times$

variables) response matrix, which is recommended as a direction for further analysis.

4. Conclusion

The study assessed the socio-economic profile and knowledge level of 70 beneficiary farmers of the PM-KISAN scheme in Navani village of Pudukhathiram block, Namakkal district, Tamil Nadu, and statistically validated the observed patterns using weighted descriptive statistics, chi-square goodness-of-fit tests and one-sample proportion tests. The respondents were predominantly old-aged, male, moderately educated, small landholders with high farming experience, low annual income and owner-cultivator status, and chi-square tests confirmed that this concentration is statistically significant for nine of the eleven profile characteristics examined. Knowledge assessment revealed that farmers possessed a high and statistically significant level of understanding of the PM-KISAN scheme's core financial features — the mandatory nature of Aadhaar linkage, the number and amount of instalments, and the place of registration with each significantly above an 80 per cent satisfactory-knowledge benchmark. However, statistically confirmed knowledge gaps were evident with respect to the eligibility exclusion of government employees and, most notably, the requirement for annual renewal of registration, both of which are critical for maintaining uninterrupted benefit flow. These findings suggest that extension functionaries and scheme administrators should intensify farmer-oriented awareness campaigns through Krishi Vigyan Kendras, village-level camps, and digital and print media with specific emphasis on renewal procedures and eligibility exclusions, in order to minimize inadvertent disqualification and strengthen the effective, sustained utilization of PM-KISAN benefits among the farming community. Future research incorporating unit-level (respondent-wise) data would allow correlation and regression analyses to formally identify which specific socio-economic characteristics predict individual farmers' knowledge scores.

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