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ARTICLE

Evaluating the Impact of Institutional, Non-Institutional & Media on Public Awareness of PMFBY : Evidence from Indian States Using Regression Analysis

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ABSTRACT

India's Agriculture and Allied Sector (A&AS) has undergone significant transformation, achieving a record food grain production of 329.7 million tonnes in 2022–23, driven by modernization and policy reforms. Despite this progress, the sector remains vulnerable to climate change due to its reliance on rainfall. To enhance resilience, the Government of India (GoI) has introduced various measures, including the Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016. As a flagship scheme, PMFBY provides affordable crop insurance with premium rates as low as 2% for Kharif crops, aiming to stabilize farmer incomes and foster resilience. This study examines public awareness (PA) of PMFBY, focusing on the role of institutional, non-institutional, and media channels in dissemi-

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nating information about the scheme. Using a quantitative research design, the study evaluates PA across socio-economic strata in four states, with detailed insights from Kerala and Rajasthan. Descriptive statistics, including mean value and point scoring approaches, assess farmers' perceptions of PA. Inferential analysis employs Pearson Rank Correlation, Regression, and Kruskal-Wallis H Test to understand the relationships between PA and key predictors. The findings reveal that media and institutional outreach significantly impact PA, with media showing the strongest influence, while non-institutional sources contribute minimally. Younger, female, OBC, and SC respondents exhibit higher awareness levels, highlighting demographic disparities. These results underscore the need for targeted interventions, improved digital outreach, and tailored communication strategies to enhance the efficacy of PMFBY and ensure inclusive agricultural resilience.

Keywords: Awareness; Institutional Support; PMFBY Scheme; Agriculture Resilience; Farmers; Pearson Correlation; Regression Analysis; Quantitative Method; Risk Management; Crop Insurance; Kruskal-Wallis; Descriptive Statistics; Public Policy; Governance

1. Introduction

In India, agriculture remains the principal driving force of the economy and is essential in the country's social and economic development [1]. It has been observed globally that with the economic development trajectory, the contribution of agriculture and its allied sector (A&AS) to the proportion of gross domestic product (GDP) has diminished. The situation remains the same in India. The share of sector in GDP has declined from 61.72 percent (%) in 1950–51 to 16.27% in 2020–21 (**Table 1**) [2].

Table 1. Share of Agriculture and Allied Sector in Gross Value Added (GVA) from 1950–51 to 2020–21. (₹ Crore in 2011–12 prices).

Year	GVA	Agriculture, Livestock, Forestry, and Fishing	Total Agricultural GVA (in %)	Total Agricultural Workers (in %)	Total Cultivators Workers (in %)	Total Agri Labour (in %)
1950–51	4,79,210	2,95,745	61.72	69.7	50.12	19.58
1960–61	7,03,138	3,98,566	56.68	69.5	52.8	16.7
1970–71	10,10,777	5,00,953	49.56	69.7	43.36	26.34
1980–81	13,68,481	5,81,113	42.46	60.5	37.81	22.69
1990–91	23,10,015	8,11,417	35.13	59	35.25	23.75
2000–01	40,24,830	10,65,837	26.48	58.2	31.65	26.55
2010–11	77,04,514	14,11,634	18.32	54.6	24.65	29.95
2020–21	1,25,85,074	20,48,032	16.27	*51.8	21.26	30.54

* Forecast.
Source: Satyasai, Tiwari and Patra [2].

As India has progressed from a state of "Triage" to sustained development in food production and productivity over the last seventy years, with productivity rising at rates of 2.46% and 2.13% [2]. This is because of the nation's liberalisation reforms, including the signing of the General Agreement on Tariffs and Trade (GATTI) in 1994 and accession to the World Trade Organisation (WTO) [3], which have enhanced the globalisation of the agricultural and agribusiness sector, impacting market dynamics in crop investment, pricing structures, and the international export of agricultural commodities [4, 5]. The A&AS of India significantly influence the global agriculture market, providing 20.4% to the nation's overall exports in 2021–22, amounting to $50.2 billion [6].

The post-globalization market-driven approach has led to the enhancement of competitiveness in the A&AS due to international market linkages. However, this has been bolstered by innovative policies, programs, and schemes, such as crop insurance, technological advancements, and streamlined supply chains [7, 8]. Policies like the Minimum Support Price (MSP) and Pradhan Mantri Fasal Bima Yojana (PMFBY) are flagship

schemes that provide price realization and risk coverage for farmers, promoting sustainable production [9]. Technological innovations, such as agri-tech startups, have transformed agriculture by providing real-time data, advanced inputs, and direct market linkages [10]. The National Agriculture Market (e-NAM) has created a unified national market for agricultural commodities, reducing inefficiencies and enhancing competitiveness [11]. These factors have enhanced the sector's capabilities to adapt to resource management and climate change challenges. The resilience of the A&AS is not only attributed to reforms, policies, schemes, and programs, but there has been a significant role of other attributes like marketing, awareness campaigns, supply chain efficiency, and information communication & education (IEC) strategies, enhancing its adaptability to resource management and climate change challenges [12].

IEC and awareness campaigns are the most valuable components of policy communication [12, 13]. In other terms, these are also known as "policy awareness" (PA) [12].

> PA refers to the level of understanding, knowledge, and consciousness that individuals possess about social, political, environmental, and health-related issues. Public awareness plays a crucial role in shaping public opinion, driving collective action, and bringing about positive change in society [14].

PA is a communication strategy that informs and educates citizens about sectorial policies, bridging the gap between policymakers and citizens. It is dynamic and applied in various stages of public policy [12, 15–18]. PMFBY, launched by the GoI in 2016, provides comprehensive risk coverage to farmers from non-preventable natural risks, aiming to stabilize farmers' income and promote innovative farming practices. The scheme has key features such as affordable premium rates, affordability for marginal, small, and medium farmers, and a 50:50 funding ratio (North-east state 90:10) [19]. However, challenges such as lack of PA among farmers and stakeholders [20, 21], adoption [22] and implementation issues, and inadequate private sector participation have hindered its success [21].

PA is crucial for the success of PMFBY, but its variability varies among farmers' socio-economic strata [23]. Factors like enrollment deadlines [23], bank account linking, language barriers [24], literacy, and technology use [24, 25] contribute to PA's failure. Overreliance on stakeholders like insurance companies, banks, local agents, PRIs, and cooperative societies hinders PA's full potential for bolstering agricultural resilience and food security [25].

The GoI has been implementing efforts to enhance PA in PMFBY, revising operational guidelines (2018, 2020 and 2023) [26, 27], supporting awareness activities, and implementing campaigns to educate farmers. The government has supported awareness activities, implementing insurance companies, financial institutions, and CSC networks. MoAFW has implemented campaigns like Fasal Bima Saptah and Fasal Bima Pathshalas to educate farmers, focusing on tribal districts. These measures increased farmer applications by 33.4% and 41% during 2022–23 and 2021–22, respectively [28].

The study assesses the impact of PA on farmers across different socio-economic strata in Kerala and Rajasthan, involving 13 institutions, 5 non-institutions, and 12 media sources. It evaluates the role of these institutions, non-institutions, and media in PA, using literature review and operational guidelines given in **Table 2**.

Table 2. Sources of PA channels: institutional, non-institutional and media.

Sr No	Information Source	Reference
(A) Institutional Sources		
1	Gramsevak (Village Volunteer)	(Meena, 2010) [29]
2	Extension Officer (PMFBY/Agriculture)	(Spreading Awareness Among the Farmers, 2023) [30]
3	Common Service Centre (CSC)	(Spreading Awareness Among the Farmers, 2023) [30]
4	Self-Awareness	(Anjani et al., 2021) [31]
5	Agriculture Scientist	(Verma and Sharma, 2015) [32]

Table 2. *Cont.*

Sr No	Information Source	Reference
6	Agriculture Science Centre	(Jethi et al., 2016) [33]
7	Kisan Call Centre	(Kavitha and Anandaraja, 2018) [34]
8	Farmers Training Centre	(Sahu et al., 2024) [35]
9	Cooperative Society	(Meena, 2010) [29]
10	Fertilizer Depot	(Kansara et al., 2015) [36]
11	Non-Profitable Organization (NGO)	(Verma and Sharma, 2015) [32]
12	Insurance Company	(Spreading Awareness Among the Farmers, 2023) [30]
13	Insurance Agent	(Kavitha and Anandaraja, 2018) [34]
(B) Non-Institutional Sources		
1	Neighbors	(Sahu et al., 2024) [35]
2	Friends & Family	(Kushwaha and Mazhar, 2021) [36]
3	Progressive Farmers	(Meena, 2010) [29]
4	Local Politicians	(Sahu et al., 2024) [35]
(C) Mass Media		
1	Newspaper	(Jethi et al., 2016) [33]
2	Television	(Spreading Awareness Among the Farmers, 2023) [30]
3	Government Office Notice Board	(Kansara et al., 2015) [37]
4	Scheme Website	(Spreading Awareness Among the Farmers, 2023) [30]
5	SMS from State Government	(Jethi et al., 2016) [33]
6	WhatsApp	(Tadavi et al., 2024) [38]
7	Facebook/Instagram	(Kushwaha and Mazhar, 2021) [36]
8	Agriculture Literature	(Kavitha and Anandaraja, 2018) [34]
9	Agriculture Exhibitions	(Meena, 2010) [29]
10	Agriculture Fairs	(Kansara et al., 2015) [37]
11	Announcement Device	(Spreading Awareness Among the Farmers, 2023) [30]

Source: Prepared by authors.

The paper uses Khatibi et al.[39] theoretical framework of decision making through scientific knowledge. The study explores the link between public participation and policy instruments like advocacy, networks, and behavioral economics, highlighting their role in policy improvement and sectorial resilience. The study provides an innovative approach to understanding the role of various institutions in policy implementation, assessing the hypothesis using Khatibi et al.'s conceptualization.

Hypothesis 1. *The level of PA of the PMFBY scheme is not identical among various socio-economic strata of farmers.*

Hypothesis 2. *There is no significant variation among Institutional, Non-Institutional, and Media sources of PA.*

2. Literature Review

The literature on Public Awareness (PA) is crucial in shaping effective policies, especially in agriculture. The paper uses an integrative approach, considering the theoretical framework of scientific knowledge and the role of various institutions in disseminating vital information about the PMFBY scheme. The review covers the significance of effective communication and PA in policy implementation, its challenges, theoretical framework and measures for assessing PA in PMFBY.

2.1. Significance of Effective PA in Policy Implementation

Public policy (PA) is a vital aspect of public policy[39], promoting accountability, transparency, and inclusivity. Effective communication platforms like television, radio, newspapers, and social media promote PA, empowering citizens to make informed decisions and engage in public discourse[15, 17, 40, 41]. The government globally uses various communication channels to spread PA, including governmental agencies and non-government agencies. Well-informed PA channels ensure policy sustainability and improve policy trust[16]. The GoI uses various strategies, including ground-level outreach campaigns and digital platforms[42], to spread

PA for social-development policies. Non-governmental channels like NGOs, CSOs, and academic collaborations also contribute to PA, ensuring evidence-based insights inform policymaking and PA strategies. These organizations are involved at different levels of the policy process to ensure information reaches the last mile [43].

2.2. PA Strategies in the Agriculture Sector in India & Crop Insurance Schemes

In India, Public Awareness (PA) plays a crucial role in promoting the agriculture sector by providing timely and accurate information and fostering resilience [44]. Communication tools include traditional media and modern information communication technologies (ICT) such as social media, digital repositories, online catalogues, and websites [45]. ICT strategies not only aid in PA but also provide real-time updates and localization information, enabling informed decision-making for farmers. This indirectly improves socio-economic development and climate change resilience in the agriculture sector [46–48].

Global PA has significantly impacted the agriculture sector, particularly in crop insurance schemes. In Italy, PA strategies have made crop insurance schemes more accessible and effective [49]. In Rwanda, educational campaigns and local organizations have removed mistrust and promoted farmers' willingness to adopt schemes [50]. In Nepal, the integration of local organizations and cooperatives improved insurance coverage for marginalized farmers [51]. In India, mass media, community meetings, and ICT tools have been effective in promoting farmers' engagement and adoption [52, 53]. These strategies help address major challenges in the sector and crop insurance schemes.

2.3. Challenges of PA in the Agriculture Sector and Crop Insurance in India

India faces challenges in agriculture and crop insurance due to social, economic, infrastructure, and policy factors. Socio-economic factors, such as lower literacy rates and income levels, often lead to farmers lacking knowledge about government policies and schemes [18]. Lack of digital infrastructure, such as phone towers and internet accessibility, also hinders claim settlement and mistrust among the government [54]. This inefficiency alienates farmers from participating in government crop insurance schemes. Procedural intricacies, such as lack of grievance redressal [18], elevated premiums and insufficient transparency, inhibit farmer engagement [48]. Insurance programs often neglect historical data [48], agro-climatic conditions, and region-specific requirements, exacerbating poverty and climate change [55]. Only 4% of agricultural households are enrolled in crop insurance schemes, largely due to insufficient awareness initiatives and inadequate execution [56]. Addressing these challenges requires literacy initiatives, specialized internet infrastructure, and farmer-oriented communication tactics.

2.4. Institution Involvement in PA

Institutions like public organisations, governance bodies, private partners, financial institutions, NGOs, and community-based organizations play a crucial role in policy communication and public awareness in India's agricultural sector. Panchayati Raj Institutions (PRIs) act as grassroots intermediaries, disseminating PA about government crop insurance schemes [57]. Non-governmental organizations and community-based organizations enhance operational efficiency and resolve regional challenges [58, 59]. Private entities foster competition, improving service delivery and innovative insurance products [60, 61]. Media, campaigns, and collaborative initiatives enhance policy communication [62]. However, challenges persist, such as inadequate coordination and limited digital penetration in rural areas.

2.5. Theoretical Framework of the Role of Scientific Knowledge in PA

In earlier sections, literature has used the ladder of participation approach by Sherry Arnstein [63], but this study uses the approach of scientific knowledge to assess the PA in the PMFBY crop insurance policy. The study also emphasizes the importance of distinguishing between local or traditional knowledge and scientific knowledge [39] for effective policy communication [64]. The integration of scientific knowledge [39] with

local insights enhances climate and agricultural risks, developing public trust and improving interconnection between government, experts, and citizens (**Figure 1**). Knowledge is crucial for policy success, and it should be perceived as credible, salient, and legitimate [65]. Thus, through literature, it has been understood that translating active data, rules, and regulations into accessible formats enhances any scheme's usability and impact, especially in areas with low literacy and limited technological adoption.

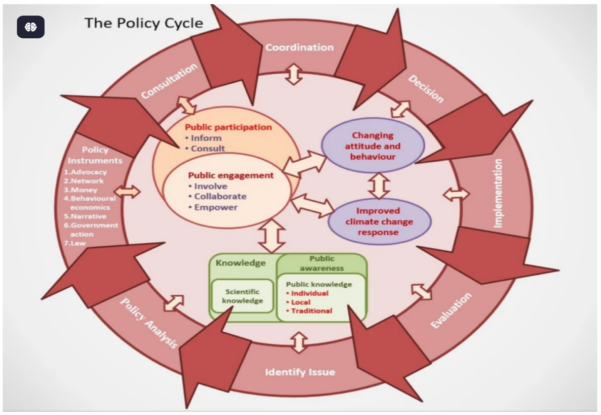

Figure 1. Types of knowledge and levels of public participation.

Source: Khatibi et al. [39].

2.6. Measures of Assessing the PA in PMFBY

Measuring PA is crucial for crop insurance schemes like PMFBY in India. Analytical tools like descriptive statistics, Pearson rank correlation, and non-parametric tests are used to evaluate farmers' knowledge, awareness, and adoption patterns. Descriptive statistics provide an overview of farmers' awareness levels and their distribution across demographic and socio-economic categories [18, 66]. Pearson rank correlation helps identify relationships between variables influencing awareness, such as education levels and organizational memberships [66, 67]. Non-parametric tests offer a robust method for analyzing ordinal and non-normally distributed data in public awareness studies [20]. Kruskal-Wallis test analyses found significant differences in awareness based on demographic factors, with younger and larger landholders showing higher awareness levels [20, 68]. Multi-level regression (MLR) was deployed to examine the impact of institutional and socio-economic factors on farmers' awareness in PMFBY [69].

The existing literature largely shows that scholars have focused on understanding PA among farmers using operational guidelines, but most research assesses the impact of PA components. Few studies focus on PA among farmers, providing insights for researchers. Thus, the literature analysis highlights the need to evaluate PA concerning crop insurance programs like PMFBY across all socio-economic tiers of farmers in India. It also highlights the underuse of non-parametric tests for statistical analysis. The current study aims to address this gap by assessing PA concerning PMFBY comprehensively.

3. Methodology

3.1. Research Design

The study evaluated the PA on farmers in Rajasthan and Kerala in India, using a mixed research design and a structured questionnaire. It assessed the role of institutions and differences in PA among different farmer strata using descriptive statistics, Pearson correlation, non-parametric test (Kruskal-Wallis), and multi-level regression modelling to assess the impact of institutions on farmers' awareness and participation in the PMFBY scheme.

3.2. Data Collection

This study collected data from Kerala and Rajasthan using a structured questionnaire. The first section of the questionnaire collected demographic details, including name, age, education, and socio-economic characteristics. The second section assessed the frequency of public awareness dissemination through institutional, non-institutional, and media sources. Institutional sources included Gram Sevak, fertilizer depots, Kisan Call Centers, insurance companies, and others. Non-institutional sources and mass media sources were identified based on literature. The third section evaluated respondents' understanding of PMFBY 1.0 and PMFBY 2.0 schemes, allowing a comparative analysis of awareness levels and policy communication effectiveness. The questionnaire provided an inclusive option for respondents to specify relevant sources of PA.

This study used a two-stage sampling method to select states based on the number of farmers enrolled in the PMFBY during the Kharif season of 2022. Rajasthan was chosen due to its significant participation, while Kerala was the only participating state from the southern part. Five districts were selected from each state to ensure comprehensive coverage, representing the state's geographical diversity. Villages were identified within each district using convenience sampling for data collection. This multi-stage approach ensured a diverse and representative sample for analysing public awareness and policy communication effectiveness under PMFBY.

The data collection for this study was conducted using two groups of field investigators, each comprising three members: two research interns and one supervisor. Each team was led by a research associate, who also participated as a field investigator. A pilot study was carried out in the Banswara district of Rajasthan from November 16 to November 21, 2023. During the pilot survey, it was observed that handling hard copies of questionnaires posed logistical challenges and contributed negatively to environmental sustainability. Consequently, the questionnaire was digitized and uploaded to Google Forms, facilitating online data collection. The questionnaire was made available in both Hindi (for Rajasthan) and English (for Kerala) to ensure accessibility. As noted by Castro (2018) and Bhalerao (2015), Google Forms is a digital data collection tool that offers eco-friendly advantages, simplifies data entry, and enhances the reliability of data[70, 71]. The real-time data entry feature allowed researchers to focus on data analysis rather than time-consuming manual data entry[71].

The main data collection phase was conducted simultaneously in both states over 19 days, from December 10 to December 29, 2023. A total of 1,494 responses were collected across the two states. The data collected from two states is as follows: Kerala with 760 (50.87%) respondents, and Rajasthan with 734 (49.13%) respondents, as detailed in **Figure 2**.

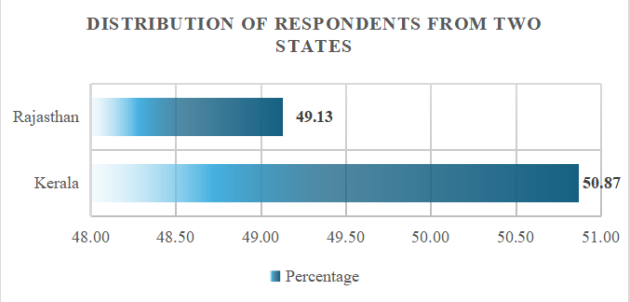

Figure 2. Distribution of respondents from two states (in %).
Source: Complied by author using Excel.

3.3. Demography of Respondents

The following tables (**Tables 3–7**) present the demographic distribution of respondents across five districts of each state, categorizing them by district, gender, educational qualification, caste, and farmer type. **Table 3** shows that the distribution of respondents among districts in Rajasthan and Kerala is fairly balanced, with most districts having around 10% representation.

The gender distribution given in **Table 4** shows that both project states (Rajasthan and Kerala) are predominated by males, with 94.14% of respondents being male, while Kerala has a higher female representation with 33.16%.

Table 3. Distribution of respondents among selected districts and states (in no and %).

District	State	Percentage Distribution (%)	Respondents Count
Jaipur	Rajasthan	10.107	151
Nagaur	Rajasthan	10.71	160
Jodhpur	Rajasthan	10.71	160
Udaipur	Rajasthan	8.501	127
Banswara	Rajasthan	9.103	136
Kasaragod	Kerala	10.174	152
Kollam	Kerala	10.107	151
Kottayam	Kerala	10.241	153
Palakkad	Kerala	10.107	151
Wayanad	Kerala	10.241	153

Source: Compiled by authors using Excel.

Table 4. Distribution of respondents based on their gender in two selected states (in % and no).

Gender	Kerala		Rajasthan	
	Percentage Distribution (%)	Respondents Count	Percentage Distribution (%)	Respondents Count
Female	33.16	252	5.86	43
Male	66.84	508	94.14	691
Total	100.00	760	100.00	734

Source: Compiled by authors using Excel.

Table 5 indicates that Kerala has a higher percentage of respondents with Higher Secondary Education (53.16%) and Graduation (25.92%), whereas Rajasthan has more respondents with No Education (20.84%) and Primary Education (25.2%), indicating better educational attainment in Kerala.

Table 5. Distribution of respondents based on their educational qualification in two selected states (in %).

Education Type	Kerala Percentage Distribution (%)	Rajasthan Percentage Distribution (%)
Able to do their signature only	2.63	11.99
Graduate	25.92	8.99
Higher Secondary Education	53.16	13.35
No education	0.92	20.84
Post Graduate and above	1.32	1.77
Primary Education	4.08	25.2
Secondary Education	11.97	17.85
Total	100.00	100.00

Source: Compiled by authors using Excel.

Table 6 highlights that OBCs are the largest group in both Kerala (50.39%) and Rajasthan (42.1%), while Kerala has a higher SC population (20.92%) and Rajasthan has a significantly larger ST population (29.43%), highlighting a demographic contrast in caste distribution.

Table 6. Distribution of respondents based on their caste categories in two selected states (in % and no).

Caste Category	Kerala		Rajasthan	
	Percentage Distribution (%)	Respondents Count	Percentage Distribution (%)	Respondents Count
Do not want to disclose	0.00	0.00	0.27	2
General	26.71	203	20.16	148
OBC	50.39	383	42.1	309
SC	20.92	159	8.04	59
ST	1.97	15	29.43	216
Total	100.00	760	100.00	734

Source: Compiled by authors using Excel.

Table 7 signifies distinct agricultural landholding patterns between the two states, with Kerala's distribution of farmers being relatively balanced across categories between 28–19%. Conversely, Rajasthan exhibits a higher concentration of medium (36.65%) and large (32.97%) farmers.

Table 7. Distribution of respondents based on their farmer categories in two selected states (in % and no).

Farmer Type	Kerala Percentage Distribution (%)	Rajasthan Percentage Distribution (%)
Do not want to disclose	0.00	0.14
Large farmer	27.24	32.97
Marginal	25.53	0.41
Medium	18.29	36.65
Semi-medium	9.34	7.08
Small	19.61	22.75

Source: Compiled by authors using Excel.

4. Data Analysis and Findings

The data analysis utilized descriptive and inferential statistics to evaluate farmers' PA on the PMFBY. This section details the method of obtaining analytical findings, while the results & discussion section covers the actual findings.

4.1. Descriptive Statistics

The study uses descriptive statistics to assess farmers' awareness of policy guidelines and the effectiveness of three types of information sources in promoting PA in PMFBY. In earlier studies, the evaluation of PA patterns and regional disparities in the healthcare sector has been influenced by approaches that focus on central tendency measures and dataset variability [72, 73]. **Table 8** shows farmers' PA of policy guidelines in both states, indicating higher PA for two payment statements and low PA for four technology usage statements, and moderate PA for other policy statements.

Further, the point-scoring approach is seen in **Figure 3** which evaluates the effectiveness of three independent variables: types of information sources (institution, non-institutional, and media) on the dependent variable awareness. This analysis highlights regional disparities and the social fabric of a state, providing insights into which type of PA source should be focused on in a particular state. This type of analysis has been utilized to assess climate policy decisions, demonstrating its applicability across various scenarios and policies [74]. The data in **Figure 3** shows that the prevalence of PA in Kerala is significantly higher than in Rajasthan.

Table 8. Descriptive statistics analysis of awareness among farmers related to PMFBY policy guidelines using central tendency.

Colour			
Codes	**Low**	**Medium**	**High**
Statements to Analyse the Awareness among Farmers	**Mean**	**Median**	**Mode**
I feel I have complete knowledge of the PMFBY scheme.	3.24	3	3
I am aware of the one crop one rate feature of the PMFBY.	3.17	3	3
I am aware of the 8% premium for annual commercial and horticulture crops.	3.19	3	3
I know I will now get the full sum insured without any reduction.	3.12	3	3
I am aware of the comprehensive risk coverage of the scheme for non-preventable risks like fire, pests, disease, tornadoes, cyclones, floods, etc.	3.18	3	3
I am aware of the voluntary coverage of farmers without KCC and other loans.	3.03	3	3
I am aware of the use of technology (capture and upload data of crop cutting) to reduce the delays of claims.	3.07	3	3
I am aware of reporting the crop loss within 72 hours to the nearest agriculture officer, CSC, and Crop Insurance Application	3.52	4	4
Are you aware of the pay-out structure under the PMFBY?	3.43	3	4
Are you aware of the add-on coverage for crop loss offered by the State Govt. under PMFBY?	3.16	3	3
Are you aware that under PMFBY, lodging of loss awareness by farmers is essential to avail add-on cover for losses arising out of localized calamities since losses are assessed on the basis of individual insured farm level?	3.2	3	3
Are you aware of the period of risk (insured period: from sowing period to maturity of the crop) covered under PMFBY?	3.13	3	3
Are you aware that farmers are supposed to timely submit their UID (Aadhaar) under the PMFBY?	3.11	3	3
Are you aware of the PMFBY website portal and its utilities?	3.01	3	3
Are you aware that you can view the PMFBY website portal in 12 Indian languages?	3.03	3	3
Are you aware that as a farmer, you can apply for crop insurance all by yourself via the Farmer Corner on the PMFBY website?	3.15	3	3
Are you aware that you can directly report crop losses and apply for claim via the PMFBY website	3.13	3	3
Are you aware that you yourself can also calculate and know your insurance premium even before Crop Insurance via the PMFBY website?	3.16	3	3
Are you aware that you can check your application status via the PMFBY web portal?	3.1	3	3
Are you aware that you can submit your PMFBY complaints and grievances directly via the web portal?	3.12	3	3
Are you aware that you can check your area's weather updates via the WINDS System available on the PMFBY web portal?	3.12	3	3
Are you aware of the sum insured/coverage limit under PMFBY?	3.06	3	3
Are you aware of the agro-advisories, sowing, cropping, harvesting, and marketing planning, consultation, and advisories offered to the farmers by the State Govt.?	3.22	3	3
Are you aware of the deficit rainfall cover offered under PMFBY?	3.17	3	3

Source: Compiled by authors using Excel.

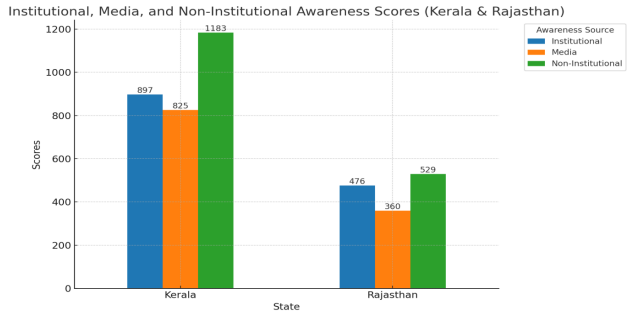

Figure 3. Range and variability analysis using point scoring approach to assess PA in PMFBY.

Source: Compiled by authors using SPSS and Tableau.

4.2. Inferential Statistics

Inferential statistics aid researchers in understanding relationships, predicting trends, and testing theoretical frameworks through techniques like hypothesis testing and regression analysis, providing robust tools for evidence-based decision-making and policy formulation [78].

The study used inferential statistical techniques like Pearson correlation, non-parametric Kruskal-Wallis H tests, and regression analysis to evaluate PA levels in PMFBY. The stated methods of analysis reveal significant relationships, PA variations, and policy adoption factors across socio-demographic groups, offering actionable insights for improving PA and enhancing the scheme implementation. The normality of a parametric test was tested using Cronbach's Alpha values, indicating a non-normal distribution.

4.2.1. Pearson Correlation

Table 9 examines Pearson correlation analysis, revealing relationships among institutional, non-institutional, and media awareness sources and a generic proxy for overall PA, with classifications provided in **Table 2**. The dataset consisted of Likert-scale replies, with each category's influence measured by an average score, and PA calculated as the average of three types of PA sources. **Table 9** analysis shows that non-institutional (r = 0.951) and institutional sources (r = 0.916) have the strongest influence on PA, while media (r = 0.810) plays a supportive role.

Table 9. Pearson correlation analysis of institutional, non-institutional source.

		Awareness	Institutional	Non-Institutional	Media
Pearson correlation	Awareness	1.000	0.916	0.951	0.810
	Institutional	0.916	1.000	0.829	0.608
	Non-institutional	0.951	0.829	1.000	0.662
	Media	0.810	0.608	0.662	1.000
Sig. (1-tailed)	Awareness		<0.001	<0.001	<0.001
	Institutional	<0.001		<0.001	<0.001
	Non-institutional	<0.001	<0.001		<0.001
	Media	<0.001	<0.001	<0.001	
N	Awareness	1494	1494	1494	1494
	Institutional	1494	1494	1494	1494
	Non-institutional	1494	1494	1494	1494
	Media	1494	1494	1494	1494

Source: Compiled by authors using SPSS.

4.2.2. Kruskal Wallis

The Kruskal-Wallis H test is a non-parametric technique employed to compare medians among groups, assessing disparities among demographic categories. It serves as an alternative to one-way ANOVA and facilitates the analysis of ordinal and non-normally distributed datasets [76]. This study used the Kruskal-Wallis H test following the test of normality (given in **Table 10**) to analyse Gaussian distribution. This part solely presents the analytical findings; the discussion of results occurs in the outcomes section.

Hypothesis 1a. *The level of PA of PMFBY scheme is not identical among different genders·*

Table 10. Test of normality for justification of use of Kruskal Wallis H test.

	Kilmogorv-Smirnov [a]			Shapiro-Wilk		
	Statistic	**df**	**Sig**	**Statistic**	**df**	**Sig**
PA	0.071	1494	<0.001	0.985	1494	<0.001
Reject H0 - Non parametric test						

[a] Lilliefors Significance Correction.

In the test of normality the null hypothesis was rejected. The Kruskal-Wallis test or Mann-Whitney U test is suitable for analysing PA data due to its non-normal distribution. Further, demographic data of gender, age, caste and type of farmers were grouped into various categories (**Tables 11–14**).

The **Table 11** reveals significant gender differences in PA levels among farmers, with *p*-values < 0.001, indicating strong evidence against the null hypothesis of identical distributions across genders.

Hypothesis 1b. *The level of PA of PMFBY scheme is not identical among different age-groups.*

In **Table 12**, significant differences in PA levels among farmers of different ages are observed, as indicated by *p*-values < 0.001 for all variables.

Hypothesis 1c. *The level of PA of PMFBY scheme is not identical among different age-groups.*

The **Table 13** analysis reveals significant differences in PA among caste groups, indicating they are affected by the PMFBY, as evidenced by *p*-values < 0.001.

Hypothesis 1d. *The level of PA of PMFBY scheme is not identical among different caste categories.*

Table 11. Kruskal Wallis test variable: gender.

Ranks - Variable - Gender			
Gender Code	**N**	**Mean Rank**	
Female	295	1710.33	
Male	1199	1467.82	
Total	1494		
Test of Statistics [a&b]			
Variable	**Kruskal-Wallis H**	**df**	**Asymp. Sig.**
PA	30.128	1	<0.001

[a] Kruskal Wallis H test.
[b] Grouping variable: gender code.
Source: Compiled by authors using SPSS.

Table 12. Kruskal Wallis test variable: age.

Ranks - Variable - Age			
Gender Code	**N**	**Mean Rank**	
18–35	341	1642.06	
36–53	732	1560.69	
54–71	384	1353.28	
72–90	37	946.34	
Total	1494		
Test of Statistics [a&b]			
Variable	**Kruskal-Wallis H**	**df**	**Asymp. Sig.**
PA	69.92	3	<0.001

[a]. Kruskal Wallis H test.
[b]. Grouping variable: age code.
Source: Compiled by authors using SPSS.

Table 13. Kruskal Wallis test variable: caste.

Ranks - Variable - Caste			
Caste Code	**N**	**Mean Rank**	
OBC	692	1590.63	
SC	219	1572.3	
ST	231	1511.03	
General	352	999.1	
Total	1494		
Test of Statistics [a&b]			
Variable	**Kruskal-Wallis H**	**df**	**Asymp. Sig.**
PA	139.196	3	<0.001

[a]. Kruskal Wallis H test.
[b]. Grouping variable: caste code.
Source: Compiled by authors using SPSS.

The Kruskal-Wallis test in **Table 14** reveals that there are differences in the level of PA among small, marginal, semi-medium, medium, large farmers. In **Table 14**, H = 33.79, $p < 0.001$, confirms that the differences in awareness among farmer types are statistically significant.

Hypothesis 1e. *The level of PA of PMFBY scheme is not identical among different types of farmers.*

Table 14. Kruskal Wallis test variable: type of farmers.

Ranks - Variable - Types of Farmer			
Type of Farmer	**N**	**Mean Rank**	
Marginal	197	1723.57	
Small	316	1375.57	
Semi-medium	124	1576.58	
Medium	408	1519.24	
Large farmer	449	1416.4	
Total	1494		
Test of Statistics [a&b]			
Variable	**Kruskal-Wallis H**	**df**	**Asymp. Sig.**
PA	33.79	4	<0.001

[a]. Kruskal Wallis H test.
[b]. Grouping Variable: Types of farmer code.
Source: Compiled by authors using SPSS.

4.2.3. Regression

This research employs regression analysis to determine effective awareness sources for farmers participating in the PMFBY scheme. The dependent variable is PA, while the independent variables consist of three categories of awareness sources[77]. The model employs standardized and unstandardised coefficients to ascertain predictor-dependent relationships, evaluates multicollinearity, and guarantees consistent results using linearity diagnostics. The residual statistics validate normality and homoscedasticity. This research is crucial for comprehending policy adoption and causal links (**Tables 15–17**). The modal summary in **Table 10** shows that 55.8% of the variability in the awareness dependent variable can be explained by the independent variables (institutional, non-institutional, and media), indicating a strong explanatory power. This high R-squared value indicates that the model works well, with a higher percentage indicating better fit to the data. This means that over half of the factors influencing awareness in this context are captured by these three factors.

Table 15. Regression model summary as per three types of awareness source.

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-Order	Partial	Part	Tolerance	VIF
(Constant)	2.117	0.02		104.162	<0.001					
Institutional	0.376	0.035	0.246	10.601	<0.001	0.679	0.129	0.19	0.273	3.665
Non institutional	−0.031	0.03	−0.025	−1.062	0.289	0.627	−0.019	−0.013	0.273	3.657
Media	0.792	0.034	0.553	23.126	<0.001	0.735	0.389	0.281	0.258	3.883

Source: Compiled by authors using SPSS.

Table 16. Collinearity diagnostics of the regression model.

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Variance Proportions (Institutional)	Variance Proportions (Non institutional)	Variance Proportions (Media)
1	1	3.756	1	0.01	0	0	0
	2	0.162	4.81	0.82	0	0.06	0.04
	3	0.045	9.128	0.02	0.04	0.87	0.54
	4	0.036	10.194	0.15	0.95	0.06	0.42

Source: Compiled by authors using SPSS.

Table 17. Residuals statistics of the regression model.

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	2.1174	4.4051	3.1611	0.53357	1494
Residual	−1.90695	2.0945	0.0000	0.47482	1494
Std. predicted value	−1.956	2.331	0.000	1.000	1494
Std. residual	−4.014	4.409	0.000	1.000	1494

Source: Compiled by authors using SPSS.

5. Results and Discussion

The results from the comprehensive assessment of the PA related to the PMFBY scheme using multidimensional analysis reveal insightful points to the policymakers enhancing the PA related to the scheme. The discussion of perception of farmers had variation because social participation, individual motivation, education, and other socio-economic factors such as caste, holding size and many more. Further, results directly indicate the improvement in operational efficiencies of the PMFBY [78]. The results from descriptive statistics reveal farmers showed higher awareness of financial aspects, such as premium rates (Mean = 3.19) and payout structures (Mean = 3.43). However, awareness of technological tools like crop loss reporting through websites (Mean = 3.13) and multilingual portals (Mean = 3.03) was notably low, reflecting gaps in digital outreach. The study highlights the need for targeted interventions to enhance information dissemination on ICT components. This aligns with studies that indicate a disparity in awareness due to limited digital outreach in rural contexts [79]. From the point scoring approach, it was highlighted that there are regional variations. Kerala scored higher due to effective institutional penetration and media campaigns, while Rajasthan showed lower scores due to weaker outreach programs. This finding aligns with studies that highlight the role of institutional frameworks and community involvement in enhancing public awareness [77, 78]. The variation in awareness among farmers regarding financial aspects and technological tools stems from differences in cognitive and technical skills shaped by experience and exposure (ALA's Digital Literacy Task Force) [79]. Additionally, infrastructural limitations, literacy barriers, and lack of institutional support further exacerbate these disparities [80]. Meitei and Devi (2009) emphasize the need for significant efforts to establish efficient information and communication networks, ensuring that rural farmers receive adequate support for digital literacy and agricultural resilience [81].

Furthermore, the inferential analysis using Pearson correlation identifies strong correlations between awareness and institutional (0.916) and non-institutional (0.951) sources. This indicates the critical role of these types of sources in PA. Whereas media showed a moderate correlation (0.810), emphasizing its supportive but secondary role. These findings are consistent with previous research that underscores the importance of institutional and community-based sources in information dissemination [82, 83]. Moreover,

studies have found that media channels, while impactful, are often less effective in rural settings due to limited accessibility [84]. Additionally, research on communication strategies confirms the role of institutional frameworks in promoting targeted and effective awareness campaigns [85]. Thus, looking at the effectiveness of the institutional framework in PMFBY targeted institutional interventions must align with structured incentives for robustness and measurability. Data-driven assessments, performance-based rewards & penalties [86]. Thus, strengthening the regulatory oversight of scheme guidelines can improve (institutional) participation and policy outcomes.

The Kruskal-Wallis H test analysis reveals significant demographic disparities in awareness, satisfaction, and transparency of PMFBY. Females outperform males ($p < 0.001$), and younger respondents (18–35 years) exhibit higher awareness and satisfaction, while older groups face barriers. OBC and SC respondents show better outcomes than the General caste, reflecting effective targeted outreach, while marginal farmers score highest compared to small and large farmers. The Kruskal-Wallis H test confirms these differences across demographic groups ($p < 0.001$), emphasizing the need for tailored interventions. These findings align with prior research on how socio-economic factors of the respondents influence waste management in Delhi [87]. From the analysis of addressing regional differences in traditional knowledge, gender, and caste requires a multidimensional approach that extends beyond centralized policy guidelines. A decentralized governance framework, operationalized through the principles of cooperative federalism, is essential for fostering inclusive development [88]. Strengthening institutional mechanisms through collaborative governance, enhancing financial devolution, and facilitating intergovernmental dialogue are critical measures to ensure equitable policy implementation [89]. Thus, improving education, income distribution, and resource accessibility can boost public participation and policy outcomes, aligning with decentralized decision-making in governance frameworks for efficiency and inclusivity.

The regression model identifies key predictors of awareness related to the PMFBY scheme. Media emerged as the most influential factor, evidenced by the highest standardized beta coefficient (0.553, $p < 0.001$), indicating its critical role in driving awareness. Institutional factors also demonstrated a positive and statistically significant effect (Beta = 0.246, $p < 0.001$), reflecting the importance of organized outreach efforts. Conversely, non-institutional factors had a negligible negative impact (Beta = –0.025, $p = 0.289$), indicating their limited contribution to enhancing awareness. Multicollinearity diagnostics confirmed the robustness of the model, with Variance Inflation Factor (VIF) values within acceptable ranges (Institutional = 3.665, Media = 3.883) and low variance proportions, ensuring the reliability of regression coefficients. The residual analysis further supported the model's fit, with a mean residual of 0.000 and a standard deviation of 0.47482. These findings emphasize the pivotal role of media and institutional outreach in increasing public awareness, emphasizing the need for strategic focus on these channels. Earlier studies also provides insights that underline the necessity of targeted awareness campaigns on households and organizations to enhance the adoption of environmental aspects [89, 90]. Moreover, the recent PMFBY revised guidelines post-2020 have emphasised the role of institutional outreach for awareness creation and institutionalized the publicity awareness expenditure of insurance companies to 0.5% of the gross premium [27]. But from the analysis, it is noted that these efforts of the GoI have not been able to penetrate the awareness among the farmers in both states. So, more focus and awareness expenditure should be included for IEC activities in the scheme to around 5% than 0.5% across all the stakeholders. The regression analysis suggests that GoI efforts have not effectively reached farmers in both states, necessitating increased awareness initiatives and increased IEC budget allocation between 2–5% for better outreach and impact. This has been observed in other studies where Anaemia Mukt Bharat (AMB) has given IEC budget between 4–6% [91].

Thus, the analysis highlights the importance of integrating digital knowledge and skills in the PMFBY scheme, particularly through the Digital India Policy and Skill India scheme, to enhance digital services and equip individuals with necessary digital tools and com-

petencies. The background paper from Oxford University suggests that developing countries should establish standard-setting bodies to certify digital and soft skills, ensuring recognition by employers and higher education institutions. So, India's Recognition of Prior Learning (RPL) framework should be expanded to incorporate digital and soft skills, linking both formal and non-formal Technical and Vocational Education and Training (TVET) with qualification frameworks to enhance accessibility, particularly for marginalized rural populations [92, 93].

6. Limitation and Future Recommendation

The study has limitations, including its regional focus on only two states and its generalizability across the country. It fails to explore socio-cultural factors like traditional beliefs, language barriers, and community norms, which may influence PA and engagement [94]. The reliance on quantitative methods limits understanding of nuanced awareness barriers, particularly those shaped by localized contexts. Challenges like the digital divide and limited accessibility to digital platforms, and the effect of the Digital India policy in rural areas remain underexplored. Future work should adopt mixed-methods approaches, expand geographical scope, integrate socio-cultural dimensions, evaluate targeted media campaigns, and use longitudinal studies to refine outreach initiatives. These findings align with prior research on sustainable agricultural practices and public engagement.

7. Conclusion

India's agriculture sector faces immense challenges due to climate variability, rural economic vulnerabilities, and gaps in public awareness of risk mitigation strategies. PMFBY, as a flagship crop insurance scheme, is the largest crop insurance scheme globally, with 19.2 million farmers covered in 2022 (Kharif Season) and has the potential to bring climate resilience to the country. Yet, protecting farmers against climatic risks is contingent on effective public awareness campaigns. The findings of this study highlight significant disparities in awareness across demographic factors such as gender, age, caste, and farming types. Media and institutional outreach were identified as the strongest predictors of awareness, while non-institutional sources showed limited influence, underscoring the critical role of structured communication strategies.

The study emphasizes the need for a multi-stakeholder approach to bridge awareness gaps, particularly in underperforming regions and socio-demographic groups. Government authorities, along with private and community-based organizations, must collaborate to address barriers such as the digital divide and socio-cultural limitations. Enhancing the ICT component of PMFBY awareness campaigns, alongside tailored institutional and media-driven strategies, can significantly boost farmers' understanding of policy benefits.

For sustainable agriculture and economic resilience, it is imperative for policymakers to refine PMFBY's outreach mechanisms, leveraging digital tools and behavioral insights to align with the specific needs of farmers. By fostering a collaborative ecosystem, the government can ensure that PMFBY meets its objectives of inclusive coverage and risk mitigation, promoting both agricultural sustainability and economic equity.

Author Contributions

Concept development and data collection, V.R.R.M.; paper development, A.K.G.; theoretical framework and data collection, P.M.; data cleaning and analysis, S.J. All authors have read and agreed to the published version of the manuscript.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflict of interest.

References

[1] Ministry of Statistics and Programme Implementation, 2024. Statistical Report on Value of Output from Agriculture and Allied Sectors (2011-12 to 2022-23). Available from: https://www.mospi.gov.in/sites/default/files/publication_reports/Brochure_2024.pdf

[2] Satyasai, K., Tiwari, A., Patra, D., 2022. Journey of Indian agriculture since independence: Vision for Amrit Kal. NABARD Study Series No. 34, 22 November 2022.

[3] Gill, S.S., Brar, J.S., 1996. Global market and competitiveness of Indian agriculture: Some issues. Economic and Political Weekly. 31(32), 2167–2177. Available from: http://www.jstor.org/stable/4404499

[4] FAOSTAT, 2023. Agricultural production data for India. Available from: https://www.fao.org/faostat/en/#data/QI (cited 15 November 2024).

[5] India Brand Equity Foundation. Agriculture and Allied Sector Report. November 2025. Available from: https://www.ibef.org/industry/agriculture-presentation

[6] Roy, D., Roy, B., 2022. India's Agriculture and Food Exports Opportunities and Challenges, 1st ed. Bloomsbury India: New Delhi, India. pp 1–4. Available from: https://www.bloomsbury.com/in/indias-agriculture-and-food-exports-9789354357978/

[7] Rajalahti, R., van der Heijden, K., Janssen, W., et al., 2006. Scenario planning to guide long-term investments in agricultural science and technology: theory and practice from a case study on India (English). Agriculture and Rural Development discussion paper no. 29, Report no 37066. 01 June 2006. Available from: http://documents.worldbank.org/curated/en/314511468170980002/Scenario-planning-to-guide-long-term-investments-in-agricultural-science-and-technology-theory-and-practice-from-a-case-study-on-India

[8] Standing Committee on Agriculture, Animal Husbandry and Food Processing, 2024. Promotion of Climate Resilient Farming. Report No. 68, 2 February 2024. Lok Sabha Secretariat: New Delhi, India. Available from: https://sansad.in/getFile/lsscommittee/Agriculture,%20Animal%20Husbandry%20and%20Food%20Processing/17_Agriculture_Animal_Husbandry_and_Food_Processing_68.pdf?source=loksabhadocs

[9] Kumar, R., Raman, M.S., Chauhan, S., 2023. Agricultural reforms in India. In: Ghosh, P.K., Das, A., Saxena, R., et al. (eds.). Trajectory of 75 years of Indian Agriculture after Independence. Springer: Singapore. pp. 775–790. DOI: https://doi.org/10.1007/978-981-19-7997-2_30

[10] Dubashi, N., Fiocco, D., Goyal, A., et al., 2023. How agtech is poised to transform India into a farming powerhouse. Available from: https://www.mckinsey.com/industries/agriculture/our-insights/how-agtech-is-poised-to-transform-india-into-a-farming-powerhouse#/ (cited 20 November 2024).

[11] Charan, A., 2024. The Future of Agriculture in India: Technology, Challenges, and Government Policies. Available from: https://www.amulyacharan.com/2024/10/26/the-future-of-agriculture-in-india-technology-challenges-and-government-policies/ (cited 22 November 2024).

[12] Manucang, S.A.T., Caina, M.A., 2024. The level of disaster awareness and preparedness of San Jose vegetable farmers in Monkayo, Davao De Oro: Basis for extension intervention. International Journal of Research and Innovation in Social Science. VIII(IIIS), 3362–3370. DOI: https://doi.org/10.47772/ijriss.2024.803242s

[13] Lunenburg, F.C., 2010. Communication: The process, barriers, and improving effectiveness. Schooling. 1(1), pp 1-11. Available from: http://www.nationalforum.com/Electronic%20Journal%20Volumes/Lunenburg,%20Fred%20C,%20Communication%20Schooling%20V1%20N1%202010.pdf

[14] Reece, T., 2023. Public awareness and its impact in empowering individuals for societal change. Journal of Political Sciences & Public Affairs. 11(2), 1–10. Available from: https://www.longdom.org/op

en-access-pdfs/public-awareness-and-its-impact-in-empowering-individuals-for-societal-change.pdf

[15] Elareshi, M., Habes, M., Ali, S., et al., 2024. Public engagement through public service advertisements for health care awareness during early COVID-19 in Pakistan. Frontiers in Communication. 9, pp 1-12. DOI: https://doi.org/10.3389/fcomm.2024.1376717

[16] OECD, 2021. OECD Report on public communication: The global context and the way forward. 21 December 2021. Open Access. DOI: https://doi.org/10.1787/22f8031c-en

[17] Quy, H., Ha, T.T., 2018. An empirical assessment of public policy communications in central region of Vietnam. Modern Economy. 9, 2052–2063.

[18] Tiwari, R., Chand, K., Anjum, B., 2020. Crop insurance in India: A review of Pradhan Mantri Fasal Bima Yojana (PMFBY). FIIB Business Review. 9(4), 249–255. DOI: https://doi.org/10.1177/2319714520966084

[19] Ministry of Agriculture & Farmers Welfare, 2024. Revival of Fasal Bima Yojana. Available from: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2042245 (cited 2 December 2024).

[20] Diyyala, R., Palanichamy, N.V., Murugananthi, D., et al., 2024. Determinants of farmers' awareness and perspectives on Pradhan Mantri Fasal Bima Yojana in Southern Tamil Nadu, India. Asian Journal of Agricultural Extension Economics & Sociology. 42(9), 26–38. Available from https://journalajaees.com/index.php/AJAEES/article/view/2538

[21] Kokare, N.M.a.G., 2024. Evaluation of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in Sangli District. EPRA International Journal of Economic and Business Review. 12(8), 76–81. DOI: https://doi.org/10.36713/epra17845

[22] Meena, S.K., Wakle, P.K., More, S.D., 2024. Relationship between profile and attitude of farmers towards Pradhan Mantri Fasal Bima Yojana. Gujarat Journal of Extension Education. 37(2), 159–162. Retrieved December 3, 2024, DOI: https://doi.org/10.56572/gjoee.2024.37.2.0027

[23] Raju, S., Chand, R., 2020. Insurance as a risk mitigation tool for Indian agriculture: The case of PMFBY. Economic and Political Weekly. 55(18), 120–127.

[24] Sharma, R., Yadav, S., 2021. Crop insurance and farmer welfare: Evaluating the impact of PMFBY in India. International Journal of Rural Studies. 29(3), 89–105.

[25] Kumar, P., Sharma, V., Reddy, M., 2022. Reforming crop insurance in India: A critical evaluation of PMFBY. Journal of Agricultural Economics and Policy. 34(1), 45–62.

[26] Sabha, R., 2024. Unstarred question: Sharing of Premium under PMFBY. Available from: https://sansad.in/getFile/annex/265/AU2112_iAHSWm.pdf?source=pqars (cited 30 November 2024).

[27] Ministry of Agriculture and Farmers Welfare (MoAFW), 2023. Operational guidelines Kharif-23 for the implementation of Pradhan Mantri Fasal Bima Yojana (PMFBY) and Restructured Weather Based Crop Insurance Scheme (RWBCIS) - From Kharif 2023 onwards. 11019/01/2022, 6 November 2024. Available from: https://pmfby.amnex.co.in/pmfby/pdf/operational_guidelines_pmfby.pdf

[28] Press India Bureau (PIB), 2023. Non opting of Pradhan Mantri Fasal Bima Yojana. Available https://pib.gov.in/PressReleseDetail.aspx?PRID=1982796&reg=3&lang=1 (cited 2 December 2024).

[29] Meena, B.S., 2009 & 2010. Communication sources credibility and utilization pattern among farmers. Rajasthan Society of Extension Education. 17 & 18, 40–43. Available from: http://rseeudaipur.org/wp-content/uploads/2013/02/10.pdf

[30] Ministry of Agriculture & Farmers Welfare, 2023. Spreading awareness among the farmers. Available from: https://pib.gov.in/PressReleseDetailm.aspx?PRID=1906890&reg=3&lang=1 (cited 2 December 2024).

[31] Anjani, Kumar, Sonkar, V., et al., 2021. Farmers' awareness and perceptions of the new farm laws 2020 in India: Empirical evidence from a household survey. AgEcon Search. 76(3), 408–423. DOI: https://doi.org/10.22004/ag.econ.345170

[32] Verma, S.R., Sharma, F.L., 2015. Application of information and communication technologies in agriculture by extension personnel. Journal of Extension Systems. 29(2). Available from: https://www.researchgate.net/publication/283767475_APPLICATION_OF_INFORMATION_AND_COMMUNICATION_TECHNOLOGIES_IN_AGRICULTURE_BY_EXTENSION_PERSONNEL

[33] Jethi, R., Joshi, K., Chandra, N., 2016. Information communication technology for agricultural knowledge dissemination in hill farming. Journal of Agroecology and Natural Resource Management. 3(3), 315–317. Available from: https://krishi.icar.gov.in/jspui/handle/123456789/12772

[34] Kavitha, S., Anandaraja, N., 2018. Kisan Call Centre services to the farming Community: An analysis. Journal of Extension Education. 29(3), 5910. DOI: https://doi.org/10.26725/JEE.2017.3.29.5910-5916

[35] Sahu, S., Bishnoi, S., Sharma, P.R., et al., 2024. Exploring popular information sources and determinants of farmers' access to agricultural extension services in the Indo-Gangetic plains. Frontiers in Sustainable Food Systems. 8, pp 01-14. DOI: https://doi.org/10.3389/fsufs.2024.1339243

[36] Kansana, B.S., Kushwaha, P.S., Singh, P., et al., 2015. Assessment of the efficacy of Kisan Mobile Advisory: An ICT tool for agricultural extension and rural development. International Journal of Scientific Research. 4(1), pp 1-3.

[37] Kushwaha, S., Mazhar, S.H., 2021. Information seeking behavior and utilization of social media for agricultural information by farmers of Prayagraj District of Uttar Pradesh. International Journal of Advances in Agricultural Science and Technology. 8(8), 42–51. Available from https://ijaast.org/index.php/ijaast/article/view/282/273

[38] Tadavi, S.A., Kadam, R.P., Manvar, V.S., 2024. Use of social media as a source of market information by the farmers. Gujarat Journal of Extension Education. 37(2), 110–114. DOI: https://doi.org/10.56572/gjoee.2024.37.2.0018

[39] Khatibi, F.S., Dedekorkut-Howes, A., Howes, M., et al., 2021. Can public awareness, knowledge and engagement improve climate change adaptation policies?. Discover Sustainability. 2(1), Open Access. DOI: https://doi.org/10.1007/s43621-021-00024-z

[40] Tang, J.L., Yan, B., Chang, H.H., et al., 2023. Policy communication in times of public health crisis: Longitudinal network modeling of U.S. politician-health agency interactions during the COVID-19 pandemic. Computers in Human Behavior. 148, 107922. DOI: https://doi.org/10.1016/j.chb.2023.107922

[41] Encabo, M.T.E., Dura, D.A.P. 2024. Public awareness of Anti-Violence against Women and Children Law in Tagum City: Basis for information dissemination plan. American Journal of Public Policy and Administration. 9(2), 48–70. DOI: https://doi.org/10.47672/ajppa.1886

[42] Hong, H., 2013. Government websites and social media's influence on government-public relationships. Public Relations Review. 39, 346–356. DOI: https://doi.org/10.1016/J.PUBREV.2013.07.007.

[43] Devi, N.A., Saleh, M.M., Srinivas, K.G.A., et al., 2024. Automated multilingual multimedia dissemination of government press releases. In Proceedings of the 5th International Conference on Innovative Trends in Information Technology (ICITIIT), Kottayam, India, 15-16 March 2024; pp. 1–7. DOI: https://doi.org/10.1109/icitiit61487.2024.10580027

[44] Bansal, V., Das, L., Joshi, V., et al., 2022. Farmer's awareness and use of different ICT tools. Asian Journal of Agricultural Extension, Economics & Sociology. 40(10), 156–165. DOI: https://doi.org/10.9734/ajaees/2022/v40i1031055

[45] Joshi, C., Singh, B., Mishra, O., 2012. Communication strategy for promoting organic farming in a hilly state of India. Journal of Global Communication. 5(2), 172. DOI: https://doi.org/10.5958/j.0974-0600.5.2.012

[46] Rao, N., 2006. A framework for implementing information and communication technologies in agricultural development in India. Technological Forecasting and Social Change. 74(4), 491–518. DOI: https://doi.org/10.1016/j.techfore.2006.02.002

[47] Patra, S.K., 2013. ICT initiatives and agricultural communication in India. Mass Communicator International Journal of Communication Studies. 7(2), 12. https://doi.org/10.5958/j.0973-967x.7.2.002

[48] Cortignani, R., Severini, S., 2012. Modelling farmer participation to a revenue insurance scheme by the means of the Positive Mathematical Programming. Agricultural Economics. 58(7), 324–331. DOI: https://doi.org/10.17221/127/2011-AGRICECON

[49] Ngango, J., Nkurunziza, F., Ndagijimana, J., 2022. Assessing rural farmers' willingness to pay for crop insurance scheme: Evidence from Rwanda. Cogent Economics & Finance. 10(1), pp 1-14. DOI: https://doi.org/10.1080/23322039.2022.2104780

[50] Ghimire, R., Kumar, P., 2014. Agricultural insurance products in Nepal: Practice and prospects. SSRN Electronic Journal. 1-17. DOI: https://doi.org/10.2139/ssrn.2374820

[51] Bhattacharya, S., 2012. Consumer credit in India. SSRN. DOI: https://doi.org/10.2139/ssrn.2007897

[52] Bielza, M., Stroblmair, J., Gallego, J., et al., 2007. Agricultural risk management in Europe. Proceedings of the 101st EAAE Seminar "Management of Climate Risks in Agriculture"; July 5–6, 2007; Berlin Germany, pp 1-22. DOI: https://doi.org/10.22004/ag.econ.9252

[53] Duhan, A., Singh, S., 2017. Factors affecting awareness level of farmers about crop insurance: A case study of Haryana. Asian Journal of Agricultural Extension Economics & Sociology. 21(4), 1–7. DOI: https://doi.org/10.9734/ajaees/2017/37966

[54] Clarke, D.J., Mahul, O., Verma, N., 2012. Improving farmers' access to agricultural insurance in India. Policy Research Working Paper No. 5987, 01 March 2012. Available from: http://documents.worldbank.org/curated/en/207211468259772817/Improving-farmers-access-to-agricultural-insurance-in-India

[55] Biswal, D., Bahinipati, C.S., 2023. Crop-insurance adoption and impact on farm households' well-being in India: Evidence from a panel study. Journal of the Asia Pacific Economy. 30(1), 1–20. DOI: https://doi.org/10.1080/13547860.2023.2266204

[56] Jain, V., Dharmaraja, S., 2019. Crop Insurance in India: A Mathematical Review. In: Tripathy, A., Sub-

udhi, R., Patnaik, S., Nayak, J. (eds.). Operations Research in Development Sector. Asset Analytics. Springer: Singapore. DOI: https://doi.org/10.1007/978-981-13-1954-9_7

[57] Rajeev, M., Bhattacharjee, M., Vani, B.P., 2016. Climate change and uncertainty in agriculture: Does crop insurance help in India? In: Nautiyal, S., Schaldach, R., Raju, K., et al. (eds.). Climate Change Challenge (3C) and Social-Economic-Ecological Interface-Building. Springer: Cham, Germany. pp. 241–260. DOI: https://doi.org/10.1007/978-3-319-31014-5_14

[58] Carey, G.R.W., 2024. Revolutionizing crop insurance in India through the Prism of Pradhan Mantri Fasal Bima Yojana (PMFBY). Indian Journal of Applied Research. 14(2), 57–60. DOI: https://doi.org/10.36106/ijar/5409520

[59] Mosley, P., Krishnamurthy, R., 1995. Can crop insurance work? The case of India. The Journal of Development Studies. 31(3), 428–450. DOI: https://doi.org/10.1080/00220389508422371

[60] Mishra, P.K., 1994. Crop insurance and crop credit: Impact of the comprehensive crop insurance scheme on cooperative credit in Gujarat. Journal of International Development. 6(5), 529–567. DOI: https://doi.org/10.1002/jid.3380060505

[61] Akber, N., Paltasingh, K.R., Mishra, A.K., 2023. Does crop insurance ensure food security for Indian farmers? Evidence from a nationally representative survey. Agribusiness. 41(1), 217–237. DOI: https://doi.org/10.1002/agr.21884

[62] Rao, N.M., 2021. Farmers perception and awareness about agriculture insurance scheme – a study of North Karnataka. Journal of Management and Science. 10(3), 33–40. Available from: https://jmseleyon.com/index.php/jms/article/view/446

[63] Arnstein, S.R., 2019. A ladder of citizen participation. Journal of the American Planning Association. 85(1), 24–34. DOI: https://doi.org/10.1080/01944363.2018.1559388

[64] Uittenbroek, C.J., Mees, H.L.P., Hegger, D.L.T., et al., 2019. The design of public participation: Who participates, when and how? Insights in climate adaptation planning from the Netherlands. Journal of Environmental Planning and Management. 62(14), 2529–2547. DOI: https://doi.org/10.1080/09640568.2019.1569503

[65] Cash, D.W., Clark, W.C., Alcock, F., et al., 2003. Knowledge systems for sustainable development. Proceedings of the National Academy of Sciences (PNAS). 100(14), 8086–8091, DOI: https://doi.org/10.1073/pnas.1231332100

[66] Paulraj, A.P., Easwaran, N., 2020. Evaluation of "revamped" crop insurance Pradhan Mantri Fasal Bima Yojana (PMFBY) among paddy farmers in Tamil Nadu, India. Current Journal of Applied Science and Technology. 39(34), 66–77. DOI: https://doi.org/10.9734/cjast/2020/v39i3431037

[67] Nagesh, H., Rao, B.M., Krishna, T.G., 2022. Constraints faced by the beneficiaries of PMFBY and suggestions given by them to overcome the constraints in Srikakulam District of Andhra Pradesh. Current Journal of Applied Science and Technology. 41(35), 40–43. DOI: https://doi.org/10.9734/cjast/2022/v41i353959

[68] Zhao, Y., Chai, Z., Delgado, M.S., et al., 2017. A test on adverse selection of farmers in crop insurance: Results from Inner Mongolia, China. Journal of Integrative Agriculture. 16(2), 478–485. DOI: https://doi.org/10.1016/s2095-3119(16)61440-5

[69] Pane, T.C., Supriyono, Y., Novita, D., 2021. Supporting food security with rice farming insurance: the farmers' perceptions (case study in Cinta Damai Village, Percut Sei Tuan Subdistrict, Deli Serdang District). IOP Conference Series Earth and Environmental Science. 782(2), 022044. DOI: https://doi.org/10.1088/1755-1315/782/2/022044

[70] Castro, S., 2018. Google Forms Quizzes and Substitution, Augmentation, Modification, and Redefinition (SAMR) Model Integration. Issues and Trends in Educational Technology. 6(2), 4-14. DOI: https://doi.org/10.2458/AZU_ITET_V6I2_CASTRO

[71] Bhalerao, A., 2015. Application and performance of google forms for online data collection and analysis: A case of North Eastern region of India. Indian Journal of Extension Education. 51, 49–53. Available from: https://acspublisher.com/journals/index.php/ijee/article/view/5310

[72] Bickel, D., 2003. Robust and efficient estimation of the mode of continuous data: The mode as a viable measure of central tendency. Journal of Statistical Computation and Simulation. 73(8), 899–912. DOI: https://doi.org/10.1080/0094965031000097809

[73] Jankowski, K., Flannelly, K., 2015. Measures of central tendency in chaplaincy, health care, and related research. Journal of Health Care Chaplaincy. 21(1), 39–49. DOI: https://doi.org/10.1080/08854726.2014.989799

[74] Lempert, R.J., Schlesinger, M.E., Bankes, S.C., et al., 2000. The impacts of climate variability on near-term policy choices and the value of information. Climatic Change. 45(1), 129–161. DOI: https://doi.org/10.1023/A:1005697118423

[75] Khakshooy, A.M., Chiappelli, F., 2018. Inferential statistics I. In: Practical Biostatistics in Translational Healthcare. Springer: Berlin, Heidelberg, Germany. pp. 71-90. DOI: https://doi.org/10.1007/978-3-662-57437-9_5

[76] MacFarland, T.W., Yates, J.M., 2016. Kruskal–Wallis

H-Test for Oneway Analysis of Variance (ANOVA) by ranks. In: Introduction to Nonparametric Statistics for the Biological Sciences Using R. Springer: Cham, Germany. pp. 177–211. DOI: https://doi.org/10.1007/978-3-319-30634-6_6

[77] Cohen, J., Cohen, P., West, S.G., et al., 2003. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Routledge: New York, USA. pp. 451–478. DOI: https://doi.org/10.4324/9780203774441

[78] Centre for Secondary Agriculture, FPO and Monitoring & Evaluation, n.d. A study on evaluation of Mega Awareness Campaign of Pradhan Mantri Fasal Bima Yojana. National Institute of Agricultural Extension Management (MANAGE): Hyderabad, India.

[79] Gupta, A., 2018. A Comparative Study of Environmental Awareness in Rural and Urban Pupil-Teachers through Social sites and Traditional Methods [Ph.D. Theis]. University of Kota: Kota, India. pp. 58-62. Available from: https://www.uok.ac.in/notifications/Anju%20Gupta%20Education.pdf

[80] Office of Information Technology Policy (OITP) Digital Literacy Taskforce, 2011. What is digital literacy? 2011. Available from: https://alair.ala.org/handle/11213/16260

[81] Meitei, L.S., Devi, T.P., 2009. Farmers information needs in rural Manipur: An assessment. Anaals of Library and Information Studies. 56, 35–40. Available from: https://www.researchgate.net/publication/267410155_Farmers_information_needs_in_rural_Manipur_An_assessment

[82] Soylu, D., Cevher, N., Schirone, M., et al., 2016. A comparative study of information seeking behavior and digital information needs of farmers in Turkey and Sweden. International Journal of eBusiness and eGovernment Studies. 8(2), 18–33. Available from: https://dergipark.org.tr/en/pub/ijeb eg/issue/26191/275814

[83] Si, W., Jiang, C., Meng, L., 2022. The relationship between environmental awareness, habitat quality, and community residents' pro-environmental behavior—mediated effects model analysis based on social capital. International Journal of Environmental Research and Public Health. 19(20), 13253. DOI: https://doi.org/10.3390/ijerph192013253

[84] Han, W., McCabe, S., Wang, Y., et al., 2017. Evaluating user-generated content in social media: An effective approach to encourage greater pro-environmental behavior in tourism?. Journal of Sustainable Tourism. 26(4), 600–614. DOI: https://doi.org/10.1080/09669582.2017.1372442

[85] Schober, P., Boer, C., Schwarte, L.A., 2018. Correlation Coefficients: Appropriate use and interpretation. Anesthesia & Analgesia. 126(5), 1763–1768. DOI: https://doi.org/10.1213/ane.0000000000002864

[86] Ghosh, R.K., 2018. Performance evaluation of Pradhan Mantri Fasal Bima Yojana (PMFBY) - Part I: Governance analysis: Governance analysis. Indian Institute of Management Ahmedabad (IIMA): Ahmedabad, India. Available from: https://www.iima.ac.in/sites/default/files/2023-08/PMFBY%20%28Part-I%29%202018%20-%20Final%20Report_final.pdf

[87] Taylor, J., Bates, T.R., 2013. A discussion on the significance associated with Pearson's correlation in precision agriculture studies. Precision Agriculture. 14(4), 558–564. DOI: https://doi.org/10.1007/s11119-013-9314-9

[88] Gautam, M., 2023. Cooperative federalism in India: Strengthening unity through collaboration. Global Journal for Research Analysis. 12(8), 56–58. Available from: https://www.researchgate.net/publication/373637626_COOPERATIVE_FEDERALISM_IN_INDIA_STRENGTHENING_UNITY_THROUGH_COLLABORATION

[89] Findi, H.A., 2021. New theories of federalism system, Indian Republic model. Polytechnic Journal of Humanities and Social Sciences. 2(2), 23–30. Available from https://www.researchgate.net/publication/360528280_New_Theories_of_Federalism_System_Indian_Republic_Model

[90] Posadzki, P., Stockl, A., Musonda, P., et al., 2010. A mixed-method approach to sense of coherence, health behaviors, self-efficacy and optimism: Towards the operationalization of positive health attitudes. Scandinavian Journal of Psychology. 51(3), 246–252. DOI: https://doi.org/10.1111/j.1467-9450.2009.00764.x

[91] Saini, A., Shukla, R., Joe, W., et al., 2022. Improving nutrition budgeting in health sector plans: Evidence from India's anaemia control strategy. Maternal and Child Nutrition. 18(2), 1-11. DOI: https://doi.org/10.1111/mcn.13253

[92] Yadav, H., Paliwal, M., Chatradhi, N., 2022. Entrepreneurship development of rural women through digital inclusion: Examining the contributions of public programs. In: Rajagopal, Behl, R. (eds.). Inclusive Businesses in Developing Economies. Palgrave Studies in Democracy, Innovation, and Entrepreneurship for Growth. Palgrave Macmillan: Cham, Germany. 287-309. DOI: https://doi.org/10.1007/978-3-031-12217-0_14

[93] Ananthesh, H., 2016. Role of "skill india program" in realizing "digital India mission." Splint International Journal of Professionals. 3(6), 78–82. Available from: https://www.indianjournals.com/ijor.aspx?target=ijor:sijp&volume=3&issue=6&article=010

[94] Jalali, M., Bouyer, A., 2019. Exploring the relationship of university students' educational variables and the degree of their use of virtual social networks. Information Discovery and Delivery. 47(4), 182–191. DOI: https://doi.org/10.1108/idd-07-2019-0051