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A study on adoption of soil health card recommendations and its association with socio-economic characteristics of farmers

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Abstract

The present study was conducted in Seoni district of Madhya Pradesh to assess farmers' adoption of Soil Health Card (SHC) recommendations and to determine its association with selected socio-economic characteristics. An ex-post facto research design was adopted and a total of 120 farmers were selected from four villages of Seoni and Barghat blocks through a multistage sampling procedure. Data were collected using a pre-tested structured interview schedule and analyzed using frequency, percentage, mean, standard deviation and Chi-square test. The findings revealed that the respondents were predominantly middle-aged (53.33%), had medium farming experience (54.17%), medium annual income (50.00%) and marginal landholdings (31.67%). Most farmers had medium levels of extension contact (55.84%), innovativeness (58.34%), risk orientation (56.67%) and decision-making ability (57.50%), while mobile/internet (76.67%) was the major source of agricultural information. Regarding adoption, the majority of farmers (56.67%) belonged to the medium adoption category, followed by high (23.33%) and low (20.00%) adoption. Education, farming experience, annual income, landholding, social participation and risk orientation showed significant associations with adoption, whereas extension contact, innovativeness, training exposure, mass media exposure, decision-making ability and accessibility to agricultural advisory services showed highly significant associations.

Keywords: Soil health card, adoption, farmers, soil fertility, extension services, Seoni District

Introduction

India is predominantly an agrarian country, where agriculture plays an important role in food security, employment generation and rural livelihoods. Soil is one of the most important natural resources for agricultural production and maintaining its fertility is essential for sustainable crop production. Imbalanced fertilizer use, continuous nutrient depletion and deterioration of soil quality can adversely affect crop productivity and farm income. To promote scientific and balanced nutrient management, the Government of India launched the Soil Health Card (SHC) Scheme in 2015. The scheme provides farmers with soil-test-based information on the nutrient status of their fields and recommendations for appropriate fertilizer application and soil amendments (Ministry of Agriculture & Farmers Welfare, 2025). The Soil Health Card covers 12 important parameters, including major nutrients, micronutrients, pH, electrical conductivity and organic carbon, thereby helping farmers make informed decisions regarding fertilizer and nutrient management.

The effectiveness of the Soil Health Card Scheme depends largely on farmers' understanding and adoption of the recommendations provided in the card. Although the scheme has achieved extensive coverage across the country, the actual adoption of recommended soil and nutrient

management practices may differ among farmers because of differences in education, landholding, income, farming experience, extension contact, access to information and availability of resources. Therefore, studying farmers' adoption of Soil Health Card recommendations and its relationship with their socio-economic characteristics is important for assessing the effectiveness of the scheme at the farm level. In this context, the present study entitled "A Study on Adoption of Soil Health Card Recommendations and Its Association with Socio-Economic Characteristics of Farmers" was undertaken to assess the extent of adoption of recommended soil health practices and to determine their association with selected socio-economic characteristics of farmers. The findings may help identify gaps in adoption and provide useful suggestions for strengthening extension services and improving the effective utilization of Soil Health Card recommendations.

Materials and Methods

The present study was conducted in Seoni district of Madhya Pradesh to assess the adoption of Soil Health Card recommendations among farmers and to determine its association with selected socio-economic characteristics. Seoni district was purposively selected considering its predominantly agriculture-based rural economy, importance

of crop production and implementation of the Soil Health Card Scheme. An ex-post facto research design was adopted for the study, as the variables under investigation had already occurred and were not subject to manipulation by the researcher. From the eight development blocks of Seoni district, Seoni and Barghat blocks were purposively selected for the study.

From each selected block, two villages were selected through simple random sampling, resulting in four villages, namely Bandol and Banki from Seoni block and Ari and Asta from Barghat block. From each selected village, 30 farmers were selected, giving a total sample size of 120 respondents. Primary data were collected through a pre-tested and structured interview schedule covering the socio-economic characteristics of respondents and their adoption of Soil Health Card recommendations. The collected information was carefully checked, classified and tabulated for further analysis.

The data obtained from the respondents were analyzed using appropriate statistical tools to achieve the objectives of the study. Frequency, percentage, mean and standard deviation were used to describe the distribution and extent of adoption among the respondents. The Chi-square (χ^2) test was employed to determine the association between selected independent variables and the dependent variable, i.e., adoption of Soil Health Card recommendations. The results obtained through these statistical procedures were interpreted systematically to draw meaningful conclusions regarding farmers' adoption behaviour and the factors associated with it.

Results and Discussion

The study considered 18 independent variables, namely age, education, gender, family size, farming experience, annual income, size of landholding, occupation, family type, caste, extension contact, innovativeness, social participation, training exposure, source of irrigation, mass media exposure, risk orientation and decision-making ability, while adoption level was taken as the dependent variable (Table 1).

Socio-Economic Characteristics of Farmers

Age: The majority of respondents (53.33%) belonged to the middle-age group (36–55 years), indicating the predominance of economically active and experienced farmers. This finding was supported by Kumar and Singh and Verma, who also reported the predominance of middle-aged farmers.

Education: The highest proportion of respondents (20.83%) had middle-school education, followed by high school (18.33%), indicating a moderate educational level. Similar findings were reported by Kumar, who observed that most farmers had education up to middle or secondary level.

Gender: A large majority of respondents (80.00%) were male, indicating male dominance in farming activities. This finding was supported by Patel and Sharma, who reported a higher proportion of male farmers.

Family size: The majority of respondents (58.33%) belonged to the medium family-size category (5–8 members). Similar findings were reported by Patel, who observed the

predominance of medium-sized families among farming households.

Farming experience: More than half of the respondents (54.17%) had medium farming experience (16–30 years). This finding was supported by Reddy and Meena, who reported a predominance of farmers with medium farming experience.

Annual family income: Half of the respondents (50.00%) belonged to the medium-income category (₹1,50,001–₹3,00,000). Similar findings were reported by Kumar, who found that the majority of farmers belonged to medium-income groups.

Landholding: The highest proportion of respondents (31.67%) were marginal farmers with landholdings up to 1 ha. This finding was supported by Kumar and Patel, who also reported the predominance of marginal and small farmers.

Occupation: Agriculture was the main occupation of the majority of respondents (43.34%). Similar findings were reported by Singh and Verma, who observed that agriculture was the primary livelihood source of most rural respondents. Family type: The majority of respondents (62.50%) belonged to joint families. This finding was supported by Yadav and Sharma, who reported the predominance of joint families among farming households.

Caste: The highest proportion of respondents (45.83%) belonged to the OBC category. Similar variations in caste composition among farming communities.

Extension contact: The majority of respondents (55.84%) had a medium level of extension contact. This finding was supported by Kumar and Singh, who reported medium extension contact among the majority of farmers.

Innovativeness: The majority of respondents (58.34%) had a medium level of innovativeness. Similar findings were reported by Kumar and Singh, indicating moderate innovativeness among farmers.

Social participation: Most respondents (50.00%) were members of one organization, followed by 30.00% with membership in more than one organization, while 20.00% had no membership. This finding was supported by Kumar, who reported that social participation facilitated farmers' access to information and improved agricultural practices.

Training exposure: The largest proportion of respondents (31.67%) had attended one training programme. Similar findings were reported by Kumar and Singh, who highlighted the role of training in improving farmers' knowledge and adoption.

Source of irrigation: Tube well/bore well was the major source of irrigation, reported by 31.66 per cent of respondents. Similar findings were reported by Kumar, who observed that irrigation availability influenced the adoption of improved agricultural practices.

Mass media exposure: Mobile/internet was the most commonly used source of agricultural information (76.67%). This finding was supported by Kumar and Singh, who reported the increasing importance of mobile-based information sources among farmers.

Risk orientation: The majority of respondents (56.67%) had a medium level of risk orientation. Similar findings were reported by Kumar and Singh, who observed medium risk orientation among most farmers.

Decision-making ability: The majority of respondents (57.50%) had a medium level of decision-making ability. This finding was supported by Yadav, who reported that decision-making ability influenced farmers' adoption of improved agricultural practices.

Adoption Level of Soil Health Card Recommendations

The data presented in Table 2 reveal that the majority of respondents (56.67%) belonged to the medium adoption category, followed by 23.33 per cent in the high adoption category and 20.00 per cent in the low adoption category. This indicates that most farmers had a moderate level of adoption of Soil Health Card recommendations related to soil testing, balanced fertilizer application and nutrient management. The findings may be attributed to farmers' knowledge, extension contact, training exposure and access

to agricultural advisory services. Similar findings were reported by and Choudhary, who observed that farmers' adoption of soil and nutrient management practices was generally medium and was influenced by knowledge, extension contact, training and access to agricultural information.

Association between Independent Variables and Adoption Level of Soil Health Card Recommendations

The data presented in Table 2 reveal that education ($\chi^2=14.26$), farming experience ($\chi^2=7.48$), annual income ($\chi^2=11.42$), size of landholding ($\chi^2=10.36$), social participation ($\chi^2=9.64$) and risk orientation ($\chi^2=12.46$) had a significant association with farmers' adoption of Soil Health Card recommendations, while extension contact ($\chi^2=16.84$), innovativeness ($\chi^2=15.32$), training exposure ($\chi^2=19.26$), mass media exposure ($\chi^2=15.18$), decision-making ability ($\chi^2=17.58$) and accessibility to agricultural advisory services ($\chi^2=21.34$) showed a highly significant association. In contrast, age ($\chi^2=2.84$), family size ($\chi^2=2.36$), occupation ($\chi^2=3.18$), family type ($\chi^2=1.46$), caste ($\chi^2=2.72$) and source of irrigation ($\chi^2=8.74$) were found to have a non-significant association with adoption. The results suggest that farmers having better educational status, economic resources, extension contact, innovativeness, training exposure, access to information and advisory services were more likely to adopt Soil Health Card recommendations.

Table 1: Distribution of farmers according to socio-economic characteristics (N = 120)

S. No.	Characteristic	Category 1	F (%)	Category 2	F (%)	Category 3	F (%)	Category 4	F (%)	Category 5	F (%)	Category 6	F (%)	Category 7	F (%)
1	Age	Young	28 (23.33)	Middle	64 (53.33)	Old	28 (23.34)	—	—	—	—	—	—	—	—
2	Education	Illiterate	12 (10.00)	Read/write	8 (6.67)	Primary	18 (15.00)	Middle	25 (20.83)	High school	22 (18.33)	Higher secondary	20 (16.67)	Graduate+	15 (12.50)
3	Gender	Male	96 (80.00)	Female	24 (20.00)	—	—	—	—	—	—	—	—	—	—
4	Family size	Small	32 (26.67)	Medium	70 (58.33)	Large	18 (15.00)	—	—	—	—	—	—	—	—
5	Farming experience	Low	25 (20.83)	Medium	65 (54.17)	High	30 (25.00)	—	—	—	—	—	—	—	—
6	Annual income	Low	35 (29.17)	Medium	60 (50.00)	High	25 (20.83)	—	—	—	—	—	—	—	—
7	Landholding	Marginal	38 (31.67)	Small	34 (28.33)	Semi-medium	30 (25.00)	Medium	15 (12.50)	Large	3 (2.50)	—	—	—	—
8	Occupation	Agricultural labour	15 (12.50)	Agriculture + Labour	28 (23.33)	Agriculture	52 (43.34)	Agriculture + Business	15 (12.50)	Agriculture + Service	10 (8.33)	—	—	—	—
9	Family type	Nuclear	45 (37.50)	Joint	75 (62.50)	—	—	—	—	—	—	—	—	—	—
10	Caste	SC	18 (15.00)	ST	32 (26.67)	OBC	55 (45.83)	General	15 (12.50)	—	—	—	—	—	—
11	Extension contact	Low	28 (23.33)	Medium	67 (55.84)	High	25 (20.83)	—	—	—	—	—	—	—	—
12	Innovativeness	Low	25 (20.83)	Medium	70 (58.34)	High	25 (20.83)	—	—	—	—	—	—	—	—
13	Social	No	24	Member	60	Member >1	36	—	—	—	—	—	—	—	—

	participation	membershi p	(20.00)	one	(50.00)		(30.00)								
14	Training exposure	No training	22 (18.33)	One programme	38 (31.67)	Two programmes	32 (26.67)	Three programmes	18 (15.00)	>3 programmes	10 (8.33)	—	—	—	—
15	Irrigation source	Rainfed	26 (21.67)	Well/Open well	35 (29.17)	Tube/Bore well	38 (31.66)	Canal	12 (10.00)	>1 source	9 (7.50)	—	—	—	—
16	Mass media	Radio Yes	42 (35.00)	Radio No	78 (65.00)	TV Yes	68 (56.67)	TV No	52 (43.33)	Newspaper Yes	50 (41.67)	Newspape r No	70 (58.33)	Mobile/Interne t Yes	92 (76.67)
17	Risk orientation	Low	27 (22.50)	Medium	68 (56.67)	High	25 (20.83)	—	—	—	—	—	—	—	—
18	Decision-making	Low	28 (23.33)	Medium	69 (57.50)	High	23 (19.17)	—	—	—	—	—	—	—	—
19	Adoption level (Depended varibles)	Low	24 (20.00)	Medium	68 (56.67)	High	28 (23.33)	—	—	—	—	—	—	—	—

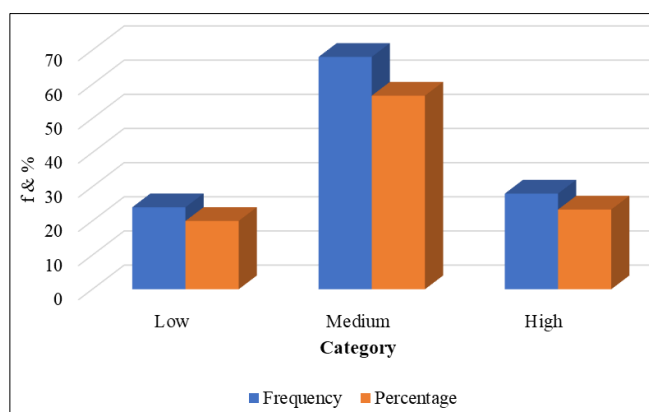


Fig 1: Distribution of respondents according to their extent of adoption level of Soil Health Card recommendations (N = 120)

Table 2: Association between Independent Variables and Adoption Level of Farmers regarding Soil Health Card Recommendations (N = 120)

S. No.	Variables	Symbol	Chi-square value (χ^2)	Significance
1	Age	X ₁	2.84	NS
2	Education	X ₂	14.26	S
3	Family size	X ₃	2.36	NS
4	Farming experience	X ₄	7.48	S
5	Annual income	X ₅	11.42	S
6	Size of landholding	X ₆	10.36	S
7	Occupation	X ₇	3.18	NS
8	Family type	X ₈	1.46	NS
9	Caste	X ₉	2.72	NS
10	Extension contact	X ₁₀	16.84	HS
11	Innovativeness	X ₁₁	15.32	HS
12	Social participation	X ₁₂	9.64	S
13	Training exposure	X ₁₃	19.26	HS
14	Source of irrigation	X ₁₄	8.74	NS
15	Mass media exposure	X ₁₅	15.18	HS
16	Risk orientation	X ₁₆	12.46	S
17	Decision-making ability	X ₁₇	17.58	HS
18	Accessibility to agricultural advisory services	X ₁₈	21.34	HS

NS: Non-significant; S: Significance

Conclusion

The study concluded that the majority of farmers were

middle-aged, moderately educated, had medium farming experience, medium annual income, marginal landholdings and medium levels of extension contact, innovativeness, risk orientation and decision-making ability. Agriculture was the major occupation, while mobile/internet was the most important source of agricultural information. The majority of farmers (56.67%) showed a medium level of adoption of Soil Health Card recommendations, indicating considerable scope for improvement. Education, farming experience, annual income, landholding, social participation and risk orientation had a significant association with adoption, whereas extension contact, innovativeness, training exposure, mass media exposure, decision-making ability and accessibility to agricultural advisory services showed a highly significant association. Therefore, strengthening farmer training, extension contact, digital information services and timely agricultural advisory support can help improve the adoption of Soil Health Card recommendations and promote sustainable soil fertility management.

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