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Impact of Agro Meteorological Advisory Services (AAS) on socio economic status of farmers

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Abstract

Agro-Meteorological Advisory Services (AAS) provide farmers with weather-related information and crop-specific advice that can assist them in making timely decisions during different stages of crop production. The present study was undertaken in Kolhapur district of Maharashtra to compare AAS beneficiary and non-beneficiary farmers with respect to their socio-economic characteristics, change in agricultural production and crop-wise productivity. An ex-post facto research design was used for the study. A total of 160 farmers, comprising 80 AAS beneficiaries and 80 non-beneficiaries, were selected from Karveer, Radhanagari, Ajara and Hatkanangale tahsils. Data were collected through a structured interview schedule and analysed using frequency, percentage and mean. The results showed that farmers in both groups were predominantly 36–55 years of age, with medium levels of farming experience and social participation. Beneficiary farmers showed a comparatively higher representation in the high categories of innovativeness and mass media contact. In terms of annual income, beneficiaries were relatively more concentrated in the medium and higher income categories. A marked difference was observed in change in production between the two groups. A high level of change in production was recorded among 61.25 per cent of beneficiaries, compared with 13.75 per cent of non-beneficiaries. Crop-wise comparison also showed higher average productivity among beneficiaries for all crops cultivated by both groups. The yield difference ranged from 3.52 q/ha in gram to 12.47 q/ha in maize, while sugarcane showed a difference of 27.50 t/ha. Sorghum was cultivated only by beneficiary farmers, with an average productivity of 21.00 q/ha. Overall, the findings indicate that AAS beneficiary farmers had comparatively better production and productivity outcomes than non-beneficiary farmers, suggesting the practical value of weather-based advisories in supporting timely farm-level decisions and agricultural performance.

Keywords: Agro Meteorological Advisory Services (AAS), socio economic status, farmers, agricultural productivity, crop production, weather information

Introduction

Agricultural production is closely influenced by weather conditions, and variations in rainfall, temperature, humidity and other weather parameters can affect crop growth, farm operations and productivity. Weather variability often creates uncertainty in decisions related to sowing, irrigation, fertilizer application, plant protection and harvesting. Timely and reliable weather information can therefore assist farmers in making appropriate farm-level decisions. In India, Agro-Meteorological Advisory Services (AAS), provided under the Gramin Krishi Mausam Sewa (GKMS), integrate weather forecasts with crop-specific recommendations to help farmers manage weather-related risks and plan agricultural operations more effectively.

The usefulness of AAS extends beyond the provision of weather information, as timely advisories can assist farmers in selecting appropriate production practices and managing farm resources. Recommendations related to irrigation, plant

protection, sowing and harvesting may help farmers respond to changing weather conditions and minimise potential production losses. Studies on agro-meteorological advisories have reported their usefulness in improving farm-level decision-making and production outcomes (Manjusha *et al.*, 2019; Deepthi *et al.*, 2022; Ramachandrappa *et al.*, 2018) ^[6, 2, 7]. However, the magnitude of such benefits may vary according to cropping systems, local weather conditions and farmers' socio-economic characteristics.

The socio-economic characteristics of farmers are closely associated with their capacity to access information, adopt improved practices and manage agricultural risks. Better production performance and efficient resource management may contribute to improved farm income and resilience to production-related uncertainties. In this context, AAS may support farmers' decision-making by providing weather-based information relevant to different agricultural operations. However, comparative evidence on AAS

beneficiaries and non-beneficiaries with respect to socio-economic characteristics, change in production and crop-wise productivity at the district level remains limited.

Kolhapur district of Maharashtra has diverse cropping systems and agricultural conditions, providing an appropriate setting for assessing the farm-level relevance of agro-meteorological advisories. The present study was therefore undertaken to compare AAS beneficiary and non-beneficiary farmers in Kolhapur district with respect to their socio-economic characteristics, change in agricultural production and crop-wise productivity. The study provides comparative evidence on the association of access to weather-based advisories with farm production and productivity outcomes.

Objectives

1. To assess the socio-economic status of AAS beneficiary and non-beneficiary farmers.
2. To assess the change in agricultural production among beneficiary and non-beneficiary farmers.
3. To compare crop-wise productivity of beneficiary and non-beneficiary farmers.

Methodology

The study was conducted in Kolhapur district of Maharashtra. Four tahsils, namely Karveer, Radhanagari, Ajara and Hatkanangale, were selected purposively. Two villages from each selected tahsil were selected, resulting in a total of eight villages. From each tahsil, 40 farmers comprising 20 AAS beneficiaries and 20 non-beneficiaries were selected. Thus, the total sample consisted of 160 farmers, including 80 AAS beneficiaries and 80 non-beneficiaries. Data were collected through a structured interview schedule administered in the local Marathi language. An ex-post facto research design was followed for the study.

The study covered selected socio-economic, behavioural and communication characteristics, change in agricultural production and crop-wise productivity. The characteristics considered were age, education, farming experience, social participation, annual income, landholding, risk orientation, innovativeness and mass media contact.

Age, education, farming experience, annual income and landholding were measured according to the categories adopted for the study. Social participation, risk orientation, innovativeness and mass media contact were assessed using structured statements. For the behavioural and attitudinal measures, responses were recorded on a five-point continuum, namely Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2 and Strongly Disagree = 1. The scores obtained for the respective statements were used to classify respondents into low, medium and high categories according to the predetermined scoring procedure.

Change in production was assessed using seven statements comprising five positive and two negative statements on a five-point continuum. The responses were scored accordingly, and the negative statements were reverse-scored before calculating the overall change-in-production score.

Crop-wise productivity was assessed using the average yield

obtained by farmers for each major crop. Productivity was expressed in quintals per hectare (q/ha) for field crops and tonnes per hectare (t/ha) for sugarcane.

The collected data were classified, tabulated and analysed using appropriate statistical techniques. Frequency, percentage and mean were used to summarise and interpret the data. A comparative assessment was made between AAS beneficiary and non-beneficiary farmers with respect to their socio-economic characteristics, change in production and crop-wise productivity. The results were presented in tabular form for systematic comparison.

Results and Discussion

1. Social, Behavioural and Communication Characteristics of Farmers

The distribution of farmers according to their social, behavioural and communication characteristics is presented in Table 1. In both groups, farmers aged 36–55 years formed the largest proportion, accounting for 57.50 per cent of AAS beneficiaries and 61.25 per cent of non-beneficiaries similar finding was reported by Verma and Sharma (2022) ^[9]. With regard to education, secondary education was the most common level among both beneficiaries (43.75%) and non-beneficiaries (37.50%) comparable result were observed by Hebsale V. K and Pathak. T.B. (2023) ^[5]. Farming experience was mainly concentrated in the medium category, comprising 47.50 per cent of beneficiaries and 45.00 per cent of non-beneficiaries the finding of the present study is in agreement with Deepthi *et al.* (2022) ^[2].

A similar pattern was observed for social participation, where the medium category represented 58.75 per cent of beneficiaries and 52.50 per cent of non-beneficiaries the finding is consistent with the observations of Soumya *et al.* (2021) ^[8]. For risk orientation, half of the beneficiaries (50.00%) and more than half of the non-beneficiaries (55.00%) were classified in the medium category, a similar trend was documented by Harshini (2023) ^[4]. These results indicate that the two groups were broadly comparable with respect to age, education, farming experience and social participation, although some variation was evident in their behavioural characteristics.

The most pronounced difference between the two groups was observed for innovativeness. A high level of innovativeness was reported for 53.75 per cent of beneficiaries, whereas the corresponding proportion among non-beneficiaries was only 12.50 per cent, present findings are consistent with the observation made by Ashrit and Joshi (2023) ^[1]. Mass media contact also differed considerably between the groups. While 32.50 per cent of beneficiaries had a high level of mass media contact, only 12.50 per cent of non-beneficiaries fell in this category, the present findings support observation made by Dilip (2021) ^[3]. Overall, the results show that AAS beneficiaries had a relatively greater representation in the high innovativeness and high mass media contact categories, whereas both groups showed broadly similar patterns for age, education, farming experience and social participation.

Table 1: Social, Behavioural and Communication Characteristics of AAS Beneficiary and Non-beneficiary Farmers

Sr. No.	Characteristics/Category	Beneficiary farmer (N=80)		Non-Beneficiary farmers (N=80)	
	Personal characteristic	Frequency	Percent (%)	Frequency	Percent (%)
1.	Age				
	Young (Up to 35 Years)	12	15.00	15	18.75
	Middle (36 to 55 Years)	46	57.50	49	61.25
	Old (56 and above)	22	27.50	16	20.00
2.	Education				
	Illiterate	05	06.25	09	11.25
	Primary Education (up to 7)	15	18.75	18	22.50
	Secondary Education (up to 10)	35	43.75	30	37.50
	Higher Secondary (up to 12)	16	20.00	15	18.75
	Graduation and above	09	11.25	07	10.00
3.	Experience in farming				
	Low (Up to 17)	24	30.00	28	35.00
	Medium (18 to 27)	38	47.50	36	45.00
	High (28 and above)	18	22.50	16	20.00
4.	Social participation				
	Low (Up to 14)	18	22.50	29	36.25
	Medium (15 to 17)	47	58.75	42	52.50
	High (18 and above)	15	18.75	09	11.25
5.	Risk Orientation				
	Low (Up to 15)	31	38.75	14	17.50
	Medium (16 to 22)	40	50.00	44	55.00
	High (23 and above)	09	11.25	22	27.50
6.	Innovativeness				
	Low (Up to 16)	17	21.25	37	41.25
	Medium (17 to 20)	20	25.00	33	46.25
	High (21 and above)	43	53.75	10	12.50
7.	Mass Media Contact				
	Low (Up to 16)	11	13.75	28	35.00
	Medium (17 to 19)	43	53.75	42	52.50
	High (20 and above)	26	32.50	10	12.50

2. Economic Characteristics and Change in Production of Farmers

Table 2 shows the economic profile of the respondents along with their distribution according to change in production. In terms of annual income, the highest share of AAS beneficiaries (33.75%) was found in the medium-income group, followed by 26.25 per cent in the high-income group. Among non-beneficiaries, 30.00 per cent belonged to the low-income category and 27.50 per cent to the medium-income category. The distribution therefore shows a relatively greater concentration of beneficiaries in the

medium and higher income groups, this result is in line with the findings with result of Deepthi *et al.* (2022)^[2].

With respect to landholding, marginal farmers represented the largest proportion in both groups, accounting for 53.75 per cent of beneficiaries and 43.75 per cent of non-beneficiaries. Small farmers constituted 28.75 and 32.50 per cent of the respective groups. Farmers with larger holdings formed only a small proportion of the sample, indicating that most respondents operated relatively small landholdings, this observation corresponds with results of Ramachandrapa (2018)^[7].

Table 2: Economic Characteristics of AAS Beneficiary and Non-beneficiary Farmers

Sr. No.	Characteristics/Category	Beneficiary farmer (N=80)		Non-Beneficiary farmers (N=80)	
	Personal characteristic	Frequency	Percent (%)	Frequency	Percent (%)
1.	Annual Income				
	Very Low (Up to 2,50,000/-)	08	10.00	15	18.75
	Low (2,50,001/- to 4,65,000/-)	16	20.00	24	30.00
	Medium (4,65,001/- to 6,50,000/-)	27	33.75	22	27.50
	High (6,50,001/- to 8,25,000/-)	21	26.25	15	18.75
	Very High (8,25,001/- and above)	08	10.00	04	05.00
2.	Land Holding				
	Marginal (Up to 1.00)	43	53.75	35	43.75
	Small (1.01 to 2.00)	23	28.75	26	32.50
	Semi-medium (2.01 to 4.00)	09	11.25	13	16.25
	Medium (4.01 to 10.00)	04	05.00	05	06.25
	Large (10.1 and above)	01	01.25	01	01.25
3.	Change in Production				
	Low (Up to 18)	08	10.00	48	60.00
	Medium (19 to 26)	23	28.75	21	26.25
	High (27 and above)	49	61.25	11	13.75

The distribution for change in production showed a considerable difference between the two groups. A high level of change was recorded by 61.25 per cent of AAS beneficiaries, compared with only 13.75 per cent of non-beneficiaries. Among beneficiaries, 28.75 per cent were in the medium category and 10.00 per cent in the low category. In contrast, the majority of non-beneficiaries (60.00%) fell in the low category, while 26.25 per cent were in the medium category. The findings thus show a substantially higher proportion of AAS beneficiaries in the high change-in-production category than non-beneficiaries, the present findings corroborate the results reported by Manjusha *et al.* (2019) [6].

3. Crop-wise Productivity of AAS Beneficiary and Non-beneficiary Farmers

Table 3 presents the average productivity of major crops cultivated by AAS beneficiary and non-beneficiary farmers. The results indicate that AAS beneficiaries recorded higher average yields than non-beneficiaries for all crops cultivated by both groups. The yield difference was 8.99 q/ha for soybean, 7.00 q/ha for kharif groundnut, 7.49 q/ha for rice

and 7.01 q/ha for wheat. In gram, the difference was comparatively smaller at 3.52 q/ha.

Among the remaining crops, maize recorded an average yield of 59.99 q/ha among beneficiaries compared with 47.52 q/ha among non-beneficiaries, giving a difference of 12.47 q/ha. The corresponding differences for sunflower and summer groundnut were 8.00 and 6.00 q/ha, respectively. Sorghum was cultivated only by AAS beneficiary farmers, who recorded an average yield of 21.00 q/ha. Since none of the non-beneficiary farmers cultivated sorghum, a comparison of productivity and yield difference was not possible for this crop.

The largest difference was observed in sugarcane, where beneficiaries recorded an average productivity of 132.50 t/ha, compared with 105.00 t/ha among non-beneficiaries, resulting in a difference of 27.50 t/ha. Overall, the findings show that AAS beneficiary farmers recorded higher crop-wise productivity than non-beneficiaries for all commonly cultivated crops included in the comparison. The consistently higher productivity among beneficiaries indicates the potential contribution of timely weather-based advisories towards improved farm-level production performance.

Table 3: Crop-wise Productivity of AAS Beneficiary and Non-beneficiary Farmers

Sr. No.	Crops	Beneficiary Avg Yield (q/ha)	Non-Beneficiary Avg Yield (q/ha)	Difference
1	Soybean	27.49	18.50	8.99
2	Groundnut (Kharif)	20.50	13.5	7.00
3	Rice	48.49	41	7.49
4	Wheat	31.01	24	7.01
5	Gram	12.51	8.99	3.52
6	Sorghum	21.00	--	--
7	Maize	59.99	47.52	12.47
8	Sunflower	18.00	10	8.00
9	Summer Groundnut	20.00	14	6.00
10	Sugarcane (t/ha)	132.50	105	27.50

Conclusion

The present study examined the socio-economic characteristics, change in production and crop productivity of AAS beneficiary and non-beneficiary farmers in Kolhapur district of Maharashtra. The findings showed that farmers in both groups were mainly middle-aged and had medium levels of farming experience and social participation. A noticeable difference was observed in innovativeness and mass media contact, with beneficiaries having a greater proportion of farmers in the higher categories. Beneficiary farmers were also relatively better represented in the medium and higher annual-income groups.

The comparison of production outcomes revealed a substantial difference between the two groups. High change in production was recorded among 61.25 per cent of beneficiaries, compared with 13.75 per cent of non-beneficiaries. Crop-wise assessment also showed higher average yields among beneficiaries for all crops cultivated by both groups. The yield advantage ranged from 3.52 q/ha in gram to 12.47 q/ha in maize, whereas sugarcane showed a difference of 27.50 t/ha. Sorghum was cultivated only by beneficiary farmers, with an average yield of 21.00 q/ha. Overall, the results indicate better production and productivity outcomes among farmers receiving AAS, highlighting the practical relevance of timely weather-based advisories in supporting farm-level agricultural decision-

making.

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