



Knowledge of Young Farmers about Climate Smart Agricultural Intervention

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Climate Smart Agriculture interventions have emerged to address the challenges in the agriculture sector caused by climate-induced disasters and stresses. For the present investigation data were collected from all the seven districts of the South Gujarat region, the overall sample size comprises of 280 young farmers. The results showed that the majority of the young farmers had adequate to best knowledge about CSA interventions. Further, results showed that the annual income, risk preference and leadership ability were found positively and significantly related to the knowledge of young farmers about CSA interventions at a 1 percent level of significance. While, education, mass media exposure, extension contact, scientific orientation, awareness on climate change, innovativeness, risk orientation and decision making ability were found positively and significantly related with the knowledge of young farmers about CSA interventions at a 5 percent level of significance. Furthermore, the land holding was found negatively and non-significantly related with the knowledge of young farmers about CSA interventions.

Keywords: *Knowledge; young farmers; climate smart agricultural intervention; relationship.*

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1. INTRODUCTION

Knowledge is a familiarity, awareness, or understanding of someone or something, such as facts (propositional knowledge), skills (procedural knowledge), or objects (acquaintance knowledge). The term knowledge refers to a theoretical or practical understanding of a subject. CSA referred to “Climate Smart Agriculture (CSA) interventions is a strategic approach that aims to sustainably improve agricultural productivity and enhance food security, increase farmers’ resilience and adaptation to climate change, and reduce and/or remove GHGs emissions where possible” [1]. According to Lipper et al. [2] “Climate Smart Agriculture (CSA) is defined as an approach for transforming and reorienting agricultural development under the new realities of climate change”. CSA helps and guides actions needed to transform and reorient agricultural systems to effectively support the development and ensure food security in a changing climate. Hence, the knowledge about CSA interventions plays a key role in combating climate change ensuring food security in our country. “Climate Smart Agricultural interventions include seed banks, fodder banks, commodity groups, custom hiring centres, collective marketing, and the introduction of weather index-based insurance and climate literacy via a village level weather station” [3]. Apart from this Neetu et al. [4] concluded that significant change in agriculture and allied activities changes to shift in climate in the region. In this regard, an attempt was carried out to measure the knowledge of respondent young farmers towards CSA interventions.

2. METHODOLOGY

The study was conducted in the South Gujarat region from the year 2020 to 2021. All the seven districts of South Gujarat viz.; Navsari, Valsad, Surat, Tapi, Narmada, Bharuch and The Dangs were selected for the study. In total 280 respondents were selected by using a simple random sampling method. Knowledge about

CSA interventions was measured with the help of well structured interviews schedule consisting of 25 dichotomous statements in four sections. The first section was on ‘adaptation’ consisted of 6 statements, the second section was on ‘mitigation’ consisted of 7 statements, the third section was on ‘productivity’ consisted of 6 statements and the fourth section was on ‘food security’ consisted of 6 statements. Thus, there were 25 statements in all. The score 1 and 0 were assigned for ‘Yes’ and ‘No’, respectively. Thus, the maximum and minimum score obtainable by a respondent was 25 and 0, respectively. The score of all four sections were summed up for each respondent and converted into frequency and percentage. Based on the total score obtained by the respondents, they were grouped into three categories namely ‘poor knowledge’, ‘adequate knowledge’ and ‘best knowledge’ by using the formula mean \pm standard deviation. Later, the same data was used to find out the relationship with independent variables.

3. RESULTS AND DISCUSSION

3.1 Knowledge of Young Farmers about CSA Interventions

Knowledge is understood information possessed by an individual. The aspect wise information regarding knowledge of the respondent young farmers about CSA interventions were collected and their responses were grouped into three categories viz., (i) Poor knowledge (mean score up to 18) (ii) Adequate knowledge (mean score 19 to 24) and (iii) Best knowledge (mean score above 24). The data in regards are presented in Table 1.

The data presented in Table 1 depicts that 58.58 per cent of the respondent young farmers had adequate knowledge about CSA interventions followed by 24.64 per cent and 16.78 per cent of the respondent young farmers who had the best knowledge and poor knowledge about CSA interventions, respectively.

Table 1. Distribution of young farmers according to their knowledge about CSA interventions (n=280)

| Sr. No. | Categories | Frequency | Percentage | Mean score | SD \pm |
|--------------|--------------------|------------|---------------|------------|----------|
| 1. | Poor knowledge | 47 | 16.78 | 20.96 | 2.57 |
| 2. | Adequate knowledge | 164 | 58.58 | | |
| 3. | Best knowledge | 69 | 24.64 | | |
| Total | | 280 | 100.00 | | |

These findings envisage that majority of the respondents (83.22 %) had adequate to best knowledge about CSA interventions. This might be due to the reason that educated respondent young farmers being more passionate in adopting innovative ideas in their farming might have developed enough curiosity and interest in gathering more information and knowledge regarding CSA interventions.

These findings are supported by the findings of Gwambene et al. [5], Md et al. [6], Nwobodo and Agwu [7] and Parvallika and Mazhar [8].

3.2 Knowledge of Young Farmers about Different Climate Smart Agricultural Interventions

The knowledge of different areas about CSA intervention was measured by calculating the frequency and percentage and data on the same presented in Table 2.

The data presented in Table 2 depicts that 100.00 per cent of the respondents had

knowledge about “Do you know about organic farming?” and “Do you know about System of Rice Intensification (SRI) of paddy?” followed by “Do you know about pest and disease tolerant varieties of major crops of this area? (95.00%)”, “Do you know about the drought tolerant varieties of major crops of this area? (83.00)”, “Do you know CSA interventions help in rain water harvesting? (64.00%)” and “Do you know about contingency crop planning? (63.00%)” in the adaptation area.

Further, 100.00 per cent of the respondents had knowledge about “Do you know CSA interventions help in reducing deforestation?”, “Do you know about solar pump irrigation system?” and “Do you know about organic manure?” followed by “Do you know CSA interventions help in reducing greenhouse gases emission? (83.00%)”, “Do you know about Integrated Nutrient Management (INM)? (68.00%)”, “Do you know about leaf colour chart? (52.00%)” and “Do you know about carbon sequestration? (45.00%)” in the mitigation area.

Table 2. Distribution of respondents according to their knowledge about different Climate Smart Agricultural Interventions (n=280)

| Sl. No. | Statements | F | % |
|---------------------|---|-----|--------|
| Adaptation | | | |
| 1 | Do you know about organic farming? | 280 | 100.00 |
| 2 | Do you know about contingency crop planning? | 176 | 63.00 |
| 3 | Do you know about the drought tolerant varieties of major crops of this area? | 231 | 83.00 |
| 4 | Do you know about pest and disease tolerant varieties of major crops of this area? | 267 | 95.00 |
| 5 | Do you know about System of Rice Intensification (SRI) of paddy? | 280 | 100.00 |
| 6 | Do you know CSA interventions help in rain water harvesting? | 180 | 64.00 |
| Mitigation | | | |
| 7 | Do you know CSA interventions help in reducing deforestation? | 280 | 100.00 |
| 8 | Do you know CSA interventions help in reducing greenhouse gases emission? | 267 | 95.40 |
| 9 | Do you know about Integrated Nutrient Management (INM)? | 190 | 68.00 |
| 10 | Do you know about solar pump irrigation system? | 280 | 100.00 |
| 11 | Do you know about the leaf colour chart? | 145 | 52.00 |
| 12 | Do you know about organic manure? | 280 | 100.00 |
| 13 | Do you know about carbon sequestration? | 126 | 45.00 |
| Productivity | | | |
| 14 | Do you know CSA interventions help to maintain stability in farm income? | 280 | 100.00 |
| 15 | Do you know CSA interventions help in reducing the cost of cultivation? | 267 | 95.00 |
| 16 | Do you know climate-resilient crop varieties help in increasing crop production? | 280 | 100.00 |
| 17 | Do you know crop diversification helps in increasing the farm productivity? | 247 | 88.00 |
| 18 | Do you know CSA interventions help in getting market related information about various crops? | 246 | 87.90 |
| 19 | Do you know agro-forestry increases the productivity of the farming system? | 229 | 82.00 |

| Sl. No. | Statements | F | % |
|----------------------|--|-----|-------|
| Food Security | | | |
| 20 | Do you know CSA interventions help in food security? | 243 | 87.00 |
| 21 | Do you know the daily requirement of food per person? | 158 | 56.00 |
| 22 | Do you know that there is a proper and adequate supply of quality food in your area? | 244 | 87.10 |
| 23 | Do you know CSA interventions help in the utilization of available food effectively? | 243 | 87.00 |
| 24 | Do you know CSA interventions help in reducing post harvest losses? | 186 | 66.00 |
| 25 | Do you know kitchen garden secures food and nutrition security? | 266 | 95.00 |



Fig. 1. Empirical model showing a relationship between knowledge of young farmers about CSA interventions and selected independent variables

While, 100.00 per cent of the respondents had knowledge about “Do you know CSA interventions help to maintain stability in farm income” and “Do you know climate-resilient crop varieties help in increasing crop production?” followed by “Do you know CSA interventions help in reducing the cost of cultivation? (95.00%)”, “Do you know crop diversification helps in increasing the farm productivity? (88.00%)”, “Do you know CSA interventions help in getting market related information about various crops? (87.90%)” and “Do you know agro-forestry

increases the productivity of the farming system? (87.00%)” in productivity area.

In addition, 95.00 per cent of the respondents had knowledge about “Do you know kitchen garden secures food and nutrition security?” followed by “Do you know that there is a proper and adequate supply of quality food in your area? (87.10%)”, “Do you know CSA interventions help in food security?” & “Do you know CSA interventions help in the utilization of available food effectively?” (87.00%)”, “Do you

know CSA interventions help in reducing post harvest losses? (66.00%)” and “Do you know the daily requirement of food per person? (56.00%)” in the food security area.

3.3 Relationship between Knowledge of Respondent Young Farmers about Climate Smart Agricultural Interventions and Selected Independent Variables

The relationship between knowledge of young farmers about CSA interventions and selected independent variables *viz.*, education, land holding, annual income, mass media exposure, extension contacts, scientific orientation, awareness on climate change, innovativeness, risk orientation, risk preference, leadership ability and decision making ability were worked out with the help of correlation coefficient (r) with a sample size of 280 respondents and data are presented in Fig. 1.

3.3.1 Education and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their education ($r = 0.119^*$) at 5 percent level of significance. Hypothesis (H_{01}): ‘There is no relationship between the knowledge of young farmers about CSA interventions with their education’ was therefore, rejected. It means that the education of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that education plays a vital role in acquisition and understanding of information about CSA interventions.

These findings are in conformity with the findings of Okoro et al. [9] and Chauhan et al. [10].

3.3.2 Land holding and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found negatively and non-significantly related with their land holding ($r = -0.006^{NS}$). Hypothesis (H_{02}): ‘There is no relationship between the knowledge of young farmers about CSA interventions with their land

holding’ was therefore, accepted. It means that the land holding of the young farmers does not exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that the interest of young farmers in gathering knowledge and information regarding CSA interventions is irrespective of their size of the land holding.

These findings are in conformity with the findings of Inavathaider et al. [11].

3.3.3 Annual income and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their annual income ($r = 0.168^{**}$) at 1 percent level of significance. Hypothesis (H_{03}): ‘There is no relationship between the knowledge of young farmers about CSA interventions with their annual income’ was therefore, rejected. It means that the annual income of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that getting good remunerative returns from farming might be motivating young farmers in gathering more knowledge about CSA interventions in the scope of obtaining further more stable income from farming.

These findings are in conformity with the findings of Okoro et al. [9] and Chauhan et al. [10].

3.3.4 Mass media exposure and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found significantly related with their mass media exposure ($r = 0.121^*$) at a 5 percent level of significance. Hypothesis (H_{04}): ‘There is no relationship between the knowledge of young farmers about CSA interventions with their mass media exposure’ was therefore, rejected. It means that the mass media exposure of the young farmers exerts its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that a good level of mass media exposure might be making young farmers more enthusiastic and might be generating more interest among young farmers in acquiring more knowledge regarding CSA interventions.

3.3.5 Extension contact and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their extension contact ($r = 0.122^*$) at 5 percent level of significance. Hypothesis (H_{05}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their extension contact' was therefore, rejected. It means that the extension contact of the young farmers exerts its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that frequent contacts as well as interaction with extension agencies might help them to seek more information and knowledge regarding CSA interventions.

These findings are in conformity with the findings of Khatri and Chauhan [12].

3.3.6 Scientific orientation and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their scientific orientation ($r = 0.140^*$) at 5 percent level of significance. Hypothesis (H_{06}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their scientific orientation' was therefore, rejected. It means that the scientific orientation of the young farmers exerts its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that young farmers might be more scientifically oriented toward CSA interventions.

3.3.7 Awareness on climate change and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their awareness on climate change ($r = 0.139^*$) at 5 percent level of significance. Hypothesis (H_{07}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their awareness on climate change' was therefore, rejected. It means that the awareness on climate change of the young farmers exert its influence on knowledge about CSA interventions of the

respondent young farmers. This might be due to the fact that awareness on climate change plays important role in acquiring and comprehending information about CSA interventions.

3.3.8 Innovativeness and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their innovativeness ($r = 0.116^*$) at 5 percent level of significance. Hypothesis (H_{08}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their innovativeness' was therefore, rejected. It means that the innovativeness of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that the young farmers might be more willing to try out new ideas in farming, which motivated them to acquire knowledge regarding CSA interventions.

3.3.9 Risk orientation and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were found positively and significantly related with their risk orientation ($r = 0.126^*$) at 5 percent level of significance. Hypothesis (H_{09}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their risk orientation' was therefore, rejected. It means that the risk orientation of the young farmers exerts its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that young farmers who are more willing to take calculated risks during uncertain situation might be wishing to acquire more knowledge regarding CSA interventions.

3.3.10 Risk preference and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were positively and found significantly related with their risk preference ($r = 0.174^{**}$) at 1 percent level of significance. Hypothesis (H_{10}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their risk preference' was therefore, rejected. It means that the risk

preference of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that young farmers might be in need of more knowledge regarding CSA interventions for making the best preference among the risks in adopting CSA interventions.

3.3.11 Leadership ability and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers towards CSA interventions were found positively and significantly related with their leadership ability ($r = 0.209^{**}$) at 1 percent level of significance. Hypothesis (H_{11}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their leadership ability' was therefore, rejected. It means that the leadership ability of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. The young farmer with good leadership quality and to influence others to adopt CSA interventions they might require more knowledge about CSA interventions.

3.3.12 Decision making ability and knowledge about CSA interventions

The data presented in Fig. 1 reveals that the knowledge of young farmers about CSA interventions were positively and found significantly related with their decision making ability ($r = 0.147^*$) at a 5 percent level of significance. Hypothesis (H_{12}): 'There is no relationship between the knowledge of young farmers about CSA interventions with their decision making ability' was therefore, rejected. It means that the decision making ability of the young farmers exert its influence on knowledge about CSA interventions of the respondent young farmers. This might be due to the fact that more knowledge about CSA interventions might help young farmers to take the right decision in choosing better CSA interventions.

These findings are in conformity with the findings of Okoro et al. [11] and Chauhan et al. [2].

4. CONCLUSION

It is concluded that the majority of young farmers had adequate to best knowledge about CSA interventions. This clearly indicates that young farmers are more passionate about adopting

innovative ideas in their farming. Furthermore, young farmers developed enough curiosity and interest in gathering more information and knowledge regarding CSA interventions. As a result, the State Department of Agriculture, Gujarat, SAUs, NGOs, and other organizations should increase efforts to increase knowledge about CSA interventions to combat climate change, increase productivity, reduce greenhouse gas emissions and increase adaptation in this regard.

5. IMPLICATION OF RESEARCH

The level of knowledge about CSA interventions may vary among the young farmers after the lapse of time in the study area. Keeping this in mind, appropriate extension methodology may be used for conducting research in the same or other areas in time to come.

RESEARCH CATEGORY

Agricultural Extension and Communication, CSA interventions, Young Farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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