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Knowledge and Awareness about Nutrition Sensitive Agriculture in Southern Odisha

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HIGHLIGHTS

- The kitchen garden skills and knowledge should be improved for the benefit of taking fresh vegetables and improving nutritional security.
- The production of value-added food crops like fortified grains, processed fruits and vegetables, and nutrient-dense snacks should be encouraged.
- It is crucial to have proper training, extension services, and campaigns to fully utilize the Nutrition-sensitive interventions.

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ABSTRACT

No matter how nutrition-sensitive agriculture is defined, nutrition starts with what we eat, the products of the food and agriculture sector. It emphasizes how important it is to educate farmers, decision-makers, and the general public on the concepts and methods of nutrition-sensitive agriculture. Programs for education and outreach are essential for promoting awareness of sustainable farming practices and their implementation, which improve nutrition and food security. The present study examines Nutrition-sensitive Agriculture in Southern Odisha, focusing on Gajapati and Rayagada districts. Three blocks were selected from each district, totaling six blocks. Within these blocks, 3 villages were selected randomly from each gram panchayats, so a total of 20 respondents from each block selected by simple random sampling technique to form a total sample size 120. The majority of respondents were having lower (57%) level of knowledge towards nutrition-sensitive agriculture with a lower (53%) level of awareness towards nutrition-sensitive agriculture. The regression model explained that 60.5 per cent (R^2=0.6050) of variability in influencing the knowledge and 67.04 per cent (R^2=0.6704) of variability in influencing the awareness of nutrition-sensitive agriculture.

INTRODUCTION

The interaction between nutrition, health, and agriculture through mutual dependence is referred to as the "nutrition-agriculture linkage" (Sahn 2010). Agriculture provides food, there are various ways in which agriculture and nutrition are related (Kadiyala et al., 2014). It is observed a change in household consumption patterns over time, with a decrease in the consumption of cereal and pulses and an increase in the consumption of commodities such milk, milk products, eggs, fish, meat, vegetables, and fruits (Gupta & Mishra, 2014; Amarsinghe et al., 2007). When people have physical, social, and economic access to enough safe, nourishing food to satisfy their dietary needs and food choices and lead active, healthy lives, they are said to be in a state of food security (FAO, 2009). In the Global Hunger Index, India ranks 102 out of 117 countries in the year 2019 which is down from 103 out of 119 the previous year (Mishra & Rampal, 2020). Cereal and grains are the main staple foods for any household and the foundation of a nutrient-dense diet for all people (Kumar, 2021). In order to accomplish their development objectives, an increasing

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number of governments, donor organizations, and development organizations are dedicated to supporting nutrition-sensitive agriculture (Bhutta et al., 2013).

The intervention's adaptability, people's knowledge and perceptions, the planning, execution, engagement, and monitoring process, the environment in which the implementation takes place, and the external context are a few examples of these variables (Damschroder et al., 2009). Among cereals and millets, rice accounted for 30 per cent of the total energy obtained from consuming all food groups in both rural and urban areas. Compared to urban areas, consumption of tiny millets was 45.45 g/CU/day, rural areas consumed the most, at 72.86 g/CU/day (Amrutha et al., 2024). The home-level study will be able to speak volumes about the situation of food and nutritional security at the household level in particular and society in general, even though the family is the fundamental unit of society (Jairu et al., 2023). Launching nutritional education initiatives and programs, particularly for low-income farm women, in order to raise awareness of other nutritional factors and appropriate eating practices and the food and nutritional security of the entire household should be enhance the dietary and nutritional habits of the households (Dominic et al., 2023).

Nutrient education is necessary to raise awareness among rural households about the importance of nutrients in food and how they contribute to growth and health maintenance. Promoting the health advantages of fresh vegetables and nutri-gardens among rural communities might enhance nutritional security at the household level (Kumbhare et al., 2023). On marginal farms, the majority of respondents reported low to moderate levels of food security, whereas on medium-sized farms, food security was extremely low (Gautam per cent Jha, 2022). It is observed that eating habits be adjusted in accordance with the seasonality of food items available in a given place, as the environment produces a variety of food variations based on the needs of the local population (Vij per cent Mann, 2022).

METHODOLOGY

Ex-post-facto research design was employed for this study while keeping the goal in mind. This research was carried out in the Gajapati and Rayagada districts of Odisha with a simple random sampling technique of a total sample size of 120 selected for the study. 3 blocks of the Gajapati district were selected randomly, viz., R. Udayagiri, Rayagada, Gumma, and then Sabarapalii, Patachanchara and Parimala gram panchayats from R. Udayagiri Block, Tibisingh, Linga, Munisingh from Gumma block and Kaithapadar, Dambapur and Hirapur from Rayagada block and 3 villages were selected randomly from each gram panchayat, so a total of 20 respondents from each block selected by simple random sampling technique to form a total sample size were 60. Similarly, three blocks of Rayagada district were selected randomly, viz., Rayagada, Muniguda, Gunupur, and then Pitamahal, Manikajhola and Bishnuguda gram panchayats from Rayagada block, Sakata, Munikhola and Kaliarpeta from Muniguda and Regada, Laba and Sirijholi from Gunupur blocks and three villages were selected randomly from each gram panchayat, so a total of 20 respondents from each block selected by simple random sampling technique to form a total sample size were 60. The data were collected through an interview schedule contacting the farmer personally. Different scales and scoring methods created by other scientists were utilized with minor modifications, and knowledge and awareness of nutrition-sensitive agriculture are considered dependent factors. For independent variables 3 point, 4 point and 5 point scales developed by scientists and for dependent variables 5 point scale was taken, SDA= Strongly Disagree (1); DA=Disagree (2); NA=Neither Agree nor Disagree (3); A=Agree (4); SA= Strongly Agree (5); the scale was developed by Junuthula et al., (2022). 19 independent variables and 4 dependent variables included tailored for all farm families. To provide the results context, the gathered data were categorized, tallied, and analysed in accordance with the goals. The statistical tools such as mean, standard deviation, frequency, percentage, correlation coefficient, and regression analysis were performed with OPSTAT (Operational Statistics) online open access software. The knowledge and awareness index, as suggested by using the formula, was used to analyse the overall knowledge and awareness level of Nutrition-sensitive agriculture in southern Odisha. It was being measured by awareness and knowledge about different promotional activities such as government policy or scheme, Training, Workshop, NGO or FPO support of Nutrition-sensitive agriculture with different technology related to cultivation, feeding, management and others, responses for knowledge is Agree (5) ; Partially Agree (4) ; Neutral (3); Partially Disagree (2) ; Disagree (1) , for awareness is Yes 2; No 1.

$$\text{Knowledge index (Ki)} = \frac{X_1+X_2+X_3+ \text{.....} +Xn}{N} \text{ x } 100$$

Where, Ki=Knowledge index, $X_1+ X_2+$..... +Xn=Number of correct response, *i.e.,* total score, N=Total number of items in the test

$$\text{Awareness index (Ai)} = \frac{X_1+X_2+X_3+\text{.....} +Xn}{N} \text{ x } 100$$

Where, Ai=Awareness index, X_1+X_2+..... + Xn=Number of correct response, *i.e.,* total score, N=Total number of items in the test.

Using an arbitrary scaling technique, the items for the knowledge and awareness about nutrition sensitive agriculture were chosen. The respondents' knowledge and awareness level of expertise were divided into low, medium, and high categories using the mean and standard deviation values.

RESULTS

It is observed in Table 1 that a measure of food consumption that takes into account a household's availability to a range of foods is called dietary diversity (45.00%), The appropriate calorie intake of an individual is gauged by their dietary diversity (56.66%), variety in diet is essential for well-balanced nutrition (37.50%), food colours can also reveal a household's nutritional diversity (46.66%), Rural and farming communities should strive to include a diverse range of foods in their diets (25.00%), It's critical that rural farming communities' diets contain a range of foods (23.33%).

Table 1. Item wise knowledge and awareness of nutrition-sensitive agriculture

	Item wise Statements	Percentage
Importance of dietary diversity	A measure of food consumption that takes into account a household's availability to a range of foods is called dietary diversity.	45.00
	The appropriate calorie intake of an individual is gauged by their dietary diversity.	56.66
	Variety in diet is essential for well-balanced nutrition.	37.50
	Food colours can also reveal a household's nutritional diversity.	46.66
	Rural and farming communities should strive to include a diverse range of foods in their diets.	25.00
	It's critical that rural and farming communities' diets contain a range of foods.	23.33
Nutrition Education	Do you understand what balanced nutrition is all about?	37.50
	You are aware of the connections between farm household nutrition and agricultural yield.	24.10
	You are aware of the connections between nutrition, hygiene, and health.	19.10
	The only nutritional issue in the rural areas where I work is obesity.	38.33
	During pregnancy, iron and folic acid are extremely important.	18.33
	Education about nutrition is only important when there is illness or poor health.	25.83
	All age groups and genders should follow the same recommended intake guidelines for energy and nutrients.	23.33
	Improving the nutritional quality of households is largely dependent on availability to clean drinking water and proper sanitation.	28.33
	The secret to raising farm households' production is good diet.	35.00
	Food prices have a significant impact on how much people eat.	54.10
Awareness of Nutrition-sensitive Agriculture		
Promotion of Kitchen Garden	Do you understand what a kitchen garden entails?	31.66
	A kitchen garden can help rural households that are lacking in certain micronutrients, including iron, vitamin A, etc.	35.00
	Children will have easy access to and availability of nutrient-dense foods thanks to kitchen gardens.	37.50
	To construct and maintain kitchen gardens for a year-round supply of vegetables, a significant amount of money and expertise are needed.	26.66
	It is an excellent idea to promote kitchen gardens.	45.00
	You have encouraged farm households to grow and raise nutrient-dense crops, poultry, and livestock.	23.33
Promotion of Diversification of Crops	Adding a new crop or different kinds of the same crop is known as crop diversification.	40.00
	Crop rotation is the practice of growing a variety of crops in the same field over the course of a season.	43.33
	Farm households that grow a variety of crops are more nutritionally stable than those that grow a select few.	26.66
	One of the main obstacles to crop diversity is the limited availability of postharvest technologies.	37.50
	At the farm level, crop variety can lower seasonal unpredictability and boost the availability of nutrient-dense foods for farm households.	26.66
	Crop diversification can improve rural communities' direct access to foods high in protein and minerals.	26.66
Promotion of value-added food products	Value addition is essential to raising small farmers' incomes along the entire food supply chain through marketing, processing, and storage.	46.66
	Value addition can increase food availability throughout the year and decrease postharvest losses.	45.00
	Value addition makes safe and reasonably priced food more accessible, which improves consumer nutrition.	20.00
	Value addition prolongs the shelf life of nutrients and foods, which improves nutrition.	28.33
	In order to alleviate the issue of malnutrition in rural regions, value-added products with increased nutritional value might be extremely important.	25.83
	Value addition may help small farms become more economically independent.	20.83
	Encouraging food processing technology with additional value is a crucial element.	31.66
	You communicate with other organizations that support innovations in food technology and value addition.	20.83

Knowledge about balanced nutrition which is essential for good health and proper body function (37.50%), awareness between farm household nutrition and agricultural yield (24.10%), awareness about nutrition, hygiene, and health (19.10%). The only nutritional issue in the rural areas was obesity (38.33%). During pregnancy, iron and folic acid are extremely important (18.33%), Nutrition education is important to knowing about illness or poor health (25.83%), All age groups and genders should have knowledge about recommended intake of energy and nutrients (23.33%), Improving the nutritional quality of households is largely dependent on availability to clean drinking water and proper sanitation (28.33%), A healthy diet is the key to increasing farm households' productivity (35.00%), The cost of food has a big influence on individual's diet (54.10%).

In promotion of kitchen garden, awareness about the component of kitchen garden (31.66%), A kitchen garden can directly help rural community to understand the deficiency of micronutrients, including iron, vitamin A, etc (35.00%), Due to kitchen gardens, children will have easy access to or availability of nutrient-dense foods (37.50%), A substantial sum of money and

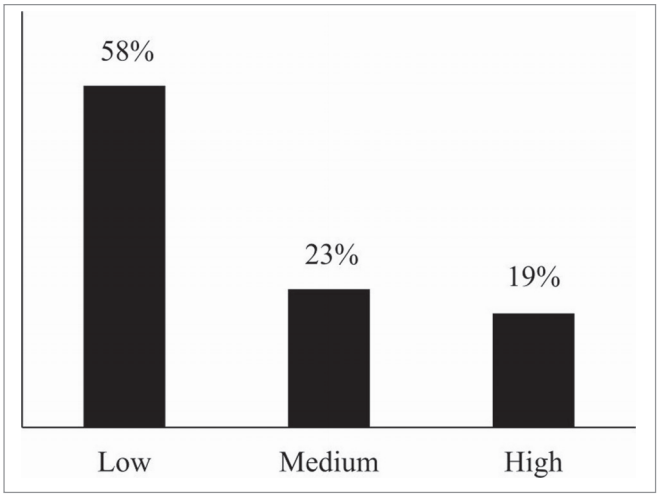

Figure 1. Overall Knowledge of Nutrition-sensitive Agriculture

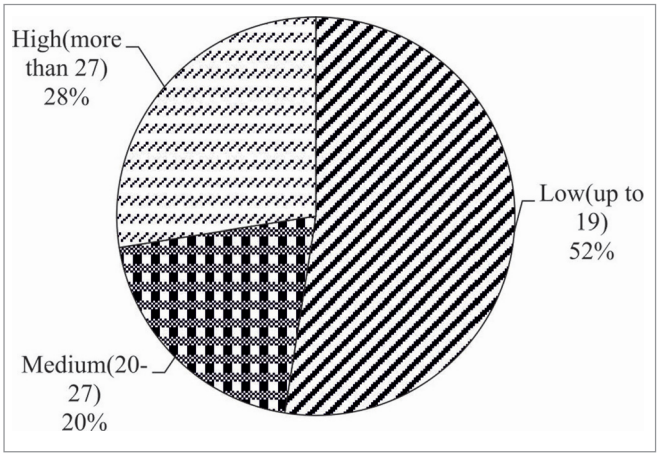

Figure 2. Overall Awareness of Nutrition-sensitive Agriculture

specialized knowledge are required to build and maintain kitchen gardens for a year-round supply of vegetables (26.66%), Promoting kitchen gardens is a great idea (45.0%). Encouraging agricultural households to raise cattle, poultry, and crops high in nutrients (23.33%). Crop diversification is the process of adding a new crop or different varieties of the same crop to encourage agricultural diversity (40.00%). Growing a range of crops in the same field over the course of a season is known as crop rotation (43.33%). Compared to farm households that plant only a few crops, those that grow a diversity of crops have more steady nutrition (26.66%), A major barrier to crop diversification is the scarcity of post harvest technologies (37.50%). At the farm level, crop diversification can enhance the direct access of rural populations to foods rich in protein and minerals while crop variety can reduce seasonal volatility and increase the availability of nutrient-dense foods for farm households (26.66%), In the promotion of value-added food products, Value addition through marketing, processing, and storage is critical to increasing small farmers' earnings along the agricultural supply chain (46.66%), Value addition can reduce post harvest losses (45.00%) and boost food supply throughout the year (45.00%). Value addition increases customer access to affordable, safe food, which enhances nutrition (20.00%), value addition increases nutrition by extending the shelf life of foods and nutrients (28.33%), value-added goods with higher nutritional value may be crucial to reducing the problem of malnutrition in rural areas (25.83%). Value addition could contribute to small farms' increased financial independence (20.83%). A key component is promoting food processing technology with added value (31.66%), communicate with other organizations that support innovations in food technology and value addition (20.83%).

Relationship of Independent variables with Knowledge and Awareness

The null hypothesis and the empirical hypothesis were used to investigate the relationship between the scores of the chosen independent variables with the degree of knowledge and awareness. After the correlation coefficient (r) was calculated, the results are shown in Table 2. An assessment of the respondents' socio-economic characteristics' impact on their knowledge and awareness of nutrition-sensitive agriculture in rural communities was undertaken. Table 2 shows that the knowledge level of respondents was highly significantly and positively correlated with the types of farmer, education, nutrition status, housing condition, preference of food, annual income, asset possession, outside contact, information seeking behaviour, extension media contact at the 1 percent significance level. On the other hand, the caste negatively highly significant (1% significance) and nutrient deficiency is negatively significant (5%) with knowledge about nutrition sensitive agriculture. But the awareness level of respondents was highly significant and positively correlated with the types of farmer, education, nutrition status, housing condition, meals taken

Table 2. Relationship of Independent variables with knowledge and awareness

S.No.	Independent Variable	Correlation coefficient of Knowledge (n=120)	Correlation coefficient of Awareness (n=120)
1.	Age	0.016^{NS}	0.050^{NS}
2.	Gender	-0.073^{NS}	-0.156^{NS}
3.	Caste	-0.298**	-0.275**
5.	Types of farmer	0.335**	0.405**
6.	Education	0.453**	0.399**
7.	Family Size	-0.010^{NS}	-0.041^{NS}
8.	Nutrition Deficiency	-0.226*	-0.246**
9.	Nutrition status	0.208*	0.265**
10.	Housing Condition	0.495**	0.529**
11.	Crop Calendar	0.018^{NS}	0.034^{NS}
12.	Meals taken yesterday	0.309^{NS}	0.380**
13.	Food source	0.148^{NS}	0.157^{NS}
14.	Preference of Food	0.356**	0.376**
15.	Primary source of Income	-0.091^{NS}	-0.236**
16.	Annual income	0.395**	0.402**
17.	Asset Possession	0.525**	0.540**
18.	Outside contact	0.523**	0.602**
19.	Information seeking Behaviour	0.430**	0.411**
20.	Extension media contact	0.591**	0.598**

1% level of significance = ** 5% level of significance = * NS= Non significant

Table 3. Multiple Regression analysis with knowledge and awareness

S.No.	Independent Variable	Knowledge about Nutrition sensitive Agriculture		Awareness about Nutrition sensitive Agriculture	
		t Value	Significance	t Value	Significance
1.	Age	-1.162	0.248	-2.296	0.023
2.	Gender	-0.116	0.908	-0.918	0.360
3.	Caste	0.408	0.684	1.101	0.273
4.	Types of farmer	-1.438	0.153	-0.384	0.702
5.	Education	2.411	0.017	1.958	0.053
6.	Family Size	-0.413	0.680	0.350	0.727
7.	Nutrition deficiency	-0.590	0.557	-0.522	0.602
8.	Nutrition status	0.331	0.741	1.227	0.222
9.	Crop Calendar	1.548	0.124	2.177	0.031
10.	Meals taken yesterday	-0.384	0.702	0.170	0.865
11.	Food source	0.879	0.381	0.128	0.898
12.	Preference of food group	0.309	0.758	0.570	0.570
13.	Housing Condition	3.298	0.001	3.746	0.000
14.	Primary source of Income	-0.391	0.696	-2.954	0.004
15.	Annual income	1.228	0.222	0.852	0.396
16.	Asset Possession	3.002	0.003	2.410	0.017
17.	Outside contact	0.600	0.550	1.710	0.090
18.	Information seeking Behaviour	-1.420	0.158	-2.317	0.022
19.	Extension media contact for advice	2.374	0.019	2.298	0.023
	Constant	17.109		14.204	
	R^2	0.6050		0.6704	

yesterday, preference of food, annual income, asset possession, outside contact, information seeking behaviour, extension media contact at the 1 percent significance level. On the other hand, the caste, nutrient deficiency and primary source of income were negatively and highly significant at 1% significance with awareness about nutrition sensitive agriculture.

Multiple Regression analysis with Knowledge and Awareness

Basically, regression analysis is a method for examining the causal connections between a group of causal factors and a group of consequential factors. Therefore, in order to evaluate the relevant characteristics and the socioeconomic variables' contribution to the knowledge and awareness of nutrition-sensitive agriculture in the research area, multiple regression analysis was conducted. The Multiple regressions could explain only 60.50 per cent of the variability in influencing the knowledge about Nutrition-sensitive Agriculture and 67.04 per cent of the variability in influencing the awareness about Nutrition-sensitive Agriculture among 19 variables. The variables age, gender, caste, types of farmers, education, family size, nutrition deficiency, Family member nutrition status, Housing Condition, Crop Calendar, Meals taken yesterday, food source, preference of food groups, primary source of income, annual income, asset possession, information seeking behaviour, outside contact, extension media contact for advice, help increase the Knowledge and Awareness about Nutrition sensitive Agriculture.

DISCUSSION

The kitchen garden skills and knowledge should be improved for the benefit of fresh vegetables and nutritional security. Promoting crop diversification is fundamental in Nutrition Sensitive Agriculture. It entails cultivating a variety of crops to enhance dietary diversity, improve nutrition, and mitigate risks associated with mono-cropping and communities can access a wider range of nutrients, by diversifying crops. The production of value-added food crops, such as fortified grains, processed fruits and vegetables, and nutrient-dense snacks, communities can improve access to nutritious foods while also generating income for farmers. This approach not only enhances food security but also stimulates economic growth and supports sustainable agriculture practices. Many regions have indigenous crops rich in essential nutrients that are often overlooked or underutilized. Encouraging the cultivation and consumption of locally available nutritious crops to improve nutrition and enhance food security. It is observed that the overall knowledge about nutrition sensitive agriculture in research area. Majority of (57.50%) of respondents were low level of knowledge, followed by moderate (23.30%) level of knowledge and followed by high (19.2%) level of knowledge towards Nutrition Sensitive Agriculture. It is observed that the overall awareness towards nutrition sensitive agriculture in research area. majority of respondents were having low (52.50%) level of awareness, followed by medium (20.00%) and followed by high (27.50%) level of awareness. The outcomes could be the consequence of lack of knowledge and awareness of people and less support of governmental and non-governmental organizations.

CONCLUSION

To promote recommended nutrition sensitive agriculture practices, need to increases knowledge and awareness among the farmers, engage them into various exhibitions, fair, krishi-mela to give those more exposures. State Agriculture University, Krishi Vigyan Kendra, District and Block Agriculture Office need to

emphasize the promotion of crop diversification, kitchen garden, nutritional security and conduct action research on nutrition-sensitive agriculture practices to increase food security. Modern monitoring tools and thorough monitoring and evaluation processes are essential for understanding the effects and effectiveness of nutrition-focused policies and programs. Incorporate nutrition promotion and education about food and sustainable food systems that draws on regional knowledge, traditions, and mind sets. Nutrition education can enhance the impact of production and income in rural households, which is especially important for women and young children, in addition to raising public demand for nutrient-dense foods.

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