NUTRITION SENSITIVE AGRICULTURE PRACTICES IN RURAL COMMUNITIES OF NALGONDA DISTRICT, India

ABSTRACT

Nutrition-sensitive agriculture (NSA) is important for rural communities as it promotes the production of diverse, nutrient-rich crops and helps to improve food security, reduce malnutrition, and promote better health outcomes. It also helps to increase the incomes of smallholder farmers and enhance their resilience to climate change and other external shocks.

The study indicated that the majority of respondents are between the ages of 20 to 40 (59.50%), have a low level of education (51.70% are illiterate), come from joint families (56.10%), and have an annual income between Rs.50,000-1,50,000 (72.78%).

The study provides information on the nutrition and agricultural practices of the respondents. It shows that a high proportion of respondents practice kitchen/nutrition gardening (85.56%) and grow vegetables in their garden (85.56%). Leafy vegetables (51.67%) and fruits (57.22%) are the most commonly grown crops. However, practices such as integrated farming systems (4.44%), the Nutri thali concept (0.00%), and organic farming (7.22%) are not widely adopted.

The aim of the study was to know the nutrition sensitive agriculture practices followed by small and marginal women in Nalgonda district of Telangana state. In this study a total number of 180 respondents were selected for the study.

This study was an attempt to as there is a need to put attention on the educational aspects by stimulating the small and marginal women farmers and the families of rural communities by adopting farming practices that promote the production and consumption of diverse and nutrient-rich crops, rural farmers can also improve their own nutrition as well as that of their communities.

Keywords: Nutrition**,** Nutrition-sensitive agriculture, Malnutrition, Dietary Diversity, Integrated farming systems (IFS) and Kitchen gardening.

INTRODUCTION

Nutrition-sensitive agriculture (NSA) is a concept that integrates food security and nutrition into agriculture, particularly in developing countries. It aims to promote the production of diverse, nutrient-rich foods and increase access to these foods for vulnerable population, which can improve their nutritional status. NSA also emphasizes the importance of gender equality and women's empowerment in agriculture, recognizing their critical role in food production and nutrition.

It is also important to note that the majority of respondents have a low level of education and income, which may impact their ability to adopt certain practices. Therefore, efforts to promote these practices should be tailored to the needs and resources of the target population.

However, successful implementation of NSA in rural areas requires a supportive policy environment, access to information and resources, and active participation from farmers, especially women. Efforts are needed to increase awareness about the potential benefits of NSA, as well as to provide training and technical support to farmers. Overall, NSA has great potential to contribute to improved nutrition and health outcomes in rural communities.

One approach to NSA is through the promotion of home gardens, which has been shown to improve household food security and dietary diversity. In a study conducted in Kenya, households that participated in a home garden program had higher vegetable consumption and improved nutritional outcomes compared to those who did not participate (Keding et al., 2013).

Another aspect of NSA is the promotion of sustainable and resilient agriculture practices that can withstand climate change and other environmental stressors. This includes the use of agro ecological approaches, such as organic farming and crop diversification, which can increase soil fertility, reduce pesticide use, and enhance biodiversity. A study in Malawi found that smallholder farmers who adopted agro ecological practices had increased crop yields and improved food security compared to those who used conventional farming methods (Tittonell et al., 2013).

Literature Review

Ahmed and Akhter (2021) opined in their study on "Kitchen Gardens: A Study of Nutritional and Economic Benefits in Rural Areas" examines the impact of kitchen gardens on the nutrition and income of rural households. The authors found that kitchen gardening increased the consumption of vegetables and improved the dietary diversity of the households. Moreover, selling surplus produce generated additional income for the households. The study suggests that kitchen gardening can be a viable strategy for improving the nutrition and livelihoods of rural communities.

Bose (2021) studied on "Challenges and Opportunities in Kitchen Gardening for Sustainable Food Systems" discusses the potential of kitchen gardening in promoting sustainable food systems. The author identifies the challenges faced by small-scale kitchen gardeners, such as lack of access to resources and knowledge, and suggests ways to overcome these challenges. The article also highlights the opportunities for scaling up kitchen gardening for larger impact, such as through community-based programs and urban agriculture initiatives.

Dhiman (2021) studied on "Benefits of Kitchen Gardening for Urban Dwellers" the author discussed on the positive impacts of growing fruits, vegetables, and herbs in urban areas. The author argues that kitchen gardening not only provides fresh produce but also promotes healthy eating habits, reduces carbon footprint, and improves mental health. The article also provides tips on how to start a kitchen garden in a small space.

Mishra (2021) studied on "The Importance of Soil Quality in Kitchen Gardening," the author emphasizes the significance of soil quality in growing healthy and productive plants. The article explains the role of soil nutrients, pH level, and texture in plant growth and provides tips on how to maintain soil quality in a kitchen garden. The author also discusses the benefits of using organic fertilizers and compost for improving soil health.

Mulugeta and Belay (2021) opine in their study "Kitchen Gardening in Developing Countries: A Review of Challenges and Solutions" which provides an overview of the challenges faced by kitchen gardeners in developing countries, such as limited access to resources, lack of knowledge and skills, and climate change impacts. The authors suggest solutions to address these challenges, including the use of appropriate technologies, capacity building programs, and policy

interventions. The article also highlights the potential benefits of kitchen gardening for food security and nutrition in developing countries.

Sibhatu and Qaim (2018) suggested in their review paper which provided a meta-analysis of studies on the association between production diversity, diets, and nutrition in smallholder farm households. It highlights the potential for nutrition-sensitive agriculture interventions to improve dietary diversity and nutritional outcomes in these households.

Herforth and Ahmed (2015) studied on topic an overview of the food environment and its impact on dietary consumption. It highlighted the role of agriculture in shaping the food environment and discusses the potential for nutrition-sensitive agriculture interventions to improve dietary outcomes.

Remans et al. (2014) discussed in their review paper about the importance of measuring the nutritional diversity of national food supplies and its implications for improving the nutritional quality of diets. It highlights the role of agriculture in influencing the nutritional diversity of food supplies and the potential for nutrition-sensitive agriculture interventions to improve dietary diversity.

Ruel (2013) suggested in their review paper on the neglect of agriculture in nutrition policies and the need for greater integration of nutrition considerations into agricultural policies and programs. It highlights the potential of nutrition-sensitive agriculture interventions to improve the nutritional outcomes of vulnerable populations.

OBJECTIVES

1. To know the general profile of the respondents.
2. To know the NSA practices followed by the respondents.

MATERIALS AND METHODS

This chapter deals with the research design, sampling procedure, variables and their measurement, tools for data collection, statistical tests used and analytical procedures followed to interpret the data.

Research design-The research design adopted for this study was exploratory research design.

Sampling size- A total of 180 respondents were taken for this study**.**

Sampling procedure - The Nalgonda district from south agro-climatic zone of Telangana state was purposively selected for the study for the year 2022.

The small and marginal women framers are taken for this study. Three mandals were selected for the study and from each mandal one village were selected accordingly.

Variables – Variables included age, education level, type of family, family income, type of farm cultivated and NSA practices followed by respondents were taken for the study.

Tools for data collection – Structured interview schedule was used for this study. The information was collected with the help of Sarpanch, Anganwadi teachers, and ward members in the villages as they are the grass root level workers actually in the field.

Statistical procedures – Frequencies and percentages were used for this study to know the NSA practices followed by respondents.

RESULTS AND DISCUSSION

The general profile data presents the frequency and percentage of respondents based on their age, education, family type, annual income and type of farm cultivated by the respondents.

Age

Table 1. Age of the respondents

S. No.	Age (in years)	Frequency (N)	Percentage (%)
1.	Below 20	07	3.89
2.	20to 30	48	26.67
3.	30 to 40	59	32.78
4.	40 and above	66	36.66
	Total	**180**	**100.00**

The majority of respondents (32.78%) fall in the age group of 30 to 40 years. About 26.67% of respondents are aged between 20 to 30 years followed by 36.66% of respondents are 40 years and above. Only 3.89% of respondents are below 20 years of age.

Education

Table 2. Education of the respondents

S. No.	Education	Frequency (N)	Percentage (%)
1.	Illiterate	93	51.67
2.	Primary Education	22	12.22
3.	Middle School	35	19.44
4.	High School	19	10.56
5.	Intermediate/ Diploma	11	6.11
6.	Graduation and above	00	00.00
	Total	**180**	**100.00**

More than half of the respondents (51.67%) are illiterate followed by 6.11% of respondents have graduated or above. About 12.22% have primary education and 19.44% have middle school education, and 10.56% have high school education.

Family Type

Table 3. Family Type of the respondents

S. No.	Family Type	Frequency (N)	Percentage (%)
1.	Nuclear	079	43.89
2.	Joint	101	56.11
3.	Extended	00	00.00
	Total	**180**	**100.00**

The majority of respondents (56.10%) live in a joint family followed by 43.89% of respondents live in a nuclear family, while none live in an extended family.

Annual Income

Table 4. Annual Income of the respondents

S. No.	Annual Income	Frequency (N)	Percentage (%)
1.	Below 50,000	44	24.44
2.	Rs.50,000-1,50,000	131	72.78
3.	Above Rs.1,50,000	05	2.78
	Total	**180**	**100.00**

The majority of respondents (72.78%) have an annual income between Rs. 50,000 to 1,50,000 followed by 24.44% of respondents have an annual income below Rs. 50,000 and about 2.78% of respondents have an annual income above Rs. 1,50,000.

Type of farm cultivated by the small and marginal women farmers

The table provides information on the frequency and percentage of respondents' i.e. small and marginal women farmers who regularly, occasionally, or never cultivate different types of farms. A list of difference types of farms in each category are mentioned below

- Vegetables (Chilli, Tomato, Beans, Okra, Brinjal, Capsicum and Radish etc.).
- Flowers (Marigold and Crysanthymum)
- Fruits (Oranges, Guava, Papaya, Mango and Pomegranate etc),
- Cereals (Rice)
- Pulses (Red Gram, Green Gram, Chick Pea and Cow Pea)
- Millets (Sorghum, Ragi and Bajra)
- Edible Nuts & Oils (Groundnut, Sunflower and Sesame) and
- Cotton

Table 5. Type of farm cultivated by the respondents

S. No	Type of farm cultivated	Regularly		Occasionally		Never	
		N	%	N	%	N	%
1.	Vegetables	18	10.00	18	10.00	144	80.00
2.	Flowers	05	2.78	16	8.89	159	88.33

3.	Fruits	02	1.11	09	5.00	169	93.89
4.	Cereals	151	83.89	17	9.44	12	6.67
5.	Pulses	94	52.22	76	42.22	10	5.56
6.	Millets	77	42.78	59	32.78	44	24.44
7.	Edible nuts & oils	73	40.56	59	32.78	48	26.67
8.	Cotton	143	79.44	35	19.44	02	1.11
9.	Others						

From the above table it was shown that percentage of respondents who regularly cultivate vegetables is 10%, while 10% cultivate vegetables occasionally, and 80% never cultivate vegetables. For flowers, 2.78% cultivate flowers regularly, 8.89% cultivate them occasionally, and 88.33% never cultivate them.

When it comes to fruits, only 1.11% cultivates them regularly, 5% cultivate them occasionally, and a vast majority (93.89%) never cultivates them.

However, for cereals, 83.89% cultivate them regularly, 9.44% cultivate them occasionally, and 6.67% never cultivate them. Similarly, for pulses, 52.22% of respondents cultivate them regularly, 42.22% cultivate them occasionally, and only 5.56% never cultivate them. In contrast, for millets, 42.78% of respondents cultivate them regularly, 32.78% cultivate them occasionally, and 24.44% never cultivate them.

When it comes to edible nuts and oils, 40.56% of respondents cultivate them regularly, 32.78% cultivate them occasionally, and 26.67% never cultivate them.

Finally, for cotton, 79.44% of respondents cultivate it regularly, 19.44% cultivate it occasionally, and only 1.11% never cultivates it.

The soil Nalgonda district it comprises of red soil, black soil, alkaline soil and alluvium. The red soil constitutes 85 % of the area.

The Nalgonda district is basically an agrarian district with good irrigation sources and favorable climatic conditions. Approximately 75% of population depends directly or indirectly on Agriculture in Nalgonda district. The major growing crops are Paddy and Cotton.

For Paddy and Ground nut seed production, the climatic conditions are very much congenial and for realizing the Telangana state as seed bowl of India, the contribution of Nalgonda district in this regard is sizeable.

The Agriculture department is committed to promote Agricultural development in more significant way to create better socioeconomic conditions among the farming community through the implementation of Government programmes. The Agriculture sector has potential for creating better opportunities and livelihoods and there by poverty alleviation is possible. In the light of the potential contribution and role of the Agriculture sector in the district, a strategic development plans need to be developed, planned for implementation for deriving growth in Agriculture sector.

Practices on Nutrition-sensitive agriculture (NSA)

Diversifying crops and planting a variety of nutrient-dense crops can help improve the availability of diverse and nutritious foods. It can also help reduce dependence on a single crop and increase resilience to environmental shocks. Integrating crops, livestock, and aquaculture can improve the productivity and sustainability of farming systems. It can also increase the availability of diverse and nutrient-dense foods and provide additional sources of income.

Conservation agriculture involves minimizing soil disturbance, maintaining soil cover, and rotating crops to promote soil health and reduce erosion. It can help improve soil fertility and increase crop yields, which can improve the availability of diverse and nutrient-dense foods. Agro forestry involves growing trees and shrubs alongside crops and livestock. It can help improve soil fertility, reduce erosion, and provide additional sources of food, such as fruits and nuts. Improving access to water through irrigation and effective water management can increase crop yields and improve the availability of diverse and nutrient-dense foods.

Post-harvest management practices, such as proper storage, handling, and processing of crops, can help reduce food loss and waste and improve the availability of diverse and nutrient-dense foods.

Implementing these practices in agriculture can help improve the availability and accessibility of diverse and nutrient-dense foods, which can improve nutrition and health outcomes.

A list of the NSA practice followed by the respondents at rural household are listed below in the table 6. Accordingly percentages and frequencies are mentioned and discussed below.

Table 6. Practices on NSA followed by the respondents

S.No.	Practices on NSA	Frequency (N)	Percentage (%)
1.	Integrated farming systems	08	4.44
2.	Nutri thali concept in diet	00	0.00
3.	Consumption of milk and egg every day	31	17.22
4.	Consumption of millets in your diet	161	89.44
5.	Consumption of more fruits and vegetables	89	49.44
6.	Using fortified foods in diet	23	12.78
7.	Practicing organic farming	13	7.22
8.	Practice of kitchen/nutrition gardening	154	85.56
9.	Growing vegetables in garden	154	85.56
10.	Growing leafy vegetables in garden	93	51.67
11.	Growing fruits in garden	103	57.22
12.	Growing creepers/gourds in garden	49	27.22
13.	Growing flowers in garden	134	74.44
14.	Growing herbs in garden	89	49.44
15.	Growing medicinal Plants in garden	77	42.78
16.	Practice of Nutrition garden model	00	0.00
17.	Cultivating portion of food produce separately without using much pesticides	13	7.22
18.	Practice of intercropping	37	20.56
19.	Practice of mixed cropping	13	7.22
20.	Maintaining surrounds neat and clean	157	87.22

The above table is discussed from major practice followed by respondents to the least practices followed.

Keeping the surroundings clean: This practice has the highest percentage of respondents (87.22%) who follow it. This is a good sign as it shows that people are aware of the importance of cleanliness and hygiene in maintaining good health.

Growing fruits in the garden: This practice is followed by 57.22% of respondents, which is a significant percentage. Growing fruits in the garden is a good way to ensure that the fruits consumed are fresh and free from harmful chemicals.

Growing vegetables in the garden: This is a widely practiced activity, with 85.56% of respondents growing vegetables in their garden. This is a good way to ensure a supply of fresh and chemical-free vegetables for daily consumption.

Growing flowers in the garden: This practice is followed by 74.44% of respondents. While growing flowers may not be directly related to nutrition, it can have a positive impact on mental health and well-being.

Growing leafy vegetables in the garden: This is practiced by 51.67% of respondents. Leafy vegetables are a good source of vitamins and minerals, and growing them in the garden ensures a fresh and pesticide-free supply.

Consuming more fruits and vegetables: This practice is followed by 49.44% of respondents, which is a good sign as it indicates an awareness of the importance of a balanced diet.

Consuming millets in the diet: This practice has a high percentage of respondents (89.44%). Millets are a good source of fiber and other nutrients, and their consumption has been linked to various health benefits.

Using fortified foods in the diet: This practice is followed by only 12.78% of respondents. Fortified foods can be a good source of essential vitamins and minerals, and their use can help address nutrient deficiencies.

Intercropping: This is practiced by only 20.56% of respondents. Intercropping can be a good way to increase crop yield and reduce pest attacks, and its low adoption rate could be due to lack of awareness or resources.

Consuming milk and eggs every day: This is practiced by only 17.22% of respondents. Milk and eggs are good sources of protein and other nutrients, and their consumption can help meet daily nutrient requirements.

Using integrated farming systems: This is practiced by only 4.44% of respondents. Integrated farming systems can help promote sustainability and increase crop yield, but their low adoption rate could be due to various factors such as lack of awareness or resources.

Practicing organic farming: This is followed by only 7.22% of respondents. Organic farming can help reduce the use of harmful chemicals and promote sustainability, but it may require more resources and expertise.

Cultivating food produce separately without using much pesticide: This practice is followed by only 7.22% of respondents. This can be a good way to ensure a supply of fresh and pesticide-free produce, but it may require more resources and expertise.

Growing medicinal plants in the garden: This is followed by 42.78% of respondents. Medicinal plants can have various health benefits, and their cultivation can be a good way to promote natural remedies.

Growing herbs in the garden: This is followed by 49.44% of respondents. Herbs are a good source of antioxidants and other nutrients, and their cultivation can help promote natural remedies.

Growing creepers/gourds in the garden: This is followed by only 27.22% of respondents. Creepers and gourds can be a good source of vitamins and minerals, and their cultivation can be a good way to combat hunger by save finances.

Overall, the table suggests that respondents are generally interested in home gardening and growing their own food. However, some practices, such as integrated farming systems, the Nutri thali concept, and organic farming, are not as widely adopted. Further efforts may be needed to raise awareness and promote the benefits of these practices.

CONCLUSION

There are several success stories of nutrition-sensitive agriculture in rural communities, such as the promotion of millets and legumes in India, the development of sustainable agriculture

practices in West Africa, and the establishment of farmer cooperatives in Latin America. These examples demonstrate the potential for nutrition-sensitive agriculture to improve food security and nutrition in rural communities.

Overall, nutrition-sensitive agriculture is an important approach to promoting sustainable agriculture and improving food security and nutrition in rural communities. By adopting strategies to overcome challenges and build partnerships with governments and non-government organizations, it is possible to promote nutrition-sensitive agriculture and improve the lives of rural communities.

Overall, the study suggested that there is a high level of interest in home gardening and growing one's own food among the respondents. However, there is a need to raise awareness and promote the adoption of certain practices such as integrated farming systems, the Nutri thali concept, and organic farming.

Conference disclaimer:

Some part of this manuscript was previously presented in the conference: 3rd International Conference IAAHAS-2023 "Innovative Approaches in Agriculture, Horticulture & Allied Sciences" on March 29-31, 2023 in SGT University , Gurugram, India. Web Link of the proceeding: https://wikifarmer.com/event/iaahas-2023-innovative-approaches-in-agriculture-horticulture-allied-sciences/

ACKNOWLEDGEMENT

First and foremost, I pray the God, the almighty, merciful and passionate, for shower of blessings throughout my research work to complete successfully.

I take this opportunity to express curtsy love and gratitude towards my parents Sri. DasruNaik Amgoth and Smt. Dhani Amgoth for their love, support, encouragement and care in all aspects of my life.

I owe my deep sense of gratitude and respect towards my major advisor Dr. B. Jamuna Rani, Director of International programmes, PJTSAU, Hyderabad. Her patience, motivation, enthusiasm, and support gave me a lot of confidence during my study. I consider myself extremely blessed to work under her guidance.

I sincerely express my indebtedness and render my warmest thanks to Dr. R. Geetha Reddy, Professor & Head, Department of Extension Education and Communication Management and (Mrs.) Dr. M. Prasuna, professor, Department of EECM, PJTSAU, Hyderabad, for their valuable suggestions, guidance and encouragement.

I am grateful to the **PJTSAU** for providing the opportunity to study in the university.

I am thankful am grateful to **ICSSR** for providing me with the short-term Doctoral fellowship which helped me in carrying out my research study.

I am thankful to **International Journal of Environment and Climate Change** for providing me an opportunity for publishing my research article.

REFERENCES

Ahmed, A., & Akhter, N. (2021). Kitchen Gardens: A Study of Nutritional and Economic Benefits in Rural Areas. *Journal of Agricultural Studies*. 9(2). 36-46. https://doi.org/10.5296/jas.v9i2.18461

Bose, S. (2021). Challenges and Opportunities in Kitchen Gardening for Sustainable Food Systems. *Agroecology and Sustainable Food Systems*, 45(7), 837-840. https://doi.org/10.1080/21683565.2021.1933205

Dhiman, A. (2021). Benefits of Kitchen Gardening for Urban Dwellers. *Journal of Urban Agriculture & Regional Food Systems*. 6(1). 1-3. https://doi.org/10.2134/juarafs2020.12.0124

Herforth, A., & Ahmed, S. 2015. The food environment, its effects on dietary consumption, and potential for measurement within agriculture-nutrition interventions. *Food security,* 7(3), 505-520. https://doi.org/10.1007/s12571-015-0455-1

https://nalgonda.telangana.gov.in/agriculture/#:~:text=The%20major%20growing%20crops%20are%20Paddy%20and%20Cotton .

Keding, G. B., Msuya, J. M., Maass, B. L., Krawinkel, M. B., & Biesalski, H. K. (2013). Home gardens and their role in improving nutrition in Africa. *Food and Nutrition Bulletin*, 34(2), 246-256.

Mishra, P. (2021). The Importance of Soil Quality in Kitchen Gardening. *International Journal of Agriculture and Biological Sciences*. 7(2). 17-20. https://doi.org/10.17957/ijab/7.2.685

Mulugeta, Y., & Belay, G. (2021). Kitchen Gardening in Developing Countries: A Review of Challenges and Solutions. *Ethiopian Journal of Agricultural Sciences*. 31(2). 105-119. https://doi.org/10.4314/ejas.v31i2.1

Remans, R., Wood, S. A., Saha, N., Anderman, T. L., & DeFries, R. S. 2014. Measuring nutritional diversity of national food supplies. *Global food security*, 3(3-4), 172-182. https://doi.org/10.1016/j.gfs.2014.08.003

Ruel, M. T. 2013. Is agriculture the neglected sector in nutrition policies?. *Global food security*, 2(1), 1-6. https://doi.org/10.1016/j.gfs.2012.12.001

Sibhatu, K. T., & Qaim, M. 2018. Review: Meta-analysis of the association between production diversity, diets, and nutrition in smallholder farm households. *Food policy*, 77, 1-18. https://doi.org/10.1016/j.foodpol.2018.04.005

Tittonell, P., Vanlauwe, B., Leffelaar, P. A., Shepherd, K. D., Giller, K. E., & Unwin, R. J. (2013). A farm level analysis of economic and ecological impacts of sustainable agricultural intensification in the highlands of Ethiopia. *Agricultural Systems*, 117, 2-10.