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# **Analysing the Scope of Kitchen Gardens in Achieving Dietary Diversity and Food Security in Rural Households for Resilient and Sustainable Food Systems**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Aim:** The study aims to identify the scope of kitchen gardens or nutrition gardens in rural households in Tamil Nadu in achieving dietary diversity and food security. Currently, only a few existing studies analyse the link between kitchen gardens and dietary diversity. The study aims to address this gap.

**Study Design:** Exploratory study.

**Place of Study:** Tiruvallur and Coimbatore districts, Tamil Nadu, India during December 2022.

**Methodology:** The study was conducted among 270 rural household heads selected through a stratified random sampling method. An index validated by Food and Agricultural Organisation (FAO) and FANTA was used to measure Household Dietary Diversity.

**Results:** The results show there was a significant decrease in dietary diversity among the households. It was also identified that promoting kitchen gardens among poor households can improve food security.

**Conclusion:** The study suggests suitable policy measures tailored to the local agricultural system to scale up kitchen gardening as a viable model for a resilient food system. Future research could be done to assess the impact of nutritive gardens on household food consumption patterns and food security.

*Keywords: Kitchen garden; nutrition garden; household dietary diversity; food security; Sustainable Development Goals.*

## 1. INTRODUCTION

Environment, sustainability and agriculture have long been threatened by various factors and the COVID-19 pandemic has added to the risk. The pandemic has affected environmental sustainability to a greater extent by disrupting the food system [1]. To solve the issue of food production and food security, multiple strategies are needed. Home gardens are a tried-and-tested strategy that is used by communities with institutional help. In several developing countries, it is widely used to alleviate poverty and malnutrition. It acts as a supplemental source for nutritional security [2]. Home gardens or kitchen gardens are food production on small plots adjacent to human settlements. They are an integral part of the family and local food system. Home gardens are classified as mixed, kitchen, backyard, farmyard, compound or homestead garden [3]. COVID-19 has again brought out the importance of kitchen gardens and their importance in maintaining food and nutritional security.

### 1.1 About Home Gardens

Home gardening, in general, refers to the cultivation of a small plot of land that is often located nearby or within walking distance of the family home. Home gardens may be thought of as a mixed cropping system that includes vegetables, fruits, plantation crops, spices, herbs, decorative and medicinal plants, as well

as livestock that can be used as an additional source of food and revenue [4].

The four characteristics of home gardens are 1. Located near the residence. 2. Contain diversity of plants 3. Production is supplemental rather than the main source of family consumption and income 4. Occupy a small area.

The home garden frequently employs family labour such as women and children of the household in their management. Just like any cropping system, home gardens might also be subjected to extreme climatic conditions leading to crop loss. This could be addressed by imparting the necessary skills and knowledge.

### 1.2 Contribution to Food Security

Home garden or kitchen garden contributes to household food security as they provide direct access to food daily. Even those below the poverty line and landless farm workers can promote homestead gardens or vacant spaces near their homes. It can be done with locally available materials and indigenous, organic methods. Home gardens also provide diverse foods and supply the essential nutrients needed by the family. Households with gardens obtain 50 per cent of their vegetables and fruits supply [5]. When included with livestock rearing, it will be an additional source of income. Kitchen gardens can become a principal source of food and income in households especially during crises like the

pandemic. An in-depth analysis of kitchen gardens will help in framing policy interventions for a resilient future.

### 1.3 Household Dietary Diversity

Household dietary diversity is the number of food groups consumed by a household in a given period. A more diversified household diet implies that a household is food-secured and vice versa. It is also a proxy measure to assess the food accessibility of a household. Kitchen or home gardens have been found to increase a household's food security and dietary diversity.

## 2. MATERIALS AND METHODS

The study aims to identify the scope of kitchen gardens in achieving household food security. It focuses on three objectives. 1. To analyse the dietary diversity of the households and 2. To measure the prevalence of kitchen gardens among rural households and 3. To identify the scope of kitchen gardening in rural households to develop a resilient food system for the future. The study follows an exploratory research design to get in-depth insights into the phenomenon. It used both qualitative and quantitative approaches to evaluate and understand different aspects of a research problem.

### 2.1 Sampling Procedure

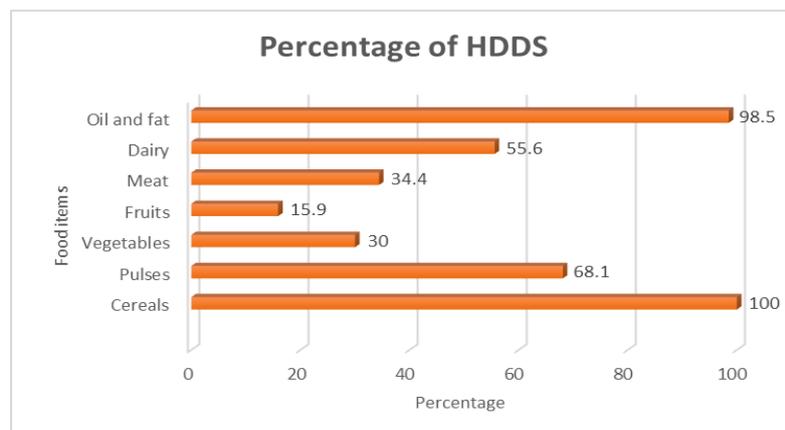
A multistage sampling method was used to select the study sample. For the study, Tiruvallur and Coimbatore districts were selected purposefully. From the two districts two blocks - Annur from Coimbatore and Poondi from Tiruvallur- were selected based on the low Human Development Index from the District

Human Development Report. A total of 270 household heads were selected based on a stratified random sampling method. The inclusion criterion for the selection of the sample is that households selected for the study should be small/marginal farmers and landless agricultural labourers. To measure household dietary diversity, Household Dietary Diversity Scores (DDS) developed by FAO and the FANTA Project (2006) were used. Seven food groups were included in DDS. A single point was awarded to each of the food groups consumed during the reference period, yielding a maximum total dietary diversity score of 7 points for each individual if his/her responses were positive to all food groups. The total dietary diversity score (DDS) ranges from 0 to 7. The DDS scores were categorized into three categories including low dietary diversity score (0–2), moderate dietary diversity score (3–5), and high dietary diversity score of more than 5.

## 3. RESULTS AND DISCUSSION

### 3.1 Household Dietary Diversity

Diversifying diets help to ensure the intake of necessary nutrients, especially among low-income households. Households that consume food from their own production and livestock sources can improve their nutritional status. The availability of diverse food production in their field or garden will also help in increasing income. Further, it also promotes climate change risk management and also promotes biodiversity. Hence to establish the link between the kitchen garden and dietary diversity, the HDDS was measured. The results are presented in the Fig. 1.



**Fig. 1. Percentage of dietary diversity among households**  
Source: Survey data

It could be seen from Fig 1 that there was a significant decrease in dietary diversity among rural households. While the consumption of cereals was high, the intake of pulses was 68.10 per cent. The consumption of fruits by the households was abysmally low at 5.90 per cent. Concerning meat consumption, only a little more than two-fourth of the households (34.40 per cent) were able to take it regularly. However, the consumption of dairy products was at 55.60 per cent. This might be due to the presence of livestock in the households. Staple foods such as cereals were available through PDS and their production and hence there the dietary intake of cereals is high. The results show that starch products have been consumed more than protein such as pulses and animal products. The availability of vegetables was affected due to the closure of markets during the pandemic period. The finding also revealed there was a reduction in the consumption of nutrient-rich foods such as fruits and vegetables among the households. Such decreased food consumption might be due to the collateral impacts of the pandemic such as job loss, reduced income, and closure of markets.

As nutrient-rich foods are more expensive than cereals and due to price inflation of these products, the consumption of such foods decreased among households. This is a major cause of concern as these food groups are important sources of micronutrients and not including them in the diet will cause serious health implications and nutrition deficiency [6].

Along the same line, Travasso et al., [7] in their findings in rural Bihar have reported reduced food consumption across all foods with nearly a quarter of the households reporting reduced consumption of fruits (27%), pulses (25%) and cereals (21%). Nearly 60 per cent reported stopping the consumption of nutrient-rich foods such as chicken, fish and eggs.

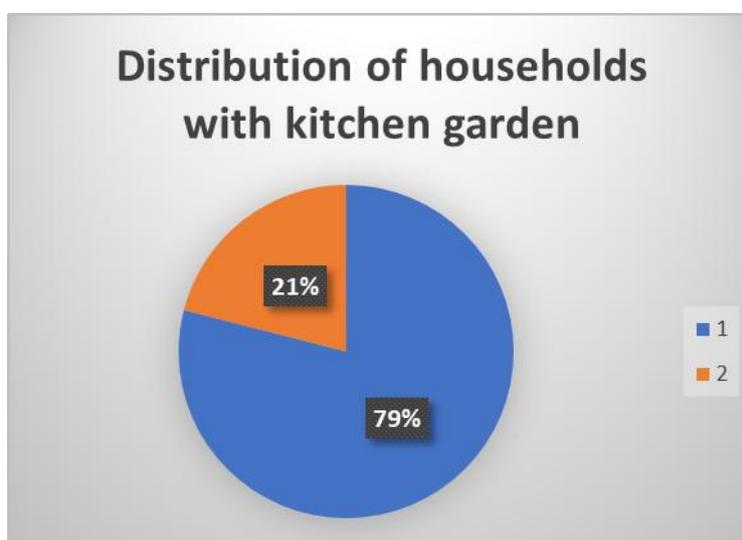
**Table 1. Overall HDDS among rural households (n=270)**

HDDS Status	Frequency	Percentage
Low HDDS	176	65.20
Medium HDDS	61	22.60
High HDDS	33	12.20

It could be observed from Table 2 that low dietary diversity was reported among three-fourths of the households (65.20%). Financial burden, low income, lack of own production of food, and low accessibility of food might be some of the reasons for less dietary diversity. Similar findings were reported by Nandi & Nedumaran, [8].

### 3.2 Prevalence of Kitchen Gardening in Rural Households

A study to understand the prevalence of kitchen gardening in the selected rural areas of the study revealed that three-fourths of the rural households did not have a kitchen garden and only 21 per cent of the households owned a kitchen garden (Fig. 2).



**Fig. 2. Distribution of households according to the presence of kitchen garden**

Most of the rural households in the rural area were not aware of the importance of the nutritional garden and its benefits. Several houses reported that they did not have space for a kitchen garden in their households and many of them said they lacked technical skills for establishing a kitchen garden. This might be the reason for the less presence of kitchen gardens in rural households.

Hence the results reveal, that not having a kitchen garden might be one of the plausible reasons for low dietary diversity among the vulnerable section of rural households. Similar findings from Tanzania revealed that Homestead Food Production (HFP) programmes improve vegetable availability and improve nutrient intake among households [9].

### 3.3 Scope of Kitchen Gardening

The key benefits of kitchen gardening to achieve food and nutritional security are as follows:

1. Improve food security
2. Increase food availability
3. Provide additional income to the household

4. Decrease risk through diversification
5. Increase local biodiversity and environmental sustainability

### 3.4 State Initiatives to Promote Kitchen Garden-Lessons from Tamil Nadu

Nutrition gardens are a micro-solution and an affordable way to ensure healthy and balanced nutrition. It improves the nutritional standards of low-income households. Under the Kalaingarai All Village Integrated Agriculture Development Programme, the Tamil Nadu government has been distributing nutritive vegetable garden kits to enable women to grow fresh vegetables to meet their daily nutritive needs [10]. The kit contains nine vegetable seeds catering to the household's diet diversity. Along the same line, vegetable gardens have been set up in nutritious meal centres across the state. Each centre was given Rs 5000 to start the vegetable gardens and the products used in the preparation of meals. While the Department of Horticulture and Agriculture had set up the gardens, students were trained to take care of the garden [11].

**Table 2. Crops suited for kitchen gardens in Tamil Nadu**

Fruits	Vegetables	Medicinal plants	Spices
Mango	Tomato	Aloe vera	Turmeric
Amla	Onion	Vasambu	Coriander
Banana	Bhendi	Vallarai	Fenugreek
Sapota	Bitter gourd	Basil	
Guava	Snake gourd	Omavalli	
Pomegranate	Curry leaf	Keelanalli	
Date palm	Spinach	Pirandai	

Source: [agritech.tnau.ac.in](http://agritech.tnau.ac.in)



**Fig. 3. Distribution and training on nutritive kitchen garden kits to rural women in Kaivandur village by the Department of Horticulture in Tiruvallur district**

Source: Survey data

#### 4. CONCLUSION AND RECOMMENDATIONS

India may be the second largest producer of food, but sadly it is ranked 102<sup>nd</sup> among the 117 countries in the 2019 Global Hunger Index and continues to grapple with undernutrition (195.9 million) [12-14]. To combat the issue, the Government of India has taken several initiatives. In this context, Nutritive garden or kitchen gardening is one of the promising interventions for enhancing the food security of rural households and it should be considered as a strategy at the national level. Nutrition gardens also enhance household dietary diversity by providing essential micronutrients through the constant supply of vegetables and fruits. The complex phenomenon of food availability and accessibility could be addressed through an integrated approach to solving food insecurity issues in the longer run. Kitchen garden or nutrition gardens also builds self-reliance and reduce dependence on subsidies and fortification schemes.

The following are the recommendations by the study to promote kitchen gardens in an effective way to address the issues of household food security and dietary diversity.

1. Scale up kitchen gardens under the National Nutrition Mission scheme to facilitate the consumption of diverse and nutrient-rich foods.
2. Training and capacity building to Anganwadi/noon meal centres in the kitchen garden
3. Awareness of nutrition gardens by demonstrating the type of vegetables and fruits to be grown should be conducted periodically in rural areas
4. Involving NGOs, Self Help Groups in the promotion of kitchen gardens in rural areas
5. Many rural households cited a lack of land and space constraints for kitchen gardens. To solve the issue, the Ministry of Rural Development can help in promoting a community kitchen garden in each hamlet or village by engaging women in the households. This would help in income generation and also improve the dietary diversity of the households.

Future research could be done to assess the impact of nutritive gardens on household food consumption patterns and food security. Such studies will add to the policy interventions taken by the government.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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