# A STUDY ON ASSESSING THE EFFECTIVENESS OF NUTRITION GARDENS ON FOOD AND NUTRITIONAL SECURITY IN TELANGANA STATE

**BY**

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# DECLARATION

I, **A.KALPANA**, hereby declare that the thesis entitled **"A STUDY ON ASSESSING THE EFFECTIVENESS OF NUTRITION GARDENS ON FOOD AND NUTRITIONAL SECURITY IN TELANGANA STATE"** submitted to the **Professor Jayashankar Telangana State Agricultural University** for the degree of **Master of Science in Home Science** is the result of the original research work done by me. I also declare that no material contained in the thesis has published earlier in any manner.

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# CERTIFICATE

Ms. **A. KALPANA** has satisfactorily prosecuted the course of research and that thesis entitled "**A STUDY ON ASSESSING THE EFFECTIVENESS OF NUTRITION GARDENS ON FOOD AND NUTRITIONAL SECURITY IN TELANGANA STATE"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by her for a degree of any university.

**Dr. M. PREETHI**
**Date:** **Chairperson**

# CERTIFICATE

This is to certify that the thesis entitled **"A STUDY ON ASSESSING THE EFFECTIVENESS OF NUTRITION GARDENS ON FOOD AND NUTRITIONAL SECURITY IN TELANGANA STATE"** submitted in partial fulfillment of the requirements for the degree of 'Master of Science in Home Science' of the Professor Jayashanakar Telangana State Agricultural University, Hyderabad is a record of the bonafide original research work carried out by **Ms. A. KALPANA** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance and help received during the course of the investigations have been duly acknowledged by the author of the thesis.

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***Date:*** *(A.Kalpana)*

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# LIST OF SYMBOLS AND ABBREVATIONS

| | | |
|---|---|---|
| % | - | Per cent |
| < | - | Less than |
| > | - | Greater than |
| = | - | Equals to |
| & | - | and |
| BDO | - | Block Development Officer |
| *et al* | - | and other people |
| etc | - | and so on |
| FAO | - | Food and Agriculture Organization |
| FLD | - | Front Line Demonstrations |
| GHI | - | Global Hunger Index |
| ha | - | Hectare |
| HH | - | Household Head |
| ICMR | - | Indian Council of Medical Research |
| IDR | - | Indian Depository Receipt |
| IU | - | International Unit |
| Kg | - | Kilogram |
| KVK | - | Krishi Vigyan Kendra |
| $m^2$ | - | Square Meter |
| mg | - | milligram |
| g | - | gram |
| NGO | - | Non-Governmental Organization |
| OVC | - | Orphan and Vulnerable Children |
| RDA | - | Recommended Dietary Allowance |
| RDI | - | Recommended Dietary Index |
| sq. ft | - | Square feet |
| TV | - | Television |
| UN | - | The United Nations |
| US | - | United States |

| | | |
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# ABSTRACT

One third of the population of Telangana State resides in and around urban areas. This causes continuous growth in demand of vegetables. Urbanization is one of the major constraints in expansion of the agricultural area. Nutrition gardening helps to maximize the food and nutritional security associated with mass production by localizing produce supply. It helps to reduce the amount spent on purchasing vegetables and fruits and adds to the biodiversity by encouraging birds and insects to flourish. It also nurtures people's social skills.

An ex-post facto research design was used for conducting the study. The three districts viz., Rangareddy, Hyderabad and Medchal-Malkajgiri were selected purposively from Telangana state with the presence of highest number of respondents growing nutrition gardens. In total three mandals, 75 respondents growing nutrition gardens were selected randomly for the study.

The data was collected by using personal interview method with the help of a structured interview schedule. Statistical procedures like frequency, percentage, paired 't' test and correlation were employed to analyze and interpret the data.

The findings of the study revealed that majority of the respondents were in the middle age group of 36-50 years, had education level up to graduation and above and had high (33.33%) experience in nutrition garden and had large >750 square feet operational landholding, because most of the respondents (89.3%) had own land. Majority (62.67%) of the respondents had medium mass media exposure, (60.00%) were with medium extension agency contact and medium (77.33%) source of information seeking behaviour.

The majority (45.33%) of the respondents participated in government-conducted nutrition garden trainings, 58.67 per cent received training in compost production, 80.00 per cent opined that nutrition garden training had improved their knowledge and felt that it was useful to them.

An average (total of vegetables, leafy vegetables, roots & tubers and fruits 237.09 kg/annum vegetables, green leafy vegetables, roots& tubers and fruits was produced through nutrition garden. Vegetables alone accounted for the highest (143.31 kg/annum) share in the average production of food groups, followed by fruits (47.45kg/annum). The average per capita availability of vegetables and fruits increased from 302.89 gm/day to 357.54 gm/day after nutrition gardens were established among selected families. There was a significant and positive relationship between the operational landholding, nutrition garden plot percentage used for growing crops, yield of the nutrition garden with food and nutritional security of the respondent at 1% level of significance ($p<0.01$).

The majority (94.67%) of the respondents faced insect and pest management as the major problem. All the respondents used organic methods for vegetable and fruit production with the usage of bio manures. Majority (90.67%) of the respondents suggested pruning and using bio-fertilizers for insect pests and diseases, as suggestions for overcoming the enlisted problems.

The establishment of nutrition gardens plays an important role in providing sufficient, safe and nutritious food at household level. In addition, gardens increase the availability, access, and utilization of vegetables and fruits, which lead to improved health within the households. This results in improving the food and nutritional security of the respondents.

## Chapter I

# INTRODUCTION

Food and nutritional security is a state that exists when all individuals, at all times have social, physical and economic access to adequate, safe and nutritious food to meet all the dietary requirements for a healthy and active life (World Food Summit, 1996).

Food and nutrition security is one of the leading problems around the world. According to Global Hunger Index 2020, India ranked 94$^{th}$ out of 107 countries, indicating a serious hunger level with a score of 27.2. More than 820 million people worldwide do not have access to sufficient and safe food to meet their daily requirements (GHI, 2020). A vast population of hungry and undernourished individuals live in developing countries under inferior living conditions and more than half a billion of the worldwide population suffer from long-lasting food insecurity.

India is suffering from triple burden of widespread poverty, food insecurity and under-nutrition. The household-level data on calorie intake indicates that the average calorie consumption among the population in India is falling over the last twenty years (Shubha, 2020).

In rural parts of India, undernourishment and deprived health status is a common challenge. It delays growth, raises the risk and extent of illness, decreases work productivity and slows mental and social development. For underprivileged households, vegetables and fruits are often the lone sources of micronutrients in the diet. Vegetables and Fruits are key sources of fiber, vitamins and minerals and their nutritional and medicinal importance in human life is well known. India's undernourished population is constantly on the rise and the situation has deteriorated with the soaring inflation witnessed with regard to food prices. With the worldwide population projected to reach more than 9 billion by 2050, there will be a continuous need to raise food production and buffer stocks to meet the mounting demand and capably cope with instabilities in prices and food production. It has been expected that worldwide food production will need to rise by 70% to meet the average day-to-day caloric requirement of the world's population in 2050 (UN, 2021).

Among several strategies to raise food production, emphasis on need for a nutrition gardens is stressed, as the resources available for food production – including agricultural land and water are becoming scarce and expensive. The drive for farming innovation is further complicated by the growing issues of climate change and natural resource depletion (FAO, 2010).

Globally, nutrition gardens have been recognized as an important additional source contributing to food and nutritional security. Gardening on small plots adjacent to the house is the oldest and most enduring form of cultivation. For centuries, nutrition gardens have been an integral factor of family farming and indigenous food systems. Nutrition gardening is a prehistoric and extensive practice all over the world. In urban areas, too growing one's own vegetables is the new trend. A close association between nutrition gardens, nutrition and foods is evident, assuming that most garden-grown produce is meant for personal consumption, sharing or sale at local markets, thus bringing benefits not only to the participants but also to the community.

Nutrition gardens directly offer food and nutritional security by creating access to food that can be reaped instantly, organized and served to household members every day or whenever essential. There are numerous social benefits that have arisen from nutrition gardening practices like employment opportunity, good health, improved income, nutrition security within the household and improvement in community social life. Nutrition-rich vegetable crops from own nutrition garden are the cheapest, safest and natural way to get functional food. A nutrition garden is an advanced form of garden in which vegetables are grown along with fruits, herbs, spices and other useful plants such as medicinal plants as a supplementary source of food and income. For small and marginal farmers, nutrition garden supply can make a significant impact to the family diet and provide several other benefits, especially for women.

Nutrition gardens can be a profitable proposal in a country like India which is largely vegetarian, where most of the nutrients are attained from vegetables and fruits for a balanced diet. Due to poor consumption of vegetables and fruits, deficiency of micro-nutrients, especially of vitamin A, vitamin C and iodine are prevalent in the developing world (Hall, 2009).

Nutrition gardening can be done with almost no financial resources, using locally available planting materials, seeds, domestic waste as manures and indigenous means of pest control. Nutrition gardens can be grown in the empty space available on the terrace of the house, backyard, and balcony. Further, the vegetables and fruits reaching the market have high amount of pesticide deposits, it is in the own interest of the consumers to grow fruits and vegetables for personal consumption.

Nutrition garden plays a vital role in the lifestyle of people living in urban areas or small towns. The main point of establishing a nutrition garden is to safeguard formal beliefs and social character of joint families. Possible benefits of nutrition gardens are increased income and improved rural employment through additional or off-season production, improved food security, increased accessibility of food and better nutrition through food diversity. Other factors like decreased risk though diversification and environmental benefits, food cycling, water nutrients, controlling shade, dust, erosion and maintaining local biodiversity also encourage the households to have their own nutrition gardens. One of the simplest ways of guaranteeing access to a healthy diet that contains enough micro and macro nutrients is to produce various kinds of food in the nutrition garden. This is especially important in rural and semi-urban areas where people have limited income-earning opportunities and poor access to markets. Nutrition gardens are becoming an increasingly important source of food and income for poor households in semi-urban and urban areas (Kaur, 2018).

One of the primary objectives of this study is to understand the effectiveness of nutrition gardens, especially for urban and semi-urban households, which ensures a healthy diet that comprises adequate quantities of vitamins and macro and micro-nutrients by producing varied kinds of vegetables.

### 1.1. Objectives of the study

1. To study the profile characteristics of respondents growing nutrition gardens.
2. To study the characteristics of the nutrition gardens.
3. To measure the impact of nutrition gardens on food and nutritional security of the respondents.
4. To identify the challenges faced by respondents in growing nutrition gardens and elicit their suggestions to overcome them.

## 1.2. Need and Importance of the study

With the growing expansion of cities and urban population across the world, there is a huge need for food supply in cities. Growing nutrition gardens is the way forward to restore our food production, ecological foundations, lower temperatures, and enhance a city's climate change resistance.

Cultivating and consuming a variety of vegetables and fruits from the own garden is one of the simplest methods to ensure appropriate macro and micronutrient intake. Nutrition gardening is one of the most convenient way to cultivate healthy fruits and veggies on our own land. It can be raised in the backyard of the house, balconies, and terraces. Vegetables produced at own homes are organic, low-cost, and could be completely free of chemicals and pesticides. A nutrition garden is an enhanced type of kitchen garden in which a variety of vegetable crops are cultivated. These gardens have a strong tradition and have a lot of potential for increasing household food security and reducing micronutrient deficiencies. Most significantly, it provides immediate access to a wide variety of nutrient-dense plants. It also boosts buying power by saving money on food bills.

The government has recognized the importance of nutrition gardens for household food and nutritional security. However, there is limited research on the impact of nutrition gardens on food and nutrition security in Telangana State. More importantly, no attempt has been made in Hyderabad to assess the effectiveness of nutrition gardens on food and nutrition security.

## 1.3 Significance of the study

This study attempts to document the impact of nutrition garden production on food and nutritional security of urban households. The study focused on studying the characteristics of the nutrition gardens, to know about respondent's involvement, experience, area under nutrition garden, and the associated constraints and challenges.

The study highlights the challenges faced by respondents in growing nutrition gardens and suggestions for the same. The findings of this study well throw light on the perception and adoption of the urban people regarding different aspects of nutrition garden activities.

### 1.4. Hypothesis of the study

Based on the objectives, the following hypothesis was framed

It is hypothesized that there will be a significant effect of nutrition gardens on the food and nutritional security of respondents in Telangana state.

### 1.5. Expected output:

1. It is expected to find an increased in dietary consumption of vegetables and fruits in the daily menu of respondents growing nutrition gardens.
2. It is anticipated that the food and nutritional security well range from good to fair among the respondent families.
3. The general challenges faced and suggestions to overcome them in growing nutrition gardens as narrated by respondents would serve as a ready reckoner for amateurs who want to start growing nutrition gardens.
4. The positive impact of food and nutritional security of respondents growing nutrition gardens in the state of Telangana can be submitted to The State Commissioner of Horticulture for intensive promotion of household nutrition gardens in the state.

### 1.6. Limitations of the study

1. The study was limited to three districts of Telangana state.
2. The study being a student investigation had the usual limitations of time and resources.
3. Selections of respondents were also limited to urban areas.
4. Sample size was limited to 75 members.

### 1.7. Presentation of the study

The study is presented in five chapters.

**Chapter I:** This chapter deals with introduction, hypothesis of the study, specific objectives, expected outcome and limitations of the study.

**Chapter II:** The second chapter deals with the review of literature on related objectives of this study.

**Chapter III:** The third chapter deals with the materials and methods used in the process of investigation. It includes the location of the study area, sampling procedure that is followed,

variables selected for the study, the procedure involved in the structuring of data collection, tools used for data collection and statistical tools followed, etc.

**Chapter IV:** The fourth chapter covers the results and discussion of the investigation.

**Chapter V:** The fifth chapter deals with the summary and conclusion with the implications of the study. At the end, literature cited and appendices are presented.

# Chapter II

# REVIEW OF LITERATURE

A literature review is a comprehensive summary of a topic, previous to a research. The literature review surveys scholarly articles, books, and other relevant sources for a particular research area. A comprehensive review of literature is an integral part of any research, as it not only provides insight into the work done in the past and helps to delineate the problem area, but also provides a basis for interpretation and discussion of findings. A critical assessment of earlier studies was done to understand the problem in depth. The literature available is organized and presented under the headings as follows:

2.1 Demographic characteristics of respondents

2.2 Characteristics of nutrition gardens

2.3 Impact of nutrition gardens on food and nutritional security

2.4 Challenges faced by nutrition garden respondents

## 2.1 Demographic characteristics of respondents

### 2.1.1 Age

Abdoellah *et al*. (2020) in their study on "Home garden commercialization: extent, household characteristics, and effect on food security and food sovereignty in Rural Indonesia" reported that the average age of the respondents was 52.15 years.

Rani *et al.* (2020) revealed in their study on frontline demonstrations on kitchen gardening that majority (41.50%) of the respondents were of younger age group, followed by middle age group (38.00%) and remaining (20.50%) were in upper age group.

Kaur (2018) in his study on "Perception and problems of KVK trained farmers for kitchen gardens" reported that majority of the respondents were in the age of above 50 years.

Prasad (2018) observed in his study on terrace gardening in Bangalore city that majority (36.67%) of the respondents belonged to the age group of 30 to 40 years, 28.33

per cent belonged to the age group of 40 to 50 years and 16.67 per cent each belonged to the age group of 20 to 30 years as well as 50 to 60 years.

Singh (2018) studied on "Kitchen gardening: A promising approach towards improving nutritional security in rural households" and reported that the respondents were in 19 to 56 years age group.

Tumwebaze (2018) in his study on effectiveness of home gardening in reducing food insecurity and improving health in Chacraseca, Nicaragua; a pilot study found that the participants age varied from 18 years to 65 years with the average age of 40.1 ± 12.4 years.

Chimbwanda (2016) studied "perceptions and attitudes of participants toward urban gardening" they reported that majority (37.5%) of the nutrition garden growers belonged to the age group of 46-50 years, followed by 30.00 per cent growers between 36-45 age group, 20.00 per cent growers in 56-60 age group, and 12.5 per cent growers were belonged to 26-35 age group.

Taboka (2016) in his study on evaluation of the impact of backyard gardens on household incomes in southern district, Botswana, found that the average age for household head was 47 years.

### 2.1.2 Gender

Prasad (2018) reported in his study on terrace gardens in Bangalore city that majority (61.67%) of the respondents were female and remaining (38.33%) were male.

Rybak *et al*. (2018) surveyed the households with nutrition gardens and reported that 91.01 per cent respondents were female and 84.09 per cent were male.

Singh (2018) studied "kitchen gardening: A promising approach towards improving nutritional security in rural households" and reported that a total of 164 rural women participated in the training program to upgrade the knowledge of rural women regarding the importance of the kitchen gardening.

Tumwebaze (2018) in his study on Effectiveness of home gardening in Chacraseca, Nicaragua, found that majority (66.06%) of participants were female whereas 33.04 per cent of the participants were male.

Moshin *et al*. (2017) concluded that the women were particularly more aware about kitchen gardening than men. They were engaged in growing of vegetables in due time with proper management and be able to save time and money in terms of buying vegetables from the market.

Chimbwanda (2016) reported in their study on contribution of urban crop production to household food security in Warren park suburb of Harare that majority (90.00%) of the nutrition garden growers were female, while 10.00% were male respondents.

Schreinemachers *et al*. (2016) showed that the average trained women spent 7 min per day on the home garden, which was an average increase of 2.5 min ($p < 0.01$) as a result of the intervention. Men spent on average 3–4 min/day on the home garden, mostly on preparing the land, and this was not affected by the intervention ($p = 0.30$).

Taboka (2016) showed that about 28.00 per cent of the households were male headed and 72.00 per cent were female headed households.

Rani *et al*. (2015) studied on "nutrition intervention and homestead kitchen gardening-improving nutritional security in rural livelihoods" in that out of total subjects, 30.05 per cent were men and 34.07 per cent were women.

Schreinemachers *et al.* (2014) reported that women spent more time on the home garden after the home garden training. Adult women in the control group provided about half of the labour for planting, weeding, watering and harvesting. Women in the intervention group provided about three-quarters of the labour for these activities. It suggests that the intervention increased the relative involvement of women.

### 2.1.3 Education

Rana *et al*. (2021) reported in their study on "kitchen garden: an ideal approach to enhance household nutritional security in rural areas of Seoni district Madhya Pradesh", twenty two per cent of the women were illiterate followed by elementary education 41.00 per cent and middle school education 37.00 per cent.

Dubey (2021) revealed in her study on impact of planned and non-planned kitchen gardening for improvement of nutrition and economical benefits of societies that majority

(75.00%) of the respondents got primary level education while 10.00 per cent got middle level education and 15.00 per cent were illiterates.

Abdoellah *et al*. (2020) found in their study on home garden commercialization: extent, household characteristics, and effect on food security and food sovereignty in rural Indonesia that the average length of schooling was 7.51 years. They also found that some heads of household had no formal education and overall educational levels were low.

Rani *et al*. (2020) depicted that majority (29.50%) of the respondents were educated up to secondary school, followed by primary school 25.00 per cent, respondents who can read and write were 20.50 per cent, whereas 11.00 per cent respondents were educated up to senior secondary level. Only 4.00 per cent of total respondents were educated up to graduation/post-graduation level.

Singh *et al*. (2019) in their study on food and nutritional security through nutrition gardening in Unnao district reported that majority (37.00%) of the respondents were illiterate and only 20.00 per cent of respondents had high school or more educational status.

Verma *et al*. (2017) found in their study on kitchen gardening practices in Sultanpur city that majority (52.05%) of the household heads were illiterate, followed by primary level education (26.25%).

Arya *et al*. (2018) found in their study on household food security through kitchen gardening in rural areas of western Uttar Pradesh, India that majority (62.05%) of the family were literate to middle level educated.

Rybak *et al*. (2018) studied on the "status and scope of kitchen gardening of green leafy vegetables in rural Tanzania: Implications for nutrition interventions" and revealed that 40.00 per cent and 48.00 per cent of household heads had no formal education while 59.04 per cent and 51.00 per cent had only primary school education in Morogoro and Dodoma.

Singh (2018) in his study on kitchen gardening: a promising approach towards improving nutritional security in rural households stated that most (35.36%) of the females were educated up to primary level and among them (19.51%) were found illiterate.

Pillai *et al*. (2016) stated that majority (72.05%) of the respondents had completed primary education, 7.05 per cent respondents were completed secondary education and 20.05 per cent respondents were illiterates in his study on effect of nutrition education on the knowledge scores of urban households with home gardens in Morogoro, Tanzania.

Taboka (2016) found that 25.00 per cent of the households had non-formal education and 75.00 per cent had formal education. In his study on evaluation of the impact of backyard gardens on household incomes in southern district, Botswana also revealed that 47.00 per cent had gone up to primary level whilst 16.00 per cent attained junior secondary school, 9.00 per cent had senior secondary school and 3.00 per cent had tertiary education.

Rani *et al*. (2020) revealed that majority (43.00%) women had higher school education, 20.00 per cent of the women were illiterates, and 37.00 per cent had elementary education.

Chayal *et al*. (2013) in their study on improving nutritional security through kitchen gardening in rural areas identified that majority (75.00%) heads of the family were literate to primary level education.

**2.1.4 Family type**

Dubey (2021) indicated that majority (80.00%) of the respondents belonged to nuclear families, remaining were belonged to (20.00%) joint family.

Singh *et al.* (2019) indicated that majority (73.00 %) of respondents belonged to nuclear family (53.00%) with medium family size.

Verma *et al*. (2019) in his study found that 57.05 per cent and 42.05 per cent of respondents belonged to joint and nuclear family respectively.

Arya *et al*. (2018) indicated that majority (60.00%) of respondents belonged to joint family and rest (40.00%) of them belonged to nuclear family.

Chayal *et al*. (2013) reported in their study that majority (90.00%) of the respondents belonged to nuclear family while remaining (10.00%) belonged to joint family.

### 2.1.5 Family size

Dubey (2021) found that 65.00 per cent of the families had 5 to 7 members followed by (30.00%) having 1 to 4 members and more than 7 members (5.00%).

Rana *et al.* (2021) found that majority of the respondents had (65.00%) medium size families, followed by small size 30.00 per cent and big size 5.00 per cent respectively.

Verma *et al*. (2019) found the majority (52.05%) of the family belonged to medium size, followed by small (28.75%) and big size (18.75%) respectively.

Singh *et al*. (2019) indicated that majority (73.00%) of respondents belonged to nuclear family and more than half 53.00 per cent had medium size families.

Arya *et al*. (2018) found that majority (55.63%) of the families were from medium sized families, followed by small size (35%) and big size (9.37%) respectively.

Prasad (2018) found that majority (68.33%) of the terrace garden practitioners had three to four members in the family and 18.33 per cent had five to six members in the family.

Tumwebaze (2018) reported the household size of the respondents as 1 to 10 family members. The average household size was 4.9 ± 2.5 family members.

Legesse *et al*. (2016) in their study on Species diversity, composition, structure and management in agro forestry systems: the case of Kachabira district, Southern Ethiopia found that the majority (31.05%) of the households had 6 members in family, followed by (19.01%) households with 5 members, (15.07%) households with 4 family members, (9.00%) households with family size of 2-3 persons.

Chayal *et al*. (2013) found that majority (65.00%) of the families were medium sized families, followed by small size (30.00%) and big size (5.00%) respectively.

### 2.1.6 Annual Income

Dubey (2021) reported that majority (55.00%) of the respondents had high income of more than Rs. 1.00.000 per annum followed by 30.00 per cent respondents Rs. 50.000 to 1.00.000 per annum belonged to middle income group, and less than Rs. 50.000 (15.00%) were belonged to low income group.

Abdoellah *et al*. (2020) reported that on average, home gardens were 464.21 $m^2$, and generated an average monthly income of IDR 630,674 (US$44.47), which was about 24.00 per cent of the total average monthly income.

Singh *et al.* (2019) mentioned that majority (67.00%) of the respondents belonged to middle income group with 50,000 to 1, 00,000 income per annum.

Verma *et al*. (2019) reported in their study that revealing family income majority (82.25 %) of respondents belonged to low income group of less than Rs. 50,000.

Arya *et al*. (2018) showed that majority (47.5 %) of respondents belonged to middle income group of 50,000 to Rs. 1.00.000.

Tumwebaze (2018) found that most of the households reported to have one income source. Hired to work on other agricultural farms (26.07%), personal business (26.07%), farming in own gardens and teaching 26.07 per cent were reported as sources of income.

Singh (2018) stated that the respondents' per capita income ranged between Rs. 400 to 2300 per month with a mean of Rs. 1031.48 ± 486.81 and hence belonged to middle income group.

Rani *et al*. (2015) found that (33.00%) of the respondents earned monthly income between Rs.4,001-5,000/-, while 25.00 per cent of families had monthly income between Rs.5, 001 to 7,000/- and (42.00%) of the families had below Rs. 4,000/- of monthly income.

Nyasha *et al*. (2014) found out that the majority (64.00%) of the respondents agreed that nutrition gardens provide steady income to orphan and vulnerable children in Mkoba while on the other hand only 18.00 per cent of the respondents did not agree.

Chayal *et al*. (2013) found that majority (55.00%) of respondents belonged to high income group with more than Rs. 1.0 lakh per annum.

### 2.1.7 Operational landholding

Dubey (2021) found that majority (60.00%) of the respondents had medium size land holding followed by small size (25.00%) and large size (15.00%) land holding.

Rani *et al.* (2020) reported that nearly half (45.00%) of the respondents were landless, whereas about one third (27.50%) of the respondents had land up to 5.00 acres. It is further pointed out (20%) of the respondents had land between 5 to 10 acres, and only 7.50 per cent respondents were had land more than 10.0 acres, respectively.

Kaur (2018) found that respondents had large (<10 ha) operational land because most (47.00%) of the farmers had leased their land. The findings revealed that area under kitchen gardening was low (56.00%) and more over, site of location of kitchen garden was at farm.

Singh *et al*. (2019) mentioned that majority (67.00%) of the respondents had marginal land holding followed by small (27.00%) land holding.

Verma *et al.* (2019) found that majority (81.02%) had small sized land followed by medium (16.02%) sized land.

Arya *et al*. (2018) depicted that majority (58.12%) had small sized land followed by medium (30%) sized land and only 11.88 per cent had large sized land holding.

Prasad (2018) reported that majority (85.67%) of the respondents used terrace space for gardening activities. Out of it, 28.33 per cent of the practitioners had terrace garden space of 400-600 square feet, followed by 18.33 per cent of the practitioners with the terrace garden space of 600 square feet to 800 square feet and 15.00 per cent of practitioners dedicated (800-1000 square feet) for terrace garden.

Tumwebaze (2018) reported that 46.07 per cent had no land, 20.00 per cent had greater than six acres of land where as 33.34 per cent of the participants had between an acre and six acres of farm land.

Jindal and Dhaliwal (2017) concluded that (53.02%)families grew vegetables in more than 40 square meter area, followed by 29.03 per cent that grew in 21-40 sq. meter area (585 families), 11.06 per cent grew vegetables in between 11-20 sq. meter area and only 4.04 per cent grew vegetables below 10 sq. meter area.

Awasthi *et al*. (2016) revealed that in the study on house hold food security through kitchen garden an average production from 104 $m^2$ was 209.33 Kgs where as 305.60 Kgs

production was achieved from 150 $m^2$area. About 386 Kgs production was achieved from 204 $m^2$ area.

Chayal *et al*. (2013) found that majority (60.00%) had medium sized land followed by small (30.00%) sized land and (10.00%) had large sized land.

Qaiser *et al*. (2013) reported that the potential land availability of kitchen gardening in court yards (55.00%), while cultivated around house and fields was 23.00 per cent, similarly existing area under fruits and vegetables was 42.86 per cent in field followed by 38.10 per cent was around house.

### 2.1.8 Marital status

Chimbwanda (2016) reported that majority (47.05%) growers were widowed followed by 37.05 per cent married growers, 12.55 per cent growers were divorced, and 2.05 per cent growers were single.

Pillai *et al*. (2016) indicated in their study that majority (57.05%) of women was married and 42.05 per cent women were single, widowed and divorced.

Taboka (2016) reported that majority (27.00%) of the respondents was single parent, 23.00 per cent were widowed, 19.00 per cent were married and 1.00 per cent was divorced.

### 2.1.9 Occupation

Rana *et al*. (2021) found in their study that all the respondents were engaged in agriculture and allied occupation, which fell under the category of moderate work.

Rani *et al*. (2020) reported that majority (53.50%) of the respondents had agriculture as their main occupation whereas, 24.00 per cent respondents were agriculture labourers and 14.50 per cent were in caste wise occupation.

Rybak *et al*. (2018) reported that majority (95.01%) of the respondents main occupation was farming in Morogoro and Dodoma.

Tumwebaze (2018) found that most of the households reported to have one income source. Hired to work on other agricultural farms (26.07%), personal business (26.07%), farming in own gardens and teaching (26.07%) were reported as sources of income.

Rani *et al.* (2015) in their study on Nutrition intervention and homestead kitchen gardening-improving nutritional security in rural livelihoods found that the all the respondents were engaged in agriculture and allied occupation.

**2.1.10 Extension contact**

Arya *et al*. (2018) studied on "household food security through kitchen gardening in rural areas of western Uttar Pradesh, India. KVK scientists brought a positive change in food security and nutritional diversity among the villagers.

Kaur (2018) found that majority (44.00%) of the respondents had high extension contacts, followed by 42.00 per cent respondents with medium extension contacts and 16.00 per cent had low extension contacts.

Prasad (2018) observed that 66.67 per cent of the respondents gained information from the terrace garden enthusiasts by meeting them monthly.

Chauhan (2012) indicated that the low, medium and high level of knowledge before contact with KVK scientists was 85.00 per cent, 11.00 per cent and 4.00 per cent respectively and it was increased up to 7.00 per cent, 13.00 per cent and 80.00 per cent after contact with KVK scientists.

**2.1.11 Mass media exposure**

Kaur (2018) reported that majority (55.00%) of the respondents had medium mass media exposure, followed by 27.00 per cent of the respondents had low mass media exposure, 18.00 per cent of the respondents with high mass media exposure.

Prasad (2018) observed that 100.00 per cent of the practitioners followed social media such as Whats app, Face book, You Tube etc.., for gaining and sharing their knowledge, problems and solutions regarding terrace gardens.

Taboka (2016) found that 52.00 per cent of beneficiaries owned radios, while 40.07 per cent of non-beneficiaries owned radios and about 38.00 per cent of the beneficiaries and 28.00 per cent of the non-beneficiaries had televisions. They indicated that they needed the radios and televisions to access information on better crop production techniques and major inputs such as high-yielding seeds and pesticides so that they can improve their nutrition gardens.

## 2.2 Characteristics of nutrition gardens

Galhena *et al*. (2013) followed five intrinsic characteristics of home gardens which were listed by Michelle and Hanstad, a 1) Home gardens located near the residence; 2) contain a high diversity of plants; 3) production is supplemental rather than a main source of family consumption and income; 4) occupy a small area; and 5) are a production system that the poor can easily enter at some level. Home gardens were ecologically divided into two categories: tropical and temperate. Each home garden was unique in structure, functionality, composition, and appearance.

### 2.2.1 Family member's involvement

Rybak *et al*. (2018) in their study gender roles showed that 75.00 per cent and 80.00 per cent of women 20.00 per cent and 18.00 per cent of other relatives and children participated in caring for the kitchen gardens in Morogoro and Dodoma, respectively.

Awasthi *et al.* (2016) described that mainly husband and wife do all the operations for maintaining Kitchen garden also children contributed their part in some work. Maximum contribution of wife given for harvesting (64%) and weeding (61%) while husband prepared land (50%) and fenced (50%) the garden.

Igwe *et al*. (2014) reported in their study that all the respondents worked for their nutrition garden as they did not hire any labour and about 43.33 per cent of the respondents hired labour for their home gardening activities.

### 2.2.2 Experience in nutrition garden

Kaur (2018) in his study on Perceptions and problems of KVK trained farmers for kitchen gardening found that the majority of the respondents were matriculates and had high (48.50%) experience level in kitchen gardening.

Pal (2018) mentioned that majority of the adopters were motivated for the kitchen gardening by themselves and parents. Half of the adopters were practicing the kitchen gardening from more than 33 years.

Prasad (2018) reported that the majority (35.00 %) of the respondents had two years or less than two years of experience in terrace gardening, followed by 25.00 per cent the

practitioners with more than two years to four years and 18.33 per cent of the practitioners with experience of more than four to six years.

Galhena *et al*. (2013) in their study on "Home gardens: a promising approach to enhance household food security and wellbeing" found that more than 35.00 per cent were engaged directly or indirectly in the agrarian sectors.

### 2.2.3 Ownership of land

Anitha and Amudha (2019) revealed that majority (93.00%) of the respondents residing in both individual house and apartments stated that they established kitchen garden for relaxation whereas (90.00%) for medicinal benefits, followed by 84.00 per cent for space intension, hobby (66.00%), aesthetic (56.00%), and income purpose respectively (26.00%).

Zasada *et al*. (2019) conducted a survey on home gardeners and urban gardening practice in Pune, India. This study was emphasized on socio demographic background information, gardening motivations and gardening practice among home gardeners. The focus was on terrace-rooftop gardens and backyard-kitchen gardens as they represent the predominant types of home gardening activities in Indian metropolitan areas.

Sangakkara and Frossard (2016) revealed that all gardeners had their own land for home gardening in all climatic zones.

### 2.2.4 Type of crops

Elfrida *et al*. (2020) identified that highest number of fruit plant species were recorded in Tenggulun, i.e., 34 species, followed by Selamat 27 species and Simpang Kiri 23 species.

Achinna *et al*. (2019) reported that among the vegetables Tomato produced the highest yield (58.5±0.7 Kgs) followed by Brinjal (44.5±0.9 Kgs) and Green chilies (32.5±0.2 Kgs). It was observed that an average of 36.8 Kgs of green leafy vegetables was produced in backyard spaces. An average of 54 Kgs of cucurbitaceous vegetables were produced in the backyard kitchen garden.

Pradhan *et al*. (2018) stated that in Koraput district of Odisha state, majority (32.00%) of households was grew only two or one (25.00%) vegetable in their home gardens. In Wardha district of Maharashtra state, 19.00 per cent of the households practiced traditional home gardening with cultivation of few fruit trees, vegetables and very limited cultivation of leafy vegetables.

Chimbwanda (2016) reported that the all (100.00%) respondents grew covo leaves, (95.00%) of the respondents grew rape leaves, (90.00%) grew tomatoes, (85.00%) grew onion, (67.05%) grew spinach, (57.05%) grew beans, (52.05%) grew okra, and (45.00%) of the respondents grew butternuts in their home gardens.

Rupinder (2016) found that the large proportion (69.05 %) of the respondents used canal area under nutrition garden and nearly half of the respondents (47.00%) cultivated vegetables, pulses and fruits in their nutrition garden. Adoption quotient of area under nutrition garden was 43.00 per cent and adoption quotient of crops (vegetables, pulses and fruits) cultivated for nutrition garden was 80.00 per cent.

Minh (2015) reported that in his study on "Characteristics of home garden and its improvement through vanilla introduction in central Vietnam" from the harvest of the home garden 96 per cent of the vegetables were used for home consumption and 4 per cent for sale, including bamboo shoots, taro, and papaya.

### 2.2.5 Nutrition garden development

Rani *et al*. (2020) studied on "frontline demonstrations on kitchen gardening: an impact assessment the comparison of knowledge before and after front line demonstrations". The results revealed that of maximum gain knowledge (45.00%) was in irrigation and their critical stages followed by plant protection measures (42.50%), improved varieties (42.00%) and post-harvest management (38.00%). Minimum gain knowledge in land preparation and layout (25.50%).

Prasad (2018) reported that majority (85.00%) of the practitioners had their own house and 15.00 per cent of practitioners practiced kitchen garden in rented houses. Also he revealed that majority (43.33%) of the practitioners used bore water, followed by 28.33 per cent of the practitioners using rain water and waste water with harvesting system, while

21.67 per cent of the practitioners used recycled water as a source of water for terrace garden activities.

Mohsin *et al.* (2017) mentioned that the growers were given seed kits for vegetables production. They were satisfied with the quality and price of seed kit and in the regular provision of fresh and healthy vegetables. They concluded that seed distribution was a successful project and benefitted the masses and encouraged urban agriculture.

Ferdous *et al*. (2016) reported that the highest amount of vegetables was produced by the small farmer groups (511 kg/year) followed by marginal (499 kg/year) and landless (422 kg/year) farmers. The yearly vegetable requirements of farmers were largely met by the homestead garden with a supply between 55 and 79 kg/head/year compared with the bench mark level of 21–30 kg/head/year before the intervention.

Minh (2015) in his study reported that all the households had home gardens around their houses and majority (90.00%) of the households had less than 5,000 $m^2$, and 67.00 per cent of the households obtained water for their home gardens from community reservoir systems. The remaining households depended on rain water.

**2.3 Impact of nutrition gardens on food and nutritional security**

Rana *et al*. (2021) indicated that before demonstration, respondents cultivated 8 different vegetables but after intervention they had grown 23 items. It was also found that there was an increase in homestead vegetable production (499.65 kg/unit), consumption (482 kg) and distribution of excess vegetables to neighbours and relatives (17.8 kg).

Dubey (2021) reported that given demonstrations increased in the production of green leafy vegetables which was generally lacking in the diet. In Roots and Tubers category of vegetables, per cent increased in the average production of planned garden against unplanned garden was found in the range of 26.21 per cent to 60.29 per cent in two years. Highest average production was found in the Year 2018-2019 which was 157.08 kg/year.

Singh *et al*. (2020) studied on “backyard kitchen garden as the viable tool for nutritional security of rural families: A Study from Kannauj District Uttar Pradesh”, found that availability of vegetables for consumption, percentage RDA, distribution and sale reveals that after intervention on kitchen garden there was (44.01%) increase in average

yield of vegetables, average per capita availability of vegetable increase was 43.93 per cent, percentage RDA increase was (43.93%), reduction in purchase of vegetables was 74.24 per cent and distribution/sale of vegetables increased (100%) as it was nil before intervention.

Suri (2020) conducted a study on nutrition gardens a sustainable model for food security and diversity. The study indicated that community and nutrition gardens played an important role in enhancing national food security and dietary diversity to combat malnutrition. Study focused on various programmes of the Government of India and also stated that these programmes were best initiatives for providing food security and ensuring access to adequate quantity of quality food.

Rani *et al*. (2020) revealed that 80.00 per cent of the members expressed that the kitchen gardens had helped their families to improve the consumption of fresh vegetables in their diet and improved social relationships with their neighbours by sharing the surplus produce from their homestead gardens.

Achinna *et al.* (2019) stated that back yard kitchen gardening increased per-capita consumption of varied vegetables and leafy vegetables in regular diet. It also helped to increase income levels of the tribal women farmers.

Baliki *et al.* (2019) found that after the intervention, the average impact on vegetable production per household was 43 kg/year. This had driven by the long-term improvements in women's nutrition knowledge and gardening practices, explaining the sustainability of the behavioural nutrition change with positive impact on women's empowerment and output market participation.

Verma *et al*. (2019) reported that respondents purchased vegetables from market for consumption to full fill the requirement. After establishment of nutrition garden, production of vegetables increased to (95.00%) which resulted in increased consumption (26.03%), distribution (100 %) and purchase of vegetables was decreased by 37.05 per cent.

Arya *et al*. (2018) results revealed that there was an increase in kitchen garden vegetable production, consumption and distribution of excess vegetables to neighbourhood and relatives. Before intervention, respondents were practicing traditional methods; they used to grow only one or two seasonal vegetable and they purchased vegetables from market for consumption. After intervention the production of vegetables was increased to

(41.02%) which resulted in increased consumption (17.05%), distribution (100.00%) and purchase of vegetables was decreased by 40.00 per cent.

Pal (2018) conducted a study on "Discriminatory analysis of adopters and non-adopters of kitchen gardening in Ferozepur district of Punjab". The results revealed that almost all the adopters felt that they were benefitted from kitchen gardening like fresh and healthy food products, higher share of vegetables and fruits, reduced cost of food bill and pesticide free vegetables.

Pradhan *et al*. (2018) conducted a study on improving household diet diversity through promotion of nutrition gardens in India. The results found that the average daily consumption of all groups of vegetables and fruits was 75.00 per cent and more households in Koraput district 90.00 per cent and more households in Wardha district were found to consume below the recommended daily intake (RDI) by the Indian Council of Medical Research (ICMR).

Jindal and Dhaliwal (2017) studied on "Development of vegetable nutrition garden model for diet diversification and improved nutrition security of urban and peri-urban households". They indicated that vegetable nutrition garden model provide vitamin A, iron, calcium and vitamin C to each adult member in the family on daily basis through diets. The results showed that availability of vitamin A, iron and vitamin C was at par or higher than the daily requirement. Thus this model was able to meet daily requirement of vitamin A, iron, and vitamin C of family.

Awasthi *et al.* (2016) stated that average vegetable consumption of a person was less than RDA before planting kitchen garden and also consumption of roots and tubers was more in comparison to green and green leafy vegetables. After planting Kitchen garden, consumption of vegetables increased gradually and consumption of green and green leafy vegetables also increased proportionately.

Chimbwanda (2016) reported that majority (50.00%) of the growers strongly agreed that the nutrition gardens increased access to nutritious and fresh vegetables. Majority (40.00%) of the respondents believed that the nutrition gardens had a positive impact on their life and 40.00 per cent of the respondents strongly agreed that the vegetable production increased their income.

Schreinemachers *et al*. (2016) revealed that the trained households consumed most of the home garden produce within the own household (75%), but households in the intervention group also shared some of the increased harvest with others (+5 kg per year). The amount of vegetables sold did not change significantly. During the training, women had been encouraged to consume the vegetables rather than sell them. Although the quantity of vegetables increased by only 33.00 per cent, the supply of iron, folate, zinc and protein increased by 80–95 per cent, the supply of vitamin A and calcium increased by about 135 per cent and the supply of vitamin C increased by 175 per cent.

Nyasha *et al.* (2014) reported that the majority (61.00%) of the respondents agreed that nutrition gardens produced the intended results of food security for orphan and vulnerable children in Mkoba. Nutrition gardens had positively changed the livelihood of orphan and vulnerable children and 71.00 per cent agreed with the statement.

Schreinemachers *et al*. (2014) stated that improved home gardens potentially supplied 5.04 per cent of the average household's protein needs, 9.03 per cent of calcium needs, 10.03 per cent of iron needs, over 100.00 per cent of its vitamin A needs, and 46.07 per cent of its vitamin C needs. The results of the 30-day food frequency data showed that intervention households had a greater diversity in their vegetable consumption.

Chayal *et al.* (2013) identified that kitchen gardening demonstrations resulted in increase of homestead vegetable production, consumption and distribution of excess vegetables to neighbours and relatives. The production of vegetables increased to (169.27%) which resulted in increased consumption (85.66 %) and distribution (400%) and money saving.

Qaiser *et al*. (2013) stated that after the kitchen garden training, all the participants were interested to grow kitchen garden. The practice of kitchen gardening increased from (53%) to (87%), similarly the cultivated land also increased after the kitchen gardening training. It was also accredited that water source for kitchen gardening and water conservation technology also improved after starting kitchen gardening.

Garcia *et al*. (2012) studied the impact of urban gardens on adequate and healthy food: A systematic review study, and reported that there was an increase in access to healthy foods, sharing produce and reduced food costs. They mentioned that respondents

grew their own fruits & vegetables to reduce food costs and to share foods with friends and family members.

**2.4 Challenges faced by nutrition garden respondents**

Kaur (2018) studied on "Perception and adoption of kitchen gardening by the farmers trained by KVK Jalandhar". The study revealed that majority of the respondents faced the problem of insect pests and diseases in summer season due to increase in temperature.

Pradhan *et al*. (2018) identified that the key constraints of nutrition gardens were water access in summer, lack of knowledge on importance of consuming particular fruits and vegetables seed and planting materials, small size back yard area and unavailability of labour etc., were reported to be other major issues.

Prasad (2018) reported that that insect pest infestation was the major problem, followed by plant diseases, non-insect pests such as rodents, monkeys, cats, birds. This was followed by lack of space on the terrace. The constraints faced by the practitioners were also ranked on basis of frequency.

Rybak *et al*. (2018) reported that water scarcity was the main hindrance to kitchen garden. The other challenges were fencing, tools for farming, pesticides and limited access to seeds. Lack of fences held back most of the households from establishing kitchen garden.

Singh *et al*. (2018) revealed that the availability of water for irrigation was the major constraint for production of vegetables. Unavailability of quality seed material and lack of technical knowledge ranked as second and third constraints.

Kaur and Sharma (2017) studied the constraints faced by farmers in adopting kitchen gardens in the central plain zone of Punjab. The study found the input constraints as unavailability of quality seeds/nursery, non-availability of pesticides, farmyard manure, and availability of seeds in small packets were the significant constraints. Technical limitations like lack of knowledge about recommended seed rate, varieties and major insect pests and diseases identified, and also knowledge regarding available literature, recommended varieties and seed treatment were major technical constraints.

Singh and Singh (2017) reported that the in-put constraints, brackish irrigation water was placed first with the 79.6 per cent, followed by (77.7 %) limited availability of quality of vegetable seeds in the form of kits. Under technical constraints, lack of information regarding improved varieties, seed rate and sowing time as well as lack of knowledge regarding management of insect-pests and diseases were the major constraints.

Chimbwanda (2016) reported that 100 per cent of the respondents faced difficulty in securing manures and fertilizers, 100.00 per cen faced problem of pests and diseases, 90.00 per cent faced problem of theft, 62.05 per cent identified one water scarcity problem and 52.05 per cent of respondents faced high transportation charges as challenges.

Schreinemachers *et al*. (2016) in their study on Impact and cost-effectiveness of women's training in home gardening and nutrition in Bangladesh reported that the most frequent problems were difficulty in controlling pests and diseases, plants destroyed by livestock and expensive seed.

Galhena *et al.* (2013) reported in their study that the access to suitable and sufficient land to establish a home garden along with lack of ownership were the most important limiting factors. The other constraints were access to capital or credit, access to water, seeds and planting materials, weak extension and advisory services, access to labour and access to markets. The cultural acceptance of home gardening was also found as important constraint.

Qaiser *et al*. (2013) reported some constraints and shortcomings of kitchen gardening given by the respondents, as water shortage for kitchen gardening, pest attacks & less awareness, which were tried to compensate through roof top water harvesting system, water tanks and capacity building of the trainees.

Chauhan (2012) listed the problems and constraints faced by tribal farm women in kitchen gardening. The results showed that the major constraints faced by the tribal farm women were lack of knowledge regarding sowing time, improved varieties and seed rate (82.00%) and fear of farm produce robbery (72.31%).

## Chapter III

# MATERIAL AND METHODS

This chapter deals with the research design, sampling procedure, variables and their measurement, tools of data collection, statistical tests used and analytical procedures followed to interpret the data. The details of the methodology followed in the present investigation are presented under the following heads.


**3.1 Research design**

**3.2 Locale of the study**

**3.3 Sampling procedure**

**3.4 Variables and their empirical measurement**

**3.5 Operational definitions**

**3.6 Tools for data collection**

**3.7 Statistical procedures**


### 3.1 Research Design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data (Kothari, 2008).

An Ex post facto research design was used for the study to assess the effectiveness of nutrition gardens on food and nutritional security in Telangana state. According to Encyclopedia of Research Design (2010) Ex-post facto research design, starts after the fact had occurred without interference from the researcher. In contexts, which are not possible or acceptable to manipulate the characteristics of human participants, is based on ex post facto research designs. It is also often applied as a substitute for true experimental research to test hypotheses about cause-and-effect associations or in circumstances in which it is not practical or ethically acceptable to apply the full code of behavior of a true experimental design.

### 3.2 Locale of the study

The study was carried out in Telangana State due to the following reasons:

1. Telangana state was selected purposively as per the guidelines of the university.
2. It facilitates accessibility for the student researcher since her place of study; College of Community Science is located at Hyderabad in Telangana state.

### 3.3 Sampling procedure

#### 3.3.1 Selection of Districts

Three districts were selected purposively based on the highest number of nutrition gardens in the Telangana state. According to State Board of Horticulture data (2017-2018) the districts that were recorded as having highest nutrition garden growers were identified as Rangareddy, Hyderabad and Medchal - Mallkajgiri districts when compared to other 31 districts of Telangana state (Figure.3.1).

#### 3.3.2 Selection of Mandals

Three mandals were selected randomly from each district, those were LB Nagar, Secunderabad and Malkajgiri.

#### 3.3.3 Selection of respondents

From the selected three mandals, 25 respondents from each mandal were selected by purposive random sampling procedure. The criterion was that, respondents who are growing nutrition gardens were selected. Thus, the total sample selected for the study was 75 (Figure.3.2).

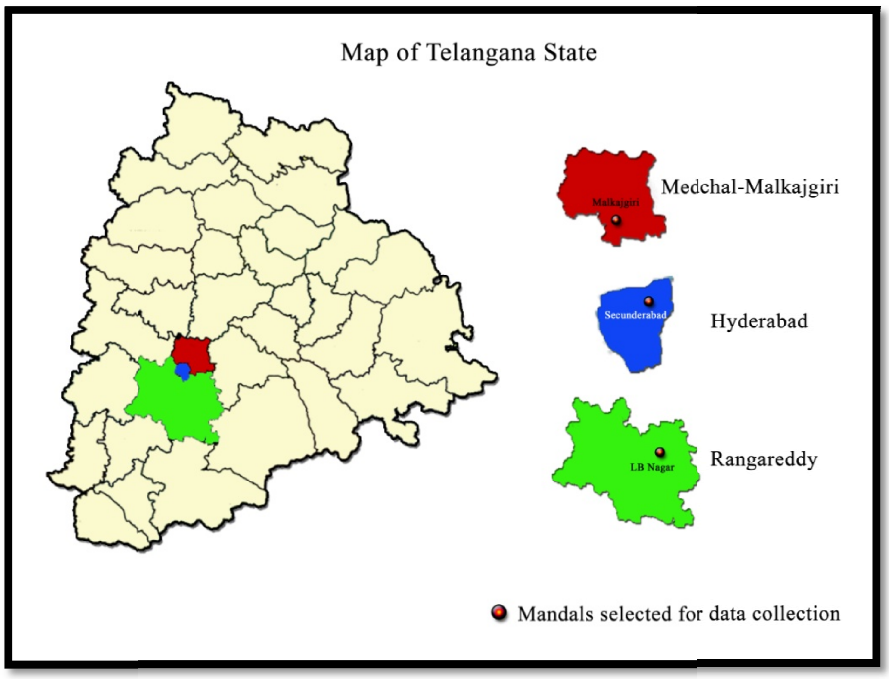


**Figure. 3.1. Geographical location of the study.**

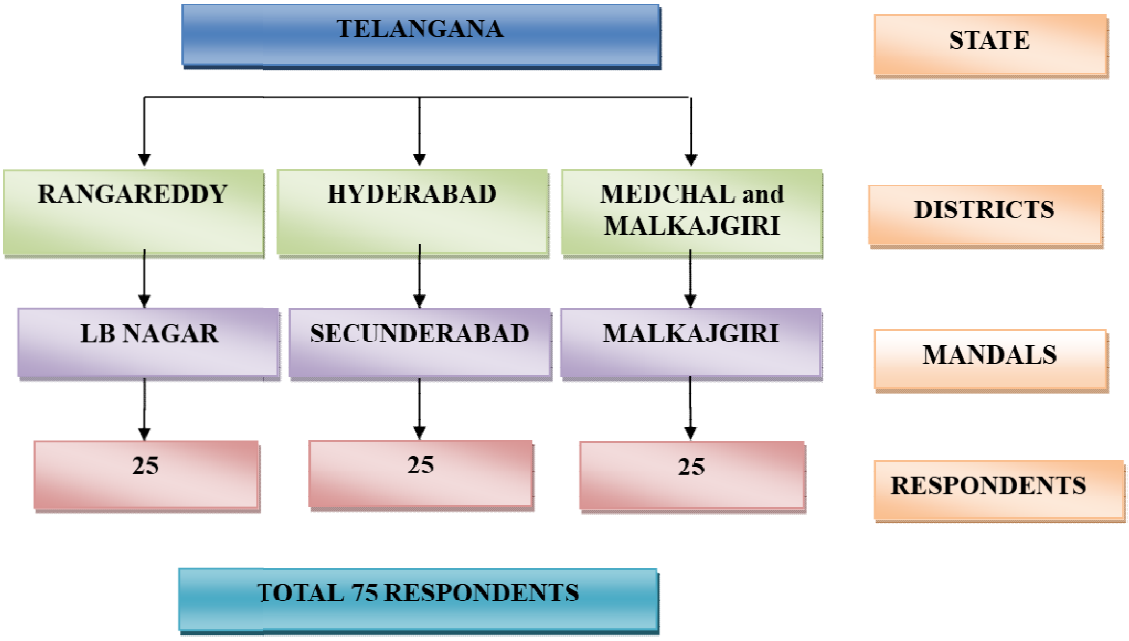


**Figure. 3.2. Sampling procedure followed in the study.**

### 3.4 Variables and their empirical measurement

The variables for the study were selected based on the review of literature and in consultation with various experts in the field. The variables selected for the study along with their empirical measurement are given below.

**Table 3.1. Variables and their Empirical measurement**

| S.No. | Variables | Empirical measurement |
|---|---|---|
| **I. INDEPENDENT VARIABLES** | | |
| 1. | Age | Chronological age of the respondents Categorized According to Kaur (2018) |
| 2. | Education | Procedure followed by Kaur (2018) |
| 3. | Marital status | Procedure followed by Galhena (2013) |
| 4. | Family type | Procedure followed by Kaur (2018) |
| 5. | Family size | Procedure followed by Kaur (2018) |
| 6. | Occupation | Procedure followed by Galhena (2013) with suitable modifications. |
| 7. | Annual income | Procedure followed by Saleem and Jan (2020) |
| 8. | Operational land holdings | Procedure followed by Prasad (2018) with suitable modifications. |
| 9. | Characteristics of Nutrition Gardens | Procedure followed by Galhena (2013) with suitable modifications. |
| 10. | Experience in nutritional garden | Procedure followed by Kaur (2018) with suitable modifications. |
| 11. | Mass media exposure | Procedure followed by Kaur (2018) with suitable modifications. |
| 12. | Extension contact | Procedure followed by Kaur (2018) with suitable modifications with suitable modifications. |
| 13. | Information seeking behavior | Procedure followed by Kaur (2018) |
| **II. DEPENDENT VARIABLES** | | |
| 1. | Food and nutritional security of respondents growing Nutritional Gardens | Procedure followed by Galhena (2013) with suitable modifications. |
| **III** | Problems faced by nutrition garden respondents | Check list developed by Galhena (2013) was adopted. |
| **IV** | Suggestions given by nutrition garden respondents | Procedure followed by Kaur (2018) |

### 3.5. Operational Definitions

#### 3.5.1 Independent variables

##### 3.5.1.1 Age

It referred to the chronological age of the respondents in terms of completed years of the life at the time of interview. The respondents were classified into the following three categories as follows Kaur (2018).

| Category | Age (in Years) |
|---|---|
| Young | 20 – 35 |
| Middle | 36 – 50 |
| Old | ≥50 |

##### 3.5.1.2 Education

Education was operationalized as the number of years of formal education acquired by the respondent at the time of the study. The categories of educational status of respondents was follows.

| S. No. | Education Level | Scores |
|---|---|---|
| 1. | Illiterate | 1 |
| 2. | Primary Education | 2 |
| 3. | Middle School | 3 |
| 4. | High School | 4 |
| 5. | Intermediate/ Diploma | 5 |
| 6. | Graduation and above | 6 |

### 3.5.1.3 Marital status

Marital status was operationalized as a person's status such as unmarried, married, widow or divorced. This was in accordance with Galhena (2013) as follows.

| S. No. | Marital Status |
|---|---|
| 1. | Married |
| 2. | Unmarried |
| 3. | Widow |

### 3.5.1.4 Family type

Family type was operationalized as a group of people who share a blood bond living together in one house either respondent's family, i.e., husband, wife and their children (nuclear) or respondents family along with in-laws families (joint family) or respondents family with parents and any other blood relation (extended). The scores were given as follows.

| S. No. | Family Type |
|---|---|
| 1. | Nuclear |
| 2. | Joint |
| 3. | Extended |

### 3.5.1.5 Family size

Family size was operationalized as the number of individuals of both sexes living together in a household.

| S. No. | Family Size | Scores |
|---|---|---|
| 1. | Small (up to 4 members) | 1 |
| 2. | Medium (5 to 7 members) | 2 |
| 3. | Large (above 8 members) | 3 |

### 3.5.1.6 Occupation

The occupation was operationalized as any activity in which a person is engaged to earn money to meet the monetary needs of the family. The respondents were classified as follows.

| S. No. | Occupation |
|---|---|
| 1. | Employee |
| 2. | Business |
| 3. | Farmer |
| 4. | Retired |
| 5. | Home maker |

### 3.5.1.7 Annual Income

The Annual income was operationalized as the income received in rupees in a year from the respondent's occupation such as agriculture, employee, business etc. Respondents were categorized into low, medium and high by using exclusive class interval technique.

| S. No. | Annual Income | Category |
|---|---|---|
| 1. | Rs. 1.00.000- 5.00.000 | Low |
| 2. | Rs.5.00.000-10.00.000 | Medium |
| 3. | Rs.10.00.000-15.00.000 | High |

### 3.5.1.8 Operational landholding

Operational Landholding was defined as number of square feet of land used for nutrition garden by the respondents at the time of enquiry. The respondents were categorized as follows.

| S. No. | Landholding (area in sq.ft) | Category |
|---|---|---|
| 1. | < 250 sq.ft | Marginal |
| 2. | 250 – 500 sq.ft | Small |
| 3. | 500-750 sq.ft | Medium |
| 4. | >750 sq.ft | Large |

### 3.5.1.9 Characteristics of nutrition garden

The characteristics of nutrition gardens are closely related to many factors, such as their geographic location and the involvement of family members, percentage of nutrition garden plots for growing crops and type of crops and ownership of the nutrition gardens. These characteristics were measured by using frequency and percentages.

| Category | Score |
|---|---|
| Yes | 2 |
| No | 1 |

### 3.5.1.10 Experience in nutrition garden

It referred to number of years the respondents were growing nutrition gardens for their own purpose. Frequencies and percentages were calculated for knowing the experience of the respondents.

| S.No | Experience in Nutrition Garden | Score |
|---|---|---|
| 1. | < one year | 1 |
| 2. | One year | 2 |
| 3. | Two years | 3 |
| 4. | Three years | 4 |
| 5. | >Three years | 5 |

### 3.5.1.11 Plot percentage of nutrition garden

The plot percentage operationalized based on land utilized for nutrition garden. The scores for plot percentage were given as follows.

| S.No. | Percentage | Score |
|---|---|---|
| 1. | <25% | 1 |
| 2. | 25-50% | 2 |
| 3. | 50-75% | 3 |
| 4. | >75% | 4 |

### 3.5.1.12 Land ownership

Land ownership referred to the individual who owned or leased land for growing nutrition garden. It was categorized as follows.

| S.No | Type of Land |
|---|---|
| 1. | Owned |
| 2. | Leased |

### 3.5.1.13 Mass media exposure

The mass media exposure was operationalized as the extent of exposure towards different mass media like radio listening, television viewing, newspaper reading, mobile and internet browsing among the respondents. The respondents‟ mass media exposure was measured as follows and categorized based on class intervals.

| Category | Frequency (F) | Percentage (%) |
|---|---|---|
| Low (7-12) | | |
| Medium (12-17) | | |
| High(17-22) | | |

### 3.5.1.14 Extension agency contact

Extension agency contact was operationalized as the frequency of contact of a respondent with the extension personnel. The schedule was developed to measure the extension agency contact. Respondent's contact with extension officer, subject matter specialist and horticulture development officer contact was measured as follows and categorized based on class intervals.

| Category | Frequency (F) | Percentage (%) |
|---|---|---|
| Low (1-3) | | |
| Medium (3-6) | | |
| High(6-9) | | |

### 3.5.1.15 Information seeking behavior

Information seeking behavior was operationalized as the frequency of contact by farm women with various information sources. The respondent's frequency of contact with informal source (family member, relatives and farmer), media source (TV/Radio, newspaper and mobile) and new media source (internet, social media and mobile applications) was measured as follows and categorized based on class intervals.

| Category | Frequency (F) | Percentage (%) |
|---|---|---|
| Low (8-12) | | |
| Medium (12-16) | | |
| High(16-20) | | |

### 3.5.2 Dependent variables

### 3.5.2.1 Nutrition gardens

It was operationalized as a small area/plot of house where a family grows vegetables, leafy vegetables, fruits, roots and tubers for their daily diet consumption and the excess of which is sold for raising income.

### 3.5.2.2 Food and nutritional security

It was operationalized as the amount of food available, accessible, sufficient, safe and nutritious to meet the dietary needs and preferences of families as per the Recommended Dietary Allowance (RDA).

The impact of nutrition gardens on food and nutritional security of respondents were measured with the help of Schedule developed by Galhena (2013) with suitable modifications for the present study. The schedule consisted of four food groups i.e., vegetables, leafy vegetables, fruits, roots and tubers. Each food groups produce and consumption of each individual was collected in terms of kilo grams/annum later it was converted into grams before and after establishment of Nutrition Garden. The details are given below.

| List | Amount Harvested (In Kg/annum) | Amount Consumed (In Kg/annum) | Market purchase (In Kg/annum) |
|---|---|---|---|
| Vegetables | | | |
| Leafy vegetables | | | |
| Roots and Tubers | | | |
| Fruits | | | |

### 3.5.2.3 Challenges faced by respondents in growing nutrition gardens

Challenges faced by the respondents were operationally defined as challenges perceived by respondents in growing nutrition gardens. The schedule consists of fifteen statements. It was measured on five point continuum viz., always a problem, often a problem, sometimes a problem and never a problem, don't know, they were given scores as 5,4,3,2 and 1 respectively. Frequencies and percentages were calculated and ranking was given in the order of magnitude.

### 3.5.2.4 Suggestions given by the respondents

Suggestions given by the respondents were operationally defined as solutions given by the respondents for overcoming the challenges expressed by them. Frequencies and percentages were calculated and ranking was given in the order of magnitude.

## 3.6 Tools used for data collection

The data was collected with the help of interview schedule which was prepared and finalized in consultation with the members of advisory committee and by consulting available relevant literature.

### 3.6.1 Interview schedule

It is a set of questions to elicit information from the respondents. These questions will be formulated and presented with a specific objective. The interview schedule was developed to elicit personal and psychological information from the respondents. The method used for collecting the data from the respondents in the present study was structured interview method. Keeping in view the objectives and different variables included in the study, a structured interview schedule was developed.

### 3.6.2 Establishing rapport

Prior to the data collection, sufficient rapport was established with the respondents during the first few days, with the help of horticulture development officers. It was made clear to the respondents that the study was purely academic. This helped the researcher to establish friendly relations with the respondents and gain confidence of the respondents, so that data collection would be factual and accurate.

### 3.6.3 Method of Data Collection

The data was collected by administering the structured interview schedule to both men and women respondents. The respondents were personally interviewed by the investigator, which enabled her to get first-hand information and provided her an opportunity to observe their reactions. It was ensured that the statements mentioned in the schedule were correctly understood by the respondents by repeating and clarifying them where ever necessary. A friendly atmosphere was maintained throughout the interview so that the respondents were at ease and expressed their opinion properly, easily and honestly (Figure.3.4).

### 3.6.4 Checklist

It is a selected list of words, phrases, sentences and paragraphs following which an observer records a check mark to denote its presence or absence of whatever is being observed.

## 3.7 Statistical procedures

The data thus collected was coded and analyzed with the help of the following statistical tools.

### 3.7.1 Class Interval

It is a range between the maximum and the minimum scores obtained by a respondent for each and every category of a variable. The respondents were categorized based on the class intervals.

$$\text{Length of class interval} = \frac{\text{Maximum obtained score} - \text{Minimum obtained score}}{\text{Number of class intervals}}$$

### 3.7.2 Frequencies

Frequency is used to know the distribution pattern of the respondents according to the variables.

### 3.7.3 Percentages

Percentages are used for standardization of size by calculating the number of individuals in a given category, when the total number is 100.

### 3.7.4 Mean score

The mean score is a set of data equal to the sum of all values in the data set divided by the total number of values. A mean is same as the average.

### 3.7.6. Paired t test:

Paired sample t-test is a statistical procedure that is used to compare two population means, in case of two samples that are correlated. Here paired t test was used to compute the significance of Nutritional Gardens with nutritional and food security.

### 3.7.7. Correlation analysis

Correlation was used to find out the extent of the relationship between the scores of independent variables and the scores of dependent variables.

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,]\,[\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

r = coefficient of correlation between x and y

Σx = sum of independent variable x

Σy = sum of dependent variable y

Σx2= sum of squares of x variable

Σy2= sum of squares of y variable

n= size of the sample.

### 3.7.8 Ranking

Ranks were given according to the priorities given by the respondents towards statements.

### 3.8 Conceptual frame work of the study

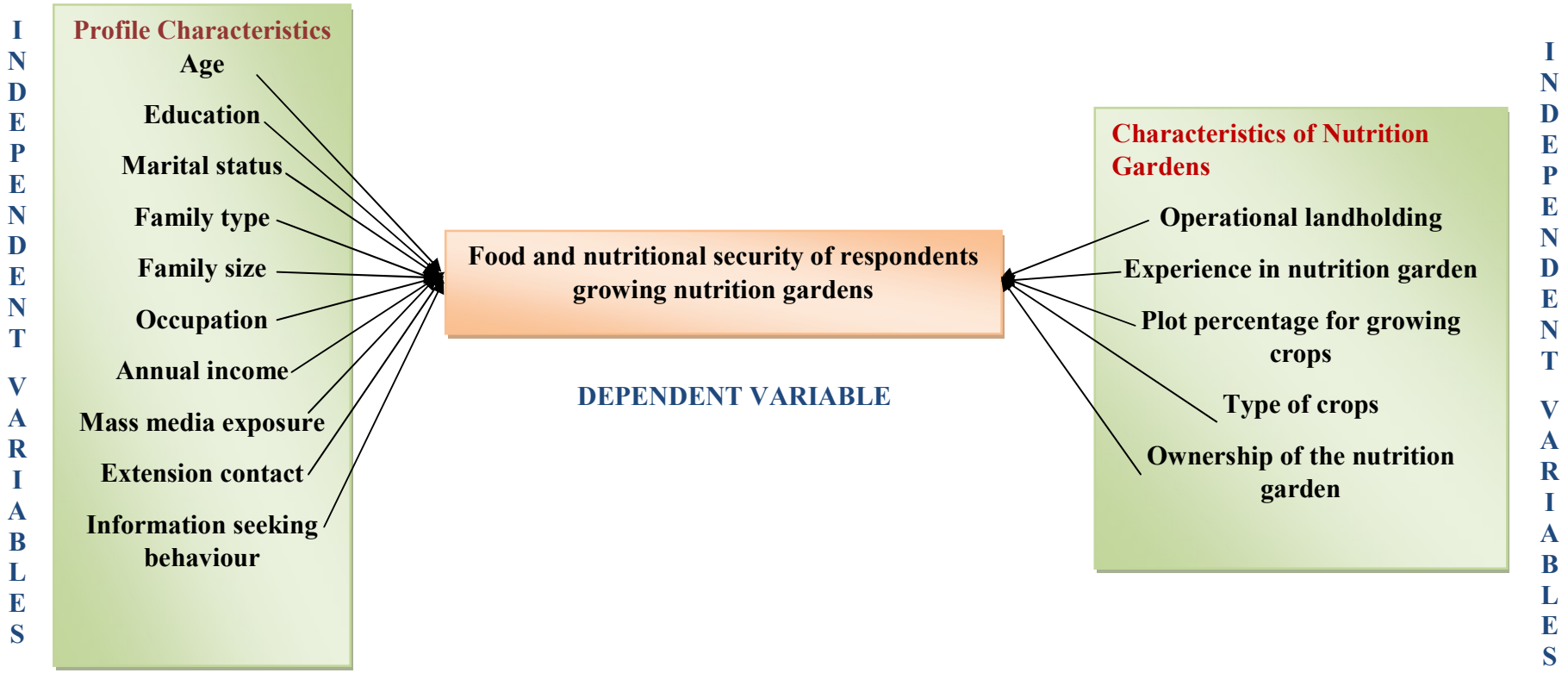


**Figure.3.3. Conceptual frame work of the study**

**3.4. Personal Interview with respondents for collecting data**

## Chapter IV

# RESULTS AND DISCUSSION

The present chapter IV focuses on the findings and interpretation of the study. The information was collected as per the objectives of the study i.e. profile characteristics of respondents growing nutrition gardens, the characteristics of nutrition gardens, to measure the impact of nutrition gardens on food and nutritional security and to identify the challenges faced by respondents in growing nutrition gardens and elicit their suggestions to overcome them. The results thus obtained were presented, along with interpretations in the following sections.

4.1 Profile characteristics of respondents growing nutrition gardens.

4.2 Characteristics of nutrition gardens.

4.3 Measurement on the impact of nutrition gardens on food and nutritional security.

4.4 Identification of the challenges faced by respondents in growing nutrition gardens and elicit their suggestions to overcome them.

### 4.1 Profile characteristics of the respondents

This section deals with the findings and discussions regarding the profile characteristics of nutrition garden growers. An interview schedule was developed to elicit information on profile characteristics such as age, gender, education, occupation, operational landholding, annual income, marital status, family type, family size, mass media exposure, extension contact and information seeking behaviour. The respondents were distributed into different categories based on their profile characteristics, which are presented and discussed in the tables from 4.1 by dividing the sample into three groups using class interval method.

### 4.1.1 Age

The age of the respondents was measured as informed by the adults, in number of years completed at the time of interview. It was categorized into three sections as follows.

**Table 4.1. Distribution of respondents according to their age**

**n = 75**

| S.No | Age (in years) | F | % |
|---|---|---|---|
| 1. | 20-35 (young) | 11 | 14.67 |
| 2. | 36-50 (middle) | 42 | 56.00 |
| 3. | >50 (old) | 22 | 29.33 |
| | **Total** | **75** | **100.00** |

It was evident from the table 4.1. that majority (56.00%) of the respondents belonged to the middle age group, followed by 29.33 per cent old age group and 14.67 per cent of the respondents belonged to the young age group (Figure.4.1).

Middle aged respondents were already married and passionate about growing nutrition gardens. Another reason was that majority of the respondents were in the working age group and were enthusiastic to grow their own vegetables and fruits and were concerned about their health.

The above results were similar to the study of Chimbwanda (2016) who studied perceptions and attitudes of participants towards urban gardening.

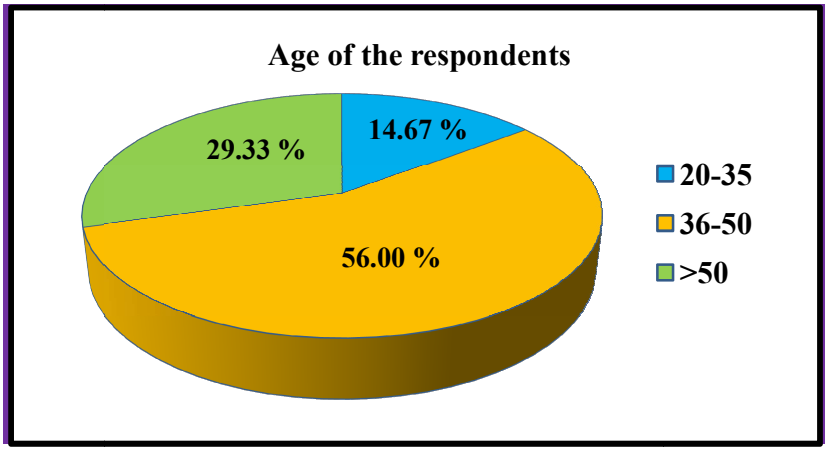


**Figure.4.1. Distribution of respondents on the basis of age.**

### 4.1.2 Gender

It refers to the distinction between being male and female. Based on the data obtained, gender was classified into two types namely male and female as reported by the respondents.

**Table 4.2. Distribution of respondents according to their gender**

**n = 75**

| S. No | Gender | F | % |
|---|---|---|---|
| 1. | Female | 42 | 56.00 |
| 2. | Male | 33 | 44.00 |
| | **Total** | **75** | **100.00** |

From the data of table 4.2. it was seen that the majority (56.00%) of the respondents were female, while the remaining (44.00%) were male (Figure.4.2).

Even though females outnumbered males in the survey, both genders actively participated in nutrition gardening. Nutrition gardens were seen as an essential food source for the household and women were in charge of the nutrition garden because they were the primary caretakers in the home. These findings were in line with Tumwebaze (2018) who studied on Effectiveness of home gardening in reducing food insecurity and improving health in Chacraseca, Nicaragua.

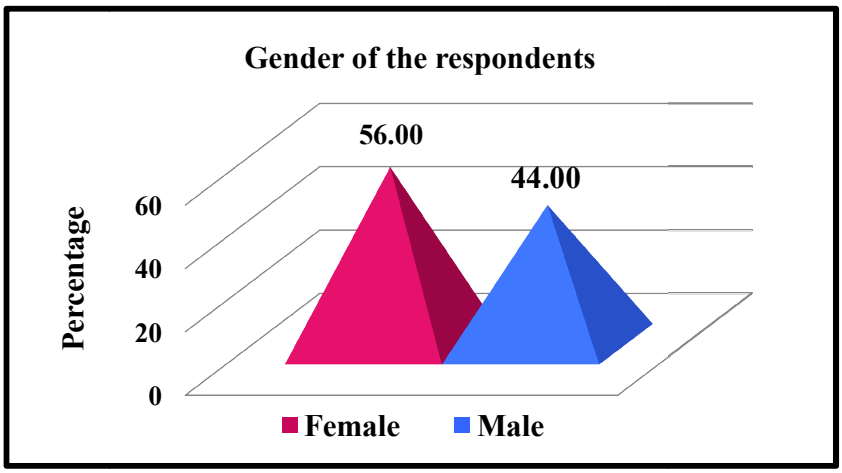


**Figure.4.2. Distribution of respondents according to their gender**

### 4.1.3 Education

The highest level of education attainment is defined as the qualification reported by the respondents in any field of study, or the highest year of school completed. In the study, the educational level of the respondents was classified into six categories, namely illiterate, primary school, middle school, high school, diploma or intermediate, and graduation and above.

**Table 4.3. Distribution of respondents according to their education**

**n =75**

| S. No. | Education | F | % |
|---|---|---|---|
| 1. | Illiterate(no education) | 0 | 0 |
| 2. | Primary Education(1st to 5th class) | 0 | 0 |
| 3. | Middle School(6th to 7th class) | 3 | 4.00 |
| 4. | High School(8th to 10th class) | 8 | 10.67 |
| 5. | Intermediate/ Diploma | 17 | 22.67 |
| 6. | Graduation and above | 47 | 62.66 |
| | **Total** | **75** | **100.00** |

It could be seen from the data presented in table 4.3. that majority (62.66%) of the respondents had education level up to graduation and above, followed by intermediate/ diploma (22.67%), high school (10.67%), and middle school (4.00%).

The majority (62.66%) of the respondents being educated up to graduation was because most of them were urban dwellers employed and retired from services. The results were in accordance to the results of Kabir and Webb (2009).

### 4.1.4 Occupation

It refers to the livelihood undertaken by the individuals to earn money to meet the basic needs of the family. Based on occupation, the respondents were classified into five categories as follows: Employee, business, retired, farmer, home maker. The following table shows the distribution of respondents as per their occupation.

**Table 4.4. Distribution of respondents according to their occupation**

**n=75**

| S. No. | Occupation | F | % |
|---|---|---|---|
| 1. | Employee | 26 | 34.67 |
| 2. | Business | 11 | 14.67 |
| 3. | Retired | 17 | 22.67 |
| 4. | Farmer | 2 | 2.66 |
| 5. | Home maker | 19 | 25.33 |
| | **Total** | **75** | **100.00** |

It was evident from table 4.4. that majority (34.67%) of the nutrition garden growers were employees followed by homemakers (25.33%), retired (22.67%), business people (14.67%), and very few (3.33%) were farmers (Figure 4.3).

According to the findings in the preceding table 4.4. majority of the respondents were employees because the respondents belonged to Hyderabad, Rangareddy, Medchal-Malkajgiri which are urban cities where most residents are salaried employees.

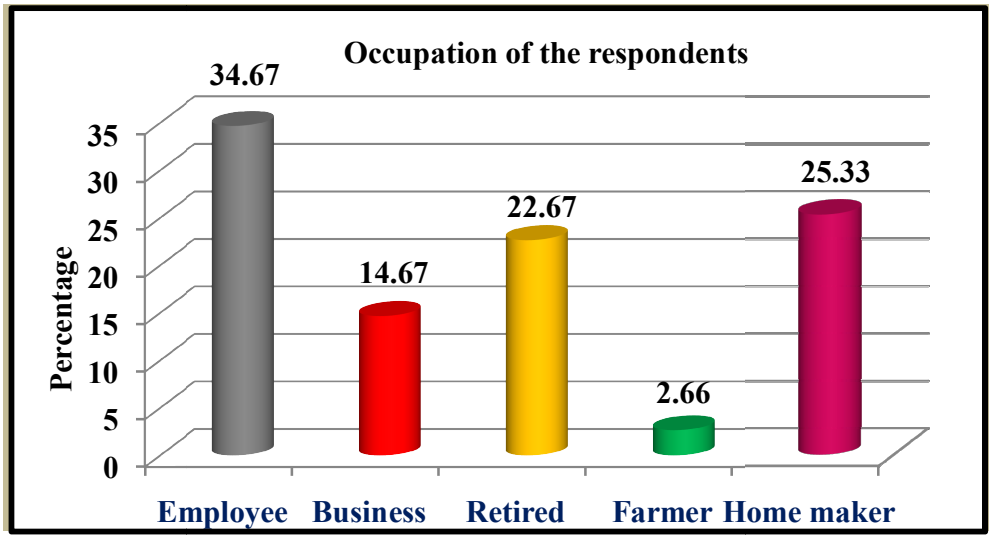


**Figure. 4.3. Distribution of respondents according to their occupation.**

### 4.1.5 Annual Income

Annual income refers to the revenue gained by the members of the family in a year. The respondents were asked to indicate their annual income and were classified into three groups: low income, medium income, and high income. As a result, the information was collected on this basis and presented in the table below.

**Table 4.5. Distribution of respondents according to their annual income**

**n=75**

| S. No. | Annual Income | Category |
|---|---|---|
| 1. | Rs. 1.00.000- 5.00.000 | Low |
| 2. | Rs.5.00.000-10.00.000 | Medium |
| 3. | Rs.10.00.000-15.00.000 | High |

The results in the table 4.5. indicated that the majority (80.00%) of the respondents belonged to the middle income group followed by 12.00 per cent of the respondents belonged to high income group and 8.00 per cent belonged to the low income group. Most of the respondents belonged to middle income group because three-fourths of the respondents were salaried employees (Figure.4.4).

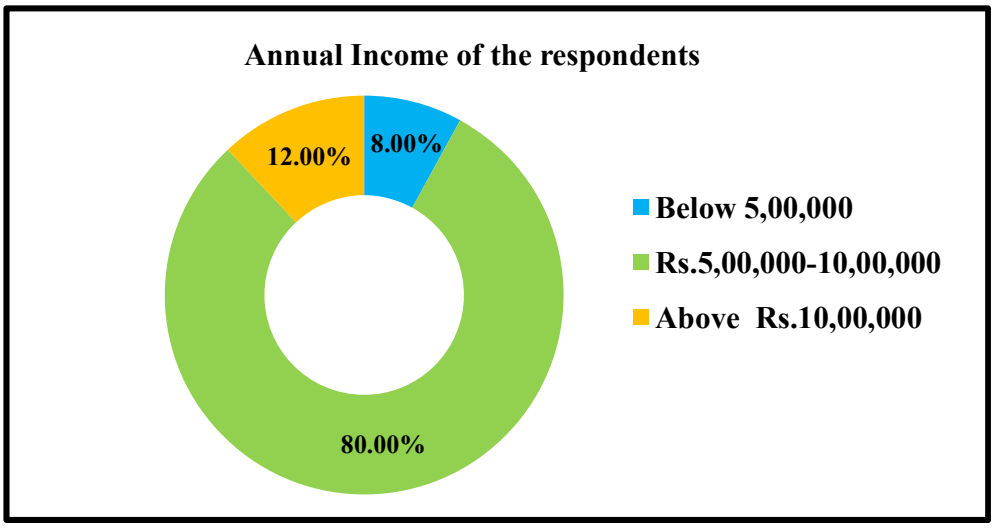


**Figure.4.4. Distribution of respondents according to their annual income.**

### 4.1.6 Family Type

Based on the type of family, the respondents were classified into three categories, namely nuclear families, joint families and extended families.

**Table 4.6. Distribution of respondents according to their family type**

**n=75**

| S. No. | Family type | F | % |
|---|---|---|---|
| 1. | Nuclear | 53 | 70.67 |
| 2. | Joint | 20 | 26.67 |
| 3. | Extended | 2 | 2.66 |
| | **Total** | **75** | **100.00** |

Table 4.6. indicated that majority (70.67%) of the respondents belonged to nuclear family, followed by 26.67 per cent belonged to joint and 2.66 per cent belonged to extended families (Figure.4.5).

This may be because a part of the family migrated from villages to cities searching for employment and business then settled in urban areas. Another reason was that many nuclear families have enough economic stability to provide family members with luxuries, opportunities, and a safe environment.

The results of this study were similar to the findings of Dubey (2021), whose study revealed that nutrition garden respondents in his sample belonged to nuclear families.

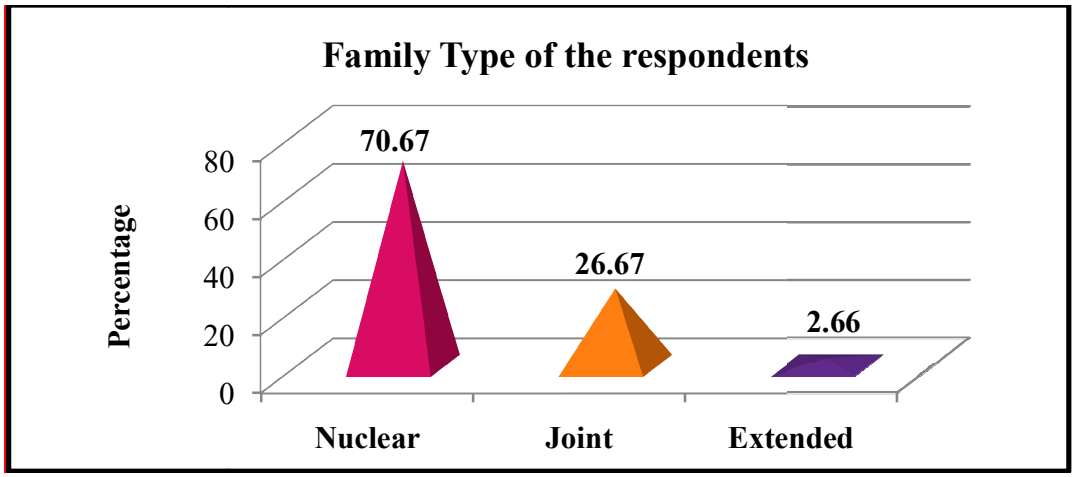


**Figure.4.5. Distribution of respondents according to their family type.**

### 4.1.7 Family Size

It talks about the number of individuals living together in one home and to which respondents belong. Based on the data obtained, the respondents were classified into three categories: small, medium, and big. Accordingly, the information was collected, and the data is as presented in 4.7 table.

**Table 4.7. Distribution of respondents according to their family size**

**n=75**

| S. No. | Family size | F | % |
|---|---|---|---|
| 1. | Small (up to 4 members) | 49 | 65.33 |
| 2. | Medium (5 to 7 members) | 18 | 24.00 |
| 3. | Big (above 8 members) | 8 | 10.67 |
| | **Total** | **75** | **100.00** |

Table 4.7. showed that majority (65.33%) of the respondents had small family size followed by 24.00 per cent of the respondents with medium families and 10.67 per cent had large families.

These results are a clear evidence for the structural changes in the family size due to increased cost of living, better socio economic status consideration and education to the children. The results are in agreement with findings of Prasad (2018) study on terrace gardening in Bangalore city.

### 4.1.8 Marital Status

Based on the marital status, the respondents were classified into three categories as married, unmarried and widowed.

**Table 4.8. Distribution of respondents according to the marital status**

**n=75**

| S.No | Marital status | F | % |
|---|---|---|---|
| 1. | Married | 68 | 90.67 |
| 2. | Unmarried | 5 | 6.67 |
| 3. | Widowed | 2 | 2.66 |
| | **Total** | **75** | **100.00** |

Table 4.8. indicated that the majority (90.67%) of the respondents were married, followed by unmarried 6.67 per cent and widowed 2.66 per cent (Figure.4.6).

This may be because most of the respondents belonged to the middle age group and at this stage, people have more responsibility for their family development. The results were in line with the results of Pillai (2016).

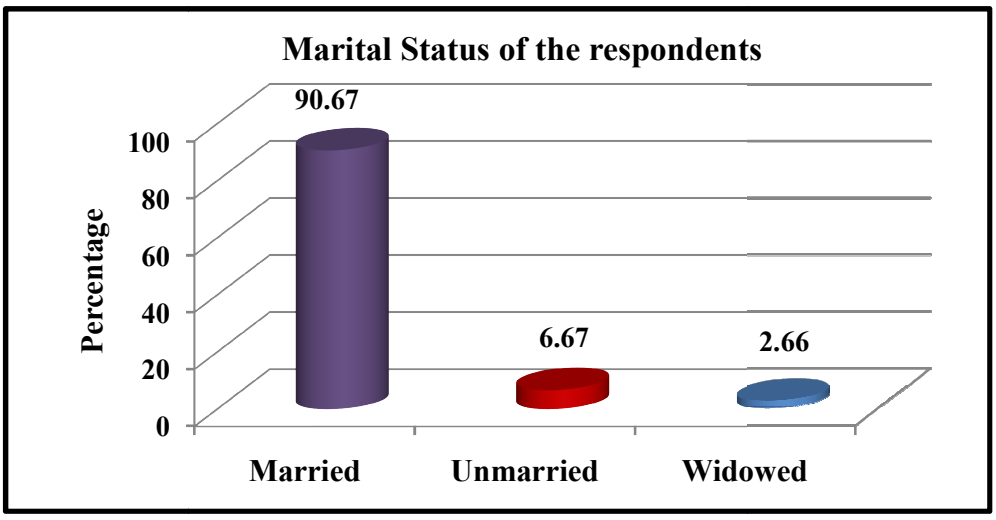


**Figure.4.6. Distribution of marital status of the respondents.**

### 4.1.9 Mass Media Exposure

Mass media exposure was defined as being exposed to various media, i.e. electronic, print media and new media. In the present study, the respondent's exposure to mass media was examined in terms of how frequently they used it. As explained in the methodology, respondents were classified into three categories based on their scores: low exposure, medium exposure, and high mass media exposure.

**Table 4.9. Distribution of respondents according to their mass media exposure**

**n=75**

| S.no | Mass Media Exposure | F | % |
|---|---|---|---|
| 1 | Low (7-11) | 02 | 02.66 |
| 2 | Medium (12-16) | 47 | 62.67 |
| 3 | High (17-21) | 26 | 34.67 |
| | **Total** | **75** | **100.00** |

Table 4.9. indicated that nearly half (62.67%) of the respondents had medium mass media exposure followed by high mass media exposure (34.67%) and 2.66 per cent of the respondents had low mass media exposure (Figure.4.7).

It might be due to the fact that majority of the respondents being employees, were preoccupied with their jobs and home responsibilities and had little time to view media unless on leisure, which resulted in medium level of mass media exposure.

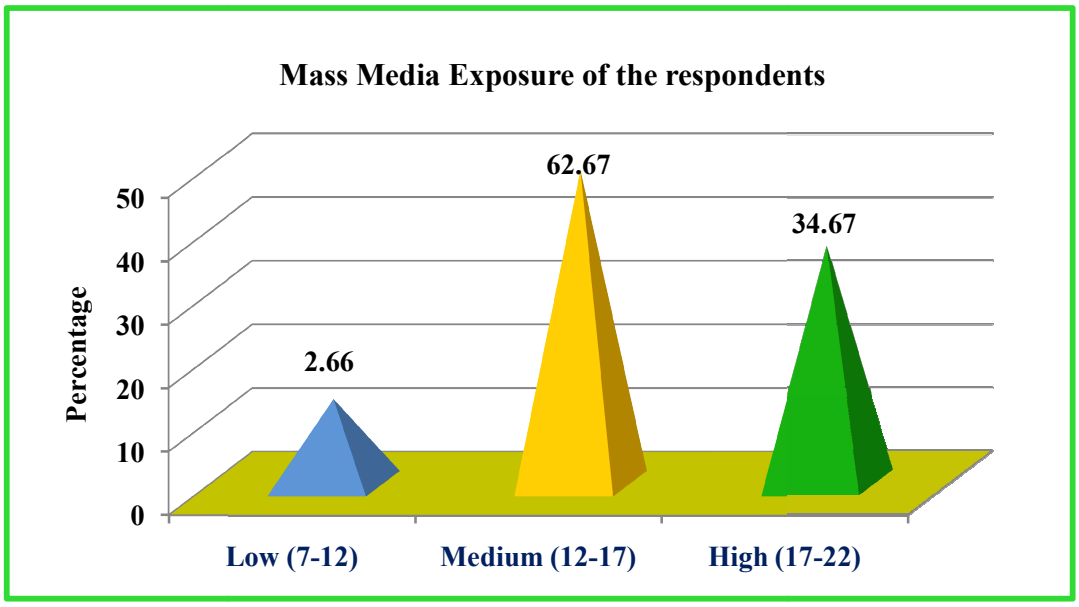


**Figure.4.7. Distribution of respondents according to their mass media exposure.**

### 4.1.10 Extension Contact

Based on the contact of the respondents with the extension agents, it was classified into four categories namely subject matter specialist, Block Development Officer (BDO), Extension officer, Horticulture development officer. Based on the contact of the nutritional garden growers with the extension agents, it was classified into three categories namely low contact, medium contact and high contact.

**Table 4.10. Distribution of respondents according to the extension contact**

**n=75**

| S. No. | Extension Contact | F | % |
|---|---|---|---|
| 1 | Low (4-6) | 28 | 37.33 |
| 2 | Medium (7-9) | 45 | 60.00 |
| 3 | High(10-12) | 02 | 2.67 |
| | **Total** | **75** | **100.00** |

It could be vividly observed from the table 4.10. that majority (60.00%) of the respondents had medium extension contact followed by low 37.33 per cent and 2.67 per cent of the respondents expressed high level of extension contact (Figure.4.8).

It could be because the beneficiaries had contact with extension personnel only during nutrition garden training but not afterwards resulting in a medium level of extension contact. The findings are in agreement with Kaur (2018) in his study on perception and adoption of kitchen gardening by the farmers trained by KVK Jalandhar.

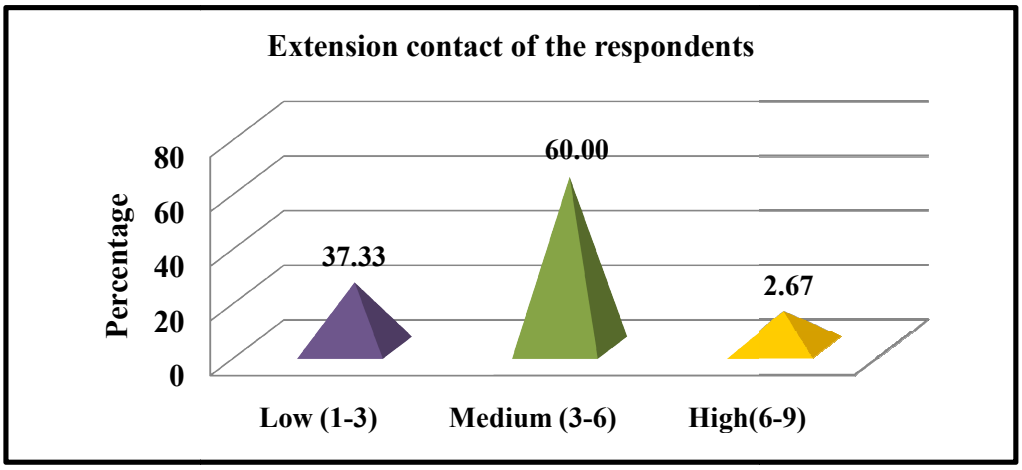


**Figure 4.8. Distribution of respondents according to their extension contact.**

### 4.1.11. Information Seeking Behaviour

It is defined as the degree of contact and frequency of contact by nutrition garden growers to different sources of information. This is the pattern by which respondents receive information either by own or being part of a network. In the present study, the degree of frequency of contact with the information sources of nutrition garden growers were classified as low, medium, high. The scores are presented in table 4.11.

**Table 4.11. Distribution of respondents according to their information seeking behaviour**

**n=75**

| S. No. | Information Seeking Behavior | F | % |
|---|---|---|---|
| 1 | Low(7-11) | 8 | 10.67 |
| 2 | Medium(12-16) | 58 | 77.33 |
| 3 | High(17 – 21) | 9 | 12.00 |
| | **Total** | **75** | **100.00** |

The above table 4.11. revealed that majority (77.33%) of the respondents had medium level of information seeking behaviour followed by low level (10.67%) and high level (12.00%) of information seeking behavior ( Figure 4.9).

The reasons for these results of medium information seeking behaviour might be due to reduced social participation in obtaining knowledge from other sources. In addition, it was also observed that respondents considered their family members as their primary source of information.

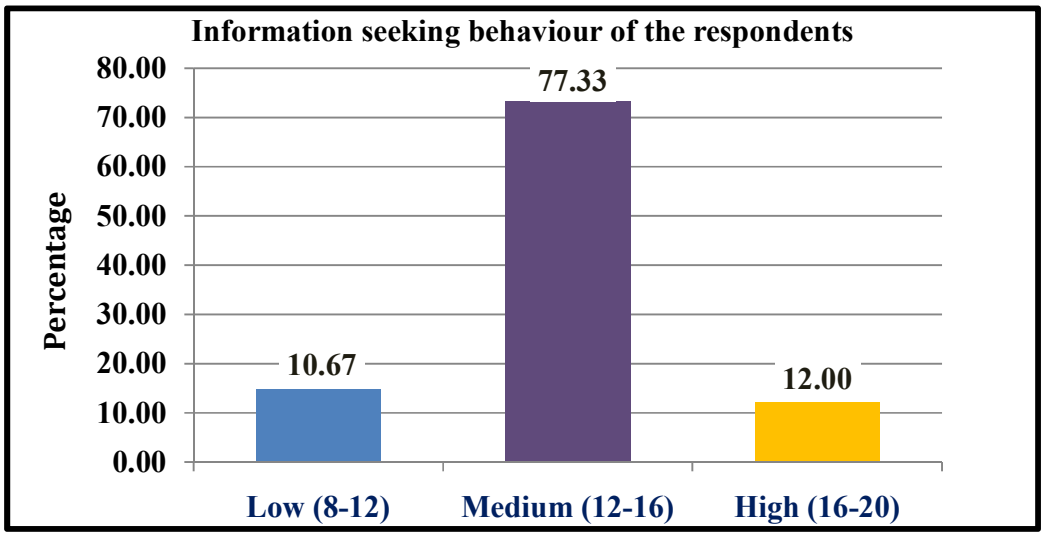


**Figure 4.9. Distribution of respondents according to their information seeking behaviour.**

### 4.2. Characteristics of nutrition garden

The characteristics of nutrition gardens are closely related to many factors, such as their geographic location, the involvement of family members, percentage of nutrition garden plots for growing crops and ownership of the nutrition garden. These characteristics were measured by using frequency and percentages. The respondents were asked to indicate their answers.

**Table 4.12. Characteristics of nutrition garden**

**n=75**

| S. No. | Characteristics | Frequency | Percentage |
|---|---|---|---|
| **1. Respondent Involvement in nutrition garden** | | | |
| 1. | Yes | 75 | 100.00 |
| 2. | No | 0 | 0 |
| **2. Family member's involvement in nutrition garden** | | | |
| 1. | Yes | 58 | 77.33 |
| 2. | No | 17 | 22.67 |
| **3. Number of family members involved in nutrition garden** | | | |
| 1. | 1 member | 22 | 29.33 |
| 2. | 2 members | 39 | 52.00 |
| 3. | 3 members | 9 | 12.00 |
| 4. | 4 members | 4 | 5.33 |
| 5. | 5 members | 1 | 1.33 |
| **4. Experience in nutrition garden** | | | |
| 1. | < One year | 2 | 2.67 |
| 2. | One year | 10 | 13.33 |
| 3. | Two years | 20 | 33.33 |
| 4. | Three years | 18 | 24.00 |
| 5. | >Three years | 25 | 26.67 |
| **5. Operational land holding** | | | |
| 1. | < 250 sq.ft | 2 | 2.67 |
| 2. | 250 – 500 sq.ft | 17 | 22.67 |
| 3. | 500- 750 sq.ft | 22 | 29.33 |
| 4. | >750 sq.ft | 34 | 45.33 |
| **6. Percentage of nutrition garden used for growing vegetable and fruits** | | | |
| 1. | 25-50% | 21 | 28.00 |
| 2. | 50-75% | 25 | 33.33 |
| 3. | >75% | 29 | 38.67 |
| **7. Ownership of land utilised for growing nutrition garden** | | | |
| 1. | Own | 67 | 89.30 |
| 2. | Leased | 8 | 10.60 |

The data given in table 4.12. showed that all the respondents (100%) were involved in nutrition garden. Majority (77.33%) of the family members were involved in the nutrition garden and lesser members were not involved (22.67%). The majority (52.00%) of the families were involved with two persons from each family, followed by one family member (29.33%), three family members (12.00%) and four members (5.33%). The majority (33.33%) of the respondents had two years of experience in the nutrition garden followed by 26.67 per cent with more than three years of experience, 24 per cent with three years of experience, 13.33 per cent with one year experience, and 2.67 per cent with less than a year of experience (Figure.4.10).

The majority (45.33%) of the respondents had their nutrition garden on more than 750 square feet land followed by 29.33 per cent of the respondents on 500-750 square feet land while 22.67 per cent of the respondents were growing in 250-500 square feet land, and only a few (2.67%) respondents were grown on less than 250 square feet land (Figure.4.11). Out of total nutrition garden cultivation area, more than 75% of the plots were used to grow vegetables and fruits by 38.67 per cent of the respondents followed by 33.33 per cent of respondents using 50-75% plots for vegetable and fruit growing, and 28.00 per cent of the respondents were using 25-50% plots for fruit and vegetable growing. The majority (89.33%) of the respondents had their own land for nutrition gardens, followed by 10.67 per cent on leased land.

The results clearly showed that all respondents, together with their family members, were quite active in the growing of nutrition gardens. Despite the fact that the majority of the respondents were female, personal interviews indicated that when it comes to maintaining a nutrition garden, they do not differentiate between family members based on gender, since nutrition gardening is a family-oriented activity rather than an individual activity. The findings were consistent with Awasthi *et al*. (2016)

The majority of the respondents had two years of experience in nutrition gardening. This might be due to the urbanization and the cost of vegetables being high during COVID 19 pandemic. The majority of the respondents owned land that was more than 750 square feet. This is because allotting land in urban areas to grow nutrition gardens is difficult, but still the respondents thought that available space like backyards, balconies and terraces

should be used to grow nutrition gardens, which resulted in the allocation of maximum amount of land for nutrition gardens. These results were in agreement with Prasad (2018).

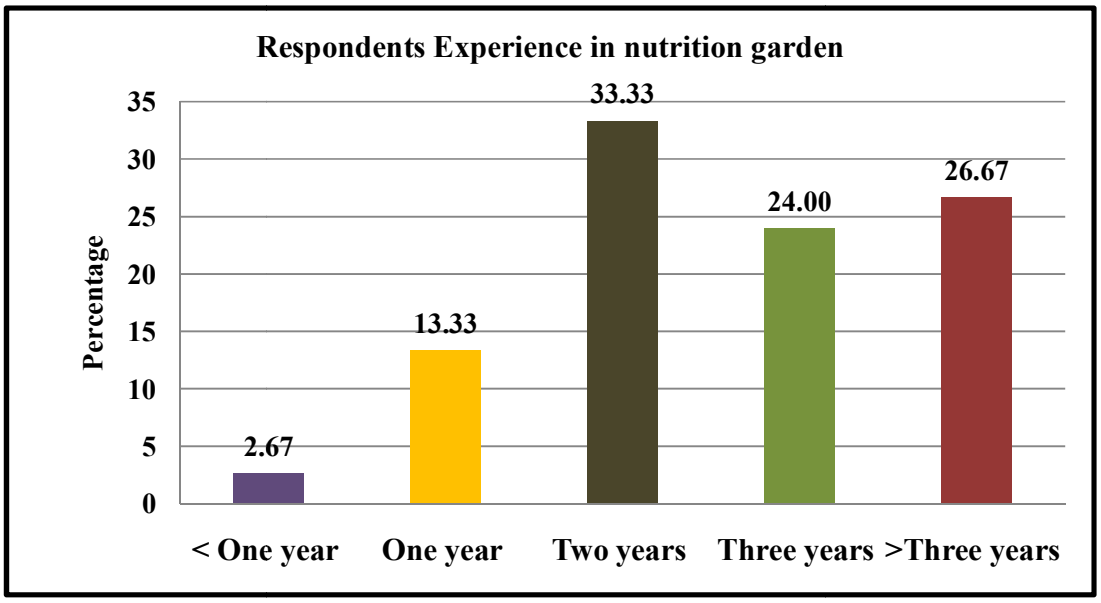


**Figure.4.10.Respondents experience in nutrition garden.**

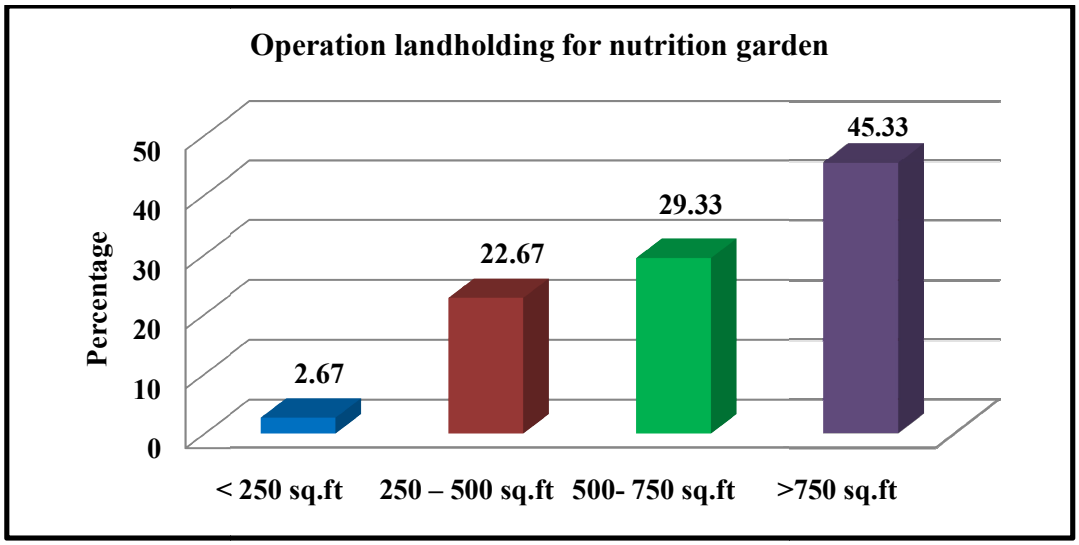


**Figure.4.11. Operational landholding for nutrition garden.**

### 4.2.1. Source of introduction to nutrition gardens

Source of introduction to nutrition gardens were studied based on whether it was self motivated, through neighbours, through school programs, through government programmes, through NGOs. The distribution of the respondents into different categories based on their source of introduction is presented in table 4.13.

**Table 4.13. Distribution of respondents according to their source of introduction to nutrition gardens**

**n=75**

| S. No. | Source of introduction | F | % |
|---|---|---|---|
| 1. | Self/Family | 20 | 26.67 |
| 2. | Neighbors | 18 | 24.00 |
| 3. | School | 1 | 1.33 |
| 4. | Government | 29 | 38.67 |
| 5. | NGO | 7 | 9.33 |
| | **Total** | **75** | **100.00** |

The data revealed that the majority (38.67%) of the respondents learned about nutrition gardens through government programs followed by 26.67 per cent of the respondents introduced by self or family through the common day to day activity, 24.00 per cent of respondents through neighbors, 9.33 per cent of respondents through NGO programs, and only 1.33 per cent respondents knew about nutrition garden through school programs (Figure.4.12).

Majority of the respondents expressed that they were aware of nutrition gardens through an urban farming program that the government started. By introducing urban farming to the community, the government-assisted in motivating respondents to establish a nutrition garden. It acted as a catalyst for them to establish their own garden. Others expressed that they were aware of nutrition gardens by self and family through the common day to day activities like reading newspaper, watching TV and with the usage of mobile, while some respondents came to know through talking with neighbors, very few expressed

that they knew through NGO programmes and by participation in the Rythu Nestham campaigns.

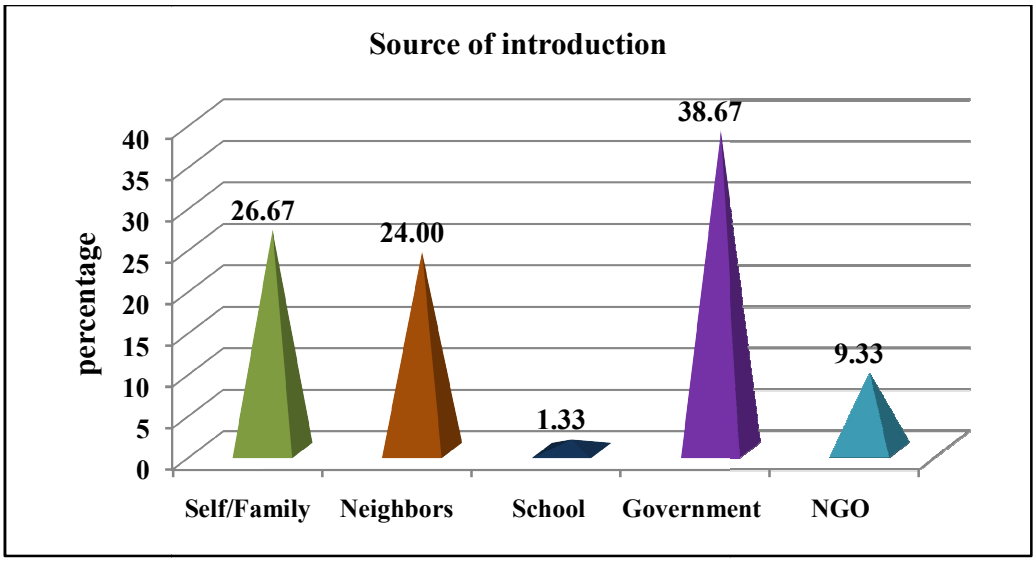


**Figure.4.12. Source of Introduction to nutrition gardens.**

### 4.2.2 Family member's engagement in nutrition garden activities

The family member's engagement in nutrition garden activities was studied based on the categories: more than five times a week, 4-5 times a week, 2-3 times a week, less than two times a week. The findings are indicated in table 4.14.

**Table 4.14.Distribution of respondents according to their family member's engagement in nutrition garden activities**

**n=75**

| S. No. | Household engagement | F | % |
|---|---|---|---|
| 1. | More than five times a week | 46 | 61.33 |
| 2. | 4-5 times a week | 17 | 22.67 |
| 3. | 2-3 times a week | 9 | 12.00 |
| 4. | Less than two times a week | 3 | 4.00 |
| | **Total** | **75** | **100.00** |

The data indicated that the majority (61.33%) of the family members engaged themselves in the nutrition gardens more than five times a week followed by 22.67 per cent households who engaged 4-5 times a week, 12.00 per cent households engaged 2-3 times in a week, and only 4.00 per cent of the family members engaged less than two times a week.

The findings revealed that most of the respondents engaged in nutrition gardens more than five times a week; this might be to keep the garden healthy by protecting it from insects, pests and disease. Also, some species need an additional amount of water to thrive. So, it requires more attention to the nutrition garden, which results in high family engagement. Most of the male respondents expressed in the interview that nutrition garden reduced stress levels after long hours in the office due to their busy work schedule.

### 4.2.3 Reasons to grow nutrition gardens

To study the reasons to grow nutrition gardens the reasons were categorized as follows: generate additional income, spend time with family, mental and physical relaxation, attract helpful organisms, and eat organically produced foods, passionate about nutrition garden. The observations are presented in the form of frequency and percentages, as shown in table 4.15.

**Table 4.15. Distribution of respondents according to the reasons to grow nutrition garden**

**n=75**

| S. No. | Reasons | F | % | Rank |
|---|---|---|---|---|
| 1. | To eat organically produced foods | 72 | 96.00 | I |
| 2. | Passion for about nutrition garden | 45 | 60.00 | II |
| 3. | For mental and physical relaxation | 44 | 58.67 | III |
| 4. | To beautify home surroundings | 33 | 44.00 | IV |
| 5. | To attract helpful organisms | 19 | 25.33 | V |
| 6. | To spend time with my family | 12 | 16.00 | VI |
| 7. | To generate additional income | 3 | 4.00 | VII |

Table 4.15. showed that (96.00%) of the respondents indicated that they were growing nutrition gardens to eat organic foods and quality produce of vegetables and fruits which was ranked first, followed by 60.00 per cent of the respondents who were passionate about growing nutrition gardens ranked second, 58.67 per cent of the respondents indicated that they were growing nutrition garden for mental and physical relaxation ranked third, 44.00 per cent of the respondents had grown nutrition garden to beautify their home surroundings ranked fourth, 25.33 per cent of the respondents had grown nutrition garden

to attract helpful organisms ranked fifth, 16.00 per cent of the respondents were growing nutrition garden to spend time with their family ranked sixth and very few 4.00 per cent of the respondents were growing nutrition garden to generate additional income ranked seventh.

Most of the respondents maintain organic nutrition gardens because they felt that vegetables and fruits available in the market had significant pesticide residues, were not fresh, and leafy vegetables were grown in polluted water under poor hygienic conditions.

For relaxation, since life is very hectic in urban cities, and employees have targets to achieve at work, leading to stress. As many were educated, they know the importance of growing gardens for relaxation. These results were similar with observations of Anitha and Amudha (2019) on comparison of benefits of terrace gardening between individual houses and apartments.

### 4.2.4. Nutrition garden development

This section deals with the findings and discussion regarding the nutrition garden development through training. These were classified into five categories as follows; family members participation in nutrition garden training, source of training, type of training received, reasons for future development of nutrition gardens based on their participation results are presented in the tables (4.16 - 4.19) by frequency and percentages.

**Table 4.16. Nutrition garden development**

**n=75**

| **Family member's participation in nutrition gardening training** | | | |
|---|---|---|---|
| **S .No.** | **Participation** | **F** | **%** |
| 1. | Yes | 44 | 58.67 |
| 2. | No | 31 | 41.33 |
| | **Total** | **75** | **100.00** |
| **Number of members participated in training of nutrition gardening** | | | |
| **S .No.** | **Members participated** | **F** | **%** |
| 1. | 1 member | 32 | 42.67 |
| 2. | 2 members | 27 | 36.00 |
| 3. | 3 members | 1 | 1.33 |
| | **Total** | **75** | **100.00** |

The data showed that the majority (58.67%) of the respondents participated in the nutrition garden training, while 41.33 per cent of the respondents did not participate in the nutrition garden training. Majority (42.67%) of the respondents indicated that one member from their family attended the training programme followed by 36.00 per cent with two members, and only 1.33 per cent with three members.

Findings revealed that most of the respondents participated in the nutrition garden training to learn new gardening techniques, compost production, and know about season viz crop selection, space allocation, weed management and pest management.

### 4.2.5 Source of training in nutrition garden

Source of training in nutrition garden was relatives, neighbours, friends, self -help groups, government, NGOs, academic institutions and self - learning.

**Table 4.17. Source of training in nutrition garden**

**n=75**

| S.no. | Source of Training | F | % |
|---|---|---|---|
| 1. | Relatives, neighbors, or friends | 9 | 12.00 |
| 2. | Self-help groups | 3 | 4.00 |
| 3. | Government | 34 | 45.33 |
| 4. | NGOs | 4 | 5.33 |
| 5. | Academic institutions | 1 | 1.33 |
| 6. | Self –learning | 24 | 32.00 |
| | **Total** | **75** | **100.00** |

Regarding the source of training in nutrition garden the table 4.17. showed that the majority (45.33%) of the respondents have trained from government, followed by 32.00 per cent of the respondents learnt by themselves, 12.00 per cent of the respondents have learnt from their neighbours, relatives and friends, 5.33 per cent of the respondents trained through NGOs, 4.00 per cent of the respondents trained from self help groups, and 1.33 per cent trained from academic organizations (Figure.4.13).

Most of the respondents participated in the government provided training program, which was conducted by the Horticulture Department under the scheme of urban farming. From personal interview, it was known that trainees got seed and seedling kits, soil bags, bio manures to develop their nutrition gardens. Some of the respondents practiced nutrition gardens by themselves by watching YouTube channels.

The above views of the results are in line with Galhena *et al*. (2013) on Home gardens for improved food security and enhanced livelihoods in northern Sri lanka.

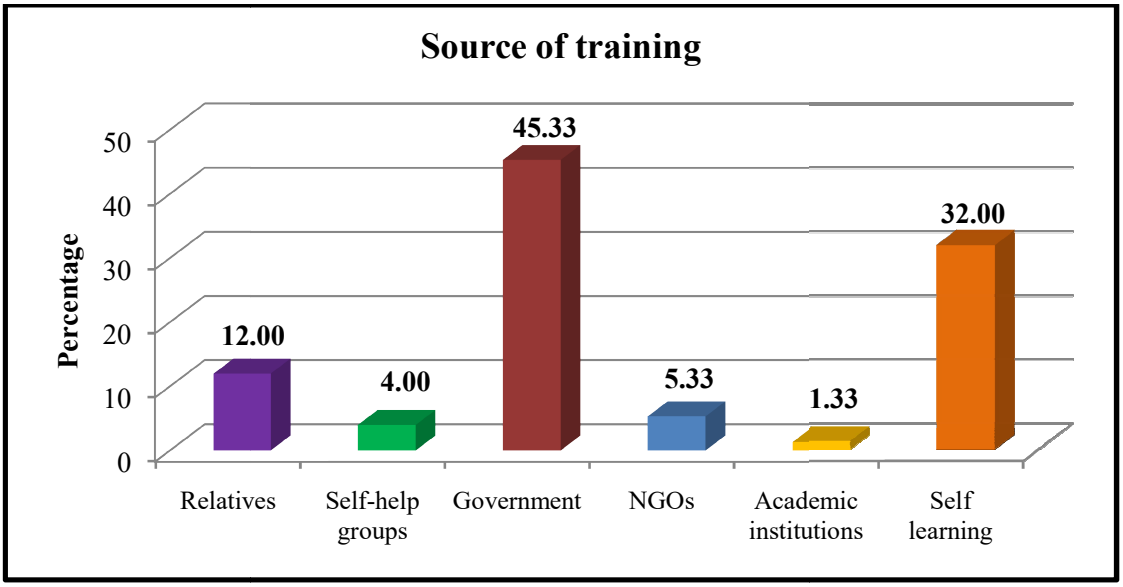


**Figure.4.13. Source of training in nutrition garden.**

### 4.2.6 Type of training received

Respondents received training on different topics such as soil and land management water management, producing seeds and seedlings, compost production, using animal and green manure, integrated pest management, integrated weed management, animal husbandry, crop diversification, selection and applications of fertilizer and selection and applications of pesticides. The information was collected on this basis and presented in the table 4.18.

**Table 4.18. Type of training received**

**n=75**

| S.No. | Training type | F | % |
|---|---|---|---|
| 1. | Soil and land management | 22 | 29.33 |
| 2. | Water management | 19 | 25.33 |
| 3. | Producing Seeds and seedlings | 21 | 28.00 |
| 4. | Compost production | 44 | 58.67 |
| 5. | Using animal and green manure | 16 | 21.33 |
| 6. | Integrated Pest management | 27 | 36.00 |
| 7. | Integrated Weed management | 23 | 30.67 |
| 8. | Animal husbandry | 21 | 27.00 |
| 9. | Crop diversification | 15 | 20.00 |
| 10. | Selection and applications of fertilizer | 14 | 18.67 |
| 11. | Selection and applications of pesticides | 32 | 42.67 |

The data showed that majority of the respondents (58.67%) participated in the compost production training, followed by selection and applications of pesticides (42.67%), integrated pest management (36.00%), integrated weed management (30.67%), soil and land management (29.33%), producing seeds and seedlings (28.00%), animal husbandry (27.00%),water management (25.33%), using animal and green manure (21.33%), crop diversification (20.00%), and 18.67 per cent of the respondents participated in selection and applications of fertilizer training.

It was evident from the above table that the majority of the respondents participated in compost production training, because most of the respondents were growing gardens on the terrace and expressed that training was the most effective way to learn in applying organic matter to soils for improving organic carbon levels.

Also growers have received training on selection and application of pesticides and fertilizers because they don't have knowledge on insect pests that can damage crops and reduce productivity of their gardens. The findings of this study are in tune with Qaiser *et al.* (2013) on impact assessment of kitchen gardening - training under watershed programme.

### 4.2.7. Reasons for future development of nutrition garden

Reasons for future development of nutrition garden categorized as training use, encouragement of nutrition garden, consent to receive future training. Respondents answers are shown in table 4.19.

**Table 4.19. Reasons for future development of nutrition garden**

**n=75**

| **Usefulness of training to improve nutrition garden** | | | |
|---|---|---|---|
| **S .No.** | **Training Use** | **F** | **%** |
| 1. | Yes | 60 | 80.00 |
| 2. | No | 15 | 20.00 |
| | **Total** | **75** | **100.00** |
| **Encouragement of nutrition garden initiative by department of Horticulture Telangana** | | | |
| **S. No.** | **Training Use** | **F** | **%** |
| 1. | Yes | 60 | 80.00 |
| 2. | No | 15 | 20.00 |
| | **Total** | **75** | **100.00** |
| **Consent to receive future training on nutrition garden** | | | |
| **S. No.** | **Consent to receive future training** | **F** | **%** |
| 1. | Yes | 75 | 100 |
| 2. | No | 0 | 0 |
| | **Total** | **75** | **100.00** |

The above table 4.19. revealed that the majority (80.00%) of the respondents opined that nutrition garden training improved their knowledge and felt that it was useful to them. Similarly, the majority (80.00%) of the respondents expressed that the training session encouraged them to initiate a nutrition garden. All the respondents (100%) were ready to take future training sessions conducted by the Department of Horticulture Telangana.

The majority of respondents stated that the nutrition garden training was extremely beneficial to their nutrition garden's development in all aspects. Respondents who participated in the training shared their reasons that they learned more from the training than their own, training techniques applied on their nutrition gardens and got good results, for this reason they were more interested to participate in future trainings. The Horticulture

Department of Telangana was encouraging nutrition gardeners with the provision of seed and seedlings, soil bags and bio manures, this was also one of the reasons to cultivate nutrition garden and participate in training.

### 4.3. Measurement on the impact of nutrition gardens on food and nutritional security

The total amount of vegetables, leafy vegetables, fruits, roots and tubers produced were recorded from each nutrition garden and the average yield per year was calculated. A on dietary survey was done on the selected respondents with recall method to assess their food consumption pattern before and after the establishment of a nutrition garden using a food frequency questionnaire. The average production of a nutrition garden of one year was calculated under four heads viz, vegetables, green leafy vegetables, roots & tubers and fruits. It was considered as the number of food groups in kg available for consumption of respondents per annum. Per day requirement of vegetables, leafy vegetables, roots & tubers and fruits in grams for each selected respondent was calculated as per recommended dietary allowances of ICMR.

**Table 4.20. Average vegetable and fruit production of nutrition garden per annum**

**n=75**

| S. No. | Group of Foods | Average Nutrition Garden Production (Kg/annum) |
|---|---|---|
| 1. | Vegetables | 143.31 |
| 2. | Leafy vegetables | 39.81 |
| 3. | Roots and Tubers | 6.57 |
| 4. | Fruits | 47.45 |
| **Total** | | **237.09** |

The table 4.20. showed an average harvest of 237.09 kg/annum as produce from vegetable and fruit crops through nutrition garden. Vegetable alone accounted for the highest (143.31 kg/annum) share in the average production of food groups, followed by fruits (47.45), leafy vegetables (39.81 kg/annum) and roots and tubers (6.57 kg/annum). This is due to their dietary pattern and food habits, the majority of the respondents prefer to grow vegetables than other food groups. The dietary priority is often to consume enough vitamin and mineral rich foods to meet essential nutrients in the body. Vegetables and fruits

are relatively good source of vitamins and minerals (Figure.4.14). These findings were in agreement with Battacharjee *et al*. (2006).

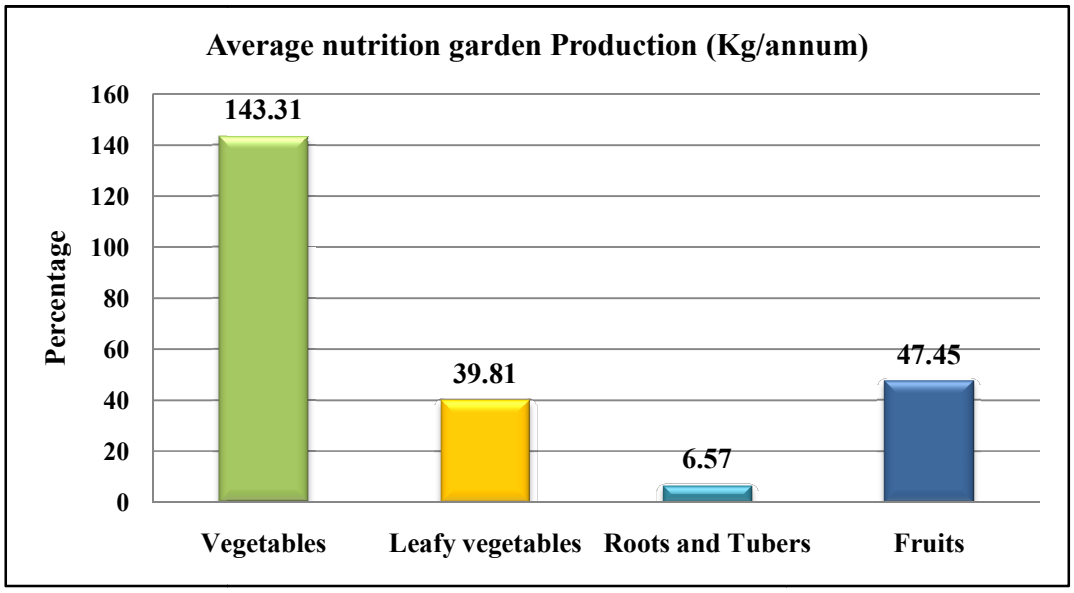


**Figure.4.14. Average nutrition garden production (Kg/annum).**

The table 4.21. shows data of the mean score of the consumption of vegetables, leafy vegetables, roots & tubers and fruits before and after nutrition garden establishment.

**Table 4.21. Measurement on the impact of nutrition gardens on food and nutritional security**

| S.No. | Food Groups Consumed in Daily Diet | Average Consumption (per capita gram/day) | | Increased Average Consumption (per capita gram/day) | t stat value |
|---|---|---|---|---|---|
| | | Before Nutrition Garden | After Nutrition Garden | | |
| 1. | Vegetables | 139.41 | 171.41 | 32.00 | 23.063** |
| 2. | Leafy vegetables | 22.98 | 30.96 | 7.98 | 20.976** |
| 3. | Roots and Tubers | 64.42 | 67.34 | 2.92 | 6.858** |
| 4. | Fruits | 76.08 | 87.83 | 11.75 | 12.141** |
| | Overall consumption | 302.89 | 357.54 | 54.65 | 26.553** |

**Significant at 0.01 level of probability

The results indicated a significant improvement in the daily consumption of various foods of the respondents. The 't' values of consumption before and after the establishment of the nutrition garden was significant at 0.01 level of probability. Hence null hypothesis was rejected, accepting the empirical hypothesis.

The information on daily consumption of vegetables among the respondents, before the establishment of nutrition garden was 139.41 g/day which increased to 171.41 g/day after the establishment of nutrition garden. In terms of green leafy vegetables the average consumption 22.98 g/day increased to 30.96 g/day after the nutrition garden establishment. Similarly the mean scores of the roots & tubers showed that the average consumption was 64.42 g/day before nutrition garden establishment which increased to 67.34 g/day. With regards to fruits the mean scores showed that the average consumption 76.89 g/day before nutrition garden establishment and was increased to 87.83 g/day after nutrition garden establishment. Thus the total consumption of the respondents, which was 302.89 g/day before nutrition garden establishment increased to 357.54 grams/day after nutrition garden establishment.

The results were evident from Table 4.21. that the mean difference of average consumption of the respondents from nutrition garden after the establishment had increased to 32.00 g/day on vegetables, followed by 11.75 g/day in fruits, 7.98 g/day in leafy vegetables and 2.92 g/day in roots and tubers. The overall mean score 54.65 was found in the consumption of respondents before and after the establishment of nutrition garden in vegetables, leafy vegetables, fruits, roots and tubers. These results proved the effectiveness of the nutrition gardens, supported by the t-values presented in the table that were highly significant at 1% level.

The majority of the respondents consumed vegetables more than leafy vegetables, roots and tubers because of their food habits and cooking patterns. In general, the consumption of leafy vegetables was always less than vegetables and fruits consumption. Hence there is only a marginal increase in leafy vegetables consumption. The yield of roots and tubers was less due to climate and geographic conditions. The yield of fruits was also less due to required soil and climatic conditions.

The results indicated a significant improvement in the daily consumption of all food groups (vegetables, leafy vegetables, roots & tubers and fruits) after the establishment of nutrition gardens in the dietary habits of respondents. Daily consumption was met and outside purchases were reduced to a minimum. The results of the study are partly in agreement with Chimbwanda (2016), who studied the contribution of urban crop production to household food security: a study of urban agriculture in warren park suburb of Harare.

### 4.3.1 Analysis of independent variables with dependent variable-food and nutritional security of respondents growing nutrition gardens

In order to study the relationship between the profile characteristics and food and nutritional security, Correlation coefficient, 'r' values were computed and the values are presented in table 4.22.

The relationship between the scores of profile characteristics of respondents of nutrition gardens were tested by relevant null and empirical hypothesis.

**Null hypothesis:** There will be no significant relationship between the scores of profile characteristics of nutrition garden respondents i.e. age, education, occupation, annual income, marital status, family type, family size, operational landholding, characteristics of nutrition garden, experience in nutrition garden, mass media exposure, extension contact, information seeking behavior and food and nutritional security of respondents.

**Empirical hypothesis:** There will be significant relationship between the scores of profile characteristics of nutrition garden respondents i.e. age, education, occupation, annual income, marital status, family type, family size, operational landholding, characteristics of nutrition garden, experience in nutrition garden, mass media exposure, extension contact, information seeking behavior and food and nutritional security of respondents.

**Table 4.22. Analysis of independent variables with dependent variable-food and nutritional security of respondents growing nutrition gardens**

| S.No | Independent variables | Dependent variable - Food and Nutritional security "r" values |
|---|---|---|
| 1. | Age | 0.018 $^{NS}$ |
| 2. | Education | -0.114$^{NS}$ |
| 3. | Annual income | 0.046$^{NS}$ |
| 4. | Family size | -0.489** |
| 5. | Extension contact | 0.201$^{NS}$ |
| 6. | Mass media exposure | 0.149 $^{NS}$ |
| 7. | Information seeking behaviour | 0.067 $^{NS}$ |
| 8. | Experience in nutrition garden | 0.108$^{NS}$ |
| 9. | Operational landholding | 0.345** |
| 10. | Land ownership | 0.146$^{NS}$ |
| 11. | Plot percentage | 0.332** |

**significant at 0.01 level of probability, NS= Non- Significant

#### 4.3.1.1 Operational landholding

From table 4.22. it could be observed that the coefficient of correlation of food and nutritional security with the operational land holding was found to be **r= 0.345**,** which was significant at 1% level of probability. Hence the null hypothesis was rejected and the empirical hypothesis was accepted. Therefore, it could be inferred that there was a significant positive relationship between respondents' operational landholding i.e. space allocated for nutrition garden and food and nutritional security.

The results, furthermore, indicated that respondents, who had the highest land allocated for nutrition garden, consumed a large number of vegetables, leafy vegetables, roots and tubers and fruits. The reason had been that as the land size of nutrition garden increased, the yield from the nutrition garden also increased, thus increasing the availability of vegetables, green leafy vegetables, roots & tubers and fruits to the respondents. This

intern increased the consumption. The findings were on par with similar study of Muraoka *et al*. (2018) revealed a positive relationship between land access and food consumption.

#### 4.3.1.2 Percentage of nutrition garden used for growing vegetables, green leafy vegetables, roots and tubers and fruits

Data from table 4.22. indicated the correlation between independent variables and food and nutritional security of nutrition garden growers. It could be seen that there was a significant positive relationship between plot percentage for growing crops and food and nutritional security with **r=0.332****, at 1% level of significance ($p<0.01$). Hence, the null hypothesis was rejected and the empirical hypothesis was accepted. This implies that as the percentage of plot for growing vegetables, green leafy vegetables, fruits and roots and tubers increased, the food and nutritional security of the respondents increased.

#### 4.3.1.3 Family Size

From the data presented in table 4.22. it could be observed that the coefficient of correlation of food and nutritional security of the nutrition garden respondents with the family size was found to be r = -0.489**, which was negative at 1% level of significance. Hence the null hypothesis was rejected and the empirical hypothesis was accepted. Therefore, it could be inferred that there was a significant negative relationship between respondents' family size and food and nutritional security. It was clear from the figures that if the family size increases, the food and nutritional security among the respondents can decrease.

It is observed that family size and per capita food consumption is inversely proportional. This is because, the available foods are distributed, shared within members of the family, hence increase in number of family members results in decrease in food availability for individuals.

### 4.3.2 Analysis of nutrition garden yield with food and nutritional security of the respondents

The yield from nutrition garden of the respondents was calculated by adding the yield of vegetables, green leafy vegetables, roots & tubers and fruits per annum in Kilo grams. This was correlated with food and nutritional security of the respondents using coefficient of correlation. The data is presented in table 4.23.

**Table 4.23. Analysis of nutrition garden yield with food and nutritional security of the respondents**

| S.No | Yield | Food and Nutritional security "r" values |
|---|---|---|
| **1.** | **Nutrition garden yield** | **.306**** |

From table 4.23. it could be observed that the coefficient of correlation of food and nutritional security with nutrition garden yield was found to be **r= 0.306**,** which was significant at 1% level of probability ($p<0.01$). Hence the null hypothesis was rejected and the empirical hypothesis was accepted. Therefore, it could be inferred that there was a positive and significant relationship between the nutrition garden yield and food and nutritional security of respondents growing nutritional gardens.

It can be explained from the results that when the quantity of produce is more, the production and consumption of vegetables, green leafy vegetables, roots & tubers and fruits increases. When the quantity of consumption increases, their food and nutritional security increases. The findings are in line with a study conducted by Rana *et al.* (2021) on "Kitchen garden: An ideal approach to enhance household nutritional security in rural areas of Seoni district Madhya Pradhesh".

The other independent variables given in the table were found to be non-significant. Hence, the null hypothesis was accepted and the empirical hypothesis was rejected. It implies that all the other independent variables had no impact on the food and nutritional security of the respondents.

It is observed that age, education, occupation, annual income, marital status, family type, extension contact, mass media exposure, information seeking behaviour, experience in nutrition garden, ownership type does not have significant impact on food and nutritional security, due to that fact most of the respondents involved in nutrition gardens with knowledge level, passion, self - interest, hobby. Hence the above variables had no correlation.

### 4.4 Challenges perceived by respondents in growing nutrition gardens and elicit their suggestions to overcome them

The respondents were asked to indicate the challenges faced in maintaining nutrition gardens and also give the suggestions for overcoming the problems. These challenges and suggestions were given ranking, from 1 to 15 for challenges and 1 to 7 for suggestions based on the response of respondents and presented in table 4.24.

**Table 4.24. Challenges perceived by the respondents growing nutrition gardens**

| S. No. | Challenges | (F) | (%) | Rank |
|---|---|---|---|---|
| 1. | Insect pest and Diseases | 71 | 94.67 | I |
| 2. | Weeds | 69 | 92.00 | II |
| 3. | Nematodes issues | 64 | 85.33 | III |
| 4. | Shortage of manure and fertilizer | 62 | 82.67 | IV |
| 5. | Damage by weather related issues | 58 | 77.33 | V |
| 6. | Shortage of quality seeds | 52 | 69.33 | VI |
| 7. | Poor soils | 50 | 66.67 | VII |
| 8. | Lack of Information and advisory support | 43 | 57.33 | VIII |
| 9. | Shortage of Land | 35 | 46.67 | IX |
| 10. | Limited family labor | 34 | 45.33 | X |
| 11. | Shortage of Water | 33 | 44.00 | XI |
| 12. | Lack of finances | 31 | 41.33 | XII |
| 13. | Destruction by animal pests | 30 | 40.00 | XIII |
| 14. | Access of Agricultural tools | 28 | 37.33 | XIV |
| 15. | Theft | 12 | 16.00 | XV |

Table 4.24. showed, the indicated problems as faced by the respondents while growing nutrition garden. Majority (94.67%) of the respondents expressed that insect pest and diseases was the major problem faced by them, which was ranked first, followed by 92.00 per cent with weeds ranked second, nematodes issues with 85.33 per cent and ranked third, shortage of manure and fertilizer with 82.67 per cent and ranked fourth, damage by weather-related issues with 77.33 per cent and ranked fifth, shortage of quality seeds 69.33 per cent and ranked sixth, poor soils with 66.67 per cent and ranked seventh, unavailability of information and advisory support with 57.33 per cent and ranked eighth, shortage of land with 46.67 per cent and ranked ninth, limited family labour with 45.33 per cent and ranked tenth, and also shortage of water with 45.33 per cent and ranked eleventh, lack of finances with 41.33 per cent and ranked twelfth, destruction by animal pests with 40.00 per cent and ranked thirteenth, access of agricultural tools with 37.33 per cent and ranked fourteenth, theft with 29.33 per cent and ranked fifteenth.

The most common challenges were identified as insect pests and diseases because of temperature in the summer and frequent water flow in the nutrition garden in the rainy season. Another reason was lack of knowledge about the major pest and diseases identification. For weeds, the reason was the usage of low-quality soil and bio fertilizers. Most of the gardeners expressed that they were unaware of nematode issues which mostly affect roots in nutrition gardens, which is difficult to identify at starting stage because the majority of plant-parasitic nematodes live in the soil and damage plants by feeding in large numbers on the roots, impairing the plant’s ability to take up water and nutrients. The findings are in agreement with Kaur (2018) study on perception and adoption of kitchen gardening by the farmers trained by KVK. Jalandhar.

### 4.4.1 Suggestions as given by respondents in overcoming challenges while growing nutrition gardens

Respondents gave the following suggestions to improve the various aspects of nutrition gardens and make the nutrition garden more effective.

**Table 4.25. Suggestions as given by respondents regarding nutrition gardens**

| S.No. | Suggestions | F | % | Rank |
|---|---|---|---|---|
| 1. | Pruning and using bio fertilisers | 68 | 90.67 | I |
| 2. | Mulching and installation of shade nets | 57 | 76.00 | II |
| 3. | Using natural weed killers and plucking | 50 | 66.67 | III |
| 4. | Awareness and trainings should be provided by Government to encourage nutrition gardens | 40 | 53.33 | IV |
| 5. | Good quality of soil and seeds should be provided by government to encourage Nutrition Gardens | 34 | 45.33 | V |
| 6. | Advisory support from government and NGOs | 25 | 33.33 | VI |
| 7. | Using recycled containers | 20 | 26.67 | VII |

Table 4.25. showed the respondents suggestions to the challenges, which revealed that the majority (90.66%) of the respondents suggested that for insect pests and diseases, they were removing affected areas with their hands and spraying organic solutions like neem oil, soapy water which was ranked first followed by 76.00 per cent of the respondents protecting their nutrition gardens from weather-related issues by installing shade nets and mulching ranked second and 66.67 per cent using natural weed killers and plucking method to remove weeds ranked third. More than half of the respondents (53.33%) suggested creating awareness and conducting more training sessions to encourage nutrition garden growers ranked fourth, and 45.33 per cent of the respondents expressed that the government should provide quality seeds to encourage nutrition gardens because private seed shops sell at a high price and low-quality seeds ranked fifth, and 26.67 per cent of the respondents said they needed advisory support from government and NGOs ranked sixth. Using recycled containers ranked seventh (Figure.4.15). The findings are in agreement with Kaur (2018).

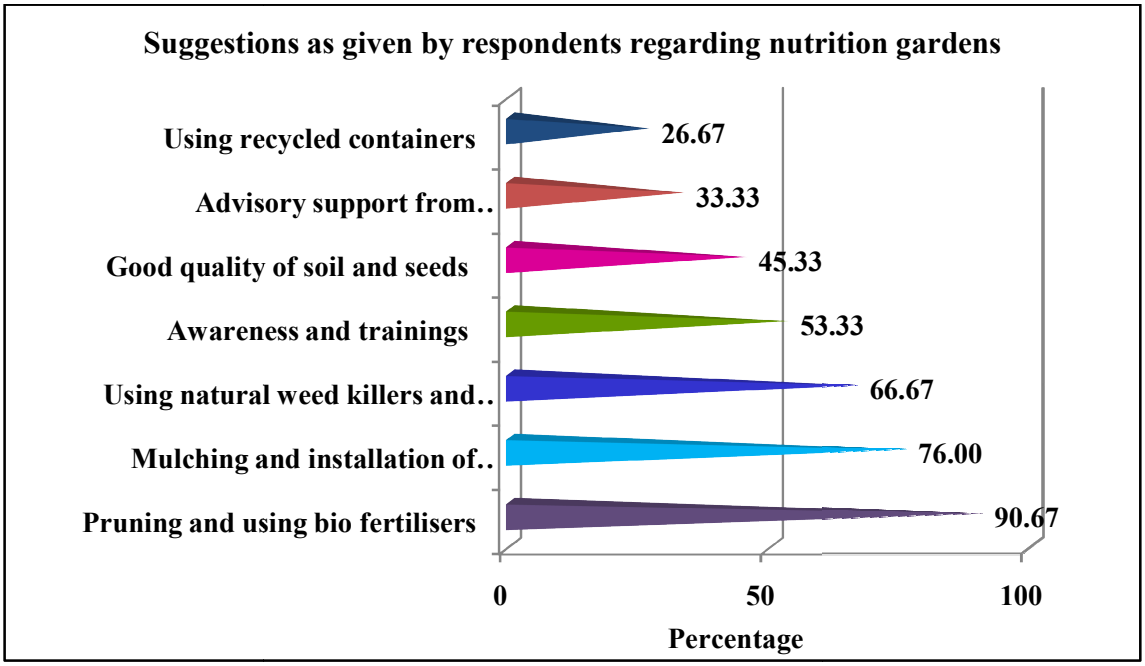


**Figure. 4.15. Suggestions as given by respondents regarding nutrition gardens.**

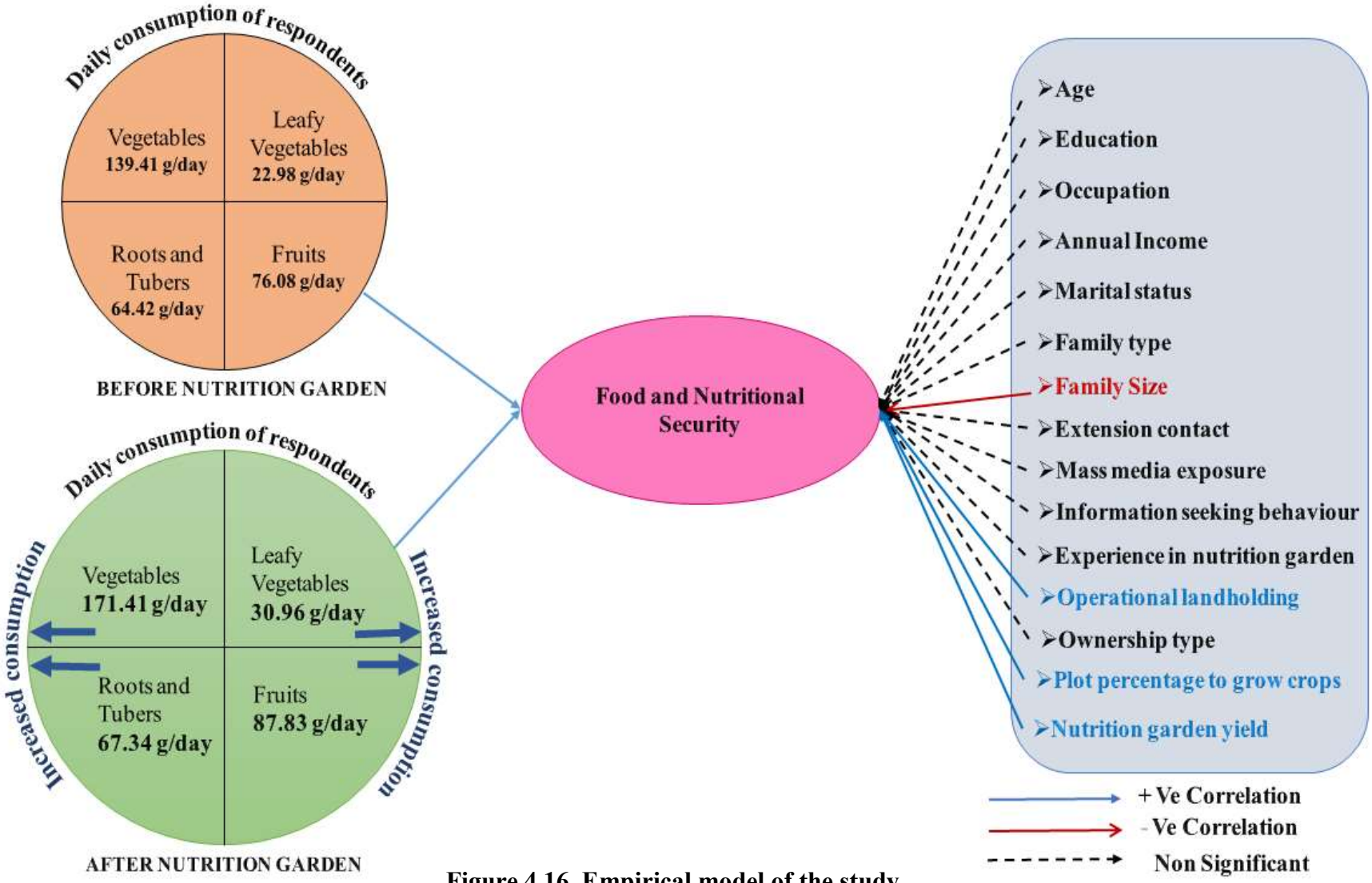


**Figure.4.16. Empirical model of the study.**

## Chapter V

# SUMMARY AND CONCLUSION

Nutrition garden plays an important role in the lifestyle of people living in villages' urban areas and small towns. Nutrition garden gives dual benefits of food provision and healthy life. Vegetables are rich and comparatively cheaper sources of vitamins. Consumption of vegetables and fruits provides taste and palatability, increases appetite and provides fiber for digestion. Vegetables are a good source of carbohydrates, proteins, vitamins and minerals. A nutrition garden is a cost-saving activity that can be enjoyed as a hobby. Moreover, it provides relaxation at high-stress times. Thus, we stay healthy and health care expenses are minimized. Further, the supplementary income from the vegetable sales by the gardening household can be used to purchase additional nutrient-rich foods ultimately improving the status of women and the overall nutrition of the family.

People should be encouraged to develop nutrition gardens to get fresh produce, better health, and prevent malnutrition. To popularize nutrition gardening among the urban community, the State Board of Horticulture conducted a large number of training programs for the nutrition garden respondents to educate them on more effective ways of nutrition gardening. After getting trained, many of the trainees started growing different kinds of vegetables, leafy vegetables, fruits, roots, and tubers for their domestic requirements, while some of the respondents grew nutrition gardens for daily consumption as well as additional The goal of this study was to see how nutrition gardens affect the food and nutritional security of respondents in Telangana state. The study was done with the following objectives.

1. To study the profile characteristics of respondents growing nutrition gardens.
2. To study the characteristics of nutrition gardens.
3. To measure the impact of nutrition gardens on the food and nutritional security of the respondents.
4. To identify the challenges faced by respondents in growing nutrition gardens and elicit their suggestions to overcome them.

An ex-post facto research design was used for conducting the study. The three districts viz., Rangareddy, Hyderabad and Medchal-Malkajgiri were selected purposively

from Telangana state with the presence of highest number of respondents growing nutrition gardens. In total 75 respondents growing nutrition gardens were selected randomly from three mandals of Telangana for the study.

Keeping in view the objectives set for the study, available literature was reviewed, experts were consulted and a draft schedule was prepared. Suitable modifications were made and a final structured interview schedule was used to collect the required information. The independent variables included in the study were age, education, marital status, family size, family type, occupation, operational landholding, characteristics of nutrition garden, experience in nutrition garden, extension agency contact, information-seeking behaviour and mass media exposure was measured by schedule developed for the study. The dependent variable "Food and Nutritional Security of the respondents growing Nutrition Gardens" was measured by a developed questionnaire. The data was collected from the nutrition garden growers with structured interview schedule personally. The data was subjected to suitable statistical methods such as frequencies, percentages, paired t-test, correlation coefficient and ranking method.

### 5.1. The major findings of the study

1. The majority (56.00%) of the respondents belonged to the middle age, 56.00 per cent were female, 62.66 per cent were educated to graduation and above level, 90.67 per cent were married, 70.67 per cent belonged to the nuclear families and 65.33 per cent had small-sized families. Major occupation of the respondents was service at 34.67 per cent, homemaker at 25.33 per cent, retired at 22.67 per cent, and the majority (80.00%) of the respondents belonged to middle-income group.
2. It was found that the majority (45.33%) of the respondents had >750 operational land holding under nutrition garden, and have three years and more of experience (33.33%) in nutrition garden.
3. Majority (62.67%) of the respondents had medium mass media exposure, 60.00 per cent were with low extension agency contact and medium (77.33%) source of information seeking behaviour.
4. All (100%) the respondents involved in the growing maintenance of nutrition gardens, family members involvement in the nutrition garden was 77.33 per cent and from each family majority (52.00%) of two people were involved in growing

and maintenance of nutrition gardens.

5. Majority (38.67%) of the respondents knew about nutrition gardens through government programs, 26.67 per cent of the respondents came to know through day to day activities such as watching TV, reading news paper, browsing internet etc.
6. The findings revealed that the majority (61.33%) of the family members engaged in nutrition gardens for more than five times a week.
7. It was identified from the results that maximum (96.00%) of the respondents grew nutrition gardens to eat fresh and organic foods, 60.00 per cent were passionate about nutrition gardens, while 58.67 per cent were growing for mental and physical relaxation.
8. The majority (58.67%) of the respondents had participated in the nutrition garden training, one member from each family (42.67%), while 36.00 per cent of respondents had two members participation in training on nutrition gardens.
9. The majority (45.33%) of the respondents participated in government-conducted nutrition garden trainings, followed by 32.00 per cent who learnt by self tutorials.
10. The majority (58.67%) of the respondents received training in compost production, followed by (42.67%) selection and applications of pesticides and 36.00 per cent in integrated pest management.
11. The majority (80.00%) of the respondents opined that nutrition garden training had improved their knowledge and felt that it was useful to them. Similarly, the majority (80.00%) of the respondents expressed that training sessions had encouraged them to initiate nutrition gardens and all the respondents (100%) were ready to take future training sessions conducted by the Department of Horticulture, Telangana.
12. To measure the increase in consumption of vegetables, leafy vegetables, roots tubers and fruits, data on daily diet pattern was collected from respondents before and after the nutrition garden was established. The scores were evaluated with food and nutritional security scores using ‘t’ test. The average per capita consumption of vegetables and fruits increased from 302.89 gm/day to 357.54 gm/day after nutrition gardening was established among selected families.
13. There was a significant positive relationship (**r=0.345****) between operational landholding (area allotted for nutrition garden) with food and nutritional security at 1% level of significance.

14. There was a significant and positive relationship (**r=0.332****) between the percentage of nutrition gardens used for growing vegetables green leafy vegetables, roots & tubers and fruits with food and nutritional security at 1% level of significance.
15. There was a significant and positive relationship (**r=0.306****) between the yield of the nutrition garden with food and nutritional security at 1% level of significance.
16. The majority (94.67%) of the respondents faced insect and pest management as the major problem. followed by 92.00 per cent weed management, while 85.33 per cent identified nematodes issue as a problem, 82.67 per cent of respondents indicated shortage of manure and fertilizers as the fourth problem.
17. The majority (90.67%) of the respondents suggested pruning and using bio-fertilizers for insect pests and diseases followed by (76.00%) mulching and installation of shade nets for weather-related issues and (66.67%) using natural weed killers and plucking of weeds as solutions to the problems faced.

## 5.2. Conclusions of the study

- Nutrition gardens can be grown at low cost, with indigenous material, green manures, shade nets and indigenous methods of pest control.
- The establishment of nutrition gardens plays an important role in providing sufficient, safe and nutritious food at household levels. In addition, gardens increase the availability, access, and utilization of vegetables and fruits, which lead to improved health within the households. This results in improving the food and nutritional security of the respondents.
- An important aspect noted from this study was that nutrition gardens provided a diversity of fresh foods that improved the quantity and quality of nutrients available to the family. Households with gardens typically obtained more than 50 percent of their supply of vegetables and fruits on a daily basis.
- The dynamic role of home gardens in family nutrition and household welfare is a long-established fact and this study reinforces the same. Usually, the functions and output of the home garden complement health and nutritional needs of the family. It was seen that while field crops provided the bulk of energy needed by the household, the nutrition garden supplemented the diet with vitamin-rich vegetables

and fruits, energy-rich roots and tubers, and spices or condiments.

- During the COVID 19 pandemic, nutrition gardens became the principal source of vegetables and fruits for households. Most of the respondents agreed that gardens were a source of stress relief, dealt with unemployment and economic disruption caused due to pandemics.
- To address the issue of sustainability of nutrition gardens, the households should adopt to innovative methods like, introducing a wider diversity of plants, initiating more effective management practices, or opening up new space for a special type of garden (vegetable, spice, herb or medicinal). It is essential to build on the indigenous gardening skills within the family, in consultation with experts in the field, especially with regard to cultivation and use of native and hybrid varieties, experience with mixed cropping and intercropping and traditional methods of conserving water and combating pests.
- Nutrition gardening is only one of the possible alternative for ensuring food security at the household levels for low and middle-income families and it should be addressed as a major part of the national food security policy. Nutrition gardening has a special role in this strategy, in providing direct access to food through self-reliance rather than dependence on external market buys or through supplementation and fortification of foods to combat nutritional deficiencies.
- Despite having a good amount of vegetable production at the national level, the per capita availability of vegetables was found to be far less than the recommended dietary allowances among the diets of respondents, during the recall method prior to growing nutrition gardens. It was found that nutrition gardens established at households' level ensured the daily supply of fresh vegetables and fruits in the diets. The average per capita availability of vegetables increased from 302.89 gm/day to 357.54 gm/day after Nutrition gardens were established among selected families.
- In the present scenario of food crisis and pandemic situation, more attention should be given to nutrition gardens as an approach to enhance food and nutritional security.

## 5.3. Implications of the study

- Majority of the respondents started nutrition gardens through an urban farming scheme which was introduced by the Government of India. Hence, Government can consider this finding to initiate more programs or schemes and encourage rural and urban households to grow nutrition gardens, which ultimately contribute to food and nutritional security.
- The study revealed that amongst the type of training received, use of fertilizers, diversification in growing of different vegetables and fruit varieties gardens, usage of bio manures, production of seeds and seedlings were training deficit areas, hence public and private stakeholders involved in promoting nutrition gardens should focus on these areas.
- The findings of the present study showed that most of the training programs on the growing of nutrition gardens are taken up by the government sector only. Hence other sectors like NGOs, academic institutions, and private enterprises can include the promotion of nutrition gardens in their calendar of activities as a way forward to food and nutritional security of families.
- The study unearthed that the cultivation of roots and tubers and fruits in nutrition gardens is on a very low scale. Hence, their contribution to increasing the average per capita consumption is also low. Hence all the stakeholders involved in the promotion of nutrition gardens should focus on introducing garden-friendly varieties of fruits, roots, and tubers and also training the communities in growing these varieties.
- Nutrition gardening kits (from govt.) were supplied to limited members due to lack of availability; hence production should be encouraged, and NGOs can take action to increase availability and supply of nutrition gardening kits to a large number of people.

### 5.4. Suggestions for future research

The results of the present study demand the need for further investigations in other directions. The following suggestions could be used by future researchers who are willing to take similar studies.

- Comparative study on food and nutritional security among growers and non-growers of nutrition garden.
- Impact assessment of nutrition gardens through frontline demonstrations in rural and tribal areas.
- Nutrition garden as the conservational practice of nutritional regime for family health.
- Analysis on the extent of consumption and utilization of products from nutrition gardens.
- Nutrition garden as a small enterprise in an urban setting.

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# APPENDICES

## INTERVIEW SCHEDULE ON THE EFFECTIVENESS OF NUTRITION GARDENS ON FOOD AND NUTRITIONAL SECURITY IN TELANGANA STATE.

The following study on the effectiveness of nutrition gardens on food and nutritional security in Telangana state is being conducted to know about the characteristics and effectiveness of nutrition gardens on certain factors. Your response will help us understand better about the nutrition gardens and their impact. If you are unsure about which response to give to a question, please choose the one that appears to be the most appropriate. We would request you to attempt to answer all questions. However the choice or decision to not to answer a particular question is entirely yours. You can always seek the help of the interview in case there is any confusion regarding the meaning of some questions or choice. It will take about 20 to 25 minutes to fill out the questionnaire and complete it.

### SECTION-A

### General Information

A1. Date of Interview:

A2. Name of the Respondent: Gender: Male ☐ Female ☐

A3. District: Mandal:

A4. Village: Contact No:

A5. Age: (must be over 21)----------

A6. Marital Status: Married ☐ Unmarried ☐ widowed ☐

A7. Education:

| S.no | Education Level | Please tick (✓) |
|---|---|---|
| 1. | Illiterate | |
| 2. | Primary Education | |
| 3. | Middle School | |
| 4. | High School | |
| 5. | Intermediate/ Diploma | |
| 6. | Graduation and above | |

A8. Occupation:

| S.no | Current Occupation | Please tick (✓) |
|---|---|---|
| 1. | Employee | |
| 2. | Business | |
| 3. | Retired | |
| 4. | Farmer | |
| 5. | Home maker | |

A9. Family Type:

| S.no | Family Type | Please tick (✓) |
|---|---|---|
| 1. | Nuclear | |
| 2. | Joint | |
| 3. | Extended | |

A10. Family Size: Total no. of Family Members

| S.no | Family Size | Please tick (✓) |
|---|---|---|
| 1. | Small (up to 4 members) | |
| 2. | Medium (5 to 7 members) | |
| 3. | Big (above 8 members) | |

A11. Annual Income:

| S.no | Annual income | Please tick (✓) |
|---|---|---|
| 1. | <Rs.1.20.000 | |
| 2. | Rs .1.20.024 - 3.59.664 | |
| 3. | Rs.3.59.676 -5.99.532 | |
| 4. | Rs.5.99.544 – 8.97.060 | |
| 5. | Rs.8.97.072 – 11.99.160 | |
| 6. | Rs.11.99.172 – 23.98.332 | |
| 7. | >23.98.344 | |

A12. Extension Contact: Please tick (✓)

| S.no | Extension Person | Frequently | Occasionally | Rarely |
|---|---|---|---|---|
| 1. | Subject Matter Specialist | | | |
| 2. | BDO | | | |
| 3. | Extension Officer | | | |
| 4. | Horticulture development officer | | | |

A13. Information Seeking Behavior: Please tick (✓)

| S.no | Source of Information | Frequently | Occasionally | Rarely |
|---|---|---|---|---|
| 1. | Family members | | | |
| 2. | Relatives & Friends | | | |
| 3. | Neighbors | | | |
| 4. | Local leaders | | | |
| 5. | Television | | | |
| 6. | Radio / F.M | | | |
| 7. | New Media | | | |

A14. Mass Media Exposure: Please tick (✓)

| S.no | Mass Media | Frequently | Occasionally | Rarely |
|---|---|---|---|---|
| 1. | Newspaper | | | |
| 2. | Magazine | | | |
| 3. | Radio/ F.M | | | |
| 4. | Television | | | |
| 5. | Mobile Phones | | | |
| 6. | Internet | | | |
| 7. | Social media Networks | | | |

## SECTION-B
## Characteristics of Nutrition Garden

B1. Are you involved in Nutrition Garden?

Yes / No

B2. Are any of your family members involved in Nutrition Garden?

Yes / No

B3. Experience in Nutrition Garden

| S.no | Experience in Nutrition Garden | Please tick (✓) |
|---|---|---|
| | < one year | |
| | One year | |
| | Two years | |
| | Three years | |
| | >Three years | |

B4. Possession of area under Nutrition garden

| S.no. | Area of Cultivable Land | Please tick (✓) |
|---|---|---|
| 1. | < 250 sq.ft | |
| 2. | 250 – 500 sq.ft | |
| 3. | 500- 750 sq.ft | |
| 4. | >750 | |

B5. Approximately what percentage of your NG plot/s is used for growing crops?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| <25% | | 25-50% | | 50-75% | | >75% | |

B6. Does your family own the land belonging to the home garden plot/s?

Yes or No

B7. Type of crops grown in Nutrition garden

| S. no | Type of crops | Please tick(✓) |
|---|---|---|
| **1.** | Vegetables | |
| **2.** | Leafy Vegetables | |
| **3.** | Roots and Tubers | |
| **4.** | Fruits | |
| **5.** | Medicinal plants | |

## SECTION-C

### Level of household engagement in nutrition garden activities

C1. How did your household get introduced to nutrition gardening?

| S.no. | Type of introduction | Please tick (✓) |
|---|---|---|
| 6. | Common day to day activity | |
| 7. | Through neighbors | |
| 8. | Through School programs | |
| 9. | Through social organizations | |
| 10. | Through government programs | |
| 11. | Through NGO programs | |

C2. How many members of your household have been involved in nutrition gardening?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

C3. On average how often does your household engage in nutrition gardening activities?

| Household engagement | Please tick (✓) |
|---|---|
| 1. More than five times a week | |
| 2. 4-5 times a week | |
| 3. 2-3 times a week | |
| 4. Less than two times a week | |

C4. Why does your household maintain a nutrition garden? Please tick the relevant factors.

| Factors | Please tick (✓) |
|---|---|
| 1. To produce food for my family | |
| 2. To generate additional income | |
| 3. To spend time with my family | |
| 4. For mental and physical relaxation | |
| 5. To beautify my home surroundings | |
| 6. To attract helpful organisms | |
| 7. To eat organically produced foods | |
| 8. I'm passionate about nutrition garden | |

## SECTION-D

## Nutrition garden impact

D1. Before nutrition garden establishment

D1.1.Food consumption pattern

| **Food items** | **Daily** | **Thrice in a week** | **Twice in a week** | **Once in a week** | **Monthly** | **Rarely** |
|---|---|---|---|---|---|---|
| Milk & milk products | | | | | | |
| Cerals & pulses | | | | | | |
| Vegetables | | | | | | |
| Fruits | | | | | | |
| Roots & tubers | | | | | | |

D1.2. What are the vegetable crops grown in your Nutrition Garden?

| List | Amount Harvested (in Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
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D1.3. What are the leafy vegetable crops grown in your Nutrition Garden?

| List | Amount Harvested (in Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

D1.4. What are the roots and tubers grown in your Nutrition Garden?

| List | Amount Harvested (In Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

D1.5. What are the fruit shrubs and trees grown in your Nutrition Garden?

| List | Amount Harvested (In Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

D2. Before nutrition garden establishment

D2.1.Food consumption pattern

| **Food items** | **Daily** | **Thrice in a week** | **Twice in a week** | **Once in a week** | **Monthly** | **Rarely** |
|---|---|---|---|---|---|---|
| Milk & milk products | | | | | | |
| Cerals & pulses | | | | | | |
| Vegetables | | | | | | |
| Fruits | | | | | | |
| Roots & tubers | | | | | | |

D2.2. What are the vegetable crops grown in your Nutrition Garden?

| List | Amount Harvested (in Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
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| | | | |

D2.3.What are the leafy vegetable crops grown in your Nutrition Garden?

| List | Amount Harvested (in Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
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| | | | |

D2.4. What are the roots and tubers grown in your Nutrition Garden?

| List | Amount Harvested (In Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
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| | | | |

D2.5. What are the fruit shrubs and trees grown in your Nutrition Garden?

| List | Amount Harvested (In Kg.) | Amount Consumed (In Kg.) | Market purchase (In Kg.) |
|---|---|---|---|
| | | | |
| | | | |
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## SECTION-E

## Nutrition Garden Development

| | | | |
|---|---|---|---|
| 1. | Have you or any one of your family members participated in any agricultural or Nutrition gardening training? | Yes | No |
| | | | |

| | | |
|---|---|---|
| 2. | How many members of your household took part in this training? | |

| | | | |
|---|---|---|---|
| 3. | Who provided this training? | 1. Relatives, Neighbors, or friends | |
| | | 2. Self-help groups | |
| | | 3. Government | |
| | | 4. Private firms | |
| | | 5. NGOs | |
| | | 6. Academic institutions: School, vocational training centers, University | |
| | | 7. Self learning_____ | |

| | |
|---|---|
| 4. | Name the public or private organization/s that is currently assisting you with credit |

| | | | |
|---|---|---|---|
| 5. | Select the type/s of training you/your family members received? | 1. Soil and land management | |
| | | 2. Water management | |
| | | 3. Producing Seeds and seedlings (nurseries) | |
| | | 4. Compost production | |
| | | 5. Using animal and green manure | |
| | | 6. Integrated Pest management | |
| | | 7. Integrated Weed management | |
| | | 8. Animal husbandry | |
| | | 9. Bee keeping | |
| | | 10. Mushroom Cultivation | |
| | | 11. Pruning and trimming | |
| | | 12. Crop diversification | |
| | | 13. Selection and applications of fertilizer | |
| | | 14. Selection and applications of pesticides | |
| | | 15. Food processing and preserving | |
| | | 16. Marketing and Management | |
| | | 17. Other (specify):_____ | |

| | | | |
|---|---|---|---|
| 6. | Did you find this training useful to improve your nutrition garden? | Yes | No |

| | | | |
|---|---|---|---|
| 7. | Has the Government nutrition garden initiative encouraged you to engage in nutrition gardening? | Yes | No |
| | | | |

| | | | |
|---|---|---|---|
| 8. | Would you like to receive training on nutrition gardens in future? | Yes | No |
| | | | |

**SECTION-F**

**Constraints of nutrition garden**

Listed below are some factors that may affect the productivity of your nutrition garden.

How often is your nutrition garden affected by these factors?

| S.no | Rate the following issues | Always a problem | Often a problem | Sometimes a problem | Never a problem | Don't know |
|---|---|---|---|---|---|---|
| 1. | Shortage of Water | | | | | |
| 2. | Shortage of Land | | | | | |
| 3. | Shortage of Manure and Fertilizer | | | | | |
| 4. | Insect pest and Diseases | | | | | |
| 5. | Nematodes issues | | | | | |
| 6. | Weeds | | | | | |
| 7. | Shortage of quality seeds | | | | | |
| 8. | Poor soils | | | | | |
| 9. | Access of Agricultural tools | | | | | |
| 10. | Limited family labor | | | | | |
| 11. | Lack of finances | | | | | |
| 12. | Destruction by animal pests | | | | | |
| 13. | Damage by weather related Issues | | | | | |
| 14. | Unavailability of Information and advisory support | | | | | |
| 15. | Theft | | | | | |
| 16. | Other Specify:_____ | | | | | |
| 17. | From the list below, choose most important 3 factors that affect the productivity of your nutrition garden and give suggestions for them. (Start with the most significant) | #1_____ #2_____ #3_____ | | | | |

**Thank You**