

SUSTAINABLE URBAN GARDENING: OVERCOMING CONSTRAINTS FOR NUTRITIONAL SECURITY AND ENVIRONMENTAL RESILIENCE

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ABSTRACT

Urban gardening, a dynamic response to the challenges of urban living, encompasses diverse cultivation practices within city spaces, contributing to environmental sustainability and addressing nutritional security. It empowers communities to take control of their food sources, fostering localized food production and reducing the carbon footprint associated with food transportation. The multifaceted concept of food and nutritional security involves not only the availability but also the quality of food intake. Using Garrett's ranking technique, this study assessed six key constraint factors—financial, input, management, social, technical and personal—operationalized as hindrances to achieving urban gardening objectives. A total of 90 respondents participated in ranking these constraints, revealing that technical constraints emerged as the most critical, receiving a mean score of 60.96. Following this, management, input, social, financial and personal constraints were ranked in descending order. Loss of crops due to pest and disease infestation topped the list of challenges, underscoring the multifaceted nature of issues faced by urban gardeners. Financial constraints were primarily dominated by the impact of pests and diseases, while socio-psychological challenges included complaints from neighbors and objections from landlords. Resource and input constraints were led by a lack of quality inputs nearby, emphasizing the importance of accessibility. The study also highlighted significant personal constraints, such as time and space limitations, which were crucial factors affecting urban gardening practices. In conclusion, the findings emphasize the necessity for tailored solutions and community engagement to address these constraints, fostering sustainable urban gardening practices amidst climatic and social challenges.

Key words: Urban gardening, technical, factors and sustainable

INTRODUCTION

Urban gardening, a practice encompassing the cultivation of plants, vegetables and herbs within city environments, has emerged as a transformative response to the challenges of urban living. From apartment balconies to rooftop sanctuaries and community gardens, urban gardening takes on various forms, each contributing to a greener urban aesthetic. Its historical roots, including the victory gardens of World War II, highlight its enduring significance in times of crisis.

Urban gardening is not only about aesthetics but also addresses essential issues of food and nutrition security. As cities expand, traditional agricultural practices face challenges and the disconnection between consumers and their food sources deepens. Urban gardening serves as a sustainable remedy, reconnecting individuals with the origins of their sustenance. It empowers communities to take control of their food sources, fostering localized food production and reducing the carbon footprint associated with food

transportation.

Container gardening, rooftop gardening, community gardens, vertical gardening and indoor gardening represent accessible forms of urban gardening. They provide flexibility and adaptability to different urban living situations, promoting both sustainability and aesthetics. Community gardens in particular, foster social interaction, community building and the exchange of knowledge.

The concept of food and nutritional security is multifaceted encompassing not only the availability but also the quality of food intake. Urban gardening plays a crucial role in ensuring nutritional security by fostering localized food production, providing nutrient-rich harvests, promoting community health, addressing food deserts and contributing to environmental sustainability. It also offers educational opportunities and promotes social cohesion and economic empowerment within communities.

Environmental sustainability, a guiding principle

for responsible resource management, involves minimizing negative impacts on ecosystems, reducing pollution and efficiently using resources. It also focuses on climate change resilience and requires collaborative efforts across various stakeholders, from governments and businesses to individuals.

Historically, societies have practiced urban farming during times of war, depression, or abundance. Today, urban farming is a significant global phenomenon, with millions of urban dwellers engaged in food production, providing sustenance for millions more.

In the Indian context, while urban agriculture has not been as prevalent as in some other regions, there is a growing interest in cities like Hubli-Dharwad, Mumbai, Pune, Nagpur, Delhi, Chennai and Kerala. These cities are witnessing the transformation of spaces into vegetable gardens, supported by both grassroots initiatives and government schemes. Urban agriculture is becoming increasingly important as India's urban areas continue to grow, and these initiatives contribute to self-sufficiency in vegetable production.

urban gardening is a transformative response to the challenges of urban living, addressing not only the aesthetic void in urban environments but also fundamental issues of food and nutrition security. It empowers communities, fosters sustainability and plays a crucial role in ensuring nutritional security, making it a vital component of urban development in India and globally. With this brief background the following objectives were formed. The objectives of this study were to identify and prioritize the constraints faced by urban gardeners, encompassing issues related to nutritional security, effective management practices and environmental sustainability. Through the application of Garrett's ranking technique, the study aims to derive insights and recommendations to address these constraints, providing valuable guidance for policymakers and stakeholders in fostering sustainable urban gardening practices. Top of Form Bottom of Form

METHODOLOGY

The study was conducted in the Bangalore Urban District during 2023-24, with a sample size of 90 respondents. The sample design initially involved a purposive sampling procedure, selecting 40 respondents from a trained list from IIHR (Indian Institute of Horticultural Research), Bengaluru and ATIC (Agricultural Technology Information Centre), GKVK (Gandhi Krishi Vignana Kendra), UAS-B (University of Agricultural Sciences, Bangalore). Following this, a snowball sampling method was employed to select further respondents from the initial respondents of using purposive sampling respondents. The Descriptive and

diagnostic type of research design was employed for study. The study operationalized constraints as factors hindering gardeners from achieving nutritional security, implementing effective management practices and ensuring environmental sustainability to their fullest potential. A pilot survey was conducted to identify problems related to financial constraints, input constraints, management constraints, social constraints, technical constraints, and social constraints. These factors underwent thorough analysis and editing after discussions with experts from the Department of Agriculture and Horticulture, advisory committee members and progressive gardeners. The refined factors were then incorporated into the interview schedule for data collection. To prioritize these constraints based on respondents' perspectives, Garrett's ranking technique was applied. This method allowed the assignment of numerical scores to constraints, facilitating their arrangement according to the respondent's priority. The ranks obtained were converted to percentages using Garrett's formula, providing a quantitative measure of the perceived importance of each constraint.

$$\text{Percent position} = \frac{100(R_{ij}-0.50)}{N_j}$$

Where, R is the rank given for i^{th} item by j^{th} individual and N is the number of items ranked by j^{th} individual.

The conversion of the percent position of each rank into scores was accomplished using the table provided by Garrett and Woodworth (1969). For each constraint factor, individual scores were aggregated and then divided by the total number of respondents. Consequently, the mean scores for all the factors were arranged in descending order, and ranks were assigned, identifying the most significant constraint factors. Under each factor, various problems were documented and statements were formulated. These statements were then integrated into the interview schedule based on inputs from a preliminary survey, existing literature reviews and expert discussions. Respondents who perceived a particular statement as a constraint were assigned a score of one. Frequencies and mean scores for constraints within each factor were computed to establish relative rankings. This systematic approach facilitated a comprehensive analysis of the constraints faced by urban gardeners, providing valuable insights for further interpretation and decision-making.

RESULTS AND DISCUSSION

Constraint in the study was operationalised as the factors that restrict the gardeners to achieve the objectives of urban nutri-gardens at its fullest potential. Based on the review of literature and per-test conducted before the sample

survey, constraints in availing the benefits of urban nutri-gardens were classified in to six factors. They were financial constraints, input constraints, management constraints, social constraints, technical constraints and social constraints. Respondents ranked the factors according to their perceived importance. All the gardeners were asked to rank the factors from one to six.

The constraints were prioritised with Garret ranking method explained in the chapter III, research methodology. The result of constraint analysis has been reported in the

tabular form (Table 1). Factors were ranked with respect to its mean score. (Table 2)

It is clear from the Table 1 and 2 that gardeners considered technical constraints as the important among the six perceived factors. The factor received the first rank with mean score of 60.96, followed by management constraints (55.92), input constraints (54.14), social constraints (46.17), financial constraints (44.70) and the last rank was assigned to personal constraints (39.11).

Table 1: Constraints as faced by urban gardeners - factor ranking

(n=90)

Factor	Rank	I	II	III	IV	V	VI	Total	Total Score	Mean Score
	Scale value	77	64	54	46	37	23			
Technicalconstraint	F	33	18	17	13	5	4	90	5486	60.96
	Fx	2541	1152	918	598	185	92			
Social constraint	F	9	12	22	13	9	25	90	4155	46.17
	Fx	693	768	1188	598	333	575			
Managementconstraint	F	14	28	21	8	16	3	90	5033	55.92
	Fx	1078	1792	1134	368	592	69			
Personnelconstraint	F	6	4	4	20	27	29	90	3520	39.11
	Fx	462	256	216	920	999	667			
Input constraint	F	18	19	14	22	8	9	90	4873	54.14
	Fx	1386	1216	756	1012	296	207			
Financialconstraint	F	10	9	12	14	25	20	90	4023	44.70
	Fx	770	576	648	644	925	460			
	Total	90	90	90	90	90	90			

Table 2. Factors ranking of the constraints

(n=90)

Sr. No.	Constraint	Mean Score	Rank
1	Technical constraints	60.96	I
2	Social constraints	46.17	IV
3	Management constraints	55.92	II
4	Personal constraints	39.11	VI
5	Input constraints	54.14	III
6	Financial constraints	44.70	V

By analysing the Table 3 it could be revealed that loss of crop due to pest & disease was the top ranked constraint (61.11 %), followed by Lack of availability of quality inputs nearby (44.44 %), Difficulty in identifying micronutrient deficiencies, disease and pest problems in the beginning (43.33 %), Harsh weather (42.22 %) and Lack of proper knowledge and training in the beginning (41.11 %).

The finding were in line with Kumari *et al.* (2021), Rani *et al.* (2016)

It can be inferred from the table that loss of crop due to pest and disease (61.66 %) ranked top among financial constraints, followed by crop damage due to squirrels and rodents (23.33 %), crop damage due to birds and monkeys (22.22 %), High initial cost in establishing permanent shade nets, stands for pots, trellis and drip (7.78 %), Less life span of sacks (3.33 %) and water leakage in terrace due to urban farming (00.83 %). The probable reason for these responses might be due to non-utilization of chemicals for control of pests and diseases for plant protection, market available polythene bags life span in only 3-5 years, high cost of quality shade nets with high durability and inability to take precautions while irrigating the terrace garden. The same results were reported by Kumari and Shirisha (2022) and Giziew (2014).

From the Table 3 it can be inferred that regarding

socio-psychological constraints it was found that topped the list with 42.44 per cent respondents, followed by Complaints from neighbours about urban farm debris falling in their premises (8.89 %), Objections from landlords for expanding urban farm by tenants (6.67 %), Children picking the fruits (5.56 %), construction works around house (4.44 %). The findings emphasize the need for robust waste management, effective communication to address neighbour concerns, and collaborative efforts to navigate challenges arising from the urban landscape. This underlines the importance of community engagement, training programs, and proactive measures to foster a harmonious coexistence between urban gardening and the socio-psychological aspects of urban living.

From the Table 3 it can be inferred that regarding resource and input constraints, it was found that Lack of availability of quality inputs nearby topped the list with 44.44 per cent respondents, followed by Insufficient labour availability (13.33 %), Insufficient water availability for irrigation (11.11 %), Lack of sun light (3.33 %) and Breaking of pots (2.22 %). The probable reason for these responses might be due to death of crop if unattended for few days, unavailability of one stop shops for urban farming needs in all localities, limited affordability of respondents for larger space to expand, lack of lift facilities in all multi-storeyed households and respondents busy with professional work for limited time spending in urban farm and water shortage in some areas especially in summer. The same results were

reported by Binsa (2018), Bhuvana *et al.* (2019) and Rani *et al.* (2016).

The data highlights that 28.89 per cent of respondents experience a lack of sufficient time to manage their urban farms, indicating a significant constraint. This challenge is compounded by the finding that 12.22 per cent of respondents feel that urban gardening demands regular monitoring and restricts them from going on vacation. Many respondents in urban areas are likely working individuals, often away from home due to job commitments, events or vacations. The need for consistent attention to urban gardens conflicts with their busy schedules, affecting the overall management of these green spaces. Addressing time constraints through the promotion of low-maintenance gardening techniques and community support initiatives could enhance the sustainability of urban gardening practices. The finding were in line with c Sreedaya (2004).

The Table 3 reveals that personal constraints in urban gardening primarily stem from space limitations, as 27.78 per cent of respondents reported. This issue is exacerbated in metropolitan areas where land is expensive and buildings predominantly consist of flats. Additionally, 14.44 per cent of respondents face challenges related to frequent visits and transporting supplies to multistorey terrace gardens due to the vertical layout of urban dwellings. Some respondents (3.33 %) encounter difficulties in land preparation, while

Table 3. Constraints encountered by urban gardeners under each factor

(n=90)

Sr. No.	Constraints	Frequency	Percentage	Rank
A	Financial constraints			
	Loss of crop due to pest and disease infestation	55	61.11	I
	Monkey menace and birds' damage	20	22.22	IX
	Rodents and squirrel's problem	21	23.33	VIII
	Leakage in terrace	3	3.33	XX
	Less life span of sacks	3	3.33	XX
	High initial cost in establishing permanent shade nets, stands for pots, trellis and drip	7	7.78	XV
B	Input constraints			
	Insufficient labour availability	12	13.33	XI
	Breaking of pots	2	2.22	XXIV
	Lack of sun light	3	3.33	XVIII
	Insufficient water availability for irrigation	10	11.11	XIII
Lack of availability of quality inputs near by	40	44.44	II	

Sr. No.	Constraints	Frequency	Percentage	Rank
C	Management constraints			
	Urban farming demands regular monitoring and restricts from going on a vacation	11	12.22	XII
	Lack of sufficient time to manage urban farm	26	28.89	VI
D	Personal constraints			
	Lack of sufficient family support	2	2.22	XXIV
	Unavailability of sufficient space for expanding urban farm	25	27.78	VII
	Difficulty in frequent visit and carrying inputs to a multistorey terrace garden	13	14.44	X
	Land preparation tides	3	3.33	XX
E.	Technical constraints			
	Old age of urban farming practitioners	8	8.89	XIV
	Lack of proper knowledge and training in the beginning	37	41.11	V
	Difficulty in identifying micronutrient deficiencies, disease and pest problems in the beginning	39	43.33	III
F.	Social constraints			
	construction works around house	4	4.44	XIX
	Children picking the fruits	5	5.56	XVII
	Objections from landlords for expanding urban farm by tenants	6	6.67	XVI
	Complaints from neighbours about urban farm debris falling in their premises	8	8.89	XIV
	Harsh weather	38	42.22	IV

Others (2.22 %) lament the lack of sufficient family support. Notably, many respondents are over 60 years old, indicating minimal assistance from their families. These constraints emphasize the need for creative space utilization techniques, such as vertical gardening, and community support programs to address the challenges posed by limited space and age-related limitations in urban gardening. This results are supported by results of Awasthi (2013) and Bhupal *et al.* (2001).

The Table 3 indicates that harsh weather is a predominant social constraint, with 42.22 per cent of respondents citing high temperatures, especially on terraces, leading to elevated heat waves due to concrete surfaces. Additionally, complaints from neighbours about debris (8.89 %), objections from landlords (6.67 %) for expanding urban farms, children picking fruits (5.56 %), and construction works (4.44 %) contribute to the challenges.

CONCLUSION

The respondents face extreme summer temperatures, impacting plant health, and heavy rains, making gardens susceptible to diseases. Construction-related issues add further complexities, introducing dust into the growing environment. These findings underscore the need for

adaptive gardening practices, weather-resilient structures, and community awareness programs to address climatic and social challenges, ensuring sustainable urban gardening practices.

IMPLICATIONS

- The study suggests policy interventions in urban planning to address constraints in sustainable gardening. Policies supporting education, community engagement, and financial aid can enhance urban gardening practices for environmental resilience and nutritional security.
- Increasing awareness through workshops and campaigns can empower communities, fostering a sustainable urban gardening culture and promoting environmental resilience.

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CONFLICT OF INTEREST:

This is to declare that there is “No conflict of interest” among researcher.

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