

URBAN AGRICULTURE IN KARACHI, SINDH PAKISTAN: A SUSTAINABLE SOLUTION FOR FOOD SECURITY AND URBAN RESILIENCE

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ABSTRACT: This study explores the role of urban agriculture as a solution to address the food security challenges and enhance urban resilience in Karachi, Sindh. Through a comprehensive review of existing literature and case studies. A total of 390 valid survey responses were received, and an empirical analysis was done using linear regression and a descriptive model. The paper highlights the benefits and challenges of urban agriculture and suggests policy interventions to promote its sustainable development. The finding of the study is house ownership has a strong impact on urban farming and income level and water availability show a negative relationship with urban vegetable production. Policymakers, stakeholders, and planners must assess the importance of urban vegetable gardening to food security.

Keywords: Urban Agriculture, Gardening, Regression.

1 INTRODUCTION

Urban agriculture is the preparation or practice of producing goods for sale to consumers both inside and outside of an urban region, including both food and non-food items [1]. Nature-based, long-term solutions to climate change are becoming increasingly relevant, particularly in metropolitan environments [2]. Through 2050, 66 percent of the population of the globe, or fifty-four percent (54%) of the total, is anticipated to reside in urban regions. The most urban expansion will occur in emerging nations, according to the Global Urbanization Prospects report by UN DESA's Population Division, which was published in 2014. A lack of food and increased prices for household essentials. By the middle of this century, there will be 25 million starving children due to climate change [3]. Moreover, as a result of increased development, urban green spaces in densely populated places are shrinking [6].

Space constraints in densely populated metropolitan settings are a difficulty that necessitates appropriate alternative solutions. In this regard, exterior surfaces, particularly the roof, give enough room for planting as a "Rooftop Garden". Furthermore, fast urban development raises the prevalence of numerous physical and mental illnesses among people [7].

Additionally, urbanization is a global phenomenon with far-reaching impacts, especially in rapidly growing cities like Karachi, and Sindh. As urban populations surge, ensuring an adequate food supply becomes a critical challenge. Rethinking how to feed the entire urban population sufficiently is one of the major concerns of this century because cities are necessarily expected to lead the way toward a more equitable and sustainable world [4].

Therefore, urban agriculture, the practice of cultivating crops and raising livestock within urban areas, emerges as a potential solution. Moreover, in Karachi, where issues of limited arable land, rising food demand, and environmental degradation are prominent, urban agriculture holds promise as a way to address these challenges sustainably. This paper aims to explore the concept of urban agriculture in Karachi, assess its benefits and challenges, and propose policy recommendations for its integration into the urban landscape.

2 LITERATURE REVIEW

Urban agriculture encompasses a variety of practices for growing, processing, and distributing food in urban environments. In an urban environment, the phrase also

refers to animal husbandry, aquaculture, beekeeping, and horticulture. Urban agriculture is distinct from peri-urban agriculture, which occurs in rural areas on the outskirts of cities. Urban agriculture may manifest itself at various stages of economic and social development.

2.1 Urbanization and Food Security

The process of urbanization often results in increased demand for food, leading to heightened pressure on existing supply chains. This is particularly evident in Karachi, one of the fastest-growing cities in the world. As highlighted by Smith et al. [8], urban agriculture can offer a means to augment local food production and improve food security for urban populations. However, the majority of researchers think that monetary wealth is the most important predictor of food insecurity because urbanization has made it more difficult for city dwellers to obtain the majority of their food, which has led to their dependence on commercially prepared foods. This could put some social groups, such as the elderly, families with only one parent, and big families, in a precarious position [5].

2.2 Urban Agriculture as a Resilience Strategies

Urban agriculture not only addresses food security concerns but also contributes to urban resilience. Rooftop gardens and community plots can mitigate the urban heat island effect, enhance green spaces, and create microclimate buffers, making cities more resilient to environmental stressors.

2.3 Challenges in Implementing Urban Agriculture

While the potential benefits of urban agriculture are evident, challenges remain. Limited space availability, inadequate infrastructure, regulatory complexities, and lack of awareness pose significant obstacles. The study by Liaqat et al. (2019), underscores the need for clear regulations and supportive policies to facilitate the growth of urban agriculture initiatives.

3 METHODOLOGY

3.1 Material

The study has selected Karachi City to accomplish research work for achieving targets. Karachi city is selected as a case study. It is located in the southern part of Sindh province at 24.8600⁰ N, 67.0100⁰ E world coordinates. Karachi is also a cosmopolitan city. The people have a diverse cultural background and a strong sense of social responsibility. Moreover, Karachi has the country's main seaport. It is also an important financial hub in Pakistan, offering an exclusive physical and geostrategic site for socio-ecological research.

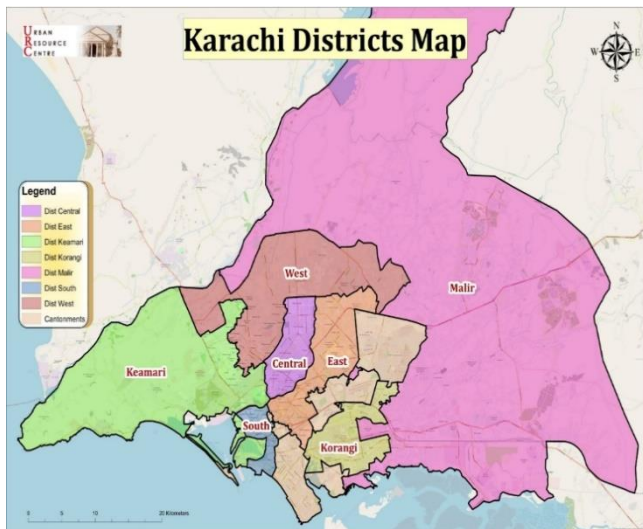


Figure 1 Karachi District Map

Methods

The goal of this study was to evaluate Karachi, Sindh, Pakistan's small-scale urban agriculture industry. The data was collected using the quantitative data survey approach. To gather the information in this regard, a standardized Questionnaire was created. To elicit precise information from residents, closed-ended questions were created. The surveys were completed at random using the Random Sampling Method. As advised by Krejcie and Morgan [10], the sample size of questionnaires was determined by the study area's population. Overall 390 sample size questionnaires were undertaken. The information was gathered through cluster sampling, which involved distributing a sample of questionnaires to several study sites. A systematic questionnaire was created to efficiently discover and extract the following information: (i) resident's socio-demographic and economic background, (ii) attitude and perception of urban gardening. Moreover, secondary data were gathered from books, reports, government records, and web sources. In the end, surveys were conducted on-site to look at the site's current state. SPSS (Statistical Package of Social Sciences) software was used to examine the data. To analyze and evaluate the data, regression modeling and descriptive statistics were used.

4 RESULTS AND DISCUSSION

The collected data are extensively analyzed and discussed in this section. For better comprehension of the research area's current conditions, the data are presented in tabular and graphical styles.

4.1 Descriptive Analysis Model

Table 01. House Ownership

House status	Respondents	Percentage
Owned	243	62.30
Rented	147	37.69
Total	390	100

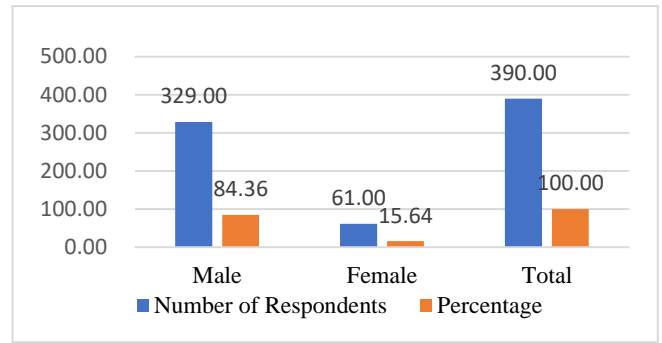


Figure 2 Gender Respondents

The male and female respondents who participated in the questionnaire survey and completed the questions. A total of 390 questionnaires were utilized to collect information from the inhabitants, with 329 (84%) completed by males and 61 (16%) completed by women. The data demonstrate that male respondents completed the bulk of the questionnaires, as shown in Figure 2.

4.2 Regression Model

In regression analysis, a summary of filled Questionnaires from different locations of the area. The study presents the demographic attributes of the respondents of the study area. The demographic attributes include gender, age, educational level, marital status, family size, house ownership, consumption of vegetables, major sources of income, urban gardening awareness, community garden, availability of water, awareness of seasonal vegetables and fruits, and daily expenditure.

The result of the regression model is shown in Table 02. The regression model includes the variables; gender, age, education level, marital status, household size, house ownership, Consumption, Income level, water availability, and daily expenditures. The result of the model shows that gender and age have a positive relationship with growing vegetables in urban areas. The majority of respondents in urban vegetable production are male, which may be due to the male is often considered responsible for household duties.

Table 02. Summary of Linear Regression Model

Variables	Coefficients	p-value
Constant	0.735	000
Gender	0.215	0.034
Age	0.197	0.052
Education level	0.133	0.089
Employer	0.109	0.056
Household size	0.082	0.093
House ownership	0.881	0.000
Consumption	0.494	0.000
Income	-0.412	0.004
Water availability	-0.238	0.077
Daily expenditures	0.041	0.039
R-square	63.3	

Employment status is another important characteristic related to participants in urban vegetable/ gardening production. The study findings indicate that most of the participants of the study are unemployed.

House ownership and household size have a positively significant impact on the participant in urban gardening or production. This might be attributed to the related stability of homeowners as compared to the relative transiency of renters, or it may indicate that space is a limiting variable. If house ownership increases, it is possible that participation in urban gardening or vegetable production would also increase.

Both Income level and water availability show a negative relationship with urban vegetable production. The water facility is negatively affected means the availability of a sufficient amount of water in the area. If a shortage of water or a needed amount of water is demanded, it impacts on the vegetable production in the market. The negative relationship between income level and residents in urban production of fruits and vegetables indicates the greater need for supplemental income and nutrition among those of lower incomes and the tendency of people to prefer substitutes for example, beef, chicken, mutton, and fish over vegetables and fruits as income increases.

Dependent Variable: resident likelihood to grow vegetables.

The result of the model shows that age and gender show a positive relationship with urban vegetable production which is significant at 5%.

3 CONCLUSION

Urban agriculture is the growing of fruits, plants, and crops in neighborhoods, towns, and cities. It is a process that involves numerous other related endeavors such as preparing food and transportation, obtaining and utilizing wasted food and rainfall water, organizing themselves, educating, and hiring residents. Cities have grown at an unprecedented rate in the last century, contributing to the emergence of a highly urbanized global population. This paper aims to explore the concept of urban agriculture in Karachi and assess its benefits and challenges. In this study, the ordinary least square model was used to analyze data.

The study findings show a negative association between income and urban vegetable production; as income levels fall, people are more likely to participate in urban agriculture. Furthermore, this exercise provides a good supply of nourishment as well as some beneficial social interaction. The government should collaborate with non-governmental organizations to offer space and inputs for urban vegetable cultivation. Moreover, there is a need to promote urban vegetable production as a pleasant, healthy, and fulfilling family activity that may benefit people of all ages and economic levels, so that it does not become stigmatized as a poor-only hobby. Another finding, house ownership and household size have a good influence on

those who engage in urban gardening or production. This might be ascribed to house owners' relative stability as opposed to renters' relative transiency, or it could imply that space is a limiting constraint. If home ownership rises, there is a chance that involvement in urban gardening or food production may rise as well.

Finally, policymakers must evaluate how significant urban vegetable cultivation is to food security. Additionally, policies should also be devised to assist extension agents in teaching the community about the benefits of urban vegetable growing and sharing knowledge about more sustainable vegetable gardening practices.

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