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RESEARCH PAPER

Urbanization and its impacts on Food Security: A Case study of District Lahore

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ABSTRACT

The Expansion of urban areas uses the agricultural land to create new built-up areas for settlement, affecting local food production and distribution systems. This study investigates the impact of urbanization on food security in District Lahore, with the aim of identifying key challenges and possible areas for intervention. The disparities in access to nutritious foods persist, particularly among low-income communities. This research seeks to understand how urbanization influences the availability of nutritious foods to poor urban residents. Utilizing a mixed-methods approach, this study combines surveys, interviews, and secondary data analysis to reveal the direct impacts of urbanization on the decreasing agricultural land and local food production. Based on the findings, several recommendations are proposed to address the challenges. These include measures to promote urban agriculture, improve access to affordable and nutritious foods through subsidized markets and implement nutrition education campaigns to raise awareness about healthy eating habits. Additionally, policymakers are urged to prioritize sustainable urban planning strategies that ensure the availability of affordable food to poor urban communities.

KEYWORDS Agricultural Land, Food Production, Food Security, Urbanization

Introduction

A significant figure Urbanization is the term used to describe the growing density of people living in urban areas along with the development and growth of cities. Individuals tend to migrate from rural to urban areas in quest of better economic possibilities, higher living standards, and to access a wider range of facilities. Pakistan is one among the highly urbanized countries in South Asia, with an annual urbanization rate of 3%. Two major factors responsible for Pakistan's urbanization are natural population growth and rural to urban mass migration as cities offer better opportunities for employment and education. Pakistan faces both opportunities and challenges from urbanization. While urbanization can potentially strengthen the flagging national economy through increased technological development, and cross-cultural interaction, it also has several drawbacks, chief among them being the issue of food security and also it will severely test the state's ability to provide basic amenities in cities. Food availability, access, consumption, and stability within a population are all included in the broad idea of food security. Through a number of interrelated mechanisms, such as modifications to land use, food production systems, distribution networks, and dietary habits, urbanization has a significant impact on food security. As a developing country, Pakistan is already facing challenges in providing its urban population with energy, water, healthcare, employment, transportation, and housing. It will be extremely difficult

to meet these needs in upcoming years as the phenomenon of urbanization has become inevitable not only in Pakistan but globally (Iqbal, 2014).

Pakistan's major goal as a developing nation, is to feed its rapidly expanding population with nutritious food and agriculture is its most significant industry in this context. The alteration of land use patterns in the country is one of the main effects of urbanization on food security. The amount of land that can be used to produce food is decreased as cities grow and frequently encroach into agricultural land. Urban sprawl is a phenomenon that leads to the depletion of ecosystem services, biodiversity, and fertile soil, all of which are necessary for agriculture. In Pakistan, over the past 60 years, the total area under cultivation has expanded by just 40%, despite a population increase of over four times and a sevenfold increase in urban expansion, leading to the creation of megacities like Karachi, Lahore etc. These megacities are constantly battling food insecurity because of urbanization. Thus, one of the most important aspects of the Millennium Development Goals is to cope with poverty, hunger and food crisis (Ahmad & Farooq, 2010).

This study investigates the impacts of urbanization on food security in the megacity, Lahore. As compared to other cities of Pakistan, Lahore is second highly urbanized (Bernstein, 1994). According to a report (Government of Pakistan 2011), 84% of the Lahore population resides in Metropolitan city area. The expansion, growth and economic gains of Lahore are thriving at the cost of terrible depletion of its agricultural lands. The trend is alarming as it directly threatens the production, availability and distribution of nutritious food in the city. Lahore is home to a sizable amount of poor urban population who are denied the benefit of health friendly food due to the decrease in local food production and conversion of agricultural land into urban infrastructure (Zaman & Arif, 2011).

Lack of access to the nutrient rich food accompanied by the excessive use of fast foods, processed meals, sugary drinks leading to the nutritional imbalances and other health related issues is also a prominent impact of urbanization that is linked to food security in Lahore. Policymakers, urban planners, and communities must comprehend these effects in order to develop measures that guarantee adequate and equitable supply of nutrient-dense food to urban residents.

The present research is based on a mixed method approach to highlight the impacts of urbanization on food security in Lahore. For the purpose, surveys, man to man interviews are conducted to get a public viewpoint combined with secondary data collected from relevant government offices to analyze the prevailing situation of urbanization in the city and how it has affected the choice and availability of food to urban residents over time.

Literature Review

Food security is a broader term that emphasizes the availability, affordability and approachability of food equally to all the individuals in a society (De Bruin et al., 2021). It also ensures the provision of proper nutrient rich food to every person (Wang et al., 2022). Food security has been a major concern to mankind even for 10,000 years ago. In ancient Egypt and China, the authorities used to store food and release it for the public in times of food crisis such as drought (Aziz et al., 2019). In 1974, the word "food security" was mentioned specifically in relation to the supply of food at the World Food Congress (Eddington & Kashangura, 2016). Food security can also be referred to the continuous availability of nutritionally balanced food that should also be sustainable to

counterbalance the fluctuating prices and production. In the concluding statement of World Food Summit (1996), the importance of food preservation was highlighted as an economic pathway to ensure the constant supply of nutritious food to all the people so that everyone can have a chance at quality life (Pribadi & Pauleit, 2015).

Pakistan is a country that relies majorly on agriculture for most of its food production. Despite the technological accomplishments, adoption of modern techniques and well-established research infrastructure in the agricultural sector, food prices are quite high in Pakistan. the main cause of this hinderance in the availability of affordable food is the huge gap between the production and demand ratio. Exponentially increasing population and urban saturation has led to high food demands while the local production of food is decreased due to the depletion of agricultural land (Atif et al., 2017).

Various attempts have been made so far to address the rising issue of urbanization or urban saturation in Pakistan (Phillips, 1964, Qutub & Richardson, 1986, Butt, 1996, Malik & Wahid, 2014, Hussain, 2014, Jabeen et al., 2017).

Lahore is also known as the "heart of Pakistan", the city has a history of more than 2000 years. Due to rich in cultural heritage, prestigious educational institutions, fast pace technological growth, abundance of employment opportunities and better infrastructure, Lahore has been greatly targeted by urbanization in the past few years (Rana & Bhatti, 2018). Previously, many researchers have attempted to address the impacts of urbanization on Lahore including water levels, urban agriculture, energy crisis, environmental impacts etc. (Rizvi, 2011, Aziz et al., 2015, Shirazi & Kazmi, 2016, Khan, 2019, Waseem et al., 2019, Butt et al., 2020).

The continuous expansion of Lahore has stirred the issue of food security that is greatly affecting the quality of life in the region. Food security is linked to a number of underlying causes including overpopulation in the city, socioeconomic differences, agricultural land depletion, adoption of unhealthy eating habits, lack of awareness regarding the nutritional value of foods among the people (Anwar et al., 2023).

Material and Methods

Study Area

This study investigates the district Lahore, that has been influenced greatly by urbanization in the past few years. The city has a dense network of roads and constantly expanding infrastructure that makes the region suitable for this research. Compared to past records, most of the agricultural land in the city has been converted into a built-up area for new infrastructure as the city expands. The following figures show the land use map of Lahore in the years 1990 to 2018 and for the recent year 2023.

Figure 1.
The Land use map of Lahore for the years 1990-2018.

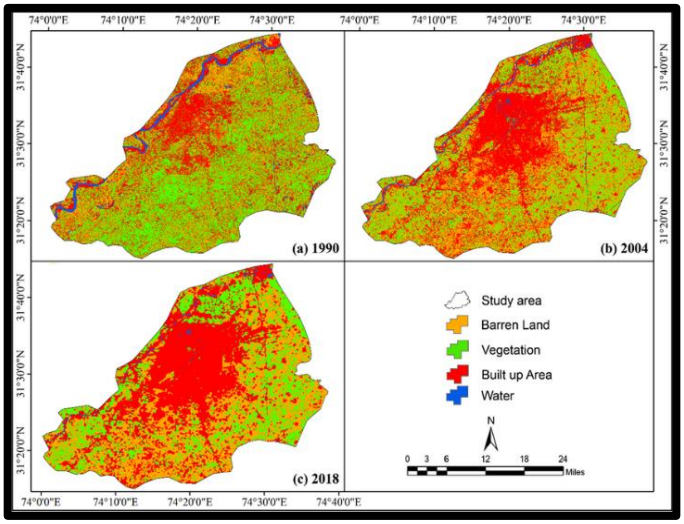
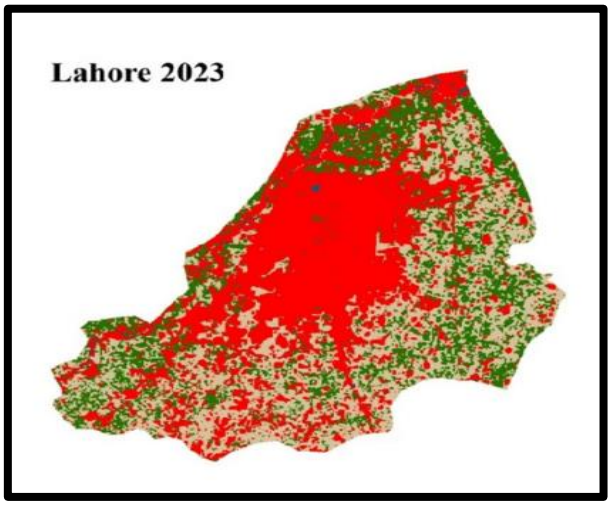


Figure 2.
The land use map of Lahore for the year 2023.



It is clear from the map pictures that agricultural land in Lahore has decreased drastically over time. The area marked red is the newly built-up area taken up by the infrastructure that was previously vegetative.

Collection of Data

After the selection of a suitable study area, the next task is the collection of relevant data and is crucial for the investigation. For that purpose, we need to analyze the availability of different resources in the area that has been targeted by urbanization and its impact on the urban residents. For primary data, a specifically designed questionnaire was prepared to collect information about the local agricultural practices, socio-economic profile of the public and food security issues to get a public viewpoint on the situation. Surveys were conducted to access the general background of local residents, migrated residents and their food and health preferences. Secondary data include the collection of statistical information from different government offices and departments. Agricultural statistics of Pakistan, the District Revenue Department, the District Agriculture Department of Lahore and the District Census Reports of Lahore are a few of noteworthy sources for secondary data collected during this investigation. All the primary and secondary data was recorded digitally to avoid mixing and loss of data.

Data Analysis

Analysis of data was done carefully through the examination of responses collected against the questionnaire, surveys and interviews with linear regression techniques. In which the monthly income was used as dependent variable and quality/consumption per month of the food as independent variable. The regression coefficients provided an estimation of the situation regarding food security in the targeted region. SPSS (Statistical Software for Social Sciences) was used to perform the regression analysis of the primary data. Analysis of secondary data includes the examination of impacts of urbanization on the land use area of Lahore. Land classification map of the area was obtained using the RS data provided by USGS (United States Geological Survey) followed by putting the RS data into ERDAS-IMAGINE for land classification. Land use maps of Lahore shows the distinct classification of land including water bodies, agricultural land, barren land and built-up area for settlement. After the assessment of prevailing situation through data analysis a comparison between the existing and previous situation of agricultural land in Lahore was done using the official data provided by the District Agriculture Department Lahore.

Results and Discussion

Results from the analysis of data collected for the study area are tabulated in this section.

Table 1
Production, consumption and selling of selected Agricultural foods in Lahore.

Agricultural foods in the study area	Production Ratio (%)	Consumption Ratio (%)	Selling Ratio (%)	Total (%)
Meat & Poultry	7.8	17.3	15.5	68%
Fruits	6	100	0	0%
Eggs	36.3	24.2	6.8	69%
Vegetables	26.2	15.4	5.6	79%

In table1, the production, consumption and selling ratio of some nutritious foods selected on area base preference of people is given. Meat and poultry, eggs, vegetables and fruits are the common healthy food choices of residents in Lahore. The production ratio is lower than the consumption ratio for food items highlights the issue of food security in the region which means that the production of these foods is lower while the consumptions are higher that leads to high food prices.

Table 2
Regression model Results

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.857	0.728	0.725	1.060

Regression results are shown in table2. The R value (0.875) indicates the positive correlation between the selected dependent (monthly income) and independent (Quality/consumption per month of the food) variables. Adjusted R^2 accounts for 72% of the area which means that our estimated model is suitable for this investigation.

Table 3
Regression Coefficients for dependent and independent variables.

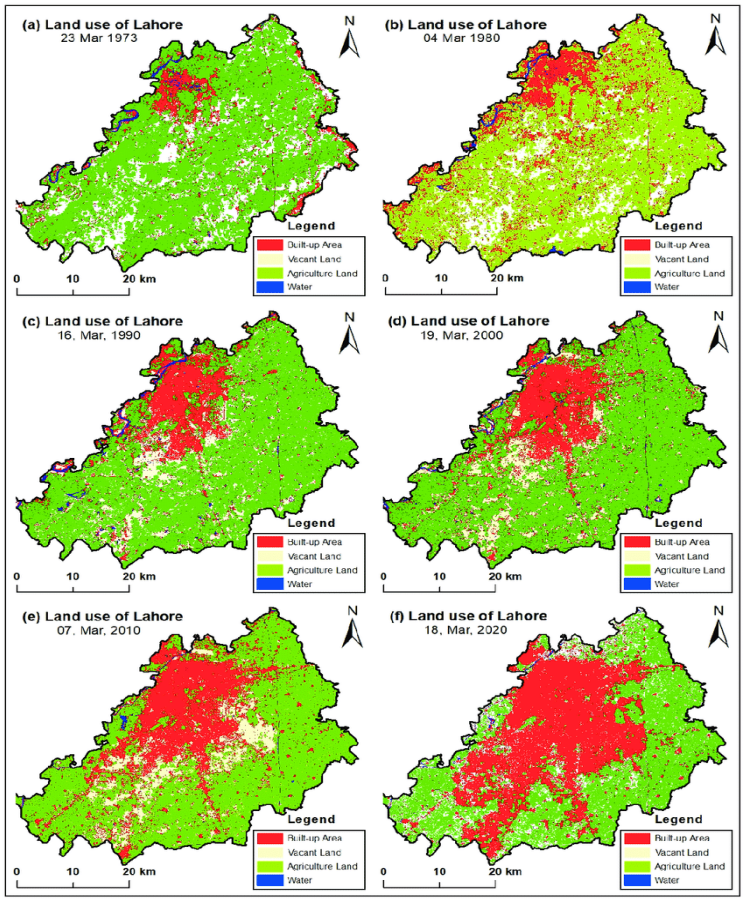
Regression Coefficient	Minimum	Maximum	Mean	Std. Deviation	N
Predicted value	2.66	4.84	3.68	0.405	900
Residual value	2.799	1.817	2.876	1.058	900
Std. Predicted value	2.509	2.882	0.000	1.000	900
Std. Residual value	2.642	1.714	0.000	0.998	900

Table 3 shows the coefficients of regression obtained from the regression analysis of the data. Each coefficient represents the change in dependent variable (monthly income) for one unit change in independent variable (per month food consumption). The predicted values of the dependent variable are obtained from the regression model while the residual values refer to the change in actual recorded and predicted values and N is the total number of observations recorded in the datasheet also known as sample size. The standard deviation for the values ranges between -1 and +1 (not above than 1) which means there is low variance in the data and the values are closer to the mean. This suggests that the statistical results proposed in this investigation are acceptable.

To assess the land use patterns in Lahore, land use classification maps are examined for the years 1973 to 2020 as shown in the figure below.

Figure 3. Land use classification maps of Lahore 1973-2020.

It is evident from the map pictures from past to recent years that agricultural land of Lahore has been tremendously affected by the process of urbanization. As the vegetative land is replaced by the expanding infrastructure, local production of food decreases. Consequently, urban residents have to rely on distant sources that are not

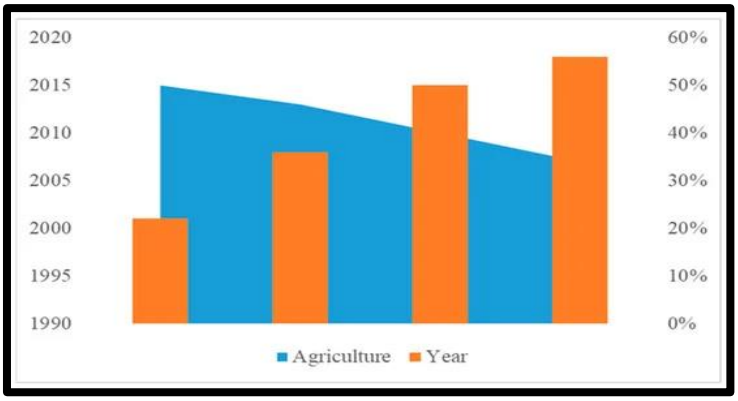


affordable for the poor urban residents. Also to cope higher demands, the food

production can be enhanced using artificial methods that compromises the food quality making the availability of nutrition-dense food scarce for the common man.

Figure 4. *Year-wise variation in the agricultural production of Lahore.*

From the official data sources, the rate of agricultural production is reduced drastically since 2001. Agricultural production was recorded at 50% in 2001 while in 2020 it was reduced to a mere 30% while the rate of increase in population is sevenfold. Figure 4



shows the variation in agricultural production over the years.

Conclusions and Recommendations

The aim of this investigation is to highlight the impact of urbanization on food security in Lahore. Through the statistical data findings, it is evident that the supply of nutritious food to urban residents is limited while the demands are high. The depletion of agricultural land in the region due to modern infrastructure is the main reason for this imbalance. Over time, agricultural land is progressively decreasing in megacity Lahore. Mass migration of people from rural to areas like Lahore has put considerable strain on food resources of these cities. To address the concern, the following are some recommendations that can counterbalance the effect of urbanization.

- Urban planners and policy makers must devise policies and programs that help facilitate the poor so that they can have access to healthy and nutritious food.
- Initiatives should be taken by the government to spread awareness regarding the choice of food among people such as preference of nutrient rich food over fast foods and processed meals so that major health risks can be avoided.
- Urban agriculture should be promoted with proper areas and sites devoted to the purpose. So that the availability of fresh and healthy food can be ensured.
- Special attention should be paid to the increasing rates of unemployment with the saturation of labor-market. To address the issue, opportunities should be provided for the poor, less educated, handicapped, upper-aged urban dwellers.
- The Access of poor to basic necessities such as healthcare, water, electricity and household items should be made easier by the subsidies given by the government.

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