

Pre-and Post-COVID Transformations in the Built Environment: Perceived and Actual Changes

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Abstract

The COVID-19 pandemic has profoundly impacted the built environment, driving significant changes in housing, local economies, and urban green spaces. As cities adapted to the challenges posed by the pandemic, these transformations reshaped how individuals interacted with and experienced their surroundings. This research examines both perceived and actual changes in these critical dimensions, focusing on the pre- and post-pandemic periods. It draws on survey data from 498 university students in the Balatçık neighbourhood of İzmir, Türkiye, a region notable for its close ties to student life. The research investigates how individuals perceive shifts in their immediate environment and compares these perceptions with documented urban modifications. By integrating survey insights with primary data, this research provides a comprehensive analysis of how the built environment has changed with the pandemic. The findings highlight notable changes in housing, including variations in availability, prices, and residential density, reflecting evolving needs during the pandemic. In the local economy, the emergence of new businesses and shifts in consumer behaviour revealed significant economic transformations, particularly in service-oriented sectors. Urban green spaces, valued for their physical and psychological benefits during lockdowns, displayed varied levels of perceived and actual improvements.

Keywords: Built environment, Housing dynamics; Local economy, Covid-19 pandemic, Perceived vs actual change, Urban green spaces, Post-pandemic urban resilience

1. INTRODUCTION

The COVID-19 pandemic emerged in late 2019 and turned into a global problem in 2020 (URL 1). The first case was declared on March 11, 2020 in Türkiye (URL 2). Its effects in Türkiye and the world continued until the end of 2021. This outbreak caused an emergency in public health. It was accepted as a ‘disaster’ due to the significant loss of life, economic downturns leading to global recessions, and drastic changes in social, financial, and public health practices (Vasanth Raju and Patil, 2020). COVID-19, while sharing similarities with other illnesses, demonstrated key differences, particularly in its rapid spread and potential for exponential growth (Krauskopf, 2020). On average, the global clinical fatality rate was estimated at 3%, with a significant increase among older populations, where fatality rates reached approximately 15% or higher for those over 80 years of age (Mahima et al., 2021). With the first confirmed COVID-19 case in Türkiye, the pandemic strained healthcare systems across the country. To reduce the workload of the health care system, nationwide curfews, travel restrictions, and remote working measures are introduced to mitigate virus transmission.

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The impacts of the COVID-19 pandemic have extended beyond public health and the economy, significantly affecting the structure of cities (Foletti, 2020; Campion et al., 2020). From this point of view, it was accepted as a '*disaster*' not only in the health aspect but also in urban planning and spatial organization. The pandemic revealed that the built environment is not a simply a passive setting for everyday life, but an active factor shaping how cities withstand crises and adapt to unexpected challenges (Lak et al., 2020). Precautionary measures such as remote working, curfews and restrictions on intra- and inter-city travel created new dynamics in housing, local economies and urban green spaces. It showed the way cities are designed and organized can either make daily life more difficult or help people cope with these measures. For instance, high-density housing with limited access to open spaces created challenges, while neighbourhoods with nearby services and accessible green areas proved more supportive during lockdowns. Moreover, mobility restrictions also underlined the importance of walkable urban forms, where residents could reach essential needs without long-distance travel.

The COVID-19 pandemic fundamentally reshaped how people work, live, and interact with their environments and cities have adapted to this unforeseen circumstance. One of the most significant shifts was the widespread adoption of remote work, driven by public health measures such as lockdowns, social distancing, and travel restrictions (Mehta, 2020). For millions of workers, the home became the new office, prompting a redefinition of work-life balance and a rethinking of urban living.

Over time, while some of these adaptations evolved into standard practices, some changes have not been a part of the post-covid period.

The COVID-19 pandemic has triggered significant transformations in housing stock, local economic activity, and the demand for urban green spaces, driven by both restrictive public health measures and broader local and global socio-economic impacts.

Overall, the COVID-19 pandemic has affected all aspects of daily life, bringing a new perspective to the significance of the built environment and urban planning practices as perceived by everyday users. It revealed both the vulnerabilities and the resilience of cities, underlying the significance of flexible housing, accessible green infrastructure, and adaptive local economies. From this perspective, this research examines two sides; the transformations in housing, the local economy, and urban green spaces, the post-COVID period as well as how these changes have been experienced and understood by individuals.

2. LITERATURE REVIEW

The COVID-19 pandemic has generated a substantial body of research that explores its impacts on the built environment and urban life. Scholars have examined how the crisis reshaped housing markets, altered local economic dynamics, and redefined the role of urban green spaces (Ling et al., 2020; Spencer et al., 2020; Ahsan and Sadak, 2021; Lopez et al., 2021. Poortinga et al., 2021). These studies highlight that the pandemic did not only pose a temporary disruption but also acted as a catalyst for long-term transformations in how cities are experienced and organized. In particular, the literature underscores the interconnectedness of social, economic, and environmental dimensions of urban systems, showing that changes in one area often produced ripple effects across others. Against this background, the following subsections review the key findings from national and international studies, focusing on three critical domains: housing, local economies, and urban green spaces.

2.1 Housing and the Built Environment

The COVID-19 pandemic has significantly altered housing markets and residential preferences across the world. The initial outbreak brought immediate disruptions: lockdown measures and infection fears discouraged in-person processes such as house tours and deed transactions, leading to a decline in housing sales (Wang, 2022). For instance, in Türkiye, sales dropped sharply during April–May 2020 under strict government-imposed restrictions (Ahsan and Sadak, 2021). Similar trends were observed in other countries where uncertainty about income and employment shaped housing demand (Pawlewicz et al., 2022). In response, many governments introduced policy interventions such as interest rate cuts to stimulate real estate markets (Ling et al., 2020). In June 2020, public banks in Türkiye reduced housing loan interest rates to 0.64% for new homes and 0.74% for pre-owned homes, a move intended to revive the housing market (Anadolu Agency, 2020).

Beyond sales, the pandemic triggered deeper shifts in residential preferences. Prolonged remote working and distance education reshaped the meaning of home, increasing demand for larger dwellings and suburban or rural locations offering open space and better living conditions (Nanda et al., 2021; Hanzl, 2020). In European cities such as Milan and Madrid, this trend was reflected in a rise in suburban housing demand (De Rosa and Di Palma, 2020). In Türkiye, the shift to online education reduced the number of students in metropolitan areas, dampening rental demand and stabilizing rent prices in some cities (Subaşı and Baycan, 2022). Research in Çanakkale further highlighted that local housing preferences during and after the pandemic were closely tied to economic pressures, with students displaying distinctive dynamics such as shared living to lower costs (Usaklı et al., 2025). International studies also emphasized construction-related challenges: lockdowns slowed building activity due to labor shortages and supply-chain disruptions, although recovery phases saw the resumption of delayed projects (Ahsan and Sadak, 2021; Gurran et al., 2022). Overall, the pandemic redefined housing not only as a shelter but also as a multifunctional space for work, study, and social life, fundamentally altering urban residential patterns.

2.2 Local Economic Transformations

The pandemic also caused profound disruptions in local economic activity. The imposition of curfews, mobility restrictions, and closures of non-essential businesses led to severe contractions in service and retail sectors (Gungoraydinoglu et al., 2021). Small and medium-sized enterprises, particularly in hospitality, catering, and tourism, were among the most vulnerable due to both reduced consumer demand and supply chain challenges (Fornaro and Wolf, 2020; OECD, 2020). In Türkiye, the sharp decline in tourism revenues and the reduction of in-person services highlighted structural fragilities in local economies (Erdem, 2021).

At the same time, the pandemic accelerated the adoption of digital platforms. Online shopping, delivery services, and digital payment systems experienced rapid growth, reshaping consumer habits and pushing businesses toward e-commerce solutions (Donthu and Gustafsson, 2020). These changes were not temporary: scholars note that the pandemic acted as a catalyst for digital transformation across many economies, embedding long-term shifts in both supply and demand structures (Brem et al., 2021). Furthermore, research in different regions shows uneven impacts: while global tech and logistics companies thrived, many informal sector workers and local shop owners experienced severe losses (ILO, 2021). These dynamics illustrate that COVID-19 not only disrupted existing economic models but also accelerated structural transitions in urban and local economies worldwide.

2.3 Urban Green Spaces and Well-being

Urban green spaces gained heightened importance during the pandemic as safe, accessible environments for recreation, socialization, and mental well-being. A growing body of international research underscores their role in supporting public health during crises. In New York City, residents reported increased recognition of green spaces as essential for both short-

term relief and long-term well-being (Lopez et al., 2021). Similar findings in Brussels highlighted that green spaces provided psychological comfort and a safe venue for social interaction, reducing isolation risks (Noël et al., 2021). Studies from Italy and Poland demonstrated that access to parks and green areas reduced stress, supported physical activity, and contributed to community resilience during lockdowns (Ugolini et al., 2020; Pawlewicz et al., 2022).

In Türkiye, access to urban green areas during lockdowns was uneven, revealing spatial inequalities between neighborhoods with abundant open spaces and those with limited or no access (Çelikyay and Elicin, 2021). This aligns with broader debates on environmental justice and equitable distribution of green infrastructure in cities (Spencer et al., 2020; Poortinga et al., 2021). The pandemic further sparked urban planning discussions around tactical urbanism and the “15-minute city” model, advocating for local, easily accessible amenities, including green spaces, within walking distance of residents (Honey-Rosés et al., 2020; Moreno et al., 2021).

Overall, the pandemic elevated urban green spaces from “optional amenities” to “essential infrastructure” for resilient and healthy cities. They not only offered physical and psychological benefits but also emphasized the necessity of designing equitable and inclusive urban environments capable of withstanding future crises.

2.4. COVID-19 precautions in Türkiye

To mitigate COVID-19's impact and reduce the risk of infection, governments implemented a range of precautionary measures, including curfews, lockdowns, and restrictions on inter-city travel. Table 1 presents the precautions and curfews implemented in Türkiye during the first 18 months of the COVID-19 pandemic.

Table 1. COVID-19 precautions in Türkiye (Prepared by the authors)

	Precautions
11 March 2020	First coronavirus case in Türkiye
16 March 2020	Suspension of education in schools and universities
23 March 2020	Start of the distance education process at universities
3 April 2020	Suspension of all entries/exits by land, air, and sea to and from the 30 metropolitan cities and Zonguldak province for 15 days
3 April 2020	The declaration of a curfew for individuals aged 20 and under
11 April to 31 May 2020	The declaration of weekend curfews for the 30 metropolitan cities and Zonguldak province
1 June 2020	The commencement of the normalisation process
5 December 2020	The declaration of weekend curfews
29 April 2021	Lockdown for 17 days
June 2021	The commencement of the normalisation process
September 2021	Start of the hybrid education process at IKCU

Source: URL 3; Presidency Circular No. 2020/8; Ministry of Interior Circular No. 89780865-153, 89780865-153-E.6484

The primary measures aimed to reduce social interaction and limit the transmission of the virus, particularly among specific groups such as students and the elderly. Additionally, intercity travel restrictions, lockdowns, and curfews were also enforced.

3. METHODOLOGY

3.1. Study Area

Balatcik is the study area of the research. The neighbourhood is located in the northern region of Izmir between urban and rural transition areas. The population is 18.254 in 2024 (URL 4). The population primarily consists of university students due to the neighbourhood's proximity to the university. Even for those students who do not reside in Balatcik, the neighbourhood plays a crucial role in their daily lives. It is the closest area to the university where students can engage in social activities, dine out, or meet friends. Balatcik hosts a variety of cafes, restaurants, and social spaces that cater to students' needs, making it a hub for student interaction and leisure.

3.2. Sample size

The survey sample consisted of 498 university students, selected to provide diverse insights into their lived experiences and perceptions. The relatively large sample size ensures adequate representation and enhances the reliability of the findings. Students from İzmir Katip Çelebi University were selected for the study because a significant number of them reside in Balatcik. Additionally, even if they do not live there, Balatcik is the closest area to the university for socialising making it a place that students frequently use. The research was conducted with ethical standards that were reviewed and approved by the university's research ethics committee (no.2021/20-11).

3.3. Data collection and analysis

Figure 1 explains the contextual framework of this research. While data regarding the perceived change is collected from surveys, the actual change is investigated in primary data from Cigli Municipality. The survey questions and statistical analyses are designed to examine three key aspects of change in the built environment: housing, local economy, and urban green spaces. Based on these, the main research question is how the changes in housing, local economy, and urban green spaces are perceived in the post-COVID period and whether these perceptions align with actual changes. Data were collected through a structured survey using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to measure respondents' agreement with various statements under each category. The survey included four questions for the local economy, four for housing stock, and three for green spaces, ensuring comprehensive coverage of each dimension. Descriptive statistics, including mean (M), standard deviation (SD), and standard error (SE), were calculated for each item to analyse response patterns and provide reliable population estimates.

The mean scores reflected the central tendencies of students' perceptions, while standard deviations measured variability across responses. Standard errors ensured precision in estimating the population mean. The results were interpreted in the context of urban changes following COVID-19, offering insights into how students perceive shifts in their immediate environments. This approach provides a structured framework for understanding neighbourhood dynamics post-pandemic and identifying areas of improvement or concern.

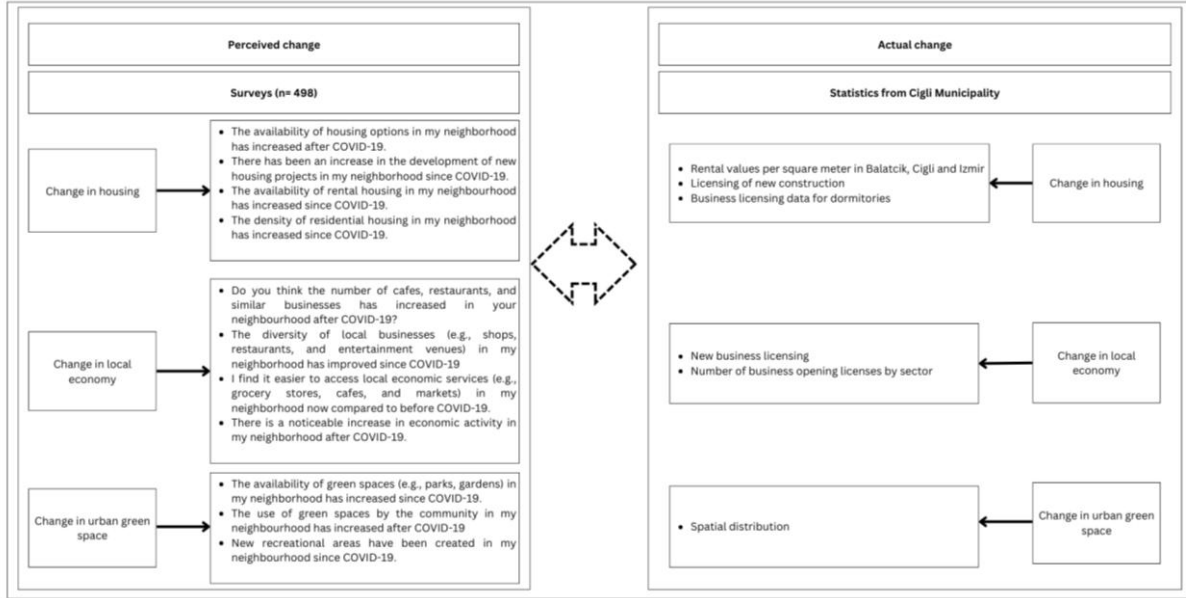


Figure 1. Contextual framework

4. RESULTS

4.1. Descriptive statistics

The sample of 498 students reflects a balanced gender distribution, with 45.78% females ($n = 228$) and 54.22% males ($n = 270$). In terms of housing affordability, the majority of students (60.64%, $n = 302$) pay rent within the range of 0-1500 TL, while the remaining 39.36% ($n = 196$) reside in accommodations with higher rent. Living arrangements show diversity, with 35.34% ($n = 176$) residing in dormitories, followed by 27.11% ($n = 135$) sharing a house, 20.68% ($n = 103$) living with families, and 16.87% ($n = 84$) in aparthotel (Table 2). Most students (62.85%, $n = 313$) have lived in their current residence for 0-4 years, while 37.15% ($n = 185$) are longer-term residents of over 4 years. Notably, 63.25% ($n = 315$) of the students live in Balatcik, emphasising its role as a primary residential area for İzmir Katip Çelebi University students, while the remaining 36.75% ($n = 183$), although not residing there, likely rely on Balatcik for socialising and other activities due to its proximity to the university.

4.2. Results of perceived and actual change in the built environment

Urban change is investigated under three main categories; housing stock, local economy and urban green space. The housing and economic crises experienced by many countries during and after the COVID-19 pandemic highlight the vulnerabilities of urban systems. Additionally, the significance of urban green spaces became evident during lockdown periods. All of these built environment features are compared with both perceived and actual changes.

4.2.1. Change in housing

Perceived changes in housing were measured through four questions (Table 3). These questions aimed to capture students' perceptions regarding the availability of housing options, new developments, rental housing trends, and residential density in their neighbourhoods. The results provide insights into how students view the evolution of the housing market, particularly in the context of post-COVID-19 urban dynamics.

Table 2. Descriptive statistics of samples

		Count (n)	Percentage (%)
Gender	Females	228	45.78
	Males	270	54.22
Rent	0-1500 TL	302	60.64
	Above 1500 TL	196	39.36
Where to live	With families	103	20.68
	Aparthotel	84	16.87
	Dormitories	176	35.34
	Sharing a house	135	27.11
Length of residency	0-4 years	313	62.85
	above 4 years	185	37.15
Live in Balatcık	Yes	315	63.25
	No	183	36.75

Table 3. Perceived changes in housing

	Mean (M)	Standard Deviation (SD)	Standard Error (SE)
HOUSING STOCK	3.52	1.11	.05
The availability of housing options in my neighbourhood has increased after COVID-19.	3.55	1.10	.05
There has been an increase in the development of new housing projects in my neighbourhood since COVID-19.	3.50	1.12	.05
The availability of rental housing in my neighbourhood has increased since COVID-19.	3.48	1.11	.05
The density of residential housing in my neighbourhood has increased since COVID-19.	3.55	1.13	.05

The data highlights students' perceptions of changes in the housing stock within their neighbourhoods after COVID-19, with an overall mean score of 3.52, indicating mild agreement. The highest agreement was observed for the statements "*The availability of housing options has increased*" and "*The density of residential housing has increased*" (both $M = 3.55$, $SD = 1.10$ and 1.13 , respectively), suggesting students perceive moderate improvements in these areas. The statement regarding new housing development projects received a slightly lower mean score ($M = 3.50$, $SD = 1.12$), while the availability of rental housing had the lowest agreement ($M = 3.48$, $SD = 1.11$). Standard deviations across all items indicate moderate variability in responses, while the standard error of 0.05 suggests reliable estimates of the population mean. These findings suggest students perceive some positive changes in housing stock, particularly in overall availability and density, though perceptions of rental housing availability and new developments are slightly less favourable.

The actual changes in housing affordability and availability for students and residents are investigated through primary data and statistics. The actual change in housing stock is examined under three key aspects: rental housing prices, the licensing of new construction, and the availability of private dormitories. The perceived change in housing focuses on assessing rental

housing prices (Figure 2) and accommodation capacity, particularly through private dormitory options.

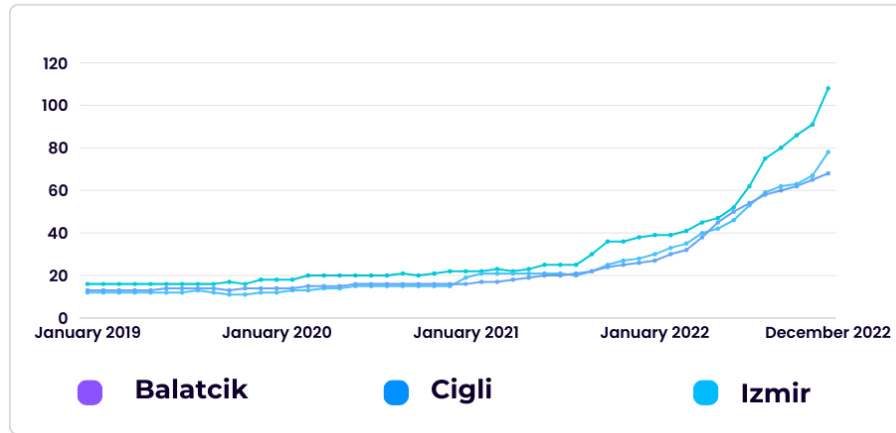


Figure 2. Rental values per square meter in Balatcik, Cigli and Izmir (Prepared by the authors using the data from Çiğli Municipality)

Figure 2 illustrates the rental values per square meter for Balatcik, Cigli, and Izmir over the period from January 2019 to December 2022. As seen in the graph, Balatcik consistently has higher rental values per square meter compared to its overall district (Cigli) and the broader city (Izmir). This trend highlights Balatcik's sustained attractiveness throughout the observed timeframe. Notably, the period spanning the second half of 2021 and 2022 marks a significant increase in the price difference, which overlaps with the removal of COVID-19 restrictions and the resumption of face-to-face education. These events may have contributed to the widening gap in rental values during this phase.

The construction history of the neighbourhood, based on licensing data provided by Cigli Municipality, is presented in Figure 3. The data indicate a significant acceleration in construction activity during 2017 and 2018. However, the overall construction trends remained relatively stable in the periods immediately before and after the COVID-19 pandemic period. Despite this, the increased volume of construction within the neighbourhood over time creates the impression of a continual rise in development activity.

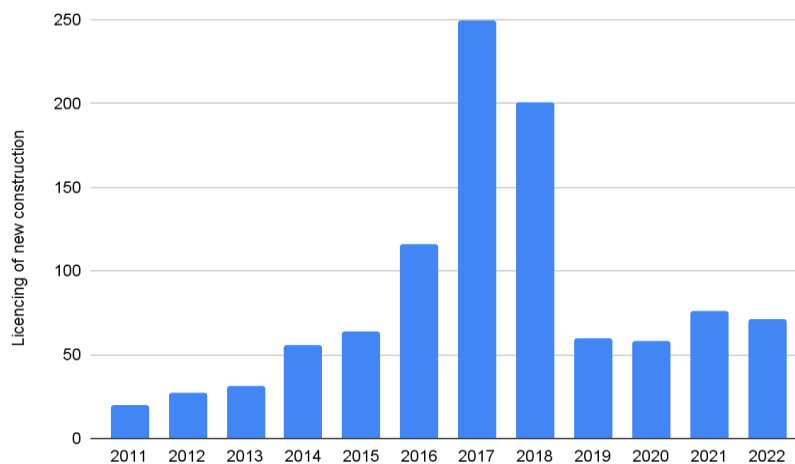


Figure 3. Licensing of new construction in Balatcik (Prepared by the authors using the data from Çiğli Municipality)

According to business licensing data obtained from Cigli Municipality, two private dormitories were operational in 2020; however, one of these facilities had its license revoked in April 2020. In 2021, two private dormitories remained active, and this number increased to three in 2022.

4.2.2. Changes in local economy

Perceived changes in the local economy were measured through four questions (Table 4). These questions focused on students' perceptions of changes in economic activity, the diversity of local businesses, the availability of services, and the growth of establishments such as, cafes and restaurants in their neighbourhoods. The findings shed light on how students perceive the economic transformations in their communities following the COVID-19 pandemic.

Table 4. Perceived changes in the local economy

	Mean (M)	Standard Deviation (SD)	Standard Error (SE)
LOCAL ECONOMY	3.83	1.17	.05
Do you think the number of cafes, restaurants, and similar businesses has increased in your neighbourhood after COVID-19?	3.85	1.10	.05
The diversity of local businesses (e.g., shops, restaurants, and entertainment venues) in my neighbourhood has improved since COVID-19.	3.75	1.15	.06
I find it easier to access local economic services (e.g., grocery stores, cafes, and markets) in my neighbourhood now compared to before COVID-19.	3.80	1.20	.05
There is a noticeable increase in economic activity in my neighbourhood after COVID-19.	3.92	1.25	.06

The evaluation of students' perceptions toward the local economy in their neighbourhoods after COVID-19 reveals generally positive views, with an overall mean score of 3.83 on a 5-point Likert scale. Among the four items, the highest agreement was observed for the statement *"There is a noticeable increase in economic activity in my neighbourhood after COVID-19"* (M = 3.92, SD = 1.25), while the lowest agreement was for *"The diversity of local businesses in my neighbourhood has improved since COVID-19"* (M = 3.78, SD = 1.15). The standard deviations ranged from SD = 1.10 to SD = 1.25, indicating moderate variability in responses, with the lowest variability for the perceived increase in cafes and restaurants and the highest for overall economic activity. Standard errors ranged from 0.05 to 0.06, suggesting a reliable estimate of the population mean. These findings suggest that students perceive notable improvements in their local economy, particularly in terms of increased economic activity and accessibility to services, although opinions vary slightly regarding the diversity of businesses.

The actual change in the local economy has been investigated through the dynamics of new business licensing in the Balatcik neighbourhood, focusing on the number of new licenses and their respective sectors (Figure 4 and Table 5).

New business licensing is closely tied to changes in the local economy. Figure 4 depicts the issuance of new business licenses in Balatcik from 2007 to 2022. The data reveal that 2014 and 2018 were peak years with the highest number of new licenses. However, a notable decline was observed in 2020, coinciding with the onset of the COVID-19 pandemic and associated restrictions. Food-related businesses were particularly affected by curfews, while student-oriented businesses experienced significant impacts due to the temporary relocation of students and the transition to distance learning.

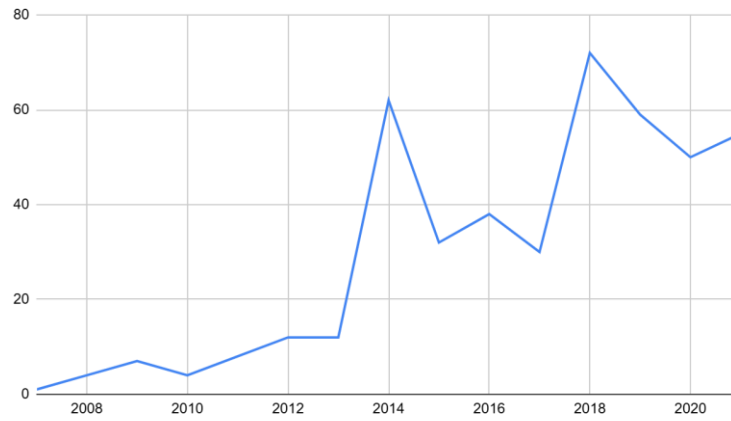


Figure 4. New business licensing in Balatcik by year (Prepared by the authors using the data from Çiğli Municipality License and Inspection Directorate)

Table 5. Number of business opening licenses by sector (Prepared by the authors using the data from Çiğli Municipality)

	2019	2020	2021	2022
Food & beverages	13	17	18	16
Grocery shops	8	11	11	12
Tourism & hospitality	2	2	3	3
Personal care services	0	4	5	5
Entertainment centres	0	1	0	2
Real estate services	0	1	4	2
Others	21	8	12	28

Table 5 provides insights into the trends in the issuance of business opening licenses across various sectors from 2019 to 2022. The key focus is how the local economy has been impacted by the COVID-19 period. The food & beverages sector had a steady growth from 2019 to 2021, peaking at 18 licenses in 2021. It overlaps with the transition to hybrid education. A slight decline in 2022, however, might be linked to two factors; either market saturation or economic adjustments post-pandemic period. Grocery shops have consistent growth throughout the period during and after the COVID-19 pandemic. This might be linked to the restrictions and lockdowns. Tourism & hospitality, personal care services, entertainment centres and real estate services increased over time. It is noteworthy that this neighbourhood has hosted university students since 2011, with its services being largely student-oriented. Following the transition to hybrid education, the return of students to their accommodations led to a sudden population influx, which likely impacted the growth in these service sectors.

4.2.3. Changes in urban green space

Perceived changes in green spaces were measured through three questions (Table 6). These questions explored students' perceptions of the availability of green spaces such as parks and gardens, the community's use of these spaces, and the creation of new recreational areas in their

neighbourhoods. The results provide an understanding of how students view the development and utilisation of green spaces in the post-COVID-19 urban landscape.

Table 6. Perceived changes in urban green space

	Mean (M)	Standard Deviation (SD)	Standard Error (SE)
URBAN GREEN SPACE	2.46	1.15	.51
The availability of green spaces (e.g., parks, and gardens) in my neighbourhood has increased since COVID-19.	2.50	1.12	.05
The use of green spaces by the community in my neighbourhood has increased after COVID-19	2.40	1.14	.05
New recreational areas have been created in my neighbourhood since COVID-19.	2.48	1.19	.05

The data evaluates students' perceptions of changes in green spaces in their neighbourhoods after COVID-19, with an overall mean score of $M = 2.46$, indicating low to moderate agreement. The statement *"The availability of green spaces (e.g., parks, gardens) in my neighbourhood has increased since COVID-19"* received the highest mean score ($M = 2.50$, $SD = 1.12$), suggesting slightly more agreement compared to other statements. The lowest agreement was observed for *"The use of green spaces by the community in my neighbourhood has increased after COVID-19"* ($M = 2.40$, $SD = 1.14$). The statement *"New recreational areas have been created in my neighbourhood since COVID-19"* had a mean score of $M = 2.48$, $SD = 1.19$, reflecting moderate agreement but with slightly higher variability.

The standard deviations, ranging from $SD = 1.12$ to $SD = 1.19$, indicate moderate variability in responses, suggesting differing experiences or perceptions among students. The standard errors, consistently $SE = 0.05$, provide reliable estimates of the population means. These findings suggest that while students generally perceive limited improvements in green spaces, there is some recognition of increased availability and the creation of new recreational areas, though the community's use of these spaces appears to have seen the least improvement.

The actual change in green space is investigated with spatial distribution in the neighbourhood (Table 7). The perceived change in green space seeks to evaluate how the actual changes in green space metrics align with the perceived characteristics of green spaces in the post-pandemic context.

Table 7 presents the percentage and urban facilities (m^2 per person) in the study area. The data indicate that as of 2019—before the onset of the COVID-19 pandemic—undeveloped land constituted the largest proportion of the spatial distribution. The presence of agricultural areas further reflects the ongoing development process within the neighbourhood, signalling a transitional phase in its urbanisation.

When comparing the actual urban facilities to the minimum standards outlined in Annex-2 of the Spatial Plans Construction Regulation (No. 29030), it is evident that the provision of education facilities significantly exceeds the established requirements. However, this assessment is based on aggregated data for all education facilities (kindergarten, elementary school, middle school and high school), which may compromise the precision of the comparison. In contrast, the availability of parks and green spaces falls substantially short, amounting to approximately one-fourth of the mandated standards. Specifically, the current provision is $2.42 m^2$ per person, whereas the regulation stipulates a minimum of $10 m^2$ per person.

Table 7. Spatial distribution in 2019 (Prepared by the authors using the data from Çiğli Municipality)

Area	Percentage (%)	Urban Facilities (m ² per person)	Min standards (m ² per person)
Residential and Commercial Area	21.24	45.15	N/A
Non-Residential Urban Study Area	4.49	9.55	N/A
Tourism Facilities	0.02	0.04	N/A
Educational Facilities	18.45	39.22	Kindergarten 0.50
			Elementary 1.50
			Middle School 1.50
			High School 1.75
Healthcare Facilities	0.11	0.23	1.50
Worship Facilities	0.25	0.53	0.50
Social & Cultural Facilities	0.61	1.30	0.50
Park/Green Space	1.14	2.42	10.00
Agricultural Areas	3.8	8.08	N/A
Transportation- Infrastructure	24.23	51.51	0.50 (Road and parking excluded)
Undeveloped Area	25.66	54.55	N/A

Between 2020 and 2022, a total of four parks, covering an area of 7,400 m², were designed in Balatçık (Table 8). In 2020 and 2022, two parks were constructed in different locations within the neighbourhood. However, in 2021, three parks were renovated, and no new parks were designed in the area (URL 5; URL 6; URL7).

Table 8. Newly built urban green space (Prepared by the authors using the data from Çiğli Municipality)

	2020	2021	2022
Nihat Gürer Park	2500m ²		
Ceren Özdemir Park	2500m ²		
8790/k Street Park		Renewed	
Şair Ahmet Arif Park		Renewed	
Green Space Next to Balatçık Muhtar's Office		Renewed	
Huriye Namık İrktaş Parkı-8914 Street			400m ²
Sınav Koleji Arkası-8903 Street			2000m ²

5. DISCUSSION AND CONCLUSION

The analysis of perceived and actual changes in housing, the local economy, and urban green spaces during the post-COVID-19 period reveals both alignments and discrepancies. In the analysis of perceived and actual changes in housing, students perceived an increase in housing

options, new developments, and residential density. However, while rental values rose significantly post-pandemic, actual construction activity in the research area remained relatively stable, suggesting that perceptions of growth in housing stock may overestimate the reality. Similar to the findings of Wang (2022) and Ahsan & Sadak (2021), this research identified significant disruptions in housing markets during the initial stages of the pandemic. The fear of infection and lockdown restrictions led to a marked decline in property transactions, mirroring global patterns. The surge in market activity resulted in rising housing prices, making affordability a key concern.

The analysis of perceived and actual changes in the local economy shows that students reported improvements in economic activity and accessibility to services, likely reflecting the rebound effect as restrictions eased. However, actual data shows that the issuance of new business licenses declined sharply during the pandemic, with only gradual recovery in subsequent years, indicating a slower economic revival than perceived. Local economies experienced profound transformations during the pandemic, as evidenced by this study and corroborated by Fornaro and Wolf (2020) and Gungoraydinoglu et al. (2021). The fear of the virus, coupled with government-imposed curfews and restrictions, led to a contraction in economic activity, particularly in the service sectors.

The heightened importance of urban green spaces during the pandemic, as explored by Lopez et al. (2021) and Noël et al. (2021), was evident in this research's findings. Both perceived and actual changes highlight limited progress. Students reported low agreement on improvements in green spaces, and actual data confirms that green space availability remains far below regulatory standards, despite some new parks being constructed. Despite efforts to expand green spaces, including the construction and renovation of parks in 2020-2022, the pandemic underscored the need for equitable access to green areas, particularly in urban neighbourhoods.

Overall, the findings not only align with existing literature but also contribute to the understanding of how local contexts shape the experience and outcomes of global crises. COVID-19, as one of the most devastating disasters in recent history, disrupted every facet of human life, leading to unprecedented public health emergencies, economic turmoil, and social isolation. Its widespread impacts highlighted the fragility of urban systems and the urgent need for strategies to mitigate future crises. This research highlights the importance of coordinated efforts to address vulnerabilities exposed by the pandemic and to build sustainable, adaptable, and inclusive urban environments for the future.

In light of the challenges identified in housing, local economies, and urban green spaces, several strategic directions can be proposed for enhancing urban resilience in the face of future crises:

Housing Strategies: Urban housing policies should prioritize affordability and flexibility all the time for resilience of the settlements. Strengthening rental support mechanisms by governments, particularly for students and low-income groups, is essential to prevent housing insecurity during future disruptions.

Local Economic Strategies: Encouraging mixed-use neighborhoods and fostering local supply chains can reduce dependence on global systems and strengthen local resilience. Financial support packages play significant role for rapid recovery; therefore, they should be designed by governments to ensure as assistance for small businesses during crises.

Green Space and Environmental Strategies: The pandemic highlighted the necessity of equitable and accessible urban green spaces. Investments in parks and multifunctional open spaces should ensure that all residents can access green amenities within walking distance, aligning with concepts such as the "15-minute city."

By embedding these strategies into urban planning and policy frameworks, cities can not only recover from the lessons of COVID-19 but also prepare more effectively for future pandemics and other large-scale disruptions. Strengthening the adaptability of housing, the resilience of local economies, and the inclusiveness of urban green infrastructure will be crucial in shaping healthier, more sustainable, and crisis-ready urban environments.

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