



# COVID-19 outbreak and housing use: the case of Samsun

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## Abstract

The research aims to configure how the COVID-19 epidemic impacts housing satisfaction, determine the changes in current conditions, evaluate the analysis findings, and offer housing design solutions. The evaluation and analysis of 157 participants regarding their homes in Samsun during the epidemic period were discussed. The conclusions were assigned to the computer habitat using a statistical program, and the results were analyzed with basic and cross-table queries. In general, 59.2% of the participants were satisfied with the residences, 21.0% were neutral, and 19.7% were unsatisfied. According to the findings, there were significant differences in some variables (household communication, communication with neighbors, desired house, changes in the places in the house, transportation to the city center, etc.) according to demographic characteristics. With the epidemic, housing has become much more critical regarding both an opportunity and a threat environment regarding human health, needs, and expectations. In conclusion, it has been revealed that a building design process for the protection of health should be considered, and a strategy within the extent of healthful housing should be exhibited in housing design.

**Keywords** COVID-19 · Housing · Housing satisfaction · Housing use · User satisfaction

## Introduction

Throughout human history, it has been exposed to many epidemic diseases such as plague (Athens), smallpox (America), yellow fever (Haiti), rinderpest virus (Africa), Spanish Flu, Sars, Swine Flu, Mers and Ebola (Okumuş 2021). These epidemics caused the deaths of healthy individuals by completely disrupting their daily living conditions (Kuzey 2021). They spread over a wide geographical area

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and caused mass deaths (Koçyiğit and Aktaş 2020). Epidemics spread quickly all over the world, negatively affecting people in different regions (Buçukoğlu and Sönmez 2020) and bringing some social and economic changes (Bulgurcuoğlu and Kelebek Küçükarslan 2021).

In approximately thirty years, epidemics have increased and multiplied more than average. The last known epidemic disease caused by the coronavirus was named the COVID-19 epidemic (Elkoca et al. 2020). This epidemic in China (Wuhan Province) was on the world's agenda for the first time in December 2019. The disease, which seriously harms human health, has also affected other areas, such as the economy and transportation, as well as overall development (Avogo et al. 2022). The COVID-19 epidemic spread rapidly to other countries in the process, following Thailand, Japan, and South Korea (Doğan 2020) due to globalization that caused human mobility created by free market conditions (Bulgurcuoğlu and Kelebek Küçükarslan 2021). Following the quick spread of the virus all over the globe and the unbeatable reach of the infection, it was declared a global epidemic disease on March 11, 2020, by the World Health Organization (WHO) (Altun 2021). In Turkey, the first case was seen when the disease was declared a pandemic (Koçyiğit and Aktaş 2020). This epidemic, which created a worldwide crisis, upended all known normals in daily life (Das and Ramalingam 2022). It made itself felt with all its weight in every sense and dimension, such as social and cultural and showed that humanity is facing a tremendous crisis at the global level (Okumuş 2021). The concept of "social distance" was developed by the American sociologist Bogardus in 1933 and used as "the state of the proximity of an individual's bond with others, the state of being determined by a square meter distance" (Canatan 2020), was used as "an element of precaution, a measure of personal protection that means equal for all" during the COVID-19 pandemic period (Özşenler 2021). Thus, despite the contagious tendency of COVID-19, the interaction between people has been tried to be minimized (Kuzey 2021).

Since WHO declared the coronavirus disease an "epidemic," many governments have resorted to restrictive measures with school closures and quarantine practices (Amerio et al. 2020). Unprecedented curfews have been imposed for people to stay home to limit the epidemic's spread (Mericle et al. 2020; Power et al. 2020). In expansion, the governments invited people to self-quarantine to control the epidemic's spread (Nadeem et al. 2020). However, what happened at the global level found its place in Turkey as well, and as of March 21, 2020, various measures and restrictions were introduced by the relevant ministry on the use of public space (Sağsöz et al. 2021). Restraint measures have propelled many individuals to acclimate to more extended periods of indoor actions, restricted space mobility, and broad deterrence efforts for social distancing (Cheshmehzangi 2020). With the adaptation process to the new situation, a lifestyle has emerged in which the time spent at home increases and moves as schooling and profession are taken out inside the home (Altun 2021). With this, technological opportunities have increased following the age requirements due to reasons such as working at home and online learning (Amerio et al. 2020; Cheshmehzangi 2020). As a result, residences have become where people

rest, dine, perform, practice, and associate. For this reason, closed housing conditions started to play a much more critical role in ordinary life concerning public health and fulfillment.

The essentials of habitats and their marks on human health are broadly investigated in scientific examination. Determining how the living conditions were shaped in the houses during the COVID-19 epidemic, which impacted the entire globe for a temporary duration and caused intense differences in residency requirements, drives it essential to indicate new investigation. Although satisfaction with housing is a research topic, it was necessary to look at the issue from a different perspective during the epidemic. In doing so, investigators and decision-makers should create forethought for an explanation. This study analyzes how COVID-19 influenced the existing housing requirements and fulfillment. In this context, the epidemic's effect will be indisputable in forthcoming housing strategies. The matter is worth exploring in this regard, and it was intended that this study would contribute to the answers and resolutions that will arise on the topic. In doing so, the study aimed to analyze the current housing conditions, evaluate the findings, determine how the epidemic affects housing satisfaction, and present future solutions for housing within the pandemic process and through the set criteria.

## Method

This study employed a comprehensive research methodology involving a structured survey and interview processes to gather and analyze data. The survey instrument, meticulously designed to capture relevant insights, was developed by thoroughly reviewing existing literature on the subject and prepared by the author. In order to enhance the questionnaire's reliability and validity, a pilot study was conducted before the primary data collection phase, leading to necessary refinements in the survey instrument. The principal data collection activities took place in the city of Samsun, Turkey, a prominent urban center situated strategically between the Kızılırmak and Yeşilirmak deltas. Samsun is the largest city in the Central Black Sea region of Turkey (Beden et al. 2018), covering an area of 9.083 km<sup>2</sup>, and it holds significant importance in the trade dynamics of the Black Sea region (Serbestoğlu 2015; Bodur 2019). As of 2021, it boasted the highest population density in the region, with a population of 1,371,274 (Turkstat 2021).

The scope of this investigation consists of the interviews with the households determined by the random sampling method in the province of Samsun and the findings obtained from these discussions. The study deals with the evaluations and analyses of 157 participants, considering aspects such as physical and social in the dwellings during the epidemic. Regarding the district of residence, the participants' distribution across various areas in Samsun is as follows: The majority of the cohort resides in the Atakum district, comprising 62 individuals, accounting for 39.5% of the total sample. The İlkadım district closely follows, with 57 participants, representing 36.3%. Furthermore, the Canik district is represented by 17 participants, constituting 10.8% of the total. Minor proportions are observed in Bafra (7 participants, 4.5%), Çarşamba (7 participants, 4.5%), Vezirköprü (4 participants, 2.5%),

Terme (2 participants, 1.3%), and Dikbıyık (1 participant, 0.6%) districts. The distribution of participants in the city is illustrated in Fig. 1.

The survey instrument comprised a comprehensive set of 27 questions. These questions encompassed inquiries about participants' neighborhoods, the nature and duration of their residency, and extensive demographic information, including age, gender, academic qualifications, and marital status. Additionally, 14 questions delved into the intricacies of participants' household dynamics, interactions with relatives, friends, and neighbors, transportation, evaluations of their current residences, and any modifications undertaken during the pandemic. To assess and analyze user satisfaction across various dimensions, including communication, transportation, and overall residential satisfaction, a 3-point Likert scale was employed. This scale provided participants with three distinct response options: (1) Improved, (2) Unchanged, and (3) Worsened. The selection of the Likert scale for this study was guided by its well-established utility in capturing nuanced responses and facilitating quantitative analysis. This structured yet adaptable format enabled participants to articulate their sentiments and perceptions effectively, rendering it a suitable instrument for investigating diverse residential experiences during the pandemic. The survey also incorporated open-ended questions meticulously designed to elicit qualitative insights from participants concerning the modifications made within their residences—a team of students specializing in architecture and interior design administered of survey questions and the subsequent field analysis. Given the exceptional circumstances precipitated by the pandemic, participants responded via phone interviews or email correspondence. The collected data were processed using the statistical software package SPSS (Statistical Package for the Social Sciences) and analyzed utilizing descriptive statistics, chi-square tests, and correlation analysis. Finally, the result of the determinations, outcomes of the study, and suggestions for the future were put forward.

## Findings

### Demographic profile of participants

In this section, there are demographic characteristics and evaluations of the participants. Table 1. displays the demographic attributes of the participants.

Age distribution among participants reveals the highest percentage in the 18–25 age bracket (31.2%), followed by 26–35 (23.6%), 36–45 (19.1%), 46–55 (14.0%), 56–65 (7.0%), and a smaller percentage aged 66 or above (3.2%). The gender distribution of participants indicates a nearly balanced representation, with 46.5% being male and 53.5% female. In terms of education, participants exhibit a range of educational backgrounds, with 66.9% holding a university degree or higher, 19.7% being high school graduates, and 13.4% completing primary-secondary education. Marital status varies among participants, with 47.1% being married, 51% single, and a minor proportion choosing not to disclose their marital status (1.9%). Regarding housing types, a significant majority of participants (92.4%) live in apartments, with a smaller proportion dwelling in detached houses (7.0%) and

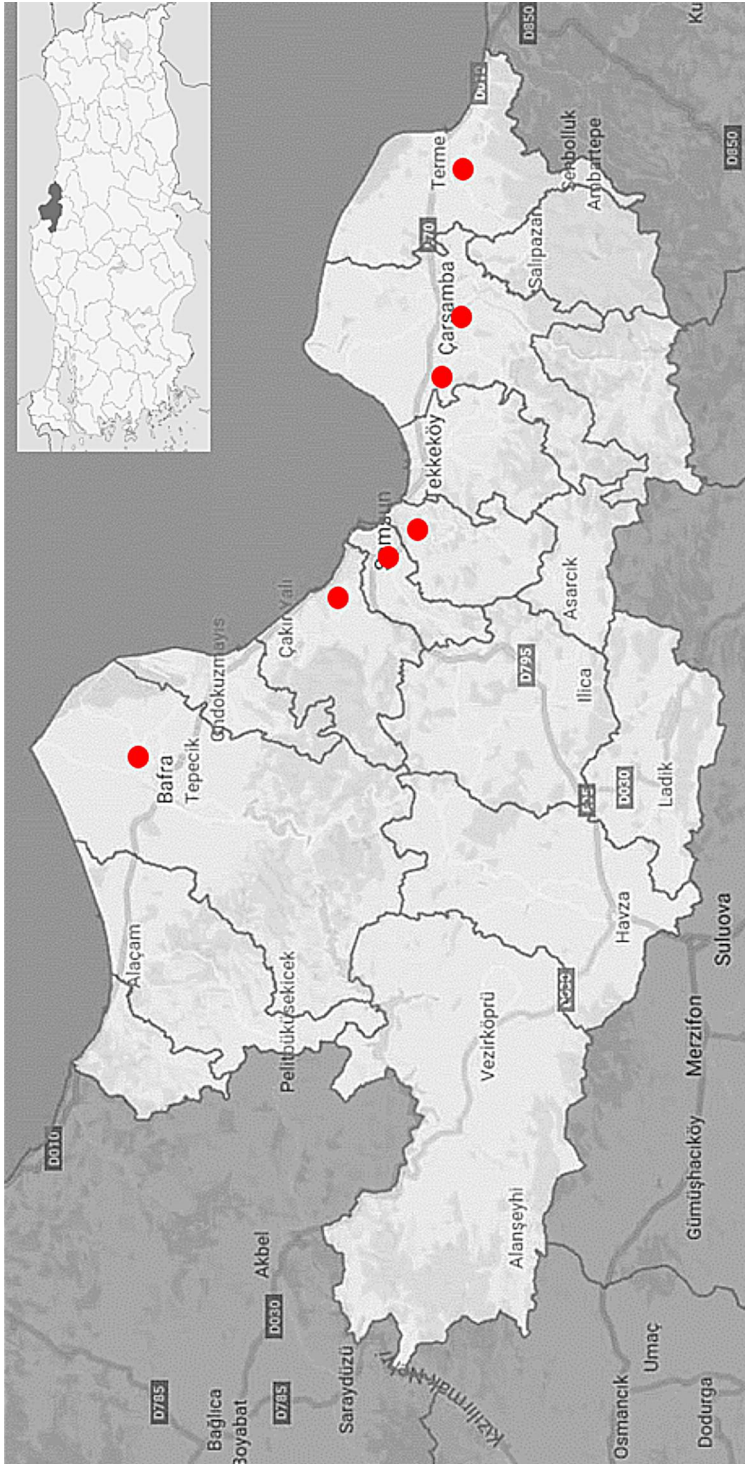


Fig. 1 Distribution of participants across districts

**Table 1** Participant demographic characteristics

Demographic characteristic	Categories	Number in sample	Percentage in sample (%)
Housing type	Apartment	145	92.4
	Villa	1	0.6
	Detached house	11	7
Age	18–25	49	31.2
	26–35	37	23.6
	36–45	30	19.1
	46–55	22	14.0
	56–65	11	7.0
	66– above	5	3.2
	No answer	3	1.9
Gender	Male	73	46.5
	Female	84	53.5
Level of education	Primary–Secondary	21	13.4
	High school	31	19.7
	University and above	105	66.9
Marital status	Married	74	47.1
	Single	80	51
	No answer	3	1.9
Home ownership	Yes	113	72
	No	41	26.1
	No answer	3	1.9
Work status	Unemployed	13	8.3
	Housewife	21	13.4
	Public	24	15.3
	Retired	13	8.3
	Student	50	31.7
	Worker	15	9.6
	Employer	21	13.4
Number of persons	One person	10	6.4
	Two person	28	17.8
	More than two	118	75.2
	No answer	1	0.6
Number of employees	One person	31	19.7
	Two and more	122	77.8
	No answer	4	2.5
Monthly income <sup>a</sup>	3000 TL and below	28	17.8
	3001–5000 TL	44	28.1
	5001–7000 TL	25	15.9
	7001–9000 TL	17	10.8
	9001 TL and above	22	14
	No answer	21	13.4

<sup>a</sup>At the time of the survey, 1\$ = 15,74 TL

a lone participant opting for a villa (0.6%). Homeownership status reveals that most participants own their homes (72%), while 26.1% do not own their homes, and 1.9% did not provide this information. Participants' employment statuses are diverse, encompassing students (31.8%), public employees (15.3%), employers (13.4%), workers (9.6%), housewives (13.4%), unemployed individuals (8.3%), and retirees (8.3%). Household size varies, with 75.2% of participants living with more than two individuals, 17.8% with two people, and 6.4% with one person. One participant did not provide information in this regard. Concerning the number of income earners within households, the majority (77.8%) have two or more income earners, while 19.7% have a single income earner, and 2.5% did not disclose this information. Monthly income distribution is as follows: 28.1% earn between 3001 TL and 5000 TL, 17.8% earn 3000 TL or less, 15.9% earn between 5001 TL and 7000 TL, 10.8% earn between 7001 TL and 9000 TL, 14% earn 9001 TL and above, and 13.4% chose not to disclose their monthly income.

### Social relationships and interactions

Figure 2 shows the evaluations of the participants regarding their social relationships. In the context of household relationships, 71 respondents (representing 45.2% of the total) evaluated their social connections as "Better." In comparison, 68 respondents (equivalent to 43.3%) reported a neutral assessment and 18 respondents (comprising 11.5%) expressed an opposing viewpoint categorized as "Worse." Regarding interactions with relatives and friends, 26 participants (constituting 16.6%) perceived their relationships as "Better," while 73 participants (46.4%) maintained a neutral perspective, and 58 participants (37.0%) characterized their interactions as "Worse." In assessing interactions with neighbors, 17 participants (accounting for 10.8%) considered their relationships "Better." In comparison, 93 participants (59.2%) expressed a neutral standpoint, and 44 participants (28.0%) categorized their interactions as "Worse." notably, 3 participants (constituting 1.9%) did not respond to this question.

Considering the frequency of meetings with neighbors (Fig. 3), 70 participants, constituting 44.6% of the total, indicated that they never engaged with their neighbors. Conversely, 51 participants (32.5%) reported rare encounters, while 19

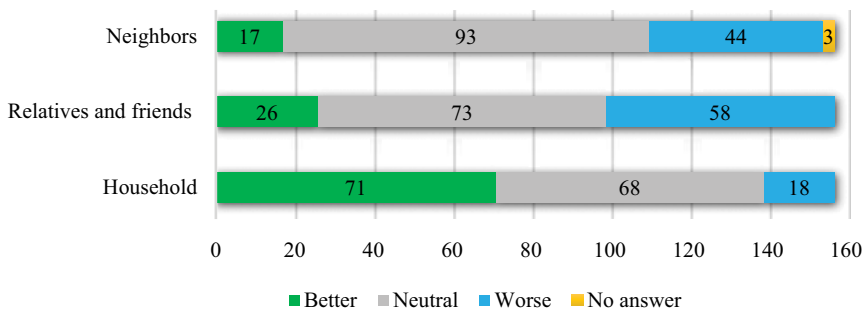
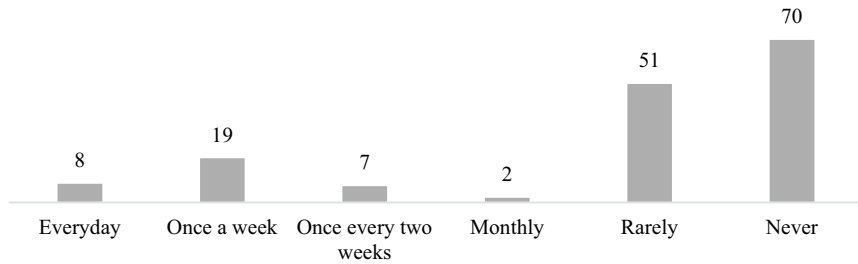


Fig. 2 Participant social relationships assessment



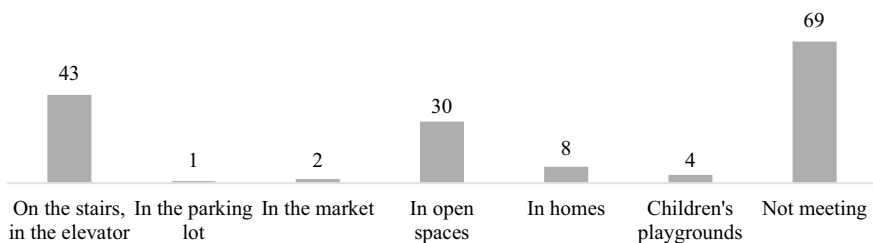
**Fig. 3** Frequency of meeting with neighbors

participants (12.1%) communicated with their neighbors once a week. A smaller percentage of 7 participants (4.5%) engaged once every two weeks, and 2 (1.3%) had monthly interactions. Interestingly, 8 participants (5.1%) reported conversing with their neighbors daily. When queried about encountering problems with their neighbors, 9 participants (5.7%) acknowledged facing problems, while 147 respondents (93.6%) reported having no such issues. One participant (0.6%) did not respond to this query.

Considering the answers to the places where neighbors were interviewed (Fig. 4), a significant portion, accounting for 43.9% (69 respondents), mentioned not meeting their neighbors. Among those who engaged in neighborly interactions, the distribution of locations was as follows: 27.4% (43 respondents) reported interactions on common areas like stairs or in elevators, 19.1% (30 respondents) communicated in open outdoor spaces, 5.1% (8 respondents) had interactions within their own homes, 2.5% (4 respondents) indicated children's playgrounds as interaction spots, 1.3% (2 respondents) mentioned the local market, 0.6% (1 respondent) reported interactions in parking lots.

### Transportation and city center visits

Participants' modes of transportation to the city center were diverse. The majority, comprising 66.9% (105 respondents), reported using special vehicles for their commute. Additionally, 12.1% (19 respondents) indicated they did not go to the city center. Walking was a mode of transportation for 9.6% (15 respondents),



**Fig. 4** Locations interviewed with neighbors



followed by minibusses at 7.0% (11 respondents). A smaller portion, 1.3% (2 respondents) each, mentioned using bicycles and trams. Only 0.6% (1 respondent) reported using a taxi service. Notably, 1.3% (2 respondents) did not provide an answer regarding their mode of transportation (Fig. 5).

Participants' frequency of going to the city center varied significantly (Fig. 6). The majority, accounting for 56.1% (88 respondents), reported rarely visiting the city center. In contrast, 24.8% (39 respondents) never visited the city center. Some participants reported more frequent visits, with 12.1% (19 respondents) going several days a week and 6.4% (10 respondents) visiting daily. Additionally, 0.6% (1 respondent) did not provide an answer regarding their frequency of visits to the city center.

### Residential evaluation and preferences

Considering the suitability of the existing housing for taking the necessary actions during the pandemic period, the results revealed that most participants, precisely 107 individuals, representing 68.2% of the sample, perceived their residences as suitable. Conversely, 22 participants (14.0%) adopted a neutral standpoint; however, 28 (17.8%) appraised their housing as unsuitable (Fig. 7).

Participants' housing preferences during the pandemic exhibited diverse inclinations (Fig. 8). A minor segment, comprising a mere 3.2% of respondents, expressed contentment with apartment living. In contrast, a substantial majority of 52.2% displayed a propensity for two-story residences adorned with gardens. Furthermore, 38.2% of participants preferred single-story cottages, while 0.6% indicated

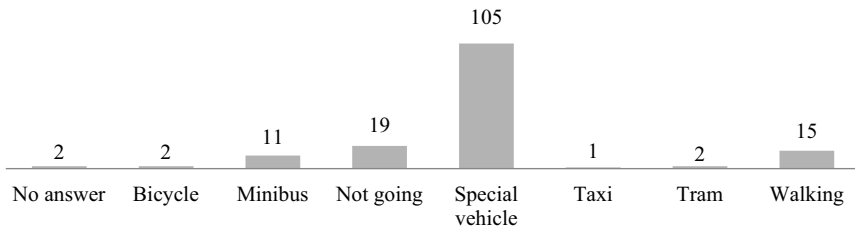


Fig. 5 Transportation to the city center

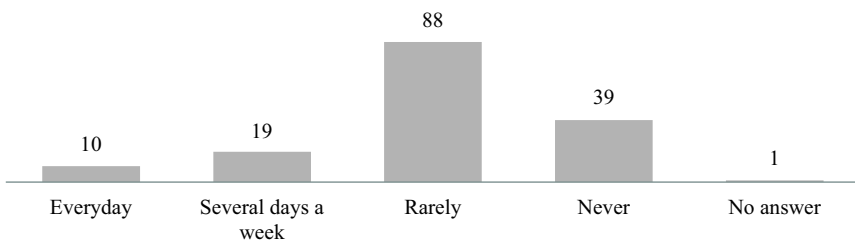
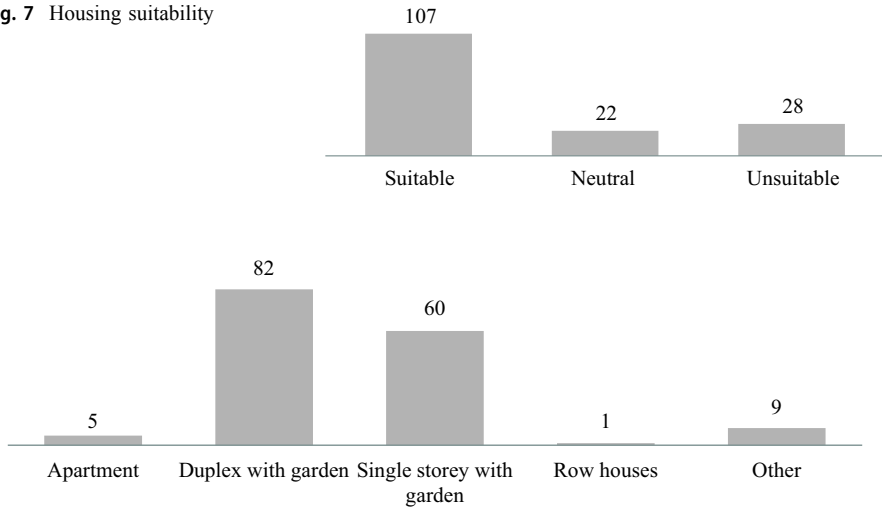


Fig. 6 Frequency of going to the city center

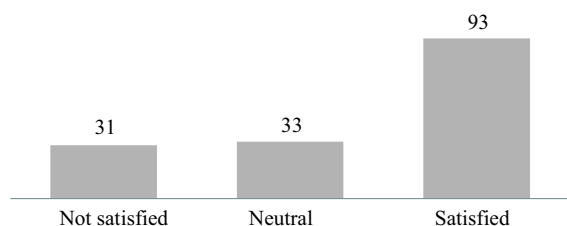
**Fig. 7** Housing suitability**Fig. 8** Desired housing preferences

a tendency for row houses. Beyond these primary inclinations, 5.7% of respondents articulated a desire for alternative housing types, including mansions, village houses, sylvan abodes, coastal chalets, or villas graced with pools, often emphasizing familial cohabitation.

The evaluation of 157 participants' overall satisfaction with their residences revealed diverse sentiments within the surveyed population. Notably, 93 individuals, constituting 59.2% of the participants, reported a sense of satisfaction, while 33 individuals (21.0%) adopted a neutral standpoint. Conversely, 31 participants (19.7%) expressed dissatisfaction with their residences (Fig. 9).

### Effects of the epidemic on indoor spaces

One of the most critical questions of the study was about the effect of the epidemic period on the spaces at home. In assessments on room utilization and furniture arrangements, most participants, totaling 51.6%, reported alterations in space utilization following their specific requirements. These individuals indicated that they reconfigured furniture placement and various rooms' functionality. Additionally,

**Fig. 9** Overall satisfaction

they expressed heightened attentiveness towards cleanliness and highlighted notable disparities, particularly in their approach to balcony utilization. They generally reported that they did not live in crowded conditions, and some took the opportunity to renovate certain areas of their homes. Those who spent more time at home took proactive steps to optimize their living spaces. This optimization often involved identifying and removing unused items, decluttering living areas, and refreshing various aspects of their surroundings. Participants mentioned rearranging household appliances, repurposing sofas for shared relaxation, painting doors and rooms, and repositioning tables, armchairs, flowers, and vases. In children's rooms, minor adjustments were made, particularly in the living room, where furniture layouts were altered. The driving factors behind these changes included a sense of boredom, a desire for simplified and efficient cleaning routines, and a preference for a more organized living environment. Participants engaged in work or study activities mentioned utilizing dining tables as working desks and some allocated space in their homes for sports equipment.

Participants in the study underscored the significance of adapting their living spaces to meet individual needs, primarily driven by the imperative of maintaining physical distancing within the household as a response to the ongoing pandemic. These adaptations were multifaceted and included the transformation of their living rooms into versatile areas. For many, the living room assumed dual roles as both a bedroom and a study area, particularly in light of children returning home from universities in other cities. Some also designated specific spaces for storing clothing worn outside the home or even created isolation rooms for family members affected by the virus. Furthermore, the reconfiguration of living spaces extended to allocating areas for physical activities and play, especially for children.

Regarding housekeeping practices, participants reported an increased frequency of cleaning, the removal of used carpets, elevated laundry temperatures, and enhanced ventilation in their living spaces. Significantly, participants highlighted the transformation of their balconies as a pivotal change during the pandemic period. Balconies emerged as essential spaces for addressing the need for outdoor activities while adhering to lockdown measures. Participants reported spending more time on their balconies, repurposing them into leisure areas. They adorned these spaces with various furnishings, including armchairs, tables, chairs, televisions, and ornamental flowers. Moreover, balconies became venues for dining and socializing, serving as inviting conversation spaces. To enhance comfort, some participants installed sunshades on their balconies, ensuring that these areas catered to their specific needs during a challenging period of restricted movement.

Several participants expressed diverse viewpoints and additional insights regarding their experiences during the pandemic. Those residing in houses with gardens particularly emphasized the advantages of their living arrangements. They emphasized the importance of open spaces and the therapeutic nature of parks during the pandemic. Some participants raised concerns about the perceived lack of seriousness in responding to the epidemic. They expressed a strong desire to return to pre-pandemic routines and normalcy.

Additionally, participants highlighted the importance of having residences oriented toward pleasant views. Challenges related to housing were also voiced.

Some participants felt that their homes needed to be sufficiently spacious to accommodate the demands of remote work and schooling. The balcony emerged as a vital element of their living spaces. Participants stressed the need for increased open spaces within homes, enabling them to engage in hobbies during the pandemic. Some found the period productive in terms of rearranging and renovating their homes. In terms of education, participants underscored the importance of continuing face-to-face learning. They observed that children, in particular, experienced profound boredom at home. For students, adapting to the new remote learning environment posed difficulties, with feelings of constraint and unmet needs being common sentiments during this period.

### Analysis through crosstab queries

A thorough analysis was undertaken, intertwining demographic attributes with specific inquiries via chi-square tests and cross-tabulated queries. As Kara (2011) emphasized, cross tables are fundamental tools in meticulously examining and comprehending correlations between two discrete variables within a dataset. These analytical constructs play a pivotal role in unraveling the intricate relationships between diverse demographic factors and responses to inquiries, thereby significantly deciphering the nuanced associations inherent in the dataset. As Sharpe (2015) indicated, employing chi-square tests within the framework of cross-tabulated analyses enables a robust exploration of these associations, fostering a comprehensive understanding of the dataset's intricacies by revealing statistically significant connections between demographic attributes and the posed questions. The results of these analyses are presented in Table 2.

The statistical analyses revealed a significant association ( $\chi^2 = 42.564, p = 0.038$ ) between district locations and preferred housing choices, as indicated in Table 2. However, no meaningful relationships were observed among other factors. Therefore, the pertinent dataset shows that district locations do not present a substantial difference concerning housing-related factors during the pandemic period. A significant relationship was identified between housing type and “household relationships” ( $\chi^2 = 20.010, p = 0.010$ ), “overall satisfaction” ( $\chi^2 = 20.689, p = 0.008$ ), and “modifications in residential spaces” ( $\chi^2 = 242.301, p < 0.001$ ). However, no significant relationships were found among other factors. Consequently, participant opinions concerning housing type do not generally exhibit substantial variations. There is no meaningful relationship between age and the majority of factors. However, significant associations were observed between age and factors such as “relations with relatives and friends” ( $\chi^2 = 41.601, p = 0.003$ ), “relations with neighbors” ( $\chi^2 = 43.371, p = 0.002$ ), “housing suitability” ( $\chi^2 = 32.948, p = 0.034$ ), and “modifications in residential spaces” ( $\chi^2 = 450.736, p = 0.040$ ). This situation indicates that, in general, there wasn't a definite relationship between the age variable and various factors. On the other hand, distinct from the studies conducted by Keller et al. (2022), Kocur-Bera (2022), and Ehmke et al. (2022), no statistically significant gender-related disparities were evident. Only the variable “relations with neighbors” ( $\chi^2 = 27.833, p = 0.001$ ) demonstrated noteworthy differences regarding educational level. Apart from “household

**Table 2** Pearson's chi-square test results for cross-classification

1: Value	Household relationships	Relations with relatives and friends	Relations with neighbors	Frequency of meeting with neighbors	Locations of interviewed with neighbors	Encountering problems with neighbors	Transportation to the city center	Frequency of going to the city center	Housing suitability	Desired housing preferences	Modifications in residential spaces	Overall satisfaction
2: df	28	28	28	35	42	14	49	21	28	28	574	28
3: Asymptotic significance (2-sided)	0.653	0.653	0.393	0.878	0.848	0.067	0.943	0.517	0.898	0.038	0.305	0.199
District of residence	1 35.834	24.537	29.393	25.569	32.682	22.622	34.401	20.064	18.992	42.564	590.766	34.063
Housing Type	1 20.010	8.174	13.048	14.825	13.445	0.884	2.624	3.720	10.547	3.434	242.341	20.689
Age	1 23.940	41.601	43.371	32.643	20.416	2.809	40.435	11.524	32.948	24.827	450.736	25.132
Gender	1 2.433	0.621	2.831	2.169	10.425	1.169	5.415	7.481	6.323	3.223	82.287	0.463
Level of education	1 9.623	13.503	27.833	8.829	7.929	1.249	13.750	6.145	8.687	13.242	175.567	9.479
Marital status	1 15.823	10.538	16.275	4.164	6.883	1.206	18.655	3.978	3.307	11.939	82.529	10.456
Home ownership	1 6.382	1.465	0.293	1.496	3.290	4.414	16.768	8.050	2.326	4.608	72.858	6.345
	2 8	8	8	10	12	4	14	6	8	8	164	8
	3 0.045	0.229	0.039	0.940	0.865	0.877	0.179	0.680	0.914	0.154	1.000	0.234
	2 4	4	4	5	6	2	7	3	4	4	80	4
	3 0.172	0.833	0.990	0.914	0.772	0.110	0.019	0.045	0.676	0.330	0.702	0.175

**Table 2** (continued)

1: Value	Household relationships	Relations with relatives and friends	Relations with neighbors	Frequency of meeting with neighbors	Locations interviewed with neighbors	Encountering problems with neighbors	Transportation to the city center	Frequency of going to the city center	Housing suitability	Desired housing preferences	Modifications in residential spaces	Overall satisfaction
2: df												
3: Asymptotic significance (2-sided)												
Work status	1 30.072 2 24	37.510 24	49.232 24	35.220 30	27.094 36	10.036 12	56.457 42	25.667 18	30.643 24	21.946 24	476.195 492	21.887 24
Number of persons	3 0.182 1 11.786 2 8	0.039 10.935 8	0.002 6.111 8	0.235 6.665 10	0.858 8.233 12	0.613 12.404 4	0.067 33.444 14	0.108 5.830 6	0.164 9.937 8	0.582 19.298 8	0.687 210.418 162	0.586 5.955 8
Number of Employees	3 0.161 1 12.485 2 12	0.205 15.012 12	0.635 9.493 12	0.757 15.034 15	0.767 21.467 18	0.015 8.164 6	0.002 25.116 21	0.442 9.228 9	0.270 36.296 12	0.013 11.711 12	0.006 228.038 246	0.652 21.209 12
Monthly Income	3 0.408 1 25.592 2 20	0.241 25.934 20	0.660 19.011 16	0.449 12.695 25	0.256 33.612 30	0.226 14.519 10	0.242 37.715 30	0.417 20.107 15	0.000 18.650 20	0.469 16.278 20	0.788 303.416 370	0.047 10.753 20
	3 0.180	0.168	0.268	0.980	0.297	0.151	0.157	0.168	0.545	0.699	0.995	0.952

relationships” ( $\chi^2 = 15.823$ ,  $p = 0.045$ ) and “relations with neighbors” ( $\chi^2 = 16.275$ ,  $p = 0.039$ ) factors, there were no significant relationships among other factors with marital status. Regarding homeownership, no substantial differences are observed among factors in general. However, “transportation to the city center” ( $\chi^2 = 16.768$ ,  $p = 0.019$ ) and “frequency of going to the city center” ( $\chi^2 = 8.050$ ,  $p = 0.045$ ) exhibit significant relationships. Thus, homeownership condition is not a decisive factor among variables. When exploring the relationship between work status and other variables, except for “relations with relatives and friends” ( $\chi^2 = 37.510$ ,  $p = 0.039$ ) and “relations with neighbors” ( $\chi^2 = 49.232$ ,  $p = 0.002$ ), no significant relationship was identified among the other factors. The “number of persons” variable shows substantial differences in “encountering problems with neighbors” ( $\chi^2 = 12.404$ ,  $p = 0.015$ ), “transportation to the city center” ( $\chi^2 = 33.444$ ,  $p = 0.002$ ), “desired housing preferences” ( $\chi^2 = 19.298$ ,  $p = 0.013$ ), and “modifications in residential spaces” ( $\chi^2 = 210.418$ ,  $p = 0.006$ ). However, no significant differences were found in other variables. Except for “housing suitability” ( $\chi^2 = 36.296$ ,  $p < 0.001$ ) and “overall satisfaction” ( $\chi^2 = 21.209$ ,  $p = 0.047$ ), there is no significant relationship in other variables when considering the “number of employees.” Interestingly, no meaningful relationship was observed between “monthly income” and all the other variables. In conclusion, while some variables exhibited significant associations in this analysis, others did not demonstrate substantial relationships, indicating the complexity and nuanced nature of the factors influencing housing preferences and related aspects among the studied demographics.

## Discussion

The onset of the COVID-19 pandemic reshaped our world in unprecedented ways, causing us to rethink fundamental aspects of our lives and society. As the global community grappled with the repercussions of the virus’s rapid spread, it became increasingly apparent that its impact extended far beyond healthcare. This profound disruption rippled through every facet of our existence, transforming how we interacted with one another and our concept of “home.” The pandemic set in motion a series of extraordinary events that reshaped daily routines and family life. Early in the pandemic, nations worldwide implemented stringent measures to curb the disease’s escalation, primarily preventing healthcare systems from becoming overwhelmed (Ak 2020). As the virus emerged in Turkey, the government enforced restrictions to mitigate the pandemic’s progression (Türkyılmaz 2020). These measures, as revealed by Döğ̈er and Kılınç (2021), induced substantial shifts in family life, impacting the daily rituals of parents and children, thereby affecting household living conditions. This study aimed to explore the profound impact of the pandemic on individuals’ living spaces, with a particular focus on how these spaces adapted to the challenges and demands imposed by the virus’s spread. The following paragraphs delved into the key findings of this research, shedding light on the changing dynamics of social relationships, the reconfiguration of domestic spaces, and the emerging trends in housing preferences.

Satisfaction with residential spaces varied based on quality criteria, encompassing physical interior characteristics, air quality, thermal comfort, lighting, and acoustics (Cheshmehzangi 2020). In this study, similar to the findings of Kocur-Bera (2022), several critical factors, including interior characteristics, air quality, and thermal comfort, significantly affected participants' satisfaction with their residential spaces. Participants who perceived their interior spaces as well-organized and aesthetically pleasing reported heightened happiness. As highlighted in Dong et al.'s study (2022), air quality gained prominence, with good ventilation and the absence of indoor pollutants contributing to higher satisfaction levels. As people spent more time indoors, maintaining clean and well-ventilated spaces became crucial.

Furthermore, thermal comfort, encompassing temperature and humidity control, was another critical factor. Participants who experienced efficient thermal comfort, ensuring warmth during the winter and cooling during the summer, reported increased satisfaction levels. This underscores the importance of implementing effective heating, cooling, and insulation systems within housing designs. In essence, akin to the findings in Navas-Martín et al.'s research (2022), residents' satisfaction with their residential spaces was closely tied to these factors, underscoring the need for adaptable and well-designed interior spaces, excellent air quality, and efficient thermal regulation systems in housing designs to enhance comfort during prolonged periods spent at home. These considerations will guide future housing planning and design, prioritizing the creation of resilient and comfortable living spaces.

The COVID-19 pandemic's profound impact extended beyond physical health, significantly reshaping social relationships and communication patterns. The importance of solid social bonds became increasingly evident during this crisis, and the pandemic's effects on interactions with family, friends, and neighbors were notable. Research has shown that strong social bonds enhance a sense of belonging and identity, ultimately improving one's commitment to society (Ammar et al. 2020). The pandemic necessitated significant changes in how people interacted with friends. Face-to-face socializing became limited due to social distancing measures. However, the internet and the virtual world have gained unprecedented significance. Okumuş (2021) mentioned the growing role of virtual interactions during the pandemic, facilitating continued friendships despite physical separation. Early in the pandemic, there was concern that prolonged periods of isolation and stress might erode family relationships. However, findings contrary to this expectation were observed. A study by Williamson (2020) suggested that family communication did not significantly decline during the pandemic's early stages. Individuals exhibited higher levels of forgiveness and increased interactions among family members. Okumuş (2021) reinforced this perspective by highlighting the strengthening of intra-familial communication throughout the pandemic. These studies collectively indicate that, in many cases, family bonds grew stronger during the pandemic.

On the other hand, a study by Erin and Çubukçu (2022) suggested that neighborly relations remained unchanged (Erin and Çubukçu 2022). Given these findings, it is evident that the pandemic's impact on social relations was not as



pronounced as initially expected. Today, with various alternative means for social communication, such as social media, social relations remain resilient, even in the face of the pandemic's challenges. However, in this study, nearly half of the participants indicated that they did not interact with their neighbors frequently, and very few reported problems with them. These issues mostly centered around privacy and noise. Some participants who sought fresh air and, by extension, used their balconies felt the need for more privacy from their neighbors. Noise complaints were associated with children's music, games, domestic quarrels, and the noise generated while cleaning balconies. These concerns underscore the imperative of incorporating considerations for acoustic comfort into future residential design endeavors, as notably underscored by Sağsöz et al. (2021). The findings from this study align with other research, collectively emphasizing the resilience and adaptability of social relationships in the face of unexpected challenges like the COVID-19 pandemic. While physical distancing and lockdowns presented difficulties, many individuals found ways to adapt, resulting in strengthened family bonds and the utilization of virtual platforms to maintain connections with friends.

Additionally, neighborly relations remained relatively stable. More than half of the participants rarely ventured to the city center, and when they did, most used their vehicles. This situation suggests that people were conscious of the pandemic's risks and adhered to social distancing guidelines to protect themselves and others. Participants reported lacking social interaction, freedom, and opportunities to go outside. This condition highlights that people are reluctant to relinquish their everyday routines and social interactions even when faced with restrictions.

It became evident that housing spaces must be adapted to accommodate the diverse needs arising from the COVID-19 pandemic (D'Alessandro et al. 2020; Navas-Martín et al. 2022). In this research, more than half of the participants expressed satisfaction with their living arrangements during the pandemic. This satisfaction can be attributed to the pandemic's unprecedented impact on daily life, revealing new needs that were previously unconsidered. Notably, participants believed their residences were suitable for fulfilling these new requirements. In some research, residents living in houses with gardens were found to be in a more advantageous position than those in apartments (Altun 2021; Beyaz Özbey 2021; Mouratidis and Yiannakou 2022; Xiao et al. 2022; Bojovic' et al. 2022). The pandemic led to shifts in how residents perceived their neighborhoods, with some contemplating moving to different areas for an improved quality of life (Erin and Çubukçu 2022). In this study, almost all participants preferred living in duplexes with gardens or single-floor homes. As found in the other studies, they believed such residences would enable them to engage in activities they couldn't in their homes.

The COVID-19 pandemic triggered substantial shifts in the way people utilized their homes, leading to changes in the use of domestic spaces (Bulgurcuoğlu and Kelebek Küçükarslan 2021). These changes involved a reconfiguration of space, such as altering the placement of belongings, redefining the purposes of various rooms, and adapting living areas to meet pandemic-related requirements. In essence, these adaptations transformed the functionality of living spaces (Beyaz Özbey 2021). This study's findings, aligned with results from other research,

confirm that changes were indeed made in indoor spaces during the pandemic. While individuals couldn't quickly change their residences due to various constraints, they could readily make alterations within their homes. These adjustments often included optimizing storage areas, driven by personal needs and the imperative of preventing the virus's spread. In light of these developments, as posited by Xiao et al. (2022), architects and interior designers should reimagine their approaches to design, focusing on creating healthier and more functional living spaces. By fostering flexibility and adaptability in interior layouts, homes can better accommodate the evolving needs of their occupants, ensuring resilience in the face of unforeseen challenges.

Besides, the participants proactively reconfigured the interiors of their homes, relocating belongings, repurposing rooms, and adapting their living spaces to suit better the conditions imposed by the pandemic. This experience underscores the necessity of developing future living spaces with open, flexible floor plans that minimize excessive partitions in interior design, prioritizing user preferences. By doing so, family members who spend extended periods at home can have a more significant say in defining the required areas, ultimately enhancing their comfort. However, it's crucial to recognize that the comfort conditions within residential spaces will likely take on heightened significance post-pandemic, surpassing even the considerations of workplaces and broader built environments. This paradigm shift necessitates the emergence of novel design approaches tailored to enhance occupants' comfort within their homes. Future residential interiors should be designed with built-in flexibility to accommodate living areas, workspaces, and furniture arrangements that align with the unique needs of each household. Furthermore, the restrictions and challenges that became apparent during the pandemic underscore the need for integrating more communal areas into housing designs. These spaces should support various activities, including sports and social interaction, promoting a healthier and more fulfilling lifestyle within the confines of one's home.

The onset of the epidemic prompted a noticeable shift towards heightened cleanliness and hygiene practices within households. As a result of these factors, the differentiation between interior and exterior spaces will gain more pronounced significance in the future. This distinction can be accentuated by optimizing interior spaces, which may involve reducing clutter by discarding unnecessary items and creating a clear boundary between the living environment and the external world. From this vantage point, the interior of homes will take on new roles and functions. This evolution will be facilitated by integrating intelligent applications and advanced techniques that enable continuous monitoring and control of comfort conditions within the house. Additionally, building materials used in construction will likely be selected for their antimicrobial properties, further emphasizing the importance of cleanliness and sanitation. Meticulous attention to cleanliness will enhance safety and become an integral part of the overall comfort conditions within residential spaces.

As Sağsöz et al. (2021) elucidated, there was an escalation in balcony utilization amid the pandemic. This study's results underscore terraces' heightened functionality and utilization during this period. These previously

underutilized spaces emerged as vital components of the home environment, offering outdoor access while adhering to lockdown measures and social distancing protocols. This transformation highlights the importance of reimagining architectural and urban planning to prioritize the creation of green and natural environments on balconies. Ensuring effective sound insulation in residential spaces becomes paramount in light of the growing trend of working from home. As an increasing number of individuals find themselves confined to indoor environments for prolonged periods, it is imperative to underscore the pivotal role that green roofs and walls within buildings can play in facilitating the detrimental impacts of indoor living, as emphasized by Bojović et al. (2022). These green installations offer aesthetic appeal and serve as natural sound barriers, creating a quieter and more harmonious indoor environment (Kocur-Bera 2022; Xiao et al. 2022). In this sense, integrating green solutions into architectural designs can enhance residents' overall well-being and address the changing demands of contemporary living.

The findings of this study reveal some disparities in the influence of demographic characteristics on various aspects, albeit with varying degrees of impact. While physical modifications to housing attributes display relatively consistent trends across diverse demographic groups, as observed by Fornara et al. (2022), the scope and nature of these adjustments can differ based on age, as evident in the work of Vicerra (2023). In contrast, aspects related to communication, housing use, and satisfaction display more pronounced distinctions based on the specific demographic features of the residents. In the study, while individuals of various demographics tend to make similar adjustments to the physical attributes of their homes, the same cannot be said for aspects related to communication, housing use, and satisfaction. These areas are significantly influenced by demographic factors, reflecting residents' diverse needs and preferences during the pandemic. The findings collectively suggest that, despite differences in specific demographic characteristics, residential users generally exhibit comparable responses and behaviors in adapting to their living spaces during the pandemic. This situation underlines the importance of considering demographic factors when addressing the evolving housing needs of residents.

In light of the COVID-19 pandemic, this study underscores the necessity for adaptable, user-centric housing designs that prioritize indoor comfort, enhance cleanliness, and incorporate green spaces like balconies. These findings emphasize the importance of flexible layouts, open floor plans, and the integration of communal areas within residential environments, all while considering the impact of demographic factors. As we are in the post-pandemic era, the key takeaways point to a future where our homes serve not only as shelters but also as multi-functional, resilient spaces capable of meeting the evolving needs of residents in times of unforeseen challenges. Holistically considering the results, it becomes evident that there is a pressing need to adopt a user-centric approach to housing design that prioritizes resilience and self-sufficiency. This approach should extend to reevaluating housing practices in the post-epidemic era, departing from conventional and predictable techniques. To realize this vision, engaging in housing planning that spans short-term, medium-term, and long-term perspectives is

imperative. Such planning should be driven by fostering a lifestyle more resistant to the disruptions caused by epidemics and other unforeseen challenges.

## Conclusion

The COVID-19 pandemic brought about significant changes in how we perceive and utilize our living spaces, affecting various aspects of our lives. It has diverted into a concern that has affected all sectors quickly. The crisis has shed light on the vulnerabilities inherent in contemporary society and prompted a substantial transformation in individual and collective behaviors. A conspicuous and far-reaching change brought about by the pandemic pertains to the reconfiguration of social spaces, whereby people have significantly shifted away from their routine habits. Moreover, the epidemic has dramatically influenced social stamina on a global scale. This effect showed itself in people's ordinary lives. People's satisfaction with their homes depended on factors like interior characteristics, air quality, thermal comfort, lighting, and acoustics. Street limitations arrived at the forefront, and individuals had to consume their time mostly at their homes, and householders made some mandatory usage changes in indoor spaces. Flexible interior layouts and improved air quality became crucial, enhancing residents' well-being during prolonged periods spent at home. Social relationships were also impacted, with families growing stronger bonds and neighborly relations remaining relatively unchanged. With these circumstances, housing evolved considerably more essential regarding both an opportunity and a threat environment regarding human health, needs, and expectations. As individuals adapted to these unprecedented circumstances, they initiated mandatory adaptations to their domestic spaces.

The residence was one of the essential places in terms of public health during the epidemic. This study highlights the importance of adaptable, resilient housing designs prioritizing indoor comfort, cleanliness, and green spaces. Homes should serve as multifunctional spaces capable of meeting evolving needs, and housing planning should consider short-term, medium-term, and long-term perspectives. Accordingly, decision-makers should introduce measures and innovative solutions to fulfill the requirements emerging from the outbreak for the residents and their nearest surroundings for the future. Bu çalışma sonuçlarına göre, the sanitary factor must be carried into account in the investigations to put forth according to the needs. Designers should pay meticulous attention to incorporating daylight and fresh air into the space, and mechanical systems should be supported as necessitated. The post-pandemic era calls for a user-centric approach to housing design, emphasizing resilience and self-sufficiency. Housing should prioritize flexibility, open floor plans, and communal areas while considering the impact of demographic factors. This approach should depart from conventional techniques and focus on creating adaptable living spaces that meet residents' unique needs during unforeseen challenges. Thus, it is paramount to reformulate housing strategies, centering them on considerations encompassing public health alongside other determinants, thereby embracing a holistic approach under the umbrella of "health-conscious housing" in

housing design. In conclusion, these collective endeavors will represent a significant stride towards enhancing preparedness and resilience in the face of impending epidemics.

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## Declarations

**Ethical approval** Ethical approval for the research was given by Ondokuz Mayıs University Social and Human Sciences Research Ethics Committee by the number 2020-802.

**Informed consent** This article does not contain any studies with human participants performed by the author.

**Conflicts of interest** The author declares that there is no conflict of interest related to the publication of this article.

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