

# Evaluation of the changing urban soundscape in Turkey during Covid-19 pandemic through online survey

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## Abstract

The disease caused by the virus named Covid-19 and declared as a pandemic has shortly spread worldwide. Measures taken during the pandemic has exceedingly affected the acoustic environment of the cities. Sounds are a part of the human activities in the cities; therefore, they contain information regarding city life. It is possible to understand the positive or negative impacts of the pandemic on social life by analyzing the acoustic life throughout the process. Within the scope of the study, the impacts of the changing social life in Turkey on the city acoustic were studied physically, socially, and psychologically with the soundscape approach. The study conducted accordingly is designed to understand how the Covid-19 process affected the urban soundscape. For this reason, the focus was on the answers given to the participants on their level of pleasantness with the acoustical environment before and during the pandemic, the change in the sound sources they heard, and the sounds they were pleased to hear during the pandemic. Due to Covid-19 restrictions, the study was conducted by using an online Internet survey with 690 participants across Turkey. In addition to the cities with high participation in the study and a general evaluation was made. At the end of the study, it was seen that the change in sound environment pleasantness was more pronounced, especially in the cities of high population density. In general, the audibility of nature-based sounds increased and nature-based sounds were found to be pleasing during the pandemic.

## Keywords

Covid-19, Soundscape, Urban acoustic environment, Changing acoustic environment.

## 1. Introduction

Covid-19 is an infectious disease caused by the recently discovered type of coronavirus (*World Health Organisation /Q&As on COVID-19, 2020*). The disease, which was detected in Wuhan, China at the end of 2019, has become an unpredicted global pandemic within a short time, and World Health Organization declared it as 'Pandemic' on March 10, 2020. This pandemic with global effects manifested itself in different ways in different cities and countries where public space usages, social relations, and intensities of urban settlements are organized differently.

Turkey is among the countries, which are significantly affected by the pandemic. Turkey is located between Asia and Europe. In Turkey, there are 81 cities, and 30 of them are metropolitans and 23 cities have a population of over 1 million people. The Ministry of Health declared the first positive Covid-19 case in Turkey on March 11, 2020. This condition led to extensive changes in Turkey along with the entire world. During the pandemic, it was attempted to take the progression rate of the pandemic under control through implementations such as discontinuing education, restricting transportation, suspending the activities of cafes, bars, etc., arranging the working hours of state institutions and organizations, restricting production operations, and minimizing the intensity of people circulating within the city.

The decreased use of public spaces in the cities affected many aspects, particularly the factors threatening public health such as air and noise pollution (Nicola et al., 2020), and allowed these negative effects to decrease, albeit partially. The urban acoustic environment is one of the areas where the reflections of these changes are observed. Urban sounds are a part of human activities in cities. Activities affecting social life such as restricted production operations, less or no use of means of transportation, lockdowns, and suspension of activities of entertainment venues directly impact the urban acoustic environment as well. The environment created by the Covid-19 restrictions; It is an important opportunity to explore

the urban acoustic environment experience without urban noise and to get the opinions of city users.

The soundscape approach is used in many national and international studies on the urban acoustic environment to determine and evaluate the changes (Çakır Aydın & Yılmaz, 2016; Kang & Schulte-Fortkamp, 2016; Gök Tokgöz et al., 2019). The soundscape was defined as 'the acoustic environment as perceived or experienced and/or understood by a person or people in context' in ISO 12913-1 standard (International Organization for Standardization, 2014). The soundscape changes as a result of the incidents that disrupt social life and change the social dynamics. There are studies on soundscape changing as a consequence of incidents such as wartime, nationwide protests, demonstrations, etc. that lead to dramatic changes in a certain period (Birdsall, 2012; Ceylan, 2017; Kytö & Özgün, 2016). The pandemic is also one of these dramatic changes. Contrary to nationwide or local changes, the pandemic is a global situation that affects all the cities around the world. In this regard, although the pandemic is a global situation that caused social changes, its local reflections on the cities should also be studied. It is seen that the studies on the effects of the pandemic on the urban acoustic environments concentrate on the decrease in noise, noise mapping, or classification based on the differences between the sound pressure levels before and during the pandemic (Aletta et al., 2020; Aletta et al., 2020; Asensio et al., 2020; Manzano et al., 2021; Montano & Gushiken, 2020). There are studies that measure acoustic environment satisfaction and discomfort levels with the participation of the citizens (Andargie et al., 2021; Şentop Dümen & Şaher, 2020; Torresin et al., 2022). According to the studies reviewed, in addition to the studies with an objective dataset and the decreases detected in the sound pressure levels, it is important to determine and evaluate the changing soundscape with the participation of the citizens in order to understand the physical environment simultaneously. Besides, determining the soundmarks of the process is an important part of the impressions of the

citizens in this period. Soundmarks are the sounds that may identify the identity of a space. Soundmarks contain basic information about the place, area, city, society, and culture (Yelmi, 2016). The soundmarks, which have a significant place in understanding the development and transformation of society, in hold qualifications such as identity and belonging. Therefore, it is required to determine, analyze and evaluate the soundmarks to comprehend the impacts of the pandemic on the inhabitants.

With slogans such as “limited social life” and “stay at home” repeated throughout the pandemic, the soundscape has become one of the important factors that enable people to interact with their environment. Although the visual relation with the environment was limited during the restricted social life period, acoustic relation continued. Thus, studying the effects of the pandemic, which led to radical changes in social life, using the soundscape approach is significant to extensively evaluate the effects caused by the pandemic on the acoustic environment perception of the inhabitants. The study aims to determine and evaluate the soundscape changed during the pandemic with the participation of the inhabitants. The relations between the receiver and urban environment are evaluated in terms of physical, social, and psychological aspects using the soundscape approach. According to this, the objectives of the study are;

- To evaluate the effects of Covid-19 and the measures taken in this period in the world and in Turkey,
- To understand how Covid-19 Pandemic affected the urban acoustic environment and urban soundscape in Turkey,
- To determine the acoustic environment pleasantness levels with the data in different cities before the pandemic on an individual scale and to explain how they changed ‘during the pandemic,’
- To investigate and determine the urban acoustic and sounds of different cities specific to the pandemic period (soundmarks),
- To detect and evaluate the changes in the sound environment per-

ceived and experienced by the society by comparing the periods before and during the pandemic,

- To determine the sounds defined as pleasing during the pandemic.

Online surveys were preferred rather than face-to-face research as the study method due to the social distancing rules. The online surveys were initiated on May 5, 2020, and ended on May 10, 2020. In order to evaluate the impact of the Covid-19 Pandemic process on sound sources and the sound environment pleasantness, the impact of the Covid-19 process on the world and Turkey was explained first, and then the effects of the process on the urban acoustics were analyzed.

## 2. Overview of the lockdown period

### 2.1. World and Turkey during the Covid-19 pandemic

The pandemic affected many aspects such as economic stability, education conditions, and business processes on a global scale. The sectors such as the entertainment sector, etc. where physical interactions are inevitable almost stopped and this affected the economic stability. Less use of goods and services, decreased production operations, reduced use of vehicles, as well as decreased domestic and international passages, allowed global environmental pollution to decrease (Anser et al., 2020). This process increased the use of Internet-based commerce, activities, and Internet-based social interactions. The importance of distance education technologies was understood, and they became widespread due to current conditions.

Because of the social distancing rules brought in by the limited access to public spaces during the pandemic, people were expected to stay at their homes, change their daily indoor routines (e.g., work from home or work on a rotating schedule), and socially interact with their environment from a window/balcony/garden. In the process, curfews and prohibited physical activities have minimized social/physical interaction. In the meantime, ways to face this emergency have been limited to indoor spaces and noise complaints have increased in this places (Tong et

al., 2021). The characteristics of the countries, such as demographic structure, weather conditions, the density of settlement, etc. differentiated the measures and implementations during the pandemic.

Turkey made restriction decisions in many areas such as economical, social, administrative, legal, military, religious, educational, and cultural areas. Basically, these restrictions prevent close contact which is the fundamental route of the spread of the virus. Therefore, immediately after the announcement of the first case, the activities of educational institutions were suspended, and distance education activities were initiated. Following this quick decision, the activities of entertainment venues, cinemas and theaters, religious places, and cultural places that affect the social life and host many people collectively were suspended. After stopping the use of indoor public areas, the activities such as gatherings, picnics, etc. in open or half-open public places were inhibited. It was intended to reduce physical contact by lessening the areas of interaction and to minimize going out as much as possible. The density of people in open spaces was substantially reduced by working on a rotational schedule, lockdowns for people above and under certain ages, and restriction of the use of public spaces. These measures taken in March continued throughout April. In May 2020, the restrictions were partially removed with the normalization process. First, the number of cities with mandatory lockdowns was lowered based on case management processes. The controlled normalization period, which lasted until mid-November, was interrupted by the increase in the number of patients, which was referred to as the second wave. Education was suspended once again, and the lockdowns began.

Apart from the negative impacts of the implementations during the Covid-19 pandemic on people's perceptions and psychologies, these implementations changed the functioning of the city and altered the physical environment elements such as light, sound, the odor that constitute the identity of the city. Sound, which is one of the inevitable outcomes of human activities

also got affected by this process, and the character of the soundscape has changed.

## 2.2. Effects of Covid-19 pandemic on urban acoustic in Turkey

The effects of the pandemic on urban acoustic were evaluated under two principal titles. These are the effect of regulations regarding the restricted use of public spaces and the effect of the new sound sources brought in by the pandemic.

- The effect of the regulations regarding the restricted use of public spaces

The restricted use of public space started with the suspension of education at schools. Due to the young population density in Turkey, this situation has caused a change in the urban acoustics (Steele & Guastavino, 2021). With the suspension of education in schools, vehicle sounds that take children and teachers to school have decreased. In this process, many employees worked online. It has affected the decreasing vehicle traffic during the Covid-19 period (Asensio et al., 2020; Basu et al., 2021). Suspension of all social and cultural activities and restricting houses of prayer prevented people from conducting activities collectively. This made the human sounds heard less in the cities. Decreased traffic volume allowed the dominant influence of vehicle sounds on the urban acoustic to reduce. Banning or restrictions on open-air markets which produce high-level noise (Meng et al., 2017; Yalılı Kılıç & Adalı, 2020), during the pandemic have reduced human voices in these regions. Cancellation or limitation of domestic and international travel considerably reduced road, air and rail transportation. The vehicle and human sounds have decreased effect on urban acoustic as well as decreased masking effect on natural sounds, and the audibility of natural sounds in cities increased.

- The effect of new sound sources brought in by the pandemic.

There are also new sources of sound that are brought into our social lives by the pandemic. Announcements from municipalities and mosques related to Covid-19 and announcements to re-





with high numbers of followers. The “swipe up” feature that may be used by such people ensured easy access to the survey by the participants.

The responses to the survey were accepted for 5 days between 5/5/2020 and 5/10/2020 when the restrictions and prohibitions due to the pandemic continued. During the implementation of the survey, in all cities in Turkey; distance education has been applied at all education levels, all theaters, cinemas, concerts, etc. events, restaurants, and cafe services have been closed, curfews are imposed on weekends in metropolitan cities, and intercity and international travel are restricted.

### 3.1.2. Survey structure

The questions in the survey were prepared and evaluated in four sections. The survey structure, questions, and response scales are given in Table 1.

The first section includes personal information such as age, gender, place of residence, frequency of going out, and sensitivity to noise. The second section is where the pleasure of the users regarding the changing acoustic environment before and during the pandemic was determined, and where they were asked to evaluate the pleasantness level on a scale of 1 to 10. In the third section where the most data regarding acoustic environment sounds were obtained, there are questions about the sound sources and whether they identify a sound environment before and during the pandemic. The fourth and last section includes an open-ended evaluation question asking to write down the sounds identified and found pleasing during the pandemic. A field where the user recommendations and opinions regarding the Internet survey and the current experience may be noted is added to the bottom of the survey.

### 3.2. Survey result

In the survey, which can reach 58 cities in Turkey, which has 81 cities, data evaluations of a study group of 690 people were made from the cities that include metropolitan cities where effective curfews are also applied during the pandemic process. According to TUIK data; As of the end of 2020, the total population of Turkey is 83 million

**Table 1.** The survey structured, questions and response scale.

	Questions	Response Scale
<b>Section 1:</b> <b>Personal Information</b>	<b>Q1:</b> Gender, <b>Q2:</b> Age	<b>Q1, Q2:</b> Selected among the options
	<b>Q3:</b> Which city do you live?	<b>Q3:</b> Open-ended
	<b>Q4:</b> How can you describe the building you are living in?	<b>Q4:</b> Selected among the options or writing (Flat/Single Family-house/ Flat without balcony/mass housing)
	<b>Q5:</b> When you think about the pandemic process, what is your frequency of leaving the house during this period?	<b>Q5:</b> Never/ Almost never / Once in Week/ Once in every two/ Almost every day
<b>Section 2:</b> <b>Questions for Sound Environment Evaluation</b>	<b>Q6:</b> Are you sensitive to the sounds around us?	<b>Q6:</b> 0–10 numeric scale with verbal labels only at extreme-ends: 0 Not at all sensitive, 10 Very sensitive
	<b>Q7:</b> Please indicate your general sound environment pleasantness when you think about the before pandemic process.	<b>Q7, Q8:</b> 0–10 numeric scale with verbal labels only at extreme-ends: 0 Not at all sensitive, 10 Very sensitive
	<b>Q8:</b> Please indicate your general sound environment pleasantness when you think about the during pandemic process.	
	<b>Q9:</b> Which sounds do you heard before the pandemic?	
<b>Section 3:</b> <b>Questions for Sound Sources</b>	<b>Q10:</b> Which sounds are soundmarks before the pandemic process?	<b>Q9, Q10, Q11, Q12:</b> Selected among the options-The sound sources were grouped under these titles according to the ISO 12913-2 standard.(International Organization for Standardization, 2018)
	<b>Q11:</b> Which sounds do you heard during the pandemic?	
	<b>Q12:</b> Which sounds are soundmarks during the pandemic process?	
	<b>Q13:</b> Are there any sounds you find pleasing among the sounds you hear during the pandemic? If so, what are they?	
<b>Section 4:</b> <b>Pleasant Sound During the Pandemic</b>	<b>Q14:</b> Comments	<b>Q13, Q14:</b> Open-ended

614 thousand 362 people (Turkish Statistical Institute, 2021). 705 people participated in the online Internet survey. During the survey analysis and evaluation stage, this number decreased to 690 people due to the submission of incomplete forms. It should be considered during the evaluations that the 690 people in the study group were limited in representing the universe. Survey results are given under four headings, taking into account the high participating cities.

#### 3.2.1. Personal information

Examination of the survey results, based on the gender data of the participants, 67% of the participants (463 people) were women and 33% (227 people) were men which indicated that the majority consisted of women. The age data of the participants were evaluated in 6 groups. According to the data, in the groups under the age of 45 (15-24 years, 25-34 years, and 35-44 years) %85 of the participants (587 people) constitute the majority. The general distribution was 15–24: 19% (132 people), 25–34: 45% (308 people), 35–44: 21% (147 people), 45–54: 7% (47 people), 55–64: 6% (42 people), 65+: 2% (14 people). When the use of social media tools and access to online

**Table 2.** The frequency of going out of survey participants during the pandemic.

	Number	Percentage
I go out every day	79	11%
I go out every other day	96	14%
I go out once a week	246	36%
I hardly go out	190	28%
I've never gone out	79	11%

surveys are taken into account, an expected result to have more participants in the given age groups. The low number of participants grouped as 65 years and above may also be explained by the effect of the age factor on the use of the Internet.

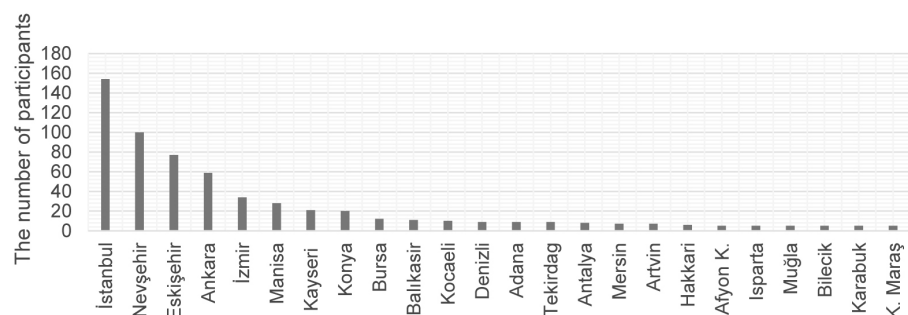
Based on the responses of the participants to the question on the frequency of going out during the pandemic (Table 2), it is determined that 75% went out once a week or less. These results indicate that the partial lockdowns and the “stay at home” strategies are adopted and practiced by the majority of the participants across Turkey.

The cities that participated in the survey are shown in Figure 3. It shows 24 cities with 5 or more participants out of 58 cities that participated in the survey. Announcing the survey on social media accounts has been effective in determining the cities with the highest participation, and the cities of Nevşehir and Eskişehir, where the organizers of the survey are located, came to the fore. 65% (449 people) of the survey participants are from Istanbul, Nevşehir, Eskişehir, and Ankara. 35% (241 people) of the survey participants participate from other 54 cities and the participation rate of each city is below 5%. For this reason, cities other than Istanbul, Nevşehir, Eskişehir, and Ankara were not evaluated separately. In addition, information such as population densities, green area ratios, and living spaces

of people, which are thought to affect the acoustic environment of these cities, are given.

Comprising 25% (174 people) of the survey participants, Istanbul is the city with the highest participation. It is the most populous city in Turkey with its population exceeding 15 million (*İstanbul Valiliği*, 2020). Also to the question, we asked people to describe where they live, 71% (124 people) out of 174 participants said flats. 10% (18 people) claimed that they lived in flats without balconies and 17% (29 people) lived in mass housing. Only 2% (3 people) lived in a single-family house. According to the data of Istanbul metropolitan municipality, the green area per person is 7% (İBB, 2020). 2751 people per square kilometer live in Istanbul. The city with the highest population density (TUIK, 2021). Istanbul is the leading city in Turkey in terms of noise problems that are getting worse due to rapid population growth (İlgürel et al., 2016). It is known that there is a lot of road, rail, and air traffic in Istanbul. In addition, many studies have been carried out on noise reduction in Istanbul (Demir et al., 2016; İlgürel et al., 2016; Ozkurt et al., 2014).

Nevşehir, which makes up 15% (100 people) of the survey participants, is the second city with the highest participation. Nevşehir, with its 243 thousand population, is the lowest populated settlement compared to the other cities examined (*Nevşehir Nüfusu*, 2021). 53 people per square kilometer live there (TUIK, 2021). According to survey results, 79% (79 people) out of 100 participants described where they live as flats. 14% (14 people) claimed that they lived in a single-family house. 6% (6 people) lived in mass housing and nobody lived



**Figure 3.** Cities participating in the survey and the number of participants.



without a balcony flat. According to the data of Nevşehir municipality, the green area per person is 14% (*Nevşehir 2019 Performans Raporu*, 2020).

14% (96 people) of the survey participants, Eskişehir is the third city with the highest participation. Eskişehir, with a population of 888 thousand, is one of the 30 metropolitan cities in Turkey (*Eskişehir Nüfus*, 2021). 62 people per square kilometer live in Eskişehir (TUIK, 2021). According to survey results, 66% (51 people) out of 77 participants described where they live as flats. 16% (12 people) claimed that they lived in flats without balconies and 13% (10 people) lived in mass housing. Only 4% (3 people) lived in a single-family house. According to the data of Eskişehir municipality, the green area per person is 13% (*Eskişehir Büyükşehir Belediyesi*, 2019).

Ankara, which makes up 11% (79 people) of the survey participants, is the fourth city with the highest participation. Ankara, with a population of 5 million 600 thousand, is the second largest city in Turkey. 212 people per square kilometer live in Ankara (TUIK, 2021). According to survey results, 83% (43 people) out of 59 participants described where they live as flats. 5% (3 people) claimed that they lived in flats without balconies and 19% (11 people) lived in mass housing. Only 2% (1 person) lived in a single-family house. According to the data of Ankara metropolitan municipality, the green area per person is 19% (*Ankara Kalkınma Ajansı*, 2018).

In the light of these data, it is predicted that the change between the acoustic environment pleasantness and the sounds heard will be more in big cities such as Istanbul and Ankara.

### 3.2.2. Sound environment pleasantness before and during the pandemic

The survey participants were asked to evaluate their pleasantness from the sound environment they were in before and during the pandemic on a scale of 10 (where 1 is minimum, i.e., "Very unpleasant" and 10 is maximum, i.e., "Very pleasant") In Table 3, averages of pleasantness values in cities with high participation and in all cities are given.

**Table 3.** Averages of pleasantness values in cities with high participation and in all cities.

	<i>Before Pandemic</i>	<i>During Pandemic</i>
Istanbul	5.02	7.07
Nevşehir	5.75	6.67
Eskişehir	5.50	6.89
Ankara	5.10	6.93
Averages of all cities	5.25	7.19

When examining the average values, it is possible to mention an overall increase in the sound environment pleasantness. The difference between the mean values before and during the pandemic is greater in large cities.

### 3.2.3. Sounds sources and the sound environment before and during the pandemic

In this section of the survey designed to define the sound environment during and before the pandemic and to detect the soundmarks specific to the area, the participants were asked to mark the sound sources heard among 26 different sound sources identified. Four titles were prepared to determine the sounds heard before the pandemic, soundmarks of the sound environment before the pandemic, sounds heard during the pandemic, and the soundmarks of the sound environment during the pandemic. The sound sources were grouped under these titles according to the ISO 12913-2 standard (International Organization for Standardization, 2018).

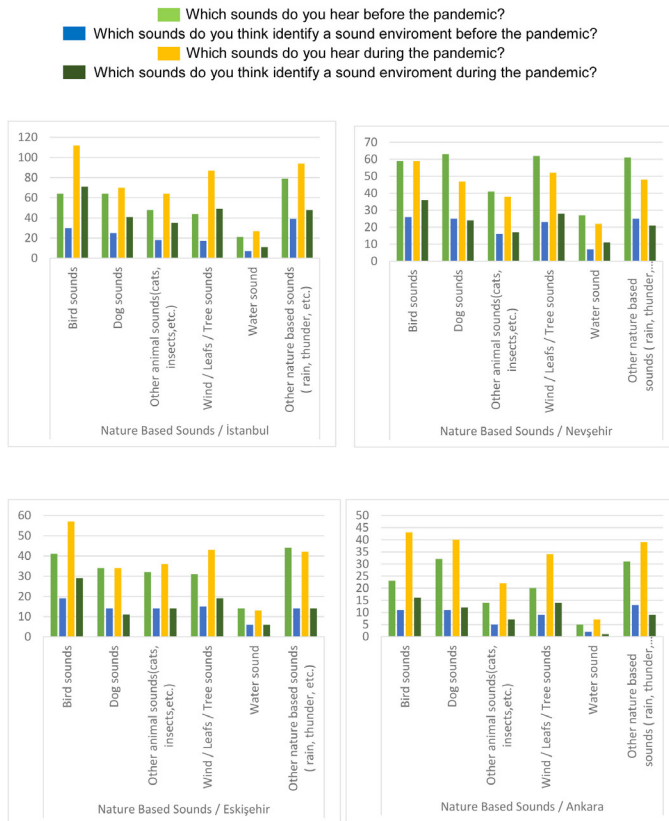
- Non-human sounds (natural sounds) were grouped as sounds of nature and pets and diversified as bird sounds, dog sounds, the sound of other animals (insects, cats, etc.), wind/leaf/tree sounds, water sounds, and other natural sounds (rain, thunder, etc.)

When Figure 4 is examined, it is seen that the hearing of the sounds of non-humans has increased more clearly in Istanbul and Ankara. In Nevşehir, it was seen that this situation almost did not change before and during the pandemic.

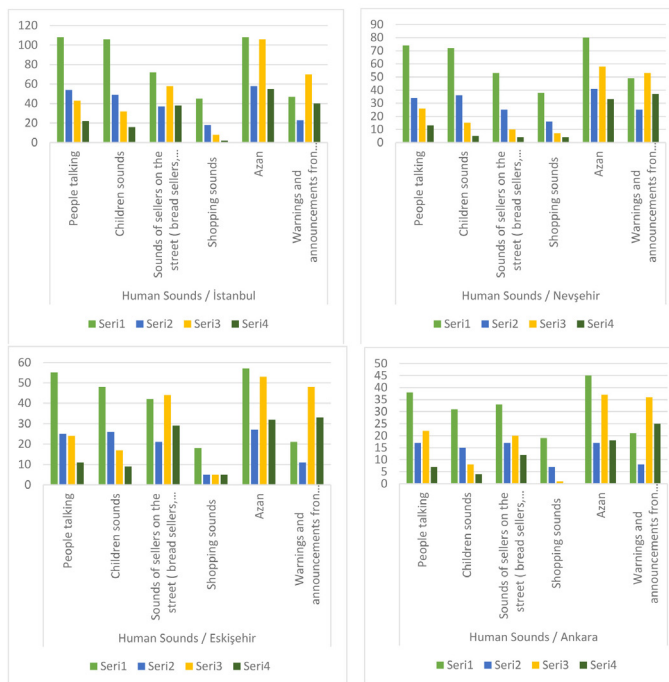
We understand that there is a response to bird sounds, which is found as a sound mark during the pandemic, from the sounds of non-humans, whose hearing status is increasing more.

- Human sounds were grouped as the sounds derived from the actions





**Figure 4.** Sounds of non-human about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.



**Figure 5.** Human sounds about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.

of the people, and social activities/events. During the pandemic, it is seen in all cities that there is a decrease in the hearing of human

voices, except azan and the warnings and announcements from mosques and municipalities.

When Figure 5 is examined, the sounds found as soundmarks during the pandemic; It has been seen that there are azan, warnings and announcements from the mosque and municipality. Azan is also a sound source that is seen as a soundmark before the pandemic.

- Sounds produced by motor vehicles and electromechanical (fixed and mobile) sounds (technological sounds) were diversified as road traffic sounds, vehicle horn sounds, aircraft sounds, mechanical sounds, sounds of ships and boats, mechanical device and equipment sounds, and motor courier sounds.

When Figure 6 is examined, during the pandemic, it is seen in all cities that there is a decrease in the hearing of sounds produced by motor vehicles and electromechanical devices. It is seen that especially the sounds of vehicles from roadway traffic are the most heard sounds in cities. Before the pandemic, vehicle sounds from roadway traffic is shown as a soundmark. During the pandemic, any of these sounds are not seen as a soundmark.

### 3.2.4. Sounds defined as pleasant during the pandemic

Within the scope of the survey, following the determination of the sounds in the acoustic environment before and during the pandemic, the participants were asked about the natural sounds, human sounds, or technological sounds that they defined as pleasant during the pandemic. 443 participants responded to this question which was designed as open-ended and which may be responded with multiple sources of sound. According to this;

- 52% (230 participants) of the participants reported “bird sounds” or “birds singing;”
- 31% (137 participants) of the participants reported “nature, animal, rain, and wind sounds;”
- 9% (40 participants) of the participants reported “azan sounds and the praying sounds;”
- 3% (13 participants) of the participants reported the sounds produced by the “celebrations from the

balconies,” “national holidays,” and “celebrations to support the health-care professionals;”

- 2% (10 participants) of the participants reported “the sound of the bakers;”
  - 2% (7 participants) of the participants reported the “announcements and declarations;”
- as their pleasant sound preferences.

When the responses were analyzed, it was seen that non-humans natural and pet sounds which are “bird sounds, animal sounds, the sound of the rain, the sound of the wind” were preferred more. This indicates that the natural sounds heard during the pandemic ensure and even increase the sound environment pleasantness of the inhabitants. Therefore, it is considered that ensuring the audibility of these sounds may increase the level of sound environment pleasantness of the city. The other sound preferences noted were social activity/event sounds of the human sounds. It was seen that motor vehicle and electromechanical sound sources were not mentioned in any response.

#### 4. Evaluating the acoustic environment and user satisfaction before and during the pandemic

Within the scope of the study, the acoustic environment pleasantness, the sounds heard, the change, and the pleasing sounds during the pandemic were asked. When the relationship between the sounds physically heard and the pleasantness was physically, socially, and psychologically reviewed,

- It was seen that the acoustic environment pleasantness before the pandemic was lower than the acoustic environment pleasantness detected during the pandemic. This differentiation is thought to be associated with the audibility of technological sounds. It may be understood from the responses that the audibility of the technological sounds has decreased during the pandemic.
- The participants reported bird sounds and natural sounds as pleasing during the pandemic, and this indicates that the relevant sounds have positive impacts on human



**Figure 6.** Human sounds about Istanbul, Nevşehir, Eskişehir and Ankara before and during the pandemic.

psychology.

- The announcements from the mosques and municipalities during the pandemic are of the sounds in the soundscape, but they are considered a new source of sound due to their changing characteristics.
- Although the urban sounds changed as a result of the urban rhythm slowing down and increasing the quality of urban acoustic, the psychological effect created by the other conditions affecting the social life (restricted interaction, inability to socialize, etc.) reduced their influence on the satisfaction and wellness of the citizens. The positive influences of increased acoustic quality were restricted.

The changes in the soundmarks such as vehicle sounds, human sounds, etc. that symbolize city life have changed the acoustic characteristic of the city

center and made the busy areas similar to any other area within the city by removing their characteristic features.

### 5. Conclusion

Sound is a dynamic component; it is directly affected by social changes. This study is important as it is a country-wide research based on the personal views of urban residents about the urban acoustic environments. Documentation of subjective data in a perception-based soundscape approach; reflects the urban users' ideas about the changing acoustic environment. In this way, different information such as the detection of new sound sources and satisfaction status can be obtained. The contribution of the study is that the determination made is wide-ranging and at a level that will allow comprehensive studies.

As in many studies focusing on urban acoustic environment change after the Covid-19 process, in this study, while the rate of hearing human sounds, motor vehicles, and electromechanical sounds before the pandemic was high, the prohibitions brought in during the pandemic decreased the rate of hearing these sounds and increased the rate of hearing natural sounds. And a rise in acoustic environment pleasantness level was observed with this increase. Most of the studies have detected these changes with acoustic environment measurements, sound pressure level changes, and conducted their studies on a city sample (Aletta et al., 2020; Asensio et al., 2020; Basu et al., 2021). Unlike this study, these determinations were made through a questionnaire and an evaluation was carried out that included many cities across the country. Thanks to open-ended questions, pleasantness level and pleasing sounds were identified with user opinions. This is an element that enriches the study and makes it a comprehensive assessment. The fact that the study was across the country made inter-provincial evaluations difficult. Different measures taken in different cities in the same period affected people's perception of the acoustic environment. With the strict measures taken for Istanbul, Ankara, and Eskişehir, the hearing of some sounds has decreased. In a small city

like Nevşehir; there was no significant reduction in noise such as low-intensity traffic noise. It should be noted that the findings obtained from the answers given by the study group participating in the survey belong only to the study group. In order to generalize the research findings, similar studies should be increased.

In this study, new sound sources such as "celebrations from the balcony", "national holidays" "celebrations to support the healthcare professionals" "sounds of bakers", and "warnings and announcements from institutions such as mosques, municipalities, etc." were detected. But these new sounds are the acoustic results of the solutions for the needs generated during the pandemic and for the problems such as informing people during the process. Even if alternatives are produced when the interaction of people with the city is interrupted by activity restrictions, the urban identity is condemned to get lost. Therefore, the analysis and interpretation of the urban soundscape are important to understand the social dynamics and identity components of this process and a process similar to this. Considering the change in the cities exemplified in the study, in future and ongoing studies, the necessity of conducting city-specific investigations comes to the fore. This situation reveals the importance of the sound identity of cities.

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