Exploring the Effect of Post-Pandemic Behaviour of Occupants on Indoor Air Quality and Comfort Conditions in Existing Residential Buildings in Turkiye

Büşra Karadeniz Akkoç[1], Gülsu Ulukavak Harputlugil[2]

1 Çankaya University
Mimar Sinan Street
Ankara, Türkiye
**Corresponding author:*
busrakaradeniz0000@gmail.com

2 Çankaya University
Mimar Sinan Street
Ankara, Türkiye
gharputlugil@cankaya.edu.tr

SUMMARY

This study aims to investigate the impact of changing residential user behaviour after the Covid-19 pandemic in 2020-2021 on indoor health and comfort conditions. In this context, user behaviour-focused studies conducted before 2020, the year of the pandemic, and behavioural patterns that changed with the pandemic will be discussed comparatively. To determine the changing user behaviour in houses after the pandemic, we will first ascertain how the behaviour of today's users in the house changes based on the time spent at home, the number of people living in the household, and the evolving psychological expectations after the pandemic. The pandemic process has compelled many people to spend more time at home, leading to significant changes in housing usage habits. The impact of these changing behaviours on indoor air quality constitutes an important research area concerning health and life comfort. In this study, face-to-face interviews with residents will be complemented by measurements to determine indoor comfort conditions, which will be compared with previous data. Behavioural changes will be identified, and the effects of these changes on energy consumption, carbon emissions, and comfort will be discussed.

KEYWORDS

Indoor Air Quality, Occupant Behaviour, Residential Buildings, Building Stock

1 PURPOSE AND SCOPE OF THE STUDY

The main objective of the study is to provide a comparison of the effects of user behaviours that change before and after the pandemic on indoor health and comfort conditions through statistical data. The main objectives can be listed as follows,
Determination of User Behaviour: Detailed determination of user behaviour changes that occur in residences after the pandemic. In this context, factors such as time spent at home, working habits, ventilation habits, and cleaning routines will be examined.
Determination of Indoor Air Quality Parameters: One of the focal points of the research is the identification of the factors affecting the indoor air quality of the dwelling. In this context, CO2 level, relative humidity, temperature and atmospheric pressure will be measured and analysed.
Examining the Relationship Between Two Variables: Statistical examination of the relationship between user behaviour and indoor air quality parameters.
As a result of this study, the effect of user behaviour on indoor air quality will be analysed and the data obtained will be evaluated. In this way, the impact of changing user behaviour on

indoor air quality after the pandemic will be better understood and recommendations can be made when necessary. This study will contribute to the development of sustainable design and utilisation methods to improve indoor air quality in residential buildings.

2 RESEARCH METHODOLOGY

The aim of the research is to determine the user behaviour profiles in the Turkish society after the pandemic and to reveal the effect of user behaviour on indoor air quality in residential buildings. The result of the study provides the development of a model that takes into account the actual behaviour of residential users and can be used as a decision tool when necessary.
The research is planned to be carried out in two phases, in winter and summer, since the user behaviour in the dwelling may show seasonal differences. In this context, the study is designed with a method based on the steps listed below:

2.1 Collecting information on housing users (Questionnaire Survey).

Information on housing users will be collected through a questionnaire survey in a sample that will cover various housing typologies in Ankara.
2.1.1 Obtaining general information on housing users: The number of people living in the dwellings, as well as their age and gender, are important information for determining comfort perceptions. The planned method for making these determinations is to measure a dwelling for a total of three days, two days on weekdays and one day on weekends, and to fill out a diary that will allow users to track their behaviour in the dwelling during these three days. In addition, a survey will be conducted with each household member. Thus, it will be possible to evaluate their comfort-related behaviours during the hours of use.
2.1.2. Questioning the comfort-related behaviours of the users: In addition to the comfort-related statements of the users, it is also necessary to determine the extent to which the users perform the behaviours required to improve this comfort situation. These behaviours can be defined as opening and closing the windows, adjusting the heating system or thermostat settings, and using the air conditioner (if any). In the light of this information, the user behaviour patterns required for the study will be defined.

2.2 Collecting information on the physical characteristics of the dwellings (with the help of data recording systems)

It is necessary to determine the physical characteristics of the houses together with the data on their users. Thus, as a result of the schemes of the sample groups to be formed according to their behavioural patterns, their relationship with indoor air quality will be clarified.
2.2.1. Determination of housing plans, materials and typologies: The plan diagrams of the houses forming the research sample will be prepared.
2.2.2. Measurement of dwellings with data recording systems: Measurements based on data logging systems will be carried out in order to define the physical characteristics of the dwellings and to compare the information given by the users about comfort in the dwellings, which may vary in the context of personal characteristics (age, gender, activity, etc.) with the average comfort values of the dwelling. During these measurements, the occupants will be asked to keep a record of their daily activities in the dwelling through an online form (such as the frequency of window opening during the day, whether they change the radiator settings, etc.). The occupants will be informed in advance that these measurements will be carried out and the measurements will be carried out with data loggers in the dwellings where permission for measurement is granted.

Measurements in Ankara, Turkey are planned to be conducted in a total of 12 households. These households will be determined to include flat, two storey apartment, detached house, adjacent detached house types. A total of 3 devices will be used for the measurements. For the cooling season measurements since the highest annual average temperature for Ankara occurs in July and August, the measurement dates were determined as July 15-August 10. Measurements will cover five weekdays and one weekend day from Monday to Saturday for each household. On Sundays, the measuring instruments will be collected from the households,the results will be taken and placed in new households.

Table 1: Timetable for measurements in households

Dates	Household A,B,C	Household D,E,F	Household G,H,J	Household K,L,M
15-20 July	x			
22-27 July		x		
29 July-3 August			x	
5-10 August				x

3 EXPECTED RESULTS

This study describes a framework for collecting and evaluating data on user behaviour towards indoor air quality in existing buildings. The evaluation of the cooling load, which is one of the expected results, constitutes the scope of this paper. Data collection and evaluation will continue for more than a year, including the heating season, and the results for the analysis of user behaviour can be interpreted after all data has been collected.The most important data source of the project is the measurements to be made in the dwellings and the interviews to be conducted with the users of the dwellings. In this context, housing choices may vary until there are dwellings where these measurements can be successfully collected and adequate interviews can be conducted with users in the same dwellings. Since access to the dwellings will be voluntary, it will be essential to access the dwelling-user groups that can be most easily worked with.

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