

The Effect of Occupant Behavior on the Residential Visual Environment: A Case Study from Annaba, Algeria

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Abstract

The construction of comfortable, energy-efficient and health-friendly homes is more crucial than ever at a time when the health crisis is forcing us to reconsider our way of life. This article used a post-occupancy evaluation of the inhabited space in residential buildings at Oued El-Fourcha neighborhood in Annaba to assess user satisfaction with occupied buildings, examine the impact of daylighting and human behavior on the lighting ambience. The results of the study were processed by SPHINX Lexica software, focusing mainly on the qualitative aspects of daylighting in the inhabited space, taking into account occupant preferences. The study demonstrated an unfavorable level of internal illuminance, and that adequate lighting also needs to meet occupant requirements in order to make these windows usable, which must satisfy a number of socio-cultural, climatic and environmental factors.

Keywords: Natural lighting; visual comfort; luminous ambience; health; inhabited space.

1. Introduction

As part of efforts to reduce greenhouse gas emissions and preserve the environment Buildings should consume less energy. In most IEA member nations, the construction industry accounts for 40% of primary energy demand, according to the International Energy Agency (IEA) (Vivian WY Tam et al., 2018). Therefore, architects are adopting design techniques to promote sustainable, low-energy architecture in response to high energy consumption and climate change. (André Stephan et al., 2011). This has been shown to reduce greenhouse gas emissions and fuel consumption (Mohammad Hakimazari et al., 2024). Daylighting is a critical and practical tactic for ensuring visual comfort, energy efficiency, and user-friendly building development. The optimal light source for accurate color rendering is considered to be daylight, the quality of which is most likely comparable to that of human vision. People are deeply moved by the sense of brightness and happiness that daylight brings (MS Alrubaih et al., 2013). To increase energy efficiency, daylighting has become essential in residential buildings. It is important to limit the use of artificial lighting and to manage heat loss and energy consumption. Modern daylighting techniques and technologies can improve the daylighting of buildings while using less energy. Because of its quality, unpredictability and spectral composition, daylight is considered to be of critical importance (Ahmed Obralic & Salam Jeghel, 2021). In Algeria, housing quality has been a legally binding criterion since 2008, underscoring the need to protect and improve the built environment. Comfort is generally defined as the absence of discomfort, or a pleasant state of harmony with one's surroundings. Even if the housing situation.

En Although the situation in Algeria has improved, there are still many housing units that do not comply with health and safety regulations. Under these conditions, housing is often substandard and cannot be adapted to the changing needs of its inhabitants (Hassani Imen et al., 2017). As a result, Algeria's residential sector is one of the most energy-intensive, consuming 46% of final energy and 28% of primary energy (Benhalilou, 2008). This article presents the results of a questionnaire survey conducted as part of a post-occupancy evaluation of the experiences of residents of the town of Oued El Fourcha in Annaba. The aim of this study was to investigate the behavior of residents with regard to natural lighting in their living spaces.

2. Material and Methods

2.1. Case study presentation

The Oued El-Fourcha settlement, located west of Annaba in northern Algeria, was the focus of the study. With a built-up area of 92.20 hectares, collective housing occupies 35% of the district's surface area, with a density of over 25 dwellings per hectare in 2002. The district is bounded by the "Seraidi" road to the north, the "Elisa" housing area to the east, the "Belaid-Belkacem" housing areas to the south, and the "Seraidi" mountain to the west (Figure 1).



Figure 1: Aerial view of the study site (Developed by Author).

Eight residential dwellings were selected for this study. These identical R+4 buildings have four storeys each and house four apartments, each with two faces (Figure 2).

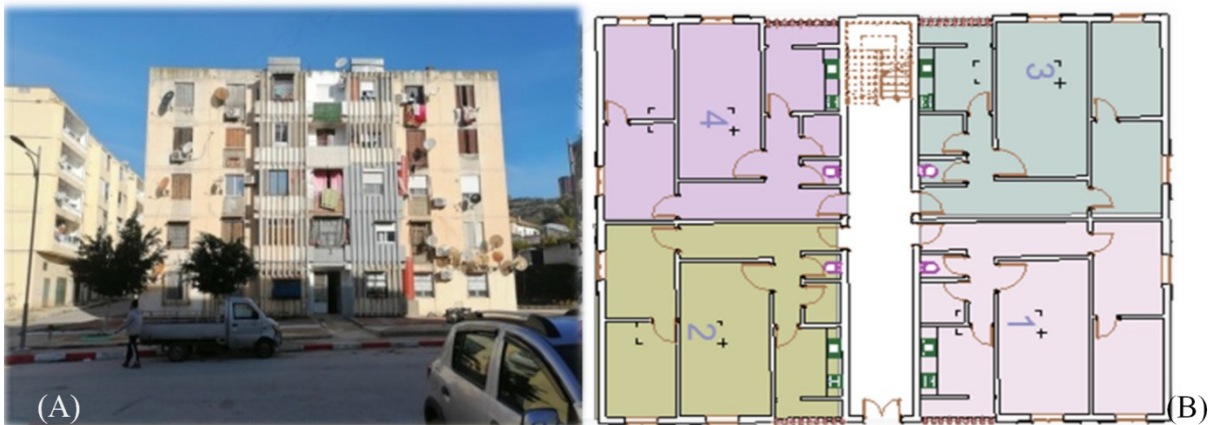


Figure 2: Architectural presentation of case studies (Developed by Author).

2.2 Méthodologie

The current study used a questionnaire survey, a quantitative data collection technique that collects a large number of comments and viewpoints by asking a series of questions in a predetermined order (Claude, 2021). It offers a number of advantages over other data collection techniques (such as focus groups and interviews), including price, speed and ease of use, as well as the ability to involve a wider population (Gilham, 2008). According to (Sanni-Anibire et al., 2016), They are considered a crucial element in the functioning of any structure (Nooraei, M.; Littlewood, J.; Evans, N. , 2013). Surveys are the most important element in determining whether or not technological features are relevant to the CBO.

For the POE, surveys are the most important element in deciding whether or not technical features contribute to end-user happiness. The questions were written succinctly and clearly to help participants understand the purpose of the survey. It consisted of single-choice and multiple-choice questions. The main objective was to study the interaction between occupants and natural light without their living space. The evaluation was carried out in August and September 2022. 190 people each received a personal copy of the questionnaire. There were 134 responses in all, or 83.75% of the total, with 91.8% of responses coming from women and 8.2% from men. A software program called SPHINX Lexica was used to process the results (figure 2).

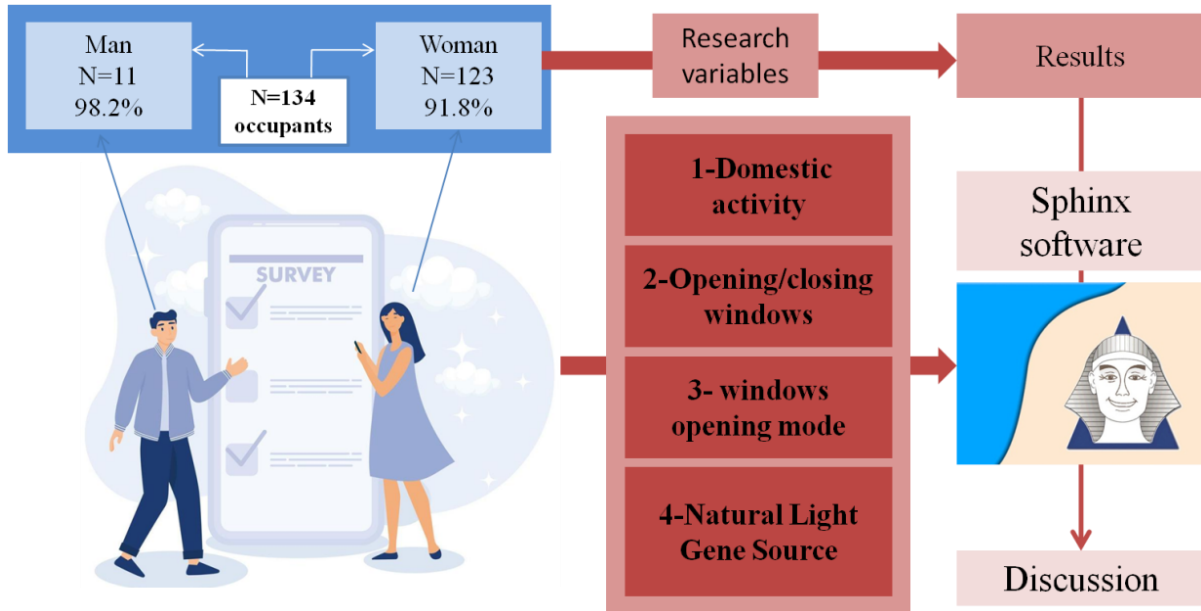


Figure 3. Structure of the Study (Developed by Author).

3. Results and discussions

3.1- Domestic activity

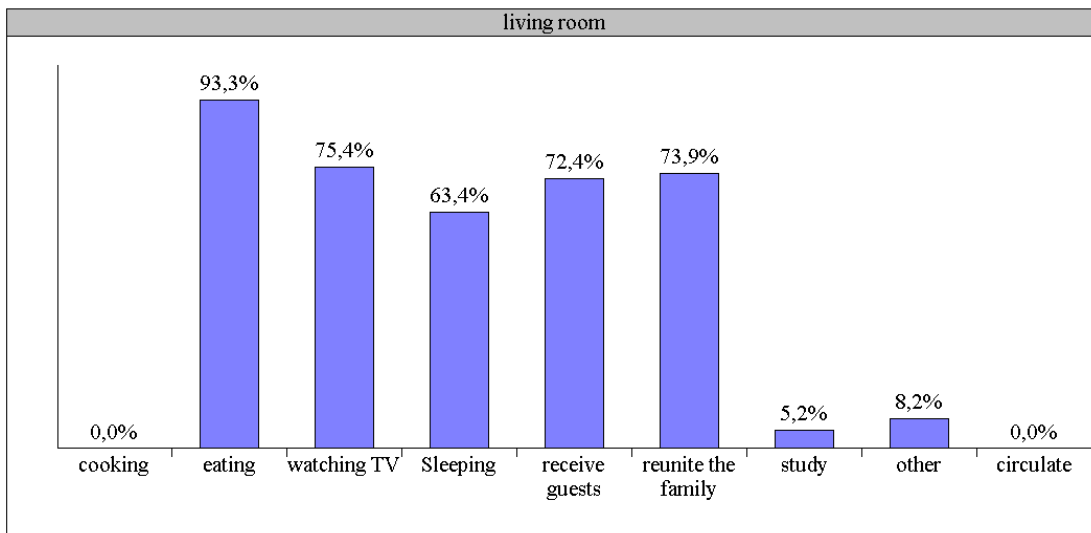


Figure 4: Domestic activity in living room (Developed by Author).

The numerous household tasks performed by the sample's residents in the various areas are depicted in the graphs. We see that every room in the living area serves several purposes.

The living room is commonly used for entertaining visitors, family gatherings, and watching television, according to 72.4%, 73.9%, and 75.4% of residents, respectively. Almost all residents - 93.3% - use this room for eating, 63.4% for relaxing (sleeping), 5.2% for studying and 8.2% for other activities.

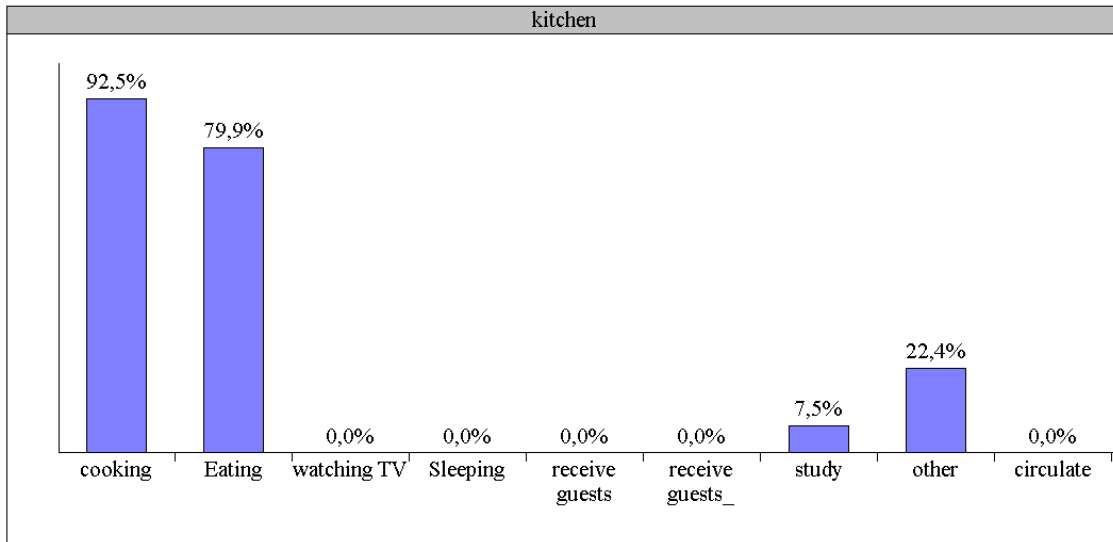


Figure 5: Domestic activity in the kitchen (Developed by Author).

92.5% of occupants utilize their kitchen area for cooking, 81.3% for eating, and 82.1% for doing laundry. 22.4% of users use it for other jobs, and 25.4% use it for learning.

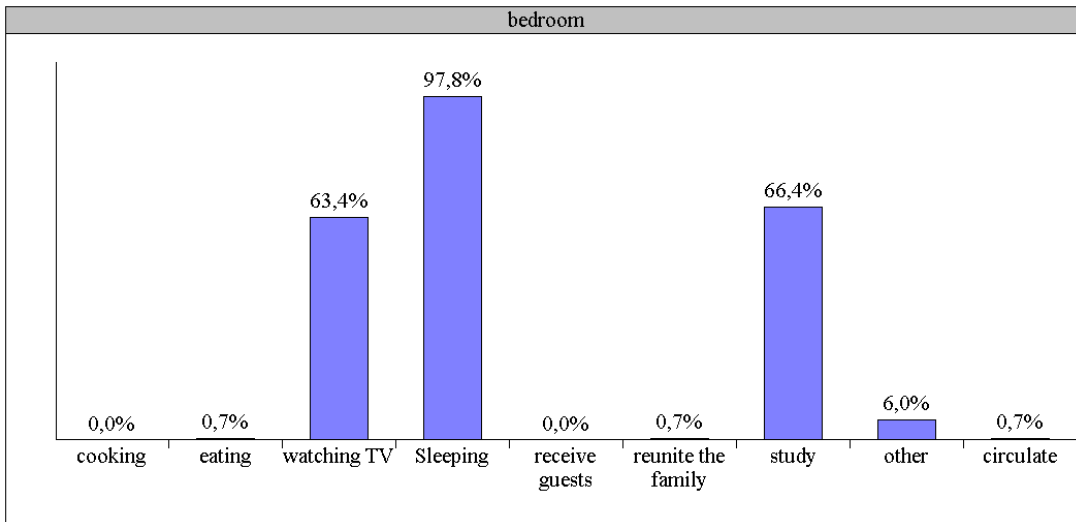


Figure 6: Domestic activity in the bedroom (Developed by Author).

Bedroom usage: 63.4% of residents use it for studying, 97.8% for sleeping, and 63.4% for watching TV. Only 6% of renters use this area for additional activities.

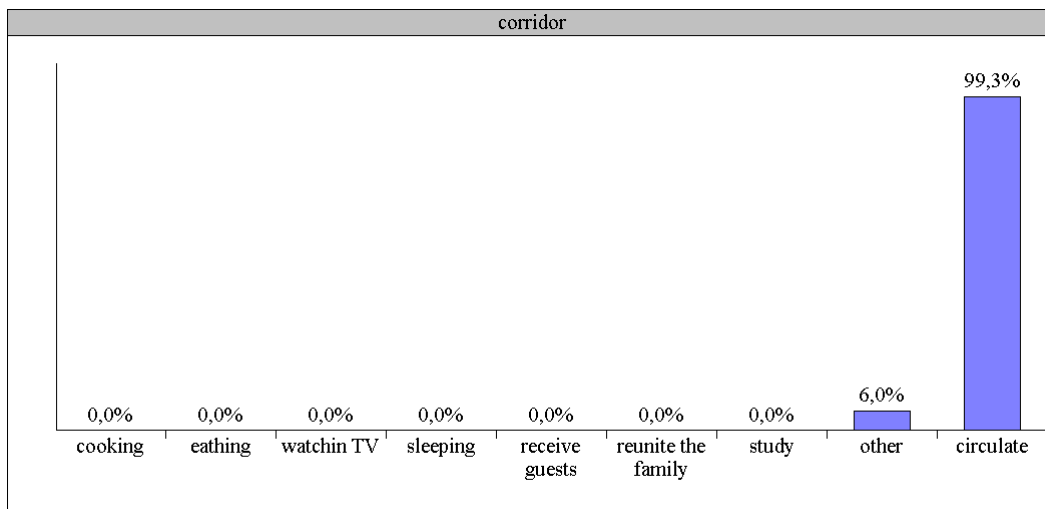


Figure 7: Domestic activity in the corridor (Developed by Author).

While the corridor is undoubtedly a place for circulation, 6.0% of tenants utilize it for other purposes, such as: washing the carpets, airing the house, and getting together with the family by opening the door and enjoying the air.

3.2-Opening/closing windows

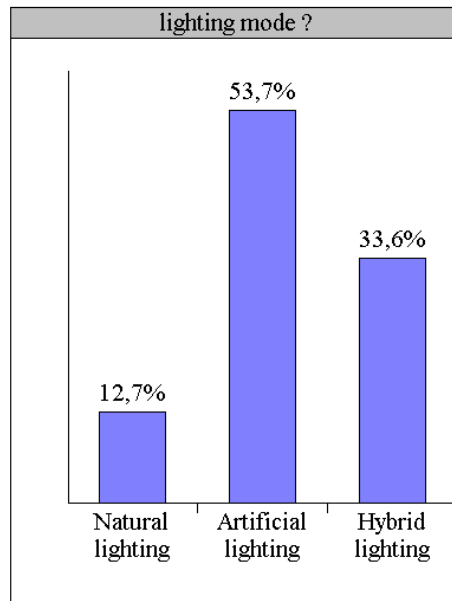


Figure 8: Type of lighting used during the day (Developed by Author).

The graph shows that, with 53.7% of total lighting, artificial lighting is the most frequently used lighting option. Artificial lighting comes in at 33.6% and natural lighting at 12.7%. This confirms the results of the daytime satisfaction study.

3.3-window opening mode

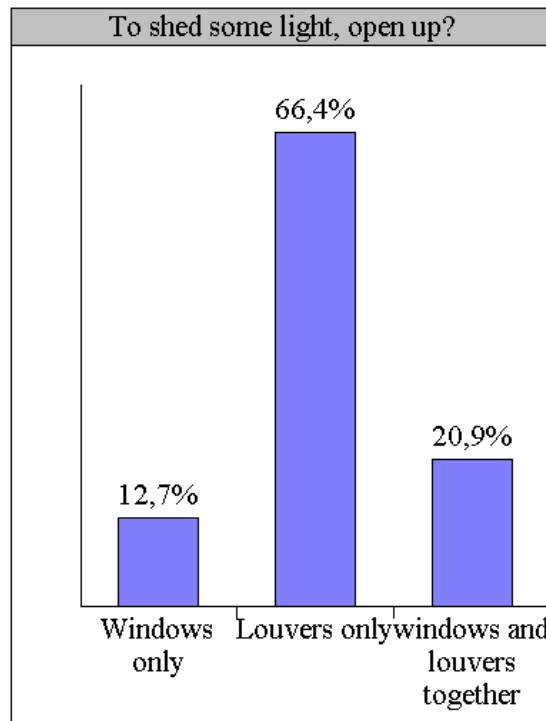


Figure 9: Window open/close mode (Developed by Author).

As per the graph, a mere 12.7% of inhabitants open their windows just for the sake of illumination. Still, 66.4% of locals claim to just open their blinds. Yet 20.9% of people simultaneously open their blinds and windows.

3.4-Natural Light Gene Source

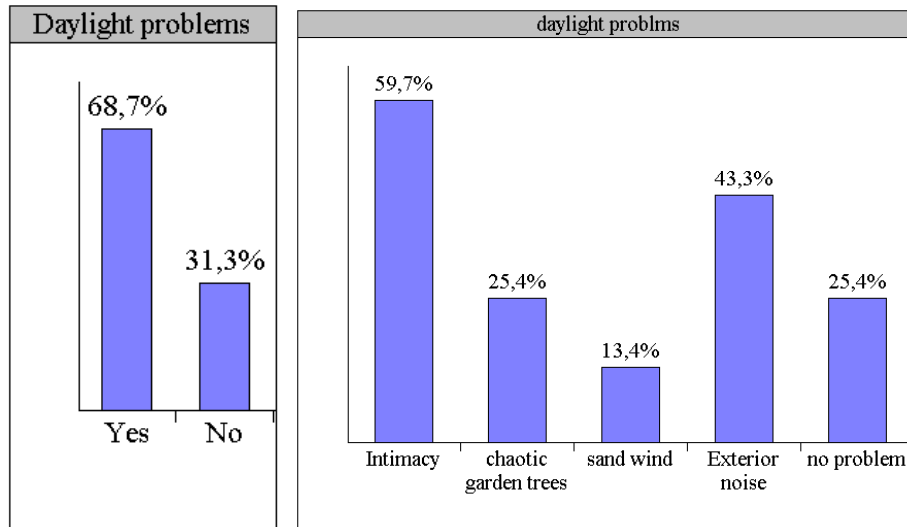


Figure 10: Genes encountered during daylighting (Developed by Author).

The majority of residents (68.7%) reported having issues with their living area's natural illumination. However, 31.3% of respondents believe that there are no barriers to natural sunlight, while 35.7% of respondents are worried about privacy, 15.2% of respondents claimed that the placement of trees in outside gardens was to blame for the absence of natural light in inside spaces, 8.0% stated that the sandy breeze was a source of discomfort, and 25.90% said that noise from the outdoors kept people from taking use of the natural illumination.

4. Discussions

This evaluation shows that the residents are dissatisfied with the natural lighting of their living space and the quality of the view to the outside. The concept of dissatisfaction leads the resident to either change or rearrange the current situation, or to move, or to change his or her attitude toward the current living situation (Hadda Mezrag et al., 2018). These comments could also be linked to the need for occupants to adjust lighting. (DUVAL, 2017). These comments could also be related to the need for occupants to adjust lighting. (Kralikova, R. & Wessely, E., 2018). Consistent with previous research, the (Durak, A et al., 2007), Our study shows that controlled lighting components are needed to achieve maximum satisfaction for home users.

5.Conclusions

As part of a post occupancy evaluation of natural lighting in the residential area of the Oued el Fourcha settlement in Annaba. The study evaluates the behavior of occupants as they perform different household activities in different areas of the home. We found that these rooms combine several functions in addition to their main ones, so the need for light is different. Hybrid lighting is the most commonly used lighting mode, followed by artificial lighting. The majority of residents had problems using daylight, mainly due to privacy concerns. Some residents also indicated that the location of trees, sand breezes, and outside noise were sources of discomfort. Occupants found a solution to these problems of seclusion by settling for artificial lighting as an alternative.

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