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Living Space Needs of Small Housing in the Post-Pandemic Era: Malaga as a case study

* Professor Dr. **Carlos Rosa-Jiménez**  , B. Arch. **Cristina Jaime-Segura** 

¹ and ² Institute for Habitat, Tourism, Territory, Edificio Ada Byron, Campus de Teatinos, 29071, University of Malaga, Malaga, Spain.

¹ E-mail: cjrosa@uma.es, ² E-mail: jscristina@uma.es

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ABSTRACT



The COVID-19 lockdown period has highlighted the ability of housing to accommodate a comprehensive programme typical of the city and its public space. Housing units of under 60 m² and in blocks of flats are the more vulnerable, as they have a higher percentage of non-community open spaces. That problem was analysed using a methodology based on psychological, urban planning and architectural indicators applied to two coastal cities in the Mediterranean area of southern Spain. The results highlight three aspects in this type of dwelling: the need to consider the orientation of the housing to improve the quality of indoor and outdoor space; the need in public housing policies for a greater number of rooms to facilitate remote working; and finally, the importance of functional terraces overlooking green areas.

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1. Introduction

In Spain, the stay-at-home lockdown during the COVID-19 pandemic highlighted the difficulty of combining remote working and family life. The experience of not only much of the Spanish population but also worldwide was reflected in numerous media assessments of the shortcomings of the housing stock. The stay-at-home lockdown forced people to relegate their whole daily life to their homes. In the words of Fernández Galiano (2020) "the intimate

hideaway has become a prison cell". Suddenly, the home has become the centre of all activity, even that which had taken place up until then in the city - which practically emptied -: education, work and leisure. Stay-at-home lockdown revealed the lack of

*Corresponding Author:

Institute for Habitat, Tourism, Territory, Edificio Ada Byron, Campus de Teatinos, 29071, University of Malaga, Malaga, Spain.

Email address: cjrosa@uma.es

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terraces, indoor environmental quality and flexible spaces in much of the residential stock built in Spain (Cuerdo-Vilches et al., 2020). Yet the less resilient type of housing to lockdown is, on the one hand, the housing units of under 60 m² and with no views of green areas, as their households are more prone to depression (Amerio et al., 2020) and, on the other hand, those located in community blocks and with aligned façades, given the difficulties to carry out extensions or alterations. This paper stresses three aspects for this type of housing: the need to consider the orientation of the housing to improve the quality of the indoor and outdoor space; the need for public housing policies for a greater number of rooms to facilitate remote working; and, finally, the importance of functional terraces overlooking green areas. This article is organized into four parts. The first chapter reviews the state of play. The second presents the analysis methodology based on psychological, urban planning and architectural indicators applied to two coastal cities in the Mediterranean area of southern Spain. The third and fourth chapters consider the results and discuss the main contributions of this paper.

2. Background

Until vaccines were developed, the hygienist movement considered the city and housing as a necessary way to prevent disease. Keeping houses clean, locating them in airy and sunny places, going outdoors and breathing pure mountain air in a suitable climate was recommended. These were the tenets of the hygienism advocated by Le Corbusier and the Modern Movement, which influenced the design of hospitals where those four principles were applied, such as the Paimio Sanatorium, designed by Alvar Aalto in Finland between 1929 and 1933. In a review of the literature on the needs arising from the pandemic and its lockdown, the returning to the hygienic principles of the Modern Movement can be organised into indoor space conditions and outdoor space conditions.

2.1. Indoor Space Conditions

During a lockdown, there needs to be a flexible approach to living space (Bettaieb & Alsabban, 2020; Cuerdo-Vilches et al., 2020; Nanda et al., 2021) for work, schooling, leisure and exercise, which requires each user to have at least a private room (Nanda et al., 2021). As

regards work, even though the idea of remote working dates back to the end of the 1960s (Van Meel, 2011), its implementation was rare in Spain (del Águila Obra et al., 2002). According to Mitchell (1999), remote working brought the home and the workplace back together, after the industrial revolution had separated it as the result of functional and spatial specialisation. Yet in turn, this would mean, on the one hand, an increase in demand for space for remote working at home with similar qualities to those of conventional offices (Ng, 2010); and, on the other hand, adequate access to information and telecommunication technologies (Ahmadi et al., 2000; Broderick, 1991; Cuerdo-Vilches et al., 2020) in an appropriate, safe and healthy work environment (Harmon-Vaughan, 1995; Hobbs & Armstrong, 1998; Kaufman-Scarborough, 2006; Kim, 2017).

As regards space, current housing is not designed for working from home and alterations would be needed (Gurstein, 2001; Magee, 2000). With the COVID-19 lockdown, many workers were forced into a work-from-home (WFH) using any available space at their home (bedrooms, living rooms, kitchen or terraces), such as pop-up offices (Nanda et al., 2021). A minimum of 60 m² surface area per housing unit (Amerio et al., 2020) and the importance of housing overlooking green areas (Amerio et al., 2020; Mirza & Byrd, 2018) also have to be added in that regard. With respect to the indoor quality indicators, natural lighting and thermal and acoustic insulation (Cuerdo-Vilches et al., 2020) are included, along with using windows to ensure well-aired homes (Porrit & Campbell, 2020).

2.2. Outdoor Conditions on Terraces and Balconies

Terraces and balconies are some of the great contributions of the hygienist movement. There is a difference between both terms: if the width is the same or smaller than the average human size, it is a balcony, while if it is larger, it can be considered a terrace as it is more comfortable (Gupta, 2019). Both elements are closely tied to a medical and hygienist role, as they are used for patients to convalesce, and they were incorporated by the Modern Movement in its architectural designs (Campbell, 2005). Thus, Le Corbusier put forward the solarium or covered garden terrace as one of the five pillars of the architecture of the Modern



Movement (Le-Corbusier, 1986), as manifested in the *Ville Savoye* (1929). It was later transferred in the tower block, evolving from a large double-height space open to the façade, in the first designs of the *L'Esprit-Nouveau* pavilion to the *brise-soleil* balconies and the use of the community roof of *L'Unité d'Habitation*.

Yet after World War II, medical advances in the development of vaccines - e.g., cholera (1884) or tuberculosis (1927) - began to mean that they're being healthy spaces began to lose importance. The speculative pressure of housing prices in the city or the development of environmental comfort technology thanks to air conditioning and mechanical ventilation reduced the size of the terraces and turned them into balconies. On the other hand, the terrace grew in importance in mass tourism architecture (Fernández Fuster, 1991:255): dimensionally (accounting for a third of the total surface area of tourist apartments), spatially (transition space between the outdoors and indoors) and symbolically (enjoying leisure as a social achievement). A paradigmatic example is, certainly, the pyramid terraced blocks of La Grande Motte (Languedoc-Rousillon, France) designed by Jean Balladur.

At present, there is a whole line of architecture specialised in terrace design (Jodidio & Kim, 2016; San Martín, 2007). Apart from its hygienic values, we can find two main lines of study: its environmental value and its link to public space. In terms of comfort, the terrace is the best space to be at dusk and dawn (Gupta, 2019); along with historically improving the energy performance of vernacular architecture (Foged, 2019). While its relationship with the public space depends on its positioning in the building and its link with the street space. Thus, the roof of the building, as it is the furthest plan from the relationship with the city, has links to the idea of a hidden city (Herranz, 2016). As regards the façade and during the pandemic, Grigoriadou (2020) analysed the urban balcony as a spontaneous public space where numerous social activities and social practices took place, including Gardening, leisure, recreation (Bettaieb &

Alsabban, 2020) or exercise (Cuerdo-Vilches et al., 2020). In fact, during the lockdown period of the pandemic, it was the most sought-after space by home users (Cuerdo-Vilches et al., 2020). However, specific dimensions, at least 6 m² per apartment with sliding doors (Bettaieb & Alsabban, 2020), are required for it to function correctly.

3. Methodology and Study Case

A mixed-method, based on quantitative (objective indicators) and qualitative (subjective indicators) approaches, was used to analyse stay-at-home lockdown during COVID-19. The objective indicators include:

(a) Planimetric survey and calculation of the closed/open surface area:

- Detailed drawing of the furnishing
- Detailed drawing of the possible routes in the house (mobility)

(b) Urban data:

- Urban location: type of neighbourhood, the height of the housing
- Orientation of the main façade
- Views and connection to the public space

The subjective indicators include an online questionnaire that was completed after the stay-at-home lockdown period. It was sent to the occupants who had been previously informed that the study would be conducted. They were asked to assess the positive and negative characteristics of their homes (layout and fittings), the activities they did at home and the changes they would make to them. The profile of the users was very similar: The majority were young couples without children, although a family with an older child was also included, but never with small children.

The four case studies (Figure 1) are flats in multi-family residential blocks along the Mediterranean coast of southern Spain. Three of them in Malaga - as an example of a non-tourist urban environment case study -, and one in Velez-Malaga, as a case study in a tourist environment. In Malaga, the first urban fringe (Case A), the urban edge (Case B) and the old town (Case C) were chosen. While a tourist neighbourhood (Case D) was selected in Velez-Malaga.



Figure 1. Location of the Case Studies along the Mediterranean coast of southern Spain. (Developed by Authors).

4. Results

As regards WFM, in housing units of under 60 m² with maximum resident occupancy, they were forced to use the living room as a pop-up office (Table 1). However, in homes over 60 m², or where there were the same or higher number of residents, the bedrooms were used as pop-up offices, in the same way as before the pandemic. In the case of housing units with only 1 bedroom for 2 users who worked, the living-dining room had to be shared, which limited its use for video conferences, leisure activities (watching television) or meals. It can

be concluded that small flats are more appropriate for remote workers who live alone, or where only one of them is working from home. The same situation occurs in the case of the 2-bed housing, which is more appropriate for 2 residents. As regards exercise, the lack of an appropriately sized terrace (A, B, C) meant the dining room or a bedroom had to be converted into a gymnasium. However, in Case of D, if they did have a large enough terrace, the users also used the dining room to exercise, as it was larger.

Table 1. Objective indicators.

Study case	A	C	D	B
Neighbourhood	Haza del Campillo	Molinillo	Torre del Mar	Los Viveros
Height	B+4	B+5	B+6	B+2
Orientation	North	North	Northeast	East
S _i (m ²)	40	48	67	70
Indoor surface area				
Number of rooms (N)	1	2	2	3
S _o (m ²)	-	8	15	2.7
Outdoor surface area				
Number of balconies	-	-	1	-
Number of terraces	-	2	-	1
Number of residents (R)	2	3	2	2
S _i /R (m ²)	20	16	33	35
N/R	0.50	0.66	1.00	1.50
S _o /R	0.00	2.66	7.50	1.35
Resident age	26 – 27	49 – 51 – 23	34 – 27	24 – 27
Number of residents in WFM	2	1	0	1
Pop-up office	Living room	Living room	-	Bedroom
Number of residents exercising	2	1	2	1
Exercise space	Living room	Bedroom	Terrace / Bedroom	Living room



As regards the indoor environmental conditions, the results in table 2 indicate a greater need for natural light and less thermal comfort for the case of north-facing buildings (A, C, D), while there was a greater sense of light in the dual-aspect Case B; furthermore, the users were aware of very little noise due to the lack of mobility during the pandemic. As far as the outdoor environmental conditions were concerned, the owners' answers also stressed the need to have a terrace of a functional size, larger than the 6 m² proposed by Bettaieb & Alsabban (2020), and of a shape that makes it easier for activities, according to the standards

of Gupta (2019). It is almost a psychological need to avoid the feeling of confinement. The existing balconies are very limited as they are used for hanging out washing or even as storage. In Case C, there are terraces large enough for furniture for the space to be used; however, as those terraces are nearly exclusively north facing and have no sunlight, space was not very pleasant and ended up not being used. In this regard, the terrace in Case D is sufficiently large to comfortably hold furniture and was used. Furthermore, even though it is also north-facing, it has views over the sea, which makes it a pleasant spot.

Table 2. Subjective indicators.

QUESTIONS		A	C	D	B
Positive characteristics of current home	Indoor	All rooms with openings outside	The large and well-lit main bedroom	Good surface and distribution	A great deal of light
	Outdoor	-	Has terrace	Enjoyable outdoor space	-
Negative characteristics of current home	Indoor	Small home: all activities in one single room	The temperature is not very comfortable, particularly in the kitchen	Lack of light. Bathrooms do not have windows	Temperature not very comfortable year-round
	Outdoor	No outdoor space	-	-	-
What aspects would you change of your home to make lockdown more bearable?	Indoor	Would add another room or extend the existing one, to create another workspace (currently, both work in the same space and it is very inconvenient). A larger kitchen	More natural light, to avoid feeling locked in	Bathrooms with natural ventilation. Combine the kitchen and living room to have one larger room	-
	Outdoor	Include an outdoor space to avoid feeling locked in	Larger outdoor space on the terrace or on the roof of the building, large enough to exercise	Better distribution of the outdoor space for better use	More outdoor space, to be able to get fresh air or exercise outside

4. Discussion and Conclusion

The results of this study (Table 3) coincide with current papers considering the problem of lockdown during the pandemic. Specifically, the comparison of housing units under 60 m² with those exceeding this standard not only confirms the results of Amerio et al. (2020) but also complements them in three aspects, which are detailed below. The first is the inclusion of orientation as a factor influencing environmental conditions. In our study, housing units facing north are a negative factor in the perception of thermal conditions and lighting. An aspect that is not reflected in the study by

Cuerdo-Vilches et al. (2020), and which also goes beyond the consideration regarding an appropriate sizing of the window proposed by Bettaieb & Alsabban (2020). As regards the built housing stock, the orientation of a housing unit is a variable that cannot be modified, which makes this indicator a negative factor to be considered in the resilience of the housing during lockdown periods, to avoid such a type of housing.

The second is remote working, the case studies of small housing show that the housing extensions suggested by Gurstein (2001) and Magee (2000) to incorporate this function are

not possible. Therefore, WFH is possible in appropriate conditions where there is a room converted into an office for each user working in the housing unit, i.e., those that originally were oversized in relation to the number of people living there, and when a room had already been converted into an office before the pandemic (Cases D and B). The results are, therefore, in keeping with Nanda et al. (2021) who opted for a relationship between the number of rooms and the number of residents over 1. This is even greater than the need for a balcony for the flats, which is only considered a demand on the rise. However, in contrast with Bettaieb & Alsabban (2020), Cuervo-Vilches et al. (2020) and Nanda et al. (2021), we do not consider high levels of space flexibility to be necessary, as most of the case studies had the same or a greater number of rooms than the users.

The third is concerning the terraces and balconies. Our results also coincide with Cuervo-Vilches et al., (2020) and Bettaieb & Alsabban (2020) in that they are the most sought-after spaces and, along with the dining room, the spaces most used for exercise. However, unlike the above authors, this study also stresses the need for an appropriate orientation and quality views. Continuous balconies are the ones that work best and an

exercise circuit can be set up if they provide a continuous flow with the home. In this regard, tourist housing offered a better response to the COVID-19 lockdown, as they usually have a large surface area of terraces-solariums design, better landscape visuals, and communal areas with swimming pools and/or landscaped areas. Land availability even means that extensions of the building can be envisaged (Case D).

If we analyse some examples of contemporary architecture, we find two examples that may be relevant. The first is the project to transform *Bois-le-Prêtre* tower (2005-2011) by Druot, Lacaton & Vassal, where a winter garden was attached to the existing façade connected to most of the rooms (Tostões & Silva, 2020). It is a glazed transition space between the main part of the house and the balcony that can be used by the users as an office or exercise area during stay-at-home lockdowns. However, this type of solution is only possible in blocks of flats that have free areas for growth. The second example is the design of the *Huerta Tower*, by the MVRDV Studio, as part of the Sociopolis project (Valencia, Spain), where each housing unit has a large cantilever terrace. A design that the architecture team had already tested at the *WoZoCo* (Amsterdam, Netherlands).

Table 3. Conclusion and assessment of indicators.

	A	C	D	B
INDOOR SPACE				
Dimension $S_i > 60 \text{ m}^2$	-	-	+	+
Room for remote working	-	-	+	+
Orientation	North	North	Northeast	East-northeast
Sufficient natural lighting	-	-	-	+
Thermal insulation	+	-	+	-
Noise insulation	+	+	+	+
Views	Inner court	Street	Street Green area	Inner court Street
OUTDOOR SPACE				
Typology	-	Balcony	Terrace	Balcony
Surface $> 6 \text{ m}^2$	-	-	+	-
Assessment	-	Inadequate	Enough	Inadequate
Use	-	clothes horse	Sport	clothes horse
Activity level	-	Low	High	Low

According to the obtained results, there is an obvious need for the social housing standard to be reviewed by the Administration and other legislators (Cuervo-Vilches et al., 2020; Madeddu & Clifford, 2021): an adequate orientation for the sun is required (banning just north-facing), the number of rooms adjusted to the number of persons (1 room per person) (Nanda et al., 2021) and terraces included (not

just balconies) over 6 m^2 in size and suitable to facilitate activities (Bettaieb & Alsabban, 2020) and avoiding north facing. Guidelines that should be included in refurbishing policies and for new housing developments.

Given that the limitations of this study are focused on childless couples or with an adult offspring, future research should analyse the case of large families with small children, along



with assessing the impact of lockdown on different types of architecture. It would also be relevant to go further into the role of tourist housing as a positive habitat for lockdown and the doors that those designs open for the remote working city.

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Conflict of interests

The authors declare no conflict of interest.

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