

Healthy Cities Commission: call for evidence

## **Laboratory for Design and Machine Learning Royal College of Art**

The Laboratory for Design and Machine Learning is a cross-disciplinary design research group dedicated to research with tangible social impact. The architectural practice-led research in the Lab focuses on design analysis, design processes, and design value. It explores the impact of data-driven and evidence-based design, regulatory frameworks, and policy, and lived experience and cultural expectations on spatial design. The Lab is part of the School of Architecture at the Royal College of Art in London.

Our study **The Home, the Household, and Covid-19** explored how people in London have used, adapted, and experienced their home during Covid-19. It examined how satisfied occupants are with their home and its design, what criteria they use to define well-designed homes, and what their current and future housing expectations are. As we spend more hours inside our homes, a detailed study that interrogates the changing use and perception of the home is crucial for the future of healthy and equitable cities.

Data was collected through an online survey and interviews with residents living in the Greater London area. The online survey and interviews (2nd March to 6th May 2021) took place during the initial easing of the third national Covid-19 lockdown in England, which started on 6th January 2021. There were a total of 1,250 complete survey responses and, subsequently, in-depth interviews with 50 of the survey participants.<sup>1</sup>

The survey found that people spent on average 22-23 hours a day at home during the pandemic, indeed for 61% it was 22 hours or more, compared to 13-14 hours on average before the pandemic.

### **2.A - Is there evidence that changes to urban design and housing quality – including energy efficiency, security, affordability – for both new development and neighbourhood regeneration lead to healthier cities?**

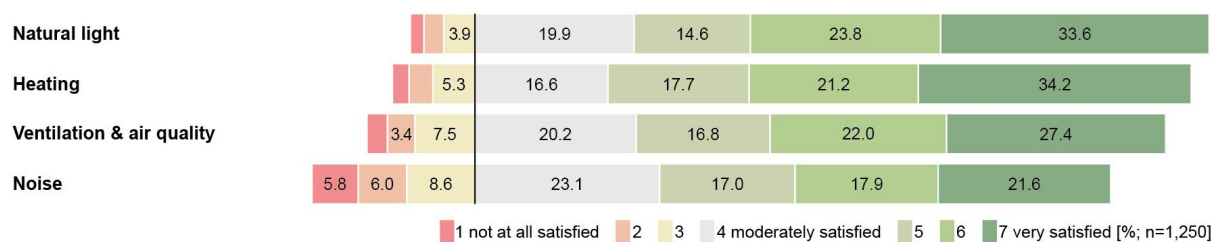
In the assessment of housing quality, environmental comfort plays an important role. When asked about how comfortable the interior of their homes is, measured against standard environmental factors, the great majority of survey respondents (67%) were at least moderately and around one-third very satisfied with the levels of natural light, heating, ventilation and air quality, and noise.

However, giving further details on specific problems (413, 33%), the main issues experienced by respondents related to natural light (141) were a lack of or too small windows (30), with other concerns including blocking of light by structures and trees (22) and building orientation (15). Heating problems (173) were largely caused by poor heat

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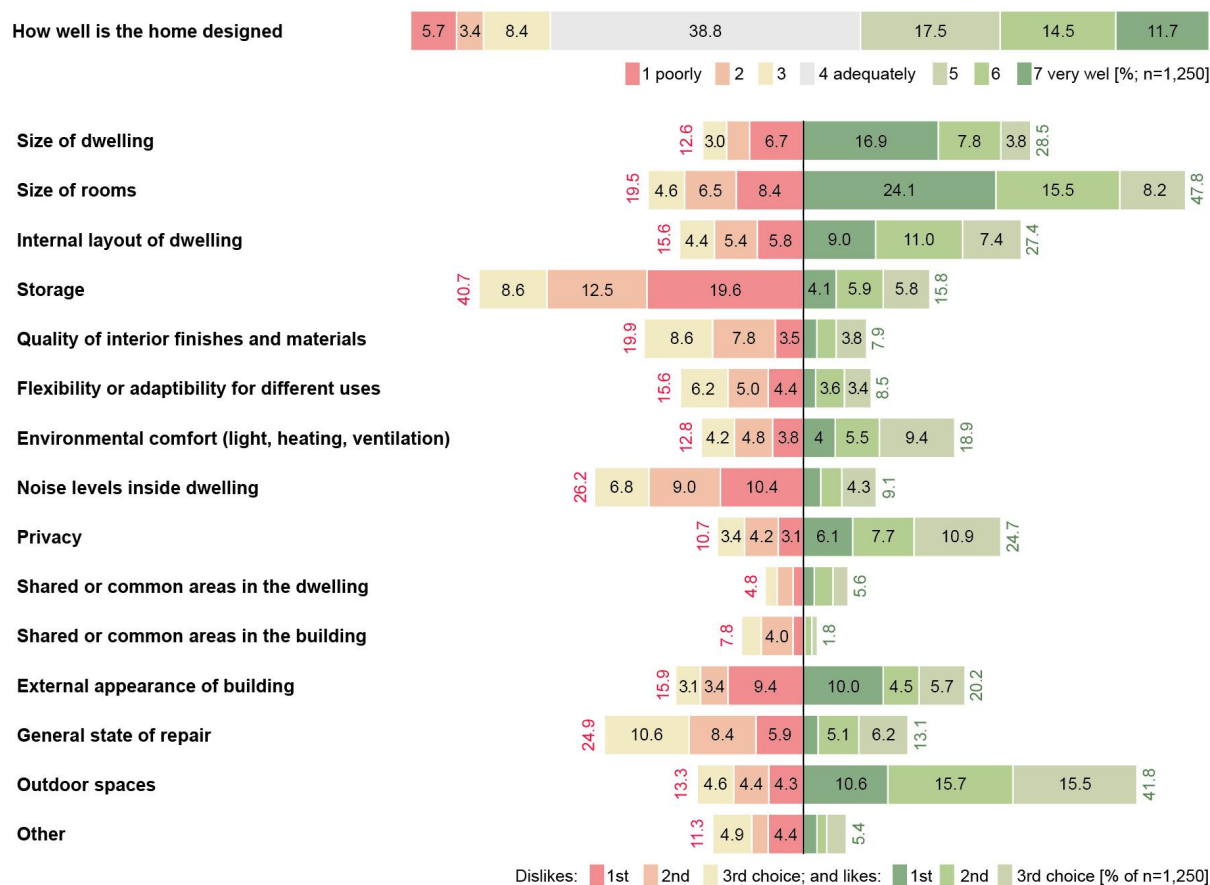
<sup>1</sup> Further information on methodology can be provided upon request.

distribution and retainment due to inadequate thermal insulation and draught proofing (65) or insufficient and not working heating systems (70). Common ventilation and air quality issues (145) were lacking cross ventilation and operable windows (23) as well as background or mechanical ventilation (12), leading to damp, mould, and condensation problems (28). In addition, external factors such as air pollution (32) and smells (9) were mentioned. But the most common complaints were about noise (306), especially in flats (200), with problems split between noisy neighbours (125) and external noise pollution from roads and planes (119).



**Table 1. Comfort in home interior based on environmental factors**

Although only 17.5% of respondents found the design of their home inadequate, many more were unhappy with certain aspects of their home (Table 2). When questioned about the three things they liked or disliked most about the design of their homes in order of importance (Table 2), the five top positive features related to room size (28.5%), outdoor space (41.8%), dwelling size (28.5%), internal layout (27.4%), and privacy (24.7%). At the same time, the five least liked features were storage (40.7%), noise (26.2%), general state of repair (24.9%), quality of interior finishes and materials (19.9%), and size of rooms (19.5%).



**Table 2. Likes and dislikes about the design of the home.**

To put this into context, the five things generally considered important in a well-designed home are, in order of priority and considering only the first criteria (1,113), dwelling size (281), room size (180), light (152), layout and design (142), and outdoor space (66). However, taking into account all replies, the design of dwellings (459) is the greatest concern voiced by all respondents. But unlike other categories, design is less readily defined and encompasses a range of considerations. Most commonly, it refers to the layout of dwellings but also the flow of spaces and their functionality, adaptability, and flexibility.

The survey found that the size and quality of their home impacted the wellbeing of 37.9% (474) of all respondents during Covid-19. This means that there is a strong connection between how housing quality is perceived and the wellbeing of the occupants. 54% of those with natural light issues, 54% of those with heating issues, 65% of those with ventilation, and 55% of those with noise issues reported that the size and quality of their homes impacted their wellbeing (Table 3).

	Reported wellbeing issues		Did not report wellbeing issues		Total	Chi square tests of independence
	n	%	n	%		
<b>Environmental Comfort</b>						
Natural lighting						
Yes	55	54%	46	46%	101	X2 (1) = 12.7621 p = .000354 N = 1250
No	419	36%	730	64%	1149	
Heating						
Yes	70	54%	59	46%	129	X2 (1) = 16.3218 p = .000053 N = 1250
No	404	36%	717	64%	1121	
Ventilation						
Yes	110	65%	59	35%	169	X2 (1) = 61.276 p = <.00001 N = 1250
No	364	34%	717	66%	1081	
Noise						
Yes	141	55%	114	45%	255	X2 (1) = 41.0783 p = <.00001 N = 1250
No	333	33%	662	67%	995	
<b>Design Issues</b>						
Size						
Yes	186	56%	149	44%	335	X2 (1) = 65.1351 p = <.00001 N = 1250
No	280	31%	635	69%	915	
Design						
Yes	125	57%	94	43%	219	X2 (1) = 41.396 p = <.00001 N = 1250
No	349	34%	682	66%	1031	

**Table 3. Comparisons of environmental comfort and design issues with wellbeing.**

Quality, wellbeing and comfort were further explored through in-depth interviews. Participants were asked what the reasons were for choosing where they live and if those reasons are still valid today considering the impact of Covid-19.

Although only mentioned by a few participants, energy efficiency was among the reasons for participants choosing their homes. However, sustainability and energy efficiency came up much more frequently when participants were asked what they thought made a home high-quality. For participants, energy efficiency encompassed environmental factors such as having proper ventilation, natural lighting, and a comfortable temperature inside their home, but also other factors such as ‘more green’ and ‘eco-friendly’ materials. One participant spoke about how technology, such as ‘smart meters’ helps to be more comfortable in their home:

“Having a smart thermostat, it's actually, it doesn't save you any money, really, I think, but it does mean that you're comfortable all the time, you're not like not turning on the heat because you want to save. Instead, the whole thing is automatic, and you're just

always comfortable and just automatically turns off when you're not home. So I'd say that definitely is a factor of a high quality home.”

For participants, choosing a home based on energy efficiency was not necessarily among their top priorities, however, they spoke positively about energy efficiency once they had witnessed the benefits. An example is a participant who is forced to use Barking and Dagenham’s own energy supply:

“There's a mixture of renewable solar energy and panels and all that. So that was quite interesting. I don't know if you would call it a perk but definitely interesting feature of the flat I would say (...) but I am quite eco conscious so I'm actually quite glad that this is a feature.”

However, there were also participants who witnessed poor energy efficiency and high bills, particularly those in rented homes. The participants that had pay as you go meters complained about high bills and problems paying their bills during lockdown. One participant said the following about their pay as you go meter:

“it is sometimes very expensive. I mean it's much more expensive than a regular meter, and due to the pandemic and the difficulties in the location of this. We've had it hasn't been possible for us to change it so we're, we're stuck to the pay as you go”

In the interviews, participants were asked about some of the reasons for choosing the home they currently live in. The main reason given was location (44), followed by size (30). Among the 50 participants interviewed, more than one-third (18) spoke about choosing their home based on affordability, whether for renting or any form of ownership. Affordability in many cases determined the neighborhood and the amount of space they could afford. A first-time buyer using the government’s Help to Buy scheme benefited greatly from being able to commute to work safely using his cycle:

“I used to commute to work by bicycle, and there's a really good cut out cycle highway CS3 from Canary Wharf, into the city, and it's also really nice because it's all along the Thames River. So that for me was a huge reason why I chose it, because I was going to commute by cycling. It was a new built and it was affordable.”

One out of five participants also mentioned security and safety as important factors when choosing their home. Location was further considered important when participants spoke about feeling safe, in addition to certain building features and characteristics such as a buzzer or a communal garden. Safety and security were mentioned more by women participants, for example, a participant said:

“I've worked a lot of evenings quite late, and so I'm coming back late on my own and I want to feel comfortable in the area that I'm in.”

## 2.2 - What is the evidence that poor quality housing leads to physical and mental health, excess (winter) deaths, accidents in the home, increased hospital admissions and readmissions, premature moves into residential care and fuel poverty?

As stated, the survey found that the size and quality of homes impacted the wellbeing of 37.9% (474) of all respondents during Covid-19, with a further 9.2% (115) unsure (Table 4). The negative responses were about mental health, health, and wellbeing issues caused by the pandemic, using words indicating a lack of space and mobility, such as ‘claustrophobic’, ‘cramped’, ‘cut off’, ‘confined’, ‘trapped’, and ‘imprisoned’, and expressing strong negative emotions, such as feeling ‘overwhelmed’, ‘anxious’, ‘stressed’, ‘depressed’, ‘unmotivated’, ‘frustrated’, ‘lonely’, ‘isolated’, and ‘sad’. The pandemic has seriously exacerbated existing housing inequalities. While one respondent said, ‘we love our house, so when school shut we were fine’, another said, ‘horrible, depressing environment – being here makes me suicidal’.

Aspects of size and quality on wellbeing	First response		Second response		Third response		Total
	n=350	%	n=199	%	n=151	%	n=
Sufficient space (positive impact)	55	15.7	9	4.5	5	3.3	69
Access to outdoor space (positive impact)	21	6.0	20	10.1	5	3.3	46
Housing quality, design (positive impact)	18	5.1	6	3.0	5	3.3	29
Negative feelings, mental health	92	26.3	31	15.6	21	13.9	144
Not enough space	83	23.7	31	15.6	22	14.6	136
Privacy and noise	35	10.0	27	13.6	25	16.6	87
No access to outdoor space	33	9.4	20	10.1	14	9.3	67
Housing condition, environment, design	14	4.0	25	12.6	28	18.5	67
Working from home	27	7.7	16	8.0	10	6.6	53
Being in same space/same routine	25	7.1	10	5.0	8	5.3	43
Sedentary lifestyle	11	3.1	6	3.0	2	1.3	19

**Table 4. Impact of dwelling size and quality on wellbeing.**

In the interviews, participants further expanded on in which ways their physical and mental health had been impacted. One participant, confined to just her bedroom due to not having a living room in their house share, stated:

“It’s not been great. I just keep hitting my[self], like on the desk or on the cupboard, because I don’t really have any space to do stuff. If I do Pilates or yoga, I can only do things that are like, straight, I can’t really do like, you know, like that on the floor because there’s no space for my hands or my legs to go. So, I just feel like I’ve had less room for activity in my life. (...) I’d want a living room, not even necessarily to socialize with anyone but just to have a different scenery.”

Other participants reported that their working from home setups were inadequate and for some even problematic for their physical health as they had no proper desk, chair, or lighting. A participant who lives in a converted terraced house that has subsided, had a desk and a chair, however, they mention:

“The floor I’m stepping on is slightly slant[ed] (...) I noticed that if I sit, then there will be like a half a centimeter difference between both my arms. So obviously if I’m working like that, then my back hurts pretty badly by the end of the day.”

Dampness and mould were the main health hazards that repeatedly came up in interviews. Some of the causes mentioned have been due to leaks from other flats, lack of maintenance, layering of materials when renovating, and poor quality materials. In some participants, the mould has even led to health concerns such as chest pain or asthma. The following are their testimonials:

“The sewage drains outside, to the point where it's flooded my hallway, and parts of the bedrooms and the living room. There's leaking from the ceiling from the properties above. I've actually got a crack in my kitchen at the moment from damage up there. (...) However, they put in short term things for long term problems. And that's my only issue, you know, things like the damp has triggered off my asthma on many occasions, and it's in every room”

“so they were fighting with them about who had to pay for it so it just never got fixed because then we went into lockdown so then having to spend, you know, another month with massive water damage in our living room, and like the amount of black mould is very depressing when you're here 24/7”

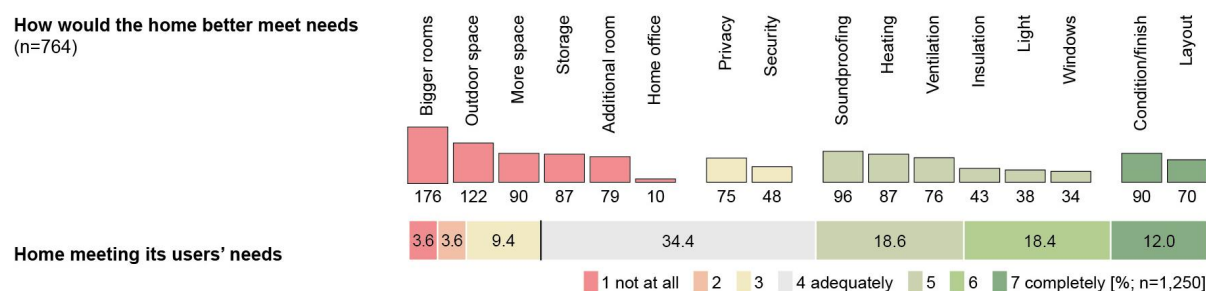
“I worry that, because of the mould, the air quality is low, or solo sometimes that I wake up in the morning and actually feel like a pain in my chest, which is a bit worrying, I must say, so I tried to leave the door or window open as, as often as I can. But that is worrying.”

#### **2.4 - What lessons can be learned from 'post-occupancy evaluations' that obtain feedback and gauge the satisfaction of the homes' occupiers?**

The extended period of time people spent inside their homes during lockdown exacerbated both positive and negative aspects of existing housing stock, making it a crucial moment for 'post-occupancy' evaluations. Similar to post-occupancy evaluations, we explored how satisfied occupants are with their home and its design. In the survey, when asked to assess the quality of homes in relation to their own needs and how their dwellings are designed, around a sixth of respondents felt that this was inadequate. At the same time, almost half believed that their needs were more than adequately met, however, only every eighth home met them completely. Similarly, less than one in nine considered their home very well designed.

Respondents (764) listed a wide range of needs that could be better met. The greatest number of replies (69.9%) were about dwelling size. Almost a quarter asked for bigger rooms, including specifically more living space (87). Every tenth required at least one additional room, often for use as a toilet, bathroom, or bedroom. Related to wanting more space was the wish for access to any or more open space (16.0%), particularly gardens and balconies (to flats). This frequently came with requests for greater privacy (9.8%), which in turn was associated with issues of security (6.3%). Another set of complaints related to more resolvable concerns around maintenance and upgrading of the home to improve environmental comfort (47.6%). First of all, more soundproofing (12.6%) was a recurrent

demand, followed by around a tenth having issues with heating and ventilation, about half of this with thermal insulation, and natural light, and a small number wanting more, larger, and insulated windows (4.5%). This was often linked to complaints about the state of repair, need for modernisation, and the quality of material, finish, and detailing (11.8%). Finally, the need for better planning and design to achieve an improved layout and use of existing space was raised by 9.2% of respondents.



**Table 5. The home and user needs.**

Even though almost half of participants felt their needs were being met in their home, a third of all survey respondents (35%) stated that Covid-19 had made them consider moving home. The most common reason given was, ‘I would like more space and some outdoor space’. When subsequently asked what they looked for in their next home, the answer of respondents (352) was more internal space (237), access to outdoor space (215), by which they mostly meant private gardens but some also referred to public or open space in the vicinity of the home. Another high priority was – rather than thinking in terms of size – wanting more rooms (127).

The results of our study point to the difficulty of reliably assessing housing design quality, as what is deemed important or sufficient greatly varies and is specific to each dwelling context and household. Especially past housing experiences by individuals play a significant role in housing expectations and how housing quality is understood. A quantitative comparison on its own can be misleading, as not all housing design and quality failures have the same impact on the health and wellbeing of occupants or the usability of a home. There are not only differences in the weighting of the severity of housing aspects or features on usability and wellbeing but how housing is experienced is highly individual and contextual, dependent on previous housing experiences and cultural expectations. It is therefore essential to collect both more qualitative and quantitative data on housing expectations and experience, especially from those most negatively affected by housing inequalities.

**2.5 - Does the evidence from the pandemic show links between susceptibility to the Covid virus and health inequalities such as: overcrowding; multigenerational households; cold and damp conditions; lack of space to work or study at home; lack of garden/balcony/green Space?**

The pandemic has clearly affected those sharing and lacking space and amenities greatest. Spending prolonged time at home has made survey respondents fully aware of shortcomings in the size and flexibility of a dwelling (136), the need for privacy and quiet



(87), the importance of access to outdoor space (87), and the poor condition and design of their homes (67). Working from home and a lack of live and work separation combined with remaining all day in the same space, and at times in the same room, as well as a sedentary lifestyle has created serious new domestic mental health problems and future challenges to the design and provision of housing. This is in addition to known health problems related to issues such as dampness and mould or cold and draughty homes. These physical and environmental problems were experienced in parallel to increased stress on interpersonal relationships caused by insufficient space and privacy as well as being unable to socialise and meet with friends and family. The pandemic and its economic downturn have also led to job losses and growing utility bills, especially in old and badly maintained properties, which has been another cause of stress to some.

In the interviews, participants spoke about in what ways the design of their home suited self-isolation and being sick during the lockdowns and how homes could have accommodated the new needs better. Of the participants interviewed, 12 had Covid-19.

One participant living in a flat spoke about the lack of space when sick:

“It was awful. It was absolutely awful. It was in the previous flat so it was just, it was just, ridiculous. I hated every second of it. (...) And yeah, I was just so tiny, it just felt like a prison, like we couldn't even, like, go to the rooftop, so we're just stuck there.”

Most participants who had Covid-19 mentioned how inevitably their entire household caught Covid-19 at some time. One participant told how their roommate got sick and, despite isolating from each other, they both got sick as they shared essential facilities:

“I think the hardest bit was when we both had to come out to cook or use the bathroom. I think, if the only way I could think of, it could have been better off if we had our own ensuite.”

Another participant spoke about how their household planned what to do if someone should catch Covid-19, since their roommate's bedroom ventilated into another room:

“We discussed this at the start of Covid and basically if our housemate got Covid, he would have, we wouldn't be able to use the conservatory. He would have to be able to open all the windows and the conservatory, (...) and that would be the only way that you can get ventilation in there.”

Other participants spoke about how their balconies would not comply with the self-distancing rules, because ‘we will be less than two meters apart from each other’ when using the balcony. This was also the case for many participants who would use their local park due to a lack of private outdoor space. A participant with children expressed how difficult it was for the children to be locked up all day:

“We try, if it's not raining, [to] go out for daily walks because we don't have a garden. We don't have a balcony. So we're quite claustrophobic in the small flat. So I try my best to take them out for walks but it's really hard during the winter (...). I have to walk

quite far to get to the park. And there's a green area at the park but obviously, it is a bit of a walk, to be honest, especially when you've got children, it would be nice if we had a small communal garden so at least I could just sit out, get some fresh air.”

The lack of space for some participants was evident in the lack of an adequate space to work or even to live. Alarming, a quarter of homes were deemed overall too small by their occupants (26.8%), and over three-quarters (77%) found at least one room or area lacking in size for their needs. The survey showed how in one-storey flats, 7.1% (57 responses) of living rooms are used for sleeping, including in 26 studio flats or similar. In the significantly fewer cases where living rooms were used for sleeping in houses, this was typically not for a lack of available bedrooms and presumably for reasons of accessibility.

One participant living in a 5 person house share had to work, eat her meals, and watch movies all from her bed:

“I live in London in a very small flat, and the like there's literally no space that I could even use the table for working, and the chair that's provided with the room is so uncomfortable that it's actually more comfortable to sit on the bed.”

## **2.11 - Is there evidence that outcomes are unsatisfactory for occupiers of high-rise flats? Or of out-of-town estates with no community facilities?**

For some participants, living in a highrise has been challenging, especially during lockdown, due to negative interactions with neighbours, lack of outdoor space or communal areas, appearance of the building, or lack or poor maintenance to facilities. A participant living in a council managed estate, spoke about always having rubbish around the building:

“There's a lot of issues with rubbish and bins, huge amounts (...) bins are emptied on a daily basis. Sometimes even on the weekend, it's pretty extreme. And they always seem to be full. There's like a bin chute for the whole block. And that's often blocked.”

One interview participant, living in a 17-storey high-rise, complained about typical daily problems:

“I've witnessed social behavior literally going almost outside the door, you know, people drug taking (...) and I'm seeing the police, literally, outside my corridor, coming into my block, and all that. So, these things, if you'd like to stress, where otherwise you would have thought that working from home should be peaceful”

Another participant felt his child could not play safely in the common areas because neighbours complained about the noise, and expressed the desire for a private garden:

“Some of the people don't like children playing in the communal areas. They said it is too noisy. Which is sad and regrettable because in Covid children need to. So it forces people like us to go to a park that's about 15 minutes away from you because

the complaints. I wish we could have a bigger place with a garden for instance, they could go out and just feel safe to go in the communal area”

This was a recurring issue with many parents who felt their children had no outdoor space to play in and depended on having to visit the nearest park. One participant living on the ground floor of a block of flats, expressed how the lack of outdoor space was affecting their mental health and, when they could go to parks or common areas, the spaces were too crowded for social distancing:

“We had no outdoor space where we could sit comfortably and safely, or even privately, because if we did go to the front of our house, and use the property out there with everybody else that's trying to get away from their property. So there was just so many downsides to being here during lockdown, and it was playing on our mental health. In the summer when it got a bit brighter. We didn't really have anywhere to go.”

When participants were asked why they wanted to move from their home, several participants expressed they wished to change from a flat to a house. Some participants disliked the appearance of their building, saying ‘our place here looks like a prison because it's all gated’. When living in a high-rise block, one participant mentioned the difficulty for taking decisions and putting complaints forward:

“Our next home would be definitely a house in the suburbs with our own garden. I don't think I would want to be part of any residency position. You know, I like my own space. I want to be able to only worry about my own home. Occasionally, my neighbor next door, not neighbors up down left right and common areas below, and all that.”

### **3.7 - Is there evidence of benefit to health and wellbeing from access for citizens to green space facilities, parks, allotments, etc?**

The access, size, and privacy of an outdoor space during the pandemic had an immediate effect on how people could cope with staying more at home. Almost all people surveyed (97.4%) agreed that access to an outdoor space was important, including 74% who considered it very important. To provide context, 60.2% had access to a private rear garden or patio, 30% to a private front garden, and 18.2% to a balcony or terrace, while 15.3% could use a shared garden or open green space and only 13% of dwellings had none of these. In the follow up interviews, 13 out of 50 participants had no type of outdoor space. For some of those participants this was not problematic as they live near a park or other open spaces such as commons, Thames River, or sportsgrounds. However, as one participant expressed, parks were often overcrowded during lockdown:

“We are quite lucky because just opposite is a small park. So you can use that. That gets quite busy. And also this area's, not the best area. In the summer at night, actually, it's quite unpleasant”

Many participants mentioned that their outdoor space helped to cope with the stress of lockdown. A participant mentioned how even 'in quite a densely populated area in London so it's nice to have green'. A participant, who lost their job during lockdown, mentioned how their allotment helped to keep busy:

"I've been quite lucky because we've got the garden and I've been able to have my exercise. I think if I hadn't had the allotment in the summer, it really would have impacted because, you know, having my husband at home working from home, and it's quite an intense job that he does."

In addition to green spaces, participants also expressed their desire for communal spaces where they could meet outdoors in a comfortable environment, regardless of the weather. A participant who lives alone expressed the importance of having interactions among the neighbours in their block of flats:

"You know, these sorts of blocks where you don't have communal space. I wonder if they should be some sort of place where you can go and sit with your neighbors or, you know, even if it's inside. Yeah, because you know there are a few of us who get on well and in this lockdown we kind of ended up standing in the stairwell."

#### **4.8 - What has the Covid pandemic taught us in terms of health inequalities? What are the lessons in respect of residential care homes and the need for age-friendly, independent accommodation within the community?**

As our study shows, the Covid pandemic has not necessarily created new housing inequalities but significantly exacerbated already existing ones. Especially those most in need of better quality housing, experienced the most severe impact on their health. There is a significant link between housing and health inequalities.