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Summary of modifications:

Following the suggestions and comments made by the reviewers, the following changes have been made:

In response to the comment made by Anna Mavrogianni, we have addressed the issue about the place of work in those who were practicing work from home. The Aims were included in the Introduction. The issue about interpretation of R2 as a weak correlation has been expanded; a reference by Singh et al has been cited to explain the reason for our analysis. Greater analysis of potential relationships between characteristics of homes and wellbeing has been made in the form of figures.

To address the suggestions of Simone Torresin, the Research question has been defined in greater detail, and a conclusion section added to describe how the research question has been answered. The t-tests were performed as suggested and specification made whether assumptions were met. Incongruence about "feeling in general" R2 values between the text and the table T3 has been corrected. Further details are provided to discuss the regression results with reference to direction of associations. The results have been presented in the results section and not been introduced for the first time in Discussion. As suggested, home-based participants were excluded. A limitation section has been added.

Sir
We are submitting a manuscript titled 'Effect of lockdown on activities of daily living in built environment and well-being' to be considered for publication in UCL Open: Environment. It is submitted solely to UCL Open: Environment; the manuscript or a substantial portion of it is not under consideration and has not been published elsewhere.

COVID-19 pandemic has been unlike anything most of us have encountered in our lifetimes. Without a vaccine or drug to prevent or to treat, physical methods are the only methods of prevention. By default, built environmental factors have been brought to the forefront in dealing with it. Currently, published studies have focussed on the layout and construction of workspaces to enable physical distancing, with comments on transportation modes and distance from places of residence. The largest and most strict lockdown ever, aspects of micro built environment, or the place of living and its impact on the people was important for effective implementation of the lockdown. There has not been a formal documented of this subject. The current exploratory work assessed the effect of the immediate built environment on the daily living during the initial weeks of the lockdown. This social experiment can offer insights into how aspects of daily living are impacted by the immediate surroundings. While the effects

of built environment on health (well-being, physical exercise, access to food, sleep and shift work) are recognised, this offers an unusual opportunity to assess how these were affected by voluntary isolation. Further longitudinal studies can provide information into the long-term implications, when economic burden begins to be felt as a result of the forced lockdown. In addition, transdisciplinary interactions of built environment, workplace design, distance from place of residence, stress at work and at home, hours of sleep, place for relaxation can provide a comprehensive framework for further design of spaces.

Thanking you

Yours truly,

GR Sridhar

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Effect of lockdown on activities of daily living in built environment and well-being

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Abstract

In an effort to arrest the spread of COVID-19 infection, a nation-wide lockdown was declared in India in March 2020. To assess how personal built environment affected the citizens in the first few weeks, an explorative online survey was conducted, eliciting responses about the work habits before the lockdown, the psychological well-being, time spent in various activities, characteristics of those who worked from home and sleep patterns. The major difference entailed by the lockdown was a reduction of time and distance to go to their workplace, which was an average of 8.9 km. In terms of diet, subjects who were vegetarian did not experience any difference, unlike those who were non-vegetarians, who reduced the intake of meat. Forced social isolation did not alter the television channels that were viewed. Among those who worked from home, most preferred to work from their bedroom. There was no change in the quality or quantity of sleep

during the lockdown. This study in the early weeks of the lockdown documents the way in which individuals lived through it in terms of the built environment at home.

Introduction:

The coronavirus (Covid-19) epidemic, identified at the turn of 2020 has an ability to spread by droplet transmission. There is as yet no vaccine to prevent it, or drugs to cure the infection. The only measures to reduce the transmission consist of physical distancing, frequent washing of hands with soap and water, and avoiding touching the face. Though these are simple to itemize, it is difficult to implement. In an attempt to prevent community spread of infection, India imposed a lockdown, beginning on 22nd March 2020. Depending on the situation, the lockdown has been modified over the course of time.

The uncertainty about the disease coupled with lockdown across the nation led to a stressful situation for the common good. It is understandable that apprehension and anxiety could result from being lonely due to social isolation, fear of being infected, economic impact and uncertainty about the future course (1). A report that compared psychological distress and loneliness in 2018 and in April 2020 showed that the prevalence of serious psychological distress increased three-fold in April 2020 (1).

Following the outbreak of Covid-19, a number of studies were published on knowledge, attitude and practices (KAP) about the condition from across the world, including different parts of India (2,3,4).

Built environment, refers to ‘‘environments that are modified by humans, including homes, schools, workplaces, highways, urban sprawl, accessibility to amenities, leisure and pollution (5). It is conceivable that the response to the pandemic and measures to slow its spread can be modified by built environment. To our knowledge, there have not been any studies evaluating the effect of built environment on daily living and psychological stress during the lockdown. A report from Brazil studied the spatial correlation between the incidence of Covid-19 and human development (6). Doshi et al reported that fear about Covid-19 was low due to lack of knowledge, although women, lower educational status and being a healthcare worker were associated with higher fear levels (7). In situations such as these, physical interviewing is neither feasible nor desirable. Earlier studies have shown that social media platforms can be employed to recruit as well as to communicate about Covid in both developed and developing countries (8,9). Therefore we have conducted an online survey to assess the effect during the early weeks of lockdown on living habits, attitudes and other aspects influenced by the built environment.

The twin aims of the study is to evaluate how activities of daily living (ADL) have a bearing on well-being during lockdown and how spaces at home support ADL during the “stay home stay safe” strategy. The research questions we attempt to address are (A) Is there a perceptual change in wellbeing during lockdown to that of before lockdown? (B) As a health concern are there any changes in food

habits and rest/sleep? (C) How do people accomplish their responsibilities of work/study?

Methods:
The second phase of lockdown beginning 15th April 2020 till 03rd May 2020 had stringent restrictions of "stay home" with 3-4 hours of relaxation in the morning to take home essential commodities. A structured questionnaire was developed covering different sections in sequence, namely demographics, food intake, activities of daily living, built environment (specifically homes), leisure and entertainment, and health and wellbeing.

This self-reported questionnaire survey designed in Google forms (available in Appendix at the end of the manuscript) was administered online from 19th April 2020 to 07th May 2020, i.e. during and beyond 4 days of the second phase of lockdown (Figure-1). The online questionnaire was circulated to the contacts of the authors by online social media.

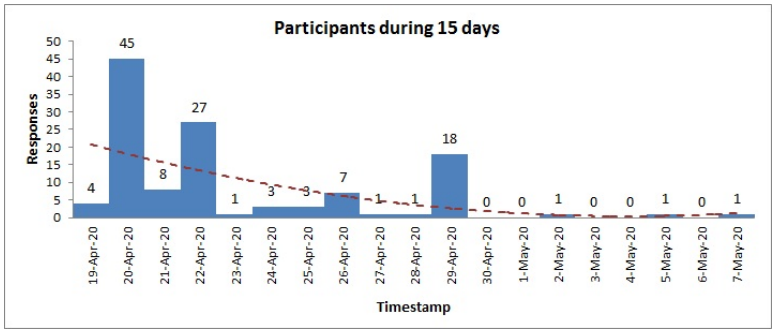

Figure 1: Duration of online survey

The section of Demographics has data pertaining to Age, Gender, Height, Weight, Marital status, Education and Employment. The Food intake section is related to information on changes of intake in principal meals and any change in intake of vegetarian and non-vegetarian food items. Information of activities of daily living covered day-to-day tasks. Questions on the Built environment section related to where their residence is located (area, floor level), type of house (rented/owned, individual/apartment etc.), what spaces do they have and where they spent most of the time during lockdown. Watching television and spending time with family at home being common leisure and entertainment activities, questions were included on the preferences of channels like movies, sports, education, spiritual, serials/drama, music, environment and news. Lastly the section on health and well-being relate to whether they are taking any medication along with six questions on well-being (Feeling in general; Energy, pep or vitality; Feel any tension; Happy, satisfied or pleased with personal life; Feel healthy enough and Concerned or worried about health and well-being). Following the objectives of the study, the wellbeing of the subjects is assessed for the activities of daily living (ADL) and how spaces at home support them using linear regression.

Statistical analysis
Of the 121 responses received, there is considerable demographic representation of age, gender, food habits, profession (Table-1a) and age with

physiological parameter of Body Mass Index, BMI (Table-1b). Linear or multiple regression analysis was employed to evaluate the relationship of dependent variables with predictor variables. Independent variables which have significance of $p<0.05$ with coefficients that have positive association with the dependent variables are discussed. While R2 of greater than 50% is considered significant, in sociological and psychological studies low R2 do have relevance (10) specifically considering the unprecedented situation that humankind encounters and volatile experience of the respondent to comprehend. The variables considered throw light on aspects that could be taken into account to find ways to live with situations like covid-19 pandemic. Statistical analysis using excel is carried out for the parameters of demographics, food intake, ADL, built environment, leisure and entertainment, and health and wellbeing.

Results:

Demographic variables are presented in Table 1a and 1b

Table-1a: Details of responses by gender, food habits and profession

	Gender		Food Habits		Profession		
	Male	Female	Vegetarian	Non-vegetarian	Employee	Student	Home based
Percentage	63%	37%	27%	73%	70%	22%	7%
Number	76	45	33	88	85	27	09

Table-1b: Age and Body Mass Index (BMI)

	Age (in years)	Body Mass Index (BMI)
Mean	35.5	26.3
Standard Deviation	12.9	4.6
Minimum	18.0	15.7
Maximum	70.0	49.9
Number of Subjects	121	121

Food habits: Questions on whether there is any change in food intake were asked. Items like chicken, mutton, fish etc. were considered for non-vegetarian and various types leafy vegetables, tubers, vegetables etc. were considered for vegetarian subjects. Table below shows the responses of change in average intake of various items by vegetarian and non-vegetarian subjects (Table-2). Ttest for vegetarian and non-vegetarian groups show significant differences ($t<0.05$) for food intake during lockdown. Further, the standard error of mean for the two groups of vegetarian and non-vegetarian food intake during lockdown show reduction in intake of non-vegetarian items (Figure-2).

Table-2: Average intake of food items

Food Intake During Lockdown					
Non-vegetarian			Vegetarian		
Intake	Number	Percentage	Intake	Number	Percentage
Never had	14	15.9%	As usual	20	60.6%

Started	08	9.1%	Light increase	05	15.2%
Stopped	15	17.0%	Moderate increase	07	21.2%
Increased	11	12.5%	Heavy increase	01	3.0%
Remained the same	24	27.3%	Total	33	100%
Reduced	16	18.2%			
Total	88	100%			

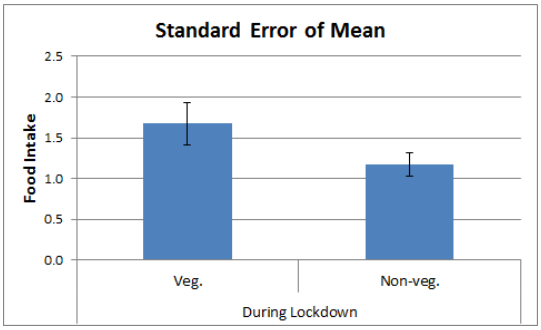

Figure 2: Food intake during lockdown

Health and Wellbeing: Self-reported questions on perception of well-being parameters include "energy, pep, vitality", "happy and satisfied personal life", "feel healthy to work", "generally tensed" and "worried about health". However, a question "feeling in general" is asked which includes overall perception of health. A regression analysis of different predictor well-being parameters that contribute to "feeling in general" is analysed for both before and during lockdown. The result of 121 subjects show a significance of $p<0.02$ with predictor variables of "energy, pep, vitality" and "feel healthy to work" to the dependent variable of "Feeling in General", with $R^2 = 0.51$ during the pandemic situation. Whereas the predictor variables of "energy, pep, vitality", "happy and satisfied personal life", "feel healthy to work" show significant relation $p<0.02$ with dependent variable of "feeling in general" is observed before lockdown with $R^2=0.60$ indicating a greater reliability. There does not seem to have any influence of "Generally tensed" and "Worried about health" parameters indicating that the subjects feel safe during lockdown and experience the same confidence as before lockdown in absence of the epidemic (Table-3).

Watching television-TV: There is significant positive relation with 95% confidence interval and $R^2=0.18$ to "Feeling in General" for the news channels of "News updates on COVID-19 cases" with ($p<0.05$) and "General news updates" with ($p<0.01$) (Table-3). There is significant relation to "Happy and satisfied personal life" with ($p<0.01$) at 95% confidence interval and $R^2=0.14$ for channels related to "spirituality".

Table 3: Regression results

Dependent Variable	Predictor Variable	Coefficients	Standard Error	t Stat	P-value
Feeling in General	During Lockdown				
Sample size=121	Energy, pep or vitality	0.305	0.122	2.504	0.014**
$R^2=0.509$	Happy, satisfied personal life	0.149	0.096	1.556	0.123
Significance, F=2.21E-16	Feel healthy to work	0.374	0.098	3.802	0.000**
Intercept=1.704	Generally tensed	-0.115	0.072	-1.586	0.115
	Worried about health	-0.124	0.073	-1.699	0.092
Feeling in General	Before Lockdown				

Sample size=121	Energy, pep or vitality	0.501	0.088	5.687	0.000**
R2=0.601	Happy, satisfied personal life	0.193	0.071	2.739	0.007**
Significance, F=1.89E-21	Feel healthy to work	0.207	0.083	2.484	0.014**
Intercept=1.189	Generally tensed	-0.066	0.051	-1.285	0.202
	Worried about health	-0.080	0.056	-1.441	0.152
Feeling in General	Watching TV (News Channels)				
Sample size=121	News updates on COVID-19 cases	0.269	0.126	2.130	0.035**
R2=0.189	News updates COVID-19 health precautions	-0.173	0.140	-1.234	0.220
Significance, F=0.00002	General new updates	0.311	0.113	2.740	0.007**
Intercept=3.383					
Happy, satisfied personal life	Watching TV (Leisure Channels)				
Sample size=121	Movies	0.155	0.080	1.938	0.055
R2=0.145	Music	0.055	0.080	0.689	0.492
Significance, F=0.001	Spirituality	0.201	0.077	2.610	0.010**
Intercept=4.069					
Feel healthy to work	Mode of Transport				
Sample size=121	Public transport (Bus/Metro etc.)	-0.190	0.114	-1.665	0.099
R2=0.119	Para transport (Autorickshaw)	0.115	0.136	0.850	0.397
Significance, F=0.023	Company vehicle	0.066	0.076	0.871	0.385
Intercept=4.112	Personal Car	0.161	0.067	2.395	0.018**
	Personal 2-wheeler	0.084	0.068	1.236	0.219
	Shared transport (friends vehicle)	0.014	0.083	0.174	0.862
WfH	Employees living at individual houses irrespective of ownership				
Sample size=22	Bed room	3.253	1.355	2.401	0.029**
R2=0.526	Balcony/Sit-out/Utility	-1.631	0.815	-2.001	0.063
Significance, F=0.024	Front/Back yard	-1.932	1.379	-1.401	0.180
Intercept=10.698	Toilet	-1.752	1.131	-1.550	0.141
	Other Rooms	-1.746	0.958	-1.823	0.087
WfH	Students staying at own houses				
Sample size=21	Bed room	1.540	1.041	1.480	0.160
R2=0.481	Balcony/Sit-out/Utility	1.727	0.803	2.152	0.048**
Significance, F=0.057	Front/Back yard	-2.164	1.212	-1.785	0.095
Intercept=7.882	Toilet	-2.488	1.030	-2.415	0.029**
	Other Rooms	-0.717	0.799	-0.898	0.384
Sleep Pattern	Night sleep				
Sample size=121	Generally tensed	0.007	0.003	2.682	0.008**
R2=0.057					
Significance, F=0.008					
Intercept=0.313					
Sleep Pattern	Siesta				
Sample size=121	Generally tensed	0.007	0.002	3.417	0.001**
R2=0.089					
Significance, F=0.0009					
Intercept=0.032					
**indicates significance at 95% confidence interval					

The expectations of the people when the lockdown is released show Mode of transport in personal car has a positive relation with "Feel healthy to work" ($p<0.02$) with $R^2=0.12$(Table-3).

Built environment and Work from Home (WfH): Of the 121 samples 62% of them own the residence, 37.2% stay in rented houses and 0.8% stay in quarters provided by the employer. The breakup of different types of residential buildings are Apartment/group housing (52.9%), Individual/independent houses (40.5%) and (6.6%) of Row housing. With 22 home-based (10 home makers/retired

persons, 22 office/business persons at home) the average distances of 9.5 KM travelled by the remaining 99 office/institute going respondents have actually saved time and energy that could be contributed to WfH.
The generally available spaces for residential buildings in India are kitchen, living, dining, balcony or sit-out spaces, toilets/washrooms and with more than 90% of them having 1-4 bedrooms (11). The number of dwellings studied consisting of these spaces are shown in the figure with few having exclusive spaces viz. store space, home theatre, garage/parking, terrace and back/front yard (Figure 3).

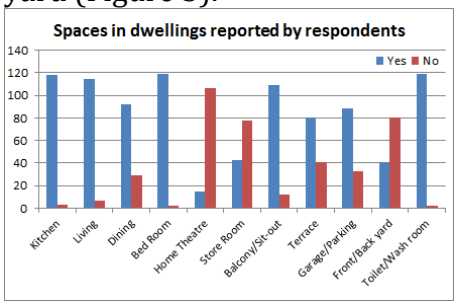

Figure 3: Spaces in dwellings

We assessed the response of the participants on WfH and found that people whose homes are of group housing/apartment type have no significant relation. Those staying in individual houses (22 respondents) irrespective of the ownership prefer WfH from their bed room space ($p<0.05$ and $R^2=0.52$) with 95% confidence interval (Table-3). As for the students, those who stay at their own houses (21 samples) prefer balcony/sit-out spaces to perform their activities ($p<0.05$ and $R2=0.48$ with 95% confidence interval). The general living conditions in Indian homes can broadly be categorized under active and passive zones. Activities related to watching TV, family interactions and daily chores of household are performed in active zones that include living, dining and kitchen and are often noisy. Hence the possibility of WfH with no other choice left could happen in bedrooms and sit-outs that are relatively calm and are sufficient in numbers considering the average size of 4-members in a family (Figure 4). However, design of spaces that could accommodate the requirements of formal and calm environments for WfH is important during situations of "stay home stay safe".

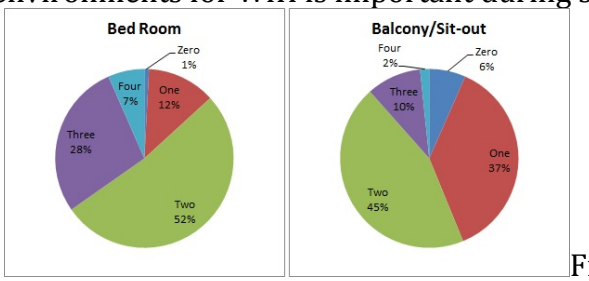

Figure 4: Percentage of number of bedroom and balcony/sitout present in dwellings.

Sleep Pattern: There is a significant relation in sleep patterns to the well-being parameter of "Generally tensed" indicating poor quality of sleep due to stress or anxiety. Night sleep and siesta were significant at a $p<0.01$ at 95% confidence interval with $R^2$of 0.06 and 0.09 respectively (Table-3).

Discussion

We report an exploratory view of how the built environment was impacted by the world's biggest lockdown following the covid pandemic; rather than take a

narrow technical deep view of architecture per se in terms of construction, transmissibility and other micro-environmental factors, we considered the different ways in which people responded at home and for work in their immediate built environment.

Essentially we observed that the major difference entailed by the lockdown was a reduction of time and distance to go to their workplace. In terms of food intake, those who ate only vegetarian food did not experience any change, unlike those who were non-vegetarians, who reduced the intake of meat. This was necessitated both by the cost as well as an (unfounded) fear of transmission through meat. To fill the time available on hand during the lockdown, watching television at home was a common past-time. Forced social isolation did not alter the channels watched (movies, sports, educational, spiritual, soap operas, music, environment or news).

The unprecedented lockdown led to the family staying at home, and accomplishing all their usual activities in an environment for which it was not originally designed, viz employment work, studies, entertainment and leisure all at once by all the family members. Among those who worked from home, most preferred to work from their bedroom. Students preferred to study outside the house, in balconies or in sit-outs.

Sleep is one of the compromises in the modern world, where people are accused of 'gorging themselves with food and starving themselves of sleep' (12). Here was a situation where there was ample time available for sleep, without the distractions of work or the forced circadian disruptions of shift work. However there was no improvement of quality or quantity of sleep during the lockdown. Dependent variables of "night sleep" and "siesta" are significantly related to predictor variable of "generally tensed" and hence poor sleep), but the small sample sizes makes it difficult to reach valid conclusions. However, factors including fear of being infected, economic uncertainty could have played a major role. It was a period of forced isolation, not volitional vacation; in addition the period of study could have been too short for any changes to be perceived.

Following the recognition of covid-19 pandemic, attention has focused on built environment trends to lower the risk of transmission by the design of buildings (13), as well as other tactile surfaces such as doorknobs, switches, toilet handles and faucet knobs (14). More broad based concerns about the construction of smart cities which can deal with future pandemics consisted of popularization for health science, improving emergency health systems, and keeping in place multi-industry coordination mechanisms, to deal with pandemics (15).
The concept and application of built environment owes its origin to epidemics and pandemics in the past: bubonic plague in the 14th century, yellow fever in the 18th and cholera and small pox in the 19th all resulted in innovations such as broad boulevards, sewer systems, plumbing and urban sprawls (16).

Besides healthy workplaces, telecommuting and online accessibility of various services including telemedicine, distance learning, online shopping and online entertainment are bound to evolve. Houses are not just physical structures, but

they are part of a broader social sphere; pandemics disturb the structures and routines that are closely inter-related, which is an interesting macro feature to consider (17). Some of the potential ways covid-19 will impact built environment consist of a shift away from large city offices, a reduced reliance on cars for transport to jobs and development of new forms of public spaces (18).

Ultimately these must lead to rethinking of design, operations, behaviour and maintenance to ensure that first the workplace and thence the economy is less susceptible to disruptions caused by disease (19).

To convert the crisis into an opportunity, one must plan to respond to such unexpected events, re-calibrate transport facilities, the work places to improve spatial distancing, as well as re-design of the environment by fusing blue and green infrastructure (20,21).

Conclusion

The unprecedented lockdown due to COVID-19 pandemic has greatly impacted the behaviours of family staying at home and accomplishing all their usual activities in an environment for which it was not originally designed. The “stay home stay safe” strategy contributed for wellbeing factors of general health, happiness and vitality while keeping away the worry of health and feeling of tensed. However, there seems to have an (unfounded) fear of transmission impacting their food habits and with ample time to rest there is no improved sleep compared to prior lockdown or during normal days. While there are difficulties in performing the activities of daily living mainly of work and leisure related in constrained environments, people could find spaces and seem to adapt with reasonable modifications to built environment. WfH could also benefit with reduced effort in travel distance and time by whatever mode of transport they opt. Forced social isolation did not alter the TV channels watched at home and family members seemingly found new ways and means of entertainment.
Some of the potential ways covid-19 will impact built environment consist of a shift away from large city offices, mode of transport and development of new forms of public spaces. More broad based concerns about the construction of smart cities can deal with future pandemics with popularization of health science and improving emergency health systems keeping in place multi-industry coordination mechanisms, to deal with pandemics. Besides healthy workplaces, telecommuting and online accessibility of various services including telemedicine, distance learning, online shopping and online entertainment are bound to evolve.

Limitation of the study

Our exploratory study has limitations in having a small sample of subjects along with inherent biases in the recruitment of subjects who had access to internet, were conversant in English and agreed to participate in the study. Nevertheless, it confirms the principles of built environment on well-being and health (22) and hopefully provides an impetus for development based on sound biopsychosocial concepts.

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Appendix:
Online link to Questionnaire:
https://docs.google.com/forms/d/e/1FAIpQLSdNFuo3S8x4zUE1UG7RtRF52dpONvvJG_T58AYbzCUElbzXjg/viewform?vc=0&c=0&w=1

Author: Anna Mavrogianni

Review text

I would like to thank the authors for this is very interesting and timely study.

I have a few comments/suggestions:

- Abstract: 'most preferred to work from their bedroom'. I was wondering to what extent this is an actual choice given the multiple restrictions that might apply in some instances, especially in smaller or overcrowded homes.

  "The general living conditions in Indian homes can broadly be categorized under active and passive zones. Activities related to watching TV, family interactions and daily chores of household are performed in living, dining and kitchen and are often noisy and are usually considered as active zones. The only livable spaces left are

bedroom and balcony/sit-out which are relatively calmer and considered passive zones. Hence with no other choice left,WfHcould happen in bedrooms and sit-outs that are relatively calm and are sufficient considering the average size of 4-members in a family. Thus the job attending respondents' preferred bedroom and educational institute attending respondents preferred balcony/sit-out (Figure 4). However, design of spaces that could accommodate the requirements of formal and calm environments for WfH is important during situations of "stay home stay safe".

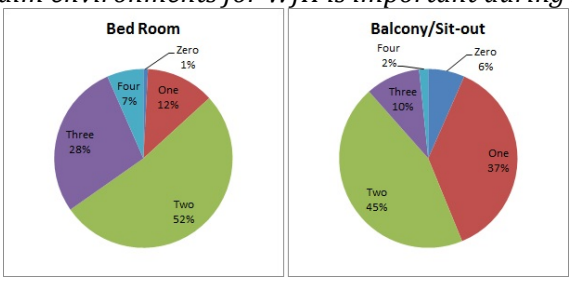

Figure 4: Percentage of number of bedroom and balcony/sit-out present in dwellings.

- I would have perhaps included the Aims in the Introduction rather than the Methods section.

  Yes, it has been includedin Introduction section.

  "The twin aims of the study is to evaluate how activities of daily living (ADL) have a bearing on well-being during lockdown and how spaces at home support ADL during the "stay home stay safe" strategy."

- I think that part of the results analysis could be slightly clearer. For instance: "There is significant positive relation with 95% confidence interval and R2=0.18 [...]" I would have interpreted such an R2 value as a weak correlation? This applies to other results too, such as the analysis of sleep patterns.

  "While R2 of greater than 50% is considered significant, studies show that in sociological and psychological research low R2 do have relevance (Ref. 10 in paper) specifically considering the unprecedented situation that humankind encounters and volatile experience of the respondent to comprehend. The variables considered throw light on aspects that could be taken into account to find ways to live with situations like covid-19 pandemic."

  Ref. 10 in paper: Singh, A.K., Low R-squared values in multiple regression analysis? (2020). https://www.researchgate.net/post/Low_R-squared_values_in_multiple_regression_analysis/5f14e06e55a4926101753aa8.

- A more in-depth analysis of potential relationships between the characteristics of participating homes and wellbeing during the lockdown would have been very interesting.

  The aim of the study is to assess Activities of Daily Living (ADL), whether existing built environments support ADL when all members stay home and overall well-being. During questionnaire design, striking the balance addressing all and keeping in view the respondent's ease, specifically time and effort taken to fill the

questionnaire online was challenging. However, following modification is made to explain the characteristics of participating home and wellbeing.

"Built environment and Work from Home (WfH): Of the 121 samples 62% of them own the residence, 37.2% stay in rented houses and 0.8% stay in quarters provided by the employer. The breakup of different types of residential buildings are Apartment/group housing (52.9%), Individual/independent houses (40.5%) and (6.6%) of Row housing. The generally available spaces for residential buildings in India are kitchen, living, dining, balcony or sit-out spaces, toilets/washrooms and with more than 90% of them having 1-4 bedrooms (11). The number of dwellings studied consisting of these spaces are shown in the figure with few having exclusive spaces viz. store space, home theatre, garage/parking, terrace and back/front yard (Figure 3).

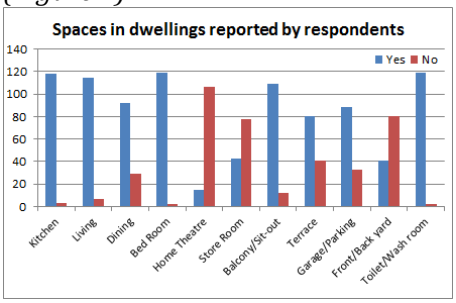

Figure 3: Spaces in dwellings

We assessed the response of the participants on WfH and found that people whose homes are of group housing/apartment type have no significant relation. Those staying in individual houses (22 respondents) irrespective of the ownership prefer WfH from their bed room space ($p<0.05$ and $R2=0.52$) with 95% confidence interval (Table-3). As for the students, those who stay at their own houses (21 samples) prefer balcony/sit-out spaces to perform their activities ($p<0.05$ and $R2=0.48$ with 95% confidence interval). The general living conditions in Indian homes can broadly be categorized under active and passive zones. Activities related to watching TV, family interactions and daily chores of household are performed in active zones that include living, dining and kitchen and are often noisy. Hence the possibility of WfH with no other choice left could happen in bedrooms and sit-outs that are relatively calm and are sufficient in numbers considering the average size of 4-members in a family (Figure 4). However, design of spaces that could accommodate the requirements of formal and calm environments for WfH is important during situations of "stay home stay safe".

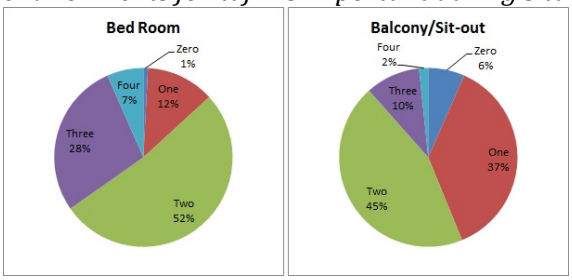

Figure 4: Percentage of number of bedroom and balcony/sitout present in dwellings.

Author: Simone Torresin

Review text

The study provides insights into how the lockdown affected several aspects of daily life in India. Despite the limitations stressed by the authors (limited sample size and

sampling modality), I find the study interesting, as it contributes to the ongoing research on the effect of the COVID-19 outbreak and built environment on the health and well-being of building occupants. In the following, some suggestions are provided to improve the paper quality:

- Research questions (RQs) should be better defined in the Introduction. As the study investigated many different aspects, those should be better linked together in order to avoid confusion. I suggest adding a Conclusions section where answers to RQs are clearly reported;

  Following statements is included in continuation to Aim that is included in "Introduction" section as suggested by the 1st Reviewer.

  "Is there a perceptual change in wellbeing during lockdown to that of before lockdown? As a health concern are there any changes in food habits and rest/sleep?How do people accomplish their responsibilities of work/study?"

  Conclusion is added as follows,

  "The unprecedented lockdown due to COVID-19 pandemic has greatly impacted the behaviours of family staying at home and accomplishing all their usual activities in an environment for which it was not originally designed. The "stay home stay safe" strategy contributed for wellbeing factors of general health, happiness and vitality while keeping away the worry of health and feeling of tensed. However, there seems to have an (unfounded) fear of transmission impacting their food habits and with ample time to rest there is no improved sleep compared to prior lockdown or during normal days. While there are difficulties in performing the activities of daily living mainly of work and leisure related in constrained environments, people could find spaces and seem to adapt with reasonable modifications to built environment. WfH could also benefit with reduced effort in travel distance and time by whatever mode of transport they opt. Forced social isolation did not alter the TV channels watched at home and family members seemingly found new ways and means of entertainment.
  Some of the potential ways covid-19 will impact built environment consist of a shift away from large city offices, mode of transport and development of new forms of public spaces. More broad based concerns about the construction of smart cities can deal with future pandemics with popularization of health science and improving emergency health systems keeping in place multi-industry coordination mechanisms, to deal with pandemics. Besides healthy workplaces, telecommuting and online accessibility of various services including telemedicine, distance learning, online shopping and online entertainment are bound to evolve."
- My main concern regards the statistical analyses. The term "significant" is used in the text as regards the food intake comparison shown in Figure 2, but it is not clear whether a statistical test has been done (e.g. t-test) and, in case, the level of significance.

  Yes, Ttest was conducted as shown in Table below. However, we presented only the differences in veg. and non-veg. food intake during lockdown. Now, we made the following modification in the statement,

  "Ttest for vegetarian and non-vegetarian groups show significant differences ($t<0.05$) for food intake during lockdown.Further, the standard error of mean for

the two groups of vegetarian and non-vegetarian food intake during lockdown show reduction in intake of non-vegetarian items (Figure-2)."

During Lockdown	
Veg.	**Non-veg.**
2.0	1.5
1.0	0.8
1.4	2.0
1.0	0.5
1.8	0.2
3.0	0.3
1.0	2.0
1.0	0.8
2.6	1.8
1.4	0.7
1.0	1.5
3.4	0.5
1.4	1.7
2.6	2.5
1.8	0.2
1.0	2.0
1.2	1.8
2.8	0.3
2.2	0.0
1.0	0.3
2.2	0.3
1.0	0.0
2.0	1.0
1.4	1.7
1.0	2.5
2.0	1.0
3.0	1.0
1.0	0.0
1.4	1.7
1.0	2.0
1.0	1.5
2.6	1.5
1.0	0.3
0.0	2.2
	1.8
	1.2
	1.8
	1.2
	1.0
	1.7

1.0
2.2
2.2
0.3
0.7
1.8
1.2
1.0
1.2
2.3
2.0
1.5
0.3
1.2
0.5
0.5
2.0
1.0
1.7
0.7
1.3
1.2
1.2
1.2
1.0
0.3
1.2
2.2
0.7
0.7
0.8
2.2
0.8
0.8
1.2
0.5
1.2
0.8
0.8
2.0
2.2
0.5
0.3
0.5
0.7

		2.2
		2.2
		1.0
Ttest (2 tailed, type 3)		0.001504

	During Lockdown	
	Veg.	**Non-veg.**
Mean	1.7	1.2
STDEV	0.745	0.676
STDERR	0.130	0.072
95% CI	0.259	0.144

- For all the statistical tests, the Authors should specify whether assumptions are met.

  Tests for Independence, Linearity and Homoscedasticity are satisfied for regression analysis during lockdown for dependent variable of "feeling in General" to the predictor variables of "Energy, pep or vitality" and "Feel healthy to work". Test of Independence & linearity is met for all the statistical tests.

- An incongruence is present for "feeling in general" R2 values between the text and the table T3 (0.51 and 0.60 seem to be inverted).

  The incongruence has been corrected.

- Regression results should be further discussed with reference to the direction of associations suggested by the regression coefficients. Moreover, in case of low R2 values, Authors should stress the limited relevance of results as only a small percentage of the variance in the dependent variable is actually explained by the independent variables.

  The comment has been addressed and the following text is added in "Statistical Analysis" section.

  "Independent variables which have significance of p<0.05 with coefficients that have positive association with the dependent variables are discussed. While R2 of greater than 50% is considered significant, in sociological and psychological studies low R2 do have relevance (10) specifically considering the unprecedented situation that humankind encounters and volatile experience of the respondent to comprehend. The variables considered throw light on aspects that could be taken into account to find ways to live with situations like covid-19 pandemic."

- Results should not be introduced for the first time in the Discussion section (e.g. reduction of distance to the workplace).

  This is included in "Built environment and Work from Home" section as follows,

  "With 22 home-based (10 home makers/retired persons, 22 office/business persons at home) the average distances of 9.5 KM travelled by the remaining 99 office/institute going respondents have actually saved time and energy that could be contributed to WfH."

- The Authors report: "Essentially we observed that the major difference entailed by the lockdown was a reduction of time and distance to go to their workplace, which was an average of 8.9 km." How is the average calculated? If the average is made between people that kept working at their usual working place and people that started working from home, I am wondering whether the average provides meaningful information.

  Yes, so we now exclude home-based participants and made the following correction/inclusion.

  "With 22 home-based (10 home makers/retired persons, 21 office/business persons at home and 1 student) the average distances travelled by the remaining 99 office/institute going respondents is 9.5 KM."

- I suggest adding a Limitation section dedicated to the limitations already stressed by the Authors.

  The following existing paragraph is placed in "Limitations" section

  "Our exploratory study has limitations in having a small sample of subjects along with inherent biases in the recruitment of subjects who had access to internet, were conversant in English and agreed to participate in the study. Nevertheless, it confirms the principles of built environment on well-being and health (22) and hopefully provides an impetus for development based on sound biopsychosocial concepts."

Julien Baker wrote: Agree with comments