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Health in the streets: assessing the health effects of superblocks

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The Barcelona Public Health Agency is evaluating the environmental and health effects of the Superblocks programme through the 'Health in the streets' project. It is being carried out in three districts of the city: Poblenou, Sant Antoni and Horta, using qualitative and quantitative methods. This article describes the project and presents some preliminary results.

Introduction

Barcelona city presents numerous social, environmental and health challenges. Some of these challenges are high levels of noise and air pollution, lack of green space and living space, and traffic injuries. In recent years, Barcelona City Council has begun the deployment of the Superblocks model in different districts of the city, which is included in the government measure 'Let's fill the streets with life'. The aim of this programme is to improve the habitability of public space, advance sustainable mobility, increase and improve urban greenery and diversity, and promote citizen participation and co-responsibility (Barcelona City Council, 2016).

In order to evaluate the health effects of this programme, a project is being carried out, led by the Barcelona Public Health Agency (ASPB), with both quantitative and qualitative methods and with the participation of health professionals from different areas and institutions. This project is called 'Health in the streets' (*Salut als carrers*: SAC) and aims to assess the environmental and health effects of the Superblocks model with an equity perspective. A protocol explaining the project in the form of a scientific article has recently been published (Palència, et al., 2020).

In a first phase, a specific conceptual framework for the evaluation of superblocks was developed (Diagram 1). This model shows how urban governance, through the Superblocks intervention, aims to impact public space, the various types of mobility, green spaces and community participation.

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- Barcelona Public Health Agency (ASPB).
 - CIBER of Epidemiology and Public Health (CIBERESP).
 - Biomedical Research Institute (IIB Sant Pau).

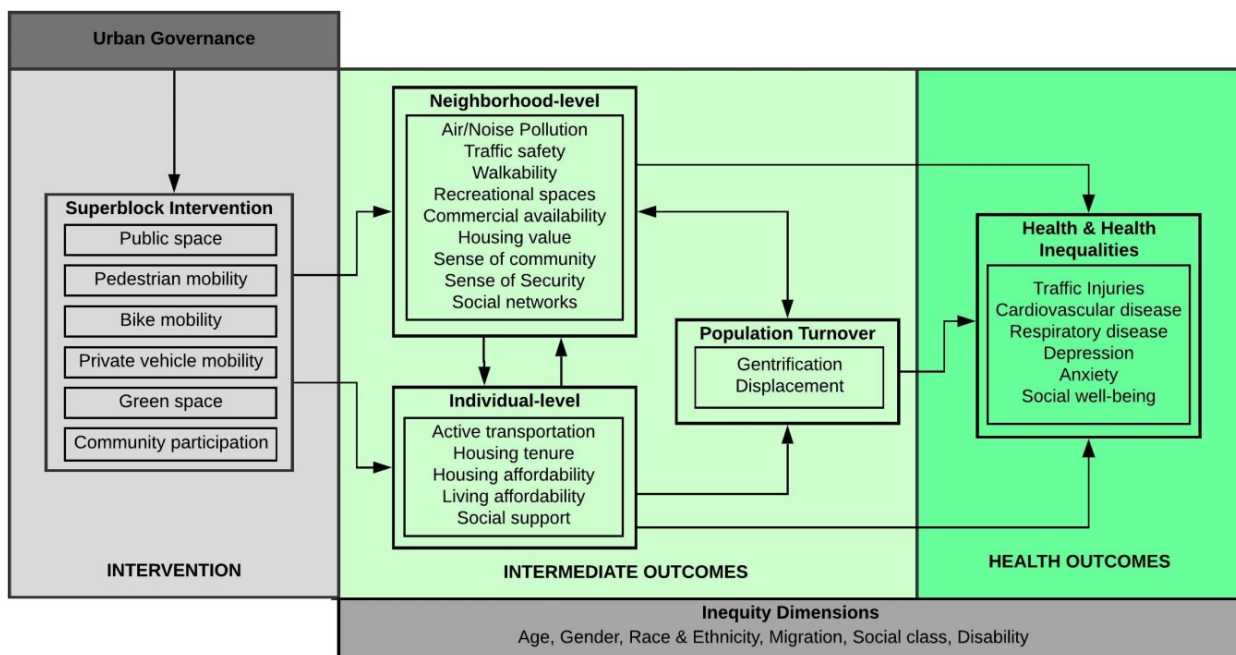
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This intervention is expected to have effects regarding the neighbourhood (decreased air and noise pollution, increased road safety and walkability, etc.) and regarding individuals (increased active transportation and support social, etc.), but it could also lead to an increase in the cost of living and housing and the possible expulsion of residents from the neighbourhood. All this will have effects on health and, if the effects vary according to the different axes of inequality, on social inequalities in health.

The evaluation was carried out in the neighbourhoods of Poblenou, Sant Antoni and Horta, taking into account the times of implementation of the superblocks. The following are the interventions being evaluated and the methods that are being carried out, as well as some preliminary results.

Diagram 1. Conceptual model for assessing the health effects of superblocks



Source: Mehdipanah *et al.* (2019)

Poblenou Superblock

It was inaugurated in September 2016 and was the first to be implemented by the common government of Barcelona. It is the pacification of motorised traffic, prioritising pedestrians and bicycles, in an area of 3x3 blocks. Thus, the superblock includes the creation of new living spaces in sections of the old streets and their confluences freed from traffic, with picnic tables, literary tours, spaces for occasional markets and sports and games areas.

When the 'Health in the streets' project began, this superblock had already been implemented. For this reason, a qualitative study was carried out with the aim of determining the perception of residents about the effects of the superblock on public space, mobility and the health of people living in the neighbourhood or who make use of the superblock, taking into account the gender perspective. The following six discussion groups were formed, from eight to ten people each, which due to their profile could make a different use of the superblock: 1) parents of children; 2) teenagers studying in the superblock; 3) the elderly; 4) adults studying or working in the superblock; 5) other adults not included in any of the above groups, and 6) an exclusive group of women. Through the dynamisation of the groups, a moderator of the Pere Tarrés Foundation proposed different topics related to the effects in the following aspects: a) the use of the space; b) mobility; c) physical and mental well-being; d) social cohesion, and e) the economy of the

neighbourhood, always keeping in mind the gender perspective. These groups were held during the months of February to June 2019.

All groups agreed that the groups that use the Poblenou superblock most frequently are families with children (especially mothers, due to their greater role in reproductive work), who use children's play areas, as well as working people, who frequent it to eat or when they finish the day. The other groups mostly use it in passing. Young people think that it is a space that is not designed for them, and the elderly agree that they do not use the superblock and that it seems to them an isolated space. Among the group of women, some consider this area to be a deserted area and perceive some insecurity, while others perceive the opposite due to it being an open space.

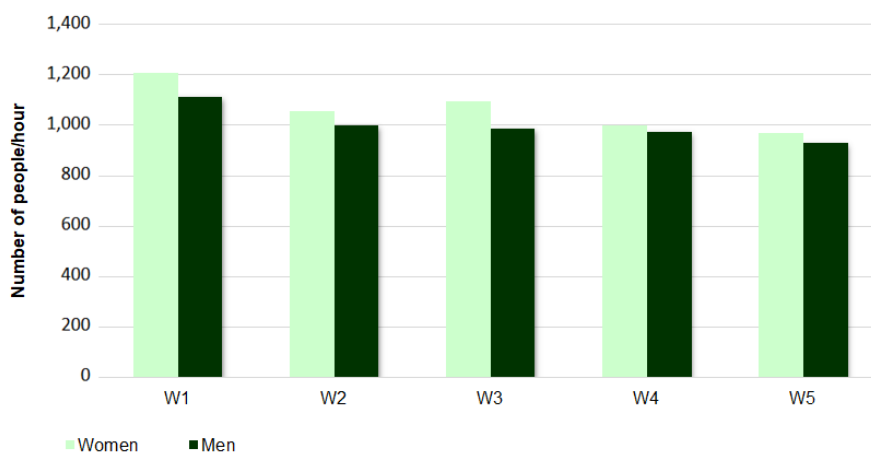
Both the group of young people and the two groups of adults highlight the positive effects that a reduction in pollution and an improvement in air quality can have on health. The three groups also highlighted the positive effect of a decrease in noise pollution. The group of adults without dependent children specifically talks about a more relaxed environment and a reduction in stress. In the elderly group, however, no health effects derived from the superblock are perceived. In the case of the group of workers, there is talk again of the positive effects of a decrease in pollution, but in this case it is also clear that in the streets around the superblock pollution could be increased and, therefore, produce negative effects on people living on these streets. In this group, there is also talk that picnic areas could encourage people to bring their lunch from home and therefore lead to an improvement in diet. Also, that the space of the superblock makes it easier to walk and also provides peace of mind, and therefore this means an improvement in mental health. In the case of women, the idea arises that the space facilitates interaction between neighbours, and thus promotes relationships and social networks, and the issue of a potential negative effect on the streets around the superblocks reappears.

Sant Antoni superblock

The first phase of the Sant Antoni superblock consists of the redevelopment of the public space around the new Sant Antoni market. Specifically, the pacification of Carrer del Comte Borrell between Floridablanca and Manso and that of Carrer de Tamarit between Viladomat and Comte d'Urgell. This represents the creation of a large public square at the intersection of the streets, as well as the creation of new living spaces and more green presence on the pacified streets.

In this superblock, as part of the 'Health in the streets' project, three studies have been carried out. The first study is an audit to assess the effects of the superblock on the physical activity patterns of superblock users with a tool called SOPARC (McKenzie, 2006). This is a methodology that allows us to assess the patterns of use of the spaces with a quantitative look, counting the number of people who use the space and assessing the different profiles of people and the activities they do there.

Graph 1. Evolution of the number of people per hour counted in the Sant Antoni superblock



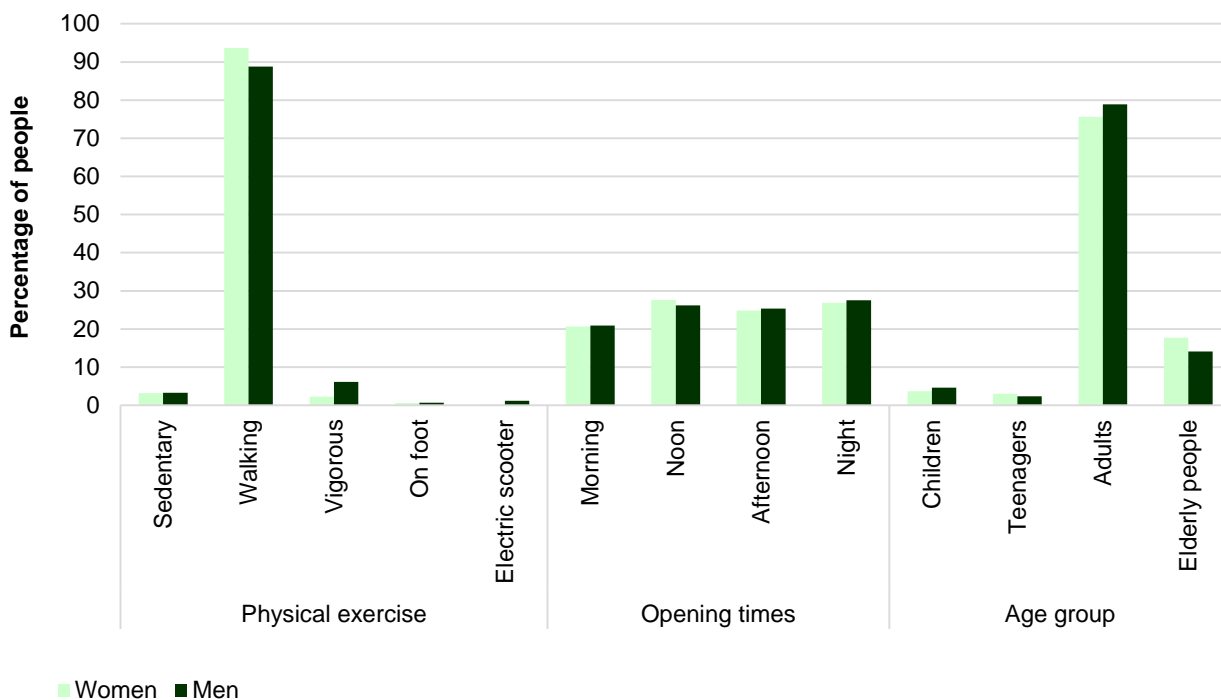
Note: weeks (W) of measurement. W1 (May 2018), W2 (October 2018), W3 (November 2018), W4 (March 2019), W5 (May 2019).

Source: Own production

The use of the superblock was maintained at a level above 900 people per hour during the course of the study (Graph 1). The first measure, which coincided with the week after the inauguration of the superblock, was that which featured a larger number of people per hour.

As can be seen in Graph 2, during the study it was observed that, on average, the superblock was mostly used by adults and for walking there. Women used it slightly more, but men did more vigorous activity than women. We see that the second age group that uses the Sant Antoni superblock is the group of elderly people, both men and women, although women are a little more present.

Graph 2. Percentage of people according to the physical activity they did, the times in which they were present and their age group, in men and women, in the Sant Antoni superblock.



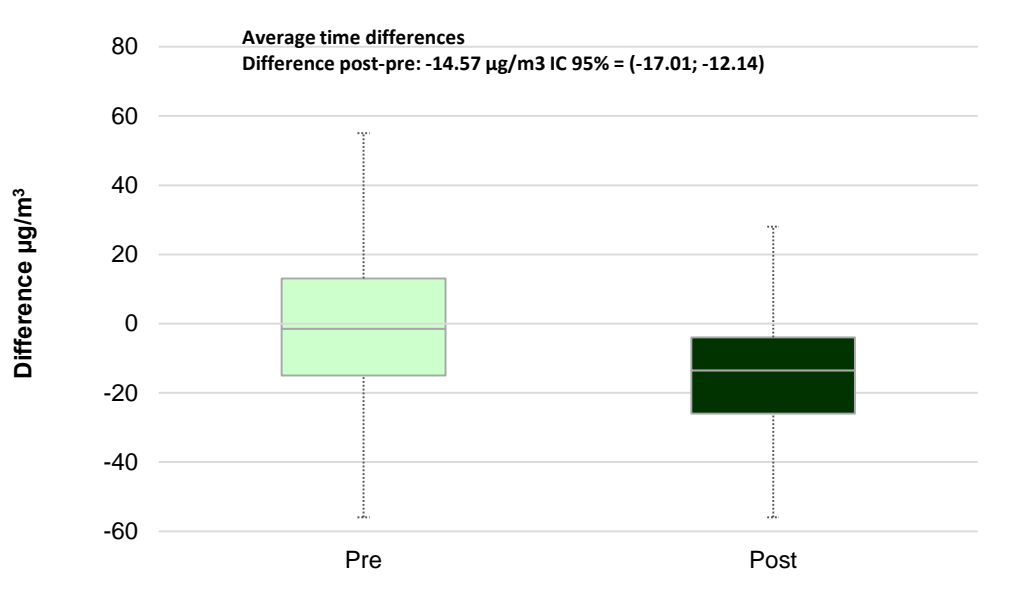
Source: Own production

The second study is an ‘ethnographic guerrilla’, a study with a qualitative methodology that combines observation with semi-structured individual or group interviews where the phenomenon to be studied takes place. Multimedia data such as photos and videos are also collected. There were three sessions of five hours each in which 74 people were interviewed in 45 interviews. The results show that in general the reform around the market (not always known as the superblock) is valued very positively, with an overall rating of between 8 and 10. The most striking positive aspect is the prioritisation of pedestrians over cars, which provides a safer and more comfortable experience, as well as the open and bright, clean and attractive space. On the negative side, it is estimated that there is still too much traffic, the poor condition of planters, the little green area, some uses considered problematic, the presence of temporary fences, the absence of a play area and too many bicycles and scooters. The superblock has a diversity of uses and, in general, an increase in the use of space; emotional health benefits, better rest, less pollution and more socialisation are reported; there are a lot of elderly people but not so many young people and families with children consider it a space that allows you to move comfortably but generates stress, as it gives a feeling of false security, because cars can pass and at some speed.

Although environmental measures have been taken in most superblocks, results are already available in Sant Antoni (Graph 3). NO₂, PM₁₀ and PM_{2.5} measurements were taken with a

mobile unit, before and after the intervention, to analyse the changes in air quality. Contamination data were measured at the junction (Comte Borrell with Tamarit) before and after the intervention and compared with a fixed control station outside the superblock to reduce the effect of other variables, such as differences in weather conditions during the two sequences of measurements (pre- and post-intervention). The average differences in the postoperative period were compared with the average pre-intervention measurements to see if the superblock had had an effect on pollution levels. As can be seen in Graph 3, NO₂ pollutant levels decreased substantially (14 µg / m³) with the implementation of the superblock (the result for the other pollutants is similar). This average a 33% reduction in NO₂ levels.

Graph 3. Change in the average NO₂ levels in the Sant Antoni superblock before and after the intervention.



Note: The average of the NO₂ hourly averages in the superblock with respect to a control station is shown.
Source: Own production.

The Horta superblock

The Horta superblock began work in October 2018, after a two-year participatory process to develop an action plan to improve mobility and quality of life in Horta. The actions are based on the redevelopment of Carrer de Fulton and part of Carrer d'Horta (single platform and speed limit of 10 km/h), part of Carrer de Chapí and Carrer Feliu Codina (single platform and reduction of parking) and Carrer d'Eduard Toda (reduction of parking and creation of living areas), apart from the redevelopment of two more corners.

In the case of the Horta superblock, several evaluation studies were proposed before and after the intervention: a specific health survey, environmental measures and a walkability index. In all cases, measures were taken between May and September 2018 and will be taken again when the works are completed.

The health survey was carried out on the basis of the methodology of the Barcelona Health Survey¹. 1,200 people living in Horta were surveyed through a census sample. The questionnaire consisted of 141 questions about perceived health, quality of life, social support, mental health, mobility, physical activity, neighbourhood characteristics and housing. Image 1 shows an infographic, with some relevant results, that was sent to respondents in return for their participation. A report was also prepared which can be found on the Agency's website². Regarding the assessment of the neighbourhood by the residents, in general we can say that it is good. As an

1. Available at <https://www.aspb.cat/arees/la-salut-en-xifres/enquestes-de-salut/>

2. Available at https://www.aspb.cat/documents/aspb_informe-salut-carrers-2018/

example, we can say that the report shows the percentages of people who strongly agree that they like living in the neighbourhood of Horta (62.4% of women and 55.4% of men). The percentages of people who strongly agree with the questions 'Are there good relationships in the neighbourhood?', 'Can people be trusted?' and 'Is it safe?' are around 10%, except when asked whether or not they can influence neighbourhood decisions, for which the percentage is 2.8%. They are also asked to rate a number of aspects of the neighbourhood, of which the following stand out with high scores (around 8 out of 10), 'It's easy and nice to walk in my neighbourhood', 'It's a good place to raise kids', and 'There is a wide range of fruit and vegetable shops in my neighbourhood'. In contrast, the lowest averages were found around the statements associated with noise.

Image 1. Infographics with some of the main results of the pre-intervention survey of 'Health in the streets', Horta, 2018.



It had been planned to contact the people who responded to the survey in May 2020 in order to assess changes in the health and assessment variables of the streets and the neighbourhood before and after the intervention. Unfortunately, the lockdown situation caused by the coronavirus epidemic will not allow the survey to be conducted as planned and will have to be postponed. A qualitative study with ethnographic guerrilla methodology had also been planned to be carried out, which would also complement the information obtained from the survey. This is now expected to be developed a few months later.

In terms of environmental measurements, measurements of NO₂, PM₁₀ and PM_{2.5} have also been taken (with the same methodology as in Sant Antoni), as well as measurements of black carbon, a component of the fine particulate matter that is produced through incomplete combustion of fossil fuels, biofuels and biomass. The latter have been taken in three types of streets: intervening streets, in which interventions related to the superblock have been carried out; indirectly affected streets, that is, streets that are not affected but where traffic changes are expected to occur, and streets that are not affected, where no changes are expected. Measurements have been taken at seven different points on each type of street. These measurements will be repeated after the interventions and once usual mobility has been restored after the exceptional period for the coronavirus.

Finally, in Horta, whether or not the interventions improve the walkability of the streets has also been evaluated. The characteristics of the built environment considered relevant to pedestrians have been assessed with a tool called the Microscale Audit of Pedestrian Streetscapes (MAPS) (Millstein, et al., 2013). These characteristics include details about streets, footpaths, intersections and design (pedestrian crossings, trees, bike lanes, curbs), as well as the characteristics of the social environment (graffiti, rubbish) that influence the experience of pedestrians and therefore the walkability of the streets. These measures will be repeated once usual mobility can be restored.

In this specific case (Table 1), the MAPS tool made it possible to detect potential improvement challenges in the streets evaluated in Horta (Chapí, Fulton, Feliu Codina and Eduard Toda

streets). In this sense, in Horta, the contextual characteristics with a lower score and therefore a negative impact on the physical activity of pedestrians are found in the intersections section, with an average score in the streets of 1.85 (on a scale that has an overall score of 8). Likewise, characteristics related to street segments also show low scores, especially for the elderly, with an average score of 5 (on a scale that scores out of 19). The streets with the most room for improvement are Chapí, in terms of the total score of the route, and Eduard Toda, in terms of

Table 1. Total scores for the route, segments and intersections of the streets in Horta before the implementation of the Superblocks programme (Chapí, Fulton, Feliu Codina, Eduard Toda). 2018

Subscales (Total score)	Number of items (score range)	Average (standard deviation)			
		Chapí Pre- intervention	Fulton Pre- intervention	Feliu Pre- intervention	Eduard Toda Pre- intervention
Of route score	3 (-2 to 33)	10 (0)	24 (1)	19 (0)	12.5 (0.70)
By segments (children / adolescents)	2 (-1 to 19)	5 (0)	10 (1.41)	11 (1.41)	2 (1.41)
By segments (the elderly)	2 (-1 to 19)	3 (0)	8 (1.41)	9 (1.41)	0 (1.41)
Of intersections	2 (-4 to 8)	2 (0)	2 (0)	1.50 (0.70)	2 (0)

Source: Own production.

Finally, in all the implemented superblocks, a quasi-experimental study will be carried out with a comparison group, with the aim of evaluating the effectiveness of the superblocks in reducing traffic injuries. The intervention group will be the superblocks already implemented and the comparison group will be the areas planned for future superblocks. Based on the traffic injury data provided by the Guàrdia Urbana, it will be possible to identify the collisions that occurred in the areas involved and compare them from 2002. An analysis will be made before and after the intervention in which the results to be analysed will be the total number of collisions, the number of injured people and the number of injured pedestrians. The models will take into account the volume of traffic and the characteristics of the street.

Conclusions

This study will provide information on the real impact of the implementation of superblocks on air quality, health and quality of life, mental health, social support, physical activity and traffic injuries, with a perspective on gender and social inequalities. It will evaluate the effectiveness of public policy in improving health and reducing health inequalities.

Preliminary results indicate that the Sant Antoni superblock has drastically reduced the levels of air pollution in the affected area, but more measures are needed to assess the impact on the entire area of the superblock. In addition, residents value the benefits to their well-being. In the Poblenou superblock, its use is not so widespread but potential benefits have also been detected. In this sense, the Poblenou superblock was more frequently used by families and working people, while the Sant Antoni superblock was used mainly by the elderly. The impact on use and the health benefits provided will depend, to some extent, on the type of intervention, as well as the characteristics of the neighbourhood in which the interventions have been carried out. Ongoing studies will provide more information and more evidence on this.

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