

# Urban Renewal and Health

The effects of the Neighbourhoods Law on health and health inequalities in Barcelona



R O S H A N A K • M E H D I P A N A H

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# **Urban Renewal and Health:**

## **The effects of the Neighbourhoods Law on health and health inequalities in Barcelona**

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*“There is no logic that can be superimposed on the city;  
people make it, and it is to them, not buildings,  
that we must fit our plans.”*

*- Jane Jacobs*

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I am officially done with school but barely done with learning. It has been a tremendous four years and although this chapter ends here, I look forward to the many more ahead.

*Thank You!*

## **Executive Summary**

Urban renewal interventions aim to improve physical infrastructures, promote social integration and increase economic gains. However, they also have the potential to improve the wellbeing of residents.

The objective of this dissertation was to better understand how an urban renewal policy, the Neighbourhoods Law, could affect health and health inequality in Barcelona, Spain. Using a mixed-methods approach, three studies were produced to better understand this connection. The first study used Concept Mapping techniques to study the perception of neighbours towards changes that had occurred in their intervened neighbourhoods in recent years and their importance for their wellbeing. The second study used the Barcelona Health Survey to analyse poor self-rated health and mental health status in women and men, before and after the intervention in participating neighbourhoods while comparing them to a group of non-intervened neighbourhood but with similar socio-demographic characteristics. The analysis was repeated to introduce the dimension of health inequality using social (occupational) class as a stratifying indicator. The third study used the results attained from previous studies and the existing literature to propose possible mechanisms linking urban renewal to health.

The results from these studies indicate that the Neighbourhoods Law had a positive effect on residents' health and health inequality.

## Resum

Les intervencions de renovació urbana tenen com a objectiu millorar les infraestructures físiques, promoure la integració social i augmentar els guanys econòmics. A més, també tenen el potencial de millorar el benestar dels residents.

L'objectiu d'aquesta tesi és poder comprendre com una política de renovació urbana, la *Llei de Barris*, pot afectar a la salut i a les desigualtats en salut a la ciutat de Barcelona. Per respondre a aquest objectiu s'han realitzat tres articles usant un enfocament de mètodes mixtos. El primer estudi utilitza la metodologia de “Concept Mapping” per analitzar la percepció dels veïns en relació als canvis que s'han produït en el barri en els últims anys i la seva importància per al seu benestar. El segon estudi utilitza l'Enquesta de Salut de Barcelona per analitzar la mala salut autopercebuda i l'estat de salut mental, abans i després de la Llei de Barris en els barris participants utilitzant com a grup de comparació un grup de barris no participants de característiques socio-demogràfiques similars. Les anàlisis es van repetir per introduir la dimensió de la desigualtat en salut utilitzant la classe social (ocupacional) com a indicador. El tercer estudi utilitza els resultats obtinguts dels dos estudis anteriors i de la bibliografia existent per proposar possibles mecanismes que vinculin la renovació urbana en la salut.

Els resultats d'aquests estudis indiquen que la Llei de Barris té un efecte positiu en la salut i en la desigualtat en salut dels veïns.



## **Preface**

This thesis was mainly completed at the Agència de Salut Pública de Barcelona under the supervisions of Dr. Carme Borrell and Dr. Carles Muntaner. It is presented as a collection of publications in agreement with the PhD in Biomedicine program requirements at the University of Pompeu Fabra. It consists of three papers: one published in the Health & Place journal, one under review in the Journal of Epidemiology and Community Health and one under review in Social Science & Medicine.

The thesis consists of an introduction of the research topic, development of the conceptual framework and the justification of the study. It is followed by an objective and hypothesis section and the results of the study in the form of the articles published. Finally, a discussion section is included on the general findings of the thesis as well as the strengths and limitations of the study, conclusions of the study and recommendations for future studies in the field.

My time in Barcelona was funded by the “Evaluating the impact of structural policies on health inequalities and their social determinants, and fostering change” (SOPHIE) funded by the European Union’s 7<sup>th</sup> Framework Programme.

In addition, to obtain a European Doctoral Mention, I spent three months at the University of Leeds in the UK under the supervision of Dr. Ray Pawson and Dr. Ana Manzano, developing the final paper of the thesis.

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# INTRODUCTION

The goal of this dissertation is to study *whose, how and why* urban renewal policies affect health and health inequalities using the Neighbourhoods Law implemented in 2004 in Catalonia, Spain as an example. This section serves to introduce the concept of urban health and how urban planning can impact health and health inequalities at the neighbourhood level. Following this, urban renewal is presented along with the existing evidence available on its relation with health and health inequalities, despite limits in methods and research design. Barcelona is then discussed as an example city for urban renewal initiatives including its participation in the Neighbourhoods Law, one of the largest urban renewal policies implemented to date in Spain. Finally, explanations are provided on why the Neighbourhoods Law and the City of Barcelona are a good opportunity to study the link between urban renewal policies and its effects on health and health inequalities of residents living in intervened neighbourhoods.

## **Urban health**

In 2008, the WHO Commission on Social Determinants of Health dedicated a section on urban health describing how the urban deprived populations were at higher risk of not only infectious diseases but also non-communicable diseases like obesity, diabetes, depression, anxiety and alcohol/substance-use (CSDH 2008). In line with these findings, other studies have confirmed that in some high-

income countries, these inequalities are not necessarily attributed to individual behavior but rather to factors such as, housing conditions, access to transportation, pollution exposure, and community integrations, all associated with social inequalities (Borrell et al. 2008; Rydin et al. 2012).

With half of the world's population living in urban areas, and 70% in rich countries, the focus is back on cities and in specific the physical and social makeup of their neighbourhoods and communities in order to predict individual's health (Borrell et al. 2013; O'Campo et al. 1997; Pickett & Pearl 2001). Although there are variations in the definition of neighbourhood, including those using administrative boundaries, statistical areas or geographical borders (Flowerdew et al. 2008; Kawachi & Berkman 2003), both contextual and composition factors must be considered when studying health effects (Kearns et al. 2009). Thus, for a neighbourhood to achieve health equity, they must provide access to basic goods, encourage social integration, promote good physical and psychological wellbeing and be protective of the natural environment, all of which are possible through effective urban planning (CSDH 2008).

Urban planning and health is not a new concept and dates back to the nineteenth century where problems with overcrowding and unsanitary conditions began to rise as a result of growing industrial cities (Barton 2005; Northridge & Freeman 2011). Research has provided good empirical and theoretical explanations on urban

planning and its role in the “healthy neighbourhood” (Bernard et al. 2007; Macintyre et al. 2002). The majority of these studies have fallen into one of five research areas: *accessibility to resources, neighbourhood selection, socio-economic composition, cultural characteristics* and *the physical environment of the neighbourhood* (Kearns et al. 2009; Rydin et al. 2012) which are described below.

### *Access to resources in the neighbourhood*

Access and availability of resources and services like health centers, community centers and food outlets in communities have been identified as important factors for an individual’s wellbeing (Chung et al. 2011; Diez-Roux 2001; Kawachi & Berkman 2003).

### *Neighbourhood selection*

Life-course trajectories and their influence on neighbourhood selection including availability of resources, affordability, changing life circumstances or general preferences, are all factors resulting in why individuals move from one area to another (Howley et al. 2009; Sampson & Sharkey 2008).

### *Socio-economic composition of the neighbourhood*

Studies have shown that neighbourhoods consisting of populations with lower socio-economic position have poorer self-rated health compared to those with higher socio-economic position (Haines et al. 2009; Ross & Mirowsky 2001). Amongst some of these factors,

income, education and employment status have been studied (Borrell et al. 2013).

### *Cultural characteristics of the neighbourhood*

A neighbourhood's norms and values, particularly those related to reciprocity, the degree of social integration and community participation, have been associated with the neighbourhood's social capital (Kawachi 1999). Studies have shown that a decreased social capital in a neighbourhood or community is associated to negative health outcomes (Joshi et al. 2000).

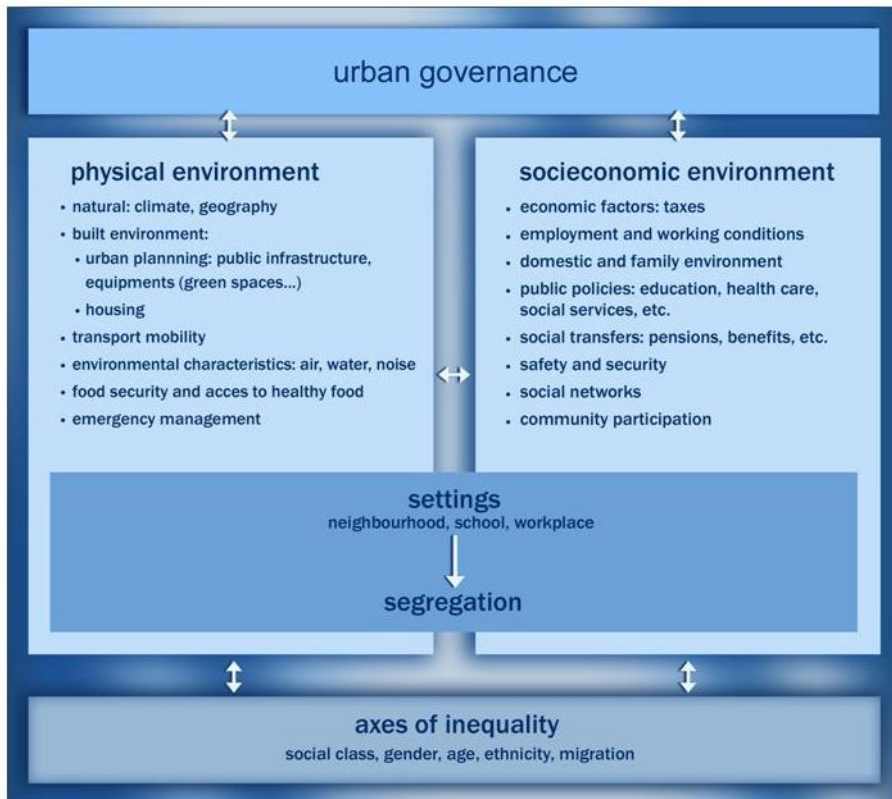
### *Physical environment of the neighbourhood*

The physical features of the environment influence the proximal links between place and individual health through various mechanisms including exposure to toxicity, housing conditions and transportation (Keller-Olaman et al. 2005; Thomson et al. 2009). For example, housing conditions and quality are important for health not only because it is a site of exposure, but also because crowded conditions tend to foster transmission of disease (CSDH 2008; Keller-Olaman et al. 2005).

Although there are many existing frameworks that have captured some of these relations including Dahlgren and Whitehead's 1991 conceptual model showing the different layers of determinants that influence health, they do not focus on the urban context. To address urban areas, we focus on a recent framework presented by Borrell et al. in 2013 on the determinants of health inequalities in cities of

Europe (Figure 1), which encompasses the various factors within the physical and social environment affecting health inequalities.

Figure 1. Determinants of health inequalities in cities of Europe.



\*Source: Borrell et al. 2013

The framework also provides room for variability as it recognizes the great complexity associated with identifying specific causal pathways linking each factor to a health outcome. It explains how urban governance, represented by political powers at different levels of the government and policy makers, has a constant interaction with the physical and socioeconomic environments. Depending on the contextual level, both of these environments go on to affect health through the different determinants of inequalities

including gender, age, social class, ethnicity and migration while also resulting in the possibility of segregation amongst the more vulnerable populations. For example, within the *physical environment*, a vast amount of studies have linked built features of the environment like housing conditions to improved mental health, transportation to better self-rated health, and the availability of green spaces to an increase in physical activity (Rydin et al. 2012, Thomson et al. 2007, 2009). There are various explanations on how the *socioeconomic environment* can affect health and health inequalities including the psychosocial or material approach. The psychosocial approach considers the stress caused by unequal societies and their impact on physiological conditions and thus the important role of social integration in alleviating some of this stress (Kawachi 1999; Wilkinson 2005). On the other hand, the material approach focuses on the material effects of inequality and how reduced investment in social resources such as, employment, education and social services are associated with negative health outcomes (Muntaner et al. 2001).

Nonetheless, cities are constantly changing and with an increasing urban population more money is being invested in renewal and development projects to address some of the issues discussed including the renewal of deprived neighbourhoods and areas that otherwise could lead to deteriorating health (Rydin et al. 2012).



## **Urban renewal**

In recent decades, Western cities have been involved in urban renewal policies, also referred to as regeneration or revitalization. These initiatives, mainly targeted at deprived areas, go beyond the repair of physical and aesthetics components of the built environment to also address some of the social problems and improve human habitat while promoting sustainability (Barton 2005; MacGregor 2010; Rydin et al., 2012; Smith & Petticrew 2010; Spaans 2004). Such projects have taken place in various countries including ones in the UK with the revitalization of Merchant City in Glasgow, France with the revitalization of Cité Internationale in Lyons, and in Netherlands with the revitalization of the New Centre project in the Hague (Spaans 2004).

Although there is great variation in the kind of projects dictated by urban renewal policies, their general goal is to improve physical infrastructure, promote social integration and increase economic gain within the neighbourhood or area intervened (Elliott et al. 2001; Nel-lo 2010; Spaans 2004). Projects can range from the creation of green spaces, the repair of streets and sidewalks and the improvement of transportation, to the establishment of employment centers, the organization of community wide events and the formation of support groups for vulnerable populations. However, urban renewal policies tend to exclude health considerations and have even been accused of worsening social and physical environments by contributing to social exclusion or gentrification and promoting a greater dependence on cars all associated with bad

health conditions (Arbaci & Tapada-Bertelli 2013; Barton 2005b). Therefore, while social issues are a top priority in these policies, there continues to be few urban renewal projects that actively target health and promote health equity (Barton 2005b; MacGregor 2010).

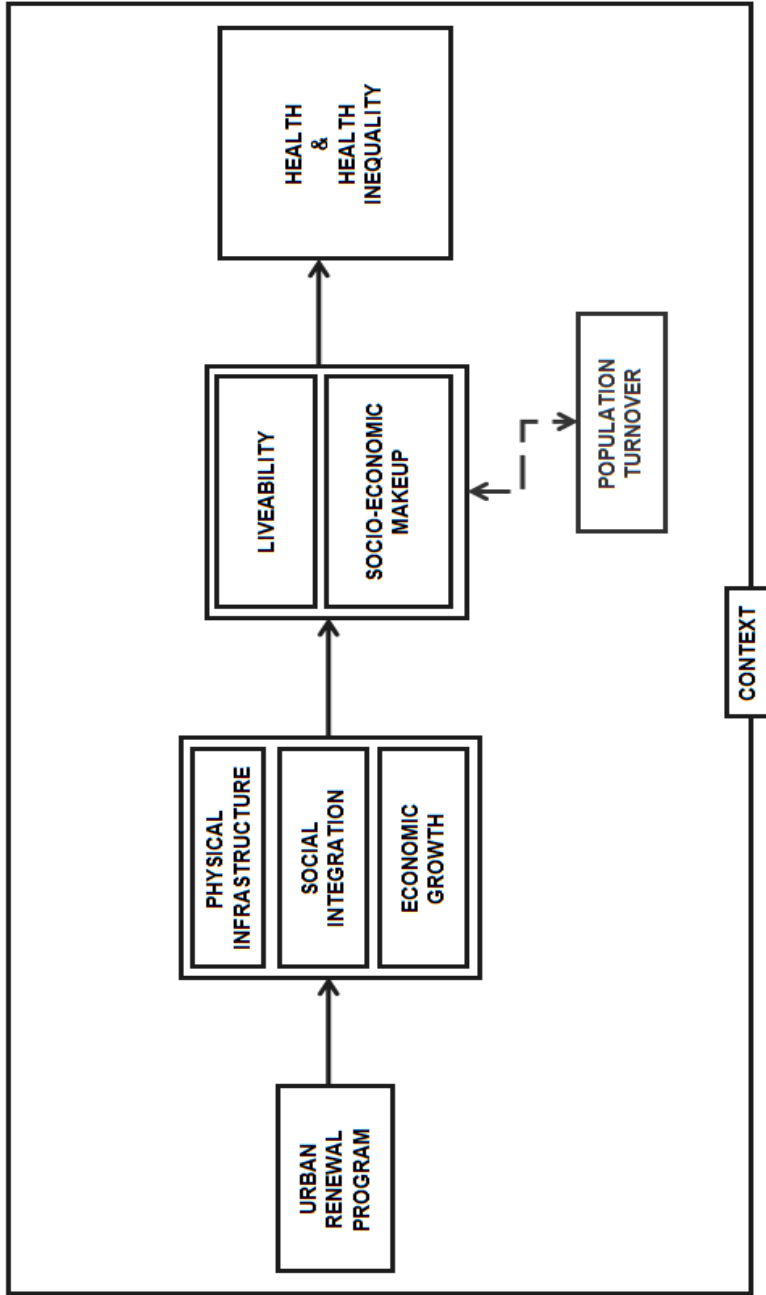
## **Urban Renewal and Health/Health Inequalities**

The relationship between urban renewal and its potential impacts on health and health inequalities is fairly unknown and limited to smaller interventions often dealing with one aspect of renewal in the built environment (Thomson et al. 2006). For example, studies have linked housing renewal to a decrease in asthma among children, transportation improvements to better accessibility to resources, and the creation of green spaces to an increase in physical activity (Gebel et al. 2009; Rydin et al. 2012).

Research on urban renewal initiatives has generally disregarded health impacts or measured them as either “automatic outcomes” such as the reduction of stress levels due to a decrease in criminal rates, or through “simple throughput measures” like access to health services or centers (Atkinson et al. 2006; Kearns et al. 2009). Furthermore, despite claims that urban renewal aims to reduce inequalities and decrease deprivation in selected neighbourhoods, there continues to be little evidence to show the impacts on the various social determinants of health (Atkinson et al. 2006; Kearns et al. 2009; Thomson 2008).

However, although the research on urban renewal effects on health and health inequalities is sparse, the established link between urban planning and health indicates potential benefits of urban renewal by improving both social and physical environments (MacGregor 2010). Referring back to Figure 1, we can then assume that any improvements in the factors outlined within the physical and social environment, could result in decreased health inequalities and improved health outcomes. This leads to our first conceptual framework explaining the link between urban renewal and its effects on health and health inequalities (Figure 2).

Figure 2. A conceptual framework of the link between urban renewal and health/health inequalities



As mentioned, urban renewal aims to improve *physical infrastructure*, promote *social integration* and increase *economic gains* which ultimately enhances *liveability* across the neighbourhoods and areas (Kennedy & Buys 2010). The term *liveability*, which is defined as the general wellbeing of a city, consists of characteristics of a neighbourhood or community that would make people want to live in it including, environmental conditions, quality of life, safety and security, transportation, aesthetics and function of built environment and social cohesion (Howley et al. 2008; Kennedy & Buys 2010).

The WHO healthy urban planning objectives are aimed to improve liveability through urban designs that include creating opportunities to exercise, promoting social integration through safe open spaces, and improving living conditions through better access to good housing, food outlets and other resources (WHO 2011). In addition, there are environmental factors which are harder to measure such as air and water quality, which are affected by consumption of energy, transportation and so on (WHO 2011).

While these are more associated with the physical conditions of the neighbourhood, the *socio-economic makeup* represents factors that would influence the social environment at both the individual and neighbourhood level including employment status, education level, gender equality, and general housing and living costs, all of which are linked to health inequalities (Bernard et al. 2007). Urban renewal programs are often designed to address some of these

issues through projects such as the establishment of employment centres, gender directed programs, and policies aimed at protecting property values. Such projects result in increased opportunities that provide resources needed by neighbours and their families to learn, work and benefit from social relationships, all affecting health outcomes (Northridge & Freeman 2011).

While liveability is more easily relatable to urban renewal outcomes, initiatives can also affect *population turnover*, referring to residents that have moved into or left the neighbourhood as a result of the intervention. Some urban renewal policies include the creation or repair of social housing that could result in a forced relocation of residents into and out of the neighbourhood. Evidence of the health effects of this type of displacement is limited and generally focused on social network disruptions and a lost sense of community (Kearns & Mason 2013). For interventions with no social housing component, gentrification or displacement could result from increased housing values and living expenses (Kearns & Mason 2013).

Consequently, with the gentrification of lower socio-economic residents, who also tend to have worst health conditions, it would be expected that the average health status of the neighbourhood to increase and possibly further improve with the migration of higher income individuals that are able to afford new conditions (Diez-Roux 2001; Ross & Mirowsky 2001). Therefore, this makes population turnover an important variable to consider when looking

at health and health inequality outcomes post an urban renewal intervention.

Finally, *context* plays an important role in the outcomes attained. Context in this framework can incorporate various factors such as the geographic location, political climate and economic status in which the intervention was undertaken. In addition, time as context is important when evaluating initiatives as they help identify adequate short- and long-term indicators. For example, at 1-year post intervention you would not expect changes at the neighbourhood level in health outcomes such as obesity rates as you would at a longer lag period.

In the following section we discuss the evaluations of urban renewal programs and the limitations faced when studying their potential health effects due to their complexity.

### **Evaluations of urban renewal and their effects on health and health inequalities**

As mentioned, urban renewal initiatives are complex because of the variability in the outcomes due to variations in the implementation of the policy, the context in which the intervention is carried out in and the actual projects undertaken (Dunn et al. 2013; Thomson et al. 2006). Such complexity results in the inability to establish clear causal pathways that can help explain why evaluations often treat the intervention as a “black box” (Nebot et al. 2011; Patton 2011).

Furthermore, the situation becomes complicated due to the limited availability and reliability of data for health and socioeconomic indicators which often impedes the ability to clearly indicate the importance of certain programs on the reduction of health inequalities and improvements in health outcomes (Tannahill & Sridharan 2013).

Existing health evaluations of urban renewal projects have generally depended on quantitative analysis to measure changes in the health of populations affected by the renewal projects (Johnston et al. 1998; Rhodes et al. 2002; Thomson et al. 2006). Others have used qualitative approaches such as in-depth interviews or focus groups, in attempts to provide a deeper understanding of how differences due to renewal projects have impacted the experiences and perceptions of those affected (Curtis et al. 2002; Elliott et al. 2001). However, few studies have combined both quantitative and qualitative methods needed to better explain the impacts on health and health inequalities (Thomson 2008).

Evaluations should be designed to best capture and include the uniqueness of each program or situation while considering the context it was carried out in (Patton 2011; Pawson & Sanjeev 2009). A successful evaluation framework should go beyond a pre and post-intervention study design and incorporate social and physical outcomes in order to understand the effects of urban renewal projects on health and health inequalities (Thomson et al. 2006; Thomson 2008; University Cambridge 1997). Such



evaluation should also consider short and long-term effects and recognize the complexity of the intervention and thus the different mechanisms of impact it may have (Patton 2011). Furthermore, until now, the majority of evaluations completed in this field have been more method driven as opposed to theory driven making their applicability to other situations more difficult.

Although limitation in the availability and reliability of data for health and socioeconomic indicators often impede the ability to clearly indicate the effects of a certain initiative on health and health inequalities, it should not be an excuse to not develop and apply innovative methods to address these limitations, as attempted in this dissertation. However, in order to propose these possible approaches, the following section presents the urban renewal policy used in this dissertation, the Neighbourhoods Law, for the evaluation of the possible effects of an urban renewal on the health and health inequalities in some of the most deprived neighbourhoods in the city of Barcelona.

## **City of Barcelona**

The city of Barcelona is the capital of the Autonomous Community of Catalonia. With a population of 1,620,993 residents in 2006, it is the second largest city in Spain (Ajuntament de Barcelona 2013). The city is divided into ten historic districts each composed of a series of neighbourhoods with distinct features and unique structures (Ajuntament de Barcelona 2013). Over the last couple of

decades the demographic characteristics of Barcelona have changed including an increase of immigrants to a total of 17.7% in 2013 (14% increase from 2001), with the majority coming from low-income countries as opposed to the rest of Spain (Ajuntament de Barcelona 2013).

Since the first democratic elections in 1979 and the selection of the Socialist Party of Catalonia as the main political party and a coalition with other left or nationalist parties, public health became a top priority with the establishment of three major goals; (1) The establishment of geographical areas to focus on various health issues at smaller geographical levels; (2) The establishment of the first Barcelona Health Survey in 1983, followed by five others (1986, 1992, 2000, 2006, and 2011); (3) Publishing annual reports on the current health status of Barcelona residents (Borrell et al. 2007). These efforts have since helped identify and study the various health inequalities in order to develop and implement more efficient and effective health policies and programs.

Within Barcelona, as the rest of Spain, life expectancy has increased resulting in a growing aged population while premature mortality has decreased over the years (ASPB 2013). The overall wellbeing of residents has improved with approximately 84.6% of men and 78.2% of women describing having good or very good health status in 2009 (ASPB 2013).

However, despite Spain's public and universal health care system, Barcelona continues to struggle with high rates of illegal drug usage and an increase in poor mental health (ASPB 2013 & 2009). Furthermore, mortality and morbidity rates continue to be high due to inequalities in inner city areas compared to the rest of the city (Borrell et al. 2000; Borrell et al. 2007; Cano-Serral et al. 2009). It cannot be ruled out that in recent years, increasing unemployment rates due to the economic crisis, the inflating costs of living and a growing population of immigrants living in poor conditions will result in an increase in negative health outcomes and health inequalities.

## **Urban renewal in Barcelona**

Although by now most of the country has participated in urban renewal programs focused mainly on transportation and improvements of rundown city centers, Barcelona implemented renewal programs as early as the 1980s with projects throughout the city aimed to eliminate urban poverty and improve social inequality (Arbacia & Tapada-Berteli 2012). By the mid-1990s, Barcelona developed a successful approach to city renewal and it has maintained efforts to constantly improve its city for both residents and tourism (Arbacia & Tapada-Berteli 2012).

Some of the more notable work during this period include the 1986 initiative, "Barcelona, posa't guapa" (Barcelona, make yourself beautiful) by the Municipal Institute of Urban Landscape and

Quality of Life (Ajuntament de Barcelona 2011a). The program involved over 22,000 projects that fell within one of the five priority areas, *building exteriors, interior walls, dividing walls, roofs and commercial areas* (Ajuntament de Barcelona 2011a). Other projects have included restructuring of the waterfront in preparation for the 1992 Olympic bid and the improvement of various areas in Ciutat Vella, a traditionally poor inner city district known for its prostitution, drug trafficking and higher levels of crime compared to the rest of the city (Ajuntament de Barcelona 2011a; BFSC 2011).

However, when discussing the success of Barcelona's renewal programs, the opinions are often split between, (1) the increased benefits for the vulnerable populations through the establishment of social interventions and infrastructure or (2) the improvements in image and reputation, attracting the upper middle classes to those areas (Arbacia & Tapada-Berteli 2012; Colomb 2007). Furthermore, this has led to questions on whether instead of addressing social and urban inequalities, renewal programs have resulted in wider economic shifts throughout the city and gentrification of populations across the city or segregation within the neighbourhoods (Arbacia & Tapada-Berteli 2012). Nonetheless, these debates have resulted in closer examination of urban renewal policies in Spain and their attempts to address social inequalities.

In 2004, the new Leftist Regional Government of Catalonia, that governed after 23 years of right wing government, presented the largest urban renewal policy in Europe, the Neighbourhoods Law

(*Llei de Barris*). The law stood out within the European context because of the magnitude and involvement of approximately 141 neighbourhoods and approximately 1.3 billion Euros invested, and its preventive approach to address social inequalities in the intervened neighbourhoods (DPTOP 2009; Nel·lo 2011). However, in 2011, the current right wing Catalan government stopped the law indefinitely stating that due to the current the economic recession, there were insufficient funds to continue the program.

## **The Neighbourhoods Law**

The Neighbourhoods Law focused on addressing some of the social problems and preventing new ones through urban renewal initiatives (Nel·lo 2011). The program consisted of partial funding (approximately 50-60%) over a period of 4 years from the regional government to selected municipal governments that presented urban renewal plans in neighbourhoods (DPTOP 2009).

The selection process was based on two phases with the first being the evaluation of the overall neighbourhood profile based on a score from 16 objective statistical indicators within the four areas of: *urban and equipment deficit, environmental problems, population socio-demographics* and *the economic and local development deficits* (DPTOP 2009; Nel·lo 2010). Once a minimum score was attained by the presented neighbourhood and deemed as a “special attention area”, it passed on to the second phase of the evaluation that considered the proposed projects. Submitted plans were

evaluated and scored based on the areas of: *improving public spaces and green spaces, renovating residential buildings, implementing and improving energy and environmental infrastructures, installing new communication technologies, improving accessibility and removing architectonic barriers, promoting gender equality in the use of urban spaces and facilities, implementing and improving energy and environmental infrastructures, and establishing programs targeting social, and economic* (DPTOP 2009; Nel-lo 2010). A final score was given to each submission and once accepted into the program, resources were allocated based on this score.

In the context of the Neighbourhoods Law the issue of displacement or gentrification of lower socioeconomic residents was not of great concern due to the implementation of a policy that protected and promoted social housing in the intervened areas (Nel-lo 2010). Furthermore, within the Catalan cultural context, a large proportion of households own their properties and have deeper roots within their neighbourhoods, thus relocation to other areas of the city despite an increase in income or property value is rare (Nel-lo 2010). However, the current economic recession may affect this in the coming years.

Although the law itself focuses more on structural changes, two complementary programs were also introduced in conjunction with it: *Employment in Neighbourhoods* (Treball als Barris) and *Health*

*in Neighbourhoods* (Salut als Barris), with the goals of creating and delivering services in employment and health respectively.

*Employment in Neighbourhoods:*

The Serveid'Ocupació de Catalunya (Employment Services of Catalonia) established the *Employment in Neighbourhoods* program in order to provide support to employers and job seekers (Serveid'Ocupació de Catalunya 2011). Since its initiation in 2006, with a total investment of 30 million Euros, the *Employment in Neighbourhoods* has participated in 121 neighbourhoods with over 6000 individuals being helped (SOC 2011). The program has two main focuses; the first involves networking and supporting employers within the neighbourhood in order to hire unemployed residents, while the second involves providing individuals with the tools and skills required in the job seeking process (SOC 2011).

*Health in Neighbourhoods:*

The Catalonia Department of Health launched the *Health in Neighbourhoods* initiative in 2005. The goal of this program is to introduce health as one of the main elements to not only improve living conditions and the wellbeing of individuals, but also reduce social inequalities of health in deprived neighbourhoods (Sierra et al. 2008). While the Department of Health oversees this program, regional and local public health agencies including the Barcelona Public Health Agency have taken charge in organizing and implementing various projects in neighbourhoods involved

including four of the five neighbourhoods being studied in our research (excluding Trinitat Vella).

*Other programs:*

In addition to the *Employment in Neighbourhoods* and *Health in Neighbourhoods* programs, the Neighbourhoods Law triggered other complementary programs through public and private investments. Although it is difficult to know every project that took place, an increase in rehabilitation licenses and permits indicate that the Neighbourhoods Law acted as a catalyst to encourage more individuals from the intervened neighbourhoods to invest in their properties compared to other non-intervened areas (Nel·lo 2010).

Preliminary evaluations on the Neighbourhoods Law have been included in the program design where a final evaluation report was required at the end of each intervention period that included an assessment on performance, results on territorial planning, economic and commercial activity, environmental aspects, social cohesion and gender equality for each neighbourhood (Nel·lo 2010). In addition, the regional government conducted a general evaluation on the first set of neighbourhoods intervened at their fourth year (DPTOP 2009). The evaluation was a two-step process with the first one comparing the post-intervention values of the indicators originally used to score each neighbourhood, while the second step consisted of interviews with residents from the intervened areas with questions addressing their overall satisfaction



with their neighbourhoods and perceptions towards changes that had occurred in the last few years (DTS 2013).

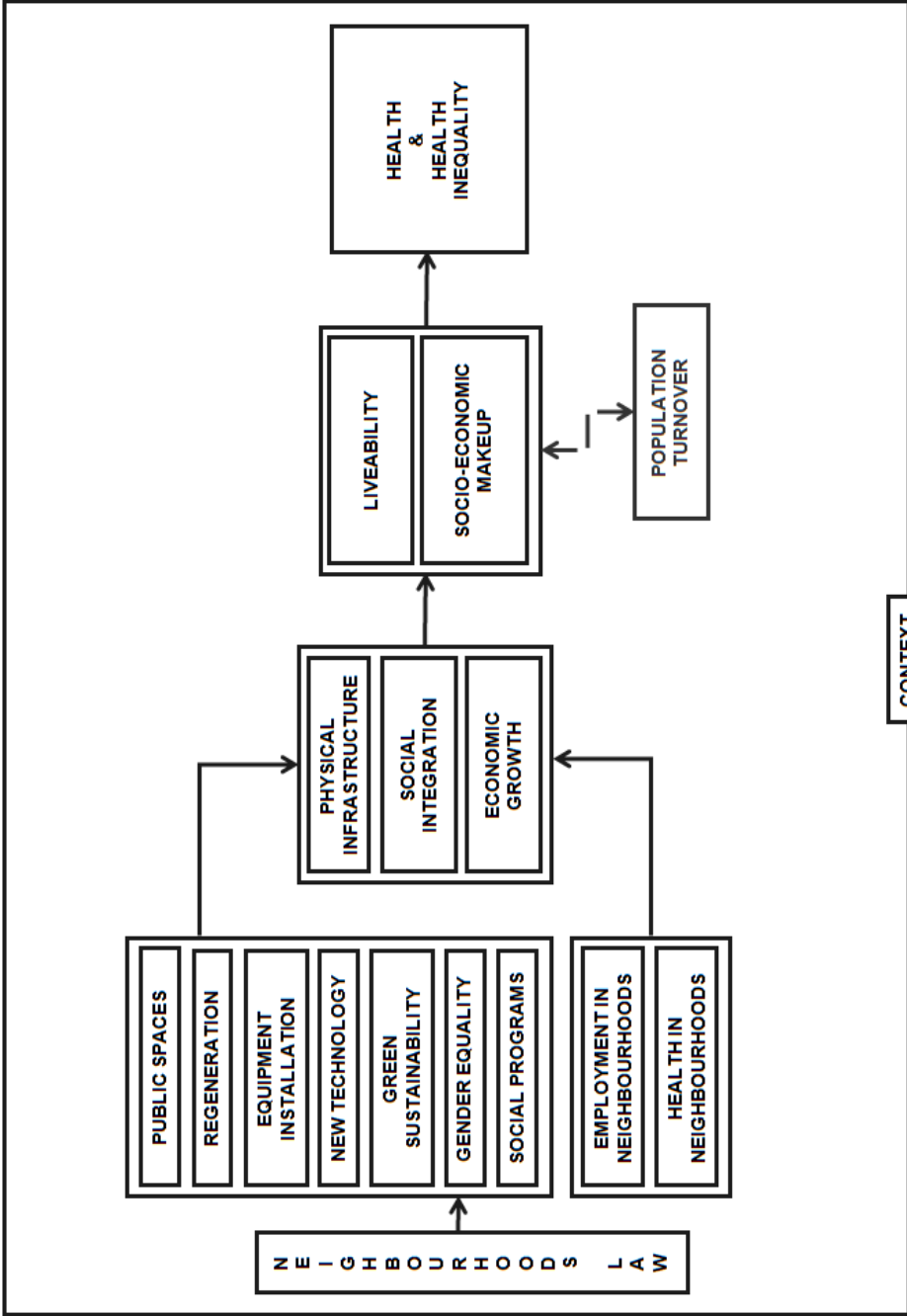
The results indicated an average 7.4% improvement in the indicators for the first set of neighbourhoods, while 85.7% of residents were satisfied with their neighbours and 51.3% felt that their neighbourhood had improved in the last five years (Nel·lo 2010). While there are some flaws in the methods including some of the indicators not being time sensitive to the one-year follow up period and no comparison groups of non-intervened neighbourhoods, the slight improvements indicate that the Neighbourhoods Law had more positive outcomes than negative in the areas intervened.

To date, the program has taken part in 15 neighbourhoods in Barcelona resulting in 10% of the city's 1.65 million inhabitants being affected by the projects. These include: Roquetes (started in 2004), Santa Caterina i Sant Pere (2004), Poble Sec (2005), Torre Baró-Ciutat Meridiana (2006), Trinitat Vella (2006), El Coll (2007), La Bordeta (2007), La Barceloneta (2008), Merseme-Besòs (2008), Bon Pastor i Baró de Viver (2009), Raval Sur (2010) and La Vinya, Can Clos, Plus Ultra (2010) (DPTOP 2009).

## **The Neighbourhoods Law Conceptual Framework**

As determined, urban renewal programs like the Neighbourhoods Law are complex to study. In Figure 3 we present the conceptual framework for the Neighbourhoods Law, developed from the initial framework presented, and how it is linked to health and health inequalities of residents.

Figure 3. A conceptual framework of the Neighbourhoods Law and its effects on health and health inequalities.



Like other urban renewal programs, the Neighbourhoods Law aimed to improve *physical, social and economic* gains through projects within the seven areas of: *public spaces, regeneration, equipment installation, new technology, green sustainability, gender equality, and social programs*, along with the two complementary programs, *Employment and Health in Neighbourhoods*.

Similar to Figure 2, we present the outcomes of the renewal project in the area of liveability, socio-economic makeup and population turnover. Here we refer to specific outcomes of the Neighbourhoods Law. For example, liveability represents factors such as, *walkability* which encompasses some of the green and pedestrian friendly zones created, *accessibility* through the installation of outdoor mechanical stairs and elevators, *perceptions of safety and security* as a result of improvements in traffic safety and the renewal of abandoned areas, and *aesthetics* which consists of better cleaning systems and the installation of equipments such as benches throughout the neighbourhood. On the other hand, within the socio-economic makeup category factors include *increased resources* such as the availability of employment services and community groups among others, *economic power* which represents either an individual's purchasing power or increased economic gains for the neighbourhood and *social cohesion* which describes opportunities aimed at networking amongst neighbours.

Finally, although we have included population turnover as a possible mechanism linking health to urban renewal, in the context of the Neighbourhoods Law, the issue of displacement or gentrification was not of great concern as explained earlier.

## **JUSTIFICATION**

Until now, research has linked urban settings to various health outcomes and health inequality in hopes of determining what makes cities healthier for people. With growing urban populations, longer life expectancies, infrastructural decay and increased immigration, urban renewal policies are needed to accommodate and address these issues.

However, the agenda of these policies rely on gains within social and economic areas and often ignore health issues. One possible explanation is the oversight of health outcomes in evaluation of these policies or if considered, they tend to focus on the areas of access and usage of health services within the neighbourhood. Therefore, this results in little evidence available on the effects of urban renewal projects on the health and health inequalities of resident.

Yet, the little evidence available shows positive links between initiatives and health outcomes. These include studies that have shown how green spaces lead to positive mental health outcomes and how improved walkability promotes physical health (Gebel et al. 2009; Mitchell & Popham 2008; Rydin et al. 2012). Nonetheless, the effects on health inequality are sparse and mainly due to the complexities associated with the variability in the outcomes due to factors such as the implementation process, the context, the targeted population and the variations in the interactions and causal

pathways. Furthermore, there continues to be a heavy reliance on method-driven evaluations that often are not adequate due to the limited availability and reliability of data for health and socioeconomic indicators.

To address these limitations and contribute to the evidence, we proposed a mixed-methods approach that takes into account various factors including short-term effects of the program, the input of the residents who are directly affected and theories behind some of the underlying causal pathways. To do this, we focus on the City of Barcelona and its involvement in the Neighbourhoods Law, one of the largest urban renewal initiatives in Spain. The Neighbourhoods Law was implemented in 2004 in attempts to address social problems through the improvement of the physical, social and economic status of some of the most deprived neighbourhoods.

A mixed-methods approach also allows for the incorporation of participant input. Concept Mapping consists of six steps carried out in two or three sessions with participants (Trochim 1989). Although it was originally designed as a management tool, in recent years it has become a strong exploratory tool. In addition, it helps provide insight on some of the possible causal pathways linking the initiative to health where traditional quantitative methods would not.

The 2001, 2006, and 2011 Barcelona Health Surveys from 2001, provide the possibility to analyze data at the neighbourhood level

and to study the pre and post-intervention's effects on variables more sensitive to short-term effects, while future surveys can be considering for long-term effects. Furthermore, with a comparison group consisting of non-intervened neighbourhoods with similar socio-economic characteristics, we will control for external effects like the economic recession and the rising unemployment rates.

Finally, using both of these studies along with existing evidence, a theory-driven approach will be used to address some of the complexities in the associations between urban renewal and health inequalities as opposed to simply stating if the intervention worked or not. This deeper understanding is transferable and helpful to emphasize the need to consider and incorporate health and health inequality measures in future policy decisions (Pawson & Sanjeev 2009).



## OBJECTIVES

The objective of this study was to study the effects of an urban renewal policy, the Neighbourhoods Law, and its effects on health and health inequalities. This objective is further broken down into three specific objectives presented here with each corresponding paper that addresses them:

### Specific Objectives

*Article 1: An evaluation of an urban renewal program and its effects on neighbourhood resident's overall wellbeing using concept mapping.*

- To evaluate the perceptions of neighbours towards the effects of recent changes in their neighbourhoods, including the Neighbourhoods Law, on their wellbeing from two Barcelona neighbourhoods using Concept Mapping methodology.

*Article 2: The effects of an urban renewal project on health and health inequalities: A quasi-experimental study in Barcelona*

- To evaluate the effects of the Neighbourhoods Law on the health of residents (women and men) of intervened neighbourhoods in the city of Barcelona and on the social class inequalities in health within these neighbourhoods.

Article 3: *Exploring complex causal pathways between urban renewal, health and health inequality using a theory-driven approach.*

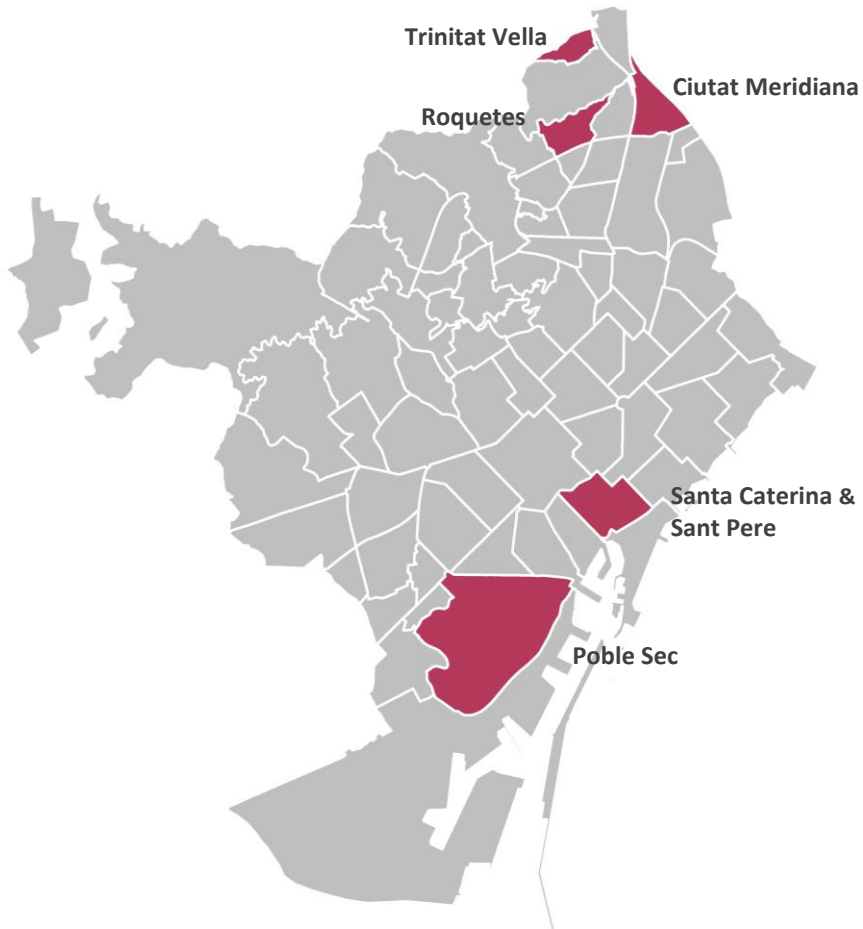
- To explore how urban renewal programs are linked to health and health inequality and discuss some of the complexities associated with these causal pathways using a theory-driven approach.

## **HYPOTHESIS**

- Neighbours will perceive the majority of changes in both the physical and social environment due to the urban renewal project, as important and positive for their wellbeing.
- In both women and men, poor self-rated health and poor mental health status will improve in intervened neighbourhoods compared to those not intervened.
- Health inequalities will decrease as the Neighbourhoods Law aimed to address social issues amongst the most deprived neighbourhoods in Barcelona.

Urban renewal projects have the potential of affecting health and health inequality of neighbourhoods intervened.

Map of Barcelona with the five intervened neighbourhoods discussed in the following articles.



## RESEARCH ARTICLES

**Article 1.** An evaluation of an urban renewal program and its effects on neighbourhood resident's overall wellbeing using concept mapping. *Health & Place* 2013.

**Article 2.** The effects of an urban renewal project on health and health inequalities: A quasi-experimental study in Barcelona. *Journal of Epidemiology and Community Health* (Under review).

**Article 3.** Exploring complex causal pathways between urban renewal, health and health inequalities using a theory-driven approach. *Social Science & Medicine* (Under review)

## **ARTICLE 1.**

Roshanak Mehdipanah, Davide Malmusi, Carles Muntaner, Carme Borrell (2013). An evaluation of an urban renewal program and its effects on neighbourhood resident's overall wellbeing using concept mapping. *Health & Place*, 23:9-17.

Mehdipanah R, Malmusi D, Muntaner C, Borrell C. [An evaluation of an urban renewal program and its effects on neighborhood resident's overall wellbeing using concept mapping](#). *Health Place*. 2013 Sep;23:9-17. DOI: 10.1016/j.healthplace.2013.04.009

## **ARTICLE 2.**

Roshanak Mehdipanah, Maica Rodriguez-Sanz, Davide Malmusi, Carles Muntaner, Elia Diez, Xavier Bartoll & Carme Borrell (*under review*). The effects of an urban renewal project on health and health inequalities: A quasi-experimental study in Barcelona. *Journal of Epidemiology and Community Health*.

Mehdipanah R, Rodríguez-Sanz M, Malmusi D, Muntaner C, Díez E, Bartoll X et al. [The effects of an urban renewal project on health and health inequalities: a quasi-experimental study in Barcelona.](#) J Epidemiol Community Health. 2014 Sep; 68(9): 811-7. DOI: 10.1136/jech-2013-203434

## **The effects of an urban renewal project on health and health inequalities: A quasi-experimental study in Barcelona**

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(All of the above authors fulfil the 4 recommended criteria set by BMJ to be authors)

**Keywords:** urban renewal, health inequalities, neighbourhoods, quasi-experimental, policy evaluation

**Word count:** 3184

## **ABSTRACT**

In the last decade, the Neighbourhoods Law in Catalonia (Spain) funded municipalities that presented urban renewal projects within disadvantaged neighbourhoods, focusing on physical, social and economic improvements. The objective of the study was to evaluate the effects of this law on the health and health inequalities of residents in the intervened neighbourhoods in the city of Barcelona.

A quasi-experimental pre and post design was used to compare adult residents in five intervened neighbourhoods to eight non-intervened comparison neighbourhoods with similar socioeconomic characteristics. The Barcelona Health Survey was used for studying self-rated and mental health in pre (2001, 2006) and post (2011) years. Poisson regression models stratified by sex, were used to compute prevalence ratios comparing 2011 with 2006, and later stratified by social class, to study health inequalities.

The intervened neighbourhoods had a significant decrease in poor self-rated health in both sexes while no significant changes occurred in the comparison group. When stratified by social class, a significant improvement was observed in the manual group of the intervened neighbourhoods. Poor mental health increased in manual men in the comparison group while no significant changes were observed in the intervened group. Decreases in health inequalities occurred as a result of drops in poor self-rated health outcomes for both sexes in the manual class of intervened groups.

The Neighbourhoods Law had a positive effect on self-rated health and seems to prevent poor mental health increases, in both sexes and especially among manual social classes.



**What is already known on this subject.**

- The built environment has an effect on health and health inequalities.
- The Neighbourhoods Law, a large scale urban renewal intervention in Barcelona, has shown potential beneficial changes for residents' wellbeing through a complimentary qualitative evaluation.
- Quasi-experimental designs are recommended to evaluate social interventions.

**What this study adds.**

- In areas intervened by the Neighbourhoods Law, self-rated health improved amongst residents of both sexes and especially manual social classes.
- The Neighbourhoods Law appears to mitigate the increase in poor mental health observed in men in the comparison group.

## INTRODUCTION

Urban renewal projects aim to provide improvements in physical infrastructure, economical gains and social integration[1, 2]. In Europe, Barcelona is a leading city in urban renewal efforts including the restructuring of its waterfront in the 1980's for the Olympic bid, and the revitalization of its traditionally poor inner-city district, the Ciutat Vella. In 2004 the regional government of Catalonia presented the Neighbourhoods Law (*Llei de Barris*), one of the largest urban renewal policies in Europe[3]. The law invited neighbourhoods, especially those with poorer physical infrastructure, and higher unemployed, immigrants or “at risk” populations, to submit plans for revitalization. Neighbourhoods were provided 50% of the funding for projects proposed (15-20 million Euros) over the 4 years program period, if selected. Although projects were prioritized to address emerging needs in each neighbourhood, all projects fell within the areas (examples within brackets) of: public space (creation of parks), rehabilitation (building reform), equipment (community centers), new technologies (solar panels), sustainability (energy efficiency), gender equality (programs for women), social programs (community events) and accessibility(street repairs)[3]. By 2011, about 148 neighbourhoods had benefited with an inversion of approximately 2 billion Euros. However, in 2012, the program was suspended by the newly-elected conservative coalition. In Barcelona, with 1.65 million inhabitants, 12 neighbourhoods have participated resulting in about 10% of the population being affected by the projects. The law mainly focuses on infrastructural changes to upgrade physical and institutional structures necessary for a functioning city, but two complementary programs were also introduced focusing on health[4] and employment[5] in specific sub-populations.

In the past, evaluations of urban renewal projects have focused on economics, transportation and housing improvements while overlooking their effects on health and health inequalities[6, 7]. Those that have considered health have tended to focus on smaller scale interventions such as impacts on asthma in children through housing renewal[8], accessibility to resources after transportation improvements[6], and increases in physical activity through the creation of green spaces[9]. Despite recent efforts looking at the effects of urban

renewal on various health outcomes, there continues to be limited evidence due to evaluations using inadequate health indicators, short-term follow up periods and a reliance on simple and linear quantitative analyses not suited for complex interventions[10, 11]. However, although the research on health effects of urban renewal effects is sparse, its potential benefits are indicated by the established link between urban planning and health through the improvement of both social and physical environments[12, 13]. Frameworks such as Borrell et al.'s (2013), *Determinants of health inequalities in cities of Europe*, explain how physical and social environments influence the determinants of health across social groups[13]; while others like Northridge and Freeman (2011) propose pathways between urban planning and health equity through *better access to materials and other resources* throughout the neighbourhood, *improvements in physical and social environment*, and *increase resources and political power*[14].

Quantitative evaluations adopting quasi experimental designs with comparison groups are adequate for natural experiments and a better understanding of indicators addressed by the intervention and appropriate for the post-intervention period[7, 15-17]. The Neighbourhoods Law is an opportunity to conduct such an experiment to study the effects of an urban renewal program in Southern Europe. Barcelona, like other major cities, has higher levels of mortality and morbidity rates in the inner-city areas, which often include the most deprived neighbourhoods, compared to the rest of the city[18-20]. Moreover, the current economic crisis resulting in record unemployment rates and inflation in the costs of living will probably have detrimental effects on the health inequality gap[21].

The objective of the study was to evaluate the effects of the Neighbourhoods Law on the health of residents of intervened neighbourhoods in the city of Barcelona and on the social class inequalities in health within these neighbourhoods. This study forms part a mixed-method evaluation whose qualitative section of the evaluation used concept mapping to better understand the perception of changes that had occurred in the neighbourhood in recent years and their effects on the overall well-being of residents[22].

## **METHODS**

### **Design, study population and sources of information**

A pre and post-intervention quasi-experimental design was used, analyzing cross sectional data for 2001, 2006 and 2011, for differences in health and health inequalities between a group of neighbourhoods intervened by the Neighbourhoods Law and a comparison group of non-intervened neighbourhoods. The intervention group consisted of all Barcelona neighbourhoods (N=5) that participated between the years 2004 to 2011. Table 1 provides information on the expenditure across the eight areas of improvement by the Neighbourhoods Law and the establishment of the complementary programs.

To obtain the comparison group, a cluster analysis of the 38 Barcelona neighbourhoods, defined by the City of Barcelona, was completed based on the 5 socioeconomic indicators developed by the MEDEA project[23] extracted from the 2001 Census: the percentages of manual workers and temporary workers over the total working population, unemployed over the economically active population, and low education over the total adult population (16 and over) and over the total young adults (ages 16 to 29). The majority of neighbourhoods intervened by the law fell within the first 2 of 5 clusters as expected since the law targeted deprived neighbourhoods. The eight neighbourhoods within those 2 clusters that were not intervened by the law up to 2011 were used as comparison neighbourhoods. Furthermore, both intervened and comparison neighbourhoods were located in the same 5 of 10 districts as defined by the city and had an average population per neighbourhood of 32,151 and 34,200 respectively.

Table 1. Total amount and distribution of expenditures of the Neighbourhoods Law in five intervened Barcelona neighbourhoods.

	<b>Roquetes (2004-2010)</b>	<b>Santa Caterina (2004-2009)</b>	<b>Poble Sec (2005-2010)</b>	<b>Ciutat Meridiana (2006-2011)</b>	<b>Trinitat Vella (2006-2011)</b>
<b>Program cost</b>	11,054,445Eur	14,616,000Eur	16,915,500Eur	18,042,000Eur	17,442,986
<b>Projects</b>					
Public space	41.2%	14.0%	58.7%	62.8%	30.8%
Rehabilitation	17.5%	10.3%	8.3%	10.0%	10.3%
Equipment	27.3%	66.0%	17.0%	18.8%	27.9%
New Technologies	0.5%	-	0.7%	2.8%	1.5%
Sustainability	2.8%	3.1%	1.9%	1.7%	1.7%
Gender equality	4.3%	-	1.8%	0.4%	1.7%
Social programs	3.5%	6.6%	2.1%	2.1%	14.0%
Accessibility	2.9%	-	9.6%	1.6%	12.0%
<b>Complementary Programs</b>					
Employment in Neighbourhoods	Yes	Yes	Yes	Yes	Yes
Health in Neighbourhoods	Yes	Yes	Yes	Yes	No

Source: DPTOP 2009[3].

The Barcelona Health Surveys (BHS) for 2001, 2006 and 2011 were used to derive data for the study. In all surveys the sample was representative of age, sex and district for the entire population of Barcelona. Furthermore, the BHS has maintained data collection and methodology techniques constant across all years in order to preserve comparability of results from one year to another[24]. Although some neighbourhoods were selected for the program in 2004 or 2005, it was not until 2006 when projects began. Therefore, we included this year as baseline data and interpretations focus then on the 2006 and 2011 years with 2001 serving as a second reference point to assess the pre-intervention trend. In addition, the 2006 BHS was a collaboration between regional and municipal efforts. Addresses of respondents were unavailable from the regional data collection making it impossible to geocode by neighbourhoods and thus resulting in a smaller sample. Adult participants (15 years or older) who lived in one of the two neighbourhood groups and had responses for all outcomes, were included in the study.

In order to address concerns regarding differential population turnover in neighbourhoods, the analysis was repeated excluding subjects from the 2011 survey who had lived less than 5 years in the neighbourhoods studied based on the survey question for this variable (N=1370). Since no significant differences were noted, the study concluded with the entire population to not lose further statistical power.

## **Variables**

### *Dependent: Self-rated health and mental health*

Several studies have shown *self-rated health* status as an indicator of health status that considers perceptions of quality of life, presence of disease and usage of health services, and is valid, reliable and sensible to (short-term) changes [25, 26]. Data for this measure was taken from the survey question “*In general, how would you say your health is (1) Excellent, (2) Very Good, (3) Good, (4) Fair, (5) Poor*”? Categories were grouped to form two categories *Good* (excellent, very good, and good) and *Poor* self-rated health (fair and poor).

Mental health was studied using the Goldberg GHQ-12 scale. This scale helps the examination of the distribution of symptoms mainly associated with anxiety and depression in the general population while acting as a screening instrument to detect risk of various mental disorders[27, 28]. Scoring was based on answers to a minimum of 7 of 12 questions including: *loss of sleep over worry*; *feeling of constantly being under strain*; and *losing self-confidence in yourself*. Poor mental health was based on a score of 3 or more while anything less was considered as *good* mental health[28].

#### *Independent: Socio-demographic characteristics*

Information on age, sex, and social class were obtained directly from the surveys. Social class, the independent variable used to study health inequalities, was derived from occupation according to Spanish adaptations of the British Registrar General classification based on the National Classification of Occupations 1994 and 2011[29,30] and grouped into 2 categories: *non-manual* including managerial and senior technical staff, free professionals, intermediate occupations, managers in commerce and skilled non manual workers; and a *manual* including skilled, partly skilled and unskilled manual workers. Previously employed individuals were classified based on their last occupation, and never employed individuals were assigned the occupation of the head of the household.

#### **Statistical analyses**

First, for each survey year, we described and compared socio-demographic characteristics (sex, age, social class and employment status) between the intervened and comparison groups using a chi-square test (Table 2).

Trends in age-standardized prevalence of poor self-rated health and poor mental health, by neighbourhood group were estimated for men and women (Figure 1). Then, for each dependent variable, trends in prevalence ratios between years ( $PR_{year}$ ), using 2006 as reference, by neighbourhood group were directly estimated through Poisson regression robust models. All PR values provided within the figures are derived from the comparison between 2006 and 2011.

Furthermore, the analysis was stratified by social class in order to compare trends in prevalence between manual and non-manual social classes (Table 3).

Finally, derived from this regression model, for each year and neighbourhood group, socioeconomic health inequalities were estimated using both absolute (change in %) and relative ( $PR_{\text{class}}$ ) differences in prevalence between manual and non-manual classes (Figure 2).

A p-value of  $<0.05$  was considered statistically significant. All analyses were conducted using STATA SE 10.0 statistical software and no weights were used, as the study does not aim to gather estimates at the city level.

## **RESULTS**

Comparing socio-demographic characteristics between the intervened and comparison groups for each survey year (Table 2), there was approximately an equal representation of women and men, while the majority of individuals were aged 35 to 64 years, manual workers, and employed. In 2011, unemployment increased by almost three times compared to 2006. The P-values indicate no significant differences between neighbourhood groups and each characteristic except for age in women for 2006.



Table 2: Comparison of population characteristics by neighbourhood group and sex for each year.

	2001				2006				2011			
	Intervened		Comparison		Intervened		Comparison		Intervened		Comparison	
	Women N=521	Men N=449	Women N=943	Men N=879	Women N=135	Men N=139	Women N=244	Men N=260	Women N=206	Men N=192	Women N=439	Men N=384
<i>Age</i>												
<b>15-34 years</b>	31.7%	35.4%	29.4%	34.7%	23.0%	28.1%	30.7%	35.8%	30.6%	26.6%	28.5%	32.6%
<b>35-64 years</b>	46.1%	48.6%	44.2%	45.4%	53.3%	51.8%	37.7%	47.7%	44.7%	50.0%	50.1%	46.9%
<b>65+ years</b>	22.3%	16.0%	26.4%	19.9%	23.7%	20.1%	31.6%	16.5%	24.8%	23.4%	21.4%	20.6%
<b>P-value</b>	0.207	0.214			0.013*	0.272			0.412	0.324		
<i>Social Class</i>												
<b>Manual</b>	62.2%	59.0%	62.3%	57.3%	63.0%	64.0%	59.8%	61.2%	57.3%	57.8%	50.3%	58.9%
<b>Non-manual</b>	34.0%	40.1%	32.9%	41.5%	35.6%	35.3%	37.3%	38.1%	35.0%	39.1%	40.3%	37.5%
<b>NA</b>	3.8%	1.0%	4.9%	1.1%	1.5%	0.7%	2.9%	0.8%	7.8%	3.1%	9.3%	3.7%
<b>P-value</b>	0.629	0.792			0.633	0.853			0.256	0.902		
<i>Employment Status</i>												
<b>Employed</b>	40.3%	63.0%	39.5%	57.0%	43.7%	66.9%	52.5%	68.9%	41.8%	51.0%	49.4%	52.3%
<b>Unemployed</b>	4.4%	4.7%	4.5%	6.5%	6.7%	2.9%	3.7%	5.4%	13.1%	14.1%	11.2%	14.6%
<b>House worker</b>	30.3%	0	31.4%	0.2%	25.2%	0	18.0%	0	17.0%	0	15.0%	0
<b>Retired</b>	14.2%	19.6%	14.4%	22.5%	15.6%	23.7%	18.4%	19.2%	15.1%	24.5%	15.0%	24.5%
<b>Student</b>	9.6%	8.2%	7.6%	9.0%	3.0%	4.3%	4.1%	5.0%	7.8%	5.2%	6.6%	5.2%
<b>Other</b>	1.2%	4.5%	2.7%	4.8%	5.9%	2.2%	3.3%	1.5%	5.3%	5.2%	2.7%	3.4%
<b>P-value</b>	0.379	0.312			0.200	0.647			0.358	0.889		

NA: not available. \*P-value from chi-square test comparing intervened and comparison group within each year and sex.

Trends in the prevalence of poor self-rated health and poor mental health were compared for each neighbourhood group by sex (Figure 1). Prevalence ratios between 2011 and 2006 are also provided.

From Figure 1, in the intervened group, poor self-rated health decreased significantly between 2006 and 2011 with prevalence ratios of  $PR_{year}=0.74$  (95% CI: 0.56-0.97) in women and  $PR_{year}=0.53$  (95% CI: 0.36-0.78) in men. On the contrary, no significant changes were observed in the comparison groups for either sex.

Poor mental health increased significantly in men in the comparison neighbourhoods with a  $PR_{year}=1.93$  (95% CI: 1.23-3.01) while there was no significant change in women. Within the intervened group, among women a break in the pre-intervention upward trend in poor mental health is observed, while it continued to gradually increase in men, all changes being non-significant.

In Table 2, the data were further stratified by social class in order to study the trends of poor self-rated health and poor mental health in each social class.

Table 3. Trends in age-standardized prevalence ( $PR_{\text{year}}$ ) of poor self-rated health and poor mental health in women and men by social class and neighbourhood group.

	<i>Poor self-rated health</i>			<i>Poor mental health</i>		
	<b>2001</b>	<b>2006</b>	<b>2011</b>	<b>2001</b>	<b>2006</b>	<b>2011</b>
<b>WOMEN</b>						
<i>Intervened Neighbourhood</i>						
Manual	34,2%	52,8%	35,0%	17,5%	31,5%	22,8%
Non-manual	30,7%	25,8%	20,2%	10,4%	12,7%	16,7%
PR (95% CI) of years in manual	0.71**(0.56 0.91)	ref	0.72*(0.53 0.97)	0.52***(0.35 0.77)	ref	0.73 (0.47 1.14)
PR (95% CI) of years in non-manual	1.14 (0.65 2.00)	ref	0.77 (0.38 1.59)	0.87 (0.37 2.05)	ref	1.68 (0.70 4.03)
<i>Comparison Neighbourhood</i>						
Manual	38,7%	26,1%	28,1%	25,9%	19,6%	19,1%
Non-manual	26,4%	14,4%	24,4%	17,7%	13,1%	16,2%
PR (95% CI) of years in manual	1.38**(1.12 1.70)	ref	1.01 (0.79 1.31)	1.19 (0.86 1.65)	ref	0.93 (0.63 1.39)
PR (95% CI) of years in non-manual	1.73 (0.95 3.17)	ref	1.62 (0.86 3.07)	1.16 (0.68 2.00)	ref	1.01 (0.56 1.82)
<b>MEN</b>						
<i>Intervened Neighbourhood</i>						
Manual	32,6%	40,0%	17,6%	11,8%	10,0%	19,7%
Non-manual	26,1%	13,1%	13,2%	7,9%	14,8%	10,7%
PR (95% CI) of years in manual	0.86 (0.63 1.17)	ref	0.45***(0.29 0.69)	1.30 (0.62 2.72)	ref	1.61 (0.72 3.60)
PR (95% CI) of years in non-manual	1.57 (0.78 3.16)	ref	0.92 (0.40 2.11)	0.58 (0.25 1.35)	ref	0.84 (0.33 2.11)
<i>Comparison Neighbourhood</i>						
Manual	29,1%	23,1%	22,9%	13,5%	11,7%	19,5%
Non-manual	22,5%	18,2%	16,8%	12,4%	5,4%	8,4%
PR (95% CI) of years in manual	1.25 (0.92 1.70)	ref	0.99 (0.69 1.40)	1.16 (0.71 1.90)	ref	1.74*(1.05 2.88)
PR (95% CI) of years in non-manual	1.43 (0.85 2.40)	ref	1.24 (0.69 2.24)	2.38 (0.97 5.83)	ref	1.90 (0.71 5.09)

All values were age adjusted. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.0001$ .

From 2006 to 2011, poor self-rated health in intervened neighbourhoods decreased significantly in the manual class for both sexes with  $PR_{year}=0.72$  (95% CI: 0.53-0.97) in women and  $PR_{year}=0.45$  (95% CI: 0.29-0.69) in men. No notable differences were seen in non-manual. No significant changes were found in the comparison group.

Poor mental health did not show significant changes. While manual men in both neighbourhood groups had poorer mental health in 2011, this increase was only significant in the comparison group  $PR_{year}=1.74$  (95% CI: 1.05-2.88). In non-manual classes, changes were not significant.

Figure 2 illustrates health inequalities through relative ( $PR_{class}$ ) and absolute differences in prevalence between manual and non-manual social classes in each neighbourhood group and sex.

Absolute and relative social class inequalities for poor self-rated health tended to decrease in all groups and sexes except men in comparison neighbourhoods (Figure 2). Within the intervened neighbourhoods, this decrease in social class health inequalities was driven by improvements in the manual class (see in Table 3), while in the comparison group this was due to the worsening conditions amongst the non-manual class. This decrease in social class health inequalities, apparently greater in men from the intervened group, was also observed for poor mental health in women in the intervened group.

Conversely, in both neighbourhood groups, social class health inequalities in mental health increased amongst men. In the intervened group this was due to an increase in manual workers and a decrease in non-manual workers while in the comparison group, there existed an increase in both social classes (seen in Table 3).

## **DISCUSSION**

Our results indicate that self-rated health of both women and men has improved in Barcelona neighbourhoods renewed under the Neighbourhoods Law. Improvements were larger in manual social class, resulting in a decrease in social class health inequalities. Mental health has remained stable in renewed neighbourhoods as opposed to its worsening in men in the comparison neighbourhoods.

Although there are variations in the projects carried out under the Neighbourhoods Law, these results are consistent with those studies that indicate improvements in self-rated and mental health due to increased walkability, better transportation, improved social integration and perception of security[6, 31-34]. Furthermore, the results were consistent with the qualitative part of the evaluation which concluded that the majority of projects within the Neighbourhoods Law, especially those focused on improving physical accessibility and establishing community groups, were perceived as important and positive for the wellbeing of residents[22].

In order to better explain our results, we can borrow from existing proposals of pathways between urban planning and health[13, 14].

Improvement of access to materials and services are linked to better health through better distribution of resources once unattainable or inaccessible by all populations, especially in deprived neighbourhoods[6, 14]. The Neighbourhoods Law improved access to materials and other resources in the neighbourhood through various projects including the improvement of community centres which offer various social services and programs, the establishment of employment centres in all 5 neighbourhoods, and the promotion and increased visibility of local businesses[3]. These projects have improved health and health equity in addition to promoting economic growth and social integration.

A large bulk of the project budgets were allocated to the improvement of physical environment where the Neighbourhoods Law repaired sidewalks to promote

walkability, installed outdoor escalators and the improved traffic safety through new traffic lights and road repairs throughout the five neighbourhoods, enhancing some of the important factors of the physical environment affecting health and health inequalities[13]. For example, increased physical access throughout the neighbourhood due to the removal of physical barriers, has improved access to food outlets and therefore decreased food insecurity, all connected to better mental and physical health outcomes[22,32,35,36].

Improved social integration has been linked to improved mental health and overall wellbeing through various mechanisms such as an increase in pride, security, and improved perceptions towards the neighbourhood[37, 39]. Therefore the creation of public spaces by the Neighbourhoods Law can also contribute to positive social interactions amongst neighbours[38]. Furthermore, the social environment was also addressed by initiatives offering employment programs, the promotion of social networks through community centers and the fomentation of community participation through annual neighbourhood celebrations[3].

Finally, the Neighbourhood Law focused on deprived neighbourhoods consisting mostly of manual class workers. We know individuals from lower socioeconomic positions tend to have worst health outcomes and benefit less from interventions aimed at the general population compared to those from high socioeconomic positions[39]. However, our results indicate otherwise and the Neighbourhoods Law seems to have reduced health inequalities within the intervened neighbourhoods. Therefore, built environment policies like the Neighbourhoods Law can have additional benefits amongst manual social classes, thus promoting health and health equity across all populations[14, 39]. Furthermore, the increase in poor mental health in men in the comparison neighbourhoods is consistent with the general trend observed in Spain due to the financial crisis and its effects on unemployment, while in the intervention group, although unemployment also increased (data not shown), mental health did not worsen, or only partially and not significantly in manual social classes.

### **Strengths and limitations**

As part of an evaluation, the study satisfies the call for more quasi-experimental studies that included non-intervened comparison groups with similarities in socio-demographic characteristics and geographical positioning[7,15]. Although factors including the current economic crisis in Spain can affect the results of our study, this group allowed us to take into account such external factors in order to attribute some of our results to the Neighbourhoods Law.

We do recognize that the intervention consists of a variety of projects, each with their own mechanisms of potential influence on the health of neighbours. However, although this is a limitation for any complex program evaluation, a mixed-method approach can help address such complexities[16]. The results of the qualitative section of this evaluation are consistent with findings from this study and we have identified some of the pathways by which the projects seem to have had an impact on residents' wellbeing in different neighbourhoods and age groups[22].

One of the limitations for studies evaluating urban renewal is the issue of population displacement[40]. This is often difficult to control for especially if the study cohort differs in each time period. Using a question in the 2011 BHS asking if the individual had been living in the neighbourhood for more than 5 years, we ran the analysis excluding residents living less than 5 years in both the intervened and comparison neighbourhoods and noted no significant differences to the models included. However this was only possible for individuals who were residing in the neighbourhood and not those who had left. Future prospective studies should address this issue in order to gain more information on the health status of those individuals post-intervention.

Another limitation was the short post-intervention time period resulting in restrictions when selecting health outcome variables[16]. While we considered studying other health outcomes related to contextual settings, a longer follow-up period would be required to capture true effects. Therefore, we have focused on outcomes reasonably able to detect more immediate changes in wellbeing, the

kind of changes previously detected through the qualitative part of the evaluation[22], such as self-rated health , which has been shown to be sensible to short-term health changes[26], and mental health as measured through GHQ-12 with question referring to *current* mood and mental status[27].

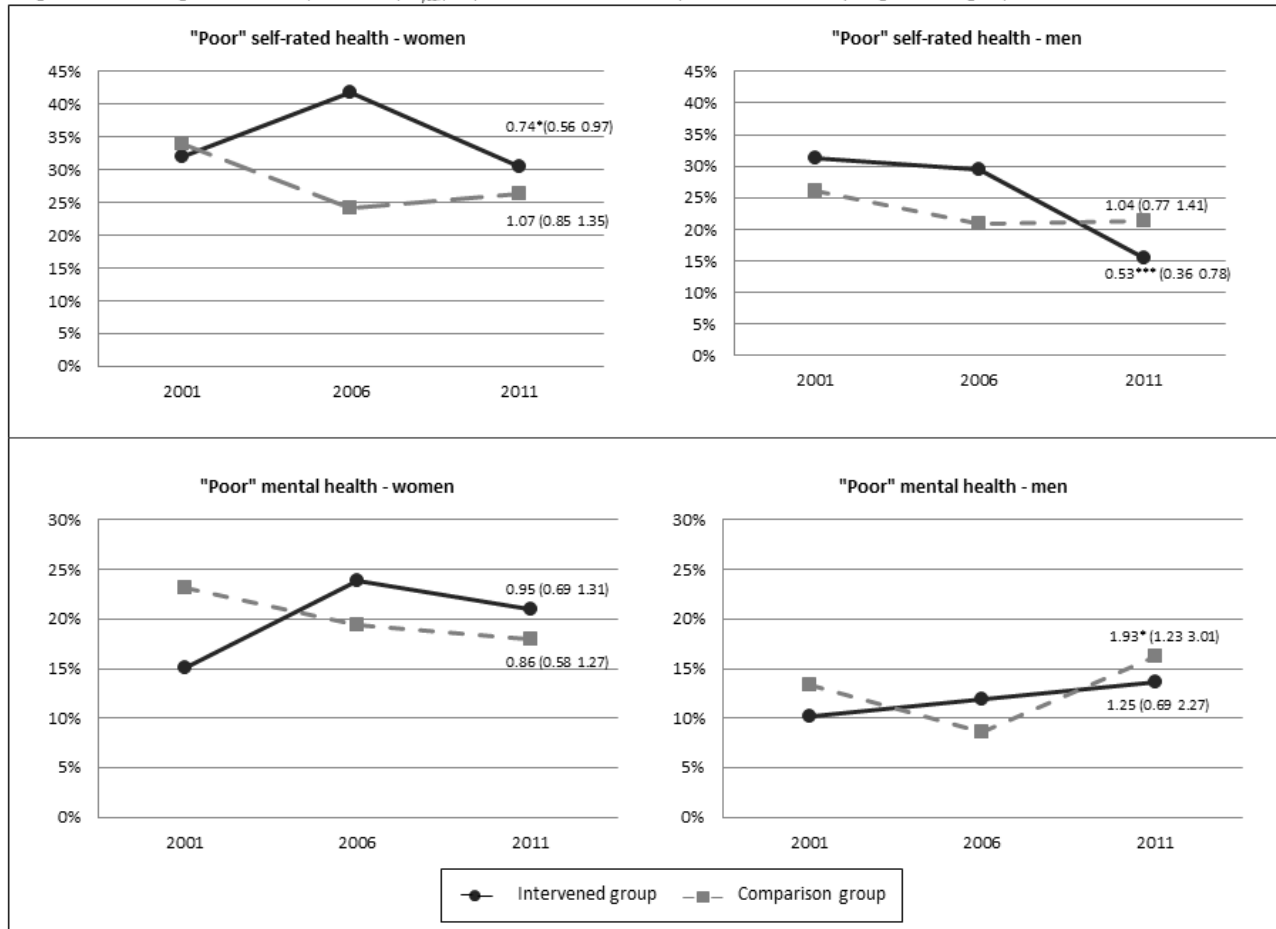
## **CONCLUSIONS**

The Neighbourhoods Law has had positive effects on the self-rated and mental health status of its residents. Furthermore, contrary to the majority of interventions aimed at the general population, the Neighbourhoods Law seems to improve self-rated health across social classes and more specifically the manual class.

Urban renewal projects are complex interventions and require special attention to long follow-up periods and indicator selection in order to better understand their impact on health and health inequalities. Our results will serve as the quantitative analysis for a mixed-method evaluation of the Neighbourhoods Law. They will also contribute to a deeper understanding of the effects of urban renewal on health and health inequalities.

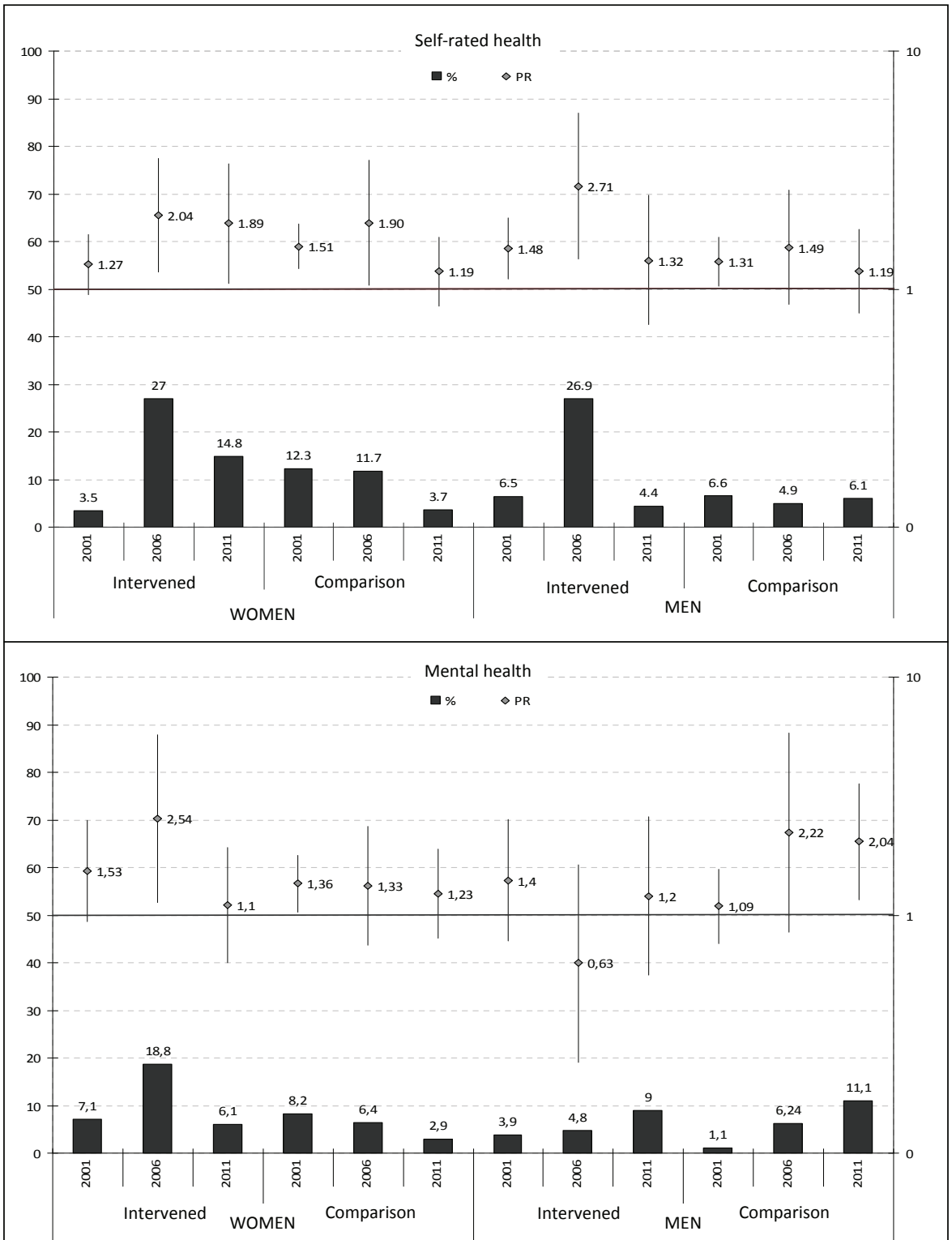


Figure 1. Trends in age-standardized prevalence (PR<sub>year</sub>) of poor self-rated health and poor mental health by neighborhood group for women and men.



Numbers in figure indicate the prevalence ratio between 2011 and 2006. Significant value \*p<0.05, \*\*\*p<0.001.

Figure 2. Relative (PR<sub>class</sub>) and absolute (%) differences in poor self-rated health and poor mental health between manual and non-manual social classes by year and neighborhood group in women and men.



Significant value \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

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### ARTICLE 3

Roshanak Mehdipanah, Ana Manzano, Carme Borrell, Davide Malmusi, Maica Rodriguez-Sanz, Joanne Greenhalgh, Carles Muntaner, & Ray Pawson (*under review*). Exploring complex causal pathways between urban renewal, health and health inequalities using a theory-driven approach. *Social Science & Medicine*.

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## **Exploring complex causal pathways between urban renewal, health and health inequality using a theory-driven approach**

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**ABSTRACT:**

Urban populations are growing and to accommodate these numbers, cities are becoming more involved in urban renewal programs to improve the physical, social and economic conditions in different areas. This paper presents a theory-driven approach, combining a mixed-methods evaluation of a specific urban renewal intervention with pre-existing literature, to discuss the link between urban renewal interventions and their effects on health and health inequalities. To better describe this, the Neighbourhoods Law, an urban renewal program targeting Barcelona's (Spain) most deprived neighbourhoods, and two of its interventions, the construction of a large central plaza and the repair of streets and sidewalks, are used. A discussion is presented on the barriers encountered by the neighbours and their repercussions on their overall wellbeing. This has resulted in a general conceptual framework describing some of the causal pathways including the increase in resources the intervention provides and the usage and adaptability of the intervention by neighbours in order to attain optimal benefits in health outcomes. This paper provides a different perspective to the field that is largely dominated by traditional quantitative studies that are not always able to address the complexities such interventions provide. Furthermore, the framework and discussions serve as a guide for future research, policy development and evaluation.

**KEYWORDS:**

Urban renewal, theory-driven, health inequality, public space, evaluation

## **Introduction**

Urban renewal policies are large-scale interventions consisting of a combination of projects, which in recent years have expanded beyond physical improvements to include social and economic gains especially in deprived urban areas (Smith & Petticrew 2010; MacGregor 2010). The complexity of these projects and their outcomes arise from the great variability in factors such as the implementation process, context, population composition and their interaction (Kearns et al. 2009; Thomson et al. 2006).

This complexity has resulted in limited evidence available on the effects of large-scale urban renewal on health and health inequalities. The existing research in this field has mostly focused on small-scale interventions such as improvements in housing and transportation and their potential effects on specific health outcomes like asthma, obesity, physical activity or mental health (Curtis et al. 2002; Morrison et al. 2003). In addition, the majority of evaluations have generally depended on quantitative analysis, including traditional cost-effectiveness methods, to measure changes in health of populations affected by urban renewal projects (Thomson et al. 2006). Finally, little information has been produced on their impacts on health inequalities possibly due to the limited availability of data for health and socioeconomic indicators (Tannahill & Sridharan 2013; Thomson 2008).

In 2001, Cave and Curtis described the need for a more theory based approach to studying the health impact of urban regeneration schemes while emphasizing the importance of incorporating stakeholders' knowledge in the process (Cave & Curtis 2001). Since then, qualitative approaches such as in-depth interviews or focus groups have been used to achieve a deeper understanding of the perceptions and experiences of urban renewal projects and their effects on wellbeing (Curtis et al. 2002). Only recently, projects like GoWell in Scotland have taken on a mixed-methods approach and have been successful in detailing the process and implementation of the program with prospects of short term and long term

impacts on health once the program has been completed, all of which are needed to better explain the impacts on health and health inequalities (Egan et al. 2010).

Furthermore, there continues to be a lack of conceptual models proposing theories for some of these presented causal pathways. A shift towards a theoretical approach can provide a deeper insight on how the intervention causes change, being useful for future policy decisions and program planning (Dunn et al. 2013; Pawson & Sridharan 2010 pg.44). A general understanding of the program theory should describe the process through which the program is expected to result in change (O'Campo et al. 2009; Sridharan & Nakaima 2011). To supplement the limited evidence in this field, we can learn from the extensive research linking the urban setting (both physical and social environments) and various health and health inequality outcomes (Borrell et al. 2013; Borrell et al. 2000; Northridge & Freeman 2011). Therefore, it is expected that any improvement in any of these two environments could ultimately lead to improvements in health and health equity.

This paper serves to explore the assumption above while highlighting some of the complexities surrounding the causal pathways between urban renewal and outcomes in health and health inequalities. It goes on to propose the use of theory-driven approach using both existing evidence in the literature and two previous studies completed on an urban renewal initiative, the Neighbourhoods Law, and its effects on the health and health inequalities of some of Barcelona's (Spain) most deprived neighbourhoods (Mehdipanah et al. 2013; Mehdipanah et al. under review).

Historically, under the Franco dictatorship (1939-1975), urban planning deteriorated in cities like Barcelona where urban slums grew rapidly resulting in socio-economically deprived neighbourhoods (Garcia-Ramon et al. 2004). It was not until 1979 with the first democratic elections where the Socialist Party elected in Barcelona worked with strong citizen support to improve these neighbourhoods (Degen & Garcia 2012; Gonzalez & Healy 2005). In keeping up with tradition, in 2004, the first Socialist-led Catalan regional government launched the

Neighbourhoods Law, the largest urban renewal program to date in Spain (DPTOP 2009). The program aimed to address major social issues by improving physical infrastructure, social integration and economic gains in a neighbourhood (Nel-lo 2010). The program has invested over 2 billion Euros in 148 neighbourhoods across the region and 12 of them in Barcelona, resulting in 10% of the city's 1.65 million inhabitants being affected by the projects. However, in 2012, the program was suspended by the newly-elected conservative coalition with lack of funds due to the current economic recession as its reasoning. As discussed for other large-scale urban renewal programs, the Neighbourhoods Law consisted of many projects overlapping and occurring at different times during the four-year program period. Therefore, it is difficult to isolate each project and associate it to one specific outcome, as interactions are both multidirectional and non-linear (Van Belle et al. 2010).

### **Theory-driven evaluation approach**

The goal of theory-driven evaluations is to develop a program theory by describing how, for whom and under what circumstances complex programs work (Chen 2012; Pawson & Sridharan 2010). Theory-driven evaluations contain a full understanding of the program and its goals while having a constant consideration of the contextual settings in which they are implemented (Pawson & Sridharan 2010; Donaldson & Gooler 2003). It is flexible in methods used and encourages both quantitative and qualitative data as long as they help confirm, refine or dismiss the different mechanisms being studied (Donaldson & Gooler 2003; Van Belle et al. 2010). Ultimately, the goal of this theory-driven approach is not to state whether a program was successful or not but rather produce an improved program theory based on evidence from the literature and the results attained from our own program evaluation (Van Belle et al. 2010). This deeper understanding would then serve to provide guidance for policy planning and implementation.

Although the roots of theory-driven evaluations date back to the 1930s, it was in the late 80s where this approach became more widely used within the evaluation

community (Coryn et al. 2011), including applications in the area of public health such as, studies searching for risk factors associated with Alzheimer's disease (Henderson 1988), looking at the relationship between physical activity and mental health wellbeing in youth (Whitelaw et al. 2010), or considering threats to public health interventions (Wong et al. 2011). Furthermore, theory-driven evaluations have evolved into more specific approaches including the realist synthesis (Pawson 2006), used for example to evaluate the effectiveness of smoking cessation programs in youth and pregnant women (Douglas et al. 2010), or to study poor housing conditions and health (Foster et al. 2011).

These studies and others have been successful in theorizing the relationship between interventions or policies and specific health outcomes, however, more studies are needed addressing health inequalities as it is an area difficult to study because of the system of interactions occurring between the social determinants of health and the interventions studied (O'Campo et al. 2009; Thomson 2008). A theory-driven approach can aid this process by exploring some of this complexity. To further explain this, the next section provides evidence from the evaluation of the Neighbourhoods Law which then served to develop a conceptual framework explaining how urban renewal is linked to health and health inequality.

### **Evidence from the evaluation of the Neighbourhoods Law**

Previous evaluations on the Neighbourhoods Law were based on the post-intervention values of the indicators originally used to score each neighborhood, a series of interviews with residents from the intervened areas with questions addressing their overall satisfaction with their neighborhoods and perceptions towards changes that had occurred (DTS 2013). In addition, at the end of each intervention period, an assessment of performance, results on territorial planning, economic and commercial activity, environmental aspects, social cohesion and gender equality for each neighbourhood, was gathered (Nel-lo 2010). The results indicated an average 7.4% improvement in the indicators for the first set of neighborhoods and 51.3% of neighbours felt that their neighborhood had improved with the intervention (Nel-lo 2010). While there are some flaws in the methods including some of the indicators not being time sensitive to the one-year

follow up period and no comparison groups of non-intervened neighborhoods, the slight improvements indicate that the Neighborhoods Law had more positive outcomes than negative in the areas intervened (Nel-lo 2010).

Our study was the first to evaluate the effects of the Neighbourhoods Law on the health and health inequality of neighbours using a mixed-methods approach. In the first study we used concept mapping, a qualitative method, to explore the perceptions of neighbors in two intervened neighbourhoods (one in the city centre and another in the peripheries) on the changes that had occurred in recent years and their potential effects on their overall wellbeing (Mehdipanah et al. 2013). Projects in each neighbourhood were tailored based on the priorities identified by the local council and taking into account the socio-demographic composition (Nel-lo 2011). However, there were similarities between the two neighbourhoods in identifying both urban renewal changes, perceived as having an important and *positive* influence on their wellbeing, and changes related with economic activity, social integration and security in the neighbourhood, which were perceived mostly as having important but *negative* effects on their wellbeing (Mehdipanah et al. 2013).

We then used a quasi-experimental design to study the potential effects of the Neighbourhoods Law on the self-rated and mental health status of individuals living in the intervened neighbourhoods while comparing them to a group of non-intervened neighbourhoods with a similar socio-economic status (Mehdipanah et al. under review). Our results showed that both women and men living in intervened neighbourhoods had improved self-rated health while these improvements were more notable in manual social class indicating a decrease in health inequalities within the neighbourhoods. On the other hand, poor mental health status remained stable in the intervened group while it worsened in men from the comparison neighbourhoods (Mehdipanah et al. under review). Both studies were complimentary to one another and provide a strong case for the intervention and its potential for having positive effects on the health and health equity of residents living in intervened neighbourhoods. Furthermore, through the incorporation of neighbours in the study process, we were able to gain insight on

how and why urban renewal had affected their wellbeing through discussions on the outcomes of the qualitative study.

The Neighbourhoods Law increased resources and opportunities through different projects, but we focus our attention on the physical and social barriers that impede neighbours from using and adapting to the intervention and ultimately improved health outcomes. We adapt Van Belle et al.'s (2010) "change model", used in the evaluation of the causal theory, in order to better understand the causal pathways and present contextual factors that can drive change in health and health inequality outcomes (Van Belle et al. 2010). This model was used for two specific examples within the Neighbourhoods Law common to the majority of urban renewal initiatives: the creation of public open spaces (green spaces and plazas) and the improvement of walkability throughout the neighbourhood (sidewalk and street repairs, and the removal of physical barriers) (Rydin et al. 2012). We use these examples to guide us through the *initial program theory*, which addressed what each project was to do and how it was expected to work, to a *refined program theory*, which describes what was actually done and why it differed from the initial theory proposed (Van Belle et al. 2010).

### **Conceptualizing the link between urban renewal and health**

Using the Neighbourhoods Law as a case study, we explore a number of assumptions generally present in urban renewal programs. Firstly we uncover the complexity of the causal pathways involved between these programs and health inequalities. These are presented in the form of a conceptual framework (Figure 1) representing a basic program theory of the steps needed for an urban renewal intervention to impact health inequality outcomes. We then focus our attention on two key mechanisms, as indicated on the map, necessary to achieve those outcomes.

Figure 1. A conceptual framework of urban renewal and its effects on health and health inequality

The model starts with urban renewal interventions addressing the areas of, *physical infrastructure, social integration* and *economic growth* (Roberts 2000; MacGregor 2010). Projects in these three areas ultimately lead to improvement in *liveability*, which encompasses characteristics that would make people want to live in a neighbourhood including environmental conditions, safety and security, transportation, aesthetics, reputation of the neighbourhood, economic opportunities and social cohesion (Howley et al. 2009), all potentially linked to positive health and decreased health inequalities.

In addition to the direct influence of changes in liveability on resident's health, urban renewal may also affect population turnovers in intervened neighbourhoods due to various factors including those leaving due to rising costs of living and those entering due to improvements in liveability (Arbaci & Tapada-Berteli 2012; Kearns et al. 2009). Poor health outcomes have been associated to social network disruptions due to forced relocation because of increased housing values and living expenses due to increasing costs associated with resources and services (Hagan et al. 1996; Kearns & Mason 2013). Displaced residents tend to be of lower socio-economic position and to move to more deprived neighbourhoods resulting in worsening conditions while the average health status of their previous neighbourhoods is expected to improve with the migration of higher income individuals that are able to afford new conditions (Kearns et al. 2009). Therefore, population turnover is an important variable to control for when looking at health and health inequality outcomes post an urban renewal intervention. Nonetheless, it is important to note that liveability and population turnover do not represent the program itself but rather a chain of events within the program that may modify outcomes (Pawson & Sridharan 2010).

Finally, the importance of context in the evaluation of complex interventions has been described by various authors (Diez-Roux 1998; Dominguez-Berjon et al. 2006). In respects to urban renewal, context can include various elements such as geographic location, political climate and the economic situation of the city, country or region at the time the intervention was undertaken. In addition, time lag for changes in health outcomes is also critical to consider where for example,



at a one-year post-intervention, the time lag may not be sufficient to see significant changes in health outcomes like obesity or cardio-vascular disease.

From our conceptual framework and our Neighbourhoods Law study, we highlight (as seen in Figure 1) two assumed pathways used to explain how urban renewal programs are connected to health and health inequalities. The first one lies between the urban renewal project areas and liveability and describes how *urban renewal increases access and availability of resources and opportunities in neighbourhoods*. The second one lies between liveability and health outcomes and describes how *neighbours must use and adapt these changes in order to achieve optimal health and health inequality outcomes*.

The first assumption is based on the exhaustive literature linking social and physical environments to health outcomes and the notion that by improving these factors, urban renewal improves health and health inequality. Evidence to support this includes the concept of improved access to resources which in turn improves wellbeing (Kearns et al. 2009; Northridge & Freeman 2011). For example, initiatives of establishing employment centres not only provide access to job opportunities but they may also provide skill based courses to improve one's abilities of getting a job. This in turn, aims to better the social status of both the poor and working class populations by improving education, employment and income levels (Tsui 2010). As a result, health improves not only through the psychosocial pathways of reducing stress and improving mental health conditions but also through pathways associated with better housing, food options, and in some countries access to healthcare through employer-provided benefits (Tsui 2010). Nonetheless, this is an area that has been studied in the field of urban planning and health and one which we have addressed in the previous studies on the Neighbourhoods Law.

The second assumption describes the notion that in order for urban renewal programs to attain optimal health benefits and reduce inequalities in health, *usage and adaptation by neighbours is required*. However, the mechanisms that help answer the how, why and whom are less studied in this area and thus become the

focus of the rest of the paper. To do this, we draw on the results from the two preceding studies on the Neighbourhoods Law to explore this causal pathway.

In addition, within the context in which the law was implemented, we do not focus on population turnover, as the issue of displacement or gentrification was not of great concern as the policy aimed to protect social housing in the intervened areas (Nel-lo 2010). Furthermore, it has been hypothesized that in the Spanish cultural context, relocation to other areas of the city despite an increase in income or property value is rare as a large proportion of households own their properties and have deeper roots in their neighbourhoods (Nel-lo 2010).

### **Usage and adaptation of urban renewal interventions and the effects of public open spaces on health and health inequality**

Public open spaces are defined as areas that allow residents to participate in public space, promote social interaction and are accessible by all compared to private areas (Borja & Muxi 2001; Garcia-Ramon et al. 2004). Studies have shown that public spaces are used optimally when they establish a relationship directly with people who live and work around it (Thompson 2002; Urban Task Force 2005).

Studies have linked public open spaces to increased opportunities for physical activity among more vulnerable populations including children and elders (Leslie & Cerin 2008; Rydin et al. 2012; Thompson 2002). Applying a health inequalities perspective has led to studies like Mitchell and Popham (2008), who have described social inequalities in all-cause and circulatory disease mortality are significantly lower amongst populations who live in greener neighbourhoods than those who do not.

In addition, other studies have demonstrated that features and facilities within the public open spaces differ across neighbourhoods based on their socio-economic position. A study by Crawford et al. (2008) showed that in more affluent neighbourhoods, public spaces tended to have more features including picnic tables, drinking fountains and more updated playgrounds making them more

attractive to users compared to poorer neighbourhoods. Possible explanations for this include the location of these neighbourhoods tending to be in higher density inner city areas not leaving much room for such features, however, not an adequate reasoning for those located on the peripheries of the city (Crawford et al. 2008). An alternative explanation describes that affluent neighbourhoods have more resources to lobby and change policies whereas in less affluent neighbourhoods, fewer resources including the inability to hire experts to formalize documents and dedicate time to such issues, result in limited efforts to pressure policy makers for change (Travers 1997).

Studies have described the features in the public spaces, such as benches and play areas, as facilitators of social interaction amongst neighbors (Borja & Muxi 2001; Garcia-Ramon et al. 2004). In a 2007 study, Pinkster describes another social mechanism of social interaction, as one that improves opportunities and resources of lower-income populations by interacting with more “affluent and educated” people that can advise and inform them in various aspects, including the labour or housing markets, in order for them to improve their social status. This in turn, has been linked to positive self-rated health and life expectancy while social exclusion has been linked to higher risks of morbidity and mortality (Berkman & Syme, 1979, Northridge & Freeman 2011). Therefore, based on assumption one, the creation of public open spaces and the features they provide, offer more opportunities and resources for physical activity and social integration, all associated with positive health outcomes.

However, the mechanisms between neighbours using and adopting of public open spaces is one that has been discussed roughly. Some explanations on perceived safety and security have been provided including its impact on health due to its effects on behaviour, crime or fear of crime or the social environment (Lorenc et al. 2012). To further explain this and other possible mechanisms, we used on of the projects within the Neighbourhoods Law, the 3.4 million Euros investment in the creation of a large central plaza the Santa Caterina neighbourhood.

This traditionally deprived neighbourhood located in the city centre, consists of a population mix including one of the highest young immigrant population in the city mostly of manual class and an older, predominantly middle-class Spanish population who has been living in the neighbourhood for many years (Mehdipanah et al. 2013). In recent history, the area where the central plaza was to be built has become the centre of controversy between neighbours who wanted a green space and the government who wanted to build a parking (Ruiz 2006). The Neighbourhoods Law, the project would bring more light into the neighbourhood, create a play area for all ages with soccer and basketballs courts, a child's play area would be constructed in addition to a community garden and benches. The initial program theory as illustrated in Figure 2 expected that these *interventions* would decrease health inequality and improve health *outcomes* through *mechanisms* including the creation of a safe and secure place accessible to all which would provide the opportunity for neighbours to interact with each other. In addition, *contextual* factors including the socio-demographic characteristics of the population and the history of this area leading to this intervention, as described, all influence both the mechanisms and the outcomes attained as described below.

Figure 2. Causal pathways for the renewal of a neighbourhood central plaza.

Despite the creation of the public open space the neighbours had fought for, the project had unintended consequences that could lead to negative health outcomes. While the project was able to provide new opportunities and resources that would essentially improve health outcomes, the poor usage and adaptability of the plaza as discussed during group discussions in our previous research was due to the interventions failure to improve the plaza's reputation and perceptions of safety and security in the older population. This was due to predominantly two factors, the physical barriers found in the plaza and the interactions between neighbors as explained below (Mehdipanah et al. 2013). In addition, like other areas in the neighbourhood, benches were reduced within the plaza as explained by the senior group "A decrease in benches throughout neighbourhood plazas" and larger benches were replaced with individual seats that were located fairly separate from

one another and located on the borders of both courts. This location discouraged interactions between neighbours and resulted in risks of being hit by young players. For the older Spanish population, with a long tradition of social interaction in open spaces like plazas, these changes may have impeded this and resulting in greater disruptions (Mehdipanah et al. 2013). Finally, although the plaza was generally recognized as positive for the wellbeing of younger neighbours as it contained various sports facilities and was directly situated across a youth centre, however they went on to state that “*the sandy floor of the soccer and basketball courts (in the plaza)*” had negative effects on their wellbeing (Mehdipanah et al. 2013). This was discussed during the interpretation section of the study where the youth claimed that the flooring used was slippery resulting in serious injuries while playing, therefore, not as ideal for sports use (Mehdipanah et al. 2013).

While these are issues more relevant to physical safety, there is also a dimension of mental wellbeing associated with sense of security (Lorenc et al. 2012). Crime and perceptions of crime including fear have been linked to various health outcomes including mental and overall wellbeing (Lorenc et al. 2012). The Neighbourhoods Law aimed to address such social issues and in the case of this neighbourhood it was the strains in the interaction and exchange amongst neighbors making conviviality difficult (Nel-lo 2010). Different populations have different perceptions of what is acceptable or safe based on their cultural beliefs (Thompson 2002) and both of our populations studied agreed that the sense of insecurity arose from clashes of attitudes and beliefs between immigrants and local neighbours (Mehdipanah et al. 2013). Since the plaza was predominantly used by the younger foreign population, the older non-immigrant population felt the plaza was a negative factor for their wellbeing (Mehdipanah et al. 2013).

Nonetheless, the perception of neighbours and the reputation of a neighbourhood take time to change and although the evaluation is based on short-term variables, a follow-up study with longer time lag could identify some of the benefits to health identified through improvements in physical accessibility, better visibility and the promotion of physical activity in a neighbourhood that previously had no such development (Lorenc et al. 2012).

### **The effects of repaired streets and sidewalks on health and health inequality**

Another example of how urban renewal initiatives could affect health and health inequalities is the repair of streets and sidewalks resulting in improved walkability. Walkability describes the extent in which the built environment supports and promotes walking for various purposes including physical activity and transportation (Gebel et al. 2009; Saelens & Handy 2008). A large body of literature has linked *walkable* neighbourhoods to improved physical activity resulting in reduced obesity amongst adolescents (Slater et al. 2013), reduced BMI in adults (Hirsch et al. 2014) and improved psychosocial status (Van Dyck et al. 2013).

Through an equity perspective, evidence has shown that the urban poor tend to walk as a means of transportation compared to the urban rich who tend to walk for leisure and physical activity (Rydin et al. 2012). In addition, improved walkability can decrease health inequalities by addressing various determinants including age, gender, disability, and income. Studies have shown that children, seniors, individuals with disabilities and low-income households tend to face the greatest barriers in mobility and displacement on foot both within and outside of the neighbourhoods (Thompson 2002; Mitchell & Popham 2008). Furthermore, in the Barcelona context, women from lower income households are more likely to walk or use public transportation as a form of displacement compared to men and women from higher income households (Olabarria et al. 2013). Therefore, in the context of less affluent neighbourhoods, improved walkability can lead to improvements in health outcomes while promoting health equity (Garcia-Ramon et al. 2004; Gebel et al. 2009).

Studies have also explored potential social mechanisms, including those that have shown how walkability improvements are linked to increased accessibility to resources such as food outlets, health services and other resources throughout the neighbourhood (Chung et al. 2011). Furthermore, it can increase perceptions of safety, access to pedestrian friendly areas and reduce the risks associated with walking mobility through better traffic control, usually areas of concern in deprived neighbourhoods (Jacobsen 2003; Morrison 2004). In addition, increased

street lighting has been associated with an increase in pedestrian activity in both women and men (Painter 1996; Gebel et al. 2009).

To illustrate some of these theories together, we present the second example where the Neighbourhood Law repaired street and sidewalk conditions in the neighbourhoods in order to improve walkability as shown in Figure 3. Based on the literature we describe, this would then have positive effects on health outcomes and reduce health inequality in the neighbourhoods. The *intervention* consisted of projects that included traffic calming schemes, wider sidewalks and increased street lighting. As mentioned, the *mechanisms* to achieve this would include improved walkability but also increased accessibility around the neighbourhood and more perceptions of safety and security. In order to better explain the concept of *context* we focus on the Roquetes neighbourhood in Barcelona, a peripheral neighbourhood distinguishable for its geographical features including barriers such as steep hills and mountains. Furthermore, the neighbourhood consists of a larger older population mostly in the manual class and a growing younger immigrant population.

Figure 3. Causal pathways for the repair of streets and sidewalks

In our previous study, street conditions were an area of concern for residents in this neighbourhood, and they perceived this intervention as having very positive and important effects on the wellbeing of residents (Mehdipanah et al. 2013). Neighbors from Roquetes agreed that one of the top most important and positive changes in their neighbourhood in recent years had been the *installation of outdoor escalators and elevators* that connected areas that were difficult to access by pedestrians (Mehdipanah et al. 2013). This had not only improved walkability but it also increased their physical access to stores and services that were once inaccessible due to physical barriers like steep hills or cracked sidewalks, as discussed by neighbours (Mehdipanah et al. 2013). Furthermore, this increase in flow of pedestrians throughout these areas and together with projects like the installation of street lights, could eventually lead to an increased sense of security and a decrease in crime (Jacobsen 2003; Lorence 2012).

Another potential mechanism in which the health inequalities may decrease is based on the notion that women are more likely to walk for transportation in Barcelona and thus sidewalk conditions would be a factor in their mobility (Olabarria et al. 2013). Our results from the discussions with women from a manual working class in this neighbourhood were consistent with these findings (Mehdipanah et al. 2013). They claimed that sidewalks and streets prior to the Neighbourhoods Law were hazardous due to unstable street tiles and unsafe traffic conditions throughout their neighbourhoods, while post-intervention the repair of sidewalks to make them wider and anti-slide, along with traffic control, were recognised as positive and important changes for their wellbeing (Mehdipanah et al. 2013).

### **Conclusions**

With this paper we have explained the relationship between urban renewal and health and health inequalities through the assumption that neighbours must be able to use and adapt to changes produced in order to benefit optimally. Although we recognize there is great complexity in this link, we use two examples from the Neighbourhoods Law initiative to illustrate this relationship. Through the creation of a central plaza we saw that although a project can present new opportunities and resources, usage by neighbors of these features was required in order to have result in health benefits. When projects were adapted and used by neighbors, through our walkability example we saw how they may not only improve health conditions but also decrease health inequalities. Such examples provide a deeper understanding of how and for whom these initiatives work and serve as a strong tool for policy makers to prioritize each neighbourhood's needs.

### **Implications for future studies**

Urban renewal programs aim to improve the physical, social and economic aspects of a neighbourhood resulting in potential improvements in health of residents and reduce health inequalities. Their evaluations need to recognize the large complexities embedding the entire system of interactions. Anticipated effects will only occur if they are supported by the populations that interventions



are addressed to and this would be contingent to contextual factors. This challenging task could be achieved by incorporating a theory approach to research in order to provide the deeper understanding required for policy development.

This paper serves as an initial attempt to provide explanations of the mechanisms through which urban renewal programs affect health and health inequality using two case studies to illustrate this. Up to now, the majority of research on the relationship between urban renewal and health and health inequalities has focused on answering whether an effect exists or not rather than finding the *how*, *why* and for *whom* (Pawson & Sridharan 2010).

In addition, by identifying the potential causal pathways, appropriate indicators are identified and used when measuring the outcomes predicted. For example, while leisure-time physical activity may be a strong indicator in an affluent neighbourhood, a more appropriate indicator for deprived neighbourhoods would look at an increase in walking for transportation (time and frequency) before and after the intervention.

Although we present only two examples in this study, we recognize that each project within urban renewal programs proposes its own causal pathways with contextual effects influencing its expected outcomes. However, the purpose of this study was to initiate discussion on a different approach to research in this field that would provide a deeper understanding compared on causation while recognizing the complexities associated with large interventions like the Neighbourhoods Law. Finally, studies have shown that community participation in program planning and intervention can empower neighbours to make decisions on the status of their neighbourhoods (Fuertes et al. 2012; Matheson et al. 2009). While this could be a mediating step between our two assumptions, empowerment and the degree of neighbourhood involvement are difficult to measure consistently across all neighbourhoods and beyond the scope of this paper.

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Figure 1. A conceptual framework of urban renewal and its effects on health and health inequality.

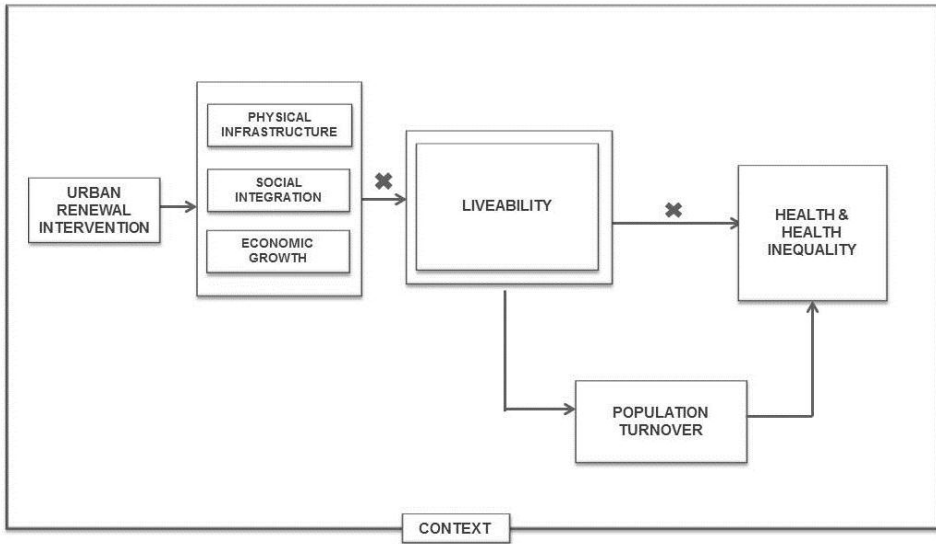


Figure 2. Causal pathways for the renewal of a neighbourhood central plaza.

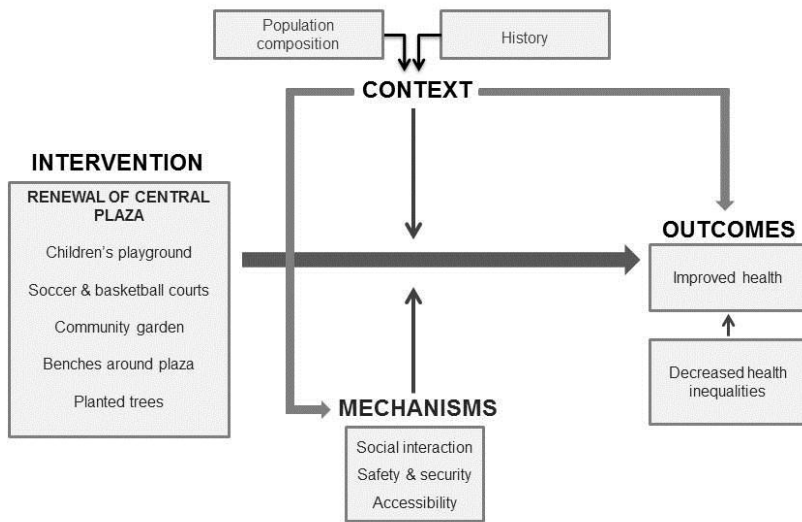
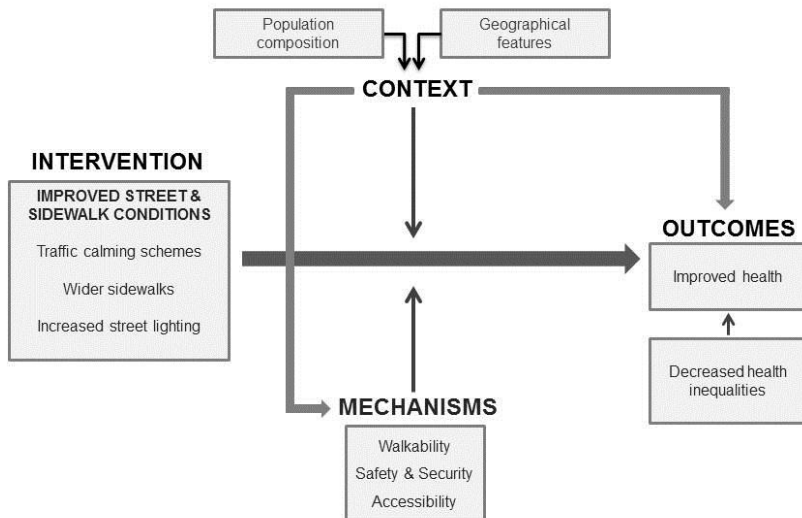


Figure 3. Causal pathways for the repair of streets and sidewalks



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## **DISCUSSION**

Based on our findings, in the neighbourhoods we considered, the Neighbourhoods Law have improved health and decreased health inequalities. Our findings were consistent with research that indicated improvements in overall wellbeing due to increased walkability, improved social integration, better transportation and perception of security (Giles-Corti & Donovan 2003; Jalaludin et al. 2012). In addition, results for health inequality are similar to studies that have demonstrated improved morbidity in deprived neighbourhoods where deprivation category improved through interventions like urban renewal (Boyle et al. 2004).

In the qualitative study, the first article, we concluded that the majority of projects identified by neighbours were perceived as positive and important to their wellbeing, while changes related to the population composition and social cohesion were viewed as negative but still important. Along with these results, Concept Mapping allowed us to explore some possible mechanisms linking the intervention to wellbeing that would serve to compliment the proceeding research.

For the quantitative study, article two, we used a quasi-experimental design and we were able to see that in women and men, both poor self-rated health and mental health status improved or remained stable while they worsened in the comparison groups. When

stratified by social class, health inequality decreases were due to an improvement in the manual class in the intervened neighbourhoods.

In the third study, using a theory-driven approach, we considered the general results obtained from the previous two studies in addition to existing literature. We presented our theory that although urban renewal interventions aim to increase access to resources and opportunities within a neighbourhood, neighbours must use and adapt to those changes in order to improve health and decrease health inequalities.

This study is among the first of its kind to use a mixed-methods approach with the selected methods and study the health effects of an urban renewal policy. Furthermore, the dissertation goes beyond establishing associations between the intervention and the selected health outcomes to provide a deeper understanding of some of the underlying mechanisms of this relation.

In this section we present the primary findings of the dissertation, followed by a discussion to the questions, *whose*, *how* and *why* the Neighbourhoods Law affects the health of neighbours based on our findings. We then describe some of the general strengths and limitations of the study and finish with final conclusions and recommendations for future evaluations and policy decisions.

## **Whose health does urban renewal affect?**

In an initial study completed by the regional government of Catalonia, it was estimated that in the first four years the Neighbourhoods Law was implemented in 92 neighbourhoods, approximately 10% (804,000) of Catalonia's population had benefited from the changes (DPTOP 2009). However, these numbers assume that all neighbours benefit equally when throughout the dissertation we have seen otherwise, especially when looking at social factors that influence health, as we discuss below.

In the qualitative study we used groups that differed greatly in age, sex, social class and ethnicity but all with the common characteristic of living in two of the most deprived neighbourhoods in Barcelona. One of the reasons we decided not mention the Neighbourhoods Law in the focus question was to determine if urban renewal projects were recognized and if so, what their importance and effect would be compared to other types of changes perceived. Across all three groups similar results were seen in terms of the importance and effect of the urban renewal programs mentioned, in addition to the social and population changes. However, differences in perceived projects were also noted that tended to be more associated with age and possibly gender. For example, in the youth group, the general changes observed included neighbourhood features like children's play areas, youth centre and features in the plaza such as the basketball courts. Conversely, the senior group mentioned changes more related to the senior centre, motorist traffic issues and sitting areas in plazas throughout the

neighbourhood. Although such results are expected, these observations strengthen the assumptions that urban renewal projects affect people differently and populations must be stratified wherever possible (Petticrew et al. 2012; Thomson 2008) in order to better understand this, unlike existing studies that have often maintained analysis at general population levels.

To address this limitation in the existing research, in the quantitative study it was important for us to stratify all results by sex and social class to study some of the dimensions of health inequalities, something that was not possible in the qualitative study due to small sample sizes. When considering *gender*, the Neighbourhoods Law improved self-rated health amongst both women and men while no significant improvements were seen in either sex for mental health. Existing literature has shown that urban design tends to affect women more than men because of their closer relationship with the neighbourhood in order to complete daily tasks related to family and domestic affairs (Garcia-Ramon et al. 2004; Justo 2001). However, urban design and planning remains non-gendered and optimal results in women's wellbeing can be achieved when urban plans address factors such as walkability, more access to resources and services and an increased sense of security, which we discuss further in the section of "why" some of these factors influence health and health inequality.

When looking at social class, the Neighbourhoods Law appears to benefit the manual class or more deprived neighbours, compared to

the non-manual class for both women and men, resulting in a decrease in health inequalities. A possible explanation for this is the degree of interaction individuals have with their environments where more deprived populations may be limited to their immediate surroundings such as their neighbourhoods, compared to those who are less deprived and have more resources to move about the city (Bernard et al. 2007). Therefore, by improving their neighbourhoods, you could facilitate their daily activity which would in turn improve their wellbeing. Although this is an area to further explore, and we provide a deeper discussion in the last chapter of this section, our results are also consistent with studies on housing renewal interventions (ie. energy efficiency, physical infrastructure) and the greater benefits they provide for lower-income households compared to high-income (Bambra et al. 2010).

We were able to see improvements in the intervened neighbourhoods, and validate these results with the comparison group. The comparison neighbourhoods not only matched in socio-economic characteristics but also in geographical locations where we assured each also fell within the same district as an intervened neighbourhood. This group was especially critical for our study in order to control for external factors occurring in the country in the past five years including the economic crisis that has left 26.7% unemployed in Spain of which 57.5% are youth (Eurostat 2014). Furthermore, the negative effects of the crisis were discussed by participants in the qualitative study including the closing of stores and locales over the past few years.

These findings not only provide more details on how urban renewal programs affect different populations but they also emphasize the importance of considering various subpopulations in the evaluations of complex interventions to better determine the true effects of specific intervention (Bambra et al. 2010; Dunn et al. 2013; Muntaner et al. 2010; Sridharan & Nakaima 2011).

Our study results reflect the health outcomes in neighbours that have lived in the intervened neighbourhoods for more than five years for both the qualitative and quantitative studies by excluding recent arrivals. This allowed us to control for changes in the socio-demographic characteristics of the population including the arrival of affluent populations that may alter health outcomes as described in the literature (Kearns & Mason 2013). However, as we explain in the discussion section of the quantitative paper, future studies should ideally contain descriptive information on the populations that left during this period in order to address the possibility of gentrification (Arbaci & Tapada-Berteli 2012).

### **How does urban renewal affect health and health inequalities?**

Up to now, the majority of evidence on urban renewal and health is largely focused on determining associations between interventions and health outcomes as opposed to providing explanations or mechanisms of how these relations occur (Bambra et al. 2010; Dunn et al. 2013). Without such theories, the research is void of the



information required to develop appropriate policies that guide health equity (Dunn et al. 2013; Smith & Petticrew 2010). Here we provided some answers to the question how urban renewal can affect health and health inequalities, as we describe below.

Concept mapping, the qualitative method used in this dissertation, also proved to be a strong tool for the exploration phase to answer the question *how*. The focus question proposed, “*One change that has occurred within my neighbourhood in recent years that has affected my family’s or my wellbeing is...*” resulted in statements that help answer how an urban renewal program is linked to overall wellbeing. Thus, each statement is a hypothesis that with further research can help in the development of a mechanism or causal pathway linking urban renewal to health. For example, in the Roquetes neighbourhood, the installation of outdoor escalators and elevators was recognized as important and positive change for the neighbours’ wellbeing. It could then be assumed that this change was related to both removing a physical barrier and improving accessibility to resources, all resulting in changes within the social and physical environment linked to improved health (Borrell et al. 2013; Northridge & Freeman 2011). Nonetheless, this process initiated some thoughts and contributions to further discussions on potential mechanisms of change.

In addition, the results from this study also supported the mechanisms highlighted, *liveability*, *socio-economic makeup* and *population turnover* connecting urban renewal outcomes to health

in our conceptual framework (Figures 2 and 3). All the maps generated were divided into two areas, one largely representing urban renewal projects such as the repair of public spaces or improvements in traffic conditions, all elements of liveability. The second described social and population changes such as the strained relation between neighbours or the increasing number of immigrants. Furthermore, both of these areas highlight elements of the physical and social environment which have been linked to health inequalities (Borrell et al. 2013).

In the theory-driven study we present two assumptions on how urban renewal programs can affect health and health inequality; the first being the resources and opportunities these interventions create for residents of the neighbourhood and the second being, in order for these interventions to have optimal health outcomes, residents must make use and adapt to these changes. Public spaces will only serve their purpose if they create a place of interaction and social exchange amongst neighbours (Borja & Muxi 2001; Garcia-Ramon et al 2004). Although the Neighbourhoods Law largely focused on the physical infrastructure aspect of urban renewal, it did provide some solutions through social programs for neighbours to use the spaces created or repaired. Therefore, social programs could facilitate these interactions and further promote the use of these newly created or renewed areas, which in turn result in improved health outcomes and increased health equity (Abaci & Tapada-Berteli 2012; Pinkster 2007). However, funding for urban renewal

often ends with the finalization of the program, which could leave these social programs in jeopardy.

### **Why does urban renewal affect health and health inequalities?**

Until now, we have explored possible answers to whose and how urban renewal initiatives affect health. To conclude the discussion, we now present possible discussions to answer *why* urban renewal programs affect health and health inequalities.

A residential decision is heavily influenced by the connection between an individual's economic means and lifestyle preferences, and the features or characteristics of a neighbourhood (De Koninck & Pampalon 2007). However, once settled in, a neighbourhood forms part of an individual's inner environment. There, different neighbourhood factors such as availability of services, accessibility and a sense of security, along with the individual's socio-demographic characteristics such as, age, sex and social class, determine how *place-bound* (the frequency or degree of interaction with the neighbourhood) a person is, which ultimately result in different health outcomes (Bernard et al. 2007). Research has shown that certain populations are more place-bound including those who depend more on local resources because of limited or no access to private transportation, people with low income or individuals who are in poor health (Bernard et al. 2007; Morenoff & Lynch 2004). In addition, seniors, children and homemakers are

also more likely to spend more time in their neighbourhoods (Robert & Li 2001). Therefore, such neighbours would be most impacted by changes to their neighbourhoods and thus, improvements could have positive effects on their health. A good example of this was the case study we present in the theory-driven article on the effects of repaired streets and sidewalks on health inequalities amongst women who tend to be from lower-income households and depend greatly on walking as a form of mobility. In addition, these conclusions are consistent with other studies including one that shows improvement in deprived neighbourhood conditions had positive impacts on the health of long term residents (Boyle et al. 2004).

Urban renewal has the potential of improving the wellbeing of the most deprived neighbourhoods, but at the same time neighbours can play a strong role in increasing these effects (Fuertes et al. 2012). Studies have shown that community participation through organizations or neighbourhood associations in program planning and evaluation can empower neighbours to make decisions on the status of their neighbourhoods (Matheson et al. 2009; Pasarin et al. 2010). Furthermore, such groups can impact the wellbeing of residents by addressing issues with production and distribution of specific resources throughout the neighbourhood that may have been done otherwise (Bernard et al. 2007). However, empowerment and the degree of neighbourhood involvement are difficult to measure consistently across all neighbourhoods and beyond the scope of this dissertation. Some indicators could be considered in

the future include, number of associations and neighbourhood groups, party voted, number of demonstrations in the area and etc.

Nonetheless, we highlight Roquetes one of our intervened neighbourhoods, and the success of the Neighbourhoods Law on the health outcomes compared to all other intervened neighbourhoods studied (based on data not shown). From discussions with stakeholders and neighbours, a possible explanation on why the Neighbourhoods Law had been more beneficial in this neighbourhood compared to the others intervened, was the strong involvement and participation of neighbours throughout the entire process of the planning and implementation of the program. However, this level of dedication has historical roots dating back to the dictatorship where difficult times led to a strong neighbourhood movement through associations (*Associació de veïns*) which continues today with groups of neighbours (*Pla Comunitari*) working on plans for improvement in the community including a special role in the implementation of the Neighbourhoods Law (Hernandez et al. 2013). Although this provides some consistent evidence to the above mentioned studies, further research would be needed to better understand this mediating mechanism.

## **Neighbourhoods, neighbours and urban renewal**

In the past, research on neighbourhoods and health was often split into a *compositional* versus *contextual* explanation (Macintyre & Ellaway 2003). While the compositional explanation focuses on

resident's characteristics forming the neighbourhood's overall health status, the contextual explanation attributes health outcomes of residents to the neighbourhoods they live in (Macintyre et al. 2002).

Throughout this dissertation we have focused on changes caused by the Neighbourhoods Law on the social and physical environment of intervened neighbourhoods and their effects on the residents' wellbeing. However, our studies and results are based on a mutual interaction between neighbours and their neighbourhoods and does not isolate contextual from compositional explanations, as from an empirical perspective, the separation between the two is not possible (Bernard et al. 2007; O'Campo et al. 1997). These views are visible in our theory-driven article where we explain that urban renewal programs can improve opportunities and resources, but these changes are not independent from resident's usage and adaptation that would be required for optimal health outcomes.

Nonetheless, urban renewal programs can serve as a strong catalyst in not only improving residents' wellbeing but also providing an opportunity to connect people with their built environment.

## **Strengths and Limitations**

One of the greatest strengths of this study was the mixed-methods approach it undertook to study the effects of an urban renewal intervention on the health and health inequality of neighbours. The results from each study served to guide proceeding studies by providing possible explanations for findings and to ultimately develop theories on *whose*, *how* and *why* urban renewal projects affected health outcomes.

Furthermore, the success of this approach would not be complete without the incorporation of the residents who provide valuable insight on the topic. This proximity to individuals who experience the effect of the intervention directly also highlighted the variability in the degree of effect different projects can have on different populations.

This study also serves as a strong example of how structural policies can affect health and health inequality despite incorporating these outcomes in the planning and implementation of these laws.

One of the limitations of the study was the changing boundary for each neighbourhood in the pre and post periods. Over the past forty years, the census tract boundaries have constantly been changed in order to accommodate the population growth. In 2006, two years after the start of the Neighbourhoods Law, the city council passed a new law redefining the city's 38 neighbourhoods to 73 new ones,

almost twice as many neighbourhood, while changing the census sections altogether. Consequently, this resulted in the need to geo-codify the data sets in order for them to correspond across 2001, 2006 and 2011. As the 2001 and 2006 Barcelona Health Surveys were very difficult and virtually impossible to geo-codify to 73 neighbourhoods, we decided to maintain the 38 neighbourhoods format in order to only require the 2011 survey year to correspond with the previous two years. The process was completed as best possible, but it was time consuming and required address searches for households that fell in undefined areas. Furthermore, although the majority of our neighbourhood boundaries were not greatly altered, for those that were there is a possibility that neighbours that were not as affected by the intervention to be included. However, since our results indicate an improvement by the initiative, this limitation may have affected the degree of effect of the initiative where it could have been higher if only the population directly intervened were included. Nonetheless, this could also indicate the potential spill-over effects on surrounding neighbourhoods that have also benefited from the intervention (Diez Roux & Mair 2010; Nebot et al. 2011). Although the government controls census tract modifications, studies such as this one rely on a degree of consistency in census tracts in order to provide the most accurate trend analysis for the city.

Finally, there was the heavy reliance on the Barcelona Health Surveys where samples are designed to represent the population but often the size does not permit for subpopulation analysis. This also



explains why we did not discuss the potential effects of the complimentary programs of the Neighbourhoods Law, the Employment in Neighbourhoods and the Health in Neighbourhoods. While these programs were deemed as successful in the evaluations conducted (Fuertes et al. 2012; Servei d'Ocupació de Catalunya 2011), the populations affected would not be large enough to be captured in our sample and further stratifications.

## CONCLUSIONS

The final conclusions of this thesis are:

- The majority of projects within the Neighbourhoods Law were perceived as positive and important to the wellbeing of neighbours.
- On the contrary, population and social changes in these neighbourhoods were largely observed as negative and important.
- The incorporation of neighbours' perspectives is critical for understanding better the compositional and contextual factors in a neighbourhood.
- The division found in the maps of the concept mapping, provided support for the concepts of liveability and population turnover found in the conceptual framework.
- In both women and men, self-rated health improved in the neighbourhoods intervened by the Neighbourhoods Law, especially those within the manual social classes, compared to non-intervened neighbourhoods with similar socio-demographic characteristics.

- Similar results as above were seen for the mental health status of women in the intervened neighbourhoods. The Neighbourhoods Law appears to moderate further increases in poor mental health observed in men from the comparison group.
- Although urban renewal programs may improve opportunities and resources in a neighbourhood, residents must use and adapt to these changes in order to benefit optimally.
- More theory-driven methods are needed to explore potential causal pathways linking urban renewal to health outcomes.

## RECOMMENDATIONS

Based on the findings from this dissertation, here we make a set of recommendations for the evaluation of urban renewal initiatives and their effects on health and health inequality.

- Evaluations should include responses to whose, how and why an intervention affects health or health inequalities of residents.
- Health and health inequality outcomes should be included in the evaluations of urban renewal programs conducted.
- Wherever possible, studies should include sub-population analysis in order to better understand the population affected.
- A thorough understanding of contextual and compositional factors in which the intervention was carried out is essential in order to understand the influence it may have on the outcomes attained.
- Participation of targeted populations in the evaluation is critical in order to gain a deeper understanding of the effects of the intervention and underlying mechanisms linking them to health outcomes.
- A mixed-methods approach should be used to provide the ability to understand some of the underlying mechanisms

linking the intervention to health and health inequality outcomes.

- Whenever possible, samples should control for individuals that move in and out of the neighbourhood during the intervention phase in order to address questions on gentrification.

Finally, in addition to the studies we have presented, sufficient evidence is available to identify links between urban renewal and health outcomes. In the case of the Neighbourhoods Law, information from this dissertation can be used to lobby government groups to allow for the continuation of such interventions. Furthermore, future urban renewal policies should take into account potential effects on health and health inequality at both the planning and evaluation phases resulting in the need for intersectoral work.

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