



458

Towards Just Cities:

An architectural approach to mapping unequal living conditions

ANN LEGBY & CHEN FENG

KTH ROYAL INSTITUTE OF TECHNOLOGY

ABSTRACT

Unequal living conditions is a core challenge in contemporary societies and addressed in the Sustainability Development Goals. It is argued that unequal living conditions create and reproduce urban segregation. Having good access to different resources is especially critical for disadvantaged groups. One way of increasing the understanding of urban segregation and the role of architecture, urban design and planning that reach beyond housing segregation is to define living conditions created by the distribution of, and the accessibility to, various resources and opportunities in an urban environment. We argue that analysis of living conditions needs to acknowledge urban form since such descriptions highlight accessibility *through* public space and are closer to what people may perceive and experience in their everyday life.

This paper presents a comprehensive approach that uncover urban inequalities, using the city of Uppsala in Sweden as a case study. Configurative analysis identifies spatial segregation and foregrounds the spaces that have a high network centrality. Accessibility to local resources and amenities is measured with a high spatial resolution based on both metric distance and topological distance. Analyses that measure the socioeconomic diversity within the catchment areas of schools reveal the potential diversity among pupils. Further, the study explores methods for comparison between neighbourhoods. Superimposing socio-economic layers of the population illustrates how analyses may inform decisions of future urban design strategies with the aim to counteract segregation and realize the just city. The results reveal an urban landscape characterised by unequal living conditions. However, the situation in many of the neighbourhoods may be improved through urban design interventions and investments.

KEYWORDS

Inequality, just city, living conditions, urban segregation, social infrastructure



1 INTRODUCTION

Living conditions in cities are largely formed and reproduced as a result of how we plan and design our cities and our living environments. Poor and unequal access to key functions and amenities is something that creates and reproduces urban segregation. Having poor access to different resources and urban opportunities is especially problematic for disadvantaged groups, the newly arrived, and minority groups etc. Housing, employment, access to service and well-functioning public spaces are examples of key components for achieving social sustainability and maintaining welfare. In the book, *The Just City* (2010), Fainstein relates justice to welfare and links it to the built environment and to urban planning. Fainstein addresses problems related to housing segregation but also emphasizes the importance of having access to urban resources and to urban public space. Equal societies, according to Wilkinson & Pickett (2009), foster well-being, health, trust, and social development.

Unequal living conditions is a core challenge in contemporary societies and addressed in the Sustainability Development Goals (UN 2021). We argue that from a segregation perspective, unequal living conditions both create and reproduce urban segregation. One way of increasing the understanding of urban segregation that reach beyond housing segregation, is to define living conditions created by the distribution of, and the accessibility to, various resources and opportunities in an urban environment.

In Sweden, social sustainability is a prioritized issue within planning, including goals of counteracting segregation and inequalities (Regeringskansliet 2018). One of the overarching aims of the *Swedish Planning and Building Act* (PBL 2020:900) is to create equal living conditions. Urban planning and urban design has an important role in relation to the living conditions created in our cities. How we plan, structure and design cities create various preconditions for urban activity, land use, and influences density, accessibility, diversity, and urban capacity. It influences access to collective resources and provides basic conditions for urban everyday life that is important in relation to urban opportunities, democracy and social cohesion. Unequal living conditions are negative from a social sustainability perspective. Situations of unequal living conditions are argued to reproduce and increasing segregation (Franzén 2001). During the last two decades there has been an increased polarisation in Sweden (Liang 2021; Waldenström 2020) and the effects are worse health outcomes, poorer educational attainment, higher unemployment rates, poorer housing standard, as well as lower participation in democracy as well as in higher crime rates (Regeringskansliet 2018; Delmos 2021). Since the 1970s several State initiatives have been implemented with the aim to support the most deprived neighbourhoods in Sweden, where the focus and character of the different programs have changed over time (Andersson, Bråmås & Holmqvist 2010).

Accessibility to housing is a key factor in relation to social sustainability and just cities, so is accessibility to societal resources and amenities in the urban context. Access to schools, health



care, parks, service, culture, public transportation, and recreation is crucial for realizing adequate living conditions and is highly influenced by planning and urban design. Firstly, access to the primary functions in themselves is important; secondly, access to the urban life that these places and institutions foster is important, as they constitute social arenas and support social processes between individuals and between different social groups and thus foster public culture and social inclusion. Access to collective resources is especially important for disadvantaged groups with fewer resources (Hanson 2000; Legeby 2013).

Today there are many definitions of 'deprived neighbourhoods' or 'disadvantaged neighbourhoods'. The indicators and criteria vary depending on in what field such descriptions are produced, and they have been changing over time as a result of a change of focus in the political debate. From a planning and urban design perspective, we argue that descriptions are needed that acknowledge the role of urban form and land use and take into account spatial relations at different scales. In addition, the descriptions need to focus upon aspects that are of relevance from a planning and/or urban design perspective, and where urban design interventions, investments and regulations can make a difference in order to produce equal urban environments.

This paper presents an approach to mapping living conditions, which takes into account urban form and how urban design facilitates or impedes access to amenities, people, and urban life. The city of Uppsala in Sweden is analysed, and the survey includes a selection of resources and amenities relevant to the urban segregation problem and at the same time relevant to the field of urban planning and design. Buildings, places, institutions and places that constitute the social infrastructure, and activities at and around these places, are significant for everyday urban life and social processes. The analysis is made at a detailed level. It identifies different degrees of inequalities and enables a comparison between different neighbourhoods and comparison to the situation in the city at large. The approach also includes analysis of diversity within different catchment areas, exemplified through catchment areas of schools in order to contribute to the discussion on school segregation.

The resulting maps reveal an urban landscape characterised by inequality and show large variations in terms of access to services and amenities, especially cultural facilities, sport and recreation. Moreover, the urban form and its configurative properties produce spatially segregated enclaves, which the spatial configurational analysis shows. This has negative impacts on urban life and inhibit exchanges within and between neighbourhoods (Hanson 2000; Legeby & Marcus 2011). As we compare neighbourhoods, it becomes evident that several of the neighbourhoods with poor access to amenities also have a population with fewer social-economic resources, a situation that is likely to reinforce and even increase segregation. However, many of the situations that the inequality mapping has revealed can be improved by urban design interventions and investments, which would contribute to the realisation of a just city.



2 THEORY: URBAN FORM AND ACCESS TO RESOURCES

Urban design and planning has a great impact on urban living conditions. How we through architecture and urban design form and structure the city has a direct impact on its performative properties, the quality of locations, spatial relations between people and activities as well as movement flows (Hiller 1996; Hillier et al. 1993). This will in turn influence cities' potential to generate social processes, patterns of encounter and co-presence (Berghauser Pont, Stavroulaki & Marcus 2019; Hillier & Hanson 1984; Hanson & Hillier 1987; Legeby 2013; Netto 2017). Urban design and planning will influence the accessibility to collective resources and services that will contribute to the living conditions. By extension, this will have consequences for urban life (Hillier & Hanson 1984; Legeby 2018; Lofland 1998; Marcus 2010).

The differences in living conditions are about differences in opportunities and life chances that the local environments provide. Fainstein (2020) highlights the importance of the built environment in relation to the concept of the just city and she links matters of justice to welfare. Fainstein argues that to decrease residential segregation is essential but in addition to that, she emphasises the importance of having access to public arenas and to urban public space. Social groups with fewer resources, in particular, benefit from collective resources and having amenities in proximity or easy to access. Therefore, it is especially important to achieve adequate living conditions in neighbourhoods that have a population with fewer resources. The question is: how can such neighbourhoods be identified and described?

From a planning and urban design perspective we argue that we need descriptions of cities that acknowledge aspects that are relevant for architecture and planning, including their practice, regulations and institutions, and aspects that urban planning has a mandate to change. The descriptions and mapping surveys thus need to rely on an architectural understanding of space, taking into account spatial relations conditioned by the urban form (Hillier 1996), as well as resources and amenities that are important from a just city perspective and for counteracting urban segregation. According to the Swedish government, social inequality, as climate change, is associated with large societal costs—so extensive, that Sweden cannot afford not to act (Prop. 2019/20:188, p.45).

Initiatives addressing 'deprived neighbourhoods'

Urban inequalities may be described from several different perspectives. Since 1970s several national and municipal initiatives with the aim of counteracting segregation have been launched in Sweden (Andersson, Bråmås & Holmqvist 2010; Grander, Roelofs & Salonen 2021; Legeby 2013; Olsson & Törnquist 2009). The neighbourhoods in focus for the initiatives were mostly selected based on an analysis of the socio-economic status and/or ethnic background of the *residential* population (for a longer discussion see Legeby 2013). It is established that socio-economic status of the neighbours has an impact on life chances for others in the local environment, described for example as neighbourhood effects (Andersson & Holmqvist 2019; Massey &



Denton 1993; Brandén 2018), the recognition of which has been important for driving initiatives counteracting segregation in Sweden. For example, the Urban Development Initiative (between 2012-2015) selected in total 15 neighbourhoods according to the following criteria: a population of more than 4000 inhabitants, low employment rate, high economic subsidies, as well as education level.

An approach that have had a great political impact over the last five years is the mapping of so called deprived or exposed neighbourhoods conducted by the Police Authority (National Operative Department 2017; 2021). According to the Police, an exposed area is geographically well-defined and characterised by low socioeconomic status where criminals have an impact on the local community (p.10). They consider the physical environment to be problematic in many of these areas, partly as a result of the traffic separated structure, over-crowding and the enclaved housing units (p.11-12). The classification is constructed to be relevant for the police operations and to support their allocation of resources but has lately been referred to within many other fields, for example within planning and urban design practice. However, it may be problematic for other disciplines to apply the list from the police in an unreflective manner. To what extent are those definitions and classifications adequate for other fields such as education, healthcare, labour market initiatives or urban planning? From the perspective of architecture and urban design, the identification of deprived neighbourhoods according to the police may give valuable background information in relation to realising the just city, but we argue that these descriptions give inadequate foundation regarding interventions in the built environment and poor guidance for how to develop cities in the future. For this purpose, we need descriptions of cities that acknowledge the socio-spatial relations and the accessibility to key amenities that contributes to the living conditions, and we need methods that can reveal any possible inequalities in the key resources' accessibility and distribution, including accessibility to different people and social groups.

Descriptions will influence the understanding

The approach used by the police authority (or similar) tends to locate the segregation problems in so called deprived areas, in spite of the fact that segregation is a relational phenomenon (i.e., it is the city that is unequal or segregated and not specific neighbourhoods). The approach also ignores other factors important for life chances and of relevance for contracting segregation. From a planning and urban design perspective, we argue that complementary descriptions are needed that take into account how the city is formed and structured and how this has implications for segregation and unequal living conditions. For example, accessibility to key amenities important for everyday life may be included, for example, public and private service, schools, playgrounds, workplaces, parks or cultural facilities, as well as potential outcomes of urban life related to social processes that may foster social cohesion and building social networks to which non-residents also contributes.



Key amenities and social infrastructure in relation to living conditions

Having access to adequate living conditions—in particular, how such resources are distributed—is essential from a sustainability perspective (Franzén 2001, Wilkinson & Pickett 2010).

Disadvantaged and less established groups with fewer resources are more dependent on collective resources than others. This could be exemplified not only by having access to schools, workplaces, healthcare, libraries but also by being close to playgrounds, sport facilities, recreation and well-functioning streets or squares. Schools for example, both provide education possibilities and allow the society to be present locally through the school buildings (Legeby 2017; Koch, Legeby & Miranda 2019; Peponis 2017). The schoolyards are essential for the local environment in many ways since they are often used during evenings and weekends besides being used by the school. Accessibility to public transportation is important since this supports mobility and provides access to resources in a larger area, beside that the public transportation in itself brings people with different backgrounds together (Rockem & Vaughan 2019). Access to public space such as high streets with service and economic activities opens for participation and negotiations in socio-cultural processes that support integration processes (Vaughan et al 2010).

Depending on how cities are designed and structured, it has implications for how they may be populated and function as social arenas (Bergman 1991; Hanson 2000; Legeby 2013). Who share public space will in turn influence public culture, norms and attitudes as well as togetherness and sense of belonging (Amin 2012; Lofland 1998; Valentine 2008; Zukin 1995). Public space is a key component for providing an arena for interaction between people, between inhabitants and strangers, important not only for individuals but for society at large (Jacobs 1961). According to Hillier & Hanson (1984, p.ix), space is not a neutral background. Rather, architecture structures the system of space in which we live and move and conditions co-presence, movement, encounter and avoidance. Hägerstrand (1991) suggests that that co-presence is fundamental for the intricate interaction between people and the information that emerges and is made accessible in public space, which is essential for the city to function. Co-presence may potentially bridge social differences (Giddens 1984; Goffman 1963; Grannis 1998) and foster an increased understanding of other social groups' living conditions (Young 1996). Such social processes are dependent on and influenced by the built environment in combination with land use, a relation that is developed within architectural theory (Hanson & Hillier 1987; Hillier & Hanson 1984; Markus 2003).

Oldenberg (1989) highlights that many urban amenities beside their primary function have parallel functions important for building trust, cohesion, community and ability for collective problem solving. Such institutions, places and buildings are integrated in the urban fabric and made accessible through public space. Lofland (1998) describes how processes in public space emerge as people share space, for example in places such as buses, cafés, and parks or in the streets. Many of the functions that constitute the social infrastructure are found to be of importance for integration of the newly arrived and the disadvantaged (Wessendorf & Phillimore



2019). Studies in Swedish cities have shown that the conditions for urban life and the access to resources may vary considerably, which are related to urban form and population density (Legeby 2010, 2013; Legeby, Berghauser & Marcus 2015). Lately the concept of social infrastructure has been developed, which includes arenas that support social life. Klinenberg (2018) emphasizes the importance of social infrastructure to support solidarity and foster public life and public culture. Klinenberg points out that not only public institutions such as libraries, schools, parks, sport facilities but also – in line with Jacobs' ideas (1961) –sidewalks and streets that invite people to participate in urban life imply that people are being exposed for diversity and that people are being trained to deal with diversity and unexpected practices, which contributes to challenging stereotypes and identities of different social groups. The social infrastructure a neighbourhood affords supports the building of social networks that according to Lathman & Layton (2019) provide important resources, not least in times of stress.

When analysing urban environments focusing upon living conditions, these kinds of amenities need to be acknowledged in a way that increases the understanding of the role of architecture. Analyses aim to increase the understanding of how the configuration of the streets, density, and land use affects movement flows and access to key functions and resources. Hence, first, access to primary functions in themselves, and second, to what extent they may function as arenas for reproducing and develop social networks and support social processes (Legeby 2013). Spatial segregation separates people as well as activities and functions and limits access to amenities, and limits what social groups may share public space (Legeby & Marcus 2011). Hence, unequal living conditions may be understood as differences in what neighbourhood affords, and as this is linked to the socio-economic profile of the residents, it becomes relevant for phenomena as segregation and social exclusion.

Municipal plans, programs and policies

Public institutions, amenities, key functions and public spaces are important in themselves but may also be seen as functions constructing an ecosystem for social processes and urban opportunities that contribute to maintaining and developing communities and society. By analysing where these functions are found – and the accessibility that different neighbourhoods affords – it is possible to identify to what extent the urban landscape is characterized by unequal living conditions in a way that has relevance from an urban planning and design perspective. First step of the analysis included a process of selecting amenities to analyse, partly based on municipal plans, programmes and policy documents, and partly based on discussions and interviews with planning officials. In the municipal budget (2021) there are goals regarding equal living conditions and inclusiveness. The municipality prioritizes the situation for children and youth, including sport, recreation and culture activities beside education. Public space should be accessible and perceived as safe. Public health is highlighted, and related to this is the access to physical activities and recreation provided by parks, green areas, as well as a well-functioning pedestrian and bicycle network. The Comprehensive plan (2016) has goals about improving the



living condition in general but especially in neighbourhoods having a population with limited resources in terms of socio-economic aspects. The Comprehensive plan highlights the need of new housing units, improved public transportation, and states that new development should be located in connection to existing areas and to important paths and nodes. The urban network should be developed in a way that decreases barrier effects and improves the connections *between* neighbourhoods. The Culture Political Program (2020) formulates goals about improving access to culture and promoting interventions to encourage participation. The aspects highlighted in these plans, programs and policies are integrated in the analyses presented below.

3 APPROACHES AND METHODS

The aim of mapping urban living conditions in Uppsala is to increase the understanding of how inequalities and urban segregation may be addressed by urban planning and design and identify what urban design interventions potentially could support social sustainability. Through the example of Uppsala, a city in Sweden of 167 000 inhabitants¹, an approach and a mapping method will be presented where inequalities in the urban landscape – in terms of accessibility to key amenities and spatial segregation – are identified. Conditions that urban design and planning may influence are selected and descriptions is suggested to form a foundation for realising a just city and address social sustainability goals on municipal level as well as Sustainable Development Goals according to Agenda 2030 (2021).

Uppsala is Sweden's fourth largest city. The medieval urban grid was largely replaced by a grid structure city plan approved in 1643. Later, the city expanded several times, for example in mid nineteenth century, and during the twentieth century, especially from the 1940s as the population doubled in fifty years. During this period, neighbourhood units became the role urban model for urban expansion and urban development primarily expanded to the west and south of the city.

The mapping of accessibility to societal and urban resources describes what different neighbourhoods afford. The PST tool has been used both for configurative analyses, catchment area analyses and for accessibility analyses (Berghauser Pont et al 2019). The survey identifies in a nuanced way which places are favoured or disfavoured and to what extent inequalities appear. Conditions and amenities that the planning and urban design practice have a possibility to influence are selected. The analysis of the living conditions focuses on accessibility to key amenities. The aim of the configurative analyses is to identify degrees of centrality and spatial segregation as well as identifying the foreground network, including the main axis that connects the different parts of the city. Catchment areas of various public institutions such as schools and health care clinics is analysed in terms of diversity of the residential population (e.g. income level of households). Analyses takes urban form into account and measures distances both in metric distances and topological distances (perceived distance), both measurements through the

¹ Number of residents in 2020 (SCB 2022).

street network that is accessible for pedestrians and bicyclists. The model used is an axial map developed in iterative during 2018 and 2021 (Legeby, Koch & Miranda 2019; Legeby & Feng 2021). Information about services, facilities, and key functions is provided by the Uppsala municipality. The selection of amenities analysed is related to goals formulated in municipal documents such as the Municipal budget (2021), the Comprehensive Plan (2016), the Program for Culture (2020). There is a mix of analyses that measure the minimum distance to a certain attraction, analyses capturing how many attractions are within reach of a certain radius and analysis accessible areas, for example number of square metres of parks within a certain walking distance (Legeby & Feng 2021). The analyses accessible population density includes thematic analyses of children and elderly. In addition, analysis of diversity is carried out, the diversity within catchment areas. In the Uppsala case, it is demonstrated by studying catchment areas of preschools, schools and health care centres where diversity according to income levels is studied. Diversity is analysed using Simpson's index². The analyses are conducted on a detailed scale level, from each address point, which is argued to give a high-resolution illustration where variations even *within* different administrative units appear. The study includes a method for comparative analyses that is demonstrated for a selection of the variables, a comparison between neighbourhoods and a comparison between neighbourhoods and the situation in the city at large (i.e. the mean value of the city). The data set used includes data from 2017-2020.

Table 1: List of data used: analysis of living conditions.

<i>Function</i>	<i>Year</i>	<i>object</i>
Residential population	2021	points
Working population	2021	points
Address points	2021	points
Education/Schools	2021	points
Culture facilities (libraries, museums, theatres, culture schools etc.)	2021	points
Basic service (grocery stores, public service, health care)	2017/2021	points
Public transportation (i.e. bus stops and train station)	2021	points
Playgrounds, sport facilities, recreation, parks	2021	points, polygons
Restaurants, cafés, bars, entertainment	2017	points
Retail and commercial service	2017	points
Income per households	2021	polygons
Socioeconomic index for schools (Statistics Sweden)	2018	polygons

4 RESULTS

The results of the configurative analysis describe a concentration of centrality around the historical city core that stretches out in spokes further towards more distant neighbourhoods as centrality gradually fades rather rapidly. The highly integrated spokes are not connected across; thus, there is a lack of a wheel structure, confirming the strategy of the Comprehensive Plan that there is a need to improve cross connections. Moreover, several of the neighbourhoods having a residential population with fewer resources are characterized by spatial segregation, which limits the potential to attract service and workplaces locally and thus inhibits exchange.

² $1/\lambda = 1 / (\sum_{i=1}^R p_i^2)$, where R is the total number of categories and p_i is the share associated with i th category.

Neighbourhoods that are spatially segregated in combination with a disadvantaged residential population are Stenhagen, Sävja, and Gottsunda. In the betweenness centrality analysis (radius two kilometres) the so-called foreground network emerges. There is a rather dense grid in around the city core and there are a few more clusters of grids further out, for example in Eriksberg, Gottsunda and Sävja. As the radius is increased to five kilometres several of these clusters fade and instead there are only a few single spikes that reach out, there is no grid formation at the city level.

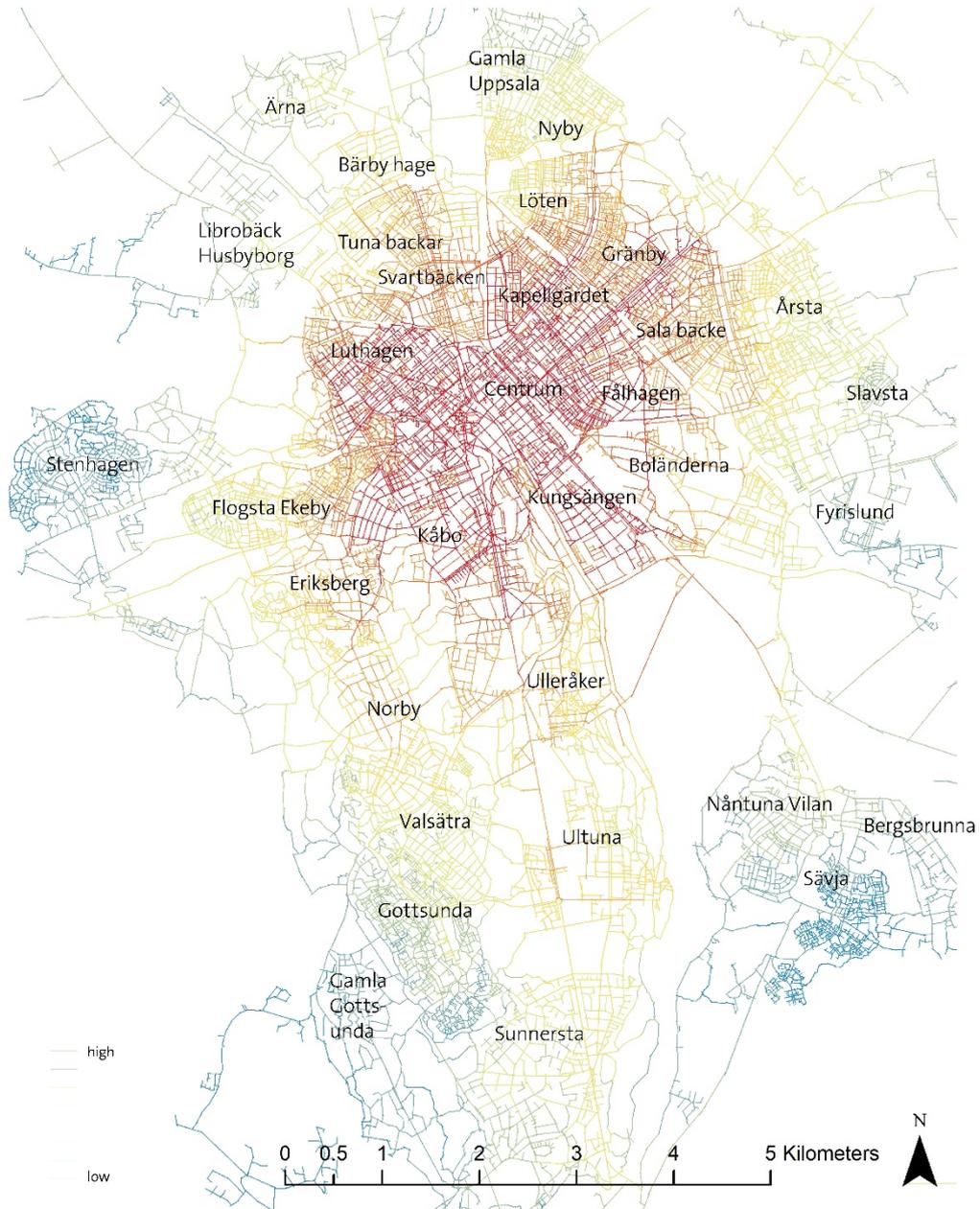


Figure 1: Integration (closeness centrality) analysis of Uppsala, radius: 80 steps.

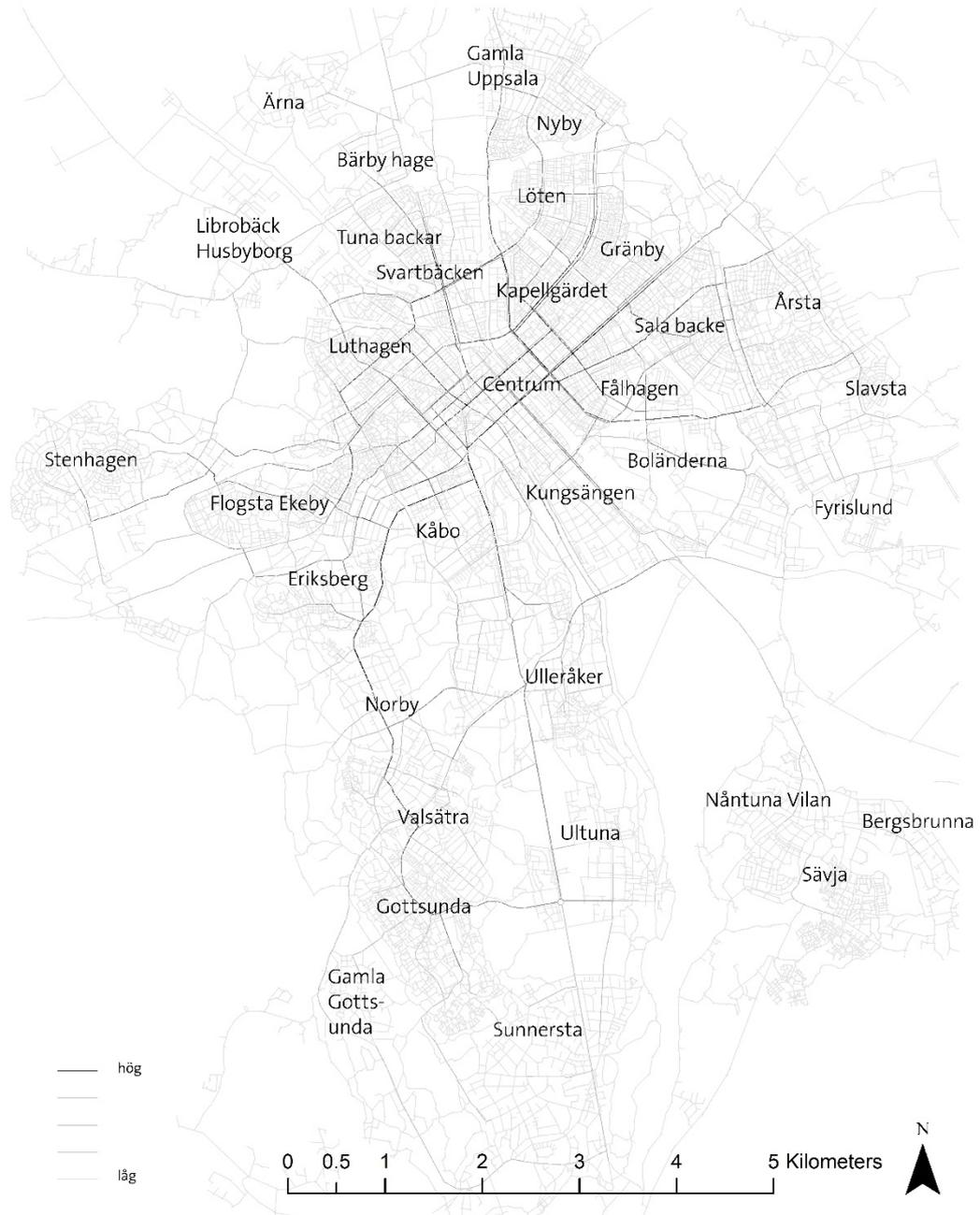


Figure 2: Betweenness centrality of Uppsala, five kilometers walking distance.

Public services and institutions are of special importance since the municipality has great impact where these functions are being located and designed. The primary function of schools, preschools and education for adults is education at the same time as school buildings makes society present on a local level (Legeby, Koch & Miranda 2019) and the location and the design of the building is possible to relate to questions of power and representation (Hanson 1998; Koch, Legeby & Miranda 2019; Markus 1993; Peponis 2017). Outdoor environment including the schoolyards are important for the local context as they are used both by the school but also used by the local neighbourhood in evenings and weekends and schoolyards often provide the local community with sport fields, playgrounds or places for young people to gather etc.



The preschools in Uppsala are well distributed, 37% of the housing units have a preschool within a walking distance of 300 meters and as much as 90% have a preschool within 800 meters. Compulsory schools are similar to preschools relatively accessible where 80% of the housing units have a school within one kilometre of walking distance. Comparing accessibility by on the one hand measuring distance as the number of turns in the street network (reflects the perceived distance), and on the other hand measuring distance as the metric distance, it is possible to see that the spatial segregation in some neighbourhoods is resulting in greater distances as the perceived distance is analysed, for example in several neighbourhoods west of the inner city; Stenhagen and Flogsta Ekeby, as well as in Årsta, located east of the inner city. High schools and education for adults are typically concentrated to the inner city. Hence, these institutions are only present in the inner city and the urban life that follows the educational activities will concentrate in proximity of these locations.

The social mix at different schools is addressing the issue of school segregation, thus, the residents in the catchment areas of the preschools and schools are studied. In Sweden, most households chose a preschool that are found in proximity of their homes, which means that the diversity found in such catchment area have great impact on the diversity among pupils. Here, the diversity has been measured according to income levels among households within one kilometre from each preschool³. The income is divided into three categories: low, medium, and high. The result indicate that about twenty preschools are categorised afford high diversity while about forty have a households with a non-diverse economic situation. The method applied reveals large differences *within* different administrative areas since the catchment area is analysed with so-called floating boundaries. This means that schools may have rather different social catchment areas in spite of them being localised in proximity of one another, which the method captures.

An additional diversity analysis is conducted that is based on a socioeconomic index based on the situation of the pupils registered at the different schools (Statistics Sweden 2018). The index cover information about the pupils' guardians, including education level, income level, economic subsidies, if the guardians live together or separated, the number of siblings in the household as well as the income level in the neighbourhood where they live. Information about the pupils also includes gender and Swedish/non-Swedish background. The analysis shows that schools having a constitution of advantageous pupils with high socioeconomic index are located in many different districts within Uppsala. At the same time, we see that the schools with a low socioeconomic index are concentrated to certain districts, for example in Gottsunda, Valsätra and Stenhagen, where there are no schools with high socioeconomic index. Most likely, schools in these areas need more support than schools in other areas in order to achieve goals regarding equal education. In Gränby, there are schools with both high and low socioeconomic indexes in proximity of one another.

³ The analysis in Uppsala builds on an earlier study of diversity at schools in Stockholm, applying similar methods (see Legeby 2013).



Figure 3: Socioeconomic index among pupils at compulsory schools in Uppsala.

In the municipality of Uppsala, the conditions for children and young people are prioritized. Adequate access to sport-, recreation and leisure time activities and to associations that supports physical activities is seen as crucial from a social as well as public health perspective. The municipality emphasises good access to playgrounds for families, both as it is important for the children and for the development of social networks between families. In addition, having



families co-present in public spaces is advantageous for the safety locally. The result illustrates that in terms of access to sport and recreation there are large differences across the city. Many neighbourhoods afford poor access to both indoor and outdoor facilities. There are situations when the poor access coincides with where the residents have fewer resources, for example Stenhagen, Sävja, and to some extent Gränby and Gottsunda. When it comes to playgrounds on the other hand, as much as 90% have a public playground within 800 metres and 30% have one within 300 metres. As the density of children is superimposed to the analysis, it is possible to see that Gränby is having poor access.

Access to culture facilities is crucial as it provides places where people may engage, witness, show and do (Koch, Legeby & Abshirini 2017; Legeby, Koch & Abshirini 2016), opportunities that in the long promotes democracy and engagement. In the Uppsala analysis, the following was included: culture schools, museums, theatres, libraries and other culture institutions. The municipality is largely influencing where such institutions are located, and therefore, influencing accessibility for different neighbourhoods. The results of the analyses reveal that many of the socioeconomically disadvantaged neighbourhoods are poorly provided when it comes to culture facilities. Libraries stand out as key features of high importance in relation to living conditions and problems related to exclusion and segregation. Libraries in Sweden not only provide opportunities for reading and borrow books, but the libraries also holds a wider responsibility in society and is a space commonly used for studying, working, achieve information, and socializing. Libraries often develop into important social arenas in their local context. In areas having an extensive overcrowding, the access to facilities and collective resources in local proximity brings relief to such critical housing situation. The results reveal that one quarter of the addresses have a library within one kilometre walking distance and one quarter have more than two kilometre walking distance (blue points in the figure below). We see that many of the disadvantaged neighbourhoods have adequate access to libraries, while low-income areas like Nyby, Flogsta Ekeby and parts of Lötén afford poorer access.

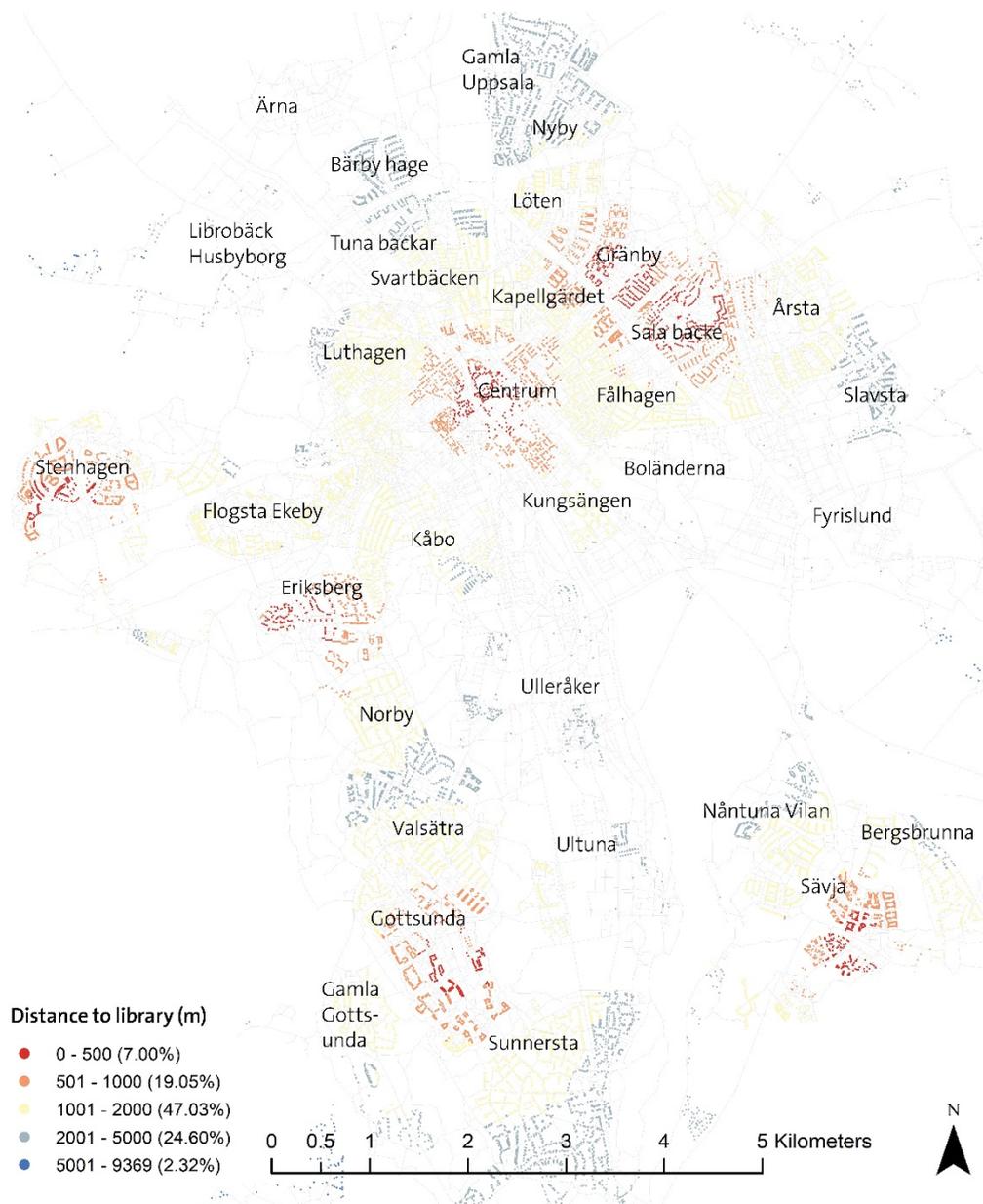


Figure 4: Accessibility to libraries as a key feature in relation to local living conditions.

The inequalities in health have consequences for example registered sick days registered or life expectancy. Good accessibility to health care clinics is essential and for household without a car the access using public transportation or walking/biking becomes important. The analysis of access to health care clinics in Uppsala illustrates that 15% of the addresses have a health care clinic within a walking distance of 500 metres and 50% have a clinic within one kilometre. Districts close to the inner city have the highest accessibility, while neighbourhoods with low access are Gamla Uppsala, Stenhagen, Södra Norby and southern part of Sunnersta, where Stenshagen has a residential population with fewer resources in general. Another aspect is to study how many people who live in the catchment area of each clinic and the method takes into

account if two or more clinics are accessible in overlapping catchment areas. The clinics in proximity of the city core has about 3000-4500 people for each clinic, while in the districts to the north and in Gottsunda there is higher pressure, between 6500 and 12500 people.

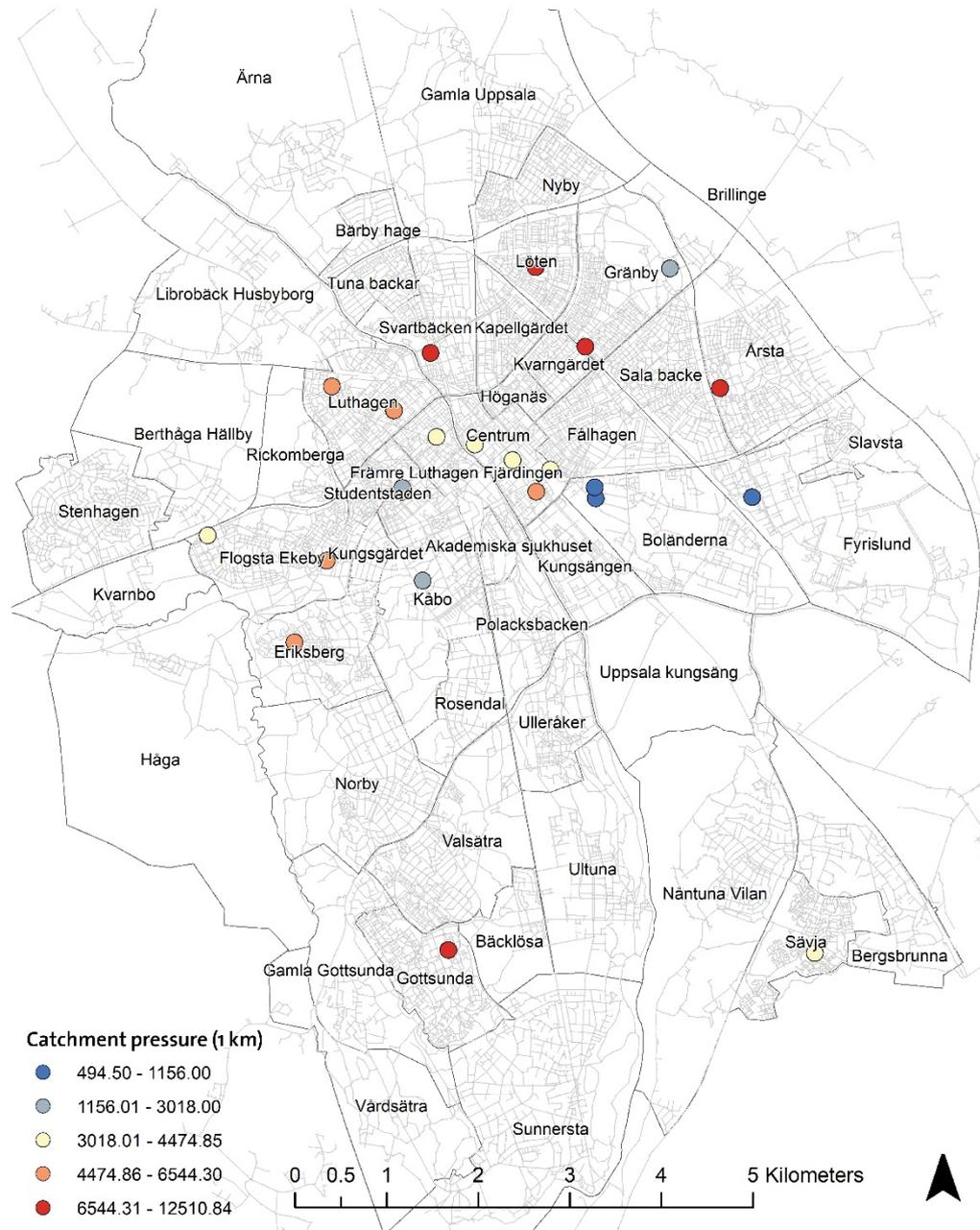


Figure 5: Population density in the catchment areas of health clinics.

The accessibility to parks and recreation areas is prioritized in Uppsala. During the pandemic access to parks and green recreational areas has been increasingly appreciated. The majority of residential units (two-thirds) have a park or green recreation area within a 300 meter walking distance. However, many of the parks are rather small in size why an analysis is made of accessible park area is conducted. This shows that within six turns there is high access for inner

city neighbourhoods while measured in metric distance these neighbourhoods have poor access. This means that it is easy to orientate to get to large park areas but still rather far to walk.

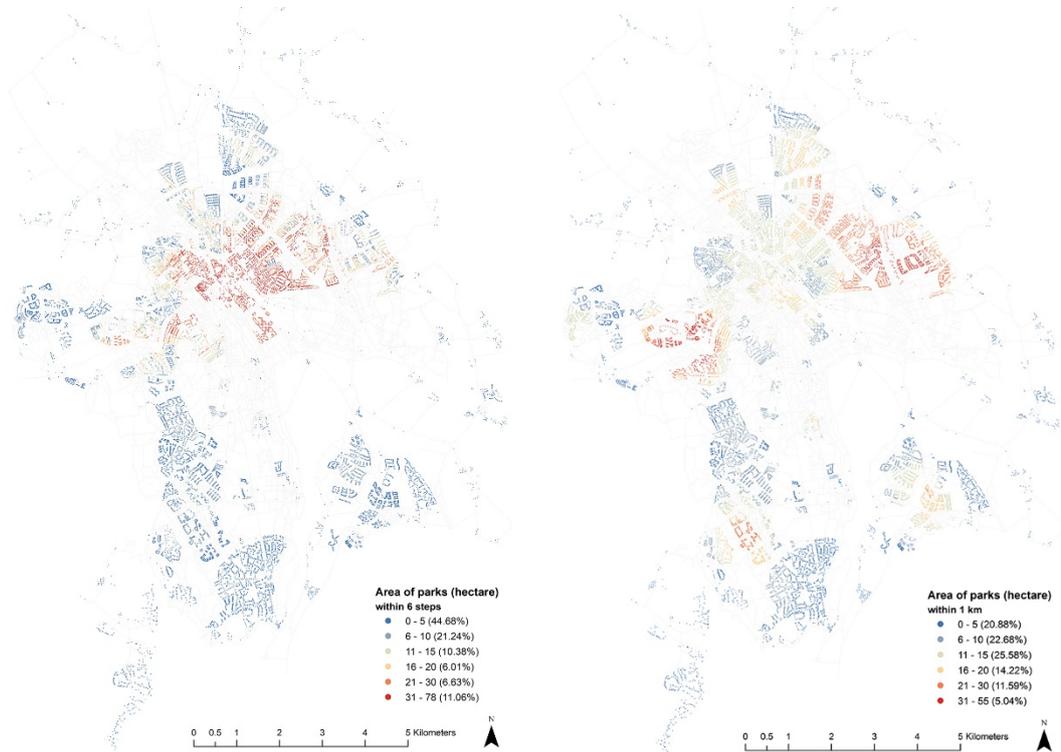


Figure 6: Access to park area measured as number of turns in the street network (left) and as metric distance (right).

5 CONCLUSIONS

The city of Uppsala is characterized by unequal living conditions as revealed by mapping the access to key amenities and functions. The unequal living conditions, emerging from poor access to amenities, risk reproducing and maintaining segregation and can lead to increased polarisation. Nevertheless, many of the conditions can be improved through urban design interventions. As the neighbourhoods are compared, large differences are revealed. It is evident that some neighbourhoods are disfavoured in many aspects as a result of how the city has been developed, shaped and structured as well as how land uses have been planned. The mapping survey reveals which neighbourhoods afford poor living conditions, influenced by how the built environment is structured and formed and as a result of the distribution of different land uses and facilities. Planning and urban design practice has far-reaching mandate to change the situation, and most important is to prioritize neighbourhood with poor conditions but also include the socioeconomic profile of the residents, for example income and education levels, overcrowding as well as employment rates etc.



The approach includes a large set of analyses that respond to the complexity of what constitutes our living environments. Important – besides the housing situation – is what is afforded in the local context, in public space and what resources are accessible. What are found in the courtyard, in the street, in the block, in the neighbourhood and to some extent in different parts of the city as a whole, contribute to the living conditions. It is important to acknowledge the complexity of amenities, take the primary function into consideration, and acknowledge them as part of the ecosystem of a social infrastructure providing arenas for social processes. It includes spaces for recreation, service, and culture, and to different degrees, these facilities function as arenas for building social networks, aesthetic experiences as well as key functions important for the welfare state such as education, public transportation and health care. It includes collective resources and opportunities for the development of social networks. The constitution (e.g. the mix of locals and non-locals) and the intensity of urban life are essential in relation to such social processes. Spatially segregated neighbourhoods suffer both from a lack of services and amenities and from a lack of exchange with other neighbourhoods that in a situation of residential segregation is negative from a social sustainability perspective. A mixed urban life has the potential to reduce negative effects of residential segregation.

We argue that the approach applied in Uppsala, using a method that takes urban form into account, reveals the living conditions places and neighbourhood afford in the city and increases the understanding of how urban design contributes to inequality and what kind of urban interventions that can potentially improve the living conditions. To build a just city those neighbourhoods with poor living conditions and limited resources need improvement. A better understanding of what role urban form has played can help in this regard. Descriptions of our cities that reveal the role of the built environment in relation to living conditions and social aspects such as cohesion and equality are important for initiating and implementing urban design interventions that turn the city in a just and sustainable direction.

REFERENCES

- Agenda 2030. (2021) [<https://www.regeringen.se/regeringens-politik/globala-malen-och-agenda-2030/17-globala-mal-for-hallbar-utveckling/>]. Accessed: November 27, 2021].
- Andersson, Roger, Bråmås, Åsa & Holmqvist, Emma. (2010) Counteracting Segregation: Swedish Policies and Experiences. *Housing Studies* 25 (2): pp. 237-256.
- Amin, Ash. (2012) *Land of Strangers*. Cambridge: Polity.
- Berghauer Pont, Meta., Koch, Daniel., Legeby, Ann., & Marcus, Lars. (2019) *Documentation PST*. Göteborg: Chalmers. DOI: [10.13140/RG.2.2.25718.55364](https://doi.org/10.13140/RG.2.2.25718.55364).
- Brandén, Maria. (2018) *Grannskapseffekter: en forskningsöversikt om boendesegregation och bostadsområdets betydelse*. Linköping: Linköpings universitet.
- Fainstein, Susan. (2010) *The Just City*. Ithaca: Cornell University Press.
- Franzén, Mats. (2001) 'Problemet segregation: en orättvis jämförelse'. In: Lena Magnusson Turner (eds.) *Den delade staden*. Umeå: Boréa förlag.



- Giddens, Anthony. (1984) *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge: Polity Press.
- Goffman, Erving. (1963) *Behavior in Public Places*. New York: Free Press.
- Grander, Martin., Roelofs, Kim., & Salonen, Tapio. (2021) 'Area-based development initiatives: a means to an end or an end in itself? – a literature overview on the case of Sweden', *Nordic Social Work Research*. DOI: 10.1080/2156857X.2021.1997792.
- Grannis, Rick. (1998) 'The Importance of Trivial Streets: Residential Streets and Residential Segregation', *American Journal of Sociology*, 103 (6), pp. 1530-1564.
- Hanson, Julienne., & Hillier, Bill. (1987) 'The Architecture of Community: Some New Proposals on the Social consequences of Architectural and Planning Decisions', *Architectural Behaviour* 3(3): pp. 251-273.
- Hillier, Bill. (1996) *Space is the Machine: a configurational theory of architecture*. Cambridge: Cambridge University Press.
- Hillier, Bill., & Hanson, Julienne. (1984) *The Social Logic of Space*. Cambridge: Cambridge University Press.
- Hillier, Bill., Penn, Allan., Hanson, Julienne., Grajewski, Tadeusz., & Xu, J. (1993) 'Natural movement: Or, configuration and attraction in urban pedestrian movement', *Environment and Planning B: Planning and Design* 20 (1), pp. 29–66. doi: [10.1068/b200029](https://doi.org/10.1068/b200029).
- Hägerstrand, Torsten. (1991) *Om tidens vidd och tingens ordning*. Stockholm: Bygghälsningsrådet.
- Klinenberg, Eric. (2018) *Palaces for the people: how social infrastructure can help fight inequality, polarization, and the decline of civic life*. New York: Crown Publishing Group.
- Koch, Daniel., Legeby, Ann., & Abshirini, Ehsan. (2017) 'Perspectives on Culture: to witness, engage with, show, or do in cities'. In: Teresa Heitor, Miguel Serra, João Pinelo Silva, Maria Bacharel, Luisa Cannas da Silva (eds.), *Proceedings of the 11th International Space Syntax Symposium* (pp.130.1-130.15). Instituto Superior Técnico.
- Koch, Daniel., Legeby, Ann., & Miranda Pablo. (2019) 'Suburbs and Power: Configuration, Direct and Symbolic Presence, Absence, and Power in The Swedish Suburb Gottunda'. In: *Proceedings of the 12th International Space Syntax Symposium*, Beijing: Beijing Jiaotong University, 2019, pp. 264-2:1-264-2:21.
- Latham, Alan., & Layton, Jack. (2019) 'Social infrastructure and the public life of cities: Studying urban sociality and public spaces', *Geography Compass*. 2019:13, pp. 1-15. doi: 10.1111/gec3.12444.
- Legeby, Ann. (2013) *Patterns of Co-presence: spatial configuration and social segregation*. Stockholm: KTH.
- Legeby, Ann. (2018) 'Everyday urban life at neighbourhood centres: Urban design and co-presence'. In: Anne Elisabeth Toft & Magnus Rönn (eds.). *The Production of Knowledge in Architecture by PhD Research in the Nordic Countries*. Proceeding Series 2018:1.
- Legeby, Ann., Berghauer Pont, Meta., & Marcus, Lars. (2015) *Dela[d] Stad: Stadsbyggande och segregation: 1 Perspektiv och utgångspunkter*. KTH: Stockholm.
- Legeby, Ann. & Feng, Chen. (2021) *Uppsala – ojämlik stad? Segregation och livsvillkor utifrån ett stadsbyggnadsperspektiv*. Stockholm: KTH.
- Legeby, Ann., Koch, Daniel., & Abshirini, Ehsan. (2016) *Kulturnärvaro: Inspel till boende och stadsmiljö*. Stockholm: Stockholms stad.
- Legeby, Ann & Marcus, Lars. (2011) 'Does the urban structure of Swedish cities inhibit the sharing of public space?', *Built Environment* 37 (2): pp. 155-169.
- Liang, Che-Yuan. (2021) 'Inkomstojämlikhet och boendesegregation', *SNS Analys*, 71, pp. 1-11.
- Lofland, Lyn. (1998) *The Public Realm: Exploring the City's Quintessential Social Territory*. New York: Routledge.



Marcus, Lars. (2010) 'Spatial Capital: A Proposal for an Extension of Space Syntax into a More General Urban Morphology', *Journal of Space Syntax*, 1 (1), 33-40.

Markus, Thomas A. (1993). *Buildings & Power: Freedom & control in the origin of modern building types*. London: Routledge.

Mål och budget 2021: med plan för 2022-2023. (2021) Uppsala kommun: Kommunfullmäktige.

Oldenberg, Ray. (1989) *The great good place: Cafes, coffee shops, bookstores, bars, hair salons, and other hangouts at the heart of a community*. Boston: Da Capo Press.

Plan- och bygglagen 2020:900. [https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/plan--och-bygglag-2010900_sfs-2010-900. Accessed: November 13, 2021].

Regeringskansliet. (2018) *Regeringens långsiktiga strategi för att minska och motverka segregation*. Stockholm: Regeringskansliet, Kulturdepartementet.

Rokem, Jonathan., & Vaughan, Laura. (2019) 'Geographies of ethnic segregation in Stockholm: The role of mobility and co-presence in shaping the "diverse" city', *Urban Studies*, 56 (12), pp. 2426-2446.

SCB (2022). Största statistiska tätorterna, [<https://www.scb.se/hitta-statistik/sverige-i-siffror/miljo/tatorter-i-sverige/>. Accessed: January 27, 2022].

Tonkiss, Fran. (2005) *Space, the city and social theory: social relations and urban forms*. Cambridge: Polity.

UN (2021). *Sustainability Development Goals*, [<https://sdgs.un.org/goals>. Accessed January 26, 2022].

Valentine, Gill. (2008) 'Living with Difference: Reflections on Geographies of Encounter', *Progress in Human Geography*, 32 (3), pp. 323–37.

Vaughan, Laura., Jones, Catherine Emma., Griffiths, Sam., & Haklay, Mordechai (Muki). (2010) 'The spatial signature of suburban town centres', *Journal of Space Syntax*, 1 (1), pp. 77-91.

Waldenström, Daniel. (2020) 'Perspektiv på den ekonomiska ojämlikheten i Sverige', *Ekonomisk Debatt*, 4 (48), pp. 14-25.

Wessendorf, Susanne., & Phillimore, Jenny. (2019) 'New Migrants' Social Integration, Embedding and Emplacement in Superdiverse Contexts', *Sociology*, 53 (1), pp. 123–138.

Wilkinson, Richard G., & Pickett, Kate. (2010) *Jämlikhetsanden: därför är mer jämlika samhällen nästan alltid bättre samhällen*. Stockholm: Karneval.

Zukin, Sharon. (1995) *The Culture of Cities*. Oxford: Blackwell.

Young, Iris Marion. (1996) 'City Life and Difference'. In: Susan S. Fainstein & Scott Campbell (eds), *Readings in Urban Theory*. Oxford: Blackwell.

Översiktsplan 2016 för Uppsala kommun. (2016) Uppsala kommun: Stadsbyggnadskontoret.