STREETS
AS PUBLIC SPACES AND DRIVERS OF
URBAN PROSPERITY

UN HABITAT
FOR A BETTER URBAN FUTURE

STREETS AS PUBLIC SPACES AND DRIVERS OF **URBAN PROSPERITY**

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FOREWORD

In the history of cities, successful urban development has not been possible without an organized physical layout and a system of street interconnectivity within cities. Since ancient times, streets have played a critical role in cities, connecting spaces, people and goods, and thereby facilitating commerce, social interaction and mobility.

Streets, plazas and designed public spaces have contributed to define the cultural, social, economic and political functions of cities. They were – and continue to be – the first element to mark the status of a place, from a chaotic and unplanned settlement to a well-established town or city.

Nowadays, streets and the notion of public space are often overlooked. When planning the city, the multiple functions of streets are poorly integrated and, in the worst cases, are neglected. Streets are usually regarded as mere links in a road network, enabling travel between two or more destinations. This conventional representation of the street as a link has tended to define and use streets only through its movement function, ignoring or subverting the other functions, which are seen as "collateral" uses of the street. Streets have thus progressively lost their multi-functionality as public spaces.

Today, people are reclaiming their streets as public spaces in many corners of the world. Streets are being planned to recover the full use by the communities and as means of social engagement. The planning and design of streets should also recover the needs of all users of this common space: age-groups, gender, economic status and modal means.

In 2012 UN-Habitat presented to the world the notion of city prosperity, which implies success, wealth, thriving conditions, and wellbeing, as well as opportunity for all. Cities that foster infrastructure development, environmental sustainability, high productivity, quality of life, and equity and social inclusion are considered prosperous cities. Building on the notion of prosperity, UN-Habitat emphasizes that for a city to be prosperous, it must have a generous and well-designed street pattern. In this report, UN-Habitat advocates for a holistic approach to streets as public spaces that embraces the concept of livability and completeness. A good street pattern boosts infrastructure development, enhances environmental sustainability, supports higher productivity, enriches quality of life, and promotes equity and social inclusion.

In this report, *Streets as Public Spaces and Drivers of Prosperity*, UN-Habitat is making a first attempt to integrate streets into the five dimensions of prosperity measured by the City Prosperity Index (CPI). These five dimensions – productivity, infrastructure development, environmental sustainability, quality of life, and equity/social inclusion – are all strongly linked to the quality of the street pattern. Elements such as urban form and connectivity become featured in the City Prosperity Index. UN-Habitat's "Composite Street Connectivity Index" (CSCI), introduced in this report, is now an integral part of the CPI and expresses the recognition that urban form, planning and structure are part of a city's prosperity. The findings and policy positions presented in this report are based on data from more than 100 cities around the world, an important critical mass of information that ensures inclusive geographical representation and a good coverage of different types of cities.

The findings of this report show that prosperous cities are those that recognize the relevance of public spaces (with proper layouts) and those which have allocated sufficient land to street development, including sufficient crossings along an appropriate lengthy network. Those cities that have failed to integrate the multi-functionality of streets tend to have lesser infrastructure development, lower productivity and a poorer quality of life. The report also shows that the lack of street connectivity increases social exclusion and generates inequalities in various spheres of life, access to basic services, in particular. This report aims to be a useful tool for policymakers, urban planners, researchers, city changers, and all Habitat Partners in ensuring that cities are prosperous places for all.

Dr. Joan Clos
Under-Secretary-General and
Executive Director, UN-Habitat

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OVERVIEW AND KEY FINDINGS

Integrating urban form in the monitoring of the Millennium Development Goals

In 1996 the world's governments endorsed the Habitat Agenda at the second United Nations Conference on Human Settlements (Habitat II) in Istanbul, Turkey, reinforcing UN-Habitat mandate to monitor urban conditions and trends. In 2000 the Millennium Development Goals (MDGs) focused the world's attention on the plight of slum dwellers. The MDG Slum Target was introduced during a time when there was neither a universal definition of "slums" (also known as informal settlements) nor comparative information on slums at the country or global level. Efforts were made to define slums, guided by the approach of Smart Indicators (Specific, Measurable, Achievable, Relevant and Time-bound).

However, the slum definition, formulated by UN-Habitat in consultation with its partners, includes only elements of land and housing, namely, improved water, improved sanitation, durable housing, overcrowding and security of tenure. Here the elements of urban form, such as built and non-built areas, urban density, environmental infrastructure, such as street networks, were not included. This was not due to the lack of interest or poor judgement, but due to lack of data.

It is well known that without sufficient street networks provision of basic services is virtually impossible. Recognizing the importance of the urban form, in 2004 UN-Habitat introduced the Monitoring Urban Inequities Programme (MUIP) that aims to collect and analyze crucial information on the layout and planning of cities. Under the MUIP, a community profile was designed in association with other modules of an Urban Inequity Survey (UIS). The community profile, supported by GIS, provides crucial information on the urban form, including the street network as a key element of public space. It also collects qualitative information through focus groups that reflect people's opinions on infrastructure, social networks, security, etc.

After twelve years of monitoring the MDGs' slum target, UN-Habitat introduced the City Prosperity Index, based on a combination of five dimensions that are supposed to define the prosperity in a city. One of the dimensions, infrastructure, includes elements of the slum definition, among others. The five dimensions of the City Prosperity Index (CPI) are: productivity; infrastructure; environmental sustainability; quality of life; and equity/social inclusion. However, defining elements of urban form such as streets were not included in the first edition of the CPI, as there wasn't sufficient data to allow it.

Since then, efforts and mechanisms have been put in place to collect and analyze reliable data on street and population density in more than 100 cities around the world. The combination of these efforts provides today an opportunity to have sufficient data not only to analyze elements of urban form but to associate them with other socio-economic dimensions, such as the five dimensions of the City Prosperity Index.

This report is not only about the measurement of street elements, but about how streets, as public spaces, are associated with urban prosperity. Indeed, streets play a key role in productivity, infrastructure, environmental sustainability, quality of life and equity/social inclusion.

The first chapter of this report, "Streets as Public Spaces – A Historical Perspective", highlights the role of streets from the ancient era to the present time. It traces the transformation of street planning and design during the period of rapid urbanization that accompanied the Industrial Revolution in Europe, North America and Oceania, as well as during the colonial and post-colonial eras in Africa, Asia and Latin America and the Caribbean.

The second chapter, "Prosperous Streets – Concepts, Methods and Measurements" re-conceptualizes the City Prosperity Index with the street dimension as a cross-cutting element through the five dimensions. Indeed, it is assumed that streets contribute to the prosperity of cities by contributing to productivity, infrastructure development, environment sustainability, quality of life, and social inclusion.

The third and fourth chapters analyze different components of street connectivity, such as the proportion of land allocated to streets, street density, intersection density and the Composite Street Connectivity Index disaggregated by city core and suburban areas in selected cities across the globe. Chapter Three presents findings from Europe, North America and Oceania, while Chapter Four presents findings from Africa, Asia, Latin America and the Caribbean. The latter shows, as predicted, that street connectivity in developing regions is not just a problem of quantity, but quality as well.

The fifth and last chapter, *"Streets as Public Spaces and Drivers of Urban Prosperity"* is the first attempt to assess the contribution of streets on the prosperity of cities.The first edition of the City Prosperity Index (CPI) published in the *State of the World's Cities 2012/13* was based on five components which are the spokes of the wheel of urban prosperity: infrastructure development; environmental sustainability; productivity; quality of life; and equity and social inclusion. No element of the hub of the wheel was included in the measurement of the CPI. This time, an element of urban form, street connectivity, is featured in the CPI.

Multiple facets of street connectivity in Europe, North America and Oceania

Disconnected, fragmented suburbs adjacent to well-connected city cores

The expansion of cities in Europe, North America and Oceania has been accompanied by changes in land use, both in terms of form as well as structure. Streets, as public spaces, lost their importance in terms of their share of land, as well as their prominent role in shaping the culture and history of cities. Land allocated to streets in these regions is much lower in suburban areas than in the city core. While the cores of most cities have more than 25 per cent of land allocated to streets, in suburban areas it is less than 15 per cent.

The reduction in the proportion of land allocated to streets in suburban areas is the result of a combination of factors, including the adoption of hierarchical systems of street planning, with the predominance of cul-de-sacs rather than the grid system, which is a common feature of city centres. Streets in suburban areas are narrower, have shorter networks and are of low intersection density. In contrast to their relatively well connected city cores, suburbs in Europe, North America and Oceania are, in general, disconnected with little amount of land allocated to streets and few intersections along a short street network. Lower urban density in suburban areas is often accompanied by lower street density and less land allocated to streets. In suburban areas, poor connectivity is not only associated with low urban density, but the few existing streets serve a smaller number of people due to poorly connected street networks. This is an indicator of under-utilization of streets. To maximize their use, there is a call for their re-planning. This calls for an analysis of how and why the process of suburbanization occurred, and why, despite the existence of streets, many remain "empty". Case by case analyses may yield different results for different cities.

Densification of suburban areas of European, North American and Oceanic cities indicates that re-planning of suburban areas is needed, as has been started in some cities. Findings from this report call for more sustainable urban development, such as promoting mixed land use, supporting more compact development and providing transport options beyond the automobile. Among the avenues proposed are promoting environmentally-friendly public transport and designing streets in a way that pedestrians and cyclists have their equal share of streets. Future local and regional planning should consider transport needs, environmental concerns and land-use goals that may not have been considered when cities expanded. Re-urbanization should necessarily include new forms of urban planning where sufficient amount of land is allocated to streets for people to walk, cycle or socialize. The way the suburban areas are currently planned does not allow for densification.

However, any future urban (re-) planning in the cities of the developed world should consider important factors that have changed the profile of the cities of today. These factors are: ageing populations in a demographic regime of low fertility and mortality rates, and the change in family size and structure. These factors will impact the housing demand in terms of volume and type, and will also impact all population dynamics in cities. These factors will not only influence housing but also streets and other public spaces. Clearly, urban planning, even in "well planned" cities, must be an ongoing project, one that will require re-thinking as the environmental and social costs of urban sprawl become more evident and bearing in mind the reality of ageing populations.

Citizens are reclaiming streets as public spaces

In most cities of the developed world, streets are re-designed to accommodate various modes of transport i.e. motorists, cyclists and pedestrians. The question is how to optimize the use of the street networks in the re-design of streets. In Europe, North America and Oceania, there are "livable streets" movements or "complete streets" projects that aim to make streets more accessible to all types of users and to make cities more environmentally friendly by reducing motorized transport. Within existing street networks, cities are being re-designed to allocate more spaces for walking, cycling and promoting the use of public space. Cities are dedicating increasing amounts of public space to pedestrians, cyclists, and public transit. For example, London has pedestrianized a part of the famous Trafalgar Square. Vienna too has closed its central streets to vehicle traffic and Copenhagen has built an extensive bicycle network.

Various options are available to cities for the redesign of streets, including building separate lanes for cyclists and pedestrians. Other measures for increased safety are associated with the adjustment of traffic signal timing that allows sufficient time for pedestrians to cross a street. A European Union project (ARTISTS) has focused on the assessment of the transformation of arterial streets in order to better accommodate people. However, when this is not taken into consideration at the stage of urban planning, it can be very costly. After four years of evaluating the reconstruction of arterial streets by research centres, it was found that while it was feasible to redesign arterial streets, the financial cost of doing so was quite high.

However, these initiatives are still not addressing problems faced by the suburbs which are disconnected and fragmented. Here different solutions are required to create an environment accessible to all users, not only for those that can afford a car.

Multiple facets of street connectivity in Africa, Asia and Latin America and the Caribbean

Peripherization accompanied by informality

The state of streets in much of the developing world is quite different from that of the developed world, both in terms of quantity and quality. In most cities of the developing world, there are not enough streets, and those that exist are either not well designed or well maintained. Therefore, in this report the diagnostic of streets in cities of the developing world has been done differently from cities of the developed world where there is relatively sufficient land allocated to streets, the streets are paved with sidewalks and are well maintained, and street norms and regulations are enforced.

Most cities in the developing world share common characteristics: inadequate and deteriorating transport infrastructure; and poor facilities for non-motorized transport (walking and cycling). One effect of these problems has been the further marginalization of the most vulnerable segments of society who rely the most on public transport and cannot afford private alternatives. However, these similarities do come with differences as well—in terms of size, geography, cultural setting and administrative structure – which are considered in this analysis.

In cities of Africa, Asia and Latin America and the Caribbean, urban expansion has taken the form of "peripherization" that is characterized by large peri-urban areas with informal or illegal patterns of land use, combined with a lack of infrastructure, public facilities and basic services, and often accompanied by a lack of both public transport and adequate access roads. The monocentric form of street design and planning that characterized many cities in the colonial era started to change in the 20th century and accelerated with the independence of countries from the 1950s onwards. Street designs became more irregular following the peripherization of urban growth, which saw poor families move to the outskirts, areas that lacked basic services. The streets in the suburban areas of cities in the developing world often resemble slum areas, with irregular street patterns with multiple unplanned dead-end roads. While it is recognized that in most city cores, insufficient land is allocated to street (less than 15 per cent), the situation is worse in the suburbs where less than 10 per cent of land is allocated to street. Out of the 40 cities analyzed here only 7 cities allocated more than 20 percent of land to street in their city core. In most of these cities, less than 10 per cent of land is allocated to streets in their suburban areas. The large gap between street connectivity in the city core and in the suburban areas is a reflection of the huge inequalities in most cities of the developing world

Poor street connectivity hindering the provision of basic services

Lack of streets in cities has various implications in people's lives. It means that cities' ability to provide services, such as safe water and adequate sanitation, is severely hampered. Water and sewerage systems are usually planned along existing street networks, and when these are non-existent, they make it difficult for authorities to provide these services. *Establishing a coherent network of roads and streets both in new extension areas and already urbanized areas constitutes a key challenge for urban planning in cities in Africa, Asian, Latin America and the Caribbean.*

Despite lack of street connectivity, slum dwellers have no choice but to walk

In most African, Asian and Latin American and Caribbean cities, the poor walk to reach their places of work because they cannot afford the cost of public transport. In slum areas, most people are forced to walk to reach services and facilities using narrow, unpaved streets without sidewalks. The few streets built are arterial and are meant for motorized means of transport. Pedestrians are exposed to car accidents which sometimes claim their lives. In these cases, defining street walkability by the high number of pedestrians, as observed in the developed regions, is not appropriate. While in developed regions it is assumed that a walkable street is more attractive to people for various reasons, and in fact, defines the "livability" of a street, in slum areas of many cities of the developing world walking on streets is not a choice, but a necessity due to lack of other affordable transport alternatives. In addition, the walkability of the streets in most of these cities are severely hampered by a lack of sidewalks, which makes walking hazardous.

Citizens are reclaiming streets as public spaces

On a smaller scale, cities in Africa, Asia and Latin America and the Caribbean are also listening their citizens and are redesigning streets to allow pedestrians and cyclists to share space with motor vehicles. Design measures that enhance the environment or pedestrians include expanding sidewalks, planting trees and installing benches or other seating. All these initiatives have a common set of objectives: to enhance infrastructure, environmental sustainability, social interaction, public health, productivity and social inclusion, the key components of a prosperous city.

Streets for all: Walking, cycling and using public transport - There is a basic spatial structure of streets in Tokyo, Hong Kong and to some extent Mexico City, Guadalajara, Medellin, Bogota, Cape Town. In the city centre of these cities, the streets can accommodate all users when they are well designed. Most of these cities have joined the livable streets movement that originated in the developed world.

The movement aims to promote streets for all and make cities livable and become more pedestrian- and cyclist-friendly by reducing motorized transport. Within the existing street network, cities are re-designing their streets by allocating more spaces for walking, cycling and promoting the use of public spaces.

However, these initiatives are still not addressing problems faced by the urban poor who live in suburban areas and slums. Most suburban areas and slums are poorly served by streets; this further hinders the provision of basic services, such as connections to water and sanitation facilities. Lack of street networks in these areas also reduces the urban poor's transport choices.

STREET CONNECTIVITY AND CITY PROSPERITY

One critical finding is that the City Prosperity Index is higher than 0.800 (compared to the maximum, 1) among cities that enjoy high street connectivity, good infrastructure development, good environmental sustainability, high productivity and quality of life, and also high levels of equity and social inclusion. In other terms, these cities do well in all components of prosperity, including street connectivity. Provision of basic services (water, sanitation and drainage facilities) is quasi-universal in these cities. With good street connectivity, these cities also enjoy high productivity with optimal commuting time to work and other services. They have a high productivity index associated with reduced traffic congestion and improved walkability through better street connectivity.

In these cities the quality of life associated with health and safety is amongst the highest globally. Indeed their citizens enjoy public spaces, green spaces and walkable streets. With many streets re-designed to promote pedestrians and cyclists, it is expected that the quality of life in these cities will improve further. By promoting walking and cycling, obesity and related heart diseases will decrease. Although, there is long way to go regarding equity and social inclusion, these cities enjoy availability of sufficient land allocated to streets which is a prerequisite for the achievement of "livable streets" or "complete streets" and other socially-conscious projects. Promoting streets for all, particularly for pedestrians, cycling and public transport are driving the wheel of urban prosperity towards prosperous streets, streets that promote infrastructure development, enhance environmental sustainability, support high productivity, and promote quality of life, equity and social inclusion.

Cities which are at the bottom of the CPI bracket are those that perform poorly in almost all components of the CPI. Much remains to be done in terms of city planning, quality of life, infrastructure and environment. Production of goods and services is still too low, a reflection of underdevelopment. Historic structural problems, poor urban planning, chronic inequality of opportunities, widespread poverty, and inadequate capital investment in public goods are critical factors contributing to such low levels of prosperity.

Poor performance of "hubs" require more effective urban planning, laws, regulations, and institutions that can pave the way for a more prosperous future for these cities. One main physical characteristic of these cities is high prevalence of slum areas or informal settlements, most of them lacking streets. These areas, not well or adequately served by streets, suffer from crumbling and/or over-stretched basic services characterized by regular water shortages, leakages, burst water pipes, leaking sewers, power outages, and uncollected refuse. In addition, infrastructure for non-motorized transport (e.g. pavements or sidewalks for walking and bicycle lanes for cycling) is often lacking, poorly developed, on the decline or does not appear to rank high among city planners' priorities. This has led to high incidences of traffic fatalities involving pedestrians and cyclists. To be prosperous, these cities need well-connected streets. They must prioritize streets as the basic element of mobility and accessibility accompanied by the progressive provision of services (e.g. water and sanitation). This will boost productivity and contribute to high quality of life.

Between the two groups (cities at the top with a CPI of above 0.800 and the cities at the bottom with a CPI of below 0.500) featured cities that perform well in some components of the CPI but fail in others. For instance, Bangkok, Cape Town and Medellin belong to the same CPI group, but for different reasons. Cape Town and Medellin suffer from high income inequalities with an equity index of 0.217 and 0.394, respectively. Despite their capacity to provide goods and services in a good infrastructural environment, many people in these cities are left behind and don't fully enjoy the prosperity of their cities. Bangkok has strong infrastructure development, a moderate productivity index, quality of life index and equity index, but scores low on street connectivity, below the level of 0.500. This means that poor street connectivity has the same impact on Bangkok's prosperity that high inequality has on Cape Town's and Medellin's prosperity.

The negative impact of inequalities on prosperity is much more visible in the case of Johannesburg, which has a relatively well developed street network but suffers from high inequalities. This suggests that very high inequality can reverse all gains made on the other components of prosperity. Beijing, like many Chinese cities such as Shanghai, suffers from high levels of outdoor population (measured by PM10) that lower its CPI level. Considering the role of good street connectivity in reducing the use of motorized means of transport, improvement of street connectivity in Beijing can contribute to higher environmental sustainability. Due to their poor performance in street connectivity, Auckland and Moscow rank alongside the group of cities from middle- income countries, such as Beijing. This is a clear indication that poor street connectivity can hamper efforts towards true prosperity.

In the case of Beijing and cities of middle income countries with high economic growth rate, it is important that measures are taken to safeguard environmental sustainability while contributing to the prosperity of cities. The creation and (re) distribution of the benefits of prosperity should not destroy or degrade the environment. The natural assets of cities should be preserved for the sake of future generations and to promote sustainable development. By promoting walkability and cycling, prosperous streets contribute to the reduction of air and water pollution and to the preservation of biodiversity. Streets should be considered and planned as "green" public spaces. Non-motorized forms of transport, pedestrianization, cleaner fuels and reduced traffic congestion are just some of the measures that can limit the damaging effects of motorized transport and traffic congestion. Streets that provide space only to motorists are characterized by congestion and high CO^2 emissions. These should be considered when planning streets of the future.

The fact that cities can belong to the same group of CPI for different reasons calls for different solutions according to each diagnosis. This is one of the advantages of using the urban wheel framework to assess the prosperity of cities. This will also avoid replicating solutions from cities to cities without adequate diagnosis.

The Cities Prosperity Initiative established by UN-Habitat in 2012 is a strategic policy initiative for cities that are committed to adopting a more holistic, people-centred and sustainable notions of prosperity and that are willing to deploy necessary efforts and resources to move forward in the prosperity path based on their specific local conditions. Under this initiative, cities are expected to specifically work on dimensions of prosperity where the diagnosis shows a clear obstacle towards prosperity. This is a practical framework for the formulation, implementation, and monitoring of sustainability policies and practices to increase prosperity at the city level.

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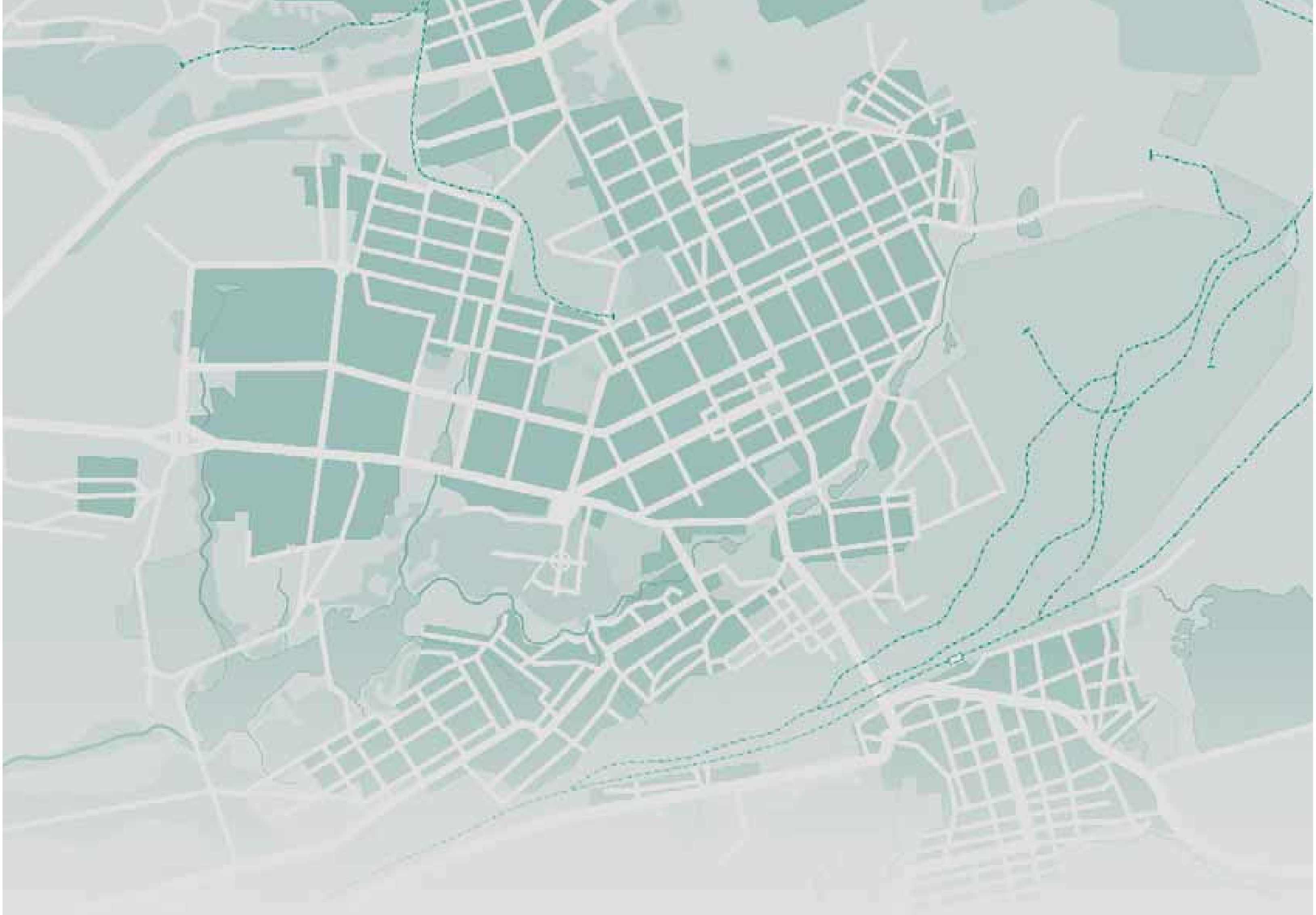


1 STREETS AS PUBLIC SPACES: A HISTORICAL PERSPECTIVE

Mohenjo-Daro. © **harappa.com**

People have histories; streets do too

Towns and cities have historically been organized around their streets. Streets have traditionally served three main purposes: mobility, commerce and social interaction. The street, normally defined as a public space with residential houses, commercial buildings and other structures on one or each side, therefore, has social and economic functions that are integral to urban life.

Indeed, there are multiple functions of streets as links or places that have commercial, economic, civic, ceremonial, political, cultural and social value. However, this multi-functionality is often overlooked, and streets are usually regarded as mere links in a road network, enabling travel between two or more destinations.

The conventional representation of the street as a link has tended to reinforce the linear representation of the street, defined only through its movement function, and ignoring or subverting the other functions. While this definition is a useful simplification for the purposes of understanding the movement of traffic in a network, it omits other significant aspects of the street as a public space.

Streets determine intra-city connections, while inter-road networks determine connectivity between cities. This report focuses on the former, which are considered an essential element of urban form and structure.

PLANNING AND DESIGN OF STREETS AS PUBLIC SPACES IN THE ANCIENT ERA

Streets in ancient cities were the result of a vision of civilization rather than a function of the economy

The traditional, pre-industrial urban settlement was one with a central meeting place for transactional activities, such as commerce or governance, surrounded by housing, workshops, and neighbourhood services, which is typical of the monocentric cities, with the wealthiest and most influential inhabitants living closest to the centre. Streets radiated from the nucleus of the city, which was usually the seat of political power or place of worship, such as a mosque, a temple or a cathedral, or some other structure of political, commercial or cultural significance, such as a royal palace or *suq* (covered market street that is characteristic of Arab cities). Main streets in trading coastal cities often constituted the "communication spine" of the city, often linking harbours to markets and other trading centres. Streets thus formed an integral part of the social and commercial fabric of these settlements. They shaped the urban form and structure by separating blocks and linking different places of interest within the city.

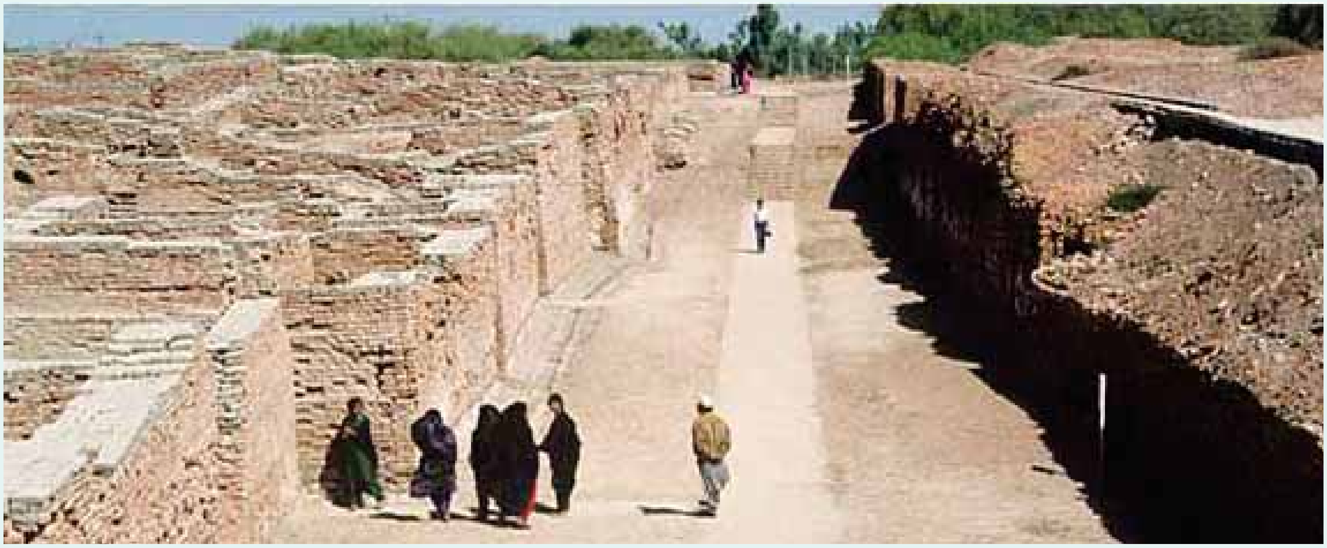
In this sense the way streets were planned, designed and connected were of importance. The grid pattern, which is a type of street plan in which streets run at right angles to each other (thereby forming a grid), is characteristic of many ancient cities. The grid system was commonly used in settlements of the Indus Valley that date back to 2600 BC. A typical city of the Indus Valley Civilization was composed of two sections connected via large streets of about 30 meters of width intersecting at right angles: one located on an artificially raised mound and another at ground level.[1] Houses were located at the lower level while other buildings of the city, such as assembly halls and religious structures, were located at the elevated level. The layout of the grid system promoted social interactions and commercial exchanges that made streets play their full function as public spaces. In addition, it facilitated the provision of basic services. For instance, water, sanitation and sewerage systems existed in the Indus Valley Civilization.[2]

In the Egyptian city of Giza, workers' villages were laid out in blocks of long galleries separated by streets in a formal grid. In 1700 BC, Babylon, one of the greatest cities of *antiquity*, was rebuilt along wide and straight streets in a grid pattern. The street grid plan has also been noted in China since 1500 BC, where guidelines outlined that a "capital city should be square on plan" and that the design of streets should consider three gates on each side of the perimeter leading into the nine main streets of the city. As fundamental component of public space, the street network links other public spaces to public as well as private spaces. For instance, the Chinese grid-pattern was shaped along four main directions, linking other important enclosed public spaces such as the Royal Court situated in the south, the marketplace in the north, the Imperial Ancestral Temple in the east and the Altar to the Gods of Land and Grain in the west." *Teotihuacan*, near present-day *Mexico City,* seems to be the largest ancient grid-plan site in the *Americas.* The city's grid covered 13 square kilometers. Its geographical layout is a typical example of the *Mesoamerican tradition of planning cities* with its urban grid aligned to precisely 15.5° east of north.[3]

The grid pattern was also adopted by the Greek and Roman empires. Although the grid was an idea present in ancient city planning, it slowly gained primacy from the 5th century BC with the planning of many Greek cities.[4] The grid system eased the movement of military units and commerce from one Greek city to another. It was adopted and designed for efficiency and inter-changeability, both facilitated by and aiding the expansion of the empires, particularly in Europe. The Roman grid was designed in a way that street intersections would be sited along important public buildings, in much the same way as central business districts are located in the centre of modern day metropolitan areas.[5] With the expansion of the Roman Empire, the concept of a grid pattern became a common feature of town planning in many cities of Europe and North America until the 20th century.[6]

The grid was also seen as a tool to democratize the distribution of land and define the boundaries between public and private ownership. Streets as public spaces were not legally protected as were most commons in public domains.[7]

BOX 1.1: STREET PLANNING DURING THE INDUS VALLEY CIVILIZATION



Mohenjo-Daro. © **harappa.com**

The people of the Indus Valley Civilization, which dates back to 2600 BC, achieved some spectacular feats when it came to building cities. Each city was carefully planned and at the peak of the civilization housed almost 40,000 people.

A typical city would be divided into two sections, each fortified separately. One section, known as the acropolis, was located on an artificially raised mound while the other was on ground level. The acropolis contained the important buildings of the city, such as the assembly halls, religious structures, granaries and, in the case of Mohenjo-Daro (in present-day Pakistan), the famous Great Bath. The lower section of the city was where the housing for the inhabitants was located.

The city was well-connected with broad roads which intersected at right angles. In Mahenjo-Daro, classification of streets was practiced, with secondary streets being about half the width of the main streets and smaller streets being about a third to a quarter of the width of the main streets. The houses, built with standardized baked bricks were located in the rectangular squares formed by the street grids. What is noteworthy is that almost every house had its own wells, drains and bathrooms. Each house was connected directly to an excellent underground sewer system that ran throughout the city. The inhabitants of the cities of the Indus Valley Civilization enjoyed a degree of sophistication unknown in the ancient world, not only in terms of sanitary conveniences, but also in terms of a highly developed municipal life. What is absolutely astounding is that these cities existed close to five thousand years ago.

Source: *Projects by Students for Students (undated); Kenoyer (undated)*

STREETS AS PUBLIC SPACES AND DRIVERS OF URBAN TRANSFORMATION

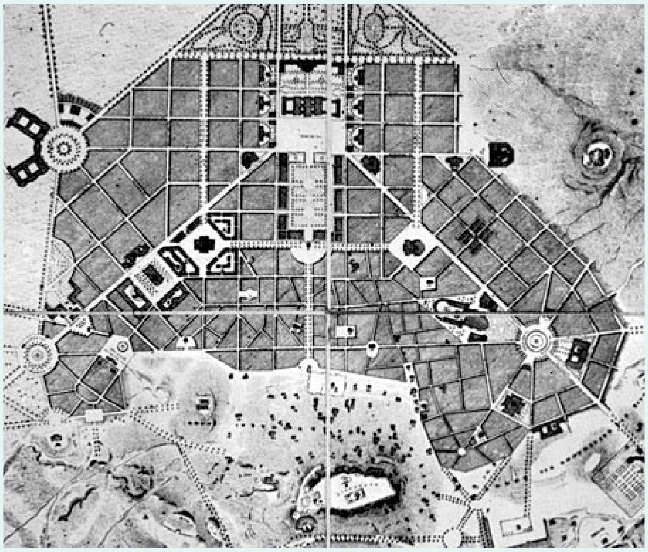
Europe, North America and Oceania

For centuries streets contributed to defining the cultural, social, economic and political functions of cities. They are a key element in determining the form and function of a city, a neighborhood and community.[8] They were the first element to mark a change in status of a place, from a village to a town, from a town to a city or from a commercial centre to a capital city. For instance, in 1832, when Athens was chosen to be the capital of Greece, amongst the most important drivers of its transformation into a capital city was the introduction of new city planning. Street widths, lengths and forms were planned and designed in a way that the main symbols of Athens were linked to the Royal Palace.[9]

In Spain, Barcelona's street grid system, commissioned in 1874 and known as "L'Eixample" (expansion of Barcelona outside its old walls), was a way to purge the city of its Roman roots which lay within its medieval walls.[10]

Paris is also known for its large boulevards that give the

BOX 1.2: ATHENS – HISTORICAL, CULTURAL STREET SYSTEM



Plan for the City of Athens designed by Kleanthis and Schaubert in 1833.
Source: *http://www.eie.gr/archaeologia/En/chapter_more_9.aspx*

A view of Athens from Lycabettus hill.

Athens, one the oldest cities in the world, has undergone various transformations through more than 7,000 years of existence. Situated in southern Europe, Athens became the leading city of Ancient Greece in the first millennium BC and its cultural achievements during the 5th century BC laid the foundations of western civilization.

In 1832, Athens became the capital of Greece with a population of about 10,000 inhabitants. The city had a few ruins and historical monuments with a few dwellings at the foot of the Acropolis. The first plan for the new capital was drafted and submitted in December 1832, and on June 29 1833 it was approved. However, after a series of protests, the implementation of the plan was suspended until a final revision was done in 1836.

The street network was elaborated in part as spokes with hubs at circular plazas, and in part as horizontals and verticals in the direction of the main axes, always with absolute regularity. The shape of the main axes would be an isosceles triangle, with its peak at today's Omonia Square, its sides defined by Piraeus and Stadiou streets, and Ermou Street as its base. The Royal Palace was expected to stand at the peak of the triangle: a symbolic merger of the geometric apex and the apex of state power. The broader area of the Royal Palace was surrounded by wide avenues. The orientation of the sides of the triangle was not accidental. As Kleanthis and Schaubert note in their memorandum, "they meet in such a manner that allows viewing simultaneously the comely Lykavitos, the Panathenaic Stadium, the rich-in-proud-memories Akropolis, and the military and commercial ships of Piraeus, from the balcony of the Royal Palace". The plan was designed to host all of the activities of a capital and a population which was expected to reach around 40,000. The geometric planning that runs through both the Kleanthis-Schaubert plan and the Klenze plan is a basic constitutive element of neoclassical-romantic city planning connected with the notions of Nation, Law, State and Government, as they were current during the course of the 18th Century.

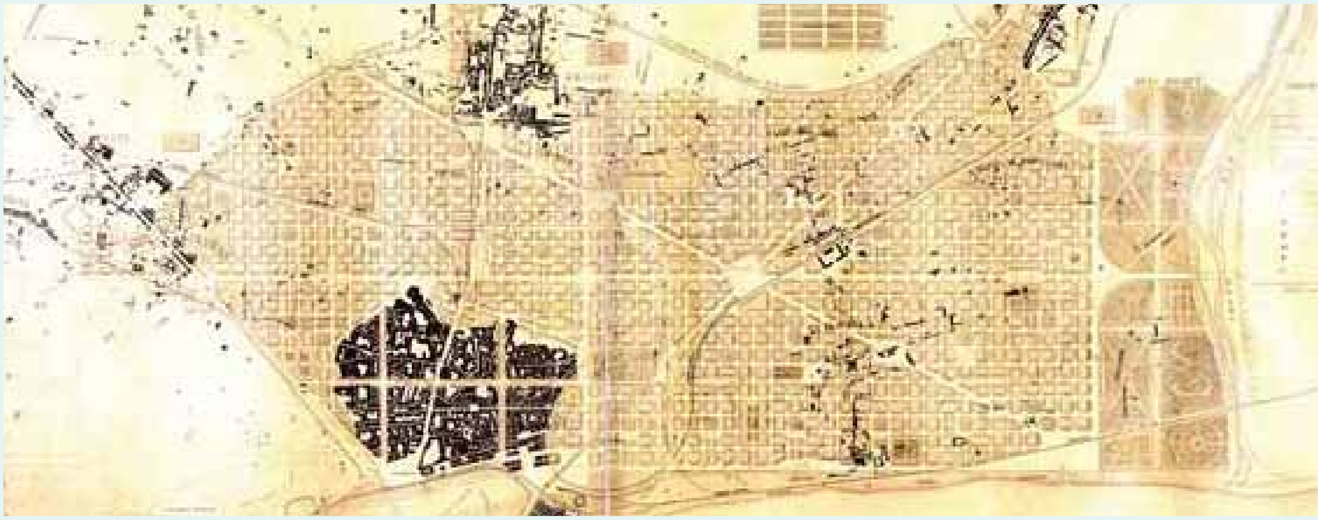
The people's reaction and negotiation

Just as the lines were being laid down and it became physically clear what areas would be expropriated for the erection of public buildings, the development of the parks and the roadway network, as well as the archeological excavations, a wave of protests erupted from property-owners, along with charges of profiteering.

The plans for expanding Athens were therefore delayed till 1840, when the first Athens theatre began to operate. It was located, according to an eyewitness account, "outside of the City … in the naked plain surrounded by mountains". This "outside the City" locale is today the small square between Menandrou and Socrates streets, behind the Vegetable Market, in the noisy center of the city, where its memory survives as Theatre Street.

Source: *Kallivretakis, (undated); GrigorisSokratis, 2008*

BOX 1.3: BARCELONA : THE ROMAN CITY



Source: *Museu d'Historia de la Ciutat, Barcelona.*

Street Network ending in broad boulevards in Barcelona, Spain. **© http://www.airpano.com/Photogallery-Photo.php?author=11&photo=494**

The Roman city of Barcelona in modern-day Spain was founded around 230 BC. Barcelona had the form of a *castrum* (plots of land reserved or constructed for use as a military defensive position), with the usual perpendicular main streets of the *Cardus Maximus* (*north to south oriented streets*) and the *Decumanus Maximus* (east to west oriented road) and a central *public square* located on the Táber hill, site of the iberic *Barkeno*. The city had perimeter walls which were 1.5 km long, enclosing an area of 12 hectares.

Barcelona's regular grid was commissioned in 1874 as a way to sanitize the city, then still constrained within its medieval walls. The city plan consisted of regular streets that followed the direction of the sea and connected the existing city (now the Old City), with the surrounding villages.

The plan also defined a hierarchy of infrastructure. At its heart was the hospital and , two parks and, at street junctions, the "ochaves", chamfered blocks for commerce. The city was highly compact and displayed complex street forms with low dispersion of varied street network types with medieval streets ending in broad, bustling boulevards.

Two main streets play a significant role: Passeig Gracia and Rambla Catalunya; the former displays the most elegant and significant shops and institutions of the city, while the latter is a popular commercial street that continues to the sea after crossing Placa Catalunya. All the streets, except Diagonal and Gran Via, maintain single-traffic directions.

Source: *Mora, 2003*

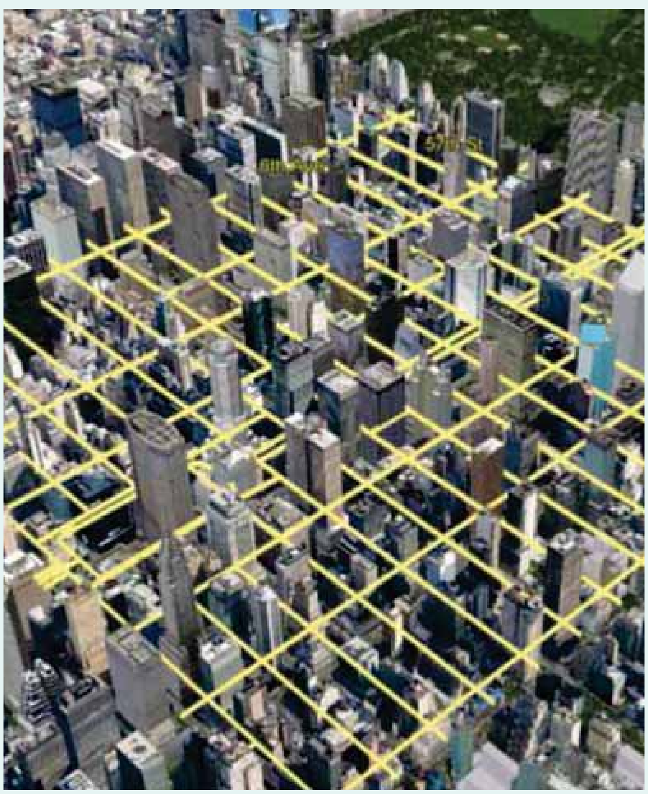
city a unique image compared to cities such as New York, where the grid street system is the norm. The large boulevards of Paris are a result of its history of urban transformation. From 1852 to 1871, buildings were demolished to accommodate the construction of wide boulevards through the fabric of old Paris and to clear space around historic buildings, such as the famous Notre Dame and the Palais du Louvre[11]. This was meant not only to promote unimpeded movement, but also to make the construction of barricades impossible.[12]

In the Netherlands, canal rings are amongst the most prominent feature of Amsterdam's architecture. These concentric rings of canals, built during the 17th century, have since been an icon of urban planning and architecture.[13] The street system of Helsinki in Finland is shaped by a plan where straight and wide streets are placed on a geometric grid.[14] In the United States, many cities did not start with a grid system. However, many North American cities adopted the grid system later as it facilitated the rapid sub-division and auction of large parcels of land.[15] The grid system was also seen as a safeguard against overcrowding, fire, and disease.[16] One of the first cities to use the grid system in the United States was Philadelphia, in 1682.[17] However, one of the most perfect grid systems in the world is to be found in Manhattan, the heart of the city of New York. The grid system of Manhattan was planned and designed in 1811 and was chosen for its practicality, easy-to-implement nature, and its facilitation of real estate development.[18] A museum curator in New York described Manhattan's grid system thus: "City cultures are defined by their plans. Los Angeles is subdivisions, Paris is broad boulevards, Vienna is the Ringstrasse, and New York is the grid. The grid has shaped this vibrant city, imposing an order and controlling its chaos."[19]

Paris, panoramic aerial view of Champs Elysees boulevard. France, Europe. **© Shutterstock.com**

BOX 1.4: MANHATTAN: EXAMPLE OF A PERFECT GRID

Source: *http://archrecord.construction.com/news/2011/12/Manhattan-Street-Grid.asp*



Source: *New York City Department of Transportation, 2012*

In 1810, the population of New York City, which was about 96,000, resided in homes near Manhattan's southern tip crossed by a winding dirt route known as the Boston Post Road, which was further divided into large green estates similar to rural areas. Before the creation of the master plan in 1811, street construction on Manhattan on a grid-like design was approved by the city's Common Council on an ad hoc basis. However due to an increase in population, a formal master plan similar to the ad hoc plan was approved in the same year; it was based on a grid system full of streets and wide avenues placed at right angles, different from the design of cities such as Washington, D.C., or capital cities in Europe. Manhattan's 200-year old grid system has served the population of New York well, and continues to inspire urban planners and architects around the world. With several extensions over the years, the grid today adequately caters for the needs of the city's 1.6 million residents; the 1.6 million commuters who come from other boroughs every day; the 19.6 million visitors from the New York metropolitan area and the over 50 million visitors from around the world annually.

Although the grid has received its share of criticism, citing it as a monotonous plan which creates orderliness and one whose design did not appreciate natural features; it has formed a working street network for a large city, and is hailed as a major milestone in the history of city planning. In addition to its forming the foundation of the urban form of present day Manhattan, some analysts identify the street layout as a good plan whose short blocks provide continous diversity for pedestrians, making the city walkable and vibrant.

Source: *Ballon, 2012; Jaffe, 2011; Marcuse, 1987; New York City Government; Moss and Qing, 2012*

Urban growth and expansion since the Industrial Revolution

The monocentric form of street design and planning that characterized many cities in the pre-industrial era started to change in the 18th century and at the start of the Industrial Revolution in the 19th century, which saw street designs in Europe and North America becoming more polycentric and hierarchical, partly as a result of stratification of society along class lines. The Industrial Revolution led to massive rural-to-urban migration as migrant workers sought jobs in factories. While industrial cities tended to grow around a single focal point, such as a factory, it was the low-paid factory workers that tended to live closest to the centre amid the factory-generated pollution and squalor. Better-off people, with more secure jobs, higher incomes, and shorter working hours, tended to move to lower-density areas towards the edge of these cities – a process that accelerated with improvements in passenger transport, especially with the advent of the automobile. Suburbs – so named because these areas were situated beyond the main urban core and lacked employment opportunities and urban facilities, such as high-level services – dominated the physical growth of cities throughout most of the 20th century.

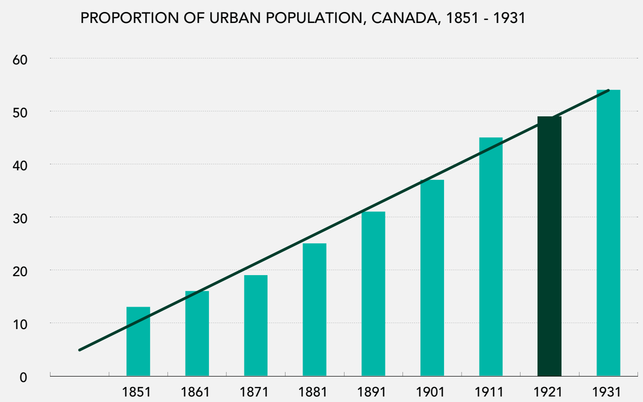
> Rapid urban land expansion had a major impact on streets and inter-road networks. Changes in **urban growth patterns** were accompanied by changes in **street patterns**.

The Industrial Revolution saw rapid population growth accompanied by high urbanization levels in Europe, North America and Oceania.[20] At the start of the 19th century, North America's population was estimated to be 7 million, more than twice its level in 1700 (2 million). During the same period, the population of Europe increased from 125 million to 203 million (1.6 times).[21] This rapid population growth was sustained throughout the 19th century with the Industrial Revolution and the introduction of compulsory vaccination and improvements in medicine and sanitation. It was during the 19th century that the population of North America experienced rapid growth, reaching 82 million at the beginning of the 20th century, which is more than 10 times its level at the beginning of the 19th century. Industrialization also created more job opportunities in urban centres than in rural areas, resulting in increased rural-to-urban migration.

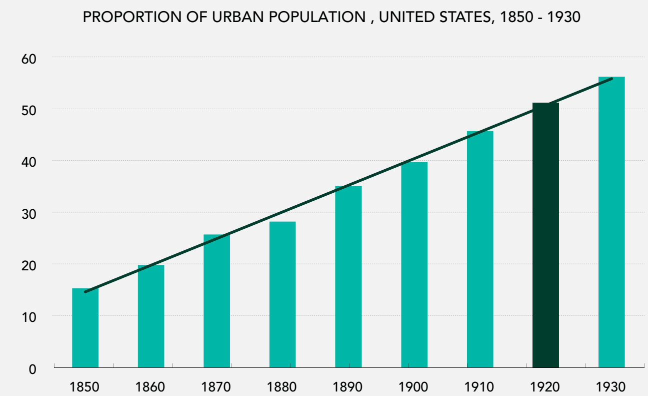
With high natural growth rates and increased rural-urban migration flows, urban growth rates were noticeable. Until the mid-19th century, both the United States and Canada were mainly rural, with less than 20 per cent of their respective populations living in urban areas (15 per cent and 13 per cent in 1850, respectively). Rapid population growth also led to higher urbanization levels, which more than doubled at the start of the 19th century (40 per cent and 37 per cent, respectively).[22] This rapid urban growth was particularly noticeable in large cities, such as New York and Los Angeles. For instance, the population of Manhattan, estimated to be 61,000 in 1800, reached 1.9 million in 1900. Twenty years later, both Canada and the United States became urbanized, with half of their respective populations living in urban centres. In the mid-19th century, a large majority of their populations (6 out of 10 inhabitants) were urban residents. At the start of the 21st century, 8 out of 10 inhabitants in North America lived in urban areas, a situation that has remained constant in the last decade. Australia and New Zealand also experienced similar urbanization processes, but at a more rapid pace. In 1950, three-quarters of their respective populations were already living in urban areas, which is more than the urbanization levels observed in North America during the same period. In 2010, 9 out of 10 people in both countries lived in urban areas.

Similar trends have been observed in Europe, with some variants between Western and Northern Europe and Southern and Eastern Europe. As observed in North America, Western and Northern Europe experienced rapid urban growth due to a combined effect of increased natural growth rate and rapid urbanization during the 19th century. However, prior to industrialization, the European population experienced population decline due to diseases, particularly in the 8th century. During the European agricultural and industrial revolutions, however, the life expectancy of children increased significantly and Europe's population increased from about 100 million in 1700 to more than 400 million in 1900. The natural growth rate remained high in all European countries, but was more pronounced in urban centres where there was better access to health services. In addition to high natural growth rates, rural-to-urban migration contributed to rapid urbanization, with large cities attracting more people. By the mid-19th century, Europe became an urbanized continent with 51.3 per cent of its population living in urban areas out of a total population of 547 million. However, it is important to note that urbanization rates in Western Europe and Northern Europe were much higher than those in Southern and Eastern Europe. In 1950, only 45 per cent and 39 per cent of the populations of Southern and Eastern Europe lived in urban areas, respectively. By the 1970s, however, both regions had become predominantly urban.

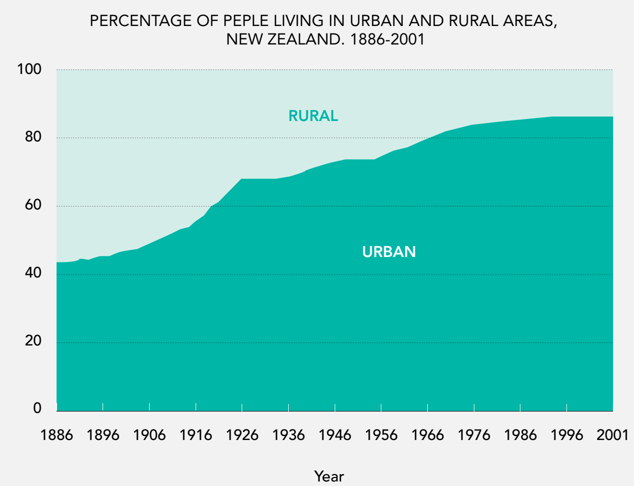
FIGURE 1.1 **POPULATION GROWTH AND URBANIZATION IN EUROPE, NORTH AMERICA AND OCEANIA, 19TH-21ST CENTURY**



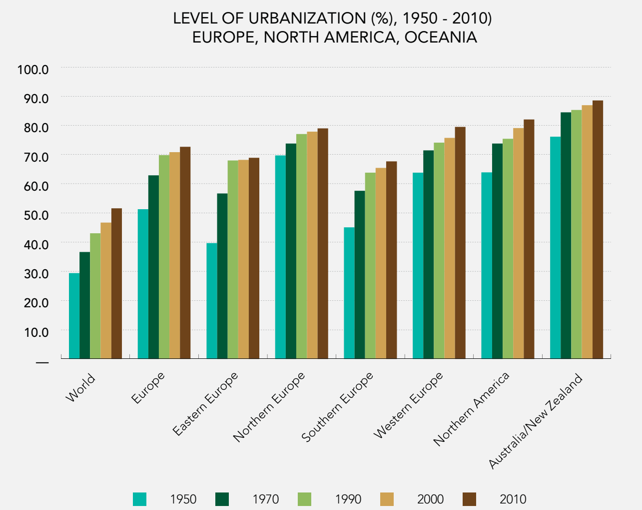
Source: *http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo62a-eng.htm Access in 2013*



Source: *Urban, Rural, and Farm Population, and Large Cities, in Campbell Gibson, American Demographic History Chartbook: 1790 to 2010, www.demographicchartbook.com Access in 2013*



Source: *http://www.stats.govt.nz/browse_for_stats/people_and_communities/geographic-areas/urban-rural-profile/historical-context.aspx Access in 2013*



Source: *United Nations Department of Economics and Social Affairs, Population Division (2012) World Urbanization Prospects, The 2011 Revision, United Nations New York*

Rapidly increasing urbanization levels from the 19th to the 21st centuries have been accompanied by spectacular growth in city size. While most cities in the pre-industrial age had less than 100,000 inhabitants, the population of cities in the 20th and 21st centuries began reaching the one million mark, and by the end of the 20th century some cities were hosting tens of millions of inhabitants. Some cities have been classified as megacities with 10 million or more of inhabitants. In 1810, Manhattan, the heart of New York City, had a population of less than of 100,000; the urban agglomeration of New York-New Jersey today hosts more than 20 million people. Cities planned in the 19th century, such as Athens, held less than 100,000 inhabitants but today have populations exceeding 3 million. At the start of the 19th century, none of the European cities hosted 1 million or more inhabitants. The city with the largest population was London (861,000), followed by Paris (547,000). The population of Amsterdam was estimated to be 209,000. Moscow's population was 146,000 and Saint Petersburg's was 164,000. It was only 20 years later that London's population reached the 1 million mark (1.3 million in 1825), followed by Paris 25 years later (1.3 million in 1850). Throughout the 19th and the 20th centuries, both cities grew spectacularly and entered the 21st century as mega cities. In 2010, the Population of Paris and London was estimated at 10.5 million and 8.9 million, respectively.

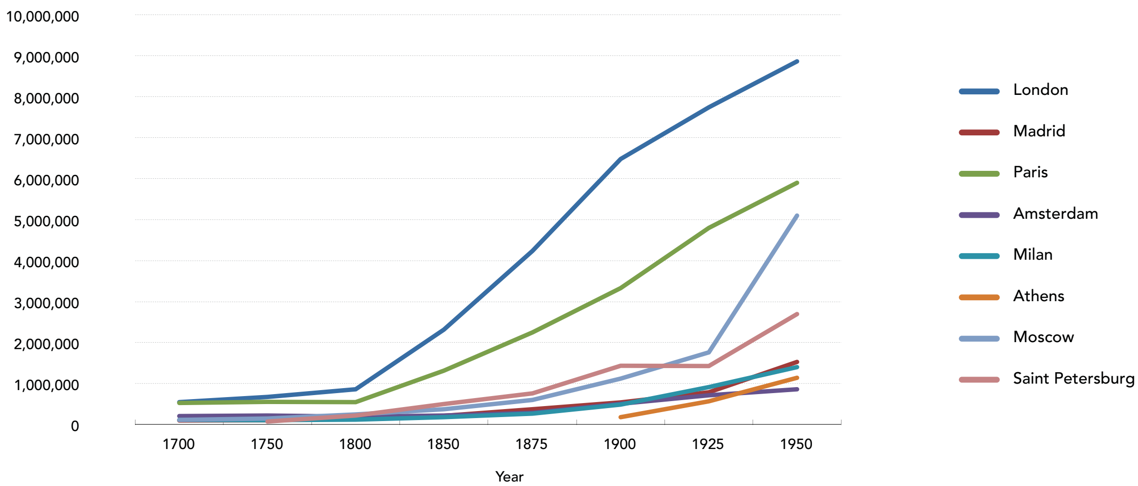
During the period of rapid urban growth in the 19th and 20th centuries, urban population growth in Europe and North America mostly occurred on the edges of cities. This was followed by rapid urban land expansion that led to a horizontal spreading of settlements with high fragmentation or dispersion of houses and other buildings.[23] This expansion occurred in different ways across regions and produced different forms of cities. In the early 1900s, in most cities urban expansion occurred just at the edge of cities. However, with the development of the automobile, the expansion extended beyond the edges of cities and generated the formation of new satellite cities.[24] In the United States, this form of urban expansion, known as urban sprawl, led to the uncontrolled expansion of low-density, single-use suburban development, with spacious houses, schools and shopping malls creating self-contained neighbourhoods that serviced high- or middle-income groups.[25]

In Europe, urban land expansion was also accompanied by urban population growth, but to a lesser extent compared to the North American urban sprawl model. In most European cities, urban land expansion was associated with the fact that the centre of the city was also the most expensive, and unaffordable to poor urban dwellers who had to move to the outskirts of the cities, a trend that was similar to American urban expansion during the pre-industrial era. Unlike urban sprawl in the United States, sprawl in Europe created suburbs primarily inhabited by lower-income groups, many of which constituted immigrants.

However, the face of urban expansion has recently changed in Europe in the last few decades with a continuous decrease of urban population density.[26] Most Canadian cities have also undergone a transition towards an increasingly decentralized urban form, particularly observed during the period 1971-96. These trends, however, are quite diverse, pointing to fundamental differences in the respective importance of growth in central and outer parts of metropolitan areas[27]. In Australia and New Zealand the same trend of urban land expansion accompanied by low density settlements has been observed in Auckland, Melbourne and Sidney.

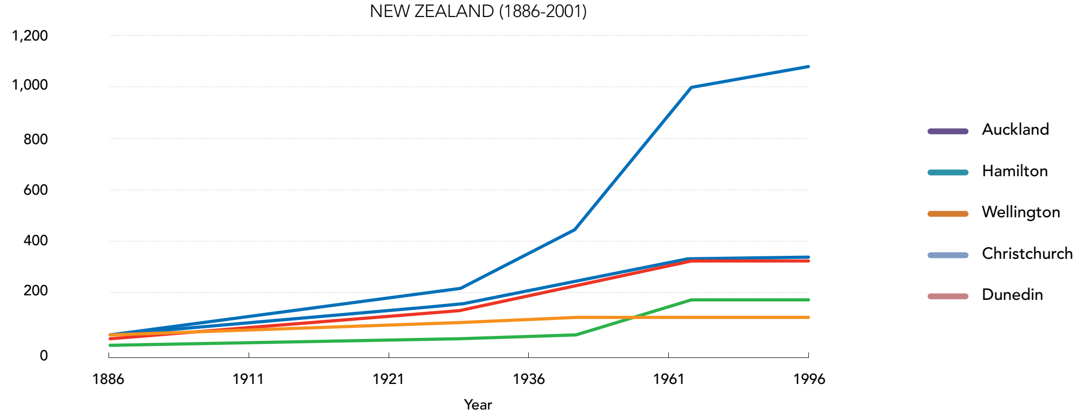
FIGURE 1.2 CITY POPULATION TRENDS IN SELECTED CITIES 1800 -2010

CITIES' POPULATION SIZE, 1700 - 1950, EUROPE



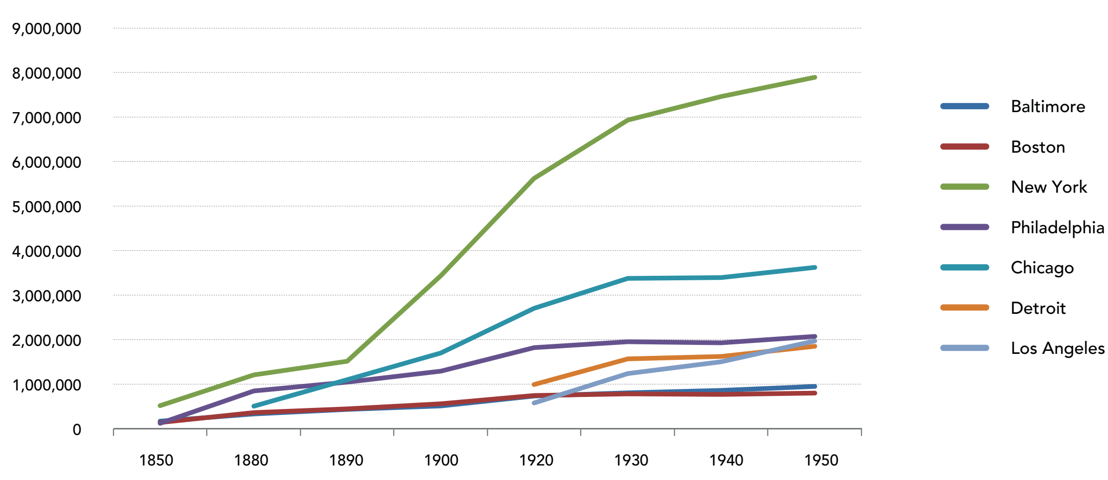
Source: *http://en.wikipedia.org/wiki/List_of_largest_European_cities_in_history* ***Access in 2013***

POPUALATION SIZE OF AUCKLAND AND OTHER CITIES OF NEW ZEALAND (1886-2001)



Source: *New Zealand 1886–2001 Censuses of Population and Dwellings*

LARGEST CITIES IN THE UNITED STATES, 1850 - 1950



Source: *http://en.wikipedia.org/wiki/Largest_cities_in_the_United_States_by_population_by_decade* ***Access in 2013***

From monocentric and grid to polycentric and hierarchical street planning

Urban expansion led to de-concentration and reduced population densities. Increased use of the automobile and the streetcar allowed people to commute to their places of work. Whereas the wealthy in the 19th century might have preferred to live in the city centre, as the poor were forced to walk from the outskirts, the modern well-to-do are less constrained by transport times and, therefore, occupy land in less-dense suburban and exurban cities[28]/[29]. This has resulted in new forms of urbanization,, such as mega-regions, urban corridors and city-regions. Thus the monocentric form of cities has been progressively substituted by polycentric forms with various centres of interest.

In some cases, urban expansion has created suburban areas that substitute the functions of the inner core of the city by offering a full range of services that traditionally belonged to compact cities[30], thereby creating polycentric cities, as observed in the American urban sprawl model. While urban density is lower in these new settlements than in the main city core, there are now many city centres with different poles of interests.[31] Rapid urban land expansion had a major impact on streets and inter-road networks. Changes in urban growth patterns were accompanied by changes in street patterns.

The transition from monocentric cities to polycentric cities is also associated with changes in street patterns from the grid system to other types of street patterns, particularly hierarchical systems. Hierarchical street plans (those that assign different levels of importance and functions to different streets) became more prevalent as cities became more polycentric. The changes in the occupation of space were accompanied by changes in urban form and structure. Grid pattern city planning gave way to hierarchical planning.

The shift to hierarchical street patterns in most cities of the developed world has been associated with the more prominent role of the automobile in the 20th century that allowed people to easily commute longer distances. Though the emergence of the automobile during the 1920s had a positive impact on mobility, it also had negative consequences, among them an increase in the rate of car accidents, particularly among small children. It has been reported that, at the early stages of the automobile's entry into major cities, the fatality rate from accidents doubled. [32]

MAP 1.1: **EXAMPLE OF PLANNED SETTLEMENT WITH CUL DE SAC**

Source: *Image © 2013 Google*

The increase in deaths associated with road accidents called for a revision of the street network system that discouraged traffic to residential areas. This called for a distinction between residential streets and other types of streets. A systematic shift in planning of cities favoured the hierarchical system.[33] In cities where population growth was associated with high urban land expansion, the street design of new settlements was through a hierarchical system of streets.

The changes in the occupation of space were accompanied by changes in urban form and structure. **Grid pattern city planning** gave way to **hierarchical planning**.

In the United States, official guidelines were revised to reflect this hierarchical system that made a clear distinction between **residential streets** (those with no or less through traffic), **arterial streets** (those that provide direct, relatively high speed service for longer trips and large traffic volumes) and collector streets (those that link cities to arterials, as well as collect traffic from local roads).[34/35]

During the same period, the Great Depression that began in 1929 forced the US government to change its housing policy. The functions of city planning and design were increasingly taken away from the public sector and allocated to the private sector. The Federal Housing Administration (FHA), created in 1934, would only finance houses in suburbs that met approved standards in a guide called *Standards for the Insurance of Mortgages on Properties Located in Undeveloped Subdivisions,* which did not give consideration to connectivity.[36] The only consideration was the topology of the areas and respect for a hierarchical system of streets. It discouraged designs that would facilitate through traffic and gave preference to cul-de-sacs. Indeed, the curvilinear street system accommodated the market for housing created by the monetary and regulatory influence of the FHA and the reduction in government controlled master planning. The design reduced through traffic, thus providing the privacy sought by families leaving the cities, and cul-de-sacs were seen by both the government and the public as the safest environment for raising children[37].

However, while this hierarchical street network may have reduced the number of accidents, it has increased traffic congestion. For instance ,the American Society of Civil Engineers (ASCE) found that street networks that are based on the cul-de-sac design increase travel demand on arterial streets by 75 per cent and on collector streets by 80 per cent, compared to a 43 per cent lower vehicle miles travelled (VMT) with a grid street design.[38] The ASCE study also found that the connected network, in the contrast to the cul-de-sac, reduced travel times and speeds, factors that impact street safety.

AFRICA, ASIA, LATIN AMERICA AND THE CARIBBEAN

In Africa, Asia and Latin American and the Caribbean, streets have also played a determining role in the cultural, social, economic and political functions of cities. This has been observed since the ancient era, in the Indus Valley civilization that dates back to 2600 BC, to the city of Babylon, the Egyptian city of Giza, to China and to the Americas in the city of Teotihuacan, near present-day Mexico City.

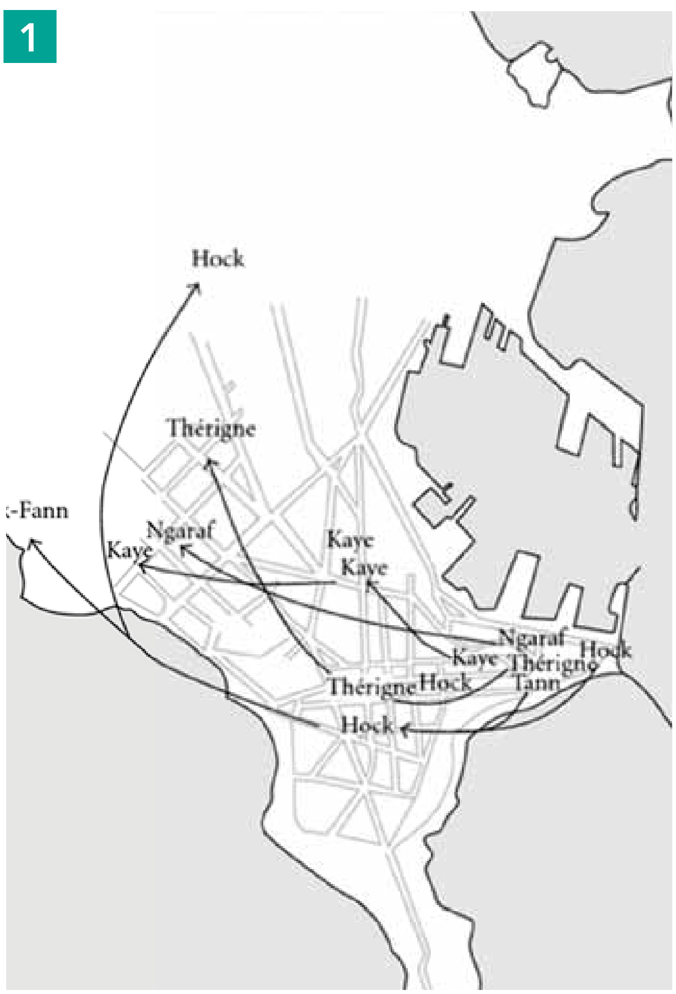
In the 7th century, the Japanese and Korean societies adopted Chinese grid-planning principles in numerous settlements. However, except some part of Tokyo, the street network surrounding the Edo Castle grounds was irregular for reasons of defense. Although the grid system was predominant in most ancient cities, it was not systematically adopted in all cities. For instance, in Constantinople (present-day Istanbul), it was not easy to classify street patterns despite various studies having been undertaken. Indeed this Byzantine settlement adopted different street patterns. Similarly, the historic city of Cairo, built between the 7th and 10th century after the Arab conquest, adopted an organic pattern of streets with a large number of dead-end streets.[39] The city of Addis Ababa, founded in 1886, also did not adopt any particular type of street system; it was literally a city without regular street patterns. Only with the final decision to halt the movement of the imperial court connecting bridges and streets were laid-out in an organic manner along the undulating terrain. With the further growth of the city the dots of the first camps were connected and a network of streets was formed. One of Emperor Menelik's contributions that is still visible today is the planting of numerous eucalyptus trees along the city's streets.

As noted in the first section of this chapter, though the grid was an idea present in ancient city planning, it slowly gained primacy from the 5th century BC with the planning of many Greek cities. The planning of European cities in the 18th and 19th centuries, which was highly influenced by the Roman grid pattern, was also extended to Africa, Asia and the Americas during the colonization period.

Cities in colonial Africa adopted the grid system, despite resistance from indigenous populations. For instance, before the advent of French colonialists, Dakar in Senegal constituted villages organized around mosques in a circular pattern around an open central space, reflecting the influence of Islam on local spatial organization.[40] However, the arrival of French troops in the 19th century changed the face of Dakar. In 1857, the French took control of the Senegal coast, and Dakar was established as an urban district. By 1891, Dakar already had 18,000 inhabitants. The great construction works at the Dakar harbour and public buildings were completed during the 1898-1914 period, and Dakar became the capital of the French Western Africa federation.[41] During the same period, the French imposed a city plan on Dakar that reflected the city plan of Paris, with large boulevards and avenues. Reflecting the military-led development of the city, these boulevards were designed perpendicular to a military fort in order to ease colonial troops' access throughout Dakar. [42] Similarly, the walls around the old historic city of Mogadishu in Somalia were pulled down in 1920 when the Italian rulers embarked on a programme to make the city the political and administrative capital of Italian Somaliland, with wide boulevards, modern government buildings and scenic waterfronts.[43]

In response to resistance from the indigenous inhabitants, the French rulers adopted a dual assimilationist/associationist approach in Dakar that allowed indigenous residents to organize their settlements at the edge of the city.[44] They decided to create districts that were exclusively for Europeans and others that were for the local Africans. Expelled from the centre, the indigenous people were left to their own devices in overcrowded areas where streets were irregular and unserved, with no adequate sewerage and drainage systems. This marked the beginning of the segregation of distribution of basic services through urban planning in Dakar and other West African cities.[45] Construction with temporary building materials was authorized in the indigenous settlements, but "the inhabitant only obtained a property title when built out of permanent materials".[46] Rather quickly, in the 1950s, the authorities were overwhelmed by the arrival of new migrants, and many shantytowns appeared on the non-developed urban fringes. It was at that time that a new policy of massive exodus of the "illegals" toward the periphery began. [47] This kind of urban divide was also a hallmark of British colonialism in Africa, when in the early part of the 20th century cities such as Nairobi and Harare were planned along racial lines, with the local Africans being relegated to the least serviced parts of the city, while the Europeans laid claim on the planned parts of the city that enjoyed superior services and better infrastructure.

MAP 1.2: **DUAL STREET PLANNING IN DAKAR**



Map 1: The displacement of the lebu residential quarters from the city centre of colonial dakar by the 1910s. ***Source:*** *Bigon,2012*
Map 2: Dakar's French Influenced Boulevards. ***Source:*** *Image © 2013 DigitalGlobe*

BOX 1.5: WALLED CITIES – CAIRO, ALEXANDRIA, DAMASCUS, TRIPOLI

CAIRO; ORGANIC STREET PATTERN

Sources: *https://sahcommunities.groupsite.com/post/tahrir-square-from-colonialism-to-post-postcolonialism-khaled-adham*

ALEXANDRIA; GRID STREET PATTERN

Sources: *jewishencyclopedia.com*

A number of restrictions governed the city's spatial expansions of Cairo through time. The northern part is less connected although there are two main gates on that wall. On the eastern part, the walled city is completely segregated due to the existing of Al Azhar park and a huge cemetery (in literature it is called the 'dead city'), in addition to Al Mouqatum Hill which forced the city to expand mainly toward the river Nile. El Muiz Street is the main accessible street inside historic Cairo and it connects the walled city directly through the northern gates and by a number of horizontal routes with the surrounding urban patterns. At the difference of Cairo, during the period 1805 – 1849, the city of Alexandria gained its current European Grid-iron pattern. The type of urban fabric inside the walled city is an orthogonal pattern at the opposite of Cairo with its organic pattern.

Description	Cairo	Damascus	Alexandria	Tripoli (Lebanon)
Date of Foundation	• 640 AD (Al Fustat City) • 750 AD (Al Askar) • 870 AD (Al Qata'i) • 969 AD (Fatimid Cairo)	• Origin dated back prior to 1200 BC, Aramean nomads • In 64 BC became major cities in Roman Empire, the city gained its walls and iron-grid spatial configuration	• Origin dated back to the Pharaonic era • 332-331 BC (Foundation) • 1805 – 1849 AD the city gained its current European Grid-iron pattern	• Origin dated back to early Christian times • 1289 Mamluk Sultan Al-Mansur Qalawun abandoning the old city known as Al-Mina and built a new city, which is the origin of the present town.
Type of urban fabric inside walled city	Organic pattern-high number of dead-end streets	Based on a grid-iron old configuration. Current pattern is partially organic pattern	Orthogonal pattern	The old fabric is Organic pattern
Level of integration with surrounding context	Highly integrated with the western side of the historic Cairo	Highly integrated with the western side of the historic Damascus	Less integrated with the south part of the formal wall's path	Old Tripoli is highly integrated with the western side of the city

Source: *Mohareb, and Kronenburgarab, 2012*

BOX 1.6: MOGADISHU: THE RISE AND FALL OF A HISTORIC CITY

Source: *Puzo, 1972*

An aerial view of Mogadishu, capital of Somalia in 1993.
Source: *Sharma, 2011*

Mogadishu has a long history that dates back to the 10th century when Arab and Persian traders began settling there. The city has at different stages of its history been a sultanate, a city-state, an important sea trade hub, the capital of a colonial administration and of an independent nation-state. Historical records indicate that the city was a traditional centre for Islam; Mogadishu's mosques are known to be among the oldest in sub-Saharan Africa. When the Moroccan traveller Ibn Batuta visited Mogadishu in 1331, he described it as "an exceedingly large city" where rich merchants sold the finest cloth, silver and gold, and where camels were traded and slaughtered.

Like many historical coastal East African cities, Mogadishu's architecture and street planning reflected what is known as the "Swahili culture" of East Africa that has strong Arab and Persian influences mixed with local African traditions. Close-knit stone and coral multi-storeyed houses facing the sea were built along narrow lanes. These so-called "stone towns" were carefully designed to allow extended families of several generations to occupy several floors of the same building while retaining some level of privacy. The narrow streets were mainly meant for pedestrian traffic. Later, in the 18th and 19 centuries, Mogadishu's architecture was influenced by its Omani rulers, who later sold the city to Italy in 1905.

The Italians pulled down the wall around the historic city in 1920 and expanded it to build a modern city, complete with boulevards, majestic arches and cathedrals. In 1929, the first masterplan for Mogadishu was developed to establish it as the political and administrative capital of Italian Somaliland. The city remained the seat of government when Somalia attained independence in 1960.

In the last two decades, however, Mogadishu has been the site of much death and destruction brought about by the civil war that started in 1991. Unfortunately, the grandeur and beauty of Mogadishu was lost during the 20 years of civil war and anarchy that reduced many of the important landmarks of the city to bullet-ridden ruins. However, with the establishment of a new government in 2012, it is hoped that Mogadishu – once known as the "White Pearl of the Indian Ocean" – will regain some of its former glory.

Sources: *Warah, Dirios and Osman, 2012*

Urbanization, peripherization of urban growth and expansion

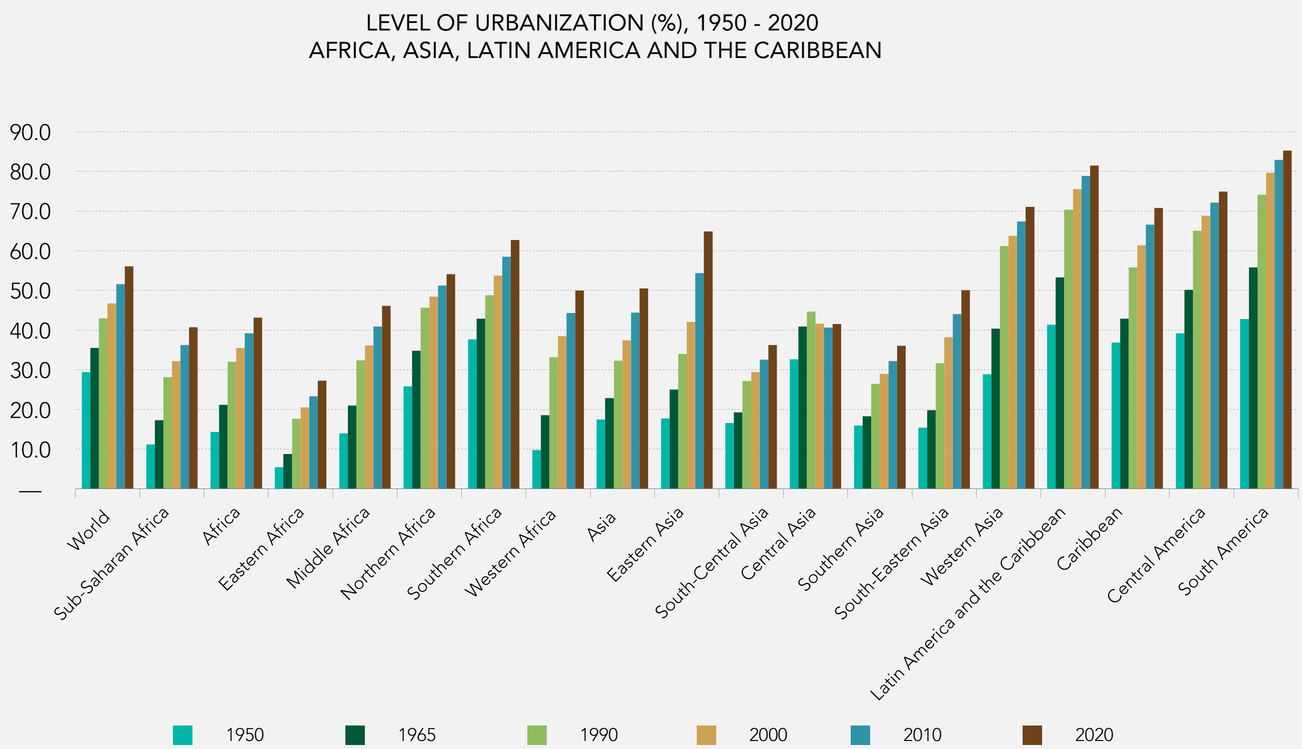
Independence in African, Asian and Latin America and the Caribbean countries led to massive rural-to-urban migration as migrant workers sought jobs in capital cities. In the early 1950s, the city authorities of Dakar in Senegal were overwhelmed by the arrival of new migrants, and many shantytowns appeared on the non-developed urban fringes.

Suburbs – so named because these areas were situated beyond the main urban core and lacked employment opportunities and urban facilities, such as high-level services – dominated the physical growth of cities in these regions throughout most of the 20th century and continues into the 21st century. The monocentric form of street design and planning that characterized many cities in the colonial era started to change in the 20th century and accelerated with the independence of countries from the 1950s onwards. Street designs became more irregular following the peripherization of urban growth, which saw poor families move to the outskirts to areas that lacked basic services. The proliferation of urban settlements that lacked improved water, adequate sanitation, durable housing and sufficient living area contributed to slum growth.[48]

While the large majority of the people in Latin American and the Caribbean already live in urban areas (79 per cent in 2010), in Asia and Africa only 44 per cent and 39 per cent live in urban areas, respectively. However, with rapid urban growth, it is projected that the majority of Asian and African populations will reside in cities and towns by 2020 and 2035, respectively.

It is important to note differentials in urbanization within the same region. For instance, while in Southern Africa and Northern Africa the majority of the population has already been living in urban areas for the last 20 years and 8 years, respectively, in Western Africa and Eastern Africa, with urbanization levels of 45 per cent and 24 per cent in 2010, respectively, the majority of the population will live in urban areas in 2020 and 2050, respectively. Pronounced variations have also been observed in the Asian region where the majority of the population in Western Asia has lived in urban areas since 1980 while in Eastern and South-Eastern Asia this happened only in 2013, while in South-Central Asia, with an urbanization level of 32 per cent in 2010, it is projected that the majority its population will live in urban areas by 2040.[49]

FIGURE 1.3 **URBANIZATION IN AFRICA, ASIA AND LATIN AMERICA AND THE CARIBBEAN, 1950 - 2010**

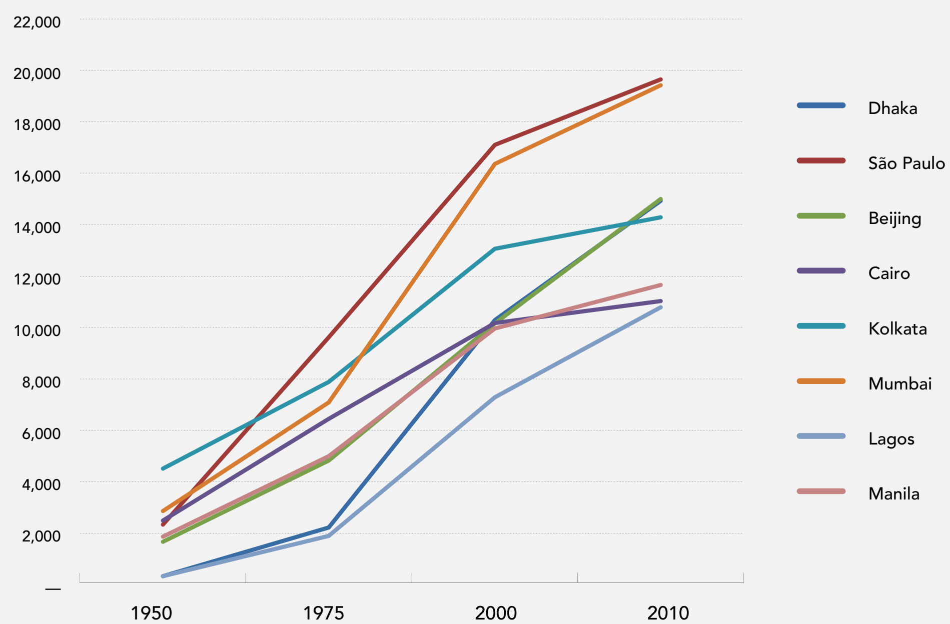


***Source:** United Nations Department of Economics and Social Affairs, Population Division (2012) World Urbanization Prospects, The 2011 Revision, United Nations New York*

Rapidly increasing urbanization levels from the 20th to the 21st century have been accompanied by spectacular growth in city size. While most cities analyzed here had less than 100,000 inhabitants in the 20th century, their populations in the 21st centuries began reaching the one million mark, and by the end of the 20th century some cities were megacities with more than 10 million inhabitants. Similar trends have been observed in cities which were planned in the 20th century. With a population of 36,000 in 1950, Brasilia today has a population of 3.7 million. During the same period, the populations of Chandigarh, Abuja and Dakar increased from 40,000 to 1 million, 19,000 to 2 million, and 200,000 to 2.9 million, respectively.[50]

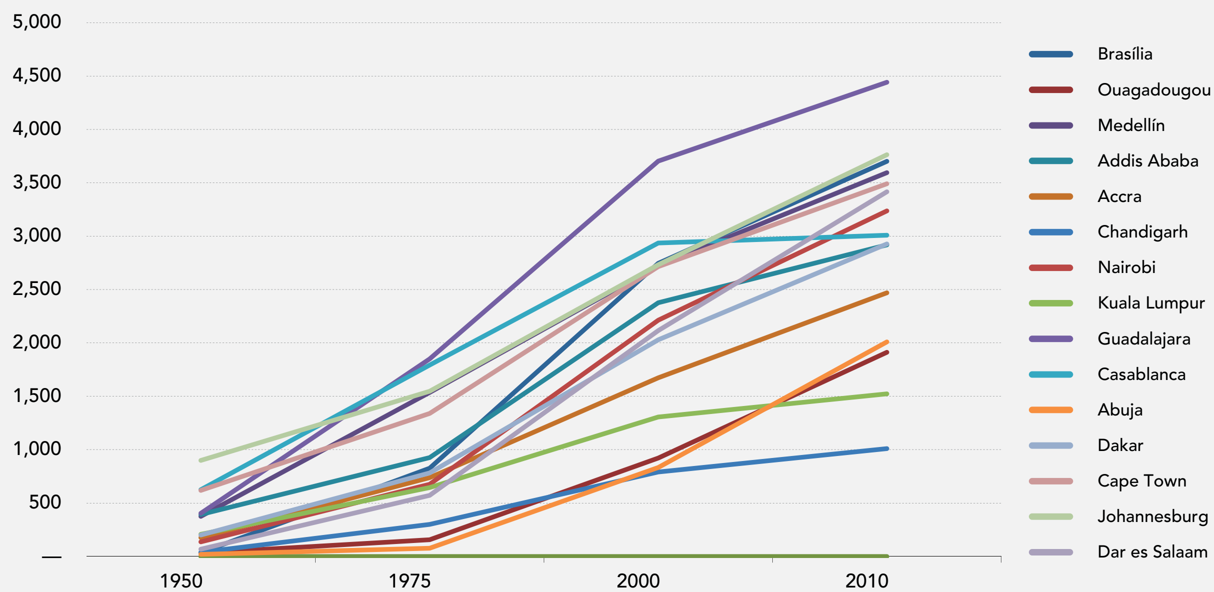
FIGURE 1.4 CITY POPULATION TRENDS AND DENSITY IN SELECTED CITIES 1950-2010

CITIES WITH A POPULATION SIZE MORE THAN 10 MILLION IN 2010, AFRICA, ASIA, LATIN AMERICA AND THE CARIBBEAN, 1950 - 2010



Source: *United Nations Department of Economics and Social Affairs, Population Division (2012) World Urbanization Prospects, The 2011 Revision, United Nations New York*

CITIES WITH A POPULATION SIZE OF LESS THAN LESS THAN 5 MILLION IN 2010, AFRICA, ASIA, LATIN AMERICA AND THE CARIBBEAN, 1950 - 2010



Source: *United Nations Department of Economics and Social Affairs, Population Division (2012) World Urbanization Prospects, The 2011 Revision, United Nations New York*

Peripherization of urban growth - proliferation of irregular, narrow streets

In many cities of the developing world, , urban expansion has taken the form of "peripherization" that is characterized by large peri-urban areas with informal or illegal patterns of land use, combined with a lack of infrastructure, public facilities and basic services, and often accompanied by a lack of both public transport and adequate access roads. Here, urban expansion is the consequence of poverty, not affluence, as informal unplanned settlements on the periphery spring up in response to a lack of affordable housing options within the city itself. In these cases, urban expansion results from a lack of policy attention to current urban challenges (slums, land, services, transport, etc.), and more particularly, an inability to anticipate urban growth, including through provision of land for the urban poor. Denial of permanent land rights to the urban poor is one of the main factors behind the "peripherization" associated with urban expansion in developing countries.[51]

Peripherization of urban growth is synonymous with slum growth in most cities in Africa, Asia and Latin America and the Caribbean. Slums are characterized by the absence of basic services, such as improved drinking water and adequate sanitation, along with insecure tenure, non-durable housing and overcrowding. One out of every three people living in cities of the developing world lives in a slum. UN-Habitat estimates indicate that (in 2012) slum prevalence – or the proportion of people living in slum conditions in urban areas – was highest in sub-Saharan Africa (62 per cent). In Asia, slum prevalence varies from a high of 35 per cent in Southern Asia to a low of 25 per cent in Western Asia, compared to 24 per cent in Latin America and the Caribbean. The lowest slum prevalence is observed in North Africa, with a level of 13 per cent.

The streets in the suburban areas of cities in the developing world often resemble slum areas, with irregular street patterns with multiple unplanned dead-end roads. These dead-ends are not the result of city planning but the result of the addition of plots by land owners who subdivide land in search of profits. In this situation, it is common to find a street ending where a subdivision starts. The result is a high frequency of dead-ends that are quite different from the planned street dead-ends (cul-de-sacs) observed in cities of the developed world in that they are not planned and continue to sprawl. In developing regions, street planning has taken on a hybrid or irregular nature, resulting in haphazard urban development.

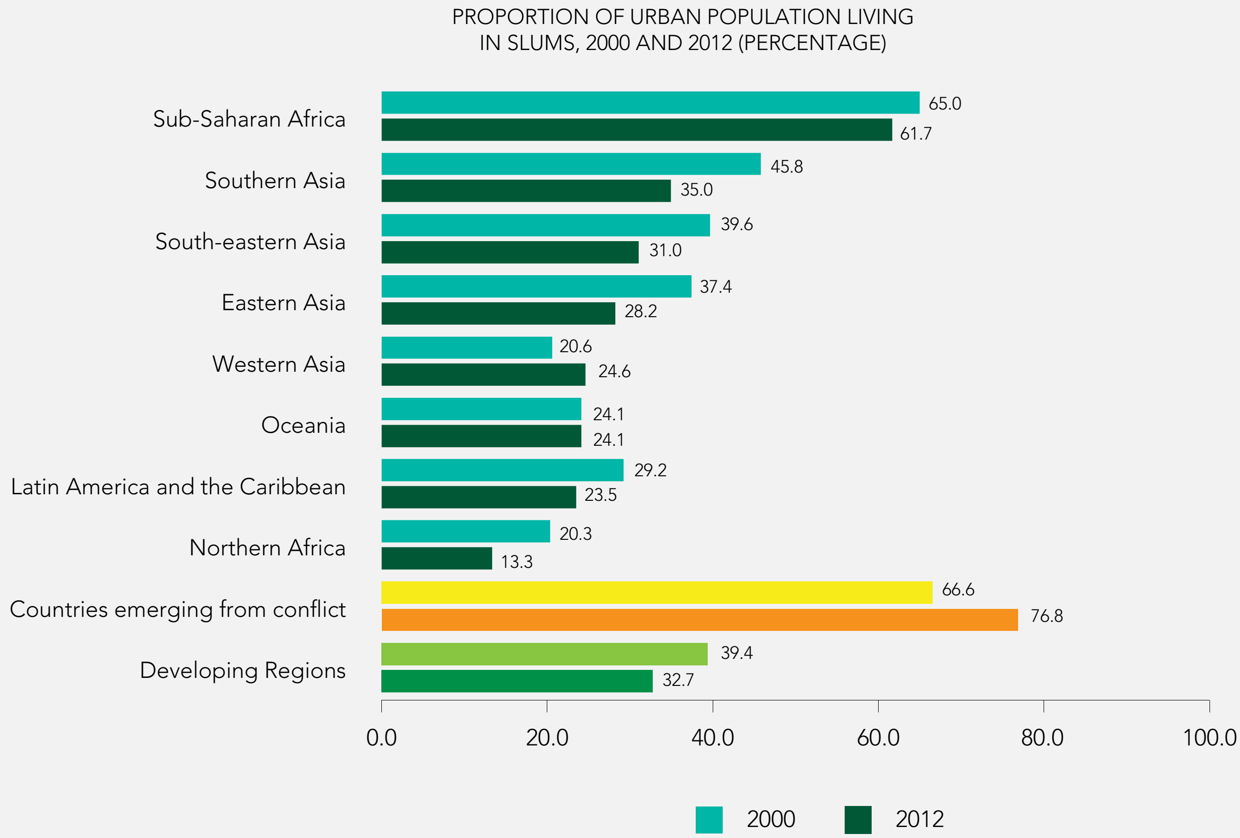
Many cities in developing regions are also adopting hierarchical streets in planned parts of the city, following a trend that has been emerging in the developed world since the second half of the 20th century.

Urbanization in the 19th and 20th centuries was thus not only accompanied by rapid urban expansion and increased use of the automobile, but also changes in the design and use of streets and the ways cities were planned. In the next chapter, we examine how street design and planning can contribute to the prosperity of cities.

MAP 1.3: **PROLIFERATION OF IRREGULAR, NARROW STREETS AND UNPLANNED DEAD ENDS**

Bangui, Central African Republic.
Source: *Image © 2013 DigitalGlobe*

FIGURE 1.5 **PROPORTION OF URBAN POPULATION LIVING IN SLUM AREAS, 2000 - 2012**



Note: *Countries emerging from conflicts included in the aggregate figures are; Angola, Cambodia, Central Africa Republic, Chad, Democratic Republic of the Congo, Guinea-Bissau, Iraq, Lao People's Democratic Republic, Lebanon, Mozambique, Sierra Leone, Somalia and Sudan*

Source: *Source: UN-Habitat, 2013. Global Urban Indicators Database 2013*

THE HIERARCHICAL STREET SYSTEM IN THE PLANNING OF MODERN CITIES

In 1960, Brasilia was celebrated as the realization of an urban planning vision based on designs by Lucio Costa and Oscar Niemeyer. Brasilia became the capital of Brazil in 1956, and became a landmark in the history of town planning. It was designed such that "from the layout of the residential and administrative districts (often compared to the shape of a bird in flight) to the symmetry of the buildings themselves – should be in harmony with the city's overall design". The city planning of Brasilia reflects elements of Le Corbusier's urban planning: monumentality, order, form over function and a fundamental reorganization of society from capitalist to collectivist.[52]

At the same time, the city of Chandigarh, the new capital of the state of Punjab in India, was being designed according to plans by Le Corbusier. In both Chandigarh and Brasilia, foreign architecture entered into a harmonious relationship with indigenous culture, forming new and independent identities. The street planning of Chandigarh, however, did not take into consideration the informality of the markets and squatter settlements. It also segregated settlements according to castes and economic classes.

The Nigerian capital Abuja's planning is marked by the predominance of avenues and boulevards characterized by wide streets.

Sources: *Hall, 1970*

Abuja road, Nigeria Metropolitan city road in Nigeria. **© http://autoportal.co.ke/gallery/spectacular-roads-of-the-world#sthash.X5w7l0CH.dpuf**

BOX 1.7: MODERN CITY PLANNING OF BRASILIA

Source: *http://theconsciousaim.com*

Brasilia, the capital city of Brazil and a Unesco World Heritage site is a modernist city created ex nihilo on an empty plateau in the centre of Brazil in 1956, and is currently the largest city in the world that did not exist at the beginning of the 20th century. Built as a way to escape the country's colonial history, and focusing on the future of Brazil, the plan for the city was based on the 20th-century principles of urbanism characteristic of Le Corbusier's design. The intention of its creators was to make every element, from the layout of the residential and administrative districts to the symmetry of the buildings themselves, to be in harmony with the city's overall design. The shape of the city is often compared to the shape of a bird in flight. The wings of the bird are Asa Norte and Asa Sul, designed to accommodate the residents of Brasilia and the "head of the bird" is the administrative centre of Brazil. The planning of the city, which was intended to shape the image of the entire country, was implicitly guided by the definition of an urban ideal based on the separation of functions, the incorporation of vast natural spaces, and a street plan whose wide traffic lanes broke with the tradition of narrower streets.

Unlike many ancient cities which formed over thousands of years and had the street as a key public space, Brasilia was designed with an urban ideal based on the separation of functions, the incorporation of vast natural spaces, and a street plan whose wide traffic lanes broke from the tradition of narrower streets. The city is interspersed by high speed highways with few traffic lights, the main one being Eixão, which cuts the city from North to South. Vehicles are not allowed to stop along the highway. Parallel to Eixão are two Eixinhos (small axis), which facilitate the access to loops and eventually to local streets. The Monumental axis cuts the city from East to West and also has a few traffic lights.

The modernistic city has received as much applause as criticism. Whereas its viewed by some as a marvel in modern architecture, others view it as a city without the appropriate ingredients which make up a city, and one that does not depict the complexity of a normal city. On the street layout in the city, there is almost general agreement that Brasilia was designed for motorized transport, as opposed to pedestrians. Some analysts identify it as a city with messy streets and one that is difficult for pedestrians. This as evidenced by the high speed highways that traverse it, a general lack of traffic lights, and few sidewalks in the centre. Other analysts identify the city as a place where the street and street life do not exist, yet they are important attributes for any operational city.

Sources: *Holston, 1989; Epstein, 1973; Snyder 1964; Sauer-Thompson, 2008; The Conscious Aim, 2013; About Brasilia, 2013; Sanchez-Cuenca, 2013; Sanchez-Cuenca, 2013; Holanda, and Medeiros, 2012*

'Plano Piloto' (Pilot Plan) of Brasilia, at 'Espaço Lucio Costa'.
© Kalipso, 2006/ www.skyscrapercity.com

BOX 1.8: MODERN CITY PLANNING OF CHANDIGARH

Chandigarh, India. ***Source:*** *Image © 2013 DigitalGlobe*

Chandigarh, the capital of East Punjab and Haryana States was conceived in 1947 and was the first pre-planned city in independent India. Like Brasilia, Chandigarh was designed based on the basic principles of modernism. The city's master plan is a result of two planning regimes, initially by the American team led by Albert Mayer and later by a team of architects led by Le Corbusier. Mayer's team evolved a fan shaped plan with super blocks which would act as self-sufficient neighborhood units placed along curvilinear roads. When Le Corbusier took over the project in 1951, he adopted most of Mayer's concepts, but modified the overall plan from the fan shape with a curvilinear road network to a rectangular shape with a grid iron pattern for fast traffic roads.

Corbusier's primary design element was a sector, which was to be a self-sufficient neighborhood unit of 800 x 1200 meters surrounded by streets of varying hierarchy. He called his hierarchical street design Les Sept Voies de Circulation - or the Seven Vs, with each V representing street level in the plan. The Vs were developed with the car as the planning unit, and all were harmoniously integrated into a network.

The first layer, V1, was comprised of the arterial/major roads with the fastest traffic flow coming in and out of the city. V2s represented major boulevards with fast traffic flow and were the main roads in the city. V3s were fast speed roads defining sectors and V4s were slower traffic streets running east to west through the middle of sectors where shops were located and V5 represented slow traffic neighbourhood streets, which formed the main loop within each sector. V6s were the access lanes leading to houses and V7s the pedestrian paths and cycle tracks blocked by walk-through gates and turnstiles to every other form of traffic. Corbusier's plan also had a blind wall separating the sector from the V3, in such a way to prevent any door from opening to the street. Buses would be allowed to ply on the V4s, but not within the sector interiors. All shops were to be located along the V4 and extend from one neighbourhood to the next. So as to maintain a uniform skyline, heights and the architectural character of the city, Architectural controls which would be applicable to different parts of the city were developed.

The City Centre, located in sector 17 was designed on a monumental scale of uniform four-storied concrete buildings, and lay at the intersection of two main axial Roads, Madhya Marg and Jan Marg. It was also laid out along four pedestrian promenades intersecting at a nodal point, where all civic buildings were located. While comparing this sector to Brasilia's central sector, Holanda & Medeiros (2012) identify that Chandigarh's central sector offers a vital public space for large numbers of people, is a hub of activity and has a surprisingly urbane atmosphere for a modern city, making it more successful than that of Brasilia.

Le Corbusier's plan was amended in the later phases of the city growth. The original low densities (17persons/acre) were increased (up to 60persons/acre) through the introduction of multi storied developments and reduction in plot sizes. The concept of "market places" and highrise commercial establishments were also introduced in place of the original shop-cum-flat pattern. Even then, Holanda & Medeiros (2012) identify that the city still exhibits a very low average density and in road segments surrounded by housing, the proportion between width and height of the street space is 60/70m x 7m (a ratio between width and height of about 10 to 1). As the city has grown however, so has a unique hierarchy of segregation between the rich and the poor, with some areas being better served than others.

Sources: *Tungare, 2001); Hall, 1996; Chandigarh Administration, 2013; Lecoufle, 2011; Vikram, 2011; Hels, 2013; The man and the machine, 2012; The Indian Backpacker, 2013; Nangia, 2013; Holanda & Medeiros, 2012; Krishan, 2010; Smith, 2010; The Boston Globe, 2013.*

ENDNOTES

1 http://en.wikipedia.org/wiki/Grid_plan; http://www.visitislamabad.net/islamabad/files/map-home.asp

2 http://library.thinkquest.org/C006203/cgi-bin/stories.cgi?article=town_planning&section=history/indus&frame=story

3 http://en.wikipedia.org/wiki/Grid_plan

4 Burns, 2005; Higgins, 2009.

5 Stanislawski, 1946; Higgins, 2009.

6 http://en.wikipedia.org/wiki/Grid_plan; Stanislawski, 1946; Burns, 2005; Higgins, 2009; Belozerskaya and Lapatin, 2004; Laurence, 2007; Gelernter, 2001.

7 See also Moudon, 1986.

8 Lehigh Valley Planning Commission, 2011; Svensson, 2004.

9 Kallivretakis, (undated).

10 Mora, (undated).

11 The urban planner best known for the transformation of Paris was Georges-Eugène Haussmann. City planners imposed regulatory laws establishing standards for housing, sanitation, water supply, sewage, and public health conditions, and introduced parks and playgrounds into congested city neighbourhoods. In the 20th century, zoning—the regulation of building activity according to use and location—came to be a key tool for city planners.

12 Benjamin, 1986; Philippe, 1989; Traugott, 1993.

13 "Amsterdamse Grachten" (in Dutch). Municipality Amsterdam. Archived from the original on 20 March 2008. http://www.mydestination.com/amsterdam/usefulinfo/6175482/amsterdam-architecture

14 The plan was by prepared by Johan Albrecht Ehrenström (1762-1847); City of Helsinki, 2012.

15 http://en.wikipedia.org/wiki/Grid_plan#cite_note-15

16 http://www.swarthmore.edu

17 Jackson, 1985; ExplorePaHistory.com

18 Jaffe, 2011; BAllon, 2012; http://www.manhattan.pro/manhattan_history/

19 Jaffe, 2011

20 18th and 19th century urban population data for Europe, North America and Oceania based on national sources.

21 Caselli et al, 2005.

22 For United States population estimates see: U.S. Census Bureau, decennial census publications, and Gibson, C. (1998), 'Population of the 100 Largest Cities and Other Urban Places in the United States: 1790 to 1990.', U.S. Bureau of the Census Population Division Working Paper No. 56., U.S. Bureau of the Census , Washington DC ; For Canada population estimates see Statistics Canada (http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo62a-eng.htm)

23 Angel et al, 2010.

24 Glaeser and Kahn, 2003

25 Greca et al, 2009

26 European Environment Agency, 2006.

27 Bunting et al, 2002.

28 Bryan et al, 2007

29 Moudon, 1986. Public Streets for Public Use. Colombia University Press, New York, USA.

30 Renaud et al, 2011.

31 Sprawl, expressed in the monocentric density model established by Colin Clark (1951), is a simple spatial model that relates urban population density to distance from the centre of the city. Two hypotheses are the basis of this model: (i) in all cities, excluding a business and commercial area, there are densely populated areas, which decrease when moving away from the centre, and (ii) in most of the cities, as time passes the density decreases in the central areas and increases in the suburbs, thus producing a territorial expansion of the city. The model proposed by Clark (1951) expresses the urban population density as negative function of the distance from the city centre as follow: $D=Doe^{-\boxtimes x}$, D represents the population density at distance x from the centre of a city; D0 is the density at the centre; e is the base of natural logarithms; ⊠ is the distance gradient, or the rate at which density falls from the centre. Following Clark, various models of urban density have been used in studies about traffic planning (for example Tanner (1961) and Smeed (1963)) , and some others in theoretical models on housing market (Muth, 1969). Tanner (1961) and Smeed (1963) proposed two new functional forms in their studies on city traffic. Their contributions are based on two special cases of the gamma quadratic function. The standard urban model of Alonso (1964), Muth (1969) and Mills (1972) considers urban densities that fall in absolute values as income rise, the city grows, and transport costs fall.

32 UNECE, 2007.

33 Mumford, 1961; A prominent 20th century urbanist, Lewis Mumford, severely criticized some of the grid's characteristics: "With a T-square and a triangle, finally, the municipal engineer could, without the slightest training as either an architect or a sociologist, 'plan' a metropolis, with its standard lots, its standard blocks, its standard street widths, in short, with its standardized comparable, and replaceable parts. The new gridiron plans were spectacular in their inefficiency and waste. By usually failing to discriminate sufficiently between main arteries and residential streets, the first were not made wide enough while the second were usually too wide for purely neighborhood functions . . . as for its contribution to the permanent social functions of the city, the anonymous gridiron plan proved empty."

34 Lehigh Valley Planning Commission, 2011.

35 The expression of nomenclature of streets may change from country to the country but the content will remain.

36 Lehigh Valley Planning Commission, 2011

37 Lehigh Valley Planning Commission, 2011

38 Lehigh Valley Planning Commission, 2011; Taylor 2001.

39 Mohareb and Kronenburgarab, 2012.

40 Harris, 2011

41 Antoine, P. and Mboup, G., 1992

42 Harris, 2011

43 Warah et al, 2012.

[44] Harris, 2011; Pinon, 1996

[45] Harris, 2011. The implementation of an orthogonal plan in Dakar was not a new practice, but a typical urban planning approach in other French colonial settlements in Africa and elsewhere in the eighteenth and nineteenth centuries.

[46] Sanou, 1990 quoted by Antoine and Mboup, 1992.

[47] Antoine and Mboup, 1992; Sanou, 1990.

[48] Slums, according to UN-Habitat, are composed of households that lack i of improved water, adequate sanitation, durable housing and sufficient living area

[49] Caution is in order here as urbanization rates and trends in different regions are, of course, largely affected by the formal definition of what constitutes a "city" or "urban area" in every country, which in turn seriously affects comparability across regions and countries. What constitutes an urban area differs from one country to another. For example, in Uganda, a settlement with a population of more than 2,000 is classified as urban, whereas in Nigeria and Mauritius the benchmark is 10 times higher; in China, those settlements with more than 3,000 residents are considered "urban", while only those with 60,000 or more are "cities". Urban areas are also typically defined by the administrative and legislative functions they serve, further complicating the designation of urban settlements.

[50] Figures of 2010 are from UNDESA, 2012.

[51] UN-Habitat, 2010.

[52] Hall, 1970.

2 PROSPEROUS STREETS: CONCEPTS, METHODS AND MEASUREMENTS

Shibuya Crossing is famous place for scramble crossing in Tokyo, Japan. All vehicles stop when pedestrians cross intersection in every direction. **© Shutterstock**

Streets embody the most basic element of a city's spatial structure. From ancient times, the street has played an indispensable role in cities by creating space for mobility, communication, commerce and social interaction.

RECLAIMING STREETS AS PUBLIC SPACES

"The desire to go 'through' a place must be balanced with the desire to go 'to' a place."[1]

Today, people are reclaiming their streets as public spaces. The desire to have livable or complete streets is present in many corners of the world. However, for streets to be livable or complete they must first be recognized as public spaces. As noted by the Project for Public Spaces (PPS), the first rule is to "think of streets as public spaces".[2] Once streets are recognized as public spaces, they can be planned and designed to serve communities and continue to ease mobility to enhance economic productivity as well as social engagement.

In recent years streets have been recognized as an integral factor in the achievement of sustainable urban development. Various notions of streets have been proposed, such as "livable" streets, "complete" streets, "streets for all", "quality" streets; "friendly" streets, and "healthy" streets.[3] In terms of variables, these notions embrace more or less similar concepts that touch on people's well-being and that make cities more prosperous.

The "livable streets" movement emphasizes streets as the fabric of social and urban life. Safety, security, social interactions are among the key components of livable streets.[4] Gehl's early work in Copenhagen suggested the need to promote non-motorized means of mobility in order to create livable streets. Based on Gehl's findings, in 1962, Copenhagen made a shift towards increased use of bicycles as an alternative to cars.[5] During the same period, there was also another advocate of livable streets in the United States, the writer and urbanist Jane Jacobs (1961).[6]

The notion of inclusiveness encompassed in "complete streets" is present in various projects around the world that advocate the planning and design of streets that take into consideration the needs of all users (ages, gender, economic status, modal means, etc.)[7]. When functioning well, mobility is easy, comfortable, and safe.[8] The concept of an inclusive system of streets was the aim of the ARTISTS (Arterial Streets towards Sustainability) project in European Union countries. The project aimed to transform or re-design arterial streets in order to accommodate pedestrians and cyclists, among other users.[9]/[10]

The **"complete streets" movement** has taken root in many countries around the world, particularly in developed countries. The movement has succeeded to influence policies in the transport sector. For instance in the United States, over 300 jurisdictions have adopted complete streets policies or have committed to do so.[11] Among the key issues addressed in the Toronto Complete Street project (2012) are traffic, safety and health.

The **"livable streets"** movement emphasizes streets as the **fabric of social** and **urban life**. Safety, security, social interactions are among the key components of livable streets.

All these initiatives and projects call for better street connectivity that puts people first. They recognize that livable or complete streets lay the groundwork for a healthy community. They advocate for the provision of amenities like seating, play areas, good sidewalks and trees – all these make all people, particularly children, women and the elderly feel safe and comfortable.

The extent to which any street is livable or complete can be measured by its street life, social contacts between neighbours and public health indicators.[12]/[13]There are various projects promoting livable or complete streets around the globe, but more in cities of the developed world, where there is a growing livable or complete streets movement. [14] From Melbourne to London, Bogota and Cape Town, the movement is promoting street life where the notion of streets as public spaces is prominent.

In reclaiming streets as public places, some differences, however, emerge in the implementation phases where some projects focus on one element of streets, such as quality of life, while others focus on the economic or environmental aspect, all of which are required for a city to become prosperous.

STREETS DRIVERS OF URBAN PROSPERITY

City prosperity implies success, wealth, thriving conditions, and wellbeing, as well as opportunity. In any urban setting, a key question will arise: What are the essential conditions and elements that are required for a city to thrive, or for an urban area to be described as prosperous, or for the wellbeing of the population?

The **City Prosperity Index** developed by UN-Habitat in 2012 takes into consideration the following five key components of city prosperity[15]: **infrastructure development; environmental sustainability; productivity; quality of life; and equity and social inclusion.** Those cities that foster infrastructure development, environmental sustainability and high productivity, enhance quality of life, and promote equity and social inclusion are considered prosperous.[16]

For a city to be prosperous, it must have prosperous streets. Using the same notion of prosperity, UN-Habitat presents a holistic approach to streets as public spaces that embraces the notion of livability and completeness as well. A prosperous street must promote infrastructure development, enhance environmental sustainability, support high productivity, and promote quality of life, equity and social inclusion. All this is possible in an environment where streets receive their just recognition for their multi-functionality as public spaces.

One fundamental feature of prosperous streets is their connectivity in terms of planning as well as design. With regard to planning, sufficient land should be allocated to streets and the street network should be sufficiently long to cover all areas. There must be sufficient intersections available to facilitate shorter distances and reduce travel times. Prosperous streets as public spaces also encourage walking and social interactions.

BOX 2.1: LIVEABLE MELBOURNE

Cars not welcome: A $25.6m proposal (seen in this artist's impression) unveiled by the Melbourne City Council proposes dedicated bike and tram lanes, but no room for cars and taxis. **© HWT Image Library**

The Australian city of Melbourne (population 3.9 million in 2010) is a prime example of a city that has made liveability a top priority. In the 1990s, the city embarked on an ambitious programme to improve its public spaces and attract people downtown, which was regarded no more than "a daytime destination for commuting office workers who could not get home quickly enough." In response, the city expanded and improved sidewalks on the main commercial streets, turned some side streets into permanent or part-time (e.g. lunch hour only) pedestrian zones and added new public plazas. Over ten years, public spaces for pedestrians grew by 71 per cent.

Hundreds of new trees, major public art works and elegant and accessible newsstands, drinking fountains, information pillars and public toilets improved the aesthetic appeal of downtown. The result was a huge upsurge in street life. In ten years, pedestrian volume on the main street jumped by 50 per cent and surpassed that of London's busiest commercial street, Regent Street. The number of outdoor cafés nearly quadrupled. In 2004, *The Economist ranked* Melbourne first among the world's most liveable cities.

Sources: *Lusher, L., Seaman, M. and Tsay, S. (2008) Streets to Live By: How livable street design can bring economic, health and quality-of-life benefits to New York City.*

Prosperous streets contribute to infrastructure development

Infrastructure development is among the five dimensions of the City Prosperity Index. The Mercer Quality of Living Survey (2012) also recently included city infrastructure, public transport, and level of congestion as among the determinants of livable cities. In the Mercer ranking, the majority of cities in Europe and Canada that have a high score of livability also perform well in the infrastructure measure. Advanced city infrastructure with increased stability and rising living standards are among the key determinants of livability.[17]

To be prosperous, a street must be well-connected. As also noted in Smart Growth America, "Complete streets are connected streets"[18]. *Connectivity* includes prioritizing streets as the basic element of mobility and accessibility accompanied by the progressive provision of services (e.g. water and sanitation). It refers to the density of connections in the street network and the directness of links. A well-connected street network has many short links, numerous intersections, and few cul-de-sacs.[19] As connectivity increases, travel distances decrease and route options and travel modes increase (e.g. more use of non-motorized and public transport), allowing more direct travel between destinations, thereby creating a more accessible and resilient system.[20]

A prosperous city expands multimodal transport systems with sidewalks and bicycle paths, ensures eco-efficiency of infrastructural systems, and supports density through integrated infrastructure development, thereby enhancing efficiency and access. In addition to accommodating all kinds of users (pedestrians, cyclists, motorists), prosperous streets promote connections to services that contribute to good health and productivity, such as clean water, sewerage facilities, drainage systems, power supply, and information and communication technologies. Streets that provide space only to motorists are characterized by congestion and high CO_2 emissions.

BOX 2.2: CONCEPTUAL FRAMEWORK OF THE CITY PROSPERITY INDEX (INDEX) AND THE WHEEL OF URBAN PROSPERITY

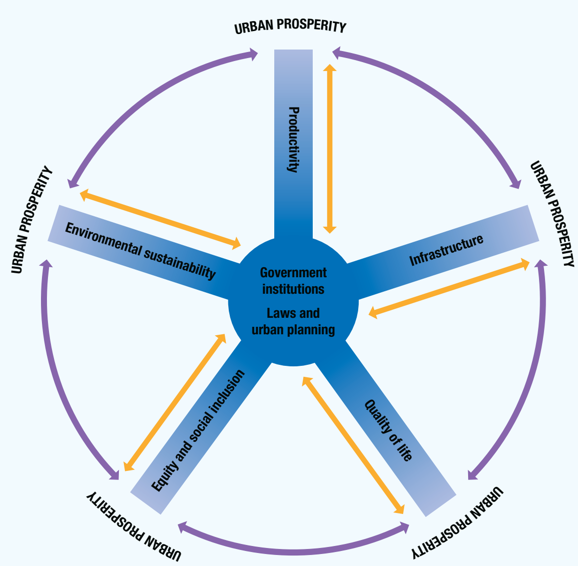
Hub of the Wheel of Urban Prosperity: Government Institutions, Laws and Urban Planning

One element of urban planning that determines the urban form is the street planning. It influences the five components of prosperity expressed as the spokes of the urban wheel, such as Infrastructure development; Environmental sustainability; Productivity; Quality of life; and Equity and social inclusion.

Spokes of the Wheel of Urban Prosperity

Infrastructure development	Provides adequate infrastructure— water, sanitation, roads, information and communication technology in order to improve urban living and enhance productivity, mobility and connectivity.
Environmental sustainability	Values the protection of the urban environment and natural assets while ensuring growth, and seeking ways to use energy more efficiently, minimize pressure on surrounding land and natural resources, minimize environmental losses by generating creative solutions to enhance the quality of the environment.
Productivity	Contributes to economic growth and development, generates income, provides decent jobs and equal opportunities for all by implementing effective economic policies and reforms
Quality of life	Enhances the use of public spaces in order to increase community cohesion, civic identity, and guarantees the safety and security of lives and property
Equity and social inclusion	Ensures the equitable distribution and redistribution of the benefits of a prosperous city, reduces poverty and the incidence of slums, protects the rights of minority and vulnerable groups, enhances gender equality, and ensures civic participation in the social, political and cultural spheres

STREETS AS PUBLIC SPACES AND DRIVERS OF URBAN PROSPERITY



Prosperous streets facilitate access to basic services

Besides easing mobility, streets provide pathways for pipes, power lines and drainage systems, among other amenities. Evidence from most cities across the world show that areas of the city endowed with adequate streets are also areas with laid down pipes for water supply, drainage and sewerage networks, as well as power lines and information and communication technologies (such as fibre optic cables) etc. When the amount of space allocated to streets is insufficient, provision of basic services is significantly hindered. In slum areas where there are few or no streets, provision of basic services is hampered as there is no network in place that allows for the provision of water, sanitation and electricity, among other services.

One main physical characteristic of slum areas or informal settlements in cities of the developing world is lack of streets.[21] The high-income areas of most cities in developing countries enjoy water supply, storm drainage, sanitation/waste collection and power supply partially because of advanced and accessible road infrastructure, as opposed to the rest of the city where streets are inadequate. Areas not well or adequately served by streets suffer from crumbling and/or over-stretched basic services characterized by regular water shortages, leakages, burst water pipes, leaking sewers, power outages, and uncollected refuse. Indeed, the absence of streets hinders accessibility and infrastructure provision in slum areas of a city.

UN-Habitat's Monitoring of Urban Inequities Programme (MUIP) indicated that the main characteristics of slum areas in developing countries are lack of improved water, adequate sanitation and drainage facilities. In such slum areas, floods are common due to lack of drainage systems. Moreover, lack of streets makes it difficult to provide urban basic services to slum areas. Existence of a street network is a pre-condition for slum upgrading. Cities that want to improve the quality of life in slums must bear this in mind when planning slum upgrading programmes.[22]

Prosperous streets accommodate both motorized and non-motorized modes of transport

The street plays a pivotal role in setting up of urban infrastructure development. The planning and design of streets as public spaces not only has a direct effect on transport modes, but it also has an impact on provision of basic services. The street provides the connectivity pattern for the city, which is fundamental for effective urban mobility. Amongst any city's most prized assets, the street network ranks high as it facilitates the movement of people, goods and services. Street networks and mobility patterns further facilitate access to jobs, commerce, health services and school facilities in the city. Good street connectivity not only reduces traffic congestion, commuting time, motor vehicle commuters, but also reduces fares, fuel consumption, traffic fatalities, and greenhouse gas emissions in cities.

However, poor maintenance of the road infrastructure characterizes most streets in the developing world. In addition, the street networks in these cities have barely kept pace with urban growth. Also, infrastructure for non-motorized transport (e.g. pavements or sidewalks for walking and bicycle lanes for cycling) is often lacking, poorly developed, on the decline or does not appear to rank high among city planners' priorities. This has led to high incidences of traffic fatalities involving pedestrians and cyclists.[23] Better urban infrastructure, more and safer bicycle routes throughout the city, more pedestrian-friendly streets, and well-planned transport systems that provide safe options for getting around the city are needed to curb the rise in traffic deaths.

The dysfunctional nature of road infrastructure in most cities in the developing world poses a major challenge to mobility and prosperity and is an important source of traffic congestion. Congested streets and poor facilities for pedestrians are the most pervasive transport problems affecting cities in the developing world. Evidence shows that traffic congestion is the main form of infrastructure deficiency plaguing cities in these regions, hindering free movement and making travel frustrating and time-consuming, according to local experts. [24]

Prosperous streets safeguard environmental sustainability

Environmental sustainability is another dimension of the City Prosperity Index. Prosperous streets help to safeguard environmental sustainability while contributing to the prosperity of cities. The creation and (re)distribution of the benefits of prosperity should not destroy or degrade the environment. The natural assets of cities should be preserved for the sake of future generations and to promote sustainable development.

By promoting walkability and cycling, prosperous streets contribute to the reduction of air and water pollution and to the preservation of biodiversity.[25] Along with public parks, waterfronts and "green" areas for recreational and productive purposes, prosperous streets help to reduce fragmentation of natural systems and reduce the spatial footprint through the careful design of infrastructure networks and settlements. The impact of pollutants on the ecological state of the city makes it imperative that streets as a "zone of maximum exposure" take centre stage when the study of environmental sustainability towards the achievement of prosperity is examined. Pollution emissions released on the street contribute to the most harmful effects on climate change, ozone depletion, ecological damage, street aesthetics, and human health.

The idea that streets are a "green" public good and are public spaces is one that needs to be examined. Non-motorized forms of transport, pedestrianization, cleaner fuels and reduced traffic congestion are just some of the measures that can limit the damaging effects of motorized transport and traffic congestion. These should be considered when planning streets of the future.

BOX. 2.3: THE STREET-LED CITY-WIDE SLUM UPGRADING APPROACH ADVOCATED BY UN-HABITAT

In a recent publication and study drawn from more than a dozen slum upgrading programmes and projects throughout the world, UN-HABITAT presents an approach called street-led city-wide slum upgrading. There is nothing new about this approach except that it addresses the problems of slums in the world in a simple and straightforward manner that takes the street as the pillar for urban transformation of slums and uses the street and the area-based plan to trigger the physical, juridical, economic and social integration of slums into the city's urban fabric and its urban planning and management regime.

Defining the streets and the street pattern is fundamental for this approach as it helps to rationalize the layout of slum settlements subject to upgrading and consolidation. It generates the spatial structure and urban patterns that are essential to transform slums into neighbourhoods and connect their economies and social processes to the city. It is an incremental development strategy that builds on streets that are prioritized based on their attributes to generate the highest impact in terms of connectivity to the city networks, public space, infrastructure provision, land regularization and security of tenure, and the economic opportunities for businesses and small-scale enterprises. Streets are treated as the primary conduits for social and economic transformation that benefit the city as a whole.

UN-Habitat's strategy to improve the lives of slum dwellers – in response to the MDGs – is ingrained in the opening of streets as the forefront of urban regeneration and as primary pillars for a deep set of informal settlement regularisation strategies and area-based planning processes that are all part and parcel of a city development strategy. Streets are proposed as the starting point of settlement upgrading and the link for integration with the city and its development plan. The strategy can work at scale across all cities, being based on the common denominator of streets. It learns from the evolution of approaches applied so far and goes forward towards defining a strategic approach for urban transformation that takes advantage of streets.

The UN-Habitat approach promotes better planning and urban restructuring of slums and informal

settlements in order to improve mobility, accessibility and provision of basic services. The existing settlement morphology, particularly the street pattern and availability of open spaces, determine the extent to which improvements are possible. UN-Habitat's approach does not advocate ad-hoc infrastructure improvements that take the existing spatial and urban layout configuration of settlements for granted and leaves them intact. The configuration of slums and informal settlements usually reflects a haphazard land occupation. Simply providing basic infrastructure and laying down pipes for water supply, drainage and sewerage networks as well as public lighting without rationalizing the urban spatial structure of these settlements has proven to be costly and counterproductive.

The street-led citywide slum upgrading strategy also suggests the need to shift from piecemeal project-based interventions to a citywide programmatic approach that comprises multiple interventions in multiple slums that will be reconnected to the city's urban fabric and its infrastructure networks. It also advocates a shift from implementing a full fledge upgrading plan towards an incremental and phased approach that takes prioritized streets as part of an area-based plan linked to the citywide urban plan and closely bound to availability of finance. It is argued that this phased and incremental approach suits cities and local governments plagued by financial difficulties. The shift towards street-led slum upgrading reinforces community and residents participation in enumeration, mapping, and data collection for plan making as well as in deciding on the street pattern and which streets to prioritize. It goes without saying that the proposed approach inevitably implies demolitions and relocation of residents living in properties that have to go for making room for streets and infrastructure provision. Therefore, the street-led strategy makes the case for securing land within the settlements – as part of the area-based plan – or in the vicinity of the settlement in order to enable relocation and resettlement that does not jeopardize the social and economic capital of affected residents.

Source: *UN-Habitat, 2012, Street-led city wide slum upgrading*

BOX 2.4: STREET CONNECTIVITY AND EMISSION OF POLLUTANTS

Traffic jam in Beijing's Central Business District, China. **© Hung Chung Chih/ Shutterstock**
Adapted from State of New South Wales through the Office of Environment and Heritage'

Street corridors naturally harbour more toxins as they are the sites of motorized mobility. This increases the complexity of the implementation of technical solutions. Review of literature shows that air toxins are up to 4 times more concentrated at street intersections than along the street. In order to lower street pollution, efforts needs to be made to reduce traffic congestion, to allow for more uniformity in vehicle travel speeds and to thoroughly examine optimal intersection density so as to identify the contribution of street design to this problem. .

A street network pattern can affect the production of pollutants by the amount of car travel that it necessitates and the speed at which cars can travel. The grid plan, with its frequent intersections, may reduce the proportion of trips made by car as they encourage walking and cycling due to the directness of routes that it offers to pedestrians. But it also makes the same routes more direct for cars, which could be an enticement for driving. The potential car trip displacement would result in a reduction of pollutant emissions.

Source: *Kovalenko, Gredasova and Podrezenko, 2013*

BOX 2.5: STREET DESIGN AS A CONCEPTUAL APPROACH TO STREET POLLUTION

Research shows that street design patterns greatly influence level of pm10 air pollution. A street design that promotes a lower rate of pollutants has: 1) Adequate percentage of land allocated to streets that has provision for alternative means of transport; 2) Efficiently designed streets that support traffic movement to reduce congestion; 3) Street design that allows for shorter trip configurations with multiple choices; 4) Mixed land use patterns that allow for shorter travel distances.

The design of streets determines network density and allocation of intersections. Designs with the most optimum intersection densities that allow for "green wave" traffic flow encourage a reduction of stop-and-go traffic. A study carried out by the Victoria Institute of Travel simulated traffic speeds and illustrated that vehicle emissions are most high when there is a high incidence of stop-and-go conditions. Land use patterns in Northern America that favour smaller parcels of land, and increased intersection density are positively associated with the decrease in vehicular travel and emissions.

Studies show that each additional intersection in the street design is associated with a decrease in the level of hydrocarbon emissions by 0.4 per cent, and an increase in mixed land use environments contributed a 22.5 per cent reduction in hydrocarbon emissions. Mixed land use development is described as dense, compact development and reduced distances between workplaces, businesses and housing that lower levels of automobile use and vehicle emissions. The design of the built environment influences the mode of travel, which has a direct effect on the cost burden to the environment.

However when emphasizing the desire for co-location of residential and commercial zones, caution has to be taken to exclude commercial facilities that emit toxic chemicals that produce adverse health impacts.

In Africa studies measuring air pollution emissions on the street indicate that poor roads, fuel quality, vehicle maintenance, and roadway dust are the most common sources of pm10 and pm2.5 emissions. In the cities of Africa, Gaborone in Botswana tops the list amongst the highest pm10 emission emitters with 216 ug/m^3, followed by Dakar in Senegal 145 ug/m^3 and Lagos in Nigeria 122 ug/m^3.

Street use patterns affect human health both directly (through air, water and noise pollution) and indirectly (climate change and bio diversity). Streets are zones of maximum exposure to pollutants because transport's share of major pollutants is a major contributor of the most harmful effects of air pollution. This exposure is mostly localized in streets, along transport corridors and in buildings located on busy streets. Pollutant particles produced on the street are also dispersed into nearby buildings that also have adverse harmful health effects to building occupants. Research suggests that people who spend prolonged periods of time on polluted streets are more likely to suffer health consequences than those who do not. A Multiple Air Toxics Exposure Study done in the South Coast basin of Los Angeles found that estimated reduction of cancer risk from diesel particulate matter along streets decreased approximately by 68 per cent at a distance 150m from the edge of a street.

Source: *http://www.sacog.org/complete- streets/toolkit/files/docs/ Chapman%20&%20Frank_SMARTRAQ%20Integrating%20Travel%20Behavior%20&%20 Urban%20Form.pdf; Frank et al., 2010; World Bank pm10 database; WHO reports; http://www.aqmd.gov/prdas/aqguide/doc/chapter02.pdf*

Prosperous streets promote productivity

Prosperous streets promote economic growth through productivity, generating the income and employment that can elevate the living standards of the whole population. High street connectivity plays a key role in productivity. Prosperous streets have the following economic advantages: they harness the benefits of agglomeration economies; they improve access to productive advantages (knowledge, quality of the environment, etc.); they provide sufficient public space for circulation of goods and people and deploy adequate infrastructure; they encourage polycentric urban development; they allow synergies between centres and sub-centres; and they intensify urban nodes and corridors to maximize the benefits of concentration.

Good street connectivity can increase economic productivity and competitiveness through increased transport system efficiency that reduces traffic congestion and commuting costs. Efficient and fast transport, in turn, can increase labour productivity by reducing commuting times, and increasing worker productivity.

Well-connected streets that promote walking and cycling also improve the overall health of city residents, thereby reducing the health and economic costs of workers who are absent due to illness. Another important benefit is on consumer expenditure, as less is spent on cars and fuel. Non-motorized means of mobility support specific industries, such bicycle shops, tourism, retail activity, construction and real estate development that highlight livability. It can also lead to a drop in the share of the household budget devoted to motorized means of transport, such as cars, which are expensive. [26].

Another benefit accruing from good street connectivity is mixed land use efficiency in a compact environment where multi-modal systems prevail, with various accessibility benefits, agglomeration efficiencies, and resource cost savings.

Cities that have a high productivity index are also cities that have reduced traffic congestion and improved walkability through better street connectivity. Reduction of congestion and creation of walkable streets can be obtained through proper street design. In Vienna, for instance, to relieve traffic congestion, underground pedestrian passage ways have been built at four of the city's busiest intersections. Escalators and stairways lead to attractive, well-lit shops and cafes beneath the street. [27]

It has been well documented that location matters for economic activities. One determining factor of location is street connectivity. Streets facilitate economic activities, such as street vending, retail and wholesale shops, filling stations, as well as a range of services. A well-connected location attracts more businesses and customers. On the other extreme, locations that are difficult to access attract less business. It has been demonstrated that the volume of sales is lower in such areas than in well-connected areas. In addition, in well-connected locations, there are higher volumes of business transactions as the co-locating businesses attract more potential customers and the businesses themselves provide demand for each other's services during more hours of the day. Well-connected streets also increase the value of land around them by attracting amenities, such as shopping malls, schools and hospitals. Houses located in these areas have higher values with higher property taxes and better city services. All this contributes to more economic activities.

Streets also play an important role in direct economic activities, such as street vending. Businesses along streets have higher sales when there are more pedestrians and cyclists using these streets. Consequently, there is a rise in employment, income, property values and tax revenues. Well-connected streets attract both formal and informal businesses.

BOX 2.6: STREET FOOD VENDING IN THAILAND

Street Food Vending on Samsen Road, Bangkok, Thailand **© UN-Habitat**

In Thailand, street vending is very common. There have been many studies of food vending in Thailand since a high percentage of Thais from all walks of life buy street food. By 1998 the ratio of expenditure on food prepared at home had declined to 50% from 76% in 1990. 58.5% of the fixed food vendors and 47.1% of the mobile food vendors had been in the business for more than five years. Most of the fixed vendors operate as a family enterprise operated by wife and husband. 70% of fixed vendors had worked as mobile vendors earlier. The majority of mobile and fixed food vendors earned significantly more than the minimum wage in Thailand. By 2004, food vending in Thailand had advanced to a stage where the vendors had significant capital invested in their businesses to the extent that they could be categorized as small and medium scale enterprises (SMEs). Street vending is not considered an informal enterprise; even the middle classes see it as a career option. Street vendors have been registered since 2000, they pay sanitation fees but are not taxed. Street vending also accounts for a significant portion of the Thailand's GDP.

Source: *ILO, 2006*

BOX 2.7: CONTRIBUTION OF STREET VENDING ON URBAN ECONOMY

In many cities of the developing as well developed world, street vending represents an avenue for entrepreneurship. Streets are the starting point of businesses for immigrants because they are cheaper to operate than established shops. Some of these vendors eventually upgrade to full establishments. A study conducted in selected African cities shows that the share of street vending in total employment varies from 10 per cent in Antananarivo (Madagascar) to 20 per cent in Lome (Togo). Street vending represents an estimated 6 per cent of employment in Hanoi and Ho Chi Minh City (Viet Nam) and Ahmedabad (India). There are about 90,000 street vendors in Dhaka (Bangladesh), 10,000 in Colombo (Sri Lanka); 100,000 in Bangkok (Thailand); 50,000 in Singapore; 47,000 in Kuala Lumpur (Malaysia), 50,000 in Manila (Philippines) and 800,000 in Seoul (South Korea). Street vendors represent 3 per cent of employed people in Buenos Aires (Argentina) and 5 per cent in Lima (Peru). In Caracas (Venezuela), census data showed that street vendors accounted for over 5 per cent of the total economically active population.

Although street vending contributes to economic activities, it engenders negative consequences that cannot be ignored. For instance, it contributes to congestion in sections and reduces the walkability of streets. Pedestrians are forced off the street, and are therefore vulnerable to fatal accidents. While it is desirable for most cities to relocate vendors rather than improve their operating space in the streets, the economic implications of such a move cannot be underestimated and is often met with resistance.

However, in livable streets, negative externalities of street vending can be overcome. It has been noted in the United States that livable streets contribute to a better local economy. Pedestrian zones in city centers have boosted foot traffic by 20 to 40 per cent, land retail sales by 10 to 25 per cent; and property values have increased by nearly one-third after traffic calming measures were installed. Property values on quiet streets are generally up to 10 per cent higher than those on noisy streets. Public recreational and gathering spaces also increase property values. Apartments near public gardens in New York City are 7 per cent higher in value compared to those that do not have a public garden or park near them.

Source: *Alexander Deley, Public Markets, Street Vendors and Downtown (http://www.uwex.edu/ces/cced/downtowns/ltb/documents/DE0210.pdf); Lusher, L., Seaman, M. and Tsay, S., 2008.*

Prosperous streets enhance quality of life

Quality of life, equity and social inclusion are other dimensions of the City Prosperity Index. Quality of life is increasingly associated with an inclusive, well-planned, healthy and supportive environment. Experts in Beira, Algiers, Praia, Luanda and Addis Ababa, among other cities in the developing world, explicitly link improved quality of life to slum upgrading and poverty reduction. One element of slum upgrading is to make streets socially connected.

European cities emphasize sustainable mobility systems, green open spaces and cultural and sports facilities as major factors contributing to a better quality of life. Prosperous streets as public spaces help to enhance the quality of life. They ease the provision of social and health services required for improved living standards. Prosperous streets also promote social inclusion by ensuring high quality public spaces that promote interaction among communities; by improving safety and security; and by promoting green spaces. It is in any city's best interest to promote public goods, such as streets that promote social inclusion, safety and equity.[28]

The ways in which we design and build streets have significant implications for health and quality of life. With the increased use of cars, a sedentary lifestyle is becoming more common among the urban middle and upper classes; this contributes to an increase in obesity, in addition to increasing air pollution and greenhouse gas emissions. Streets that promote walkability and cycling as elements of an active lifestyle contribute to healthy living, as well as reduction in vehicle emissions.[29] Many important quality-of-life benefits also arise when streets promote non-motorized transport.. Increased outdoor activity and reduced air pollution translate into better public health.

A number of recent studies have established a connection between the built environment and public health. Several studies have shown that people are less likely to be overweight if they live in more walkable areas. Other studies have shown that people who live in walkable areas are less likely to drive and thus less likely to contribute to harmful air pollution.[30] Air pollution from traffic is a major contributor to health problems in many cities, with some neighbourhoods suffering from the highest asthma hospitalization rates in the country.[31] These same hazards not only directly endanger the health of people, but they discourage residents from spending time outdoors.

Prosperous streets also influence public health by reducing road traffic injury and fatality rates, cutting noise levels and reducing air pollution. Building streets for cars only is not just short-sighted but exposes other users to a dangerous and unhealthy environment. The number of pedestrians and cyclists that have been injured or killed by cars in cities of the developing world is tragic.

In addition, chronic exposure to high levels of noise has been linked to elevated stress and poorer memory recall in children. 32 Millions of people in cities are affected by noise from transport. Transport noise annoys people, causes stress and illness and may sometimes even have a fatal impact. Increasing noise levels have a negative impact on the urban environment and are reflected in falling land values and loss of productive land uses. As a result, noise is very costly to society. Long-term exposure to noise levels above 75dB seriously hampers hearing and affects human physical and psychological wellbeing.

BOX 2.8: CYCLING, QUALITY OF LIFE AND PRODUCTIVITY IN COPENHAGEN

Cyclists in centre of city in Copenhagen, Denmark. **© Jaroslav Moravcik/ Shutterstock**

Cycling has a number of health and economic benefits, which the city of Copenhagen in Denmark has considered in its efforts to promote cycling in the city. A number of factors are included in the benefits equation, such as transport costs, security, comfort, branding/tourism, transport times and health.

If **50%** of Copenhagen's residents were to cycle by 2015, the health benefit of these extra trips taken alone would be approximately **USD 90 million** and the total health impact would be approximately **USD 80 million**.

When all these factors are added together the net social gain is DKK1.22 per cycled kilometer. For purposes of comparison there is a net social loss of DKK 0.69 per kilometer driven by car. The most important socio-economic impact of cycling lies in the area of health care. Cycling saves cities significant health care costs including saved treatment expenses and increased tax revenues as a result of fewer illnesses. Total health benefits of Copenhagen residents' healthy cycling habits is DKK 5.51 per km, hence annually, it is approximately DKK 2.0 billion. When accident costs are deducted the total health impact of 4.72 DKK per km is worth the equivalent of a total of DKK 1.7 billion.

If 50% of Copenhagen's residents were to cycle by 2015, the health benefit of these extra trips taken alone would be approximately DKK 500 million and the total health impact would be approximately DKK 440 million.

Source: *http://ebw.evergreen.ca/move/feat/copenhagen-a-city-of-cyclists; Copenhagen City of Cyclists Bicycle Account 2010 and 2012 http://subsite.kk.dk/sitecore/content/subsites/cityofcopenhagen/subsitefrontpage/livingincopenhagen/cityandtraffic/cityofcyclists.aspx*

Prosperous streets enhance equity and social inclusion

No city can claim to be prosperous when large segments of the population do not have access to streets. Prosperous streets ease equity and social inclusion in cities. They enhance access to a range of well–located, adequate public infrastructure and amenities (including education, health, recreation, etc.) for all groups, including the poor, the young, women, the old and the disabled. They also facilitate the creation of mixed neighbourhoods with a diversity of jobs and housing options; promote mixed-used land development, ensure involvement of marginalized groups; and improve connectivity between neighbourhoods and access to services.

Streets as public spaces also promote social inclusion by providing the opportunity for communities to interact and discuss various issues of common interest. Studies have shown that community interactions contribute to people's well-being. In many cities of the developed world, such as New York and London, it is not unusual to see immigrants from the same country gathering on specific streets in order to connect to their origins. This creates a sense of belonging. Indeed, residents' ownership of a street is among the suggested methods to assess friendly streets. Social networks of interaction, such as personal relationships between families, workplaces, neighbourhoods, local associations, and a range of informal and formal meeting places, are part of social capital. These networks are community-based infrastructure or institutions that facilitate social interaction and enable collective action i.e. local people coming together in an effort to improve their own standard of living, or demanding their rights, and as a net result, benefitting the wider community.

MEASURES OF STREET CONNECTIVITY AND CITY PROSPERITY

Measures of street connectivity

A variety of measures of street connectivity have been used in various fields, including transport, urban planning, geography, and landscape ecology. In this report, UN-Habitat focuses on key indicators of connectivity that are presented in Box 2.10.

As shown in Box 2.10, there are various indices that have been created to directly or indirectly measure street connectivity in an area. Stephan J. Schmidt and Jan S. Wells (Transit Village Monitoring Research, October 2005) recommend that for a best connectivity measurement, research should be done to construct a composite street connectivity index that includes the usual quantitative measures and other qualitative measures. Although all these indices are relevant to assess connectivity, UN-Habitat has selected only those that are relevant for policies and those for which large sets of data are available. These indices are: land allocated to streets; street density; intersection density; connected node ratio; and link-to-node ratio. These are likely to be highly, positively correlated to each other, and can be expressed through a composite index.

Other elements of street connectivity are the conditions of the sidewalk and the streets (paved or not, obstacles or not). However, as limited information exists for sidewalks and pavements, they will not be included in the index presented in this report but will be analyzed separately where information exists.

BOX 2.9: STREET COMPONENTS AND DEFINITIONS

Indicator	Definition
Street Density	Street density is measured as the total length of linear kilometres of streets per one square kilometer of land.
Intersection Density	Street intersection density is measured as the number of intersections per one square kilometre of land.
Proportion of Land Allocated to Streets	Proportion of land allocated to streets is the total land area covered by streets as a percentage of the total land area.
Connected Node Ratio	The Connected Node Ratio is the number of street intersections divided by the number of intersections plus cul-de-sacs. The maximum value is 1.0. Higher value indicates that there are relatively few cul-de-sacs and, theoretically, a higher level of connectivity. A perfect grid, that implies absence of cul-de-sacs, will be a ratio of 1. A connected node ratio of 0.75 is desirable
Link-to-Node Ratio	Link toNode Ratio is equal to the number of links divided by the number of nodes. Links are defined as street or pathway segments between two nodes. Higher link node ratio implies higher street connectivity. A ratio of 1.4 is the minimum requirement for a walkable community.
Accessibility Index-Pedestrian Route Directness Index	An Accessibility Index is calculated as actual travel distances divided by direct travel distances (Actual Walking Distance / Direct Distance). It's also called Pedestrian Route Directness index (PRD). An index of 1.0 is the best possible rating, indicating that pedestrians can walk directly to a destination. An average value of 1.5 is considered acceptable.
Walking Permeability Distance Index	The Walking Permeability Distance Index (WPDI) is an accessibility index specific to walking trips. It aggregates walkability factors, such as street connectivity, street width, and sidewalk quality.
Alpha Index	The Alpha Index uses the concept of a circuit - a finite, closed path starting and ending at a single node. The Alpha Index is the ratio of the number of actual circuits to the maximum number of circuits.
Gamma Index	The Gamma Index is the ratio of the number of links in the network to the maximum possible number of links between nodes. Values for the Gamma Index range from 0 to 1. The higher the value of the Gamma Index, the more well connected is the street network.
% of Obstacle-free sidewalks	Obstacle-free sidewalks make streets more accessible to pedestrians.
% Paved sidewalks	Paved sidewalks Promote cycling and walking.

Reference: *Compiled by UN-Habitat in 2012 from various sources*

Composite Street Connectivity Index (CSCI)

Having data on the proportion of land allocated to streets is not sufficient to assess the connectivity of a street. A city (or neighbourhood) can have wide streets in a very limited street network and low intersection density, which does not always imply high connectivity. For example, a lengthy network and dense intersections on very narrow streets do not also promote high connectivity. A combination of the three variables is therefore required to capture the degree of connectivity of a street network. That is what a *Composite Street Connectivity Index (CSCI)* does.

CSCI is computed using the following three street indicators: i) proportion of land allocated to streets; ii) street density; and iii) intersection density. The closer the CSCI is to 1, the more connected is the street network of a city. On the contrary, the closer the CSCI is to 0, the less connected is the street network of a city.

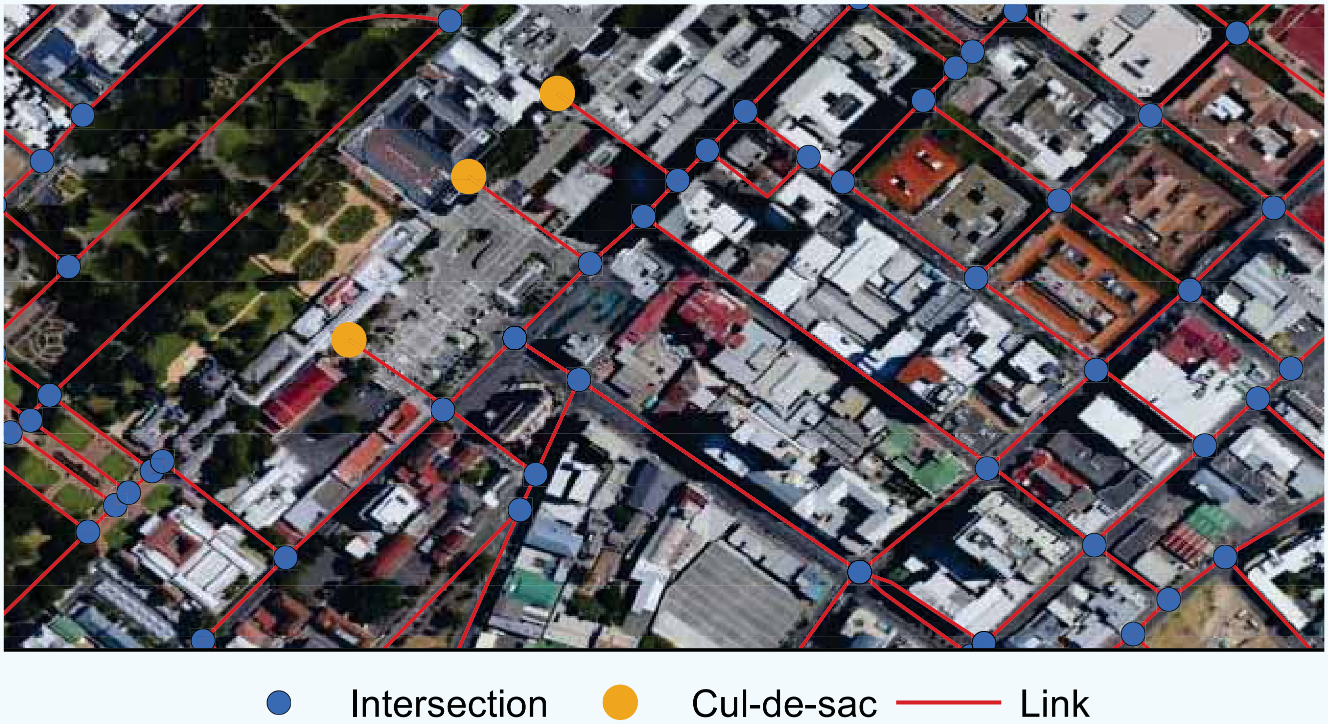
City Prosperity Index

As an initial step, UN-Habitat proposes that **street connectivity** be a key element of prosperous cities. In this regard, this report adds variables of "street" to the City Prosperity Index that encompasses elements that have not been factored before. The adage *"what gets measured gets done"* has injected a sense of urgency in the pursuit not just of prosperous streets *per se*, but also of an operational definition with specific indicators.

BOX 2.10: THE COMPOSITE STREET CONNECTIVITY INDEX AND THE CITY PROSPERITY INDEX

Dimensions	Definitions/variables
Street Connectivity	Key elements define the urban form, among them the street planning and design which is the combination of the three variables: street width, street length and the number of intersections in a street network, all in relation to the total land area of a city. One element of urban form which will be used to gauge city prosperity is the Composite Street Connectivity Index (CSCI) which is combination of three sub-indices: Land Allocated to Street Index, Street Density Index and Intersection Density Index.
Infrastructure development	The infrastructure development index combines two sub-indexes: one for infrastructure, and another for housing. The infrastructure sub-index includes: connection to services (piped water, sewerage, electricity and ICT), waste management, knowledge infrastructure, health infrastructure, transport and road infrastructure. The housing sub-index includes building materials and living space.
Environmental sustainability	The environmental sustainability index is made of four sub-indexes: air quality (PM10), CO_2 emissions, energy and indoor pollution.
Productivity	The productivity index is measured through the city product, which is composed of the variables capital investment, formal/informal employment, inflation, trade, savings, export/import and household income/consumption. The city product represents the total output of goods and services (value added) produced by a city's population during a specific year (details of the methodology can be found in the CPI technical Report).
Quality of life	The quality of life index is a combination of four sub-indexes: education, health, safety/security, social capital and public space. The sub-index education includes literacy, primary, secondary and tertiary enrolment. The sub-index health includes life expectancy, under-five mortality rates, HIV/AIDS, morbidity and nutrition variables.
Equity and social inclusion	The equity and social inclusion index combines statistical measures of inequality of income/consumption (Gini coefficient) and social and gender inequality of access to services and infrastructure.

BOX 2.11: STREET COMPONENTS USED TO MEASURE OF CONNECTIVITY



Source: *Image © 2013 DigitalGlobe*

Source: *Image © 2013 DigitalGlobe*

Intersection Density
= No. of Intersections/ Area

Link to Node Ratio
= No. of Links/ No. of Nodes

Accessibility Index
Pedestrian Route Directness
= Actual Travel Distance/ Direct Travel Distance

DATA AND SOURCES

This report is a first attempt to measure street connectivity, which is now factored in the City Prosperity Index. Street data has been gathered for many cities of the developed countries though indicators vary from country to country. In the developing countries, information on streets is scarce, and when it exists it is diluted with data on transport. Hence indicators to assess the multifunctionality of streets is lacking for most cities of the developing world, where the focus is more on the mobility function of streets rather than their social or economic functions.

The lack of reliable data on streets has held back the development of effective urban policies aimed to tackle lack of basic services and transport in cities of the developing regions. The most common indicator for streets is street density, which measures the length of street networks per one square kilometre. While this information may be available for most cities of the developed world, in the developing world, when it exists, it is at the country level, as published annually by the World Bank. However, countries with good road networks are more likely to also have good street networks in urban areas. Similarly countries with a high Human Development Index (HDI) are also likely to have a high City Human Development Index (CHDI).

Mapping streets through the Monitoring Urban Inequities Programme (MUIP)

Collection and analysis of street data has been done through the Monitoring Urban Inequities Programme (MUIP), initiated by the Global Urban Observatory in 2004. MUIP as part the Global Monitoring of the Millennium Development Goals Slum Target (Target 7D), is based on Urban Inequities Surveys (UIS) commissioned by the GUO as well as on analysis on Demographic Health Surveys (DHS).

In order to have a more inclusive assessment of street connectivity, all information and data included in this study and its analysis was done bearing the above limitations in mind. In order to partially fill the street data gap, UN-Habitat's Global Urban Observatory (GUO) has undertaken a series of steps to improve data collection. The first is an in-depth study of streets conducted in selected cities that required the use of satellite imagery and field verification. With the popularity of GIS mapping, remote sensing data and GPS tools, the most scientific way of calculating any area was through these geo-spatial tools.[33]

In addition to the use of satellite images, documents from government line ministries in charge of roads were consulted in order to better understand the policies guiding street planning and design. Following the in-depth analysis of street connectivity, another round of street data collection was conducted for 28 cities through various tools and available satellite images. In addition to this, in 2012-2013, GUO commissioned another round of data collection on land allocated to streets and intersection density in more than 30 cities. This information was used to prepare an estimation of the partial Composite Street Connectivity Index (CSCI). The data was collected at the city core level as well as at the suburban level. This information was used to capture intra-city inequalities.

Urban Inequities Surveys (UIS) have been conducted in 25 cities, including 18 towns and secondary cities in Kenya, Uganda and Tanzania.[34] UIS provides information at the community level using satellite images and field verification on key amenities and infrastructure variables, including streets and their conditions. Information on connection to water and sewerage systems was also collected. Since water and sewerage systems often run parallel to existing street networks, linking street information and information on water and sewerage is crucial for cities of the developing world where many households living in slum communities do not have access to these amenities. Existence of street networks is therefore indispensable for slum upgrading programmes. UIS provides an opportunity to create an Integrated Street Database (ISD) where street information is not just stand-alone information but is integrated with social, economic and other infrastructural and environmental information.

Another important source of information on community service delivery is the Demographic and Health Survey (DHS) that also provides information on access to basic services, such as schools and clinics at the community level in over 50 cities. Each enumeration area of a neighbourhood was geo-referenced through GPS allowing the mapping of infrastructure information in association with social and economic data. Expert opinion surveys on the five dimensions of prosperity that are part of the City Prosperity Index in 52 cities were also conducted. These surveys provided key information on infrastructure, including streets and other public variables. This information will be used to contextualise findings in cities. Finally, this study was based on more than 100 cities around the world that provide a good picture of street connectivity in different regions. Cities have been classified according to two regions: i) Europe, North America and Oceania; and ii) Africa, Asia and Latin America and the Caribbean.

SELECTED CITIES COVERED IN THE STUDY

1. Abuja
2. Accra
3. Addis Ababa
4. Alexandria
5. Amsterdam
6. Athens
7. Auckland
8. Bangkok
9. Bangui
10. Barcelona
11. Beijing
12. Bogota
13. Brasilia
14. Brussels
15. Cairo
16. Calgary
17. Cape Town
18. Casablanca
19. Chandigarh
20. Copenhagen
21. Dakar
22. Dar es Salaam
23. Dhaka
24. Dodoma
25. Georgetown
26. Guadalajara
27. Guatemala City
28. Harare
29. Helsinki
30. Hong Kong
31. Jakarta
32. Johannesburg
33. Kigali
34. Kolkota
35. Kuala Lumpur
36. La Paz
37. Lagos
38. London
39. Los Angeles
40. Lusaka
41. Manila
42. Medellin
43. Melbourne
44. Mexico City
45. Montreal
46. Moscow
47. Mumbai
48. Nairobi
49. New York
50. Ouagadougou
51. Paris
52. Phoenix
53. Saint Petersburg
54. Sao Paulo
55. Singapore
56. Sydney
57. Tokyo
58. Toronto
59. Washington, D.C.
60. Yerevan

ENDNOTES

1 Toth, 2011.

2 Not so long ago, this idea was considered preposterous in many communities. "Public space" meant parks and little else. Transit stops were simply places to wait. Streets had been surrendered to traffic for so long that we forgot they could be public spaces. Now we are slowly getting away from this narrow perception of streets as conduits for cars and beginning to think of streets as places. (Toth, 2011.)

3 Lusher et al, 2008 (livable streets); Toronto Centre for Active Transportation, 2012 (complete streets); Finn and McElhanney, 2012 (Complete streets); Smart Growth America and National Complete Streets Coalition, 2010 (Complete streets); Svensson,, 2004 (street for all); Central London Partnership, 2003(Quality streets)

4 Appleyard and Lyntell, 1977; Moudon, 1986.

5 "Every Tuesday for a whole year, a young architect named Jan Gehl sat in Strøget and recorded everything that took place around him. It was 1962, and Copenhagen's main shopping street had recently been closed off to cars – a move so controversial that the then-mayor received death threats and had to be protected by bodyguards."(Beacom, 2012) ; Copenhagen Portal (undated); City of Melbourne and Gehl Architects, 2004.

6 Jacobs, 1961; Jacobs, 1970; Jacobs, 2002; Among the pioneers of Livable street are environmental design researchers such as Whyte W. (1980) and Appleyard, D. (1981)

7 Finn and McElhanney, 2012

8 Toronto Centre for Active Transportation, 2012

9 ARTISTS, 2004.

10 The call for "pedestrianization" streets was expressed since the early 1950s in Europe and early 1960 in the United Sates. The Pedestrian street movement preceded livable and complete street movement. (see Moudon, 1986). The main goal was to reduce the negative impact of cars on quality of life with cars occupying most of the street area. As noted by Moudon, in New York, 85% of street area is occupied by car, and this despite the high proportion of land allocated to street.

11 Complete streets is largely an engineering policy that "ensures that transportation planners and engineers consistently design and operate the entire roadway with all users in mind — including bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities." (Toth, 2011; Smart Growth America, 2010b).

12 Lusher et al, 2008.

13 Bosselman et al, 1999.

14 Lusher et al, 2008.

15 The City Prosperity Initiative was introduced by UN-Habitat following the successful publication and launch of the City Prosperity Index, which is described in UN-Habitat State of the World's Cities 2012/2013 report.

16 UN-Habitat, 2012a.

17 MERCER (2012), 2012 Quality of Living Worldwide City Rankings Survey, United States, New York.

18 Smart Growth America and National Complete Streets Coalition, 2010

19 Lehigh Valley Planning Commission, 2011.

20 ARTISTS, 2004

21 As illustrated by the community profiles in UN-Habitat's Urban Inequities Survey conducted in several cities around the world between 2003 and 2012.

22 UN-Habitat, 2012b. UN-Habitat considers that the existence of street networks has a major role to play in slum upgrading that requires provision of basic services.

23 See: Dahl, R. (2004); World Health Organization (2004); Pucher, J., N., et al., 2007.

24 UN-Habitat, 2011.

25 Frank, L.D. et al., 2010.

26 Active Transportation Alliance, 2012.

27 Digital public library of America: http://dp.la/info/nara-content-notification

28 UN-Habitat, 2012a

29 Frank, L.D. et al., 2010.

30 Frank, 2006

31 Environmental Defense, 2007

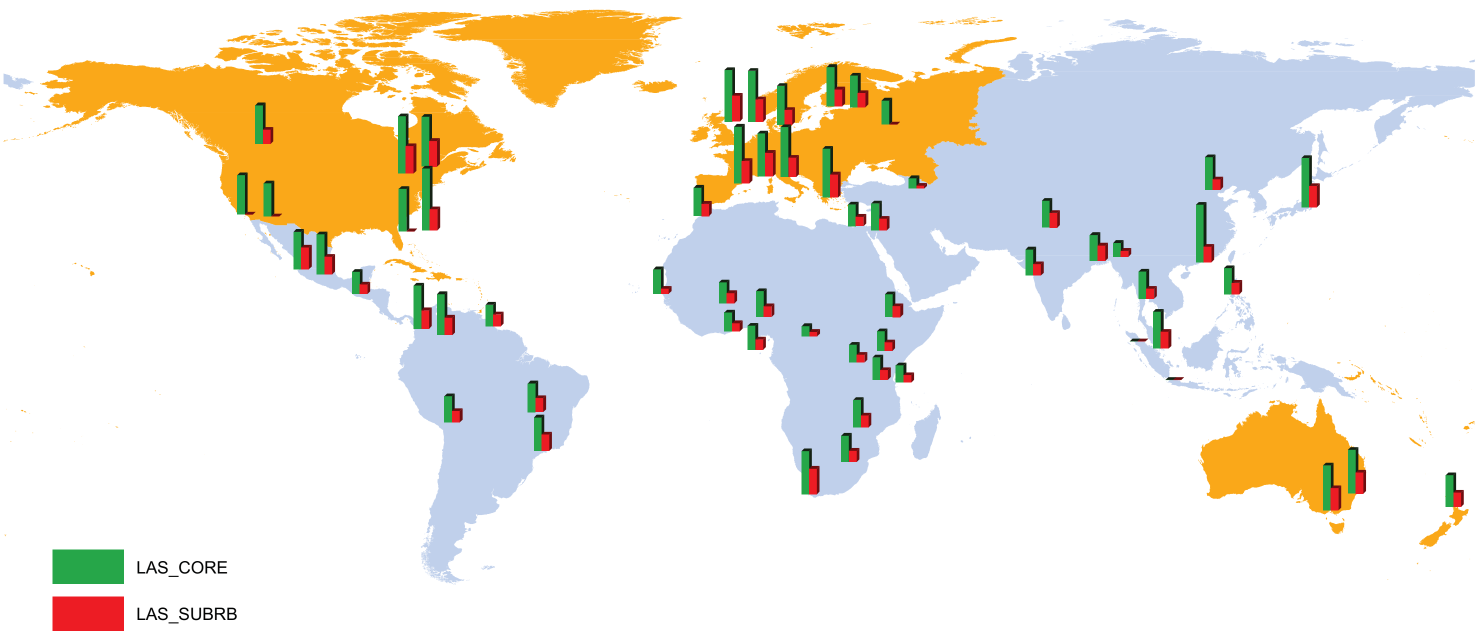
32 Evans, 1995

33 Peponis et al., 2007.

34 It is of value to include towns and secondary cities; they will shape the landscape of urbanization for the children and young people of today. Their agenda shall include management of the urban growth of these cities in unplanned environment. For those found unplanned, actions can be taken now and bring corrective measures. It is much easier now and tomorrow. In the African region, towns and cities represent 30% of the total urban population. Each is the principal centre of economic and commercial activity in their respective region.

3

THE STATE OF STREETS IN EUROPE, NORTH AMERICA AND OCEANIA



Cities in Europe, North America and Oceania have experienced various transformations, particularly since the Industrial Revolution of the 19th century and with the increased use of the automobile as a mode of transport. In the mid-19th century, several cities in these regions expanded their street networks to increase access to markets and to accommodate growing populations. Streets in many cities were being planned in a way to reflect these cities' aspirations. In more recent decades, cities in these regions have experienced population growth mainly on the outskirts of the inner cores of cities, which has led to urban sprawl or suburbanization. The expansion of cities on the outskirts has been accompanied by changes in land use, both in terms of form as well as structure.[1] Streets, as public spaces, lost their importance in terms of their share of land, as well as their prominent role in shaping the culture and history of cities.

The analysis in this section is based on street data from twenty cities: four cities in the United States of America (Los Angeles, New York, Phoenix and Washington, DC)[2]; three cities in Canada (Calgary, Montreal and Toronto); three cities in Northern Europe (Copenhagen, Helsinki and London); two cities in Southern Europe (Athens and Barcelona); three cities in Western Europe (Amsterdam, Brussels and Paris)[3]; two cities in Eastern Europe (Moscow and Saint Petersburg); and three cities in Oceania (Auckland, Melbourne and Sidney).

This report is a first attempt to globally assess street connectivity. The cities selected are mostly part of the first edition of the

City Prosperity Index published in UN-Habitat's *State of the World's Cities 2012-2013: Prosperity of City* report. Most of them are capital cities or large cities situated in different geographical areas. Though they do not represent all cities of their region, they do allow us to analyze and identify some regional variations in street connectivity. The state of streets in medium- and small-sized cities will be analyzed in future reports in this series.

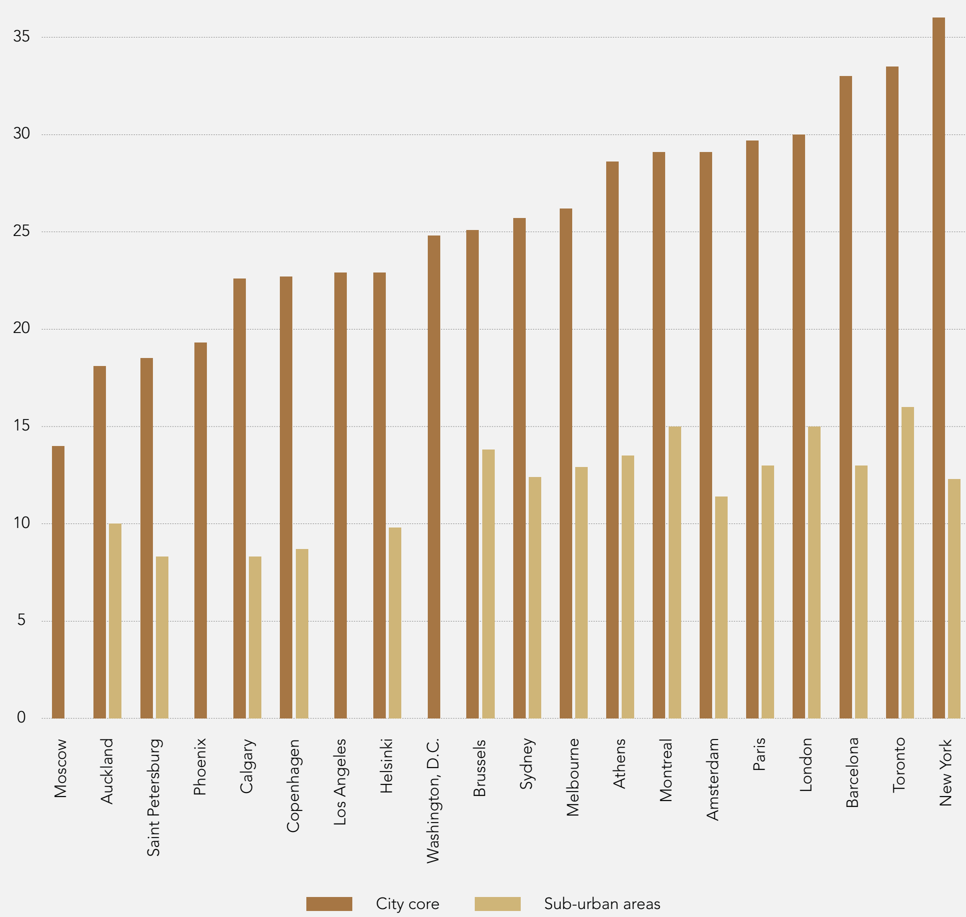
LAND ALLOCATED TO STREETS

Data collected on street connectivity in the twenty European, American and Oceanic cities show that, in general, the proportion of land allocated to streets is much lower in suburban areas than in city centres. While the cores of most cities have more than 25 per cent of land allocated to streets, in suburban areas it is less than 15 per cent (See Figure 3.1)

The reduction in the proportion of land allocated to streets in suburban areas is the result of a combination of factors, including the adoption of hierarchical systems of street planning, with the predominance of cul-de-sacs rather than the grid system, which is a common feature of city centres. Streets in suburban areas are narrower, have shorter networks and are of low intersection density. In most cases, the proportion of land allocated to streets in suburban areas is less than half of the proportion of land allocated to streets in the inner core of cities.

The data on land allocated to streets shows that cities planned in the 18th and 19th centuries, such as New York (Manhattan), Athens, Barcelona and Paris, allocated sufficient land to streets. In these cities the proportion of land allocated to streets in the city core varies between 30 per cent and 36 per cent.

FIGURE 3.1 **LAND ALLOCATED TO STREET (LAS) IN CITIES, EUROPE, NORTH AMERICA & OCEANIA**



Manhattan in New York City. USA. **© Luciano Mortula/Shutterstock**

Manhattan, which has a dense grid system, also holds the highest proportion of land allocated to streets (36 per cent). New York's city plan of 1811 prioritized land allocated to streets. In the city plan, streets less than 50 feet (15.24 metres) were not permitted, and there were norms and regulations to ensure that short, narrow or crooked streets were not laid out.[4] [5] However, this did not apply to the other four boroughs of New York (Queens, Brooklyn, Bronx and Staten Island) where there was neither a perfect street grid system nor sufficient allocation of land to streets. For instance, Staten Island, like many suburban areas, has no large, numbered grid system and allocates only 16 per cent of its land to streets, less than half the share of land for streets in Manhattan. In the city centre of Washington, DC and Los Angeles, land allocated to streets is sufficient (25 per cent and 23 per cent, respectively) but much less than that of Manhattan. In comparison to the Manhattan grid system, the street system of Washington DC was modeled on an ornate style that incorporated avenues radiating out from rectangles, providing room for open spaces and landscaping.[6] The street system of Washington DC is comparable to the combination of the grid pattern and large avenues prevalent in European cities, such as Paris.

Staten Island, like many suburban areas, has no large, numbered **grid system** and allocates only **16 %** of its land to streets, less than half the share of land for streets in **Manhattan**.

In Canada, the city core of Toronto, which has adopted a grid system, has allocated 29 per cent of land to streets. Various "Complete Streets" projects have been initiated in the city to promote a street system that accommodates all users.[7] In comparison, the proportion of land allocated to streets is also high in the city core of Montreal[8], but less pronounced in the city core of Calgary.

In Southern Europe, Barcelona also adopted a street grid system in the 19th century, although the size of each block is smaller compared to that of Manhattan. Barcelona is amongst those cities where a high proportion of land in the city's core area is allocated to streets (33 per cent). However, the grid system is not predominant in the suburban areas of the city where cul-de-sacs are the norm. Indeed, in recent decades, Barcelona's growth has mostly been through the expansion of the outskirts of the city, with settlements of low population density, along with urban planning that gives a smaller share of land to streets (13 per cent), which is less than half the proportion of land allocated to streets in the city's core. The city centre of Athens, planned in 1833, also provides a high share of land to streets (29 per cent). As observed in New York and Barcelona, the share of streets in the suburban area of Athens is less than half the share in the city centre.

In Western Europe, similar patterns can be observed in the city core of Paris, where 30 per cent of land is allocated to streets in the city core versus 13 per cent in suburbs. The sufficient land allocated to streets in the city centre can be associated to the city's history of urban transformation that was geared to cutting a unique image for the city, with wide boulevards and public spaces around historical monuments.[9] As noted in Douglas (2008) and other publications, during the period 1852-1871, "Haussmann cut wide new boulevards through the fabric of old Paris, buying and demolishing whatever was in the way, setting up axes and monuments, and clearing space around buildings like Notre Dame and the Palais du Louvre. By cutting into the body of the city with his boulevards and promoting unimpeded circulation, Haussmann hoped not only to alleviate the social pressures which produced unrest, but also to make the construction and defense of barricades impossible."

However the large boulevards in the centre of Paris were not replicated in the suburban areas that suffer from insufficient land allocated to streets (less than half the level in the city core). Two other cities in Western Europe, namely Amsterdam and Brussels, have also allocated sufficient land to streets in their inner core, but insufficient land to streets in their suburbs. The share of land allocated to streets in the city core of Amsterdam is three times higher than the share in suburban areas (29 per cent against 10 per cent).

The high proportion of land allocated to streets in the city centre of Amsterdam can be attributed to its grid system, which is traversed by multiple concentric canal rings built during the 17th century, which are considered one of the most prominent features of the city's architecture and an icon of urban planning.[10] The city of Brussels has similarly allocated a large proportion of land to streets (26 per cent) in the city's core compared to 14 per cent in suburban areas.

The city centres of Copenhagen and Helsinki in Northern Europe have similar levels of land allocated to streets (23 per cent), which is lower than the levels observed in Manhattan (36 per cent) and cities of Southern and Western Europe. Both Copenhagen and Helsinki promote the use of non-motorized means of mobility in the designs of their streets, with clear paths for pedestrians and cyclists and other users. The city of Copenhagen has since 1910 opted to promote the use of bicycles for mobility. In 1962 Copenhagen made a shift towards bicycles and pedestrians based on Gehl's findings on the need to promote a car-free city. In Gehl's perpective, making a city livable means breathing life between the buildings; people will always fill this space.[11] Since then, there has been an increased use of streets by pedestrians and cyclists. Indeed, data from 2005 shows that 30 per cent of Copenhagen's residents cycle to work, which is considered amongst the highest levels of cycling in the world. An estimated 1.2 million kilometres are cycled daily in the city of Copenhagen, with 36 per cent of all citizens commuting to work and educational facilities by bicycle.[12]

The Russian city of Saint Petersburg has a moderate proportion of land allocated to streets in the city's core (19 per cent), which is more than twice the level in suburban areas (8 per cent). These relatively low proportions could be related to the fact that the city was designed to showcase splendour, with less emphasis on functionality. In the early part of the 18th century, the urban landscape of the city took on a grand imperial quality, with huge palaces, convents and suburban residences that left little land for public spaces, such as streets.[13] In the city core of Moscow, the land allocated to streets is just 15 per cent, the lowest level among all European cities covered in this analysis. "Moscow is a long way from achieving the walkable, socially-thriving streets and squares found in many of its Western-European counterparts. The report *'Moscow – Towards a great city for people,'* makes a number of key recommendations for the city's makeover, including the transformation of canal- and river-sides from parkways to parkland."[14]

The rivers and canals in Moscow hold great recreational potential, but unfortunately most of the waterfront near the city centre surrounded by heavy traffic. A large proportion (93 percent) of the space is allocated to cars, creating a barrier between the city and the river. In addition, the roaring traffic makes it a noisy place that discourages people from lingering and strolling.[15]

Auckland in New Zealand has allocated a low proportion of land to streets in the city's core, though this is twice the level in its suburban area (18 per cent versus 10 per cent). Compared to the Australian cities of Melbourne and Sidney, the street network of Auckland is poorly planned and designed. Central Auckland's streets and land subdivision patterns are the result of the 1841 plan that was heavily influenced by the mishandling of Crown land sales followed by land speculation. Though the plan itself gave central Auckland a fairly serviceable street network, it generated a service alley system that was subjected to severe criticism and to adjustment over the years, as noted by the City Council.[16] Melbourne, on the other hand, has a well-designed street network with a grid form at its centre. Laid out in 1847, the wider Melbourne grid originated at Batman's Hill, from which two primary section lines were mapped.[17] Sydney has a street plan that is quite different from that of Auckland and

Melbourne. Sydney's original streets followed paths long used by the local Aborigines; others cut through the bush by chain gangs or following goat and bullock tracks. In early 1810, high consideration was given to streets and adjustments were made in street design.[18]

STREET NETWORKS AND WIDTHS – COMPONENTS OF LAND ALLOCATED TO STREETS

Land allocated to streets is determined by two variables: the length of the street network and the width of streets. A high proportion of land allocated to streets can be attributed to a lengthy street network with narrow streets or wide streets in a short street network. A ratio higher than 1 can be an indication that the streets are relatively wide compared to the length of the network while a ratio lower than 1 can imply relatively narrow streets compared to the length of the street network. For instance, Amsterdam and Helsinki have narrow streets (average width of 9.5m and 9.1m respectively), but lengthy networks (street density of 31 km per square km and 25.2 km per square km), and have been able to secure sufficient land to streets (30 per cent and 24 per cent, respectively). In most of the cities analyzed in this chapter, the ratio is above 1. This indicates that the land allocated to streets is both long and wide. This can be due to the preponderance of boulevards and avenues, as observed in the city core of Paris, or a regular pattern of wide streets, as observed in Manhattan. However, there is less variation in the street system of Manhattan than in the street network of the city core of Paris where the width of streets varies from 10m in local neighborhoods to 60m in the widest boulevards. In Manhattan, the street width varies from 15m to 25 m. In fact, in a grid system, the coefficient of variation must be minimal while in hierarchical systems, the coefficient of variation of the width of streets must be high, with a large amount of area provided to arterial streets and small areas provided to local neighbourhood streets.[19]

FIGURE 3.2 **STREET DENSITY IN CITIES, EUROPE, NORTH AMERICA, OCEANIA**

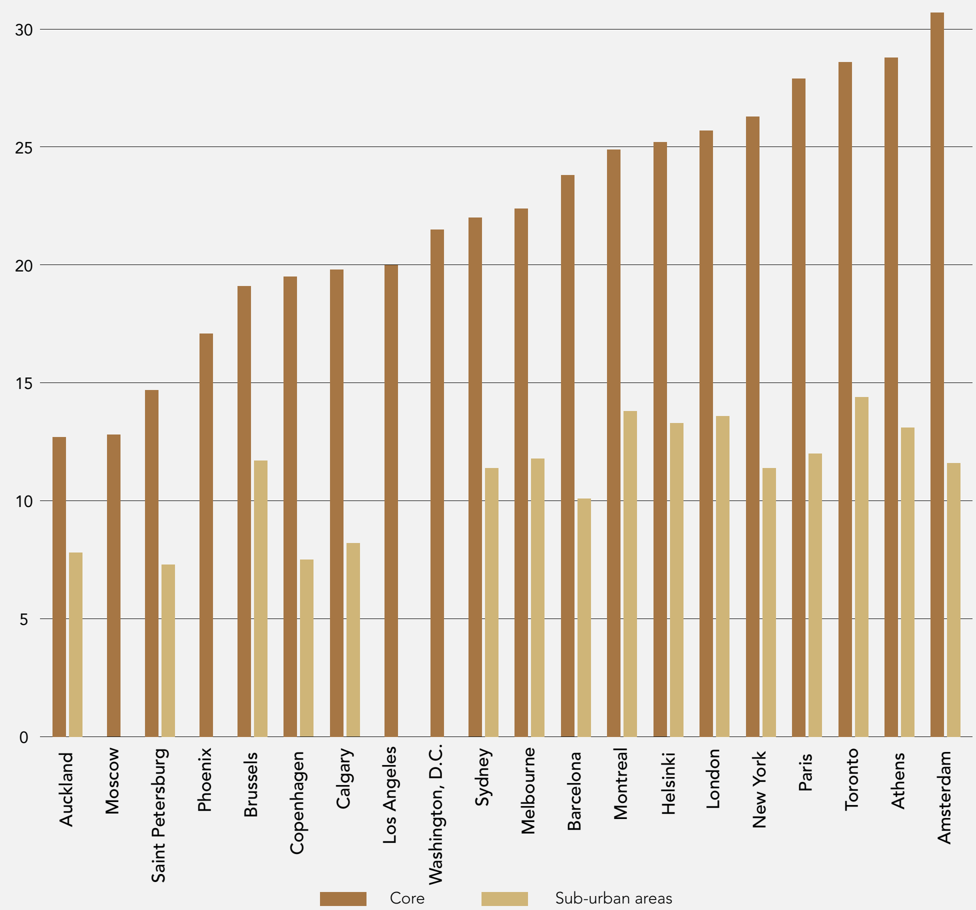
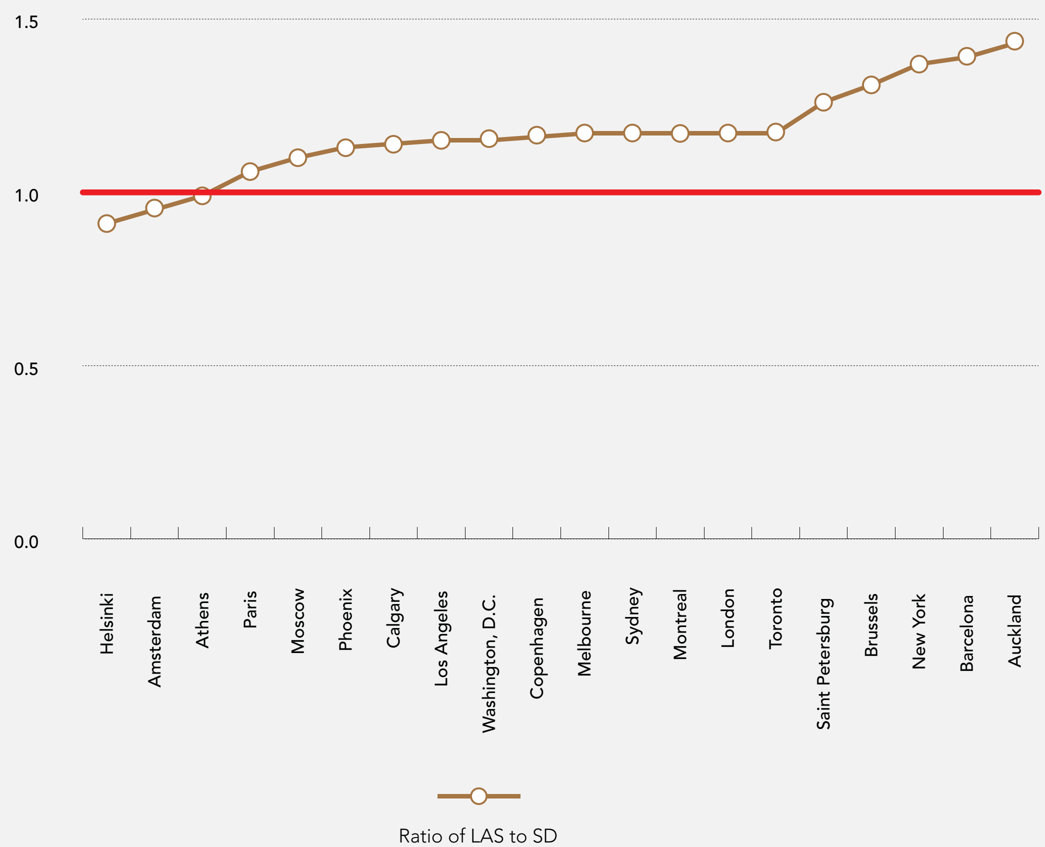


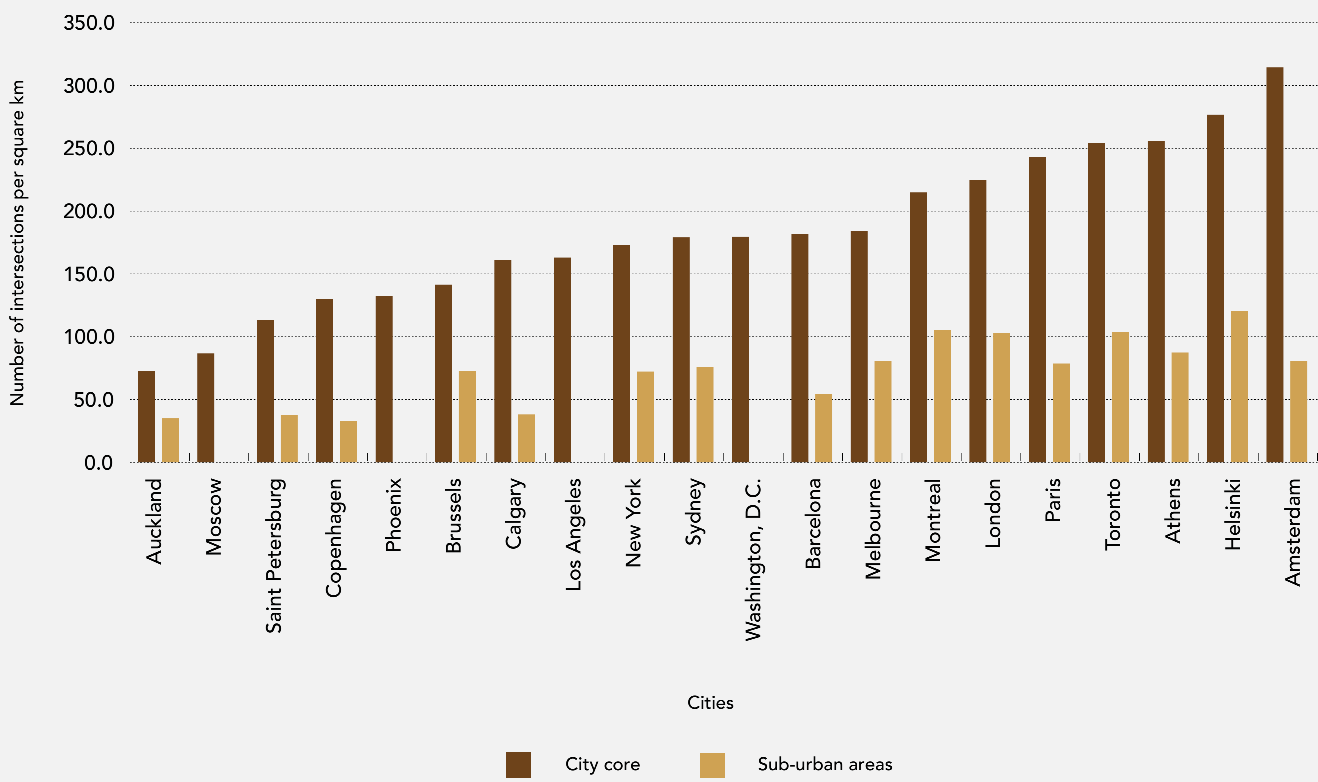
FIGURE 3.3 **RATIO OF LAND ALLOCATED STREETS TO STREET DENSITY IN CITY CORE CITIES OF EUROPE, NORTH AMERICA AND OCENIA**



INTERSECTION DENSITY AND STREET CONNECTIVITY

Intersection density is a fundamental element of walkability. The more intersection density there is in a street network, the more walkable the streets are. The predominance of cul-de-sacs in the expansion of cities or in the creation of new cities has been extensively documented in various studies in Europe, North America and Oceania. In the United States, for instance, the predominance of cul-de-sacs is the result of decisions made by individuals, real estate developers or the government. However, cul-de-sacs have a negative impact on street connectivity. More traffic congestion has been associated with the predominance of cul-de-sacs in new settlements that make people from the same neighbourhood use the same arterial streets to connect to a highway. The same has been observed in Europe and Oceania.

FIGURE 3.4 **INTERSECTION DENSITY IN CITIES EUROPE, NORTH AMERICA, OCEANIA**



The predominance of cul-de-sacs not only reduces intersection density but also reduces street density. Fewer streets are built and fewer intersections are allocated on those that have been built. The length of the street network per square km expressed in terms of street density is much lower in suburban areas than in city centres. Indeed, by opting for street networks that are predominantly cul-de-sacs, the intention of real estate developers is to build more houses on fewer streets. As shown in Figure 3.3, the street density in the city core is more than two times higher than the street density in the suburban areas of most cities. Except for Auckland and Saint Petersburg, where the street density is below 15 km per square km, street density is 20 km per square km or more in the city centre while the street density is below 15 km per square km in suburban areas of most cities. This trend is similar to what has been observed in relation to the proportion of land allocated to streets. In fact, the reduction of land allocated to streets in suburban areas could be associated with the fact that a large proportion of land in suburbs is allocated to residential plots, not to streets.

Figure 3.4 shows that in suburban areas of cities analyzed here the intersection density is low compared to city centres. Since most suburban areas were built in cul-de-sacs, some even as gated communities, they have fewer intersections compared to city cores. Except for the suburban areas of Helsinki (120.6 intersections per square km), in all suburban areas analyzed here the intersection density is less than 100 intersections per square km. This is clearly an indication of unconnected street networks that do not promote multiple options for the inhabitants to access services, such as work places, health centres and schools. Inhabitants of gated communities are obliged to use the same arterial streets that link them either to the centre of their neighbourhood or to highways that lead to main city centres. In addition, there may be congestion on most arterials serving as connectors.

The city of Auckland presents a very specific case, with its city core planned as a suburb with very low connectivity. Its intersection density is below 70, indicating a city where movement within the city centre is as complex as it is in suburban areas. As illustrated in Fig. 3.4, the city core of Auckland is within the group of suburban areas at the bottom of the graph. In other terms, it has same intersection density as suburban areas. Lack of connectivity in the city centre of Auckland is well illustrated in map 3.1. Although some of the houses in the northeastern parts of the city may be located only 400 metres from the train stations, residents have to walk for more than 1 kilometre to reach it, due to poor street connectivity. Arterial streets are mainly for cars, with lack of pedestrian lanes and bicycle paths. However, with "complete streets" or "livable streets" projects, some arterial streets have been re-designed to accommodate all users.

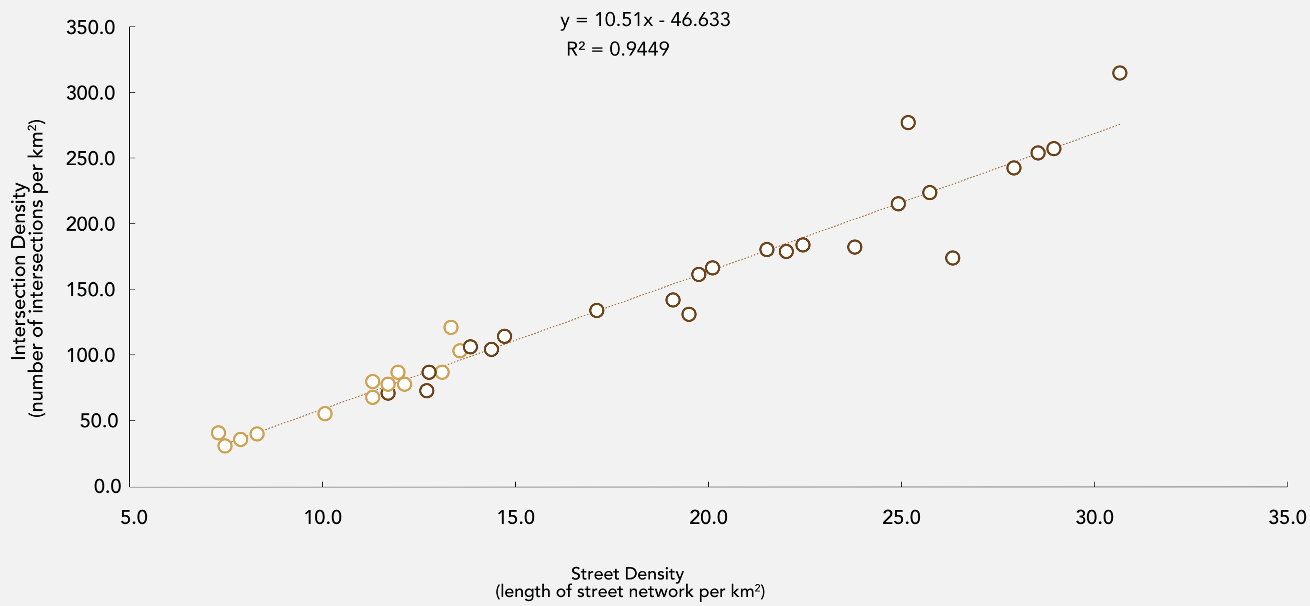
MAP 3.1: **POOR STREET CONNECTIVITY IN AUCKLAND, NEW ZEALAND**

Poor connectivity doubles distance travelled to train station.
Source: *Image © 2013 Google and 2013 Whereis® Sensis Pty Ltd*

Lengthy street networks also promote high intersection density, i.e. high connectivity. The city core of Amsterdam, with a street density of 30.7 km per square km, also has the highest intersection density in the city core (314 intersections per square km), compared to the city core of Auckland, which has an intersection density below 100 (72.9), corresponding to a street density of 12.7 km per square km. This means that despite the narrowness of its streets, streets in Amsterdam are well- connected; they promote walkability and are better able to connect people to services, such as workplaces, health centres, schools, etc. In all European and North American cities covered in this study, the intersection density in the city core is higher than 100, indicating sufficient level of street connectivity.

Lengthy street networks with sufficient street width are preferable to wide streets within short networks since they cover more neighbourhoods. Lengthy street networks can promote spatial and social inclusion. In fact, many social inequalities observed in cities are the result of the way cities are planned. Some areas have many and wide streets while other areas have few and narrow ones. This is the main criticism of urban plans of new cities or expanding cities that are based on master plans that divide the city according to the social or economic status of residents. Street networks thus have an impact of the wellbeing of people, as discussed later in this chapter.

FIGURE 3.5 **RELATIONSHIP BETWEEN STREET DENSITY AND INTERSECTION DENSITY CITIES OF EUROPE, NORTH AMERICA AND OCENIA**



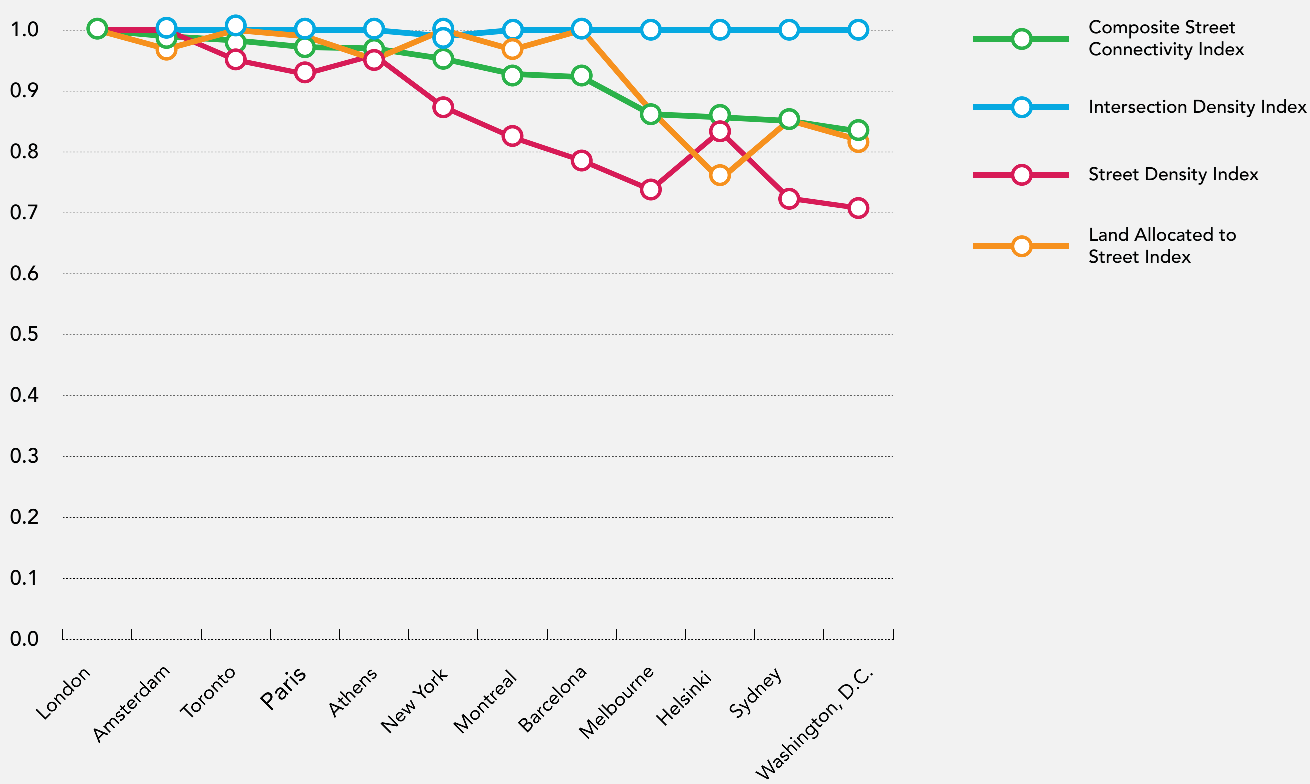
Sources: *Ximaion re porionse volorestiunt.*

CONNECTED CITY CORES ADJACENT TO POORLY CONNECTED SUBURBS

Street connectivity is determined by the amount of land allocated to streets, the length of the street network and the number of intersections along the network. Having only either the information on the proportion of land allocated to streets or the length of the network is not sufficient to assess the connectivity of a street. A city can have wide streets in a very limited street network and low intersection density, which does not translate into high connectivity. A lengthy network and dense intersections, but very narrow streets, do not also promote high connectivity. The *Composite Street Connectivity Index (CSCI)*, presented in Figure 3.6 , builds on the combination of the three variables, and aims to assess connectivity of a street considering its width, its length and the number of intersections, all in relation to the total land area of a city.

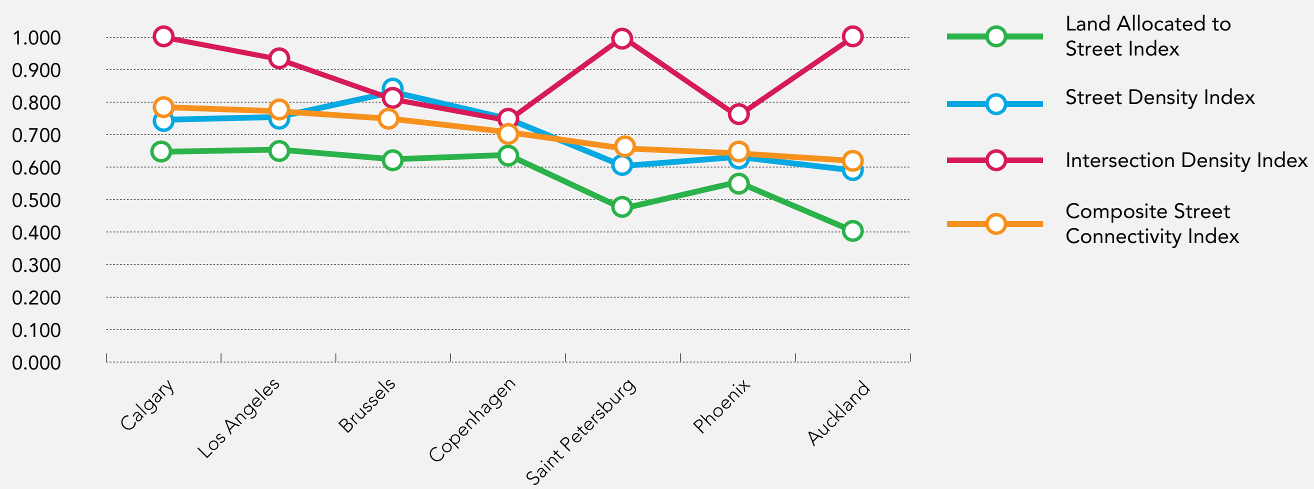
More than half of the cities presented here the Composite Street Connectivity Index (CSCI) is higher than 0.8. This means they have relatively good street connectivity. To have a CSCI higher than 0.8, a city must have streets sufficiently wide to accommodate all users, sufficient to reach all neighbourhoods and corners of the city, and a sufficient number of intersections to accommodate all users. In 12 out of the 20 cities analysed here, these three conditions are satisfied in the city core. Those cities are: London, Amsterdam, Toronto, Paris, Athens, New York, Montreal, Barcelona, Melbourne, Helsinki, Sidney and Washington. However, there are other elements of connectivity which are not captured by the CSCI, such as, for instance, those associated with the design of the street, the number of traffic lights, the amount of street lighting, or the number of people who use the streets and the peak hours of usage.

FIGURE 3.6 **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF HIGHER THAN 0.800**



There is a second group of cities with a CSCI between0.700 and 0.800. This group is composed of four cities: Calgary, Los Angeles, Brussels and Copenhagen. As the first group, they also allocated sufficient land to street with sufficient intersections to accommodate all users.

FIGURE 3.7 **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BETWEEN 0.700 AND 0.800**



A third group with CSCI between 0.600 and 0.700 is composed of three cities: Saint Petersburg, Phoenix and Auckland. Although the level of their CSCI indicates a moderate level of connectivity, they suffer from a poor level of connectivity associated to one component of the CSCI. For instance, the city core of Auckland has a level of Street density index of 0.403 indicating that the length of the network may be not sufficient to cover all areas of the city core.

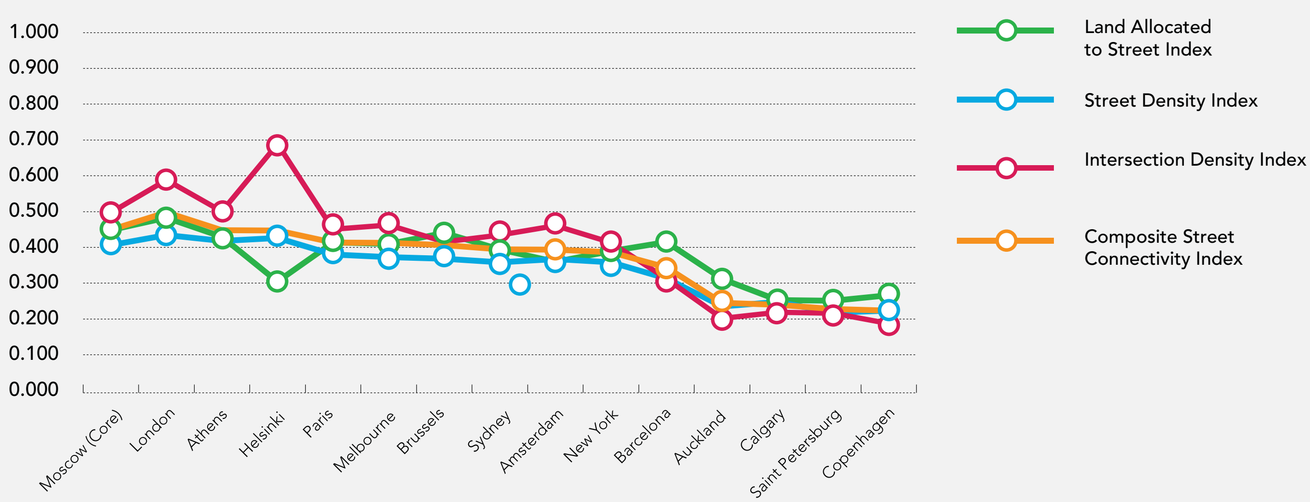
Among the twenty cities analysed here only the city core of Moscow has a CSCI below 0.500. This level is similar to the levels observed at suburban areas. The city core of Moscow suffers from insufficiency of land allocated to street with few intersections along the street network.

Cars have taken over Moscow streets, Russia. Moscow Mayor Sobyanin is leading the reconstruction of suburban railways, building new roads to solve problem of traffic jams. **© Pavel L/Shutterstock**

DISCONNECTED AND FRAGMENTED SUBURBS

The CSCI, calculated for the suburban areas of 14 cities, is below 0.500 in all the 14 cities. A level of CSCI below 0.500 indicates that suburbs in Europe, North America and Oceania are, in general, disconnected with little amount of land allocated to streets associated with few intersections along a short street network.

FIGURE 3.8 **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BELOW 0.500**

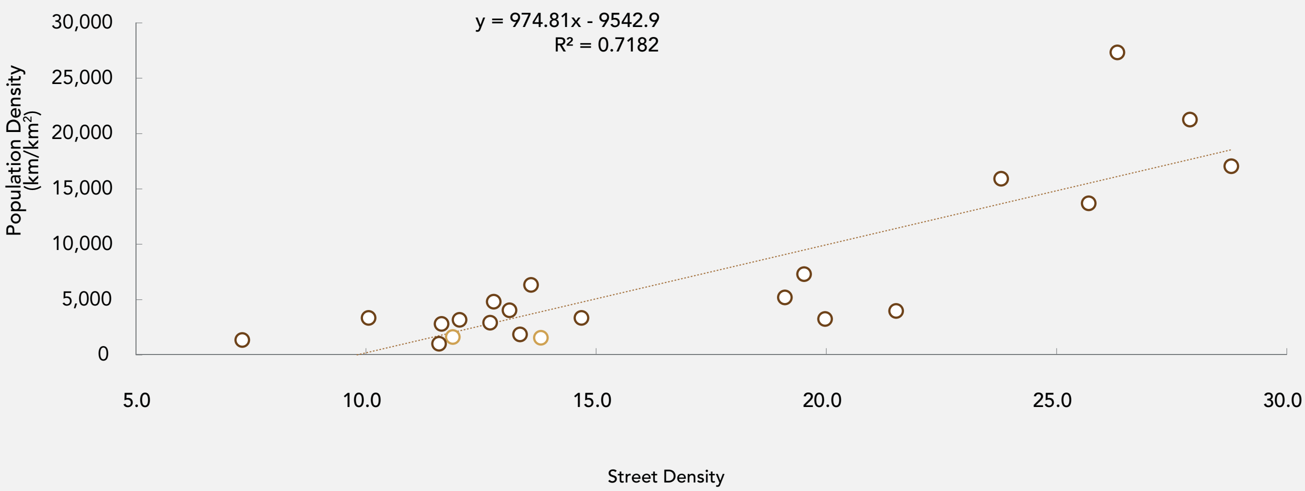


As observed earlier, lower urban density in suburban areas is often accompanied by lower street density and less land allocated to streets. Areas with high street connectivity attract more people and have high population density, and benefit from the economies of agglomeration.[20]

For instance, Manhattan, where 36 per cent of land is allocated to streets, two times the level in Staten Island (16 per cent), has a population density nine times higher than the population density of Staten Island (28,000 inhabitants per square km versus 3000 inhabitants per square km). It is important to note that the expansion of New York occurred with four additional boroughs at the end of the 19th century (Queens, Brooklyn, Bronx and Staten Island) of low population density compared to Manhattan. A similar trend has been observed in the French city of Paris; it has a population density above 25,000 inhabitants per square km in the city core and a density of less than 3,000 in its suburbs. While the city core of Paris has 30 per cent of land allocated to streets, in its suburban area, only 13 per cent is allocated to streets, which is less than half the coverage in its city core. The population density of the city of Sidney is 6,250 inhabitants per square km compared to 1,663 in its suburb of Alexandria. These examples show that there is a close association between street connectivity and population density.

In suburban areas, poor connectivity is not only associated with low urban density, but the few existing streets serve a smaller number of people due to poorly connected street networks. The paradox is that despite the few streets in suburban areas, many are under-utilized. To maximize their use, there needs to be an improvement in their connectivity. This calls for a re-planning of the street networks.[21]

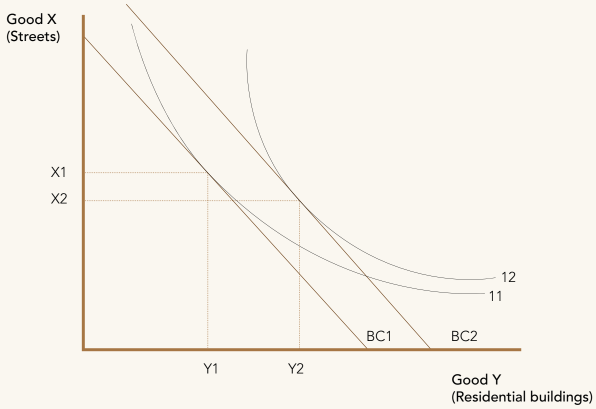
FIGURE 3.9 **POPULATION DENSITY AND STREET DENSITY CITIES OF EUROPE, NORTH AMERICA AND OCENIA**



Furthermore, the reduction of urban density from the city core to the suburban area and the reduction of the intersection density from the city core to the suburban area are associated under the logarithmic form, and can be expressed in terms of elasticity. However, this relationship must be interpreted with caution. Though poor street connectivity may lead to low urban density, there are other factors to consider, such as the existence of adequate public transport systems. Analysis of how and why the process of suburbanization occurred, and why, despite the existence of streets, many remain "empty" is also needed. Case by case analyses may yield different results for different cities.

In many North American, European and Oceanic cities, families that can afford to do so relocate to the outskirts of cities, or move to distinct cities, towns, villages on the edge or just beyond the city limits, or simply *create* their own cities by moving away from the outskirts of cities. Settling in new cities, mostly in socially and economically homogenized neighbourhoods, has been eased by the development of transport systems and highways linking these neighbourhoods to city centres. This process of sprawling has prompted new terms, such as "edge city", "edgeless city" and "technoburb".[24] Some authors describe this phenomenon as "counter-urbanization" in the sense that the city core decreases in population as well as in density, contrary to suburbanization where the city core decreases in density but increases in population by annexing other surrounding territories. The city of Detroit is a typical example of counter-urbanization. With an estimated population of 1.9 million in 1950, its population is now merely 685,000 from 952,000 in 2000, a steady decrease during the past two decades. The crime rate of the city of Detroit is amongst the highest in the United States (2,137 per 100,000 inhabitants compared to 623 per 100,000 in the city of New York). Detroit's counter-urbanization has been also accelerated by the automobile crisis that made many people in the city lose their jobs and forced many businesses to close.

BOX 3.1: IS THE STREET AN INFERIOR ECONOMIC GOOD IN THE LAND MARKET?



An inferior good is generally defined as one whose consumption reduces when income rises.[22] Are streets an inferior economic good in the land market? Considering land as in-kind income, the consumption of land as a percentage (not as an absolute value), can be seen as an economic inferior good in the land market. This can be explained by the fact that land use is heavily influenced by economic variables, among them the number and size of plots that both real estate developers and land owners seek to maximize at the cost of public spaces, such as street. However, the value added by streets to the value of plots and buildings are not well factored in the land market. Neither the real estate developers nor the land owners are willing to appreciate the economic value of streets against its social value. Beside the economic value of streets on the land market, streets have an economic and social value related to productivity, infrastructure, quality of life and social inclusion. Considering those multiple dimensions of streets, street should not be considered as an inferior economic good but a normal economic good if not a superior good that should be allocated more share in the expansion of cities.

It is interesting to note that, in all cities analyzed here, the prominent consideration given to streets in the 18th century eroded with the expansion of cities. This could be because land assumed a purely commercial value, rather than a social or cultural value. A study in the USA in over 60 cities shows that the share of land area allocated to streets was higher before 1950 than after 1950. In the USA, after 1950, land use was governed by capitalistic land and housing markets.[23] Plots were allocated for the purposes of wealth generation and accumulation, which guided the planning of new cities as well as their expansion.

The **new urban planning** has not only changed the amount of **land allocated to streets** but has also changed **street designs**, with the predominance of cul-de-sacs in the expansion of cities or in the **creation of new cities**.

The paradox is that since the post-industrial era, city planning has been under the guidance of urban planners while in the 18th and 19th centuries these planners were absent, as most city planning was based on the cultural, historical and social values of a city. The new urban planning has not only changed the amount of land allocated to streets but has also changed street designs, with the predominance of cul-de-sacs in the expansion of cities or in the creation of new cities.

SUBURBANIZATION AND INCREASED DEPENDENCE ON MOTORIZED MEANS OF MOBILITY

The dispersed urban forms of most Australian, Canadian and American cities, which were built more recently, encourage automobile dependency and are linked with high levels of mobility.[25] In this type of settlement, the only option given to the inhabitants is to use motorized means to reach their destination. Ownership of cars has increased though there is public transport linking suburban areas to the city centres. Even in the North American system, where the polycentric system of cities has been privileged, services, including work places, are not always located in the same neighbourhood, and the only option given to the inhabitants is to drive their cars to their work places and other services, such as health centres. In most arterial streets, few spaces are reserved for walking and cycling. For example, inhabitants of Staten Island in New York, which has low street connectivity, depend mostly on motorized means to reach their places of work, health services, schools and even for basic shopping. Indeed, more than 80 per cent of the households in Staten Island own at least one car compared to less that 50 per cent in the entire city of New York.[26]

The development of highways, with their correlate low transport costs, has created congestion in suburban areas, as well as in inner cities. The automobile has, in fact, a supply-side effect in that it allows factories and other places of work to decentralize by eliminating the economies of scale seen with barges and railroads (The rail industry was three times larger than trucking in 1947, but trucks now carry 86 per cent of all commodities in the United States). This has resulted in new forms of alliances between cities beyond the traditional sprawl at the outskirts of cities. These alliances create mega-regions, urban corridors and city regions, all based on larger transport networks, including highways.[27]

CHALLENGES AND POLICIES ON URBAN SPRAWL – THE PLACE OF THE STREET NETWORK

Has modern urban planning, highly influenced by the maximization of profits, failed us?

The way suburban areas are planned does not encourages families without cars to move there. People without cars are more likely to remain where public transport exists and is affordable. One of the main concerns of families is affordable housing that must be provided in close proximity to jobs and public transit. Densification of suburban areas in Europe, America and Oceania has to consider re-planning the suburban areas, as has been started in some cities. Investing huge amounts of money in mass transport systems will solve only one problem and leave many other social and economic problems unresolved.

The *"Smart Growth"* approach advocates reducing sprawl by fixing run-down urban communities, building new and better communities closer to *cities*, and preserving open spaces. Its principles endorse more sustainable urban development, such as promoting mixed land use, supporting more compact development and providing transport options beyond the automobile. Grassroots organizations are also engaged in the fight against sprawl. Among the avenues proposed are promoting environmentally-friendly public transport and designing streets in a way that pedestrians and cyclist have their equal share. Future local and regional planning should consider transport needs, environmental concerns and land-use goals that may not have been considered when cities expanded. Re-urbanization should necessarily include new forms of urban planning where sufficient amount of land is allocated to streets for people to walk, cycle or socialize. The way the suburban areas are currently planned does not allow for densification.[28]

CHANGES IN POPULATION DYNAMICS AND OCCUPATION OF CITY SPACE

Any future urban (re-) planning in the cities of the developed world should consider important factors that have changed the profile of the cities of today. Those factors are: ageing populations in a demographic regime of low fertility and mortality rates, and the change in family size and structure. These factors will impact the housing demand in terms of volume and type, and will also impact all population dynamics in cities. Old as well as young people may prefer to live in the city centre so they can easily access work places and health facilities, while married couples may prefer to live in single homes in suburban areas. These factors will not only influence housing but also streets and other public spaces.

While families may like to spend more times on streets, in parks and other public places, working and chatting, old people may not have the luxury to spend many hours in these places and young people, mostly single, would prefer to hang out in bars, pubs, restaurants, movie theatres, or libraries. Urban planners, architects, and city dwellers of today have to think of planning cities bearing this in mind.

Despite the historical success of the grid street system in shaping life in Manhattan and in the entire city New York, there was a call in 2011 under the label "The Unfinished Grid: Design Speculations for Manhattan" to future architects, private developers, and city officials to think about how Manhattan's grid might be adapted, extended or transformed in the future; what new kinds of buildings should be constructed within its blocks, and what new ways should be devised for organizing its streets? Clearly, urban planning, even in cities such as New York, is an ongoing project, one that will require re-thinking as the environmental and social costs of urban sprawl become more evident and bearing in mind the reality of ageing populations.

BOX 3.2: INITIATIVES TO REDUCE URBAN SPRAWL

City authorities in Sydney are recognizing the negative effects of sprawl and are taking measures that include re-urbanization, which consists of increasing residential population densities within existing built-up areas of the city. A regeneration scheme is encouraging people to move to previously abandoned zones of the city.

In the United States, some states have already adopted sprawl-related counter-measures, Los Angeles has managed to curb sprawl through zoning requirements that keep housing lots small and close together. Despite population growth, the land consumption, instead of increasing, has decreased by 8 per cent. As a result, the population density rose between 1970 and 1990. Timely, anticipated urban planning with work and play incentives for residents of the city proper has resulted in high population density with limited sprawl.

Canadian cities have also embarked on policies against urban sprawl. For example, the city of Calgary in Alberta launched a municipal development and planning review called *"Plan It Calgary"* with the City Council's adoption of smart growth principles in January 2007. Based on Smart Growth principles, the plan represents a departure from usual practice in Calgary, a city well known for its suburban sprawl. The Plan It design and implementation team was tasked with demonstrating how the city would grow differently if new housing and commercial development was located within the existing boundaries of the city.

A **regeneration scheme** is encouraging people to move to previously abandoned zones of the city.

STREETS FOR ALL: WALKING, CYCLING AND USING PUBLIC TRANSPORT

In most city cores of the developed world, streets are designed to accommodate various modes of transport i.e. motorists, cyclists and pedestrians. The question is how to optimize the use of the street networks in the redesign of streets. In Europe, North America and Oceania, there are "livable streets" movements or "complete streets" projects that aim to make streets more accessible to all types of users and to make cities more environmentally friendly by reducing motorized transport.[29] Within existing street networks, cities are being re-designed to allocate more spaces for walking, cycling and promoting the use of public space. Cities are dedicating increasing amounts of public space to pedestrians, cyclists, and public transit. For example, London has pedestrianized a part of the famous Trafalgar Square. Vienna too has closed its central streets to vehicle traffic and Copenhagen has built an extensive bicycle network.

Livable streets encourage walking, cycling and transit trips that are not only more cost-effective and environmentally friendly, but which also advance important social goals. London's Walking Plan, for example, argues that walking contributes to "health and well-being" and to the "vibrancy" of the city, while other programmes point to other benefits, such as a stronger sense of community. [30] The common objective of all these initiatives is the reduction of the negative impact of motorized means of mobility.

Various options are available to cities for the redesign of streets, including building separate lanes for cyclists and pedestrians. Other measures for increased safety are associated with the adjustment of traffic signal timings that allows sufficient time for pedestrians to cross a street. A European Union project (ARTISTS) has focused on the assessment of the transformation of arterial streets in order to better accommodate people. However, when this is not taken into consideration at the stage of urban planning, it can be very costly. After four years of evaluation of the reconstruction of arterial streets by research centres, it was found that while it was feasible to redesign arterial streets, the financial cost of doing so was quite high.[31]

Reconstruction of arterial streets has also been undertaken in other European cities and assessed in the ARTISTS project: Meridiana Avenue of Barcelona (Spain), Ikonomidi Street of Kalamaria (Greece), Frederikssundsvej, Copenhagen (Denmark), Regementsgatan, Malmö (Sweden), and Hamngatan Hamngatan, Eskilstuna (Sweden). The common characteristics of these reconstruction projects were the accommodation of pedestrians, cyclists and other users in arterial streets. One important element that is not well considered in these projects is the poor street connectivity in the suburban areas associated with low urban density, which is the focus of the following section.[32]

However, it is important to note that these projects are not tackling the problem of poor connectivity in suburban areas that requires other means.

BOX 3.3: TRANSFORMING LONDON'S TRAFALGAR SQUARE

BEFORE: North Terrace is part of a gyratory

Trafalgar Square was one of the busiest motorized traffic junctions in London. The Square was dominated by traffic and had poor pedestrian access. There were few direct routes for pedestrians to get to the Square so they had to take long detours. Because of the lack of pedestrian crossings, there were serious road traffic accident problems at adjoining junctions and along North Terrace. Despite this, the Square attracted large numbers of visitors, especially tourists.

The main problem was the dominance of vehicles in what should have been a pedestrian-friendly public space. With the central objective of improving access for everyone, a new master plan proposed a scheme that tried to resolve the conflicting needs of traffic and pedestrians. The reconstruction of the Square, completed in 2003, with a cost of £25 million, created a much more pedestrian-friendly space and has made this major London landmark less prone to road traffic accidents.

Arterial streets for people - Guidance for planners and decision makers when reconstructing arterial streets.

ARTISTS project - *1 December 2001 to 30 November 2004. European Commission Fifth Framework Programme Key Action: City of Tomorrow and Cultural Heritage*

Trafalgar Square in London. One of the most popular tourist attraction on Earth it has more than fifteen million visitors a year **© Shutterstock**

ENDNOTES

1 Urban Population growth and urban expansion or sprawl are presented in Chapter 1.

2 In addition to the four US cities, intra-city street data is available for 12 US cities (pre 1950 and post 1950).

3 Europe is classified in sub-regions based on the United Nations, Department of Economic and Social Affairs (UNDESA) classification (UNDESA, 2012).

4 Jaffe, 2011.

5 During that time the land owners contested the redesign of the Manhattan street grid system thinking that they would lose important portions of their plots. However, the grid system has given more value to the land in Manhattan with an increase of the unit value. Indeed the loss in quantity of land was more than compensated by the gain in value of land. The housing of Manhattan continues to appreciate even during financial crises, such as the 1970s downturn where it appreciated by more than 29% between 1970 and 1980 ,while in the same period it depreciated in all boroughs of the city equaling a city-wide depreciation of -12% during the same period (Furman Center for Real Estate and Urban Policy, 2008)

6 Passanneau, 2004.

7 Toronto Centre for Active Transportation, 2012.

8 For a detailed study of a grid system in Montreal refer to Mofarrahi (2009).

9 During the Second Empire in France (1852-1871), Haussmann cut wide new boulevards through the fabric of old Paris, buying and demolishing buildings, setting up axes and monuments, and clearing space around buildings like Notre Dame and the Palais du Louvre. Building of large boulevards was aimed not only to alleviate the social pressures which produced unrest, but also to make the construction and defense of barricades impossible. However these large boulevards in the center of Paris were not transposed in the suburban area that suffers from lack of sufficient land allocated to street and low intersection density (Douglas, 2008).

10 Agyekum, 2005; See also Marshall and Banister (eds), 2007.

11 Beacom, 2012.

12 City of Copenhagen , 2013.

13 St. Petersburg is seen as The "'Venice of the North', with its numerous canals and more than 400 bridges, is the result of a vast urban project begun in 1703 under Peter the Great. Later known as Leningrad (in the former USSR), the city is closely associated with the October Revolution. Its architectural heritage reconciles the very different Baroque and pure neoclassical styles, as can be seen in the Admiralty, the Winter Palace, the Marble Palace and the Hermitage" (UNESCO, undated).

14 The report was presented to Moscow mayor Sergey Sobyanin,

15 Behrendtzen, 2013.

16 "Much of Central Auckland's present street and land subdivision pattern is due to Felton Mathew's 1841 plan, complicated by the mishandling of Crown land sales, and the speculation that followed."(City of Auckland, 2008)

17 City of Melbourne (undated). Melbourne has several famous streets, such as Collins Street, Exhibition, Elizabeth Street and Swanstson Street that run through the heart of the central business district, and constitute Melbourne's most famous shopping strip

18 Wotherspoon, 2011; Department of Main Roads, 1976; see also Ryan, M. 2009; As noted by Wotherspoon (2011) referring to Fitzgerald S. (2007), "when roads ceased to be interpreted as going somewhere else, and became integrated within the built up area, the label 'Road' was often changed to 'Street'." (Wotherspoon, 2011)

19 As noted by Smart Growth America (2010), in many places built since the 1950s, roadway design usually means a system of widely spaced, large arterials fed by smaller roadways that rarely connect with each other. This system concentrates motorized traffic on a limited number of large roads, which causes longer, indirect trips and limits opportunities for alternate routes. Such a network makes it difficult for people who might walk, bike, or take public transportation because the indirect routes lengthen their trips and force them onto roads that are usually not designed for their safety or comfort.

20 Economic effect of good street connectivity and high density will be analysed in forthcoming publications

21 The tendency of interpreting the highest LAS per capita in suburban areas to city core as sufficient street coverage of street in Suburban areas is misleading; it's just an indication of the state of disconnected streets in suburban areas that discourage people to move there. Disconnected streets are essentially wasted streets. For Street density per capita, see also Bertraud, 2013.

22 In economics, an inferior good is a good that decreases in demand when consumer income rises, unlike normal goods, for which the opposite is observed. Normal goods are those for which consumers' demand increases when their income increases. This would be the opposite of a superior good, one that is often associated with wealth and the wealthy, whereas an inferior good is often associated with lower socio-economic groups. Inferiority, in this sense, is an observable fact relating to affordability rather than a statement about the quality of the good. As a rule, these goods are affordable and adequately fulfill their purpose, but as more costly substitutes that offer more pleasure (or at least variety) become available, the use of the inferior goods diminishes. However, the inferiority is not related to the poor or the rich, it is a notion of suppliers.

23 Bento et al, 2005.

24 Phelps and Wu, 2011.

25 UN-Habitat, 2013; In the United States it has been observed simultaneously decrease in urban population densities (Fulton et al. 2001) as well as urban street densities in the sub-urban areas as well as in new cities since the 1950s.

26 New York City Department of Transport, 2009; New York City Department of Transport, 2012; Furman Center for Real Estate and Urban Policy, 2008.

26 Bryan et al, 2007.

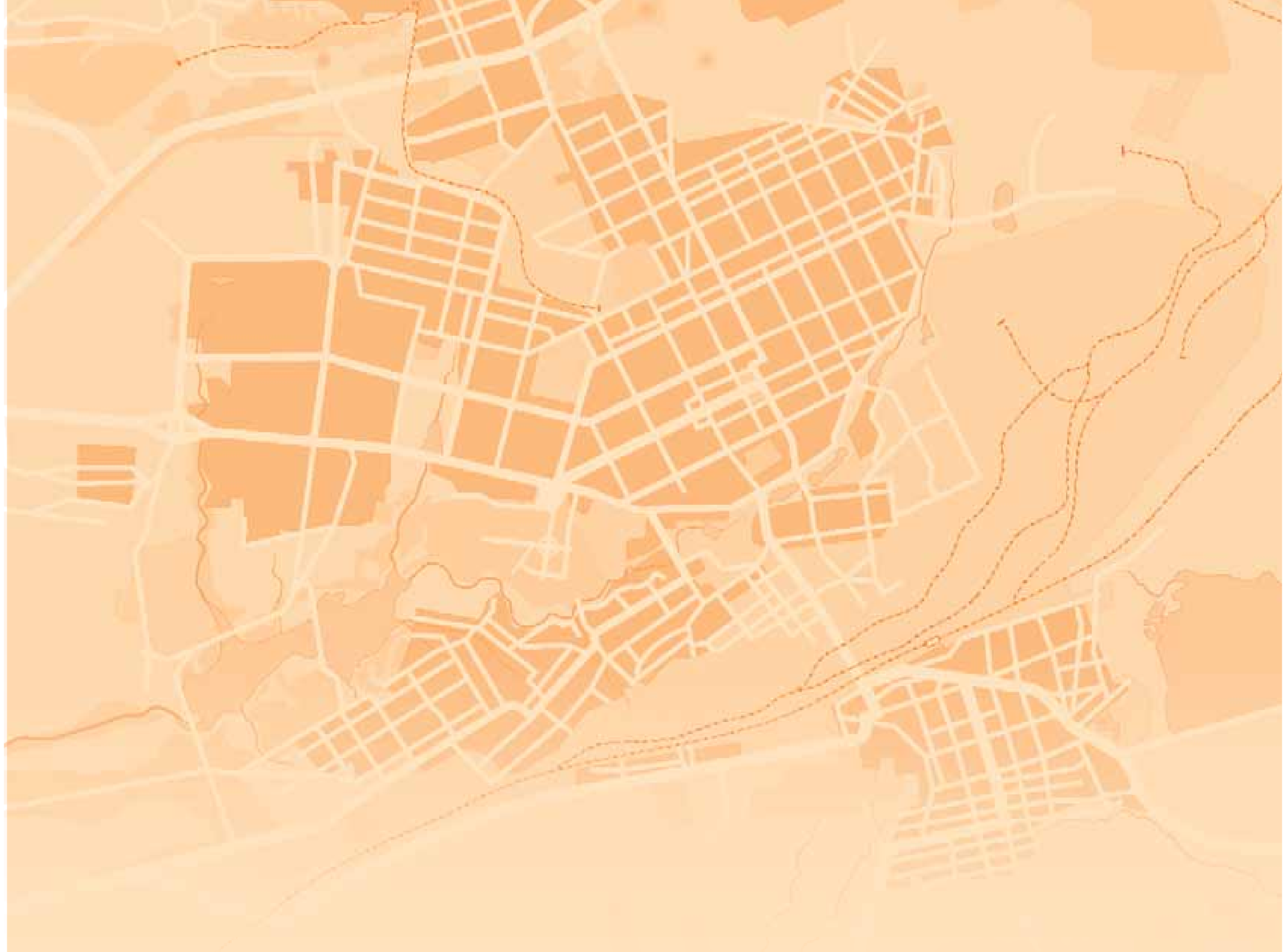
28 Urban sprawl is now rightly regarded as one of the major common challenges facing urban Europe and in Australia as noted by La Greca et al (2009) among others..

[29] Lusher, L., Seaman, M. and Tsay, S., 2008 (livable streets); Toronto Centre for Active Transportation, 2012 (complete streets); Finn, N., McElhanney, D., 2012 (Complete streets); Smart Growth America and National Complete Streets Coalition, 2010 (Complete streets); Arterial streets for people, 2004 (street for all); Central London Partnership, 2003 (Quality streets)

[30] *Lindsey Lusher, Mark Seaman, Shin-pei Tsa, Street to Live By, 2008;* Transport for London, 2004a,

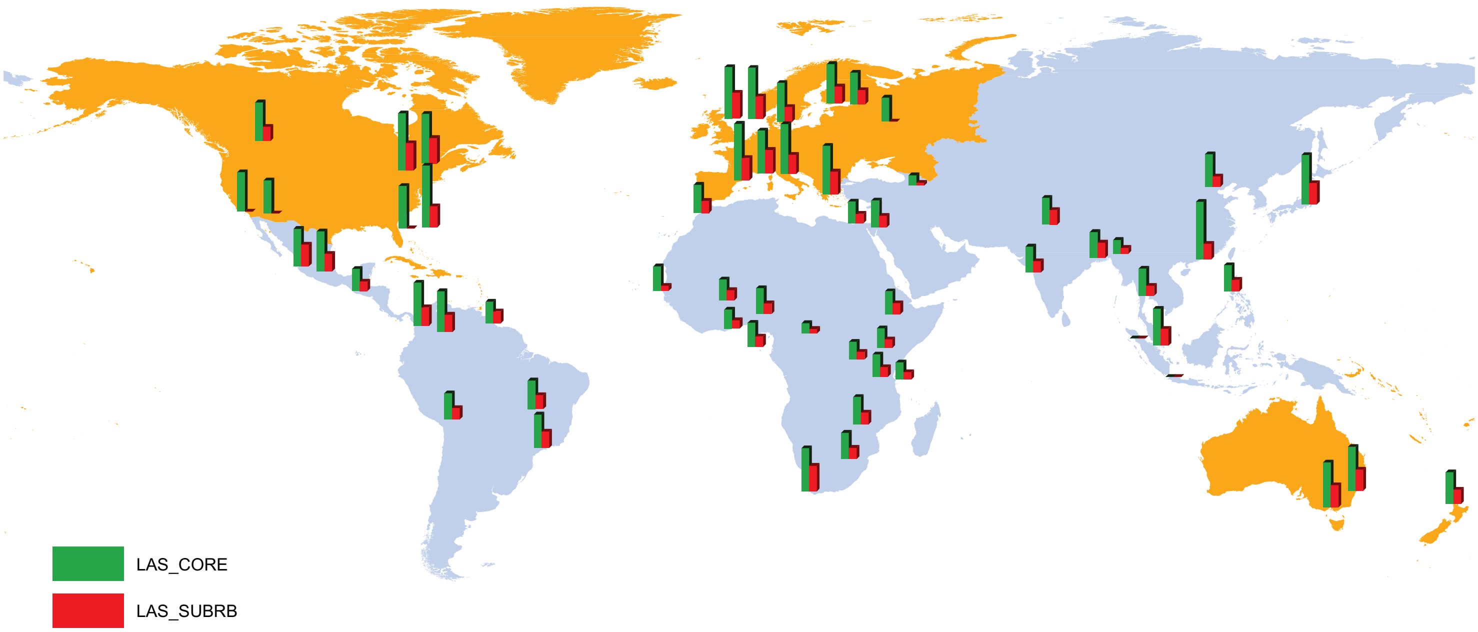
[31] Arterial streets for people - Guidance for planners and decision makers when reconstructing arterial streets. ARTISTS project - 1 December 2001 to 30 November 2004. European Commission Fifth Framework Programme Key Action: City of Tomorrow and Cultural Heritage

[32] Arterial streets for people - Guidance for planners and decision makers when reconstructing arterial streets. ARTISTS project - 1 December 2001 to 30 November 2004. European Commission Fifth Framework Programme Key Action: City of Tomorrow and Cultural Heritage



4

THE STATE OF STREETS IN AFRICA, ASIA AND LATIN AMERICA AND THE CARIBBEAN



The state of streets in much of the developing world is quite different from that of the developed world, both in terms of quantity and quality. In most cities of the developing world, there are not enough streets, and those that exist are either not well designed or well maintained. Therefore, the diagnostic of streets in cities of the developing world must be done differently from cities of the developed world where there is relatively sufficient land allocated to streets, the streets are paved with sidewalks and are well maintained, and street norms and regulations are enforced.

Most African, Asian and Latin American and Caribbean cities share common characteristics: inadequate and deteriorating transport infrastructure; and poor facilities for non-motorized transport (walking and cycling). One effect of these problems has been the further marginalization of the most vulnerable segments of society who rely the most on public transport and cannot afford private alternatives. However, these similarities do come with differences as well—in terms of size, geography, cultural setting and administrative structure – which are considered in this analysis.

This analysis of the state of streets in African, Asian and Latin American and Caribbean cities is based on 40 cities: 18 cities in Africa, 13 cities in Asia and 9 cities in Latin America and the Caribbean. Except for Tokyo, all the cities analyzed here are in developing countries. This is a first attempt to globally assess street connectivity in these three regions. Most of the cities are capital cities or large cities which were analyzed in the City Prosperity Index published in the *State of the World's Cities report 2012-2013: Prosperity* *of Cities.* Some are coastal while others are located inlands. Though they do not represent all cities of their region, they allow us to analyze and to identify some regional variations in street connectivity. The state of streets in medium- and small-sized cities will be analyzed in the second phase of this report series.

MULTIPLE FACETS OF STREET CONNECTIVITY

The following sections analyze three components of the Composite Street Connectivity Index (CSCI): land allocated to streets; street density; and intersection density. Cities are classified into four groups according to the level of land allocated to streets at the city core. The rationale behind choosing the city core of these cities for analysis is the fact that it provides more variations across cities compared to suburbs, which are generally poorly connected in most of these cities.

LAND ALLOCATED TO STREETS

Based on the level of land allocated to streets (LAS) in the city core, African, Asian and Latin American and Caribbean (LAC) cities have been classified into four groups:

1) Cities with low levels of land allocated to streets in the city core (less than 15 per cent);
2) Cities with low to moderate levels of land allocated to streets (between 15 per cent and 20 per cent);
3) Cities with moderate to high levels of land allocated to streets (between 20 per cent and 25 per cent); and
4) Cities with high levels of land allocated to streets (more than 25 per cent).

The first group is composed of 12 African cities, 3 Asian cities and 2 Latin American and Caribbean cities. The second group is composed of 5 African cities, 7 Asian cities and 3 Latin American and Caribbean cities. The third group is composed of 1 African city, 1 Asian city and 4 Latin American and the Caribbean cities; and the fourth group is composed only of 2 Asian cities. Each group will be analyzed separately though comparisons across groups will also be done when necessary.

Cities with low levels of land allocated to streets (below 15 per cent)

A large majority of African cities allocate a very small proportion of land to streets: out of the 18 African cities included in this study, 13 allocated less than 15 per cent of land to streets, with the lowest level (6 per cent) observed in Bangui in the Central African Republic. The level of land allocated to streets observed in the city of Bangui is similar to the level in the Armenian city of Yerevan (6.1 per cent), which is amongst 3 out of 13 Asian cities that allocated low levels of land to streets; the others are Dhaka in Bangladesh (8 per cent) and Jakarta in Indonesia (9.5 per cent). Two out of ten Latin American and Caribbean cities, namely Georgetown in Guyana (12.6 per cent) and Guatemala City (13.1 per cent) in Guatemala belong to this group.

The city planning of Bangui was influenced by the street planning and design of Paris, with wide boulevards oriented towards places of political and economic interest.[1] However, this influence is limited to a small proportion of the city core of Bangui, leaving the rest of the city poorly served with streets. Indeed, except for its large boulevards, Bangui is poorly served by local and connector streets. The streets are narrow and short (4.7 km per square km) and the street network is disconnected (15 intersections per square km).

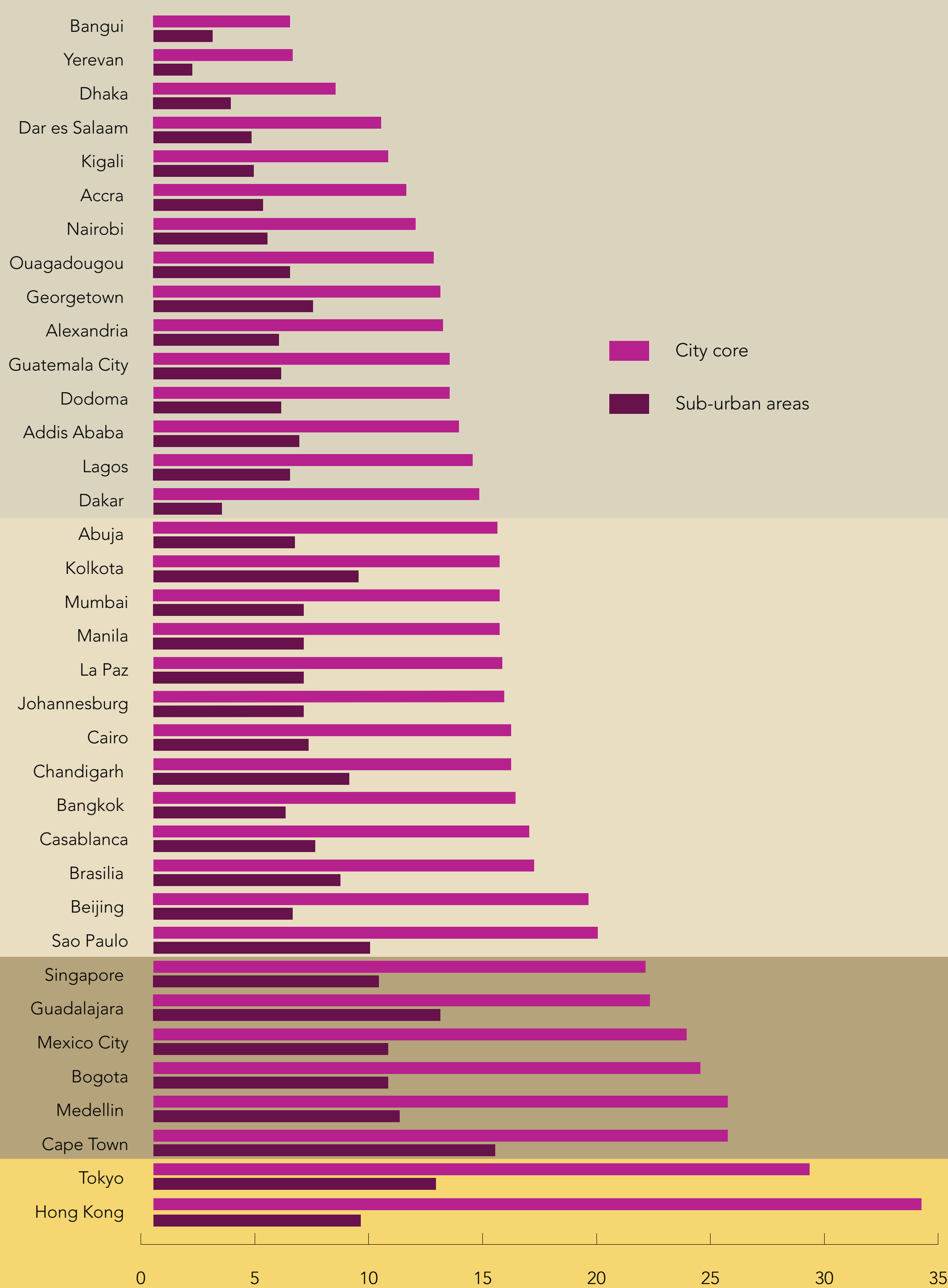
The street components in the city core of Bangui reflect the urban form of many suburban areas of cities of the developing world.

Yerevan's city core is similar to that of Bangui, but for different reasons. The low level of land allocated to streets in Yerevan is the result of a historical choice that favoured narrow streets.[2] The streets of Yerevan are not only narrow but they are also very short and disconnected (6.1km per square km with an intersection density of 18.0). A similar situation is also observed in Dhaka and Jakarta where land allocated to streets is less than 10 per cent in a disconnected street network with an intersection density of 10 and 28, respectively.

Other cities in this group have more land allocated to streets, but the levels are still very low, varying from 10 per cent in Tanzania's major city Dar es Salaam to 14.3 per cent in Senegal's capital Dakar. Three cities in this group, namely, Alexandria, Guatemala and Dakar, offer better connectivity in the city core with an intersection density greater than 100 per cent (194 per cent, 174 per cent and 159 per cent, respectively). Kenya's capital Nairobi, Dar es Salaam and Ghana's capital Accra have only 11.5 per cent, 10 per cent and 11.1 per cent land allocated to streets, respectively. Intersection density is also relatively low in these cities, at 36 per cent, 34 per cent and 38 per cent, respectively. Dodoma (Tanzania), Lagos (Nigeria), Georgetown (Guyana) and Addis Abba (Ethiopia)[3] have slightly more land allocated to streets, varying from between 13 per cent to 14 per cent and an intersection density varying from between 65 per cent and 85 per cent.

However, regardless of the level of connectivity in the city core, in the suburban areas of cities in this group, not only are there few streets built (with less than 5 per cent of land allocated to streets), but those that exist are narrow and disconnected, except for one or two arterial streets passing through neighbourhoods. The city of Dakar offers a typical example: the proportion of land allocated to streets in the suburbs is more than three times lower than its level in the city core (3 per cent versus 14 per cent).

FIGURE 4.1 **LAND ALLOCATED TO STREET (LAS) IN CITIES AFRICA, ASIA AND LATIN AMERICA AND THE CARIBBEAN**



***Source:** UN-Habitat Global Urban Observatory Database 2013*

In this group, suburbanization is mostly synonymous with slum expansion, except for some pockets of gated suburbs occupied by wealthy families. (Urban growth and slum growth often occur simultaneously in cities of the developing world, as described in the *State of the World's Cities Report 2006/7.)* Urban expansion is often the result of poor households moving to the outskirts because they cannot afford to live in the city centre. The suburban areas have street connectivity levels similar to those of slum areas, with irregular street patterns with multiple unplanned dead-end roads. These dead-ends are not the result of city planning but the result of the addition of plots by land owners who subdivide land in search of profits. In this situation, it is common to find a street ending where a subdivision starts. The result is a high frequency of dead-ends with few interections that do not promote connectivity.

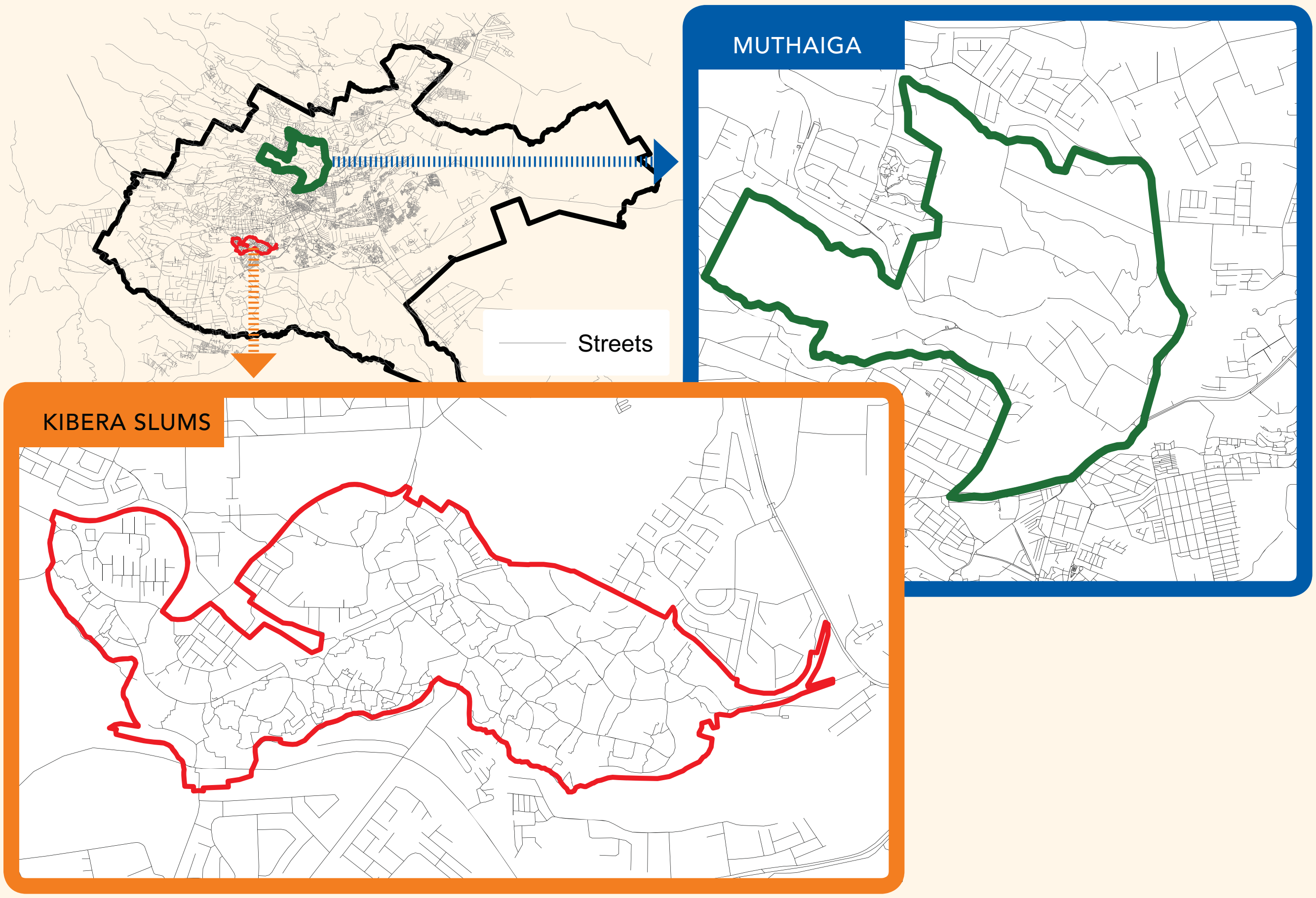
Suburban areas comprise both high-income neighbourhoods and low-income ones. Both types of neighbourhoods are poorly connected, but due to different levels of population density, the per capita land allocated to streets is quite different, with high-income neighbourhoods having higher levels than poorer ones.

Cities with low to moderate levels of land allocated to streets (between 15 per cent and 20 per cent)

Out of the 18 African cities included in this study, only five cities belong to the group with low to moderate levels of land allocated to streets; these are Abuja in Nigeria, Cairo in Egypt, Casablanca in Morocco, Johannesburg in South Africa and Harare in Zimbabwe. Out of the 13 Asian cities in this study, nearly half have low to moderate levels of land allocated to streets. Three of these cities are in India, namely, Kolkota, Mumbai, and Chandigarh; one is in the Philippines (Manila); one is in Malaysia (Kuala Lumpur) and the other one is in China (Beijing). Two Brazilian cities feature in this group, namely, Sao Paolo and Brasilia.

Traffic Jam in Dhaka, Bangladesh. © **www.bdtourplan.com**

BOX 4.1 LAND ALLOCATED TO STREET AND POPULATION DENSITY IN A SLUM AREA AND A UPMARKET RESIDENSTIAL AREA: EXAMPLE OF KIBERA SLUMS AND MUTHAIGA IN NAIROBI



Sources: *Government of Kenya; Openstreetmap*

In Kenya, the slum of Kibera, an informal settlement in the city of Nairobi that has the lowest level of land allocated to streets (3 per cent) in a short network with few intersections, holds the highest population density. However, in the case of Nairobi, low population density does not translate into higher levels of land allocated to streets. In the upmarket residential area of Muthaiga that hosts the wealthiest of the city, the proportion of land allocated to streets is similar to that allocated to Kibera. Muthaiga is not densely populated; the land in this neighbourhood is more dedicated to stand-alone houses within large plots (1 acre or more) than to streets or other public spaces. However, if we consider the population density, the street density per capita is much higher in Muthaiga than in Kibera, as has been observed in gated communities in the developed world.

FIGURE 4.2: **STREET DENSITY IN CITIES, AFRICA, ASIA, LATIN AMERICA & THE CARIBBEAN**

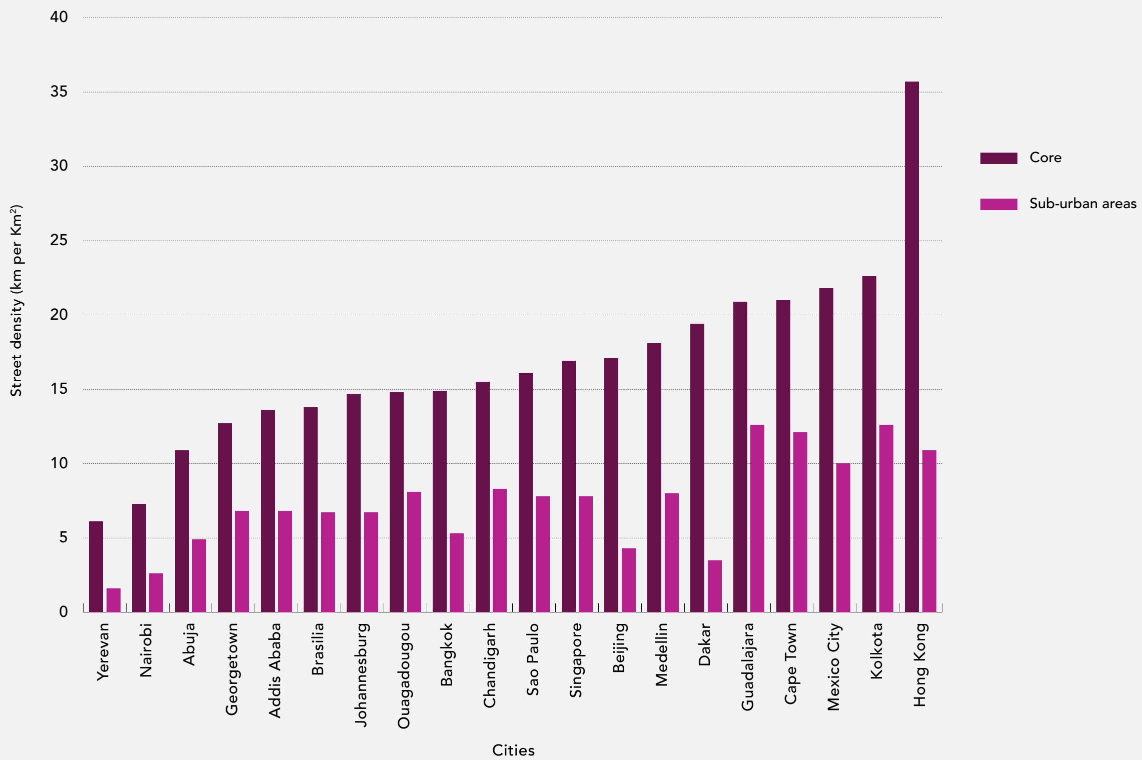


FIGURE 4.3: **RATIO OF LAND ALLOCATED STREET TO STREET DENSITY IN CITY CORE AFRICA, ASIA AND LATIN AMERICA & THE CARIBBEAN**

BOX 4.2: NAIROBI – MIDDLE AND UPPER CLASS NEIGHBOURHOODS UNDER-SERVED BY STREET NETWORKS

Source: *Image © 2013 DigitalGlobe*

In the early 1900s, most African capital cities were originally planned for less than 100,000 people; today they host millions of people. Old city plans did not anticipate rapid urban growth at the outset. Clearly, new planning is required that takes into consideration these new urban forms and structures. For example, new housing is being built without allocating adequate space for streets, parks or recreation centres. This means that families living in multi-storey apartment blocks have few places within their neighbourhoods for leisure and entertainment. In many cases, the apartments are built in areas that have no paved streets and residents have to use muddy lanes to access their homes and the main roads. The immediate consequence of this is a reduction in the quality of life, and less social inclusion. All the components of a prosperous city are thus sacrificed at the altar of increased profits for land owners and real estate developers.

A typical example of the change from single houses to highrises without changing the street planning is the middle-income neighbourhood of Kileleshwa in Nairobi. What is happening in Kileleshwa will most likely happen in upmarket suburbs of the city.

A rapidly growing middle class and greater demand for high- and middle-income housing has transformed the housing and land markets in Nairobi, Kenya's capital city. Stand-alone houses are being replaced with high-rise apartment and office blocks. An acre of land that hosted one household of 5 persons is now hosting 20 to 40 households with 2 to 3 persons. This change has implications for mobility and provision of basic services (water, sanitation, drainage systems, etc.).

Interestingly, in Nairobi, even up-market neighbourhoods lack enough streets or intersections. The amount of land allocated to streets in the upmarket neighbourhood of Muthaiga, for instance, is the same amount allocated to the low-income neighbourhood of Kibera (3 per cent). This suggests that city planners did not plan for a city with many streets or intersections, a mistake that has resulted in heavy traffic jams not just in the city's core area, but also in the suburbs.

Notes: *Muthaiga is the richest estates of Nairobi where live the rich Kenyan families as well as the diplomat communities.*

FIGURE 4.4: **INTERSECTION DENSITY IN CITIES AFRICA, ASIA, LATIN AMERICA & THE CARIBBEAN**

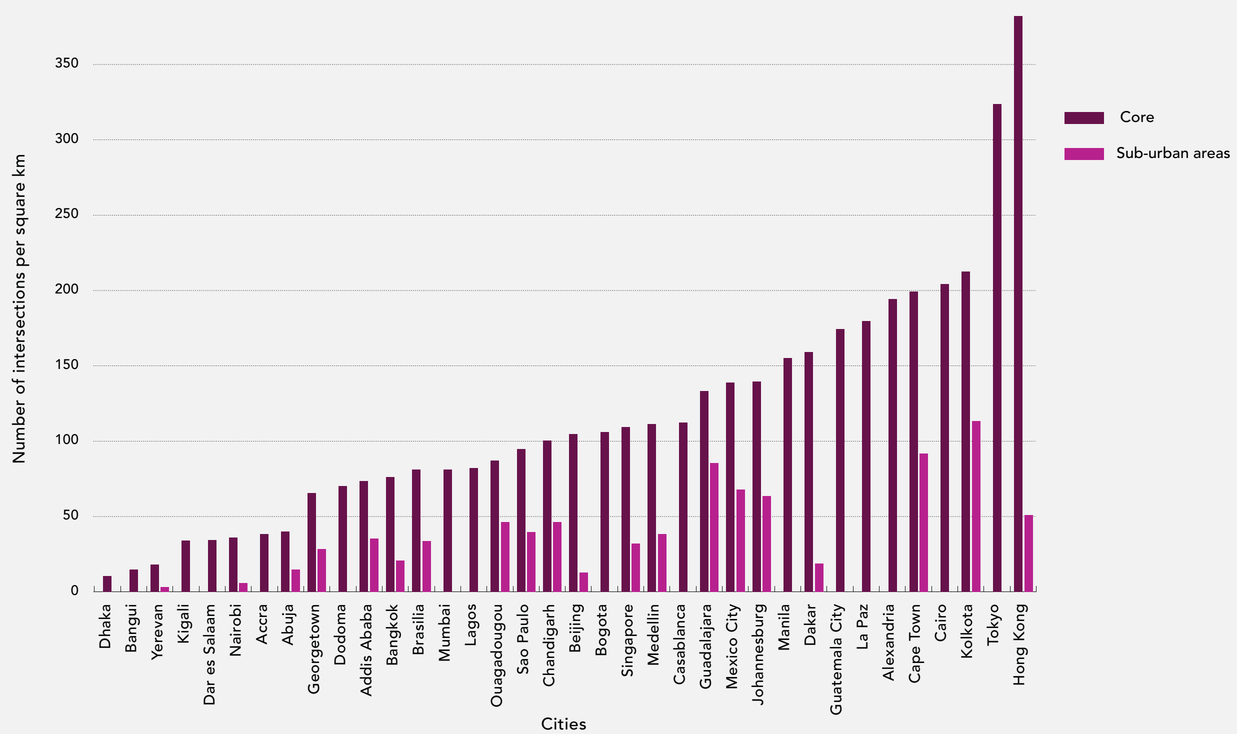
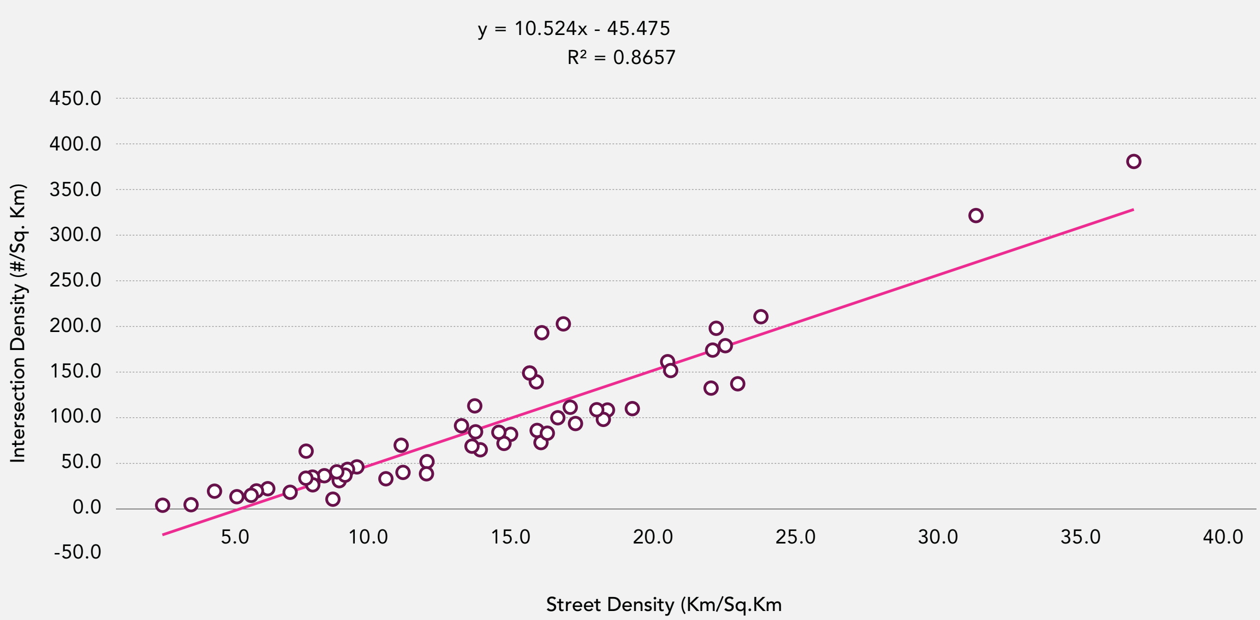


FIGURE 4.5: **RELATIONSHIP BETWEEN INTERSECTION DENSITY AND STREET DENSITY (CORE AND SUBURBAN) AFRICA, ASIA, LATIN AMERICA & THE CARIBBEAN**



It is interesting to note that cities that have adopted what may be referred to as "modern city planning", such as Brasilia, Chandigarh and Abuja, have similar levels of land allocated to streets. Although Brasilia and Chandigarh have adopted similar city planning, the latter seems better connected, with an intersection density of 100 versus 81 for the former. Despite the moderate level of land allocated to streets, the Nigerian capital of Abuja has few intersections (only 40 intersections per square km), which is way below the threshold of 100 intersections per square km. Cairo[4] and Casablanca have levels of land allocated to streets that are similar to that of Abuja, yet have a sufficient number of intersections per square km (204 and 112, respectively). Compared to the city centre of these cities, the city center of Abuja is less walkable; it promotes the use of motorized transport. In both Casablanca and Cairo, efforts have also been made in the context of slum upgrading to develop better street networks that ease access to water and sanitation connections and to better drainage systems.

Cities with moderate to high levels of land allocated to streets (between 20 per cent and 25 per cent)

In this group, the proportion of land allocated to streets varies between 20 per cent and 25 per cent. One South African city, Cape Town, features in this group, along with four others in Mexico and Colombia, namely, Mexico City, Guadalajara, Medellin and Bogota, and one city in Asia, Singapore.5 In addition to sufficient land allocated to streets, street networks are well connected, with intersection density levels higher than 100 intersections per one square kilometer. In fact, the grid pattern that favours high intersections is predominant in the city cores of these cities, with large avenues and boulevards along the street network. For instance, Singapore, with a mixed grid pattern, has 22 per cent of its land allocated to streets and an intersection density of 100 intersections per square kilometer.

However, the relatively high level of land allocated to streets in the city core is not observed in most suburban areas of these cities. In most suburban areas, the proportion of land allocated to streets is less than 10 per cent, a level which is insufficient to provide a connected street network. Indeed, the street network is short and there are few intersections; the level of intersection density is far below the 100 mark. Suburban areas comprise both high-income neighbourhoods and low-income ones. Both types of neighbourhoods are poorly connected, but due to different levels of population density, the per capita land allocated to streets is quite different, with high-income neighbourhoods having higher levels than poorer ones.

The large gap between street connectivity in the city core and in the suburban areas is a reflection of the huge inequalities in most cities belonging to this group. The highest income inequalities are observed in Cape Town and in all the Latin American cities included in this group. In South Africa, the huge inequalities in access to land between the city core and the suburbs are the result of spatial demarcation between European settlers and the indigenous African population (most starkly represented by the past policy of apartheid), with the latter living in dilapidated, crowded and unserviced settlements. As expressed in the City Prosperity Index, high levels of inequality hamper the prosperity of these cities. Although the Composite Street Connectivity Index is relatively moderate in the city core, it is very low in the suburban areas of cities in this group.

The moderate levels of land allocated to streets in these cities do, however, facilitate the provision of other services, such as water and sewerage, which are normally laid out along the paths of existing streets. The provision of basic services is almost universal in these cities in general, with connections to piped water, as well as to sewerage systems. However, considering the high frequency of flooding in some of these cities, we can assume that the opportunity offered by the availability of streets is not equally exploited to set up adequate drainage systems.

Cities with high levels of land allocated to streets (more than 25 per cent)

This group comprises only two cities, all from Asia, namely, Tokyo and Hong Kong, where the proportion of land allocated to streets is 28 per cent and 33 per cent, respectively. Both cities are well developed and contribute significantly to the GDP of their respective countries. Land allocated to streets in these two cities is similar to that observed in most cities of the developed world.

Hong Kong and Tokyo have well connected street networks with a high intersection density (382 and 324 intersections per km^2, respectively) within a lengthy street network. The city of Hong Kong shows that the amount of land allocated to streets is not necessarily associated with the size of the city but to the street planning adopted by the city. At an early stage of its development, Hong Kong implemented its planning based on two parameters: one, to allocate sufficient land to public spaces, including streets, and two, to create a healthy, highly dense settlement. The city holds amongst the highest population densities (more than 25,000 inhabitants per square km) in the world. The Japanese megacity of Tokyo has not adopted a perfect grid pattern, but has allocated sufficient land to streets. Indeed, for defence reasons, the planners of *Tokyo* eschewed the grid system, opting instead for an irregular network of streets surrounding the *Edo Castle* grounds. In later periods, some parts of Tokyo were grid-planned.[6]

Moreover, the suburbs of Hong Kong and Tokyo do not allocate sufficient land to streets – less than 15 per cent. In addition, the intersection density is far below 100, indicating the prevalence of gated communities with a predominance of cul-de-sacs. As has been observed in cities of the developed world, gated communities are also a growing trend in Tokyo and Hong Kong, with wealthy households opting to live far from the outskirts of the city, constituting their own city and presenting an image of two cities within one city.[7]

COMPOSITE STREET CONNECTIVITY INDEX

Street connectivity is determined by the amount of land allocated to streets, the length of the street network and the number of intersections along the network. However, the proportion of land allocated to streets and the length of the street network is not sufficient to assess street connectivity. A city with wide streets within a very limited street network and low intersection density is considered a city with low street connectivity because the width of the streets is not complemented by a larger street network and higher street density. Similarly, a city with a lengthy street network and dense intersections may not quality as a city with high connectivity if the streets are very narrow.

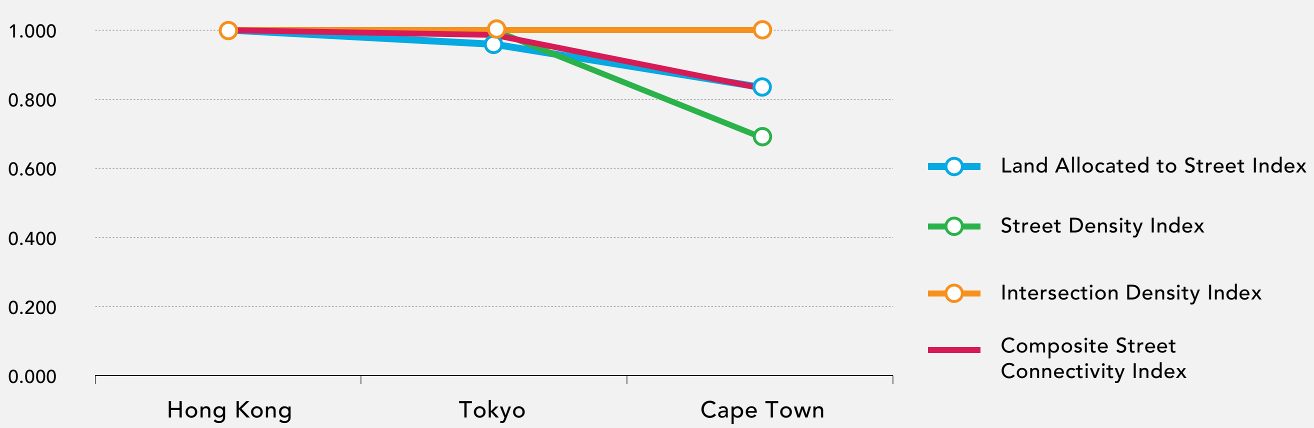
The *Composite Street Connectivity Index (CSCI)* aims to assess the connectivity of a street considering its width, its length and the number of intersections, all in relation to the total land area of a city. The CSCI has only been calculated for 36 cities where information is available for each of the three variables. However, there are other elements of connectivity which are not captured by the CSCI, such as, for instance, those associated with the design of streets (e.g. lanes for pedestrians or cyclists), the condition of the streets (e.g. state of the road and pavements and levels of maintenance), and whether there are lights for crossing, etc. It also does not consider whether the street is designed in a way that it is equitably shared by all users, namely, motorists, pedestrians and cyclists.

Cities have been classified and analyzed based on the values of their CSCI. These cities have been grouped as follows:

1. Cities with a CSCI equal to or above 0.800;
2. Cities with a CSCI of between 0.600 and 0.800;
3. Cities with a CSCI of between 0.500 and 0.600;
4. Cities with a CSCI of between 0.400 and 0.500;
5. Cities with a CSCI below 0.400.

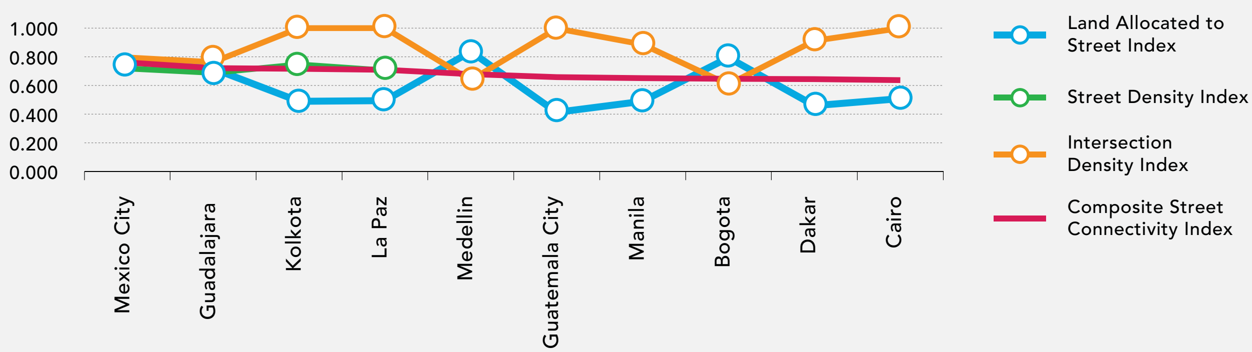
Cities with a CSCI equal to or above 0.800: Only three cities feature in this group, namely, Tokyo, Hong Kong and Cape Town. These cities have high street connectivity in their city core. They have streets sufficiently wide to accommodate all types of users, sufficient to reach all neighbourhoods and corners, and sufficient intersections to accommodate all users. However, it should be noted that in these cities streets are so busy with motorists that there is little room left for other users. In Tokyo, for instance, another element that needs to be considered is the noise of cars that forces many people away from the city centre, except for the purposes of work.[8] If well designed, the streets of Tokyo, Hong Kong and Cape Town could be better public spaces, thereby improving these cities' livability.

FIGURE 4.6: **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF HIGHER THAN 0.800**



Cities with a CSCI of between 0.600 and 0.800: Cities with moderate to high proportions of land allocated to streets (between 20 per cent and 25 per cent), such as Mexico City, Guadalajara, Medellin, Bogota and Singapore, also have a moderate Composite Street Connectivity Index (CSCI), that is between 0.600 and 0.800. Their level of connectivity is sufficient to promote infrastructure development and to ease connections to basic services, such water, sanitation facilities as well as drainage systems. However, their suburban areas are very poorly connectivity, with a CSCI of below 0.300.

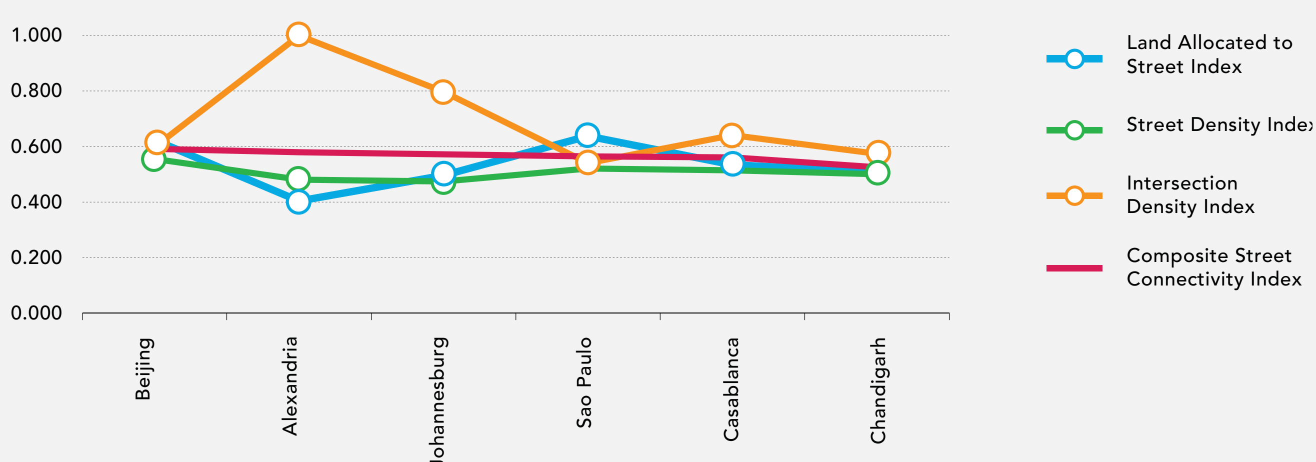
FIGURE 4.7: **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BETWEEN 0.600 AND 0.800**



This group only includes cities with low to moderate proportions of land allocated to streets (between 15 per cent and 20 percent), such as Kolkota, Manila, Cairo and La Paz. The city of Dakar is part of this group thanks to its high intersection density.

Cities with a CSCI of between 0.500 and 0.600: This group includes Beijing, Chandigarh Alexandria, Johannesburg, Casablanca and Sao Paolo. Interestingly, some cities in this group have low levels of land allocated to streets, but higher intersection density (ID) increases the value of their CSCI. For instance, Alexandria has a LAS index lower than that of other of cities in this group, but due to its high ID, it has a CSCI similar to the other cities in the group. The city of Alexandria is planned in grid pattern that favours good connectivity. On the other hand, Beijing has a moderate level of land allocated to streets and low intersection density. This shows clearly that the same amount of land allocated to streets in different cities can lead to different CSCI for these cities, depending on how the streets are planned. If the city, for instance, has many cul-de-sacs, its connectivity will be lower than cities with the same amount of land but planned in a grid pattern.

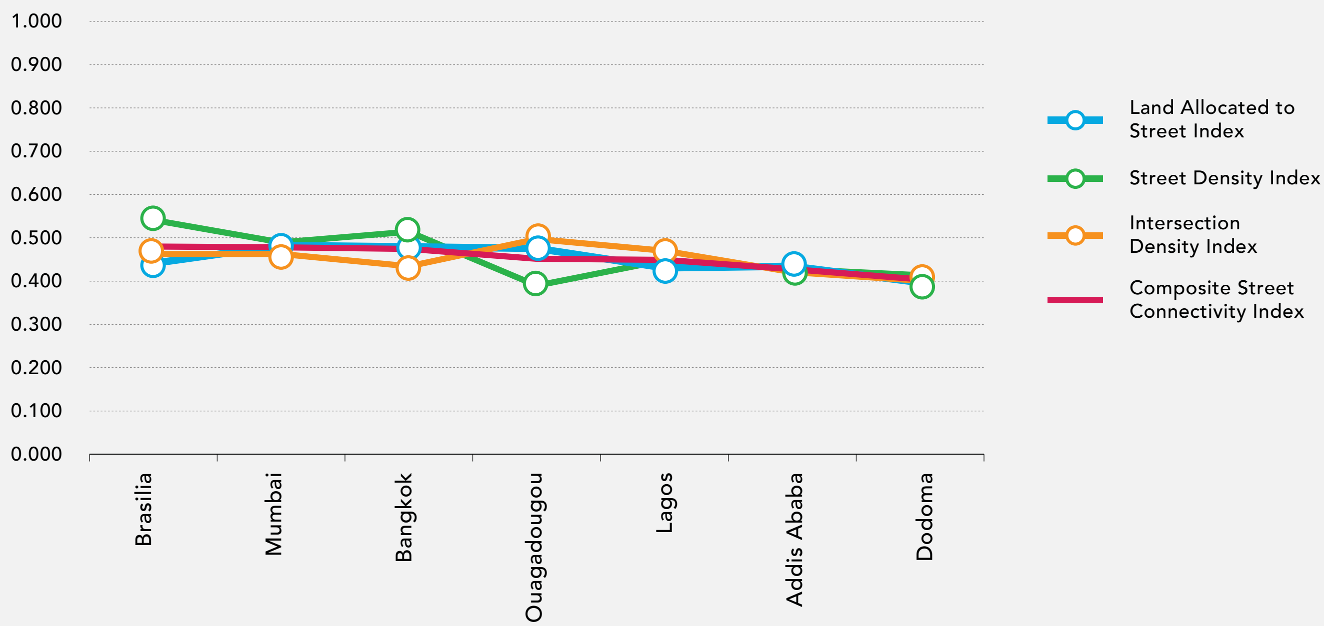
FIGURE 4.8: **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BETWEEN 0.500 AND 0.600**



As noted in other groups, the suburban areas of these cities are disconnected and fragmented with levels of CSCI below 0.500.

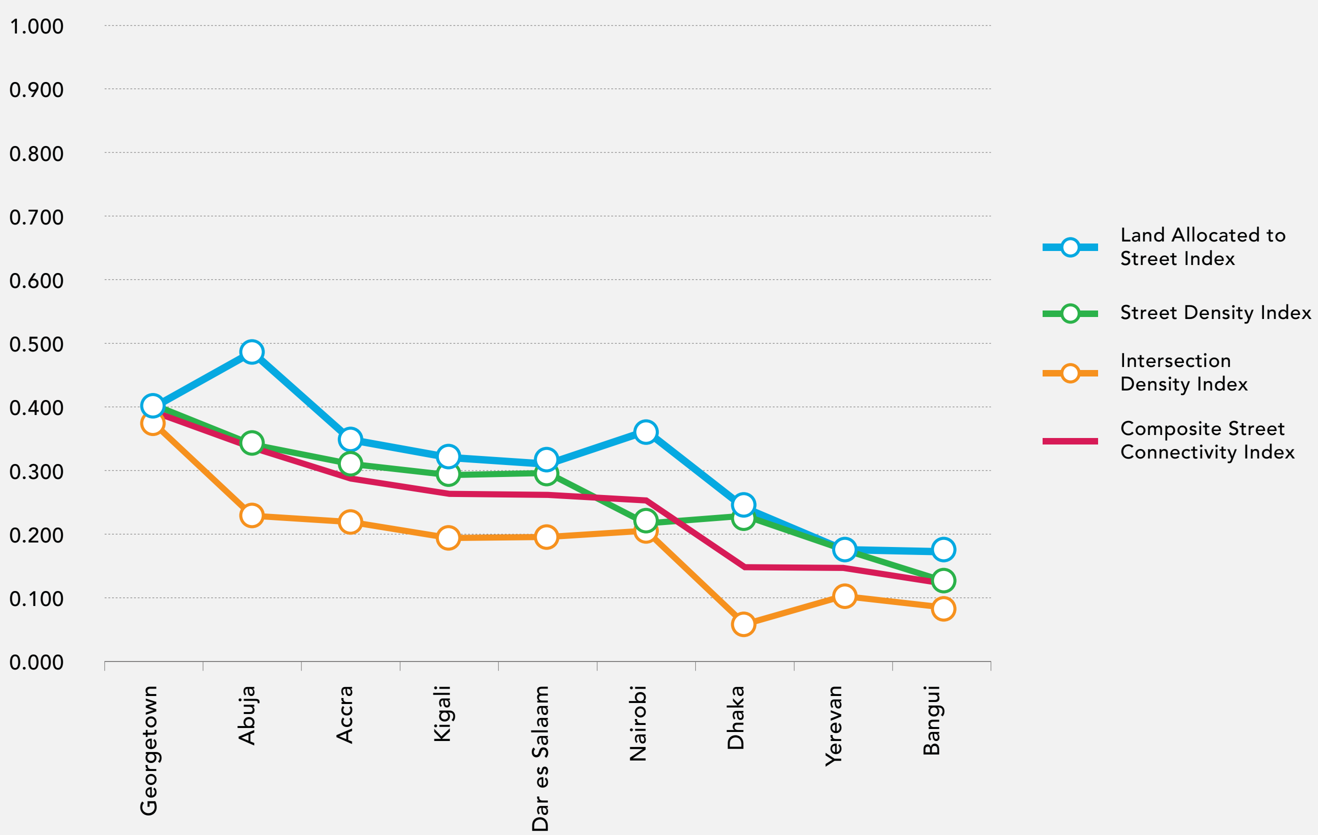
Cities with a CSCI of between 0.400 and 0.500: Except for the city of Ouagadougou, cities in this group share similar levels of land allocated to streets (LAS), street density (SD) and intersection density (ID). However, it is important to note that Ouagadougou belongs to this group, thanks to its relatively moderate level of intersection density compared to Brasilia, which has more land allocated to streets, but lower intersection density. This also indicates that the grid pattern of Ouagadougou city has made optimal use of the land allocated to streets. In Brasilia, and other cities where connectivity is low or moderate, much of the land is "wasted" as it comprises cul-de-sacs and irregular street patterns. Disconnected streets are wasted streets.

FIGURE 4.9: **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BETWEEN 0.400 AND 0.500**



Cities with a CSCI of below 0.400: Cities in this group have very poor street connectivity due to low levels of land allocated to streets, low street density and low intersection density. Their CSCI is less than half the highest level of the CSCI, which is 1. Cities with the lowest levels of land allocated to streets in this group, such as Yerevan, Bangui and Dhaka, also have the lowest CSCI. This group includes other cities with moderate levels of land allocated to streets but low intersection density, such as Abuja. The city of Abuja has a land allocated to street index of 0.500, but an intersection density index of 0.200 that lowers its CSCI. Similar trends have been observed in Accra, Dar es Salaam and Nairobi. However, while some cities may have found alternatives with the development of bus rapid transit systems (BRTs) and the use of trams, Dhaka and Bangui, with high poverty rates, have not been able to offer these alternatives.10 In these cities, specifically in slum areas, which are mainly in unplanned settelements, provision of basic services as well as means of transport remain a challenge. Comprehensive city planning programmes are needed in these cities to improve the lives of urban dwellers.

FIGURE 4.10: **COMPOSITE STREET CONNECTIVITY INDEX AND COMPONENTS, CSCI OF BELOW 0.400**



BOX 4.3: OTHER ELEMENTS OF STREET CONNECTIVITY: THE STATE OF SIDEWALKS AND PAVEMENTS

Besides the low level of land allocated to streets, the street networks in most cities of developing countries are generally substandard. Streets lack service lanes, pavements and are poorly maintained, with limited street lighting The street planning and design do not anticipate the polycentric form of cites and the rapid increase in the use of private cars.

The few existing streets are unpaved

In most cities of the developing world, few streets are paved and most lack sidewalks. For instance, in Ouagadougou (Burkina Faso) and Kigali (Rwanda), only 11 per cent and 12 per cent of the streets are paved, respectively. Less than half of all roads are paved, reducing accessibility for buses in densely populated neighbourhoods and outlying areas.

Data from the UN Millennium Cities Database on paved street density measured by the length of paved streets in metres per 1,000 inhabitants shows that in most African cities, the paved street density is less than 300 metres per 1,000 inhabitants. This level is very low compared to Asian and Latin American and Caribbean cities where the average level of paved street density is at least 1,000 metres per 1,000 inhabitants. The data also shows that there are no sidewalks in 65 per cent of the street networks in Africa. In some cities, sidewalks are quasi-non-existent; only few streets, mainly in the central business districts, have sidewalks. In many residential areas, streets are not even paved, let alone have sidewalks. Where they do exist, sidewalks are poorly maintained and contain open drains. It is also common in cities of the developing world to find properties encroaching on sidewalks, forcing pedestrians onto the streets where they have to face careless motorists. Pedestrian crosswalks and bridges are not provided, except in the city centre. Although crosswalks without signals are provided in some places, such as the central business district, they are seldom respected by motorists or enforced by the authorities.

Sources: *Kumar, A., and Barrett, F. (2008 Stuck in Traffic, Urban Transport in Africa, Africa Infrastructure Country Diagnostic (AICD); Vivien Foster and Cecilia Briceño-Garmendia (Editors), 2010. Africa's Infrastructure – A time for Transformation; UN-Habitat (2013) Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlement 2013; UN Millennium Cities database.*

For data on the Asian region, see also Kumar, N., and De, P. (2008) "East Asian Infrastructure Development in a Comparative Global Perspective: An Analysis of RIS Infrastructure Index", RIS Discussion Papers, RIS-DP # 135

UN Millennium Cities Database.

BOX 4.4: PLANNING OF SMALL CITIES AND TOWNS – THE EXAMPLE OF LAKE VICTORIA CITIES

UN-Habitat's's community profile studies conducted in 25 cities between 2003 and 2012 indicate that most of the streets in African cities lack pavements/sidewalks. While most studies in Africa cover only capital or large cities, this survey provided the unique opportunity to assess the conditions of streets in small and secondary towns – the cities of tomorrow. Indeed, if these cities are not well planned now, they will face the same problems that capital and large cities are facing today. Unfortunately, findings from the community profiles show that these towns and cities are using the trajectory of the cities of today, with limited streets, no pavements, and no street lighting. However, it will be much easier to solve the street network in these small and secondary towns than in large cities.

Country	Secondary Urban Centres	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Urban Population
Kenya	Bondo	7.1	7.1	47,056
	Homabay	8.8	14.0	59,293
	Kisii	12.2	13.4	142,274
	Migori	6.1	9.3	82,464
	Siaya	7.2	10.7	40,555
Tanzania	Bukoba	7.2	7.4	81,221
	Geita	10.5	14.4	52,487
	Muleba	4.9	9.1	10,732
	Musoma	7.0	10.2	108,243
	Mutukula	8.3	19.7	
	Sengerema	7.0	14.6	49,806
Uganda	Bugembe	6.5	8.6	26,268
	Ggaba	7.2	9.7	20,230
	Kyotera	6.9	11.8	7,590
	Masaka	6.3	8.7	67,768
	Mukono	4.1	6.4	46,506
	Mutukula	11.0	18.0	

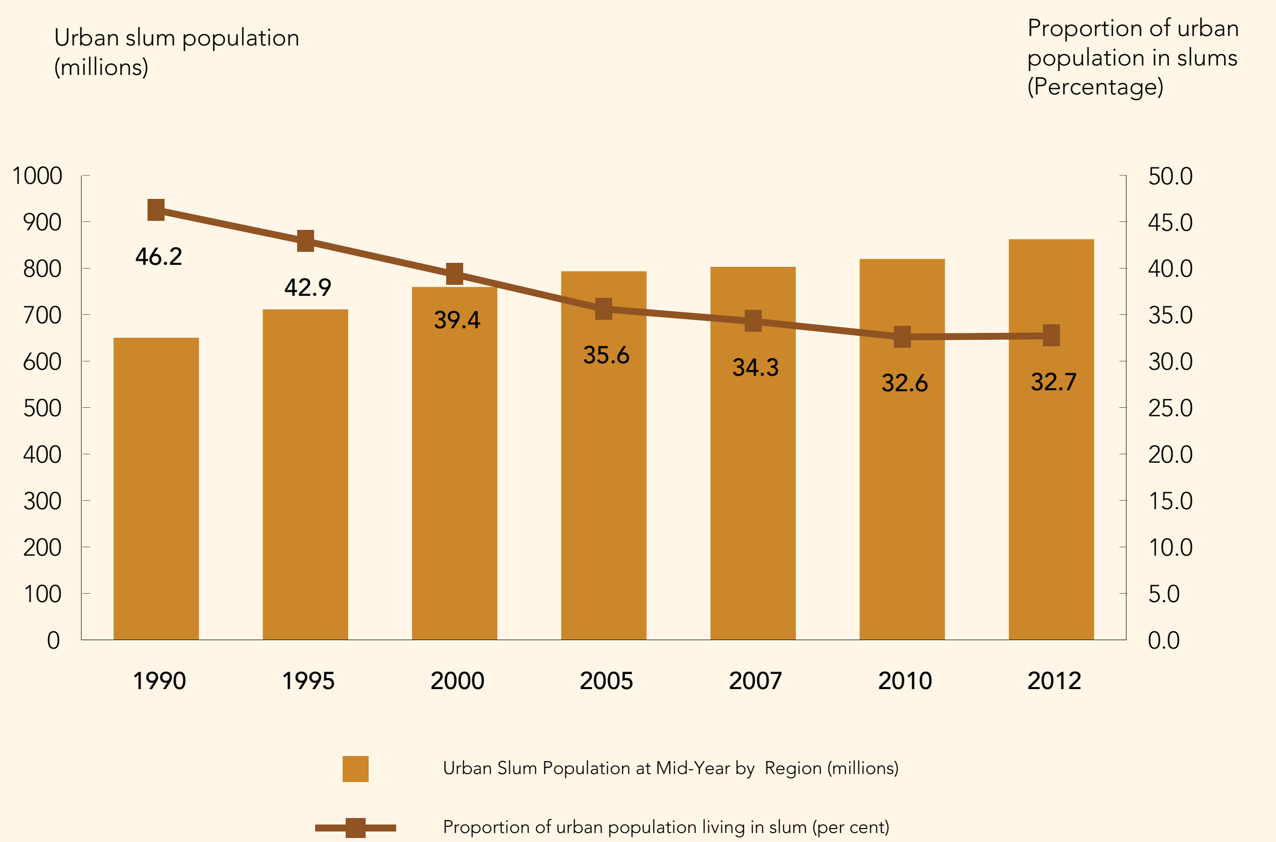
SLUM PREVALENCE LINKED TO LACK OF STREET NETWORKS

Lack of streets an obstacle to provision of basic services in slums and suburban areas

Lack of streets in cities means that cities' ability to provide services, such as safe water and adequate sanitation, is severely hampered. Water and sewerage systems are usually planned along existing street networks, and when these are non-existent, they make it difficult for authorities to provide these services.

Slums are defined by the absence of these services, along with lack of secure tenure, non-durable housing and overcrowding. One out of every three people living in cities of the developing world lives in a slum. UN-Habitat estimates indicate that in 2012 slum prevalence – or the proportion of people living in slum conditions in urban areas – was highest in sub-Saharan Africa; 62 per cent of the region's urban population lives in a slum. In Asia, slum prevalence varies from a high of 35 per cent in Southern Asia to a low of 25 per cent in Western Asia, while in Latin America and the Caribbean, 24 per cent of the urban population was classified as living in slum conditions in 2012. The lowest slum prevalence is observed in North Africa, with a level of 13 per cent. From 2000 to 2012, the share of urban residents in the developing world living in slums declined from 39 per cent to 33 per cent. More than 200 million of these people gained access to either improved water, sanitation or durable and less crowded housing. The MDG target of significantly improving the lives of at least 100 million slum dwellers by 2020 has thus been attained, ten years in advance. However, in absolute terms, the number of slum dwellers continues to grow, due in part to the fast pace of urbanization. The number of urban residents living in slum conditions is now estimated at some 863 million, compared to 650 million in 1990 and 760 million in 2000. Redoubled efforts will be needed to improve the lives of the urban poor in cities and metropolises across the developing world.

POPULATION LIVING IN SLUMS AND PROPORTION OF
URBAN POPULATION LIVING IN SLUMS, DEVELOPING REGIONS, 1990 - 2012



Lack of adequate drainage systems, the source of flooding in cities of the developing world

In slum areas, people live on dirt roads with poor drainage that contributes to serious flooding during the rainy season. The community profiles conducted by the Global Urban Observatory through its Urban Inequity Survey (UIS) in 20 African cities during the period 2003-2012 show that residents often complain of polluted and foul-smelling neighbourhoods.[11] In many African cities, flooding occurs every rainy season. Results from the community profiles show that flooding ranks amongst the top concerns of slum dwellers in cities of the developing world where waste water and solid waste find their way onto tiny, unpaved streets. This makes the streets inaccessible, particularly during the rainy season. Flooding is also the source of accidents, particularly amongst children and the elderly. In addition, it spreads disease as contaminated water is the source of many water-borne diseases.

BOX 4.5: ESTABLISHING A COHERENT NETWORK OF ROADS AND STREETS BOTH IN NEW EXTENSION AREAS AND ALREADY URBANIZED AREAS CONSTITUTES A KEY CHALLENGE FOR CITY PLANNING.

Source: *UN-Habitat,2012*

A mix of approaches, comprised of laying down the street pattern with new streets, main roads, road widening, pedestrian pathways and traffic management must be deployed in order to meet the planning objectives. The creation of new roads and the upgrading of existing roads and streets need to take into consideration various likely impacts of such actions. It should not only respond to different functional requirements, but also guide development and capture the value enhancement of surrounding properties. Investments in infrastructure, streets, public space and increased accessibility generates property valuation and production of wealth. This, along with ensuring the continued maintenance of streets, is a key challenge for urban management.

Streets are the starting point for a physical integration of slums into the formal and official systems of planning and urban management that govern a city.

A street pattern and hierarchy are laid down by an area-based plan that results in a final urban settlement layout connected to the overall city plan. This provides a strong spatial frame to deal with the complexities of regularizing tenure and retrofitting services as part of urban networks, the two key interventions of slum upgrading. The street is a vital element in the improvement of quality of life in slums, particularly in densely occupied settlements where the inadequacy of streets is the source of multiple problems faced by slum dwellers. There are no studies to quantify the impact that poor streets can have on a community, but it is well known that poor quality streets and difficulties in accessibility and connectivity are key indicators of neglected down market areas in cities.

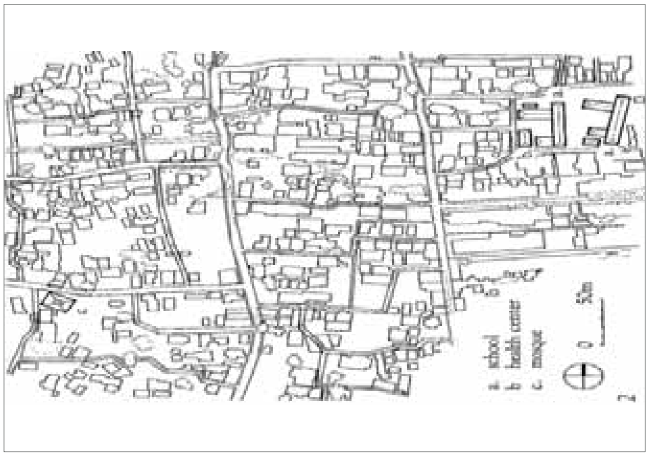
Streets in slums have multiple functions, more than in other neighbourhoods. This is because in most

slums streets are the only public space available. Streets in slums tend to be multi-layered entities instead of clearly zoned areas of use and types. They are host to multiple activities which co-exist and replace each other at different times of the day. They serve as transport space within the slum for pedestrians and passenger and goods vehicles and connect the slum with the city.

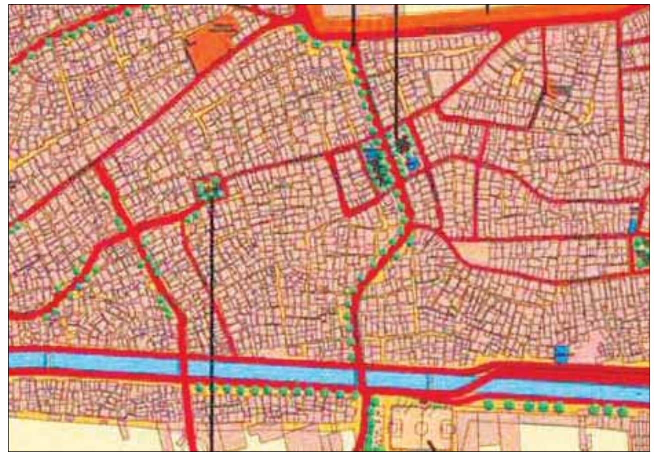
Streets provide the pathway for pipes, power lines, street lighting and drainage systems in upgrading

Projects and define the address and location of residents and businesses. Thus street addressing is part and parcel of the urban transformation that slums need to go through in order to become integrated neighbourhoods in a given city.

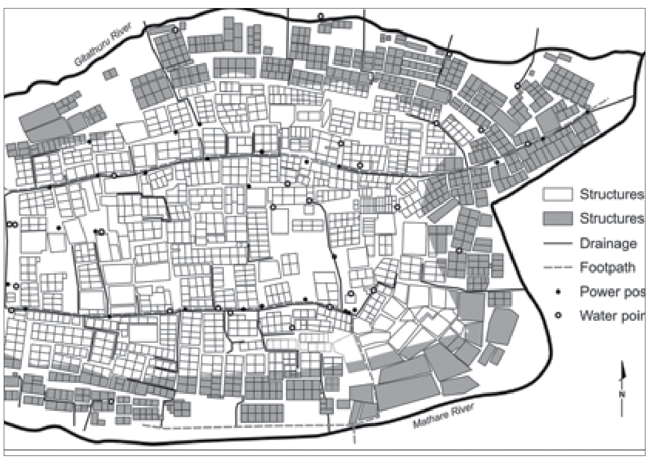
BOX 4.6: STREET PATTERNS IN SLUMS



Kampung, Jakarta, Indonesia

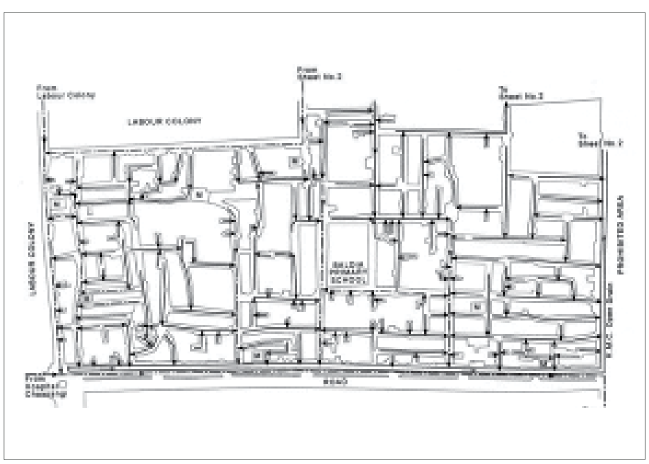


Favela, Rio de Janeiro, Brazil



Slum, Nairobi, Kenya

Zopadpatti, Pune, Inda



Kachhi Abadi, Karachi, Pakistan

Informal neighbourhood, Bissau, Guinea-Bissau

Source: © *UN-Habitat, 2012*

MAP 4.1: LACK OF STREETS AND PUBLIC SPACES IN PLANNED AND UNPLANNED AREAS IN RIO DE JANEIRO

Rocina, located in the south zone of Rio de Janeiro, Brazil. **© Tony Campbell/ Shutterstock**

Lack of streets – obstacles to mobility in slums and suburban areas

Despite lack of street connectivity, slum dwellers have no choice but to walk

For slum dwellers, walking is not a choice, it is a necessity – in their case, walking is not an indicator of their city's livability, but lack of affordable transport alternatives

In most African, Asian and Latin American and Caribbean cities, the poor walk to reach their places of work because they cannot afford the cost of public transport. In slum areas, most people are forced to walk to reach services and facilities using narrow, unpaved streets without sidewalks. In fact, the few streets built are arterial and are meant for motorized means of transport.[12] Pedestrians are exposed to car accidents which sometimes claim their lives.[13]

In these cases, defining street walkability by the high number of pedestrians, as observed in the developed regions of Europe, North America and Australia, is not appropriate. While in developed regions it is assumed that a walkable street is more attractive to people for various reasons, and in fact, defines the "livability" of a city, in slum areas of many cities of the developing world walking on streets is not a choice, but a necessity due to lack of other affordable transport alternatives. In addition, the walkability of the streets in most cities is severely hampered by a lack of sidewalks, which makes walking hazardous.

The irony is, in cities of the developing world, where rich people tend to live in gated communities, the existence of well planned and served streets does not imply social and cultural interactions amongst neighbours. The relatively more walkable streets in high-income areas do not encourage people to use them, partly because walking is associated with poverty. Rich people will often use their cars for the shortest trips, and thus it is not unusual to see empty streets and sidewalks in high-income areas.

© UNEP

Cycling

Streets in Africa, Asia and Latin America and the Caribbean also lack bicycle paths. Like pedestrians, cyclists are pushed off the road by cars. This is the cause of a high number of accidents involving cyclists.

However, it is important to note that cycling is not yet a common practice in many cities of the developing world as it is in cities of the developed world. Very few households own a bicycle. Less than 25 per cent of households in cities of the developing world, especially in Africa, own bicycles compared to near universal ownership in cities of the developed world. Less than 5 per cent of the populations of cities in Lesotho, the Democratic Republic of the Congo and Liberia own a bicycle.[14] While in cities of the developed world, cycling for leisure is common, and now an increasing number of people are cycling to workplaces, in the cities of developing countries cycling is still uncommon. However, there is a growing use of motorcycles in African, Asian and Latin American and Caribbean cities; this increase could be associated with the increased use of motorcycles as "taxis".[15]

Use of Moto in the city of Ouagadougou
Source:* © *UN-Habitat, 2012

In Ouagadougou a large proportion of people use bicycles and motorcycles to reach services such as work places, health centres, educational facilities in unpaved streets with no facilities for cycling and motorcycling.

Public transport

Due to their bad condition, the streets in developing regions discourage the use of large buses and promote the use of minibuses, taxis, and motorcycles, which have greater maneuverability than large buses but are not as efficient a means of urban mass transit. Beyond these general failings, little attention has been paid to other matters that facilitate the operation of public transport systems.[16] Dedicated bus lanes are rare, or absent altogether. Bus stops, bus shelters, and other facilities for passengers are scarce and in a poor condition.[17] Bus terminals are little more than overcrowded parking lots, with no facilities for passengers.[18]

The supply of public transport services is also increasing in North Africa, with light rail and tram systems available in Cairo, Casablanca, Rabat, Algiers and Tunis. Metro systems are now servicing the population in Cairo (Egypt) and Dubai (United Arab Emirates).[19]

BOX 4.7: THE ERA OF HIGHWAYS, ARTERIAL STREETS AND BUS RAPID TRANSIT (BRT) – ONE SIDE OF THE CORNER

While in cities of the developed world, there are plans to transform arterial streets to accommodate pedestrians, and further to create livable streets, in cities of the developing world local authorities are more preoccupied with building arterial streets for motorized vehicles, thereby ignoring the needs of pedestrians that constitute the biggest users of streets. In these poorly planned arterial streets neither sidewalks nor bicycle lanes are provided. This is common in most cities of the developing world where a low proportion of land is allocated to streets and traffic congestion is a major concern.20 Here city authorities put more emphasis on tackling traffic congestion than improving the mobility of pedestrians and cyclists. A recent example of this is the newly-built Thika Superhighway that links the Kenyan capital Nairobi to Thika and Nyeri towns in Central Kenya.

Faced with multiple problems associated with lack of streets or poorly designed streets, many cities in Africa, Asia and Latin America and the Caribbean that have moderate levels of land allocated to streets are adopting the Bus Rapid Transit (BRT) system. From Cape Town and Curituba to Bogota and Beijing, the adoption of BRT is providing an alternative to individual cars. In Africa, bus rapid transit (BRT) systems have been introduced in Lagos (Nigeria) and Johannesburg (South Africa) generating substantial benefits for residents. Perhaps most notable are China's growing investments in metro and BRT systems, servicing millions of passengers in urban areas. Latin America has relatively good formalized public transport in cities such as Montevideo (Uruguay), Bogotá (Colombia) and Rio de Janeiro (Brazil). A growing number of urban BRT systems in Brazil, Colombia, Chile, Ecuador, Peru and Venezuela have also expanded public transport services significantly.

While BRT allows the transport of more people, there is one problem that will remain unsolved – walkability. Cities of the developed world adopted BRT long ago and are now focusing more on the re-design of streets to accommodate pedestrians and cyclists. Cities in less developed regions of the world need to do the same.

Sources: *UN-Habitat (2013) Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlement 2013;* Chen, 1997; Cervero, 2013; Cervero and Golub, 2011; *ITDP (2008) 'Bus rapid transit's new wave: Ahmedabad, Guangzhou, and Johannesburg', Sustainable Tran port Winter (20):12–13, http://www.itdp.org/documents/st_magazine/ITDPST_Magazine%20V%2020.pdf; ITDP (Institute for Transportation and Development Policy) (2007) Bus Rapid Transit Planning Guide, ITDP, New York, http://www.itdp.org/documents/Bus%20Rapid%20Transit%20Guide%20-%20complete%20guide.pdf,*

STREETS FOR ALL BOGOTÁ, COLOMBIA.

Source: **©** *Karl Fjellstrom,itdp-china.org*

STREETS FOR ALL: WALKING, CYCLING AND USING PUBLIC TRANSPORT

The movement is timidly taking off in some African, Asian and Latin American and Caribbean cities

There is a basic spatial structure of streets in Tokyo, Hong Kong and to some extent Mexico City, Guadalajara, Medellin, Bogota and Cape Town. In the city centre of these cities, the streets can accommodate all users when they are well designed. Most of these cities have joined the livable streets movement that originated in the developed world. The movement aims to promote streets for all and make cities livable and become more pedestrian- and cyclist-friendly by reducing motorized transport. Within the existing street network, cities are re-designing their streets by allocating more spaces for walking, cycling and promoting the use of public spaces. The cities that are dedicating increasing amounts of public space to pedestrians, cyclists, and public transit include Bogota, Mexico City, Cape Town, Tokyo, Hong Kong and Singapore.[20]

On a smaller scale, other cities in Africa, Asia and Latin America and the Caribbean are also redesigning streets to allow pedestrians and cyclists to share space with motor vehicles. Design measures that enhance the pedestrian environment include expanding sidewalks, planting trees and installing benches or other seating. All these initiatives have a common set of objectives: to enhance environmental sustainability, social interaction, public health, productivity and social inclusion, the key components of a prosperous city. However, these initiatives are still not addressing problems faced by the urban poor who live in suburban areas and slums. Most suburban areas and slums are poorly served by streets; this further hinders the provision of basic services, such as connections to water and sanitation facilities. Lack of street networks in these areas also reduces the urban poor's transport choices.[21]

Source: *© www.andrewboraine.com*

ENDNOTES

1 The implementation of an orthogonal plan in Dakar was not a new practice, but a typical urban planning approach in other French colonial settlements in Africa and elsewhere in the eighteenth and nineteenth centuries (Harris, 2011).

2 Katsenelinboigen, 1990.

3 Baumeister and Knebel, 2009.

4 For more details of Cairo as walled city see Mohareb and Kronenburgarab, 2012.

5 See also Ministry of National Development et al, 2000.

6 Hidenobu, 1995.

7 UN-Habitat, 2008 ; UN-Habitat, 2010.

8 Sassen, 2001; Mercer, 2013.

9 Smart Growth America, 2010.

10 UNEP, undated; Tsarukyan, 2006.

11 Urban Inequities Survey

12 For mobility data see: UN-Habitat, 2013; UITP, 2006; Vasconcellos, 2001.

13 WHO, 2004.

14 UN-Habitat, Global Urban Observatory 2013 Database.

15 Kumar, 2011.

16 Cervero, 2009.

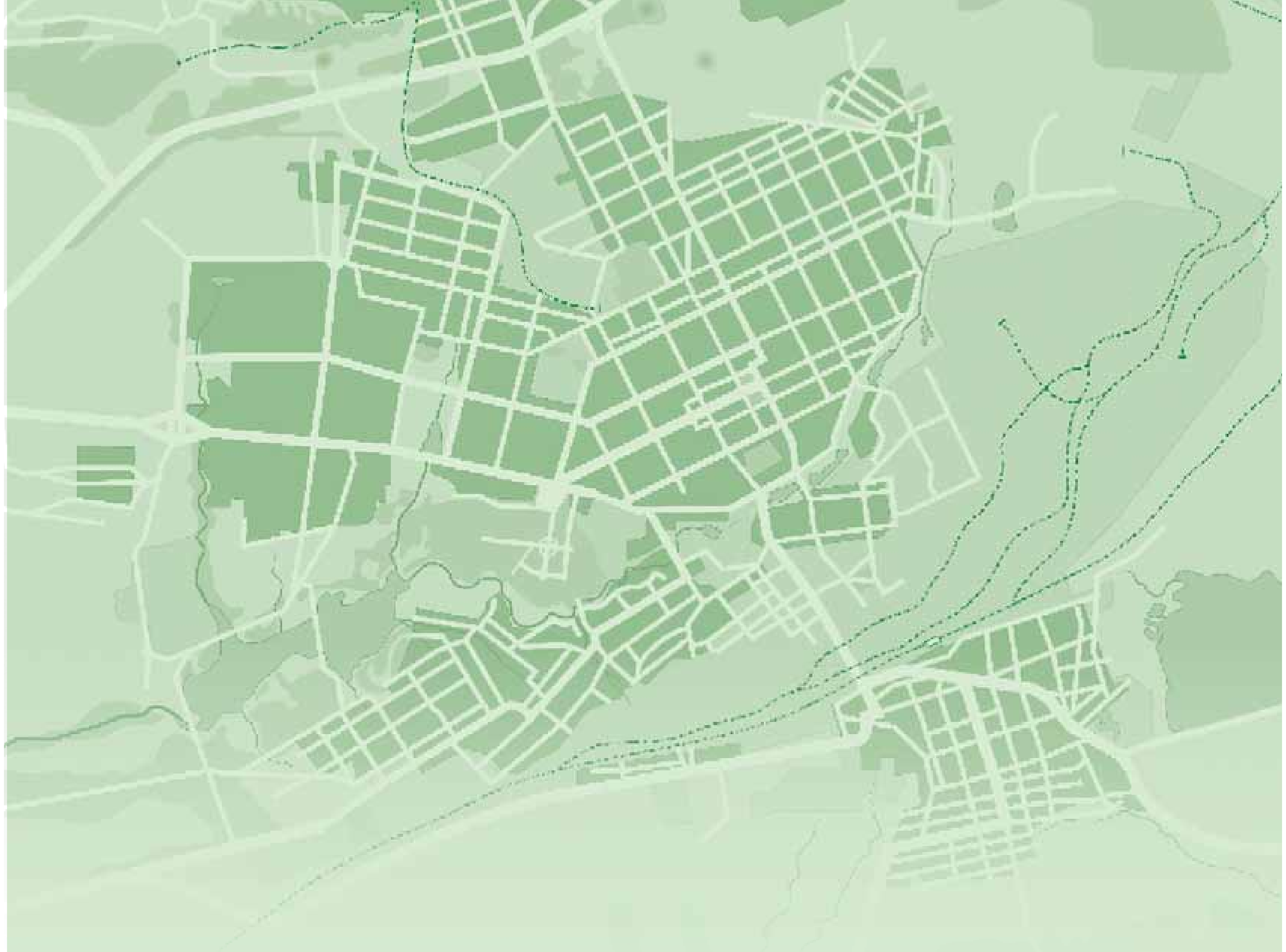
17 Cervero, 2000.

18 UN-Habitat, 2013; Kumar and Barrett, 2008.

19 UN-Habitat, 2013

20 Lusher et al, 2008.

21 Cervero, 2005; Cervero, 2011.



5

STREETS AS PUBLIC SPACES AND DRIVERS OF URBAN PROSPERITY

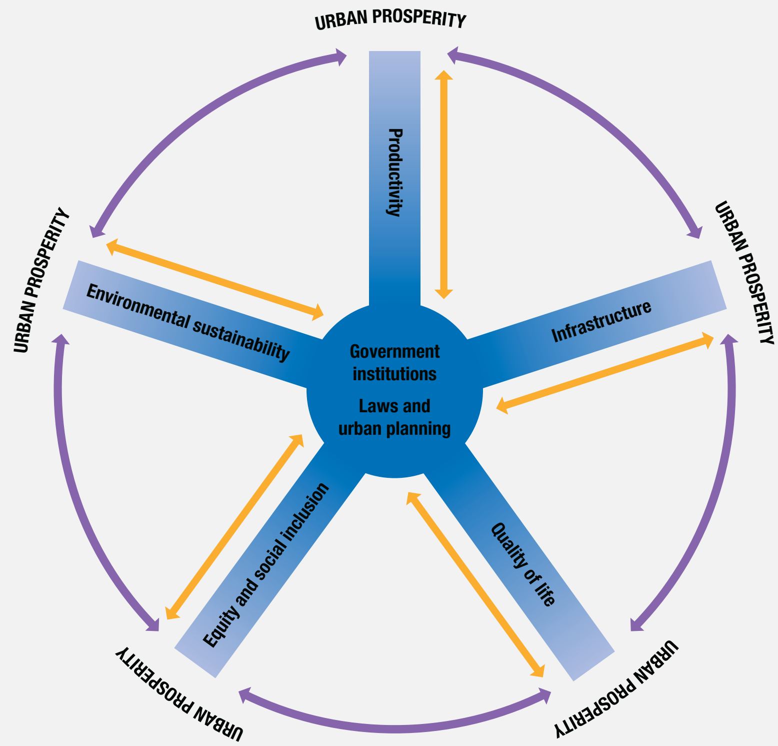
La Rambla in Barcelona, Spain. Thousands of people walk daily by this popular pedestrian area 1.2 kilometer-long. © **Shutterstock**

The first edition of the City Prosperity Index (CPI) published in the State of the World's Cities 2012/13 was based on five components which are the spokes of the wheel of urban prosperity: infrastructure development, environmental sustainability, productivity, quality of life and equity and social inclusion. [1] No element of the hub of the wheel was included in the measurement of the CPI. This time, an element of the hub, street connectivity, is featured in the CPI. For a city to be prosperous, it must have prosperous streets. One fundamental feature of prosperous streets is their connectivity in terms of planning and design. The Composite Street Connectivity Index (CSCI) is now an integral part of the CPI and expresses the determining factors of urban form and structure on city's prosperity.

As presented in the conceptual framework, the urban form, as element of the hub of the wheel of urban prosperity, influences prosperity of cities through the five spokes of the wheel. Although it is possible to estimate its effect on each spoke, how these different effects interact and impact prosperity of cities are not yet established. Therefore here, we are using only the combined effect of the CSCI on the CPI without decomposing it across the spokes. In this case, it is clear that the effect of street will be presented at its minimal level as it is also done with the spokes.

As predicted, when CSCI was included as a component of city prosperity, the CPI of some cities changed. The CPI of cities that were previously considered relatively prosperous dropped if their street connectivity was poor. Other cities that did not do well in some components of the CPI, but had a good street network, obtained a higher CPI ranking. (A city with a high CPI has a ranking close to 1, whereas a city with a low CPI has a ranking that is closer to 0.)

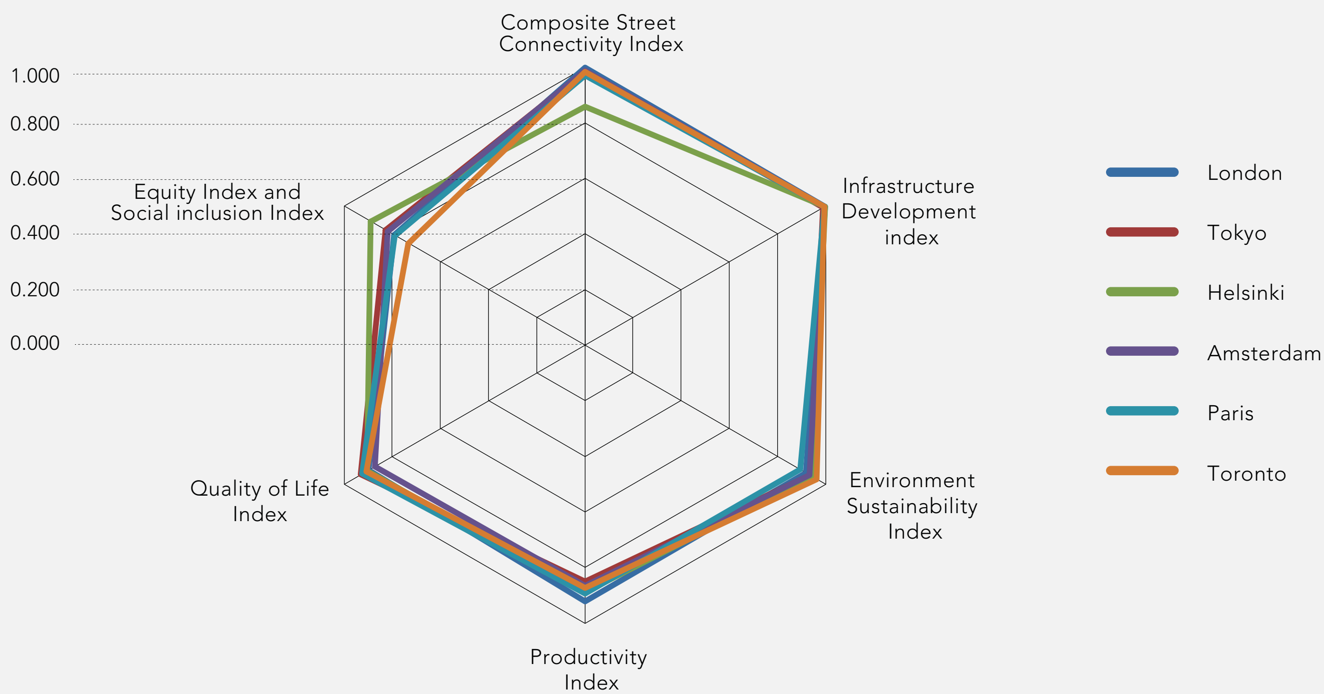
STREETS AS PUBLIC SPACES AND DRIVERS OF URBAN PROSPERITY



CITIES WITH A CPI OF EQUAL TO OR HIGHER THAN 0.900

Four cities in Europe have a CPI equal to or higher than 0.900; these cities are London, Helsinki, Amsterdam and Paris. In North America, only one city -Toronto – has this high ranking while Tokyo is the only city in Asia that has such a high level of prosperity. No city in Africa and Latin America and the Caribbean enjoys a CPI that is higher than 0.900. As the hexagon shape in the radar shown in Figure 5.1 indicates, cities in this group enjoy high street connectivity, good infrastructure development, good environmental sustainability, high productivity and quality of life, and also high levels of equity and social inclusion. In other terms, they do well in all components of prosperity, including street connectivity. The Infrastructure Development Index is higher than 0.9 in all these cities. Provision of basic services (water, sanitation and drainage facilities) is quasi-universal with an index close to 1. With good street connectivity, these cities also enjoy high productivity with optimal commuting time to work and other services. Cities that have a high productivity index are also cities that have reduced traffic congestion and improved walkability through better street connectivity. In these cities the quality of life associated with health and safety is amongst the highest globally. Indeed their citizens enjoy public spaces, green spaces and walkable streets. With many streets re-designed to promote pedestrians and cyclists, it is expected that the quality of life in these cities will improve further.[2] By promoting walking and cycling, obesity and related heart diseases will decrease.[3] Although, there is long way to go regarding equity and social inclusion, these cities enjoy availability of sufficient land allocated to streets which is a prerequisite for the achievement of "livable streets" or "complete streets" and other socially-conscious projects. Promoting streets for all, particularly for pedestrians, cycling and public transport are driving the wheel of urban prosperity towards prosperous streets, streets that promote infrastructure development, enhance environmental sustainability, support high productivity, and promote quality of life, equity and social inclusion.

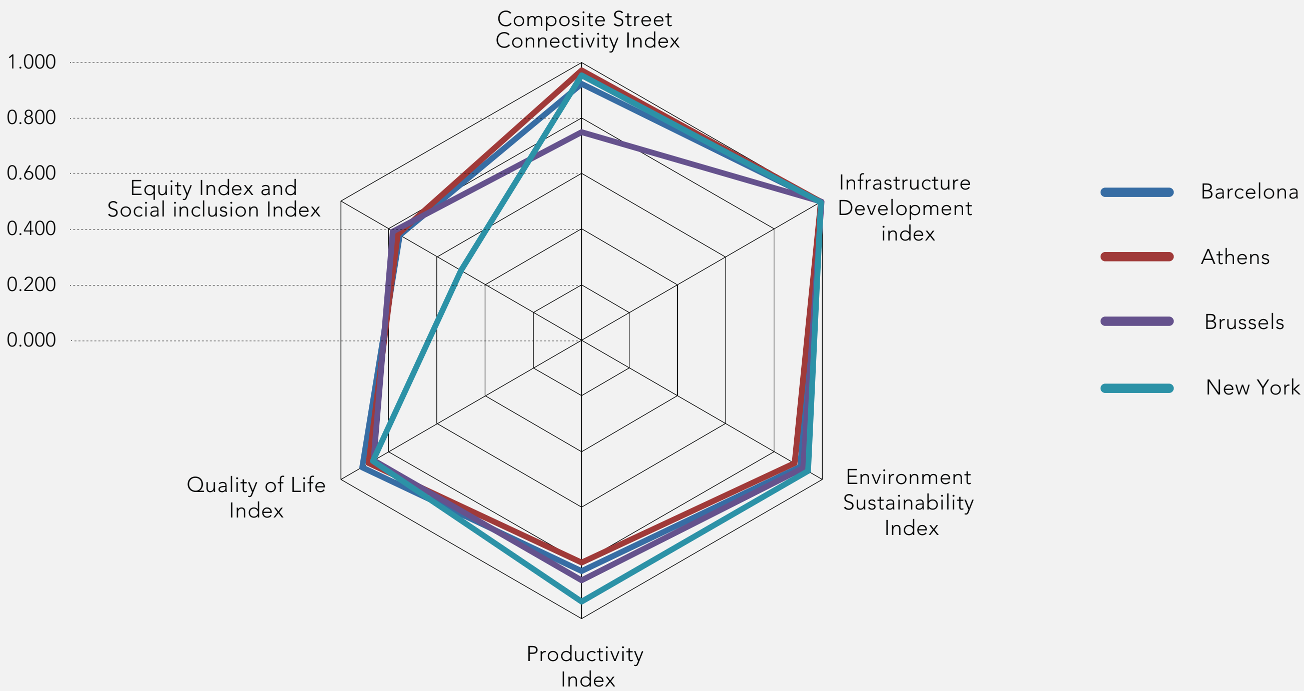
FIGURE 5.1 **CPI OF EQUAL TO OR HIGHER THAN 0.900**



CITIES WITH A CPI OF BETWEEN 0.800 AND 0.899

When the equity index is included in the CPI, the findings show that urban equity and prosperity are closely linked. The city of New York does well in almost all spokes and the hub, except in the equity dimension. Inequality is high in the city of New York with a level of 0.5. However, with its high street connectivity, the city enjoys high productivity, high infrastructure development and offers to its inhabitants a high quality of life that ensures environmental sustainability. Indeed, the city has all the characteristics of a very prosperous city, except in the equity component. Barcelona, Brussels and Athens belong to the same group as New York, but for different reasons; they perform well in almost all components of prosperity but not as much as cities such as London and Amsterdam. New York and Barcelona also embrace the livable street movement.[4]

FIGURE 5.2 **CITIES WITH A CPI OF BETWEEN 0.800 AND 0.899**

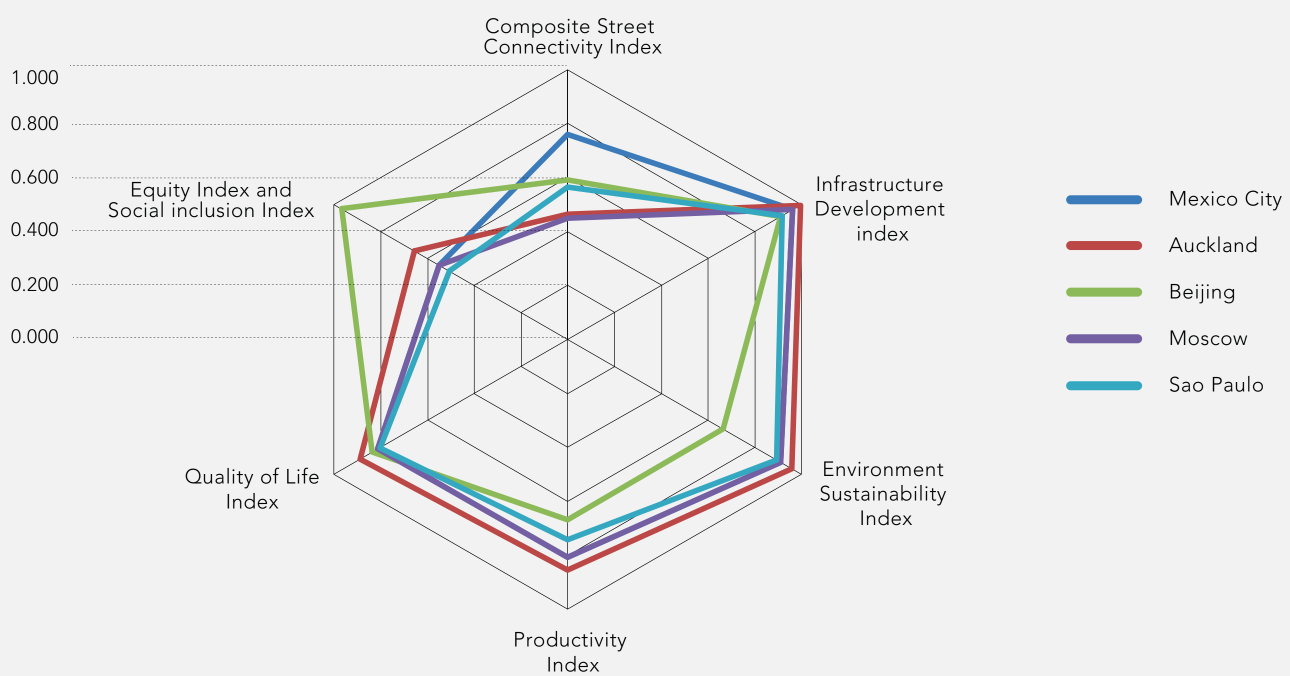


CITIES WITH A CPI OF BETWEEN 0.700 AND 0.799

Auckland, Moscow and Beijing feature in this group, along with other cities in Latin America, namely, São Paulo, and Mexico City. Auckland and Moscow belong to this group due their poor level of connectivity; both have a CSCI that is below 0.500, the lowest level in this group. In addition to a low level of street connectivity, Moscow has high levels of inequality, along with Mexico City and São Paulo. While inequality is historically entrenched in most Latin American cities, it is a recent phenomenon in Russia, and became more prevalent in aftermath of economic liberalization. Beijing belongs to this group for different reasons; despite its high level of infrastructure development and quality of life indices, the city performs moderately well in terms of street connectivity, environmental sustainability and productivity with scores of 0.592, 0.663 and 0.667, respectively. Beijing like many Chinese cities such as Shanghai, suffers from high levels of outdoor population (measured by PM10).[5] Considering the role of good street connectivity in reducing the use of motorized means of transport, improvement of street connectivity in Beijing can contribute to higher environmental sustainability.[6]

The fact that cities can belong to the same bracket for different reasons call for different solutions according to each diagnosis. This is one of the powers of using the urban wheel framework to assess prosperity of cities. This will also avoid replicating solutions from cities to cities without adequate diagnosis.[7]

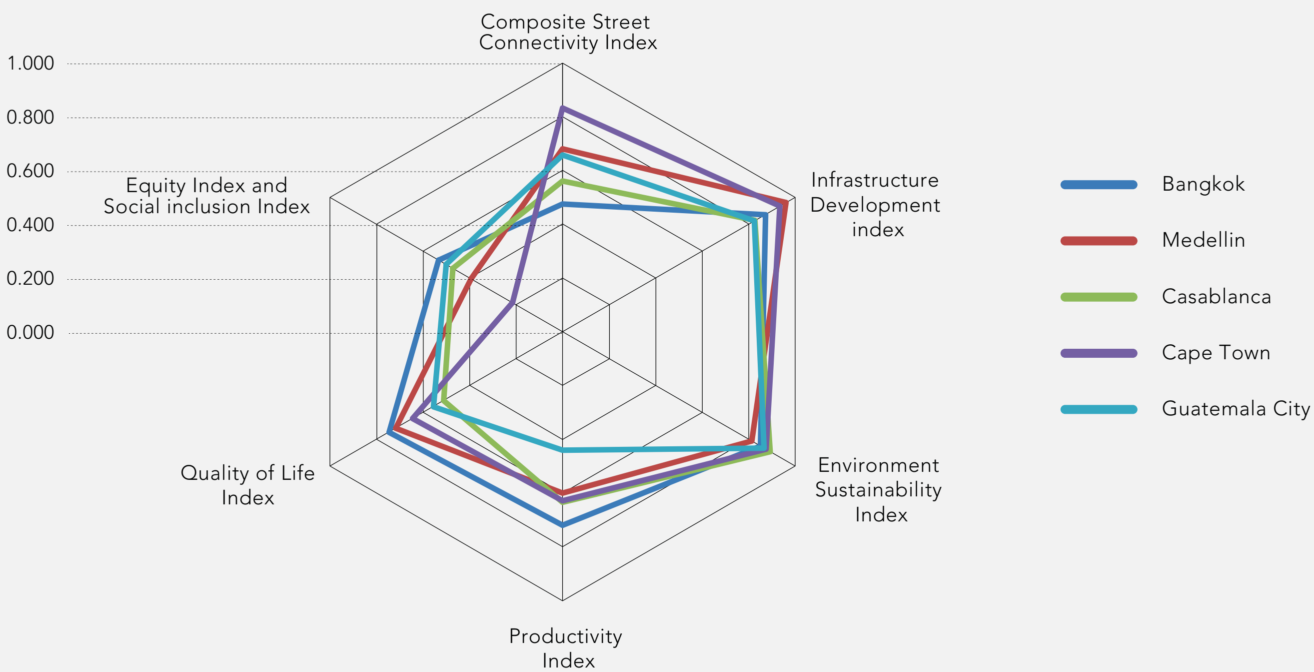
FIGURE 5.3 **CITIES WITH CPI OF BETWEEN 0.700 AND 0.799**



CITIES WITH A CPI OF BETWEEN 0.600 AND 0.699

Ttwo Latin American cities (Medellin and Guatemala City), two African cities (Cape Town and Casablanca) and one Asian city (Bangkok) belong to this group with a CPI between 0.600 and 0.699. Except Cape Town, these cities perform quite well or moderately in some dimensions of prosperity but fail on others, including street connectivity. For instance, Bangkok has strong infrastructure development, a moderate productivity index, quality of life index and equity index, but scores low on street connectivity, below the level of 0.500. Cape Town and Medellin suffer from high income inequalities with an equity index of 0.217 and 0.394, respectively.[8] Despite their capacity to provide goods and services in a good infrastructural environment, many people in these cities are left behind and don't fully enjoy the prosperity of their cities. If the equity index is not included in the calculation of the CPI, both cities will enjoy a level of prosperity higher than 0.700: 0.716, and 0.772 respectively and would move up to the third group of cities with solid prosperity. Similarly with the exclusion of street connectivity from the calculation of the CPI, the city of Bangkok will move up to the same third group as Cape Town and Medellin. This means that poor street connectivity has the same impact on Bangkok's prosperity that high inequality has on Cape Town and Medellin's prosperity. Another African city in this group is Casablanca. It does quite well on infrastructure development, environmental sustainability and productivity, but suffers from high inequality with moderate quality of life and street connectivity.

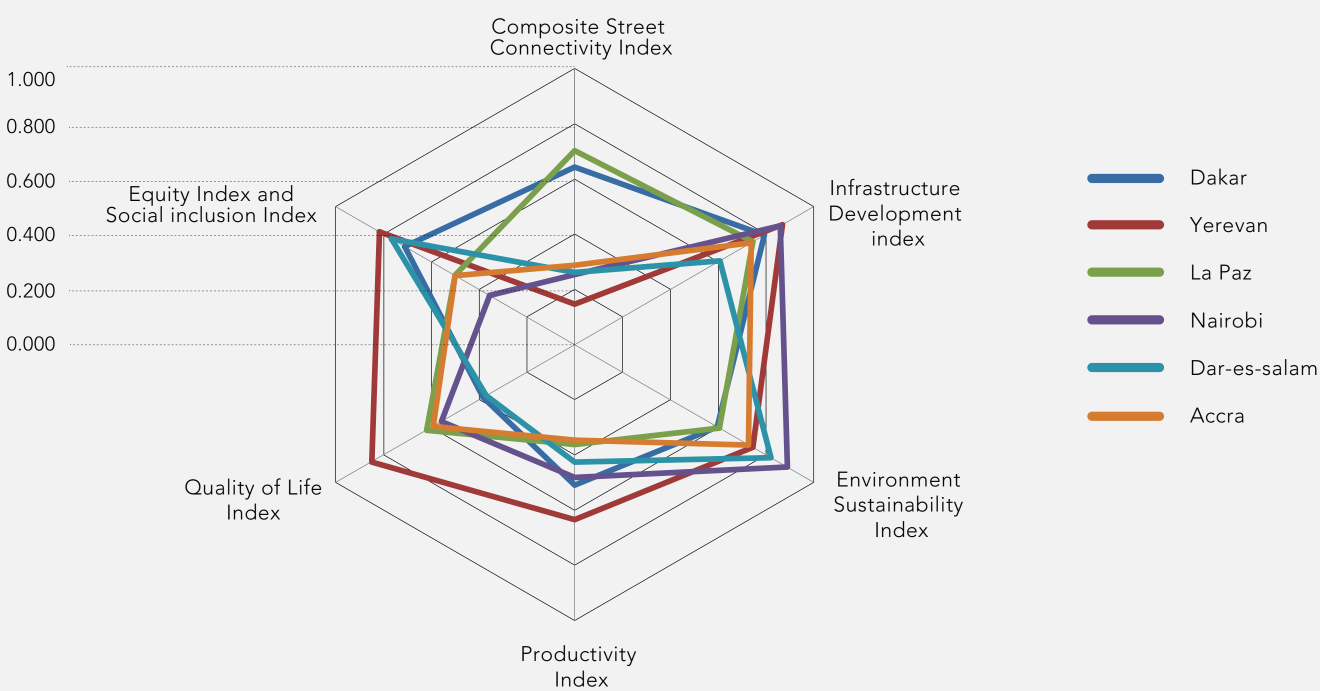
FIGURE 5.4 **CITIES WITH A CPI OF BETWEEN 0.600 AND 0.699**



CITIES WITH A CPI OF BETWEEN 0.500 AND 0.599

Four African cities belong to this group, namely, Dakar, Nairobi, Accra and Dar es Salaam. In these cities, except Dakar, the CSCI is below 0.300, a level characteristic of under-served suburban areas. In addition to that Nairobi and Accra suffer from huge inequalities, with wide gaps between the poor and the rich.[9] Although the coverage of water is relatively good, access to sewerage systems constitutes an obstacle in all these cities. Nairobi has a better infrastructure development index than Accra, but scores poorly when it comes to equity and social inclusion, compared to Accra and Dar es Salaam. At the opposite, the low CPI of Yerevan is not due to high inequality but to very poor street connectivity with a CSCI of 0.147. If the CSCI was not included in the calculation of the CPI, Yerevan would have a CPI of 0.779, a level of solid city prosperity. La Paz belongs to this group of CPI of between 0.500 and 0.599 due to its low level of productivity index (0.363). Dar es Salam scores poorly on several components of the CPI, including street connectivity with a CSCI of 0.262, quality of life with a index of 0.371 and productivity with an index of 0.427. Poor connectivity and Low productivity are the main factors leading the poor performance of Accra on the overall CPI. As noted with other groups of CPI, cities belong to a group of CPI for different reasons and thus require different plans of action towards prosperity.

FIGURE 5.5 **CITIES WITH A CPI OF BETWEEN 0.500 AND 0.599**

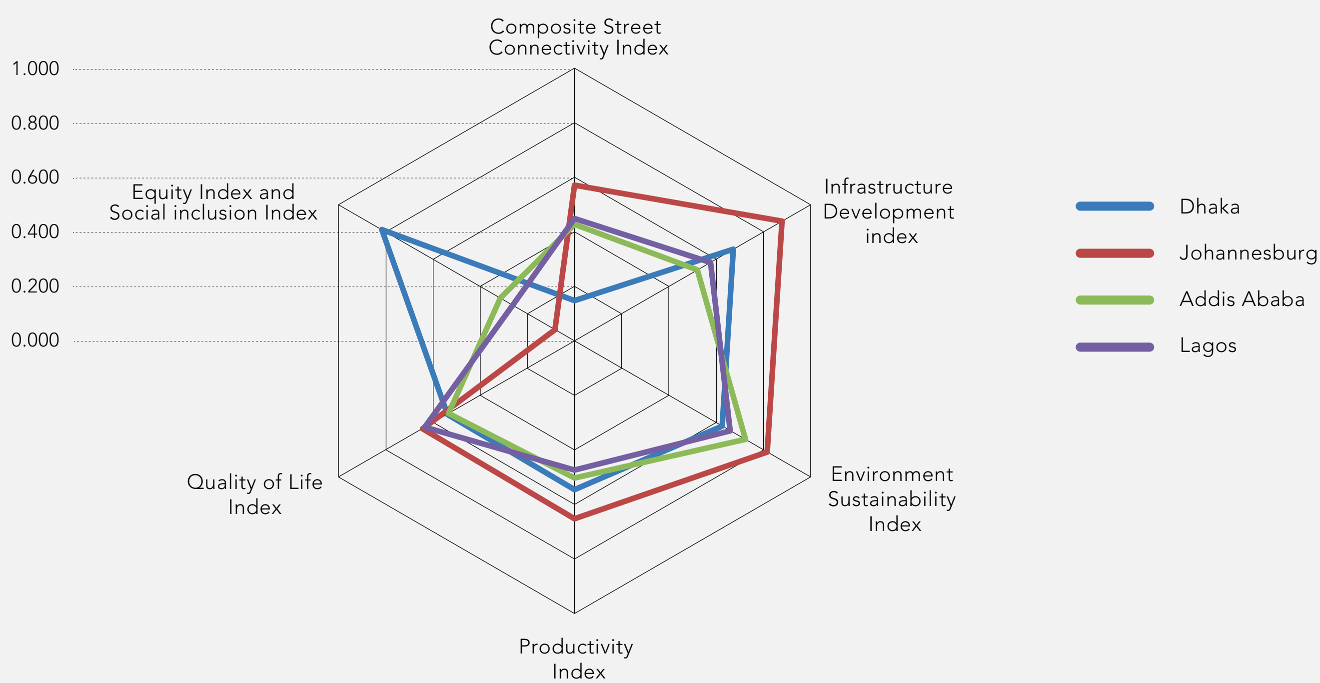


CITIES WITH A CPI BELOW 0.500

Dhaka, Johannesburg, Addis Ababa and Lagos are four cities that belong to this group. They have low scores in all the components of prosperity, including street connectivity. The city of Dhaka in Bangladesh has a CSCI of below 0.500, which is in line with its low CPI. Although Dhaka performs better than Addis Ababa and Lagos in the equity and social inclusion dimensions, its street connectivity is extremely poor, which lowers its ranking significantly. Although Addis Ababa and Lagos are very different, both geographically and in terms of population, their CPI is very similar in all its components, including CSCI. Johannesburg has no similarity with the cities of this group. The city performs well in most dimensions of prosperity, except equity and social inclusion. Indeed, if the equity index is not included in the measurement of the CPI, its CPI will become 0.742, level of the third group (solid prosperity). It is unacceptable for a city to be considered prosperous when a large segment of its citizens are left behind and languish into chronic poverty.

Except Johannesburg, in most cities with weak or very weak prosperity factors, much remains to be done in terms of city planning, quality of life, infrastructure and environment. Production of goods and services is still too low, a reflection of underdevelopment. Historic structural problems, poor urban planning, chronic inequality of opportunities, widespread poverty, and inadequate capital investment in public goods are critical factors behind such low degrees of prosperity. Poor performance of "hubs" require more effective urban planning, laws, regulations, and institutions that can pave the way for a more prosperous future for these cities.

FIGURE 5.6 **CITIES WITH A CPI OF BELOW 0.500**



Street connectivity and other components of prosperity

Streets are a determining factor in the prosperity of cities, both directly and indirectly. They impact all components of prosperity, that is, infrastructure development, environmental sustainability, productivity, quality of life and equity and social inclusion. Street data associated with these five components helps to assess the degree to which streets are linked to these components of prosperity..

Using the Pearson correlation, it has been established that the most direct associations are between streets and infrastructure, on the one hand, and between streets and productivity, on the other hand, with an R square of 0.433 and 0.428, respectively. They are followed by quality of life with an R square of 0.331. Association between streets and environmental sustainability is not strong based on the data available (R^2 is 0.181) as previously emphasized. Association between streets and equity did not also prove to be significant based on the data available (R square is 0,071). The low level of direct association between the street index and the environment index (measured with the level of PM10) can be due to various factors, one of which is the fact that those cities that have good street coverage are also those where more people can afford cars. Here, the lack of strong association can be attributed to the differential in frequency of motorized means of mobility. With equal frequencies, it is possible that the relation between the street index and the environment index will be significant. Regarding inequalities, the indicator used is income inequality; various indicators of social inclusion, such access to work, health services and basic services, are not included in the equity and social inclusion index due to lack of data. However, various studies reviewed in this report indicate association between street coverage and social inclusion.

FIGURE 5.7 **RELATIONSHIP BETWEEN STREET CONNECTIVITY AND BASIC SERVICES ACROSS CITIES**

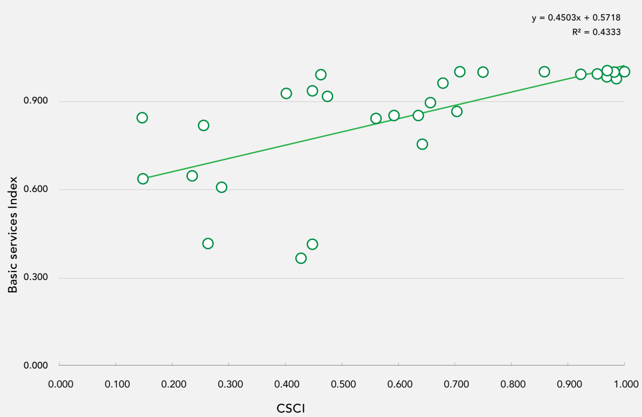


FIGURE 5.8 **RELATIONSHIP BETWEEN STREET CONNECTIVITY AND PRODUCTIVITY ACROSS CITIES**

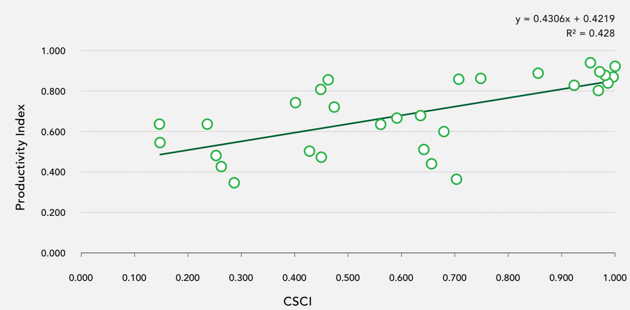


FIGURE 5.9 **RELATIONSHIP BETWEEN STREET CONNECTIVITY AND HEALTH ACROSS CITIES**

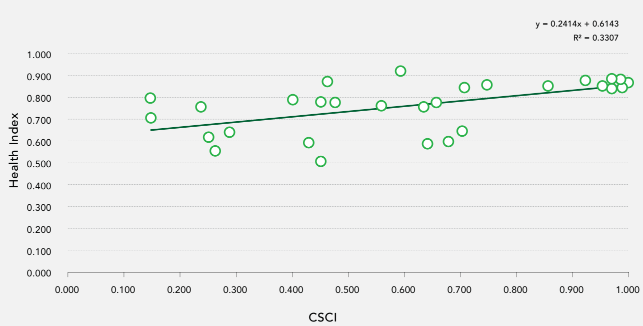
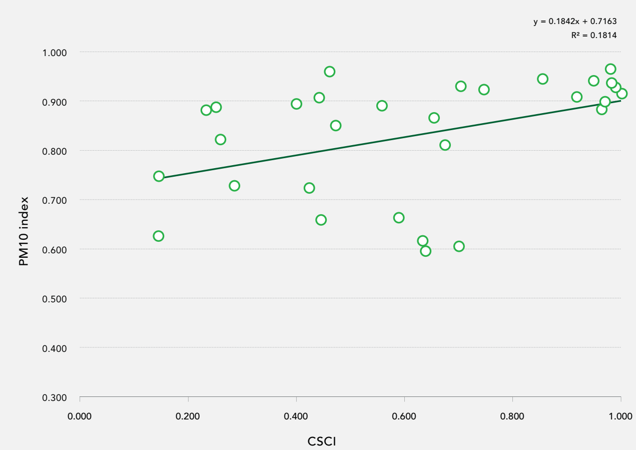


FIGURE 5.10 **RELATIONSHIP BETWEEN STREET CONNECTIVITY AND OUTDOOR POLLUTION (PM10) ACROSS CITIES**



Cities that enjoy a high Composite Street Connectivity Index, such as Tokyo and Hong Kong and cities of developed countries, are also those that have a high infrastructure development index and high productivity. Except for Auckland, the Infrastructure Development Index is higher than 0.9 in all these cities. Provision of basic services (water, sanitation and drainage facilities) is quasi-universal in these cities, with an index close to 1.

Provision of urban infrastructure such as water, sanitation is positively correlated with good street connectivity, as shown by the coefficient of correlation of 0.43 between the CSCI and the basic services index. However, the fact that the coefficient correlation is only 0.43 as opposed to a figure closer to 1 indicates that there are factors other than street connectivity that determine the provision of basic services. Those factors are associated to the economic capacity of a city to afford connections and other basic infrastructure. Another important element influencing the correlation is the threshold of land allocated to streets required for the provision of basic services such as water and sanitation. If for instance only 10 per cent is required, once this threshold is reached the association is no longer the level of street coverage but other factors that may be economic or political. What is clear, however, is low street coverage is associated to low provision of basic services.[10]

High infrastructure development also promotes high productivity, as shown in Figure 5.8. Infrastructure development through good street connectivity is key to the economic and social development of cities of developing countries. In the absence of infrastructure development that promotes access to basic services, inhabitants of cities of developing countries will continue to languish in slum areas.

Although the relationship between street connectivity and health is not as direct as it is between street connectivity and infrastructure development, it is significant with a coefficient of correlation of 0.33. By improving access to basic services such as improved water and adequate sanitation, good coverage in street may contribute to good health among the population, particularly among children who are exposed to environmental diseases such as diarrhea and respiratory diseases. There are other components of health such as obesity and heart diseases which are not captured in the current health index.

In the case of Beijing and cities of middle income countries with high economic growth rate, it is important that measures are taken to safeguard environmental sustainability while contributing to the prosperity of cities. The creation and (re) distribution of the benefits of prosperity should not destroy or degrade the environment. The natural assets of cities should be preserved for the sake of future generations and to promote sustainable development. By promoting walkability and cycling, prosperous streets contribute to the reduction of air and water pollution and to the preservation of biodiversity. Streets should be considered and planned as "green" public spaces. Non-motorized forms of transport, pedestrianization, cleaner fuels and reduced traffic congestion are just some of the measures that can limit the damaging effects of motorized transport and traffic congestion. Streets that provide space only to motorists are characterized by congestion and high CO^2 emissions. These should be considered when planning streets of the future.

The fact that cities can belong to the same group of CPI for different reasons calls for different solutions according to each diagnosis. This is one of the advantages of using the urban wheel framework to assess the prosperity of cities. This will also avoid replicating solutions from cities to cities without adequate diagnosis.

The Cities Prosperity Initiative established by UN-Habitat in 2012 is a strategic policy initiative for cities that are committed to adopting a more holistic, people-centred and sustainable notions of prosperity and that are willing to deploy necessary efforts and resources to move forward in the prosperity path based on their specific local conditions. Under this initiative, cities are expected to specifically work on dimensions of prosperity where the diagnosis shows a clear obstacle towards prosperity. This is a practical framework for the formulation, implementation, and monitoring of sustainability policies and practices to increase prosperity at the city level.

CONCLUSION

One critical finding is that the City Prosperity Index is higher than 0.800 (compared to the maximum, 1) among cities that enjoy high street connectivity, good infrastructure development, good environmental sustainability, high productivity and quality of life, and also high levels of equity and social inclusion. In other terms, these cities do well in all components of prosperity, including street connectivity. Provision of basic services (water, sanitation and drainage facilities) is quasi-universal in these cities. With good street connectivity, these cities also enjoy high productivity with optimal commuting time to work and other services. They have a high productivity index associated with reduced traffic congestion and improved walkability through better street connectivity.

In these cities the quality of life associated with health and safety is amongst the highest globally. Indeed their citizens enjoy public spaces, green spaces and walkable streets. With many streets re-designed to promote pedestrians and cyclists, it is expected that the quality of life in these cities will improve further. By promoting walking and cycling, obesity and related heart diseases will decrease. Although, there is long way to go regarding equity and social inclusion, these cities enjoy availability of sufficient land allocated to streets which is a prerequisite for the achievement of "livable streets" or "complete streets" and other socially-conscious projects. Promoting streets for all, particularly for pedestrians, cycling and public transport are driving the wheel of urban prosperity towards prosperous streets, streets that promote infrastructure development, enhance environmental sustainability, support high productivity, and promote quality of life, equity and social inclusion.

Cities which are at the bottom of the CPI bracket are those that perform poorly in almost all components of the CPI. Much remains to be done in terms of city planning, quality of life, infrastructure and environment. Production of goods and services is still too low, a reflection of underdevelopment. Historic structural problems, poor urban planning, chronic inequality of opportunities, widespread poverty, and inadequate capital investment in public goods are critical factors contributing to such low levels of prosperity.

Poor performance of "hubs" require more effective urban planning, laws, regulations, and institutions that can pave the way for a more prosperous future for these cities. One main physical characteristic of these cities is high prevalence of slum areas or informal settlements, most of them lacking streets. These areas, not well or adequately served by streets, suffer from crumbling and/or over-stretched basic services characterized by regular water shortages, leakages, burst water pipes, leaking sewers, power outages, and uncollected refuse. In addition, infrastructure for non-motorized transport (e.g. pavements or sidewalks for walking and bicycle lanes for cycling) is often lacking, poorly developed, on the decline or does not appear to rank high among city planners' priorities. This has led to high incidences of traffic fatalities involving pedestrians and cyclists. To be prosperous, these cities need well-connected streets. They must prioritize streets as the basic element of mobility and accessibility accompanied by the progressive provision of services (e.g. water and sanitation). This will boost productivity and contribute to high quality of life.

Between the two groups (cities at the top with a CPI of above 0.800 and the cities at the bottom with a CPI of below 0.500) featured cities that perform well in some components of the CPI but fail in others. For instance, Bangkok, Cape Town and Medellin belong to the same CPI group, but for different reasons. Cape Town and Medellin suffer from high income inequalities with an equity index of 0.217 and 0.394, respectively. Despite their capacity to provide goods and services in a good infrastructural environment, many people in these cities are left behind and don't fully enjoy the prosperity of their cities. Bangkok has strong infrastructure development, a moderate productivity index, quality of life index and equity index, but scores low on street connectivity, below the level of 0.500. This means that poor street connectivity has the same impact on Bangkok's prosperity that high inequality has on Cape Town's and Medellin's prosperity.

The negative impact of inequalities on prosperity is much more visible in the case of Johannesburg, which has a relatively well developed street network but suffers from high inequalities. This suggests that very high inequality can reverse all gains made on the other components of prosperity. Beijing, like many Chinese cities such as Shanghai, suffers from high levels of outdoor population (measured by PM10) that lower its CPI level. Considering the role of good street connectivity in reducing the use of motorized means of transport, improvement of street connectivity in Beijing can contribute to higher environmental sustainability. Due to their poor performance in street connectivity, Auckland and Moscow rank alongside the group of cities from middle- income countries, such as Beijing. This is a clear indication that poor street connectivity can hamper efforts towards true prosperity.

ENDNOTES

1 For a more detailed description of the CPI, see *State of the World's Cities Report 2012/2013*.

2 Lusher et al, 2008 (livable streets); Toronto Centre for Active Transportation, 2012 (complete streets); Finn and McElhanney, 2012 (Complete streets); Smart Growth America and National Complete Streets Coalition, 2010 (Complete streets); Svensson,, 2004 (street for all); Central London Partnership, 2003(Quality streets)

3 Frank, L.D. et al., 2010.

4 ARTISTS, 2004; Lusher et al, 2008

5 UN-Habitat, 2012

6 However, Beijing, as many Chinese large cities invest more on inter-city road network that intra-city connection. See UN-Habitat, 2012. The Cities of Shanghai, Guangzhou and Beijing have invested in infrastructure to connect peripheral towns and enhance the large urban configuration. Beijing has extended 304 km of roads to link all 'administrative villages' to the city (2005)

7 The City Prosperity Initiative was introduced by UN-Habitat following the successful publication and launch of the City Prosperity Index, which is described in UN-Habitat *State of the World's Cities 2012/2013 report*.

8 See UN-Habitat, 20102. Cities with steep income inequality (with Gini coefficients of 0.5 or higher) do not only reflect institutional and structural failures in income distribution, but their risks of social unrest are also higher.

9 As indicated in the SWCR 2012/13, In Nairobi, prosperity is compromised by steep inequality (Gini coefficient: 0.59), causing its CPI value to drop from 'moderate' to 'weak' (0.673 to 0.593).

10 UN-HABITAT, 2012b. UN-Habitat considers that the existence of street networks has a major role to play in slum upgrading that requires provision of basic services.

STATISTICAL ANNEX

General disclaimer

The designations employed and presentation of the data in the Statistical Annex do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, city or area of its authorities, or concerning the delimitation of its frontiers or boundaries.

TABLE 1: PROPORTION OF LAND ALLOCATED TO STREET, STREET DENSITY AND INTERSECTION DENSITY

		CITY CORE			SUB-URBAN AREA			TOTAL		
		Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Intersection density ($\#/Km^2$)	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Intersection density ($\#/Km^2$)	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Intersection density ($\#/Km^2$)
CITIES OF EUROPE, NORTHERN AMERICA AND OCEANIA										
Country	City									
Australia	Melbourne	26.2	22.4	184.1	12.9	11.8	80.9		12.0	
Australia	Sydney	25.7	22.0	179.2	12.4	11.4	75.9		15.7	
Belgium	Brussels	25.1	19.1	141.5	13.8	11.7	72.6	19.4		
Canada	Calgary	22.6	19.8	161.1	8.3	8.2	38.2	15.5	8.3	39.1
Canada	Montreal	29.1	24.9	214.9	15.0	13.8	105.4		14.4	
Canada	Toronto	33.5	28.6	254.3	16.0	14.4	103.8	27.8	16.4	125.4
Denmark	Copenhagen	22.7	19.5	130.0	8.7	7.5	32.7	15.7		
Finland	Helsinki	22.9	25.2	276.7	9.8	13.3	120.6	16.4		
France	Paris	29.7	27.9	242.9	13.0	12.0	78.9	21.4		
Greece	Athens	28.6	28.8	255.9	13.5	13.1	87.5	21.0		
Netherlands	Amsterdam	29.1	30.7	314.4	11.4	11.6	80.6	20.3		
Newzealand	Auckland	18.1	12.7	72.9	10.0	7.8	35.3	14.1		
Russia	Moscow	14.0	12.8	86.9						
Russia	Saint Petersburg	18.5	14.7	113.3	8.3	7.3	37.9	13.4		
Spain	Barcelona	33.0	23.8	181.7	13.0	10.1	54.7	33.0		
United Kingdom	London	30.0	25.7	224.7	15.0	13.6	103.0			
United States of America	Los Angeles	22.9	20.0	163.1						
United States of America	New York	36.0	26.3	173.3	12.3	11.4	72.3	24.1		
United States of America	Phoenix	19.3	17.1	132.5						
United States of America	Washington, D.C.	24.8	21.5	179.5						
CITIES OF AFRICA, ASIA, LATIN AMERICA AND THE CARIBBEAN										
Country	City									
Armenia	Yerevan	6.1	6.1	18.0	1.7	1.6	3.3	2.2	2.2	5.2
Bangladesh	Dhaka	8.0	7.7 [b]	10.3	3.4			5.7		
Bolivia	La Paz	15.3	21.4	179.8	6.6			6.4	9.6	
Brazil	Brasilia	16.7	13.8	81.0	8.2	6.7	33.8	12.4		
Brazil	Sao Paulo	19.5	16.1	94.6	9.5	7.8	39.5	14.5	12.0	63.9
Burkina Faso	Ouagadougou	12.3	14.8	87.0	6.0	8.1	46.2	11.0		
Central African Republic	Bangui	6.0	4.7	14.9	2.6			4.3		
China	Beijing	19.1	17.1	104.7	6.1	4.3	12.8	12.6		

		CITY CORE			SUB-URBAN AREA			TOTAL		
		Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)
CITIES OF AFRICA, ASIA, LATIN AMERICA AND THE CARIBBEAN										
Country	**City**									
China, Hong Kong SAR	Hong Kong	33.7	35.7	382.1	9.1	10.9	50.8	21.4		
Colombia	Bogota	24.0	17.2	106.1	10.3			17.2		
Colombia	Medellin	25.2	18.1	111.4	10.8	8.0	38.4	16.6	11.9	66.3
Egypt	Alexandria	12.7	14.9	194.2	5.5			7.9	9.6	
Egypt	Cairo	15.7	15.7	204.1	6.8			11.0	11.0	143.0
Ethiopia	Addis Ababa	13.4	13.6	73.6	6.4	6.8	35.2	8.9		
Ghana	Accra	11.1	10.0	38.4	4.8			7.9		
Guatemala	Guatemala City	13.0	21.0	174.4	5.6			8.8	13.3	
Guyana	Georgetown	12.6	12.7	65.5	7.0	6.8	28.4	9.1	8.8	40.7
India	Chandigarh	15.7	15.5	100.4	8.6	8.3	46.4	12.2		
India	Kolkota	15.2	22.6	212.4	9.0	12.6	113.3	12.1		
India	Mumbai	15.2	15.0	81.0	6.6			10.0	13.7	74.0
Indonesia	Jakarta							9.5		
Japan	Tokyo	28.8	30.2	323.8	12.4			20.6		
Kenya	Nairobi	11.5	7.3	36.0	5.0	2.6	5.9	3.8	7.3	36.0
Malaysia	Kuala Lumpur							13.5	13.0	76.2
Mexico	Guadalajara	21.8	20.9	133.2	12.6	12.6	85.6	14.6	14.4	95.8
Mexico	Mexico City	23.4	21.8	138.9	10.3	10.0	68.0	12.3	11.8	78.5
Morocco	Casablanca	16.5	15.9	112.2	7.1			11.8		
Nigeria	Abuja	15.1	10.9	40.1	6.2	4.9	14.8	10.6		
Nigeria	Lagos	14.0	13.5	82.2	6.0			10.0		
Philippines	Manila	15.2	19.5	155.0	6.6			10.0	12.8	102.0
Rwanda	Kigali	10.3	9.5	34.0	4.4			7.4		
Senegal	Dakar	14.3	19.4	159.2	3.0	3.5	18.6	10.2	13.4	106.2
Singapore	Singapore	21.6	16.9	109.4	9.9	7.8	32.0	15.8		
South Africa	Cape Town	25.2	21.0	199.2	15.0	12.1	91.7	15.2	12.2	
South Africa	Johannesburg	15.4	14.7	139.6	6.6	6.7	63.4	10.8	10.6	
Thailand	Bangkok	15.9	14.9	76.0	5.8	5.3	20.8	10.8		
United Republic of Tanzania	Dar es Salaam	10.0	9.6	34.3	4.3			7.2		
United Republic of Tanzania	Dodoma	13.0	12.5	70.2	5.6			9.3		
Zambia	Lusaka									
Zimbabwe	Harare	16.0			6.9			12.5		

Source: *United Nations Human Settlements Programme (UN-Habitat), Global Urban Indicators Database 2013*

TABLE 2: COMPOSITE STREET CONNECTIVITY INDEX

Country	City	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Intersection density (#/Km^2)	Land Allocated to Street Index	Street Density Index	Intersection Density Index	Composite Street Connectivity Index
EUROPE, NORTH AMERICA AND OCEANIA								
City Core								
Australia	Melbourne	26.2	22.4	184.1	0.868	0.738	1.000	0.862
Australia	Sydney	25.7	22.0	179.2	0.852	0.724	1.000	0.851
Belgium	Brussels	25.1	19.1	141.5	0.831	0.624	0.809	0.749
Canada	Calgary	22.6	19.8	161.1	0.746	0.647	1.000	0.785
Canada	Montreal	29.1	24.9	214.9	0.968	0.824	1.000	0.928
Canada	Toronto	33.5	28.6	254.3	1.000	0.951	1.000	0.983
Denmark	Copenhagen	22.7	19.5	130.0	0.748	0.638	0.743	0.708
Finland	Helsinki	22.9	25.2	276.7	0.755	0.834	1.000	0.857
France	Paris	29.7	27.9	242.9	0.990	0.928	1.000	0.972
Greece	Athens	28.6	28.8	255.9	0.952	0.959	1.000	0.970
Netherlands	Amsterdam	29.1	30.7	314.4	0.969	1.000	1.000	0.990
Newzealand	Auckland	18.1	12.7	72.9	0.590	0.403	1.000	0.620
Russia	Moscow	14.0	12.8	86.9	0.448	0.406	0.497	0.449
Russia	Saint Petersburg	18.5	14.7	113.3	0.603	0.472	1.000	0.658
Spain	Barcelona	33.0	23.8	181.7	1.000	0.786	1.000	0.923
United Kingdom	London	31.4	33.1	316.0	1.000	1.000	1.000	1.000
United States of America	Los Angeles	22.9	20.0	163.1	0.754	0.654	0.932	0.772
United States of America	New York	36.0	26.3	173.3	1.000	0.874	0.990	0.953
United States of America	Phoenix	19.3	17.1	132.5	0.631	0.555	0.757	0.642
United States of America	Washington, D.C.	24.8	21.5	179.5	0.820	0.708	1.000	0.834
Suburban								
Australia	Melbourne	12.9	11.8	80.9	0.409	0.372	0.462	0.413
Australia	Sydney	12.4	11.4	75.9	0.394	0.359	0.434	0.394
Belgium	Brussels	13.8	11.7	72.6	0.440	0.368	0.415	0.407
Canada	Calgary	8.3	8.2	38.2	0.253	0.248	0.218	0.239
Canada	Montreal	15.0	13.8	105.4	0.484	0.441	0.603	0.505
Canada	Toronto	16.0	14.4	103.8	0.516	0.461	0.593	0.521
Denmark	Copenhagen	8.7	7.5	32.7	0.266	0.223	0.187	0.223
Finland	Helsinki	9.8	13.3	120.6	0.304	0.426	0.689	0.447
France	Paris	13.0	12.0	78.9	0.414	0.380	0.451	0.414
Greece	Athens	13.5	13.1	87.5	0.429	0.418	0.500	0.448
Netherlands	Amsterdam	11.4	11.6	80.6	0.360	0.367	0.460	0.393
Newzealand	Auckland	10.0	7.8	35.3	0.312	0.235	0.202	0.245
Russia	Moscow							
Russia	Saint Petersburg	8.3	7.3	37.9	0.250	0.218	0.216	0.228
Spain	Barcelona	13.0	10.1	54.7	0.415	0.313	0.312	0.343
United Kingdom	London	15.0	13.6	103.0	0.483	0.434	0.588	0.498
United States of America	Los Angeles							
United States of America	New York	12.3	11.4	72.3	0.390	0.359	0.413	0.386
United States of America	Phoenix							

Country	City	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)	Land Allocated to Street Index	Street Density Index	Intersection Density Index	Composite Street Connectivity Index
AFRICA, ASIA AND LATIN AMERICA & THE CARIBBEAN								
City Core								
Armenia	Yerevan	6.1	6.1	18.0	0.176	0.176	0.103	0.147
Bangladesh	Dhaka	8.0	7.7	10.3	0.241	0.229	0.059	0.148
Bolivia	La Paz	15.3	21.4	179.8	0.494	0.703	1.000	0.703
Brazil	Brasilia	16.7	13.8	81.0	0.541	0.441	0.463	0.480
Brazil	Sao Paulo	19.5	16.1	94.6	0.638	0.521	0.540	0.564
Burkina Faso	Ouagadougou	12.3	14.8	87.0	0.390	0.476	0.497	0.452
Central African Republic	Bangui	6.0	4.7	14.9	0.172	0.128	0.085	0.123
China	Beijing	19.1	17.1	104.7	0.624	0.555	0.598	0.592
China, Hong Kong SAR	Hong Kong	33.7	35.7	382.1	1.000	1.000	1.000	1.000
Colombia	Bogota	24.0	17.2	106.1	0.793	0.560	0.606	0.646
Colombia	Medellin	25.2	18.1	111.4	0.834	0.590	0.637	0.679
Egypt	Alexandria	12.7	14.9	194.2	0.404	0.481	1.000	0.579
Egypt	Cairo	15.7	15.7	204.1	0.507	0.507	1.000	0.636
Ethiopia	Addis Ababa	13.4	13.6	73.6	0.428	0.434	0.421	0.428
Ghana	Accra	11.1	10.0	38.4	0.348	0.310	0.219	0.287
Guatemala	Guatemala City	13.0	21.0	174.4	0.412	0.688	0.997	0.656
Guyana	Georgetown	12.6	12.7	65.5	0.400	0.403	0.374	0.392
India	Chandigarh	15.7	15.5	100.4	0.507	0.500	0.574	0.526
India	Kolkota	15.2	22.6	212.4	0.490	0.745	1.000	0.714
India	Mumbai	15.2	15.0	81.0	0.490	0.483	0.463	0.478
Indonesia	Jakarta							
Japan	Tokyo	28.8	30.2	323.8	0.959	1.000	1.000	0.986
Kenya	Nairobi	11.5	7.3	36.0	0.362	0.217	0.206	0.253
Malaysia	Kuala Lumpur							
Mexico	Guadalajara	21.8	20.9	133.2	0.717	0.686	0.761	0.721
Mexico	Mexico City	23.4	21.8	138.9	0.772	0.717	0.794	0.760
Morocco	Casablanca	16.5	15.9	112.2	0.534	0.514	0.641	0.561
Nigeria	Abuja	15.1	10.9	40.1	0.486	0.341	0.229	0.336
Nigeria	Lagos	14.0	13.5	82.2	0.448	0.430	0.470	0.449
Philippines	Manila	15.2	19.5	155.0	0.490	0.636	0.886	0.651
Rwanda	Kigali	10.3	9.5	34.0	0.321	0.293	0.194	0.263
Senegal	Dakar	14.3	19.4	159.2	0.459	0.634	0.910	0.642
Singapore	Singapore	21.6	16.9	109.4	0.710	0.548	0.625	0.624
South Africa	Cape Town	25.2	21.0	199.2	0.835	0.691	1.000	0.832
South Africa	Johannesburg	15.4	14.7	139.6	0.496	0.474	0.798	0.572
Thailand	Bangkok	15.9	14.9	76.0	0.514	0.479	0.434	0.475
United Republic of Tanzania	Dar es Salaam	10.0	9.6	34.3	0.310	0.296	0.196	0.262
United Republic of Tanzania	Dodoma	13.0	12.5	70.2	0.414	0.397	0.401	0.404
Zambia								
Zimbabwe	Harare	16.0						
Sub-Uraban areas								
Armenia	Yerevan	1.7	1.6	3.3	0.023	0.021	0.019	0.021
Bangladesh	Dhaka	3.4						
Bolivia	La Paz	6.6						
Brazil	Brasilia	8.2	6.7	33.8	0.247	0.195	0.193	0.211
Brazil	Sao Paulo	9.5	7.8	39.5	0.295	0.234	0.226	0.250
Burkina Faso	Ouagadougou	6.0	8.1	46.2	0.173	0.246	0.264	0.224
Central African Republic	Bangui	2.6						
China	Beijing	6.1	4.3	12.8	0.177	0.114	0.073	0.114
China, Hong Kong SAR	Hong Kong	9.1	10.9	50.8	0.279	0.340	0.291	0.302
Colombia	Bogota	10.3						

Country	City	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Intersection density (#/Km^2)	Land Allocated to Street Index	Street Density Index	Intersection Density Index	Composite Street Connectivity Index
Colombia	Medellin	10.8	8.0	38.4	0.339	0.242	0.219	0.262
Egypt	Alexandria	5.5						
Egypt	Cairo	6.8						
Ethiopia	Addis Ababa	6.4	6.8	35.2	0.185	0.200	0.201	0.195
Ghana	Accra	4.8						
Guatemala	Guatemala City	5.6						
Guyana	Georgetown	7.0	6.8	28.4	0.208	0.201	0.162	0.189
India	Chandigarh	8.6	8.3	46.4	0.264	0.253	0.265	0.260
India	Kolkota	9.0	12.6	113.3	0.275	0.399	0.648	0.414
India	Mumbai	6.6						
Indonesia	Jakarta							
Japan	Tokyo	12.4						
Kenya	Nairobi	5.0	2.6	5.9	0.136	0.055	0.033	0.063
Malaysia	Kuala Lumpur							
Mexico	Guadalajara	12.6	12.6	85.6	0.400	0.400	0.489	0.428
Mexico	Mexico City	10.3	10.0	68.0	0.321	0.310	0.388	0.338
Morocco	Casablanca	7.1						
Nigeria	Abuja	6.2	4.9	14.8	0.178	0.133	0.085	0.126
Nigeria	Lagos	6.0						
Philippines	Manila	6.6						
Rwanda	Kigali	4.4						
Senegal	Dakar	3.0	3.5	18.6	0.069	0.084	0.107	0.085
Singapore	Singapore	9.9	7.8	32.0	0.307	0.236	0.183	0.237
South Africa	Cape Town	15.0	12.1	91.7	0.483	0.383	0.524	0.459
South Africa	Johannesburg	6.6	6.7	63.4	0.193	0.197	0.363	0.240
Thailand	Bangkok	5.8	5.3	20.8	0.165	0.148	0.119	0.143
United Republic of Tanzania	Dar es Salaam	4.3						
United Republic of Tanzania	Dodoma	5.6						
Zambia								
Zimbabwe	Harare	6.9						

TABLE 3: COMPOSITE STREET CONNECTIVITY INDEX (CSCI) AND CITY PROSPERITY INDEX (CPI)

Country	City	City Prosperity Index (CPI) with 6 Dimensions	Composite Street Connectivity Index (CSCI)	Infrastructure Development Index (FI)	Environment Sustainability Index (ESI)	Productivity Index (PI)	Quality of Life Index (QI)	Equity/Social Inclusion Index (EI)
United Kingdom	London	0.919	0.998	0.997	0.920	0.923	0.898	0.793
Japan	Tokyo	0.918	0.986	0.989	0.936	0.850	0.931	0.828
Finland	Helsinki	0.913	0.857	0.997	0.944	0.890	0.905	0.890
Netherlands	Amsterdam	0.910	0.990	0.995	0.933	0.866	0.872	0.818
France	Paris	0.909	0.972	0.996	0.895	0.895	0.925	0.788
Canada	Toronto	0.905	0.983	0.997	0.963	0.874	0.907	0.733
Spain	Barcelona	0.884	0.923	0.995	0.908	0.829	0.912	0.755
Greece	Athens	0.879	0.970	0.996	0.884	0.800	0.885	0.762
Denmark	Copenhagen	0.875	0.708	0.997	0.928	0.855	0.871	0.922
Belgium	Brussels	0.859	0.749	0.997	0.922	0.862	0.864	0.783
United States of America	New York	0.845	0.953	0.994	0.941	0.940	0.866	0.502
Mexico	Mexico City	0.788	0.760	0.960	0.908	0.806	0.813	0.550
New Zealand	Auckland	0.777	0.463	0.994	0.958	0.854	0.889	0.657
China	Beijing	0.760	0.592	0.911	0.663	0.667	0.836	0.967
Russia	Moscow	0.722	0.449	0.960	0.908	0.806	0.813	0.550
Brazil	Sao Paulo	0.721	0.564	0.918	0.894	0.742	0.803	0.507
Egypt	Cairo	0.707	0.636	0.916	0.616	0.679	0.743	0.692
Thailand	Bangkok	0.682	0.475	0.871	0.850	0.719	0.747	0.533
Colombia	Medellin	0.669	0.679	0.959	0.812	0.600	0.718	0.394
Morocco	Casablanca	0.631	0.561	0.827	0.891	0.634	0.513	0.472
South Africa	Cape Town	0.625	0.832	0.933	0.875	0.628	0.645	0.217
Guatemala	Guatemala City	0.621	0.656	0.823	0.866	0.440	0.556	0.502
Senegal	Dakar	0.590	0.642	0.794	0.596	0.510	0.384	0.712
Armenia	Yerevan	0.590	0.147	0.870	0.745	0.635	0.850	0.817
Bolivia	La Paz	0.574	0.703	0.745	0.606	0.363	0.621	0.502
Kenya	Nairobi	0.514	0.253	0.860	0.889	0.481	0.559	0.357
United Republic of Tanzania	Dar-es-salam	0.501	0.262	0.607	0.822	0.427	0.371	0.767
Ghana	Accra	0.501	0.287	0.737	0.728	0.347	0.592	0.500
Bangladesh	Dhaka	0.497	0.148	0.673	0.627	0.545	0.539	0.817
South Africa	Johannesburg	0.493	0.572	0.880	0.816	0.654	0.645	0.083
Ethiopia	Addis Ababa	0.488	0.428	0.521	0.724	0.503	0.534	0.313
Nigeria	Lagos	0.488	0.449	0.576	0.659	0.475	0.634	0.262

TABLE 4: **URBAN AGGLOMERATIONS WITH 750,000 INHABITANTS OR MORE: POPULATION SIZE AND RATE OF CHANGE**

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
AFRICA									
Algeria	El Djazaïr (Algiers)	2,278	2,851	3,608	2.25	2.35	12.3	11.2	11.3
Algeria	Wahran (Oran)	706	776	920	0.94	1.71	3.8	3.0	2.9
Angola	Huambo	578	1,039	1,666	5.87	4.72	8.5	9.3	10.3
Angola	Luanda	2,591	4,790	7,555	6.14	4.56	38.0	43.0	46.6
Benin	Cotonou	642	882	1,292	3.17	3.82	25.7	22.5	22.1
Burkina Faso	Ouagadougou	921	1,911	3,662	7.30	6.50	42.0	45.2	48.6
Cameroon	Douala	1,490	2,348	3,408	4.55	3.72	20.9	23.3	24.7
Cameroon	Yaoundé	1,351	2,320	3,420	5.41	3.88	18.9	23.0	24.8
Chad	N'Djaména	703	1,038	1,522	3.89	3.83	39.7	42.5	45.5
Congo	Brazzaville	1,022	1,557	2,074	4.21	2.86	55.5	60.9	61.5
Congo	Pointe-Noire	539	807	1,081	4.04	2.92	29.3	31.6	32.1
Côte d'Ivoire	Abidjan	3,028	4,151	5,896	3.16	3.51	41.9	41.6	41.9
Côte d'Ivoire	Yamoussoukro	348	885	1,633	9.34	6.12	4.8	8.9	11.6
Democratic Republic of the Congo	Kananga	533	846	1,293	4.63	4.24	3.7	3.8	3.9
Democratic Republic of the Congo	Kinshasa	5,414	8,415	12,322	4.41	3.81	37.2	37.8	36.8
Democratic Republic of the Congo	Kisangani	516	783	1,192	4.16	4.21	3.6	3.5	3.6
Democratic Republic of the Congo	Lubumbashi	960	1,486	2,242	4.36	4.12	6.6	6.7	6.7
Democratic Republic of the Congo	Mbuji-Mayi	891	1,433	2,172	4.75	4.16	6.1	6.4	6.5
Egypt	Al-Iskandariyah (Alexandria)	3,592	4,400	5,517	2.03	2.26	12.4	12.5	12.8
Egypt	Al-Qahirah (Cairo)	10,170	11,031	13,254	0.81	1.84	35.1	31.4	30.7
Ethiopia	Addis Ababa	2,377	2,919	3,881	2.05	2.85	24.6	21.0	19.5
Ghana	Accra	1,674	2,469	3,602	3.89	3.78	19.9	19.8	20.7
Ghana	Kumasi	1,187	1,935	2,841	4.89	3.84	14.1	15.5	16.3
Guinea	Conakry	1,221	1,715	2,632	3.40	4.28	47.2	49.1	51.3
Kenya	Mombasa	683	940	1,411	3.19	4.06	11.0	9.8	9.6
Kenya	Nairobi	2,214	3,237	4,939	3.80	4.23	35.6	33.9	33.7
Liberia	Monrovia	836	812	621	-0.29	-2.68	66.2	42.5	23.2
Libyan Arab Jamahiriya	Tarabulus (Tripoli)	1,022	1,111	1,324	0.84	1.75	25.6	22.5	23.5
Madagascar	Antananarivo	1,361	1,900	3,091	3.33	4.86	32.7	28.7	29.5
Malawi	Lilongwe	477	738	1,195	4.36	4.82	29.1	31.9	33.2
Mali	Bamako	1,142	1,932	2,998	5.26	4.39	36.0	36.7	35.8
Mauritania	Nouakchott	553	759	1,085	3.16	3.57	52.3	53.2	56.6
Morocco	Agadir	610	786	985	2.54	2.26	4.0	4.3	4.6
Morocco	Dar-el-Beida (Casablanca)	2,937	3,009	3,580	0.24	1.74	19.1	16.6	16.9
Morocco	Fès	868	1,065	1,319	2.04	2.15	5.7	5.9	6.2
Morocco	Marrakech	751	919	1,142	2.02	2.17	4.9	5.1	5.4
Morocco	Rabat	1,507	1,807	2,213	1.81	2.03	9.8	10.0	10.4
Morocco	Tanger	591	790	995	2.89	2.31	3.9	4.4	4.7
Mozambique	Maputo	1,019	1,132	1,507	1.05	2.86	19.2	15.6	15.2
Mozambique	Matola	498	759	1,120	4.20	3.89	9.4	10.5	11.3
Niger	Niamey	680	1,222	2,183	5.86	5.80	38.5	44.7	48.1
Nigeria	Aba	630	836	1,252	2.82	4.04	1.2	1.1	1.1
Nigeria	Abuja	833	2,010	3,306	8.82	4.97	1.6	2.6	2.9
Nigeria	Benin City	975	1,311	1,955	2.97	3.99	1.9	1.7	1.7
Nigeria	Enugu	547	776	1,178	3.50	4.17	1.0	1.0	1.1
Nigeria	Ibadan	2,236	2,855	4,165	2.44	3.78	4.3	3.7	3.7
Nigeria	Ilorin	633	788	1,169	2.20	3.94	1.2	1.0	1.0

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
AFRICA									
Nigeria	Jos	604	748	1,108	2.14	3.94	1.2	1.0	1.0
Nigeria	Kaduna	1,184	1,476	2,167	2.21	3.84	2.3	1.9	1.9
Nigeria	Kano	2,602	3,271	4,748	2.29	3.73	5.0	4.2	4.2
Nigeria	Lagos	7,281	10,788	15,825	3.93	3.83	13.9	13.9	14.1
Nigeria	Maiduguri	700	827	1,213	1.66	3.83	1.3	1.1	1.1
Nigeria	Ogbomosho	798	1,039	1,545	2.64	3.97	1.5	1.3	1.4
Nigeria	Onitsha	533	867	1,346	4.86	4.40	1.0	1.1	1.2
Nigeria	Port Harcourt	1,091	1,807	2,782	5.05	4.32	2.1	2.3	2.5
Rwanda	Kigali	497	961	1,499	6.58	4.45	44.6	48.1	48.0
Senegal	Dakar	2,029	2,926	4,227	3.66	3.68	52.9	55.7	57.8
Sierra Leone	Freetown	688	910	1,294	2.79	3.53	46.4	39.9	42.0
Somalia	Muqdisho (Mogadishu)	1,201	1,426	2,693	1.72	6.36	48.8	41.0	52.1
South Africa	Cape Town	2,715	3,492	4,096	2.52	1.60	10.7	11.3	11.8
South Africa	Durban	2,370	2,954	3,471	2.20	1.61	9.3	9.6	10.0
South Africa	Ekurhuleni (East Rand)	2,326	3,284	3,872	3.45	1.65	9.1	10.6	11.2
South Africa	Johannesburg	2,732	3,763	4,421	3.20	1.61	10.7	12.2	12.8
South Africa	Port Elizabeth	958	1,097	1,309	1.36	1.76	3.8	3.6	3.8
South Africa	Pretoria	1,084	1,468	1,753	3.03	1.78	4.3	4.8	5.1
South Africa	Vereeniging	897	1,174	1,406	2.69	1.81	3.5	3.8	4.1
Sudan	Al-Khartum (Khartoum)	3,505	4,516	6,028	2.53	2.89	39.1	40.6	41.1
Togo	Lomé	904	1,453	2,151	4.75	3.92	57.3	64.2	68.9
Tunisia	Tunis	711	777	935	0.89	1.85	11.9	11.2	11.9
Uganda	Kampala	1,097	1,594	2,669	3.74	5.16	37.5	31.5	30.1
United Republic of Tanzania	Dar es Salaam	2,116	3,415	5,677	4.79	5.08	27.9	29.0	29.8
Zambia	Lusaka	1,073	1,719	2,764	4.71	4.75	30.2	33.9	35.6
Zimbabwe	Harare	1,379	1,526	1,990	1.01	2.66	32.7	31.8	29.6
ASIA									
Afghanistan	Kabul	1,963	3,052	4,136	4.41	3.04	41.7	41.8	36.9
Armenia	Yerevan	1,111	1,113	1,189	0.02	0.66	55.9	56.2	58.2
Azerbaijan	Baku	1,806	2,062	2,655	1.32	2.53	43.3	42.0	46.2
Bangladesh	Chittagong	3,308	5,069	6,963	4.27	3.17	10.8	12.2	12.6
Bangladesh	Dhaka	10,285	14,930	20,064	3.73	2.96	33.6	36.0	36.3
Bangladesh	Khulna	1,285	1,723	2,406	2.93	3.34	4.2	4.2	4.3
Bangladesh	Rajshahi	678	900	1,273	2.83	3.46	2.2	2.2	2.3
Cambodia	Phnum Pénh (Phnom Penh)	1,149	1,509	1,958	2.73	2.61	49.7	53.9	55.8
China	Anshan, Liaoning	1,384	1,662	2,086	1.83	2.27	0.3	0.3	0.2
China	Anyang	753	1,129	1,374	4.05	1.96	0.2	0.2	0.2
China	Baoding	884	1,148	1,499	2.62	2.67	0.2	0.2	0.2
China	Baoji	638	901	1,246	3.46	3.24	0.1	0.1	0.1
China	Baotou	1,406	1,931	2,319	3.17	1.83	0.3	0.3	0.3
China	Beijing	10,162	15,000	20,781	3.89	3.26	2.2	2.3	2.5
China	Bengbu	687	914	1,218	2.86	2.87	0.2	0.1	0.1
China	Benxi	857	968	1,176	1.22	1.95	0.2	0.1	0.1
China	Changchun	2,730	3,598	4,693	2.76	2.66	0.6	0.5	0.6
China	Changde	735	924	1,176	2.29	2.42	0.2	0.1	0.1
China	Changsha, Hunan	2,183	3,212	4,473	3.86	3.31	0.5	0.5	0.5
China	Changshu	541	742	991	3.16	2.89	0.1	0.1	0.1
China	Changzhou, Jiangsu	1,478	2,323	3,190	4.52	3.17	0.3	0.4	0.4
China	Chengdu	4,222	6,397	9,074	4.16	3.50	0.9	1.0	1.1
China	Chifeng	677	842	1,072	2.18	2.42	0.1	0.1	0.1

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
China	Chongqing	7,436	9,732	12,479	2.69	2.49	1.6	1.5	1.5
China	Cixi	650	781	966	1.83	2.12	0.1	0.1	0.1
China	Dalian	2,833	3,305	4,067	1.54	2.07	0.6	0.5	0.5
China	Dandong	679	795	986	1.58	2.16	0.1	0.1	0.1
China	Daqing	1,082	1,547	2,145	3.58	3.27	0.2	0.2	0.3
China	Datong, Shanxi	1,049	1,355	1,777	2.56	2.71	0.2	0.2	0.2
China	Dongguan, Guangdong	3,631	7,160	8,783	6.79	2.04	0.8	1.1	1.0
China	Dongying	628	949	1,363	4.13	3.61	0.1	0.1	0.2
China	Foshan	3,877	6,208	8,910	4.71	3.61	0.9	0.9	1.1
China	Fushun, Liaoning	1,358	1,377	1,567	0.14	1.29	0.3	0.2	0.2
China	Fuxin	667	821	1,053	2.08	2.48	0.1	0.1	0.1
China	Fuyang	695	874	1,092	2.30	2.22	0.2	0.1	0.1
China	Fuzhou, Fujian	1,978	2,799	3,830	3.47	3.13	0.4	0.4	0.5
China	Guangzhou, Guangdong	7,330	10,486	14,167	3.58	3.01	1.6	1.6	1.7
China	Guilin	757	968	1,261	2.46	2.65	0.2	0.1	0.1
China	Guiyang	1,860	2,458	3,226	2.78	2.72	0.4	0.4	0.4
China	Haerbin	3,888	5,496	7,471	3.46	3.07	0.9	0.8	0.9
China	Haicheng	588	738	950	2.27	2.52	0.1	0.1	0.1
China	Haikou	738	1,587	2,050	7.66	2.56	0.2	0.2	0.2
China	Handan	811	1,250	1,814	4.33	3.72	0.2	0.2	0.2
China	Hangzhou	3,160	5,189	7,674	4.96	3.91	0.7	0.8	0.9
China	Hefei	1,532	2,830	4,549	6.13	4.75	0.3	0.4	0.5
China	Hengyang	793	1,099	1,498	3.27	3.09	0.2	0.2	0.2
China	Hohhot	1,005	1,446	2,010	3.64	3.29	0.2	0.2	0.2
China	Huai'an	818	1,262	1,815	4.34	3.63	0.2	0.2	0.2
China	Huaibei	617	963	1,400	4.45	3.75	0.1	0.1	0.2
China	Huainan	1,049	1,396	1,855	2.85	2.84	0.2	0.2	0.2
China	Huangshi	647	761	945	1.61	2.17	0.1	0.1	0.1
China	Huizhou	1,003	1,760	2,688	5.63	4.23	0.2	0.3	0.3
China	Huludao	529	795	1,142	4.08	3.61	0.1	0.1	0.1
China	Huzhou	544	790	1,099	3.73	3.30	0.1	0.1	0.1
China	Jiamusi	619	817	1,088	2.78	2.86	0.1	0.1	0.1
China	Jiangmen	519	1,103	1,435	7.55	2.63	0.1	0.2	0.2
China	Jiangyin	530	747	1,012	3.44	3.03	0.1	0.1	0.1
China	Jiaozuo	631	783	1,000	2.15	2.45	0.1	0.1	0.1
China	Jiaxing	440	749	1,150	5.31	4.29	0.1	0.1	0.1
China	Jilin	1,435	1,889	2,492	2.75	2.77	0.3	0.3	0.3
China	Jinan, Shandong	2,592	3,581	4,821	3.23	2.97	0.6	0.5	0.6
China	Jingzhou	761	1,040	1,392	3.12	2.92	0.2	0.2	0.2
China	Jining, Shandong	856	1,207	1,643	3.43	3.09	0.2	0.2	0.2
China	Jinjiang	456	859	1,378	6.33	4.72	0.1	0.1	0.2
China	Jinzhou	770	856	1,029	1.07	1.84	0.2	0.1	0.1
China	Jiujiang	471	759	1,130	4.76	3.99	0.1	0.1	0.1
China	Jixi, Heilongjiang	823	1,043	1,352	2.36	2.60	0.2	0.2	0.2
China	Kaohsiung	1,488	1,514	1,723	0.17	1.29	0.3	0.2	0.2
China	Kunming	2,601	3,388	4,371	2.65	2.55	0.6	0.5	0.5
China	Lanzhou	1,890	2,487	3,267	2.75	2.73	0.4	0.4	0.4
China	Lianyungang	567	965	1,485	5.31	4.31	0.1	0.1	0.2
China	Liaocheng	464	727	1,064	4.50	3.80	0.1	0.1	0.1
China	Linyi, Shandong	1,130	1,426	1,797	2.33	2.31	0.2	0.2	0.2
China	Liuzhou	1,027	1,353	1,783	2.75	2.76	0.2	0.2	0.2
China	Lufeng	556	732	964	2.74	2.76	0.1	0.1	0.1

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
China	Luoyang	1,213	1,539	1,982	2.38	2.53	0.3	0.2	0.2
China	Luzhou	649	850	1,113	2.70	2.69	0.1	0.1	0.1
China	Maoming	617	1,004	1,482	4.87	3.89	0.1	0.2	0.2
China	Mianyang, Sichuan	758	1,006	1,323	2.83	2.74	0.2	0.2	0.2
China	Mudanjiang	665	783	973	1.63	2.17	0.1	0.1	0.1
China	Nanchang	1,648	2,331	3,185	3.47	3.12	0.4	0.4	0.4
China	Nanchong	606	808	1,071	2.88	2.82	0.1	0.1	0.1
China	Nanjing, Jiangsu	3,980	5,665	7,732	3.53	3.11	0.9	0.9	0.9
China	Nanning	1,445	2,096	2,632	3.72	2.28	0.3	0.3	0.3
China	Nantong	1,006	1,550	2,228	4.32	3.63	0.2	0.2	0.3
China	Nanyang, Henan	672	1,164	1,787	5.49	4.29	0.1	0.2	0.2
China	Neijiang	685	883	1,154	2.55	2.67	0.2	0.1	0.1
China	Ningbo	1,643	2,632	3,842	4.71	3.78	0.4	0.4	0.5
China	Panjin	593	813	1,103	3.16	3.05	0.1	0.1	0.1
China	Pingdingshan, Henan	852	1,024	1,276	1.84	2.20	0.2	0.2	0.2
China	Pingxiang, Jiangxi	542	732	989	3.01	3.01	0.1	0.1	0.1
China	Puning	603	912	1,268	4.13	3.30	0.1	0.1	0.2
China	Putian	613	1,030	1,567	5.19	4.20	0.1	0.2	0.2
China	Qingdao	2,659	3,680	4,935	3.25	2.93	0.6	0.6	0.6
China	Qinhuangdao	702	893	1,147	2.41	2.50	0.2	0.1	0.1
China	Qiqihaer	1,331	1,588	1,982	1.77	2.22	0.3	0.2	0.2
China	Quanzhou	728	1,062	1,448	3.77	3.10	0.2	0.2	0.2
China	Rizhao	613	816	1,079	2.87	2.79	0.1	0.1	0.1
China	Shanghai	13,959	19,554	26,121	3.37	2.90	3.1	3.0	3.1
China	Shantou	2,931	4,062	5,321	3.27	2.70	0.6	0.6	0.6
China	Shaoguan	670	840	1,067	2.26	2.39	0.1	0.1	0.1
China	Shaoxing	608	873	1,215	3.62	3.30	0.1	0.1	0.1
China	Shenyang	4,562	5,469	6,772	1.81	2.14	1.0	0.8	0.8
China	Shenzhen	6,550	10,222	14,221	4.45	3.30	1.4	1.5	1.7
China	Shijiazhuang	1,914	2,741	3,786	3.59	3.23	0.4	0.4	0.4
China	Shiyan	528	737	1,012	3.34	3.17	0.1	0.1	0.1
China	Suzhou, Jiangsu	1,698	3,248	5,266	6.48	4.83	0.4	0.5	0.6
China	Taian, Shandong	910	1,240	1,655	3.09	2.89	0.2	0.2	0.2
China	Taichung	978	1,140	1,404	1.53	2.09	0.2	0.2	0.2
China	Tainan	723	784	932	0.81	1.73	0.2	0.1	0.1
China	Taipei	2,630	2,654	3,001	0.09	1.23	0.6	0.4	0.4
China	Taiyuan, Shanxi	2,503	3,392	4,519	3.04	2.87	0.6	0.5	0.5
China	Taizhou, Jiangsu	1,190	1,338	1,622	1.17	1.93	0.3	0.2	0.2
China	Taizhou, Zhejiang	535	786	1,073	3.84	3.11	0.1	0.1	0.1
China	Tangshan, Hebei	1,390	1,871	2,500	2.97	2.90	0.3	0.3	0.3
China	Tianjin	6,670	8,535	10,916	2.47	2.46	1.5	1.3	1.3
China	Ürümqi (Wulumqi)	1,705	2,954	4,565	5.50	4.35	0.4	0.4	0.5
China	Weifang	1,235	1,699	2,286	3.19	2.97	0.3	0.3	0.3
China	Weihai	440	783	1,216	5.75	4.41	0.1	0.1	0.1
China	Wenzhou	1,565	2,635	3,651	5.21	3.26	0.3	0.4	0.4
China	Wuhan	6,638	8,904	11,641	2.94	2.68	1.5	1.3	1.4
China	Wuhu, Anhui	634	1,172	1,898	6.15	4.82	0.1	0.2	0.2
China	Wuxi, Jiangsu	1,835	3,222	4,651	5.63	3.67	0.4	0.5	0.5
China	Xiamen	1,416	2,702	4,388	6.46	4.85	0.3	0.4	0.5
China	Xi'an, Shaanxi	3,690	4,846	6,303	2.72	2.63	0.8	0.7	0.7
China	Xiangtan, Hunan	698	950	1,281	3.08	3.00	0.2	0.1	0.2
China	Xiangyang	1,202	1,531	1,964	2.42	2.49	0.3	0.2	0.2
China	Xianyang, Shaanxi	790	1,019	1,319	2.55	2.58	0.2	0.2	0.2

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
China	Xining	844	1,185	1,628	3.39	3.18	0.2	0.2	0.2
China	Xinxiang	762	1,016	1,351	2.87	2.85	0.2	0.2	0.2
China	Xuzhou	1,367	2,144	3,120	4.50	3.75	0.3	0.3	0.4
China	Yancheng, Jiangsu	671	1,290	1,739	6.53	2.99	0.1	0.2	0.2
China	Yangzhou	1,216	1,566	2,021	2.53	2.55	0.3	0.2	0.2
China	Yantai	1,218	1,526	1,929	2.26	2.34	0.3	0.2	0.2
China	Yichang	692	980	1,237	3.49	2.33	0.2	0.1	0.1
China	Yinchuan	571	1,052	1,700	6.11	4.80	0.1	0.2	0.2
China	Yingkou	624	849	1,149	3.08	3.03	0.1	0.1	0.1
China	Yiwu	532	735	981	3.23	2.88	0.1	0.1	0.1
China	Yiyang, Hunan	678	819	1,014	1.89	2.13	0.1	0.1	0.1
China	Yueyang	881	1,155	1,504	2.71	2.63	0.2	0.2	0.2
China	Zaozhuang	853	1,175	1,576	3.21	2.93	0.2	0.2	0.2
China	Zhangjiakou	797	1,043	1,377	2.69	2.77	0.2	0.2	0.2
China	Zhanjiang	818	1,014	1,333	2.15	2.73	0.2	0.2	0.2
China	Zhengzhou	2,438	3,796	5,453	4.43	3.62	0.5	0.6	0.6
China	Zhenjiang, Jiangsu	679	1,008	1,423	3.95	3.45	0.1	0.2	0.2
China	Zhongshan	1,376	2,695	4,276	6.72	4.62	0.3	0.4	0.5
China	Zhuhai	1,004	1,359	1,784	3.03	2.72	0.2	0.2	0.2
China	Zhuzhou	819	1,025	1,310	2.24	2.45	0.2	0.2	0.2
China	Zibo	1,874	2,456	3,187	2.71	2.61	0.4	0.4	0.4
China	Zigong	592	946	1,177	4.69	2.19	0.1	0.1	0.1
China	Zunyi	541	844	1,228	4.44	3.75	0.1	0.1	0.1
China, Hong Kong SAR	Hong Kong	6,783	7,053	7,803	0.39	1.01	100.0	100.0	100.0
Democratic People's Republic of Korea	P'yongyang	2,777	2,834	3,049	0.20	0.73	20.4	19.3	19.4
Georgia	Tbilisi	1,100	1,117	1,149	0.15	0.28	44.0	48.7	51.8
India	Agra	1,293	1,714	2,276	2.82	2.83	0.4	0.5	0.5
India	Ahmadabad	4,427	6,210	8,452	3.38	3.08	1.5	1.6	1.8
India	Aligarh	653	891	1,210	3.10	3.06	0.2	0.2	0.3
India	Allahabad	1,035	1,205	1,487	1.52	2.11	0.4	0.3	0.3
India	Amritsar	990	1,171	1,455	1.68	2.16	0.3	0.3	0.3
India	Asansol	1,065	1,232	1,507	1.46	2.01	0.4	0.3	0.3
India	Aurangabad	868	1,167	1,562	2.96	2.92	0.3	0.3	0.3
India	Bangalore	5,567	8,275	11,641	3.96	3.41	1.9	2.2	2.4
India	Bareilly	722	961	1,294	2.86	2.97	0.2	0.3	0.3
India	Bhopal	1,426	1,851	2,427	2.61	2.71	0.5	0.5	0.5
India	Bhubaneswar	637	865	1,165	3.05	2.98	0.2	0.2	0.2
India	Chandigarh	791	1,010	1,315	2.44	2.64	0.3	0.3	0.3
India	Chennai (Madras)	6,353	8,523	11,321	2.94	2.84	2.2	2.3	2.3
India	Coimbatore	1,420	2,095	2,973	3.89	3.50	0.5	0.6	0.6
India	Delhi	15,732	21,935	29,274	3.32	2.89	5.4	5.8	6.1
India	Dhanbad	1,046	1,186	1,438	1.26	1.93	0.4	0.3	0.3
India	Durg-Bhilainagar	905	1,054	1,298	1.52	2.08	0.3	0.3	0.3
India	Guwahati (Gauhati)	797	957	1,202	1.84	2.27	0.3	0.3	0.2
India	Gwalior	855	1,084	1,414	2.38	2.65	0.3	0.3	0.3
India	Hubli-Dharwad	776	932	1,177	1.84	2.33	0.3	0.2	0.2
India	Hyderabad	5,445	7,578	10,275	3.30	3.05	1.9	2.0	2.1
India	Indore	1,597	2,127	2,820	2.87	2.82	0.5	0.6	0.6
India	Jabalpur	1,100	1,257	1,532	1.33	1.98	0.4	0.3	0.3
India	Jaipur	2,259	3,017	3,988	2.89	2.79	0.8	0.8	0.8
India	Jalandhar	694	862	1,105	2.17	2.48	0.2	0.2	0.2
India	Jamshedpur	1,081	1,320	1,672	2.00	2.36	0.4	0.3	0.3
India	Jodhpur	842	1,116	1,492	2.82	2.90	0.3	0.3	0.3

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
India	Kanpur	2,641	2,904	3,427	0.95	1.66	0.9	0.8	0.7
India	Kochi (Cochin)	1,340	1,592	1,989	1.73	2.23	0.5	0.4	0.4
India	Kolkata (Calcutta)	13,058	14,283	16,648	0.90	1.53	4.5	3.8	3.4
India	Kota	692	978	1,360	3.46	3.30	0.2	0.3	0.3
India	Kozhikode (Calicut)	875	961	1,152	0.94	1.82	0.3	0.3	0.2
India	Lucknow	2,221	2,854	3,704	2.51	2.61	0.8	0.8	0.8
India	Ludhiana	1,368	1,598	1,966	1.55	2.07	0.5	0.4	0.4
India	Madurai	1,187	1,443	1,835	1.95	2.41	0.4	0.4	0.4
India	Meerut	1,143	1,406	1,786	2.07	2.39	0.4	0.4	0.4
India	Moradabad	626	871	1,195	3.30	3.17	0.2	0.2	0.2
India	Mumbai (Bombay)	16,367	19,422	23,661	1.71	1.97	5.6	5.1	4.9
India	Mysore	776	969	1,253	2.22	2.57	0.3	0.3	0.3
India	Nagpur	2,089	2,471	3,059	1.68	2.13	0.7	0.7	0.6
India	Nashik	1,117	1,531	2,066	3.15	2.99	0.4	0.4	0.4
India	Patna	1,658	2,022	2,534	1.98	2.26	0.6	0.5	0.5
India	Pune (Poona)	3,655	4,951	6,582	3.04	2.85	1.3	1.3	1.4
India	Raipur	680	1,088	1,621	4.69	3.99	0.2	0.3	0.3
India	Rajkot	974	1,361	1,862	3.34	3.13	0.3	0.4	0.4
India	Ranchi	844	1,107	1,465	2.72	2.80	0.3	0.3	0.3
India	Salem	736	907	1,160	2.09	2.46	0.3	0.2	0.2
India	Solapur	853	946	1,129	1.03	1.77	0.3	0.3	0.2
India	Srinagar	954	1,251	1,657	2.71	2.81	0.3	0.3	0.3
India	Surat	2,699	4,438	6,600	4.98	3.97	0.9	1.2	1.4
India	Thiruvananthapuram	885	952	1,129	0.73	1.70	0.3	0.3	0.2
India	Tiruchirappalli	837	1,009	1,276	1.86	2.35	0.3	0.3	0.3
India	Tiruppur	523	927	1,466	5.73	4.58	0.2	0.2	0.3
India	Vadodara	1,465	1,794	2,270	2.02	2.36	0.5	0.5	0.5
India	Varanasi (Benares)	1,199	1,419	1,771	1.69	2.22	0.4	0.4	0.4
India	Vijayawada	999	1,453	2,058	3.74	3.48	0.3	0.4	0.4
India	Visakhapatnam	1,309	1,700	2,238	2.61	2.75	0.4	0.4	0.5
India	Warangal	569	746	995	2.70	2.88	0.2	0.2	0.2
Indonesia	Bandar Lampung	743	884	1,114	1.74	2.31	0.8	0.7	0.7
Indonesia	Bandung	2,138	2,399	2,909	1.15	1.92	2.4	2.0	1.9
Indonesia	Batam	350	957	1,628	10.07	5.32	0.4	0.8	1.1
Indonesia	Bogor	751	954	1,239	2.39	2.61	0.8	0.8	0.8
Indonesia	Denpasar	409	797	1,271	6.68	4.66	0.5	0.7	0.8
Indonesia	Jakarta	8,390	9,630	11,638	1.38	1.89	9.4	8.0	7.7
Indonesia	Malang	757	822	1,015	0.82	2.11	0.8	0.7	0.7
Indonesia	Medan	1,912	2,100	2,497	0.94	1.73	2.1	1.8	1.7
Indonesia	Padang	716	836	1,043	1.54	2.22	0.8	0.7	0.7
Indonesia	Palembang	1,459	1,455	1,655	-0.02	1.29	1.6	1.2	1.1
Indonesia	Pekan Baru	588	906	1,362	4.32	4.08	0.7	0.8	0.9
Indonesia	Samarinda	523	732	998	3.35	3.11	0.6	0.6	0.7
Indonesia	Semarang	1,427	1,558	1,872	0.88	1.83	1.6	1.3	1.2
Indonesia	Surabaya	2,611	2,768	3,260	0.59	1.64	2.9	2.3	2.2
Indonesia	Ujung Pandang	1,031	1,345	1,796	2.66	2.89	1.2	1.1	1.2
Iran (Islamic Republic of)	Ahvaz	868	1,061	1,271	2.01	1.81	2.1	2.1	2.2
Iran (Islamic Republic of)	Esfahan	1,382	1,743	2,088	2.32	1.81	3.3	3.4	3.7
Iran (Islamic Republic of)	Karaj	1,087	1,584	1,968	3.77	2.17	2.6	3.1	3.4
Iran (Islamic Republic of)	Kermanshah	729	838	992	1.39	1.69	1.7	1.6	1.7
Iran (Islamic Republic of)	Mashhad	2,073	2,653	3,171	2.47	1.78	5.0	5.2	5.5
Iran (Islamic Republic of)	Qom	843	1,043	1,253	2.13	1.84	2.0	2.0	2.2
Iran (Islamic Republic of)	Shiraz	1,115	1,300	1,535	1.54	1.66	2.7	2.5	2.7

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
Iran (Islamic Republic of)	Tabriz	1,264	1,484	1,752	1.60	1.66	3.0	2.9	3.1
Iran (Islamic Republic of)	Tehran	6,880	7,243	8,138	0.51	1.17	16.4	14.2	14.2
Iraq	Al-Basrah (Basra)	759	923	1,222	1.96	2.80	4.7	4.4	4.3
Iraq	Al-Mawsil (Mosul)	1,056	1,447	2,020	3.15	3.34	6.5	6.9	7.1
Iraq	Baghdad	5,200	5,891	7,816	1.25	2.83	32.1	28.0	27.5
Iraq	Irbil (Erbil)	757	1,009	1,395	2.88	3.24	4.7	4.8	4.9
Iraq	Najaf	542	754	1,066	3.30	3.47	3.3	3.6	3.7
Iraq	Sulaimaniya	580	836	1,202	3.66	3.64	3.6	4.0	4.2
Israel	Hefa (Haifa)	905	1,044	1,208	1.42	1.46	16.5	15.3	15.1
Israel	Jerusalem	664	778	936	1.59	1.85	12.1	11.4	11.7
Israel	Tel Aviv-Yafo (Tel Aviv-Jaffa)	2,739	3,319	4,005	1.92	1.88	49.9	48.7	50.0
Japan	Fukuoka-Kitakyushu	2,716	2,845	3,067	0.46	0.75	2.7	2.5	2.6
Japan	Hiroshima	2,044	2,103	2,272	0.29	0.77	2.1	1.8	1.9
Japan	Kyoto	1,806	1,804	1,894	-0.01	0.49	1.8	1.6	1.6
Japan	Nagoya	3,122	3,300	3,556	0.55	0.75	3.2	2.9	3.0
Japan	Osaka-Kobe	11,165	11,430	12,004	0.23	0.49	11.3	10.0	10.1
Japan	Sapporo	2,508	2,714	2,947	0.79	0.82	2.5	2.4	2.5
Japan	Sendai	2,184	2,401	2,619	0.95	0.87	2.2	2.1	2.2
Japan	Tokyo	34,450	36,933	38,707	0.70	0.47	34.8	32.2	32.6
Jordan	Amman	1,017	1,150	1,476	1.23	2.50	26.4	22.5	23.7
Kazakhstan	Almaty	1,160	1,400	1,648	1.89	1.63	13.9	16.3	17.4
Kuwait	Al Kuwayt (Kuwait City)	1,333	2,318	2,991	5.53	2.55	70.0	86.2	89.6
Kyrgyzstan	Bishkek	766	831	982	0.81	1.67	43.8	44.1	44.5
Lao People's Democratic Republic	Vientiane	442	766	1,246	5.50	4.86	37.8	37.3	40.5
Lebanon	Bayrut (Beirut)	1,487	1,983	2,302	2.88	1.49	46.2	53.8	57.8
Malaysia	Johore Bahru	630	1,002	1,396	4.63	3.32	4.3	4.9	5.4
Malaysia	Klang	631	1,132	1,619	5.84	3.59	4.4	5.5	6.3
Malaysia	Kuala Lumpur	1,306	1,524	1,959	1.55	2.51	9.0	7.5	7.6
Mongolia	Ulaanbaatar	765	1,138	1,626	3.97	3.57	55.5	61.1	67.6
Myanmar	Mandalay	810	1,035	1,379	2.45	2.87	6.6	6.7	7.0
Myanmar	Nay Pyi Taw	—	1,026	1,394	..	3.07	—	6.7	7.1
Myanmar	Yangon	3,553	4,356	5,623	2.04	2.55	29.0	28.3	28.7
Nepal	Kathmandu	644	974	1,467	4.14	4.10	19.6	19.5	20.6
Pakistan	Faisalabad	2,142	2,947	3,986	3.19	3.02	4.5	4.7	4.9
Pakistan	Gujranwala	1,226	1,712	2,341	3.34	3.13	2.6	2.7	2.9
Pakistan	Hyderabad	1,223	1,648	2,254	2.98	3.13	2.6	2.6	2.8
Pakistan	Islamabad	595	889	1,231	4.01	3.26	1.2	1.4	1.5
Pakistan	Karachi	10,031	13,500	17,729	2.97	2.73	20.9	21.7	21.8
Pakistan	Lahore	5,455	7,352	9,769	2.98	2.84	11.4	11.8	12.0
Pakistan	Multan	1,265	1,720	2,350	3.07	3.12	2.6	2.8	2.9
Pakistan	Peshawar	1,067	1,475	2,022	3.24	3.15	2.2	2.4	2.5
Pakistan	Quetta	614	874	1,210	3.52	3.26	1.3	1.4	1.5
Pakistan	Rawalpindi	1,522	2,098	2,856	3.21	3.09	3.2	3.4	3.5
Philippines	Cebu	721	839	1,078	1.52	2.51	1.9	1.8	1.9
Philippines	Davao	1,152	1,523	2,000	2.79	2.73	3.1	3.4	3.5
Philippines	Manila	9,958	11,654	14,428	1.57	2.14	26.8	25.7	25.5
Philippines	Zamboanga	605	856	1,153	3.47	2.97	1.6	1.9	2.0
Republic of Korea	Ansan	592	769	876	2.61	1.31	1.6	1.9	2.1
Republic of Korea	Bucheon	763	915	1,027	1.82	1.15	2.1	2.3	2.4
Republic of Korea	Busan	3,673	3,398	3,296	-0.78	-0.31	10.0	8.5	7.8
Republic of Korea	Daegu	2,478	2,450	2,525	-0.12	0.30	6.8	6.1	5.9
Republic of Korea	Daejon	1,362	1,520	1,667	1.10	0.93	3.7	3.8	3.9

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
Republic of Korea	Goyang	744	968	1,096	2.63	1.24	2.0	2.4	2.6
Republic of Korea	Gwangju	1,346	1,486	1,627	0.99	0.91	3.7	3.7	3.8
Republic of Korea	Incheon	2,464	2,601	2,800	0.54	0.74	6.7	6.5	6.6
Republic of Korea	Seongnam	911	962	1,052	0.54	0.90	2.5	2.4	2.5
Republic of Korea	Seoul	9,917	9,751	9,849	-0.17	0.10	27.1	24.4	23.2
Republic of Korea	Suweon	932	1,140	1,275	2.01	1.12	2.5	2.9	3.0
Republic of Korea	Ulsan	1,011	1,089	1,193	0.74	0.92	2.8	2.7	2.8
Republic of Korea	Yongin	376	738	906	6.75	2.06	1.0	1.8	2.1
Saudi Arabia	Ad-Dammam	639	909	1,242	3.52	3.12	4.0	4.0	4.4
Saudi Arabia	Al-Madinah (Medina)	795	1,106	1,491	3.31	2.98	5.0	4.9	5.3
Saudi Arabia	Ar-Riyadh (Riyadh)	3,567	5,227	7,294	3.82	3.33	22.3	23.2	25.9
Saudi Arabia	Jiddah	2,509	3,452	4,690	3.19	3.06	15.7	15.3	16.6
Saudi Arabia	Makkah (Mecca)	1,168	1,543	2,055	2.79	2.87	7.3	6.8	7.3
Singapore	Singapore	3,919	5,086	5,597	2.61	0.96	100.0	100.0	100.0
Syrian Arab Republic	Dimashq (Damascus)	2,063	2,582	3,383	2.24	2.71	24.8	22.7	23.5
Syrian Arab Republic	Halab (Aleppo)	2,204	3,068	4,065	3.31	2.81	26.5	27.0	28.3
Syrian Arab Republic	Hamah	495	893	1,249	5.91	3.36	6.0	7.9	8.7
Syrian Arab Republic	Hims (Homs)	856	1,321	1,799	4.33	3.09	10.3	11.6	12.5
Thailand	Krung Thep (Bangkok)	6,360	8,213	10,265	2.56	2.23	32.3	35.2	37.5
Thailand	Samut Prakan	389	1,093	2,174	10.34	6.88	2.0	4.7	7.9
Turkey	Adana	1,123	1,423	1,863	2.37	2.69	2.7	2.8	2.9
Turkey	Ankara	3,179	4,074	5,229	2.48	2.50	7.7	7.9	8.2
Turkey	Antalya	595	877	1,164	3.89	2.83	1.4	1.7	1.8
Turkey	Bursa	1,180	1,659	2,172	3.41	2.69	2.9	3.2	3.4
Turkey	Gaziantep	844	1,160	1,527	3.17	2.75	2.1	2.3	2.4
Turkey	Istanbul	8,744	10,953	13,791	2.25	2.30	21.2	21.4	21.7
Turkey	Izmir	2,216	2,842	3,673	2.49	2.57	5.4	5.5	5.8
Turkey	Konya	734	1,023	1,351	3.31	2.78	1.8	2.0	2.1
United Arab Emirates	Abu Zaby (Abu Dhabi)	486	869	1,539	5.82	5.71	19.8	13.8	19.4
United Arab Emirates	Dubayy (Dubai)	906	1,835	3,134	7.06	5.35	36.9	29.1	39.4
United Arab Emirates	Sharjah	444	914	1,543	7.22	5.23	18.1	14.5	19.4
Uzbekistan	Tashkent	2,135	2,213	2,549	0.36	1.42	23.0	22.3	22.2
Viet Nam	Can Tho	284	902	1,753	11.57	6.64	1.5	3.4	4.9
Viet Nam	Da Nang	568	805	1,140	3.49	3.48	3.0	3.0	3.2
Viet Nam	Hà Noi	1,660	2,809	4,201	5.26	4.02	8.6	10.5	11.8
Viet Nam	Hai Phòng	599	889	1,280	3.95	3.65	3.1	3.3	3.6
Viet Nam	Thành Pho Ho Chí Minh (Ho Chi Minh City)	4,389	6,189	8,535	3.44	3.21	22.9	23.2	24.0
Yemen	Adan (Aden)	495	746	1,247	4.11	5.14	10.6	9.8	10.3
Yemen	Sana'a'	1,347	2,293	3,820	5.32	5.10	28.9	30.0	31.5
EUROPE									
Austria	Wien (Vienna)	1,549	1,708	1,852	0.97	0.81	29.4	30.2	31.2
Belarus	Minsk	1,700	1,847	1,982	0.83	0.71	24.2	25.8	27.2
Belgium	Antwerpen	922	956	1,018	0.36	0.63	9.3	9.2	9.5
Belgium	Bruxelles-Brussel	1,785	1,933	2,090	0.80	0.78	18.1	18.5	19.4
Bulgaria	Sofia	1,128	1,175	1,194	0.41	0.16	20.5	21.6	22.0
Czech Republic	Praha (Prague)	1,172	1,265	1,373	0.76	0.82	15.5	16.4	17.4
Denmark	København (Copenhagen)	1,077	1,192	1,330	1.02	1.09	23.7	24.8	26.3
Finland	Helsinki	1,019	1,122	1,244	0.96	1.03	24.0	25.0	26.5
France	Bordeaux	763	841	974	0.97	1.47	1.7	1.6	1.7

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
France	Lille	1,003	1,034	1,175	0.30	1.28	2.2	1.9	2.0
France	Lyon	1,362	1,471	1,682	0.77	1.34	3.0	2.7	2.9
France	Marseille-Aix-en-Provence	1,363	1,472	1,684	0.77	1.34	3.0	2.8	2.9
France	Nice-Cannes	899	980	1,130	0.86	1.42	2.0	1.8	1.9
France	Paris	9,739	10,516	11,681	0.77	1.05	21.5	19.7	19.8
France	Toulouse	778	917	1,078	1.65	1.62	1.7	1.7	1.8
Germany	Berlin	3,384	3,450	3,586	0.19	0.39	5.6	5.7	5.9
Germany	Hamburg	1,710	1,786	1,885	0.44	0.53	2.8	2.9	3.1
Germany	Köln (Cologne)	963	1,002	1,058	0.40	0.55	1.6	1.6	1.7
Germany	München (Munich)	1,202	1,350	1,463	1.16	0.81	2.0	2.2	2.4
Greece	Athínai (Athens)	3,179	3,382	3,728	0.62	0.97	48.4	48.6	50.4
Greece	Thessaloniki	797	872	987	0.90	1.24	12.1	12.5	13.3
Hungary	Budapest	1,787	1,731	1,838	-0.32	0.60	27.1	25.1	25.5
Ireland	Dublin	989	1,102	1,342	1.09	1.97	43.9	39.8	41.5
Italy	Bergamo	699	774	864	1.02	1.10	1.8	1.9	2.0
Italy	Milano (Milan)	2,985	2,916	3,018	-0.23	0.34	7.8	7.1	7.0
Italy	Napoli (Naples)	2,232	2,348	2,563	0.51	0.88	5.8	5.7	6.0
Italy	Palermo	855	904	1,005	0.56	1.06	2.2	2.2	2.3
Italy	Roma (Rome)	3,385	3,306	3,416	-0.24	0.33	8.8	8.0	7.9
Italy	Torino (Turin)	1,694	1,620	1,662	-0.45	0.26	4.4	3.9	3.9
Netherlands	Amsterdam	1,005	1,049	1,153	0.43	0.94	8.2	7.6	7.9
Netherlands	Rotterdam	991	1,010	1,097	0.19	0.83	8.1	7.3	7.5
Norway	Oslo	774	898	1,073	1.49	1.79	22.6	23.2	25.1
Poland	Kraków (Cracow)	756	756	773	0.01	0.21	3.2	3.2	3.3
Poland	Warszawa (Warsaw)	1,666	1,718	1,792	0.30	0.42	7.0	7.4	7.7
Portugal	Lisboa (Lisbon)	2,672	2,825	3,095	0.55	0.91	47.5	43.7	44.4
Portugal	Porto	1,254	1,355	1,511	0.78	1.09	22.3	21.0	21.7
Romania	Bucuresti (Bucharest)	1,949	1,935	1,991	-0.08	0.28	16.6	17.1	17.7
Russian Federation	Chelyabinsk	1,082	1,128	1,201	0.42	0.63	1.0	1.1	1.1
Russian Federation	Kazan	1,096	1,142	1,205	0.41	0.53	1.0	1.1	1.1
Russian Federation	Krasnodar	641	741	849	1.44	1.36	0.6	0.7	0.8
Russian Federation	Krasnoyarsk	911	972	1,050	0.64	0.77	0.8	0.9	1.0
Russian Federation	Moskva (Moscow)	10,005	11,472	12,478	1.37	0.84	9.3	10.9	11.7
Russian Federation	Nizhniy Novgorod	1,331	1,253	1,246	-0.60	-0.05	1.2	1.2	1.2
Russian Federation	Novosibirsk	1,426	1,472	1,548	0.31	0.50	1.3	1.4	1.5
Russian Federation	Omsk	1,136	1,153	1,202	0.15	0.41	1.1	1.1	1.1
Russian Federation	Perm	1,014	992	1,016	-0.22	0.24	0.9	0.9	1.0
Russian Federation	Rostov-na-Donu (Rostov-on-Don)	1,061	1,089	1,136	0.26	0.42	1.0	1.0	1.1
Russian Federation	Samara	1,173	1,165	1,203	-0.08	0.33	1.1	1.1	1.1
Russian Federation	Sankt Peterburg (Saint Petersburg)	4,719	4,842	5,065	0.26	0.45	4.4	4.6	4.8
Russian Federation	Saratov	878	839	841	-0.46	0.02	0.8	0.8	0.8
Russian Federation	Ufa	1,049	1,062	1,108	0.12	0.43	1.0	1.0	1.0
Russian Federation	Volgograd	1,010	1,021	1,058	0.10	0.36	0.9	1.0	1.0
Russian Federation	Voronezh	854	888	948	0.39	0.65	0.8	0.8	0.9
Russian Federation	Yekaterinburg	1,303	1,348	1,429	0.34	0.58	1.2	1.3	1.3
Serbia	Beograd (Belgrade)	1,122	1,133	1,185	0.10	0.45	20.9	20.5	20.5
Spain	Barcelona	4,731	5,488	6,230	1.48	1.27	15.4	15.4	16.2
Spain	Madrid	5,014	6,405	7,752	2.45	1.91	16.3	18.0	20.2
Spain	Valencia	795	799	837	0.05	0.47	2.6	2.2	2.2
Sweden	Stockholm	1,206	1,360	1,595	1.20	1.59	16.2	17.0	18.6
Switzerland	Zürich (Zurich)	1,078	1,183	1,305	0.93	0.98	20.5	21.0	22.0

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
Ukraine	Dnipropetrovsk	1,077	1,003	913	-0.71	-0.94	3.3	3.2	3.0
Ukraine	Donetsk	1,026	965	905	-0.61	-0.64	3.1	3.1	3.0
Ukraine	Kharkiv	1,484	1,453	1,431	-0.21	-0.15	4.5	4.7	4.7
Ukraine	Krivoi Rog	673	749	809	1.06	0.77	2.1	2.4	2.7
Ukraine	Kyiv (Kiev)	2,606	2,805	2,943	0.73	0.48	7.9	9.0	9.7
Ukraine	Odesa	1,037	1,009	1,034	-0.27	0.24	3.2	3.2	3.4
Ukraine	Zaporizhzhya	822	775	733	-0.59	-0.56	2.5	2.5	2.4
United Kingdom	Birmingham	2,285	2,273	2,453	-0.05	0.76	4.9	4.6	4.6
United Kingdom	Glasgow	1,171	1,140	1,220	-0.26	0.68	2.5	2.3	2.3
United Kingdom	Liverpool	818	797	856	-0.26	0.72	1.8	1.6	1.6
United Kingdom	London	8,225	8,923	9,796	0.81	0.93	17.8	18.1	18.4
United Kingdom	Manchester	2,248	2,216	2,384	-0.14	0.73	4.9	4.5	4.5
United Kingdom	Newcastle upon Tyne	880	875	955	-0.07	0.87	1.9	1.8	1.8
United Kingdom	West Yorkshire	1,495	1,605	1,820	0.71	1.25	3.2	3.3	3.4
LATIN AMERICA AND THE CARIBBEAN									
Argentina	Buenos Aires	11,847	13,370	14,876	1.21	1.07	35.6	35.8	36.2
Argentina	Córdoba	1,348	1,532	1,776	1.28	1.47	4.0	4.1	4.3
Argentina	La Plata	676	747	876	0.99	1.60	2.0	2.0	2.1
Argentina	Mendoza	838	942	1,101	1.17	1.56	2.5	2.5	2.7
Argentina	Rosario	1,152	1,264	1,468	0.93	1.49	3.5	3.4	3.6
Argentina	San Miguel de Tucumán	722	853	1,001	1.67	1.60	2.2	2.3	2.4
Bolivia	La Paz	1,390	1,678	2,143	1.88	2.45	27.1	25.4	26.3
Bolivia	Santa Cruz	1,054	1,653	2,248	4.50	3.07	20.5	25.1	27.6
Brazil	Aracaju	606	748	906	2.10	1.91	0.4	0.5	0.5
Brazil	Baixada Santista	1,468	1,659	1,897	1.22	1.34	1.0	1.0	1.0
Brazil	Belém	1,748	2,038	2,367	1.54	1.49	1.2	1.2	1.3
Brazil	Belo Horizonte	4,659	5,407	6,217	1.49	1.40	3.3	3.3	3.4
Brazil	Brasília	2,746	3,701	4,654	2.98	2.29	1.9	2.3	2.5
Brazil	Campinas	2,264	2,794	3,295	2.10	1.65	1.6	1.7	1.8
Brazil	Campo Grande	654	775	916	1.69	1.67	0.5	0.5	0.5
Brazil	Cuiabá	686	789	916	1.39	1.50	0.5	0.5	0.5
Brazil	Curitiba	2,494	3,118	3,761	2.24	1.87	1.8	1.9	2.1
Brazil	Florianópolis	734	1,010	1,300	3.19	2.52	0.5	0.6	0.7
Brazil	Fortaleza	2,875	3,520	4,190	2.02	1.74	2.0	2.1	2.3
Brazil	Goiânia	1,635	2,049	2,483	2.26	1.92	1.2	1.2	1.4
Brazil	Grande São Luís	1,066	1,304	1,562	2.01	1.81	0.8	0.8	0.9
Brazil	Grande Vitória	1,398	1,666	1,964	1.75	1.64	1.0	1.0	1.1
Brazil	João Pessoa	827	1,067	1,322	2.54	2.15	0.6	0.6	0.7
Brazil	Maceió	952	1,154	1,378	1.92	1.77	0.7	0.7	0.8
Brazil	Manaus	1,392	1,798	2,241	2.56	2.20	1.0	1.1	1.2
Brazil	Natal	910	1,252	1,610	3.20	2.51	0.6	0.8	0.9
Brazil	Norte/Nordeste Catarinense	923	1,114	1,327	1.88	1.75	0.7	0.7	0.7
Brazil	Pôrto Alegre	3,505	3,892	4,376	1.05	1.17	2.5	2.4	2.4
Brazil	Recife	3,230	3,684	4,210	1.32	1.33	2.3	2.2	2.3
Brazil	Rio de Janeiro	10,803	11,867	13,020	0.94	0.93	7.6	7.2	7.1
Brazil	Salvador	2,968	3,947	4,925	2.85	2.22	2.1	2.4	2.7
Brazil	São Paulo	17,099	19,649	22,243	1.39	1.24	12.1	12.0	12.2
Brazil	Sorocaba	578	776	987	2.95	2.40	0.4	0.5	0.5
Brazil	Teresina	789	902	1,045	1.33	1.48	0.6	0.5	0.6
Chile	Concepción	648	758	891	1.56	1.63	4.9	5.0	5.3
Chile	Santiago	5,275	5,959	6,748	1.22	1.24	39.8	39.1	40.1
Chile	Valparaíso	803	874	1,003	0.84	1.38	6.1	5.7	6.0

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
Colombia	Barranquilla	1,531	1,867	2,251	1.99	1.87	5.3	5.4	5.6
Colombia	Bogotá	6,356	8,502	10,579	2.91	2.19	22.2	24.5	26.1
Colombia	Bucaramanga	855	1,092	1,370	2.45	2.27	3.0	3.1	3.4
Colombia	Cali	1,950	2,402	2,936	2.08	2.01	6.8	6.9	7.2
Colombia	Cartagena	737	963	1,217	2.67	2.35	2.6	2.8	3.0
Colombia	Cúcuta	632	775	958	2.04	2.12	2.2	2.2	2.4
Colombia	Medellín	2,724	3,595	4,497	2.77	2.24	9.5	10.4	11.1
Costa Rica	San José	1,032	1,466	1,920	3.51	2.69	44.6	49.0	53.1
Cuba	La Habana (Havana)	2,187	2,128	2,017	-0.27	-0.54	26.0	25.1	24.0
Dominican Republic	Santo Domingo	1,813	2,154	2,613	1.72	1.93	34.2	31.4	31.7
Ecuador	Guayaquil	2,077	2,273	2,598	0.90	1.33	27.9	23.5	22.0
Ecuador	Quito	1,357	1,598	1,934	1.63	1.91	18.2	16.5	16.4
El Salvador	San Salvador	1,248	1,570	1,910	2.30	1.96	35.7	39.5	41.9
Guatemala	Ciudad de Guatemala (Guatemala City)	908	1,128	1,650	2.17	3.80	17.9	15.9	16.6
Haiti	Port-au-Prince	1,693	2,143	2,874	2.36	2.93	55.0	41.3	39.8
Honduras	Tegucigalpa	793	1,051	1,487	2.82	3.47	28.0	26.8	28.3
Mexico	Acapulco de Juárez	791	865	1,056	0.89	2.00	1.1	1.0	1.0
Mexico	Aguascalientes	734	934	1,162	2.41	2.18	1.0	1.1	1.1
Mexico	Chihuahua	683	854	1,060	2.24	2.16	0.9	1.0	1.0
Mexico	Ciudad de México (Mexico City)	18,022	20,142	23,239	1.11	1.43	24.1	22.8	22.9
Mexico	Ciudad Juárez	1,225	1,332	1,492	0.84	1.13	1.6	1.5	1.5
Mexico	Cuernavaca	667	878	1,111	2.76	2.36	0.9	1.0	1.1
Mexico	Culiacán	749	836	977	1.10	1.56	1.0	0.9	1.0
Mexico	Guadalajara	3,703	4,442	5,293	1.82	1.75	5.0	5.0	5.2
Mexico	Hermosillo	616	789	986	2.48	2.23	0.8	0.9	1.0
Mexico	León de los Aldamas	1,290	1,613	1,999	2.24	2.15	1.7	1.8	2.0
Mexico	Mérida	848	1,021	1,235	1.86	1.90	1.1	1.2	1.2
Mexico	Mexicali	770	938	1,142	1.97	1.96	1.0	1.1	1.1
Mexico	Monterrey	3,266	4,100	5,113	2.27	2.21	4.4	4.6	5.0
Mexico	Morelia	625	810	1,069	2.60	2.77	0.8	0.9	1.1
Mexico	Puebla	1,907	2,296	2,730	1.85	1.73	2.6	2.6	2.7
Mexico	Querétaro	795	1,101	1,466	3.25	2.86	1.1	1.2	1.4
Mexico	Reynosa	531	729	934	3.16	2.48	0.7	0.8	0.9
Mexico	Saltillo	643	825	1,044	2.50	2.35	0.9	0.9	1.0
Mexico	San Luis Potosí	858	1,042	1,257	1.95	1.87	1.1	1.2	1.2
Mexico	Tampico	659	763	908	1.46	1.74	0.9	0.9	0.9
Mexico	Tijuana	1,287	1,757	2,299	3.11	2.69	1.7	2.0	2.3
Mexico	Toluca de Lerdo	1,417	1,702	2,130	1.84	2.24	1.9	1.9	2.1
Mexico	Torreón	1,014	1,218	1,478	1.83	1.93	1.4	1.4	1.5
Nicaragua	Managua	887	954	1,192	0.73	2.24	31.9	28.8	29.9
Panama	Ciudad de Panamá (Panama City)	1,073	1,389	1,794	2.59	2.55	55.2	53.0	55.8
Paraguay	Asunción	1,507	2,073	2,777	3.19	2.92	51.0	52.3	55.0
Peru	Arequipa	678	791	960	1.54	1.95	3.6	3.5	3.7
Peru	Lima	7,294	8,950	10,695	2.05	1.78	38.6	40.0	41.2
Puerto Rico	San Juan	2,508	2,478	2,518	-0.12	0.16	69.5	66.9	67.6
Uruguay	Montevideo	1,605	1,659	1,816	0.33	0.90	53.0	53.3	55.7
Venezuela (Bolivarian Republic of)	Barquisimeto	946	1,215	1,510	2.50	2.18	4.3	4.5	4.8
Venezuela (Bolivarian Republic of)	Caracas	2,864	3,176	3,855	1.04	1.94	13.1	11.7	12.2
Venezuela (Bolivarian Republic of)	Ciudad Guayana	599	779	977	2.63	2.26	2.7	2.9	3.1
Venezuela (Bolivarian Republic of)	Maracaibo	1,724	2,255	2,773	2.69	2.07	7.9	8.3	8.8
Venezuela (Bolivarian Republic of)	Maracay	898	1,089	1,353	1.92	2.17	4.1	4.0	4.3
Venezuela (Bolivarian Republic of)	Valencia	1,392	1,821	2,249	2.69	2.11	6.4	6.7	7.1

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
NORTHERN AMERICA									
Canada	Calgary	953	1,191	1,420	2.23	1.76	3.9	4.3	4.7
Canada	Edmonton	924	1,121	1,325	1.93	1.68	3.8	4.1	4.4
Canada	Montréal	3,471	3,808	4,347	0.93	1.32	14.2	13.9	14.3
Canada	Ottawa-Gatineau	1,079	1,191	1,387	0.99	1.53	4.4	4.3	4.6
Canada	Québec	684	746	871	0.86	1.55	2.8	2.7	2.9
Canada	Toronto	4,607	5,485	6,298	1.74	1.38	18.9	20.0	20.7
Canada	Vancouver	1,959	2,235	2,583	1.32	1.45	8.0	8.2	8.5
United States of America	Allentown-Bethlehem	581	760	907	2.68	1.77	0.3	0.3	0.3
United States of America	Atlanta	3,542	4,875	5,620	3.19	1.42	1.6	1.9	2.0
United States of America	Austin	913	1,266	1,499	3.28	1.68	0.4	0.5	0.5
United States of America	Baltimore	2,083	2,415	2,814	1.48	1.53	0.9	0.9	1.0
United States of America	Birmingham	665	759	904	1.33	1.75	0.3	0.3	0.3
United States of America	Boston	4,049	4,772	5,491	1.64	1.40	1.8	1.9	1.9
United States of America	Bridgeport-Stamford	894	1,100	1,303	2.08	1.69	0.4	0.4	0.5
United States of America	Buffalo	977	1,090	1,289	1.09	1.67	0.4	0.4	0.5
United States of America	Charlotte	769	1,088	1,291	3.47	1.71	0.3	0.4	0.5
United States of America	Chicago	8,333	9,545	10,832	1.36	1.26	3.7	3.7	3.8
United States of America	Cincinnati	1,508	1,756	2,059	1.53	1.59	0.7	0.7	0.7
United States of America	Cleveland	1,789	2,022	2,364	1.22	1.56	0.8	0.8	0.8
United States of America	Columbus, Ohio	1,138	1,369	1,613	1.84	1.64	0.5	0.5	0.6
United States of America	Dallas-Fort Worth	4,172	5,143	5,913	2.09	1.40	1.9	2.0	2.1
United States of America	Dayton	706	835	993	1.67	1.74	0.3	0.3	0.3
United States of America	Denver-Aurora	1,998	2,492	2,905	2.21	1.54	0.9	1.0	1.0
United States of America	Detroit	3,909	4,364	5,025	1.10	1.41	1.7	1.7	1.8
United States of America	El Paso	678	813	968	1.82	1.74	0.3	0.3	0.3
United States of America	Hartford	853	982	1,164	1.41	1.70	0.4	0.4	0.4
United States of America	Honolulu	720	848	1,008	1.62	1.73	0.3	0.3	0.4
United States of America	Houston	3,849	4,785	5,509	2.18	1.41	1.7	1.9	1.9
United States of America	Indianapolis	1,228	1,552	1,827	2.35	1.63	0.5	0.6	0.6
United States of America	Jacksonville, Florida	886	1,066	1,263	1.85	1.69	0.4	0.4	0.4
United States of America	Kansas City	1,365	1,577	1,852	1.44	1.61	0.6	0.6	0.7
United States of America	Las Vegas	1,335	1,995	2,344	4.02	1.61	0.6	0.8	0.8
United States of America	Los Angeles-Long Beach-Santa Ana	11,814	13,223	14,907	1.13	1.20	5.3	5.2	5.2
United States of America	Louisville	866	1,021	1,210	1.64	1.70	0.4	0.4	0.4
United States of America	McAllen	532	824	984	4.37	1.78	0.2	0.3	0.3
United States of America	Memphis	976	1,165	1,378	1.77	1.67	0.4	0.5	0.5
United States of America	Miami	4,946	5,971	6,843	1.88	1.36	2.2	2.3	2.4
United States of America	Milwaukee	1,311	1,488	1,749	1.27	1.62	0.6	0.6	0.6
United States of America	Minneapolis-St. Paul	2,397	2,802	3,256	1.56	1.50	1.1	1.1	1.1
United States of America	Nashville-Davidson	755	951	1,129	2.31	1.72	0.3	0.4	0.4
United States of America	New Orleans	1,009	858	984	-1.62	1.38	0.4	0.4	0.4
United States of America	New York-Newark	17,846	20,104	22,487	1.19	1.12	8.0	7.9	7.9
United States of America	Oklahoma City	748	848	1,007	1.25	1.73	0.3	0.3	0.4
United States of America	Omaha	629	746	889	1.71	1.76	0.3	0.3	0.3
United States of America	Orlando	1,165	1,459	1,719	2.25	1.64	0.5	0.6	0.6
United States of America	Philadelphia	5,160	5,841	6,690	1.24	1.36	2.3	2.3	2.4
United States of America	Phoenix-Mesa	2,934	3,830	4,433	2.67	1.46	1.3	1.5	1.6
United States of America	Pittsburgh	1,755	1,965	2,298	1.13	1.56	0.8	0.8	0.8
United States of America	Portland	1,595	2,025	2,371	2.39	1.58	0.7	0.8	0.8
United States of America	Providence	1,178	1,373	1,617	1.53	1.64	0.5	0.5	0.6
United States of America	Raleigh	549	803	960	3.80	1.78	0.2	0.3	0.3

		Estimates and projections ('000)			Annual rate of change (%)		Share in national urban population (%)		
		2000	2010	2020	2000-2010	2010-2020	2000	2010	2020
United States of America	Richmond	822	984	1,168	1.80	1.71	0.4	0.4	0.4
United States of America	Riverside-San Bernardino	1,516	1,882	2,206	2.16	1.59	0.7	0.7	0.8
United States of America	Rochester	696	814	969	1.56	1.74	0.3	0.3	0.3
United States of America	Sacramento	1,402	1,730	2,031	2.10	1.60	0.6	0.7	0.7
United States of America	Salt Lake City	890	1,040	1,232	1.56	1.69	0.4	0.4	0.4
United States of America	San Antonio	1,333	1,585	1,863	1.73	1.61	0.6	0.6	0.7
United States of America	San Diego	2,683	3,120	3,618	1.51	1.48	1.2	1.2	1.3
United States of America	San Francisco-Oakland	3,236	3,681	4,254	1.29	1.45	1.4	1.4	1.5
United States of America	San Jose	1,543	1,790	2,098	1.49	1.59	0.7	0.7	0.7
United States of America	Seattle	2,727	3,298	3,823	1.90	1.48	1.2	1.3	1.3
United States of America	St. Louis	2,081	2,351	2,740	1.22	1.53	0.9	0.9	1.0
United States of America	Tampa-St. Petersburg	2,072	2,484	2,895	1.82	1.53	0.9	1.0	1.0
United States of America	Tucson	724	891	1,059	2.07	1.73	0.3	0.3	0.4
United States of America	Virginia Beach	1,397	1,598	1,877	1.34	1.61	0.6	0.6	0.7
United States of America	Washington, D.C.	3,949	4,634	5,334	1.60	1.41	1.8	1.8	1.9
OCEANIA									
Australia	Adelaide	1,102	1,181	1,410	0.69	1.77	6.6	6.0	6.2
Australia	Brisbane	1,603	1,993	2,426	2.18	1.97	9.6	10.1	10.6
Australia	Melbourne	3,433	3,896	4,612	1.26	1.69	20.6	19.6	20.2
Australia	Perth	1,373	1,617	1,955	1.64	1.89	8.2	8.2	8.6
Australia	Sydney	4,078	4,479	5,254	0.94	1.60	24.4	22.6	23.0
New Zealand	Auckland	1,063	1,407	1,754	2.80	2.20	32.2	37.4	41.9

Source: *United Nations Department of Economic and Social Affairs, Population Division (2012) World Urbanization Prospects: The 2011 Revision, United Nations, New York.*

TABLE 5: POPULATION DENSITY OF URBAN AGGLOMERATIONS IN SELECTED CITIES

Country	City	Population Estimate	Year	Base Year Population Estimate	Land Area: Km²	Density	Base Year
AFRICA							
Egypt	Cairo	15,071,000	2013	14,500,000	1,658	9,100	2011
Central African Rep.	Bangui	792,000	2013	700,000	111	7,100	2003
Nigeria	Lagos	12,090,000	2013	11,223,000	907	13,300	2011
Kenya	Nairobi	4,457,000	2013	3,600,000	557	8,000	2008
Ghana	Accra	3,933,000	2013	3,600,000	945	4,200	2010
Tanzania	Dar es Salaam	3,723,000	2013	3,200,000	570	6,500	2010
Senegal	Dakar	3,270,000	2013	2,930,000	194	16,800	2010
Ethiopia	Addis Abeba	3,226,000	2013	3,125,000	389	8,300	2012
Morocco	Casablanca	3,120,000	2013	3,010,000	220	14,200	2010
Nigeria	Abuja	2,360,000	2013	2,153,000	225	10,500	2011
Burkina Faso	Ouagadougou	2,193,000	2013	1,910,000	350	6,300	2010
Rwanda	Kigali	1,055,000	2013	940,000	114	9,300	2010
ASIA							
Japan	Tokyo-Yokohama	37,239,000	2013	36,900,000	8,547	4,400	2010
Indonesia	Jakarta (Jabotabek)	26,746,000	2013	24,750,000	2,784	9,600	2010
Philippines	Manila	21,241,000	2013	19,850,000	1,437	14,800	2010
China	Beijing, BJ	18,241,000	2013	16,800,000	3,497	5,200	2010
India	Mumbai, MAH	17,307,000	2013	16,600,000	546	31,700	2011
India	Kolkota, WB	14,630,000	2013	14,113,000	1,204	12,100	2011
India	Chandigarh, CH	1,074,000	2013	1,026,000	202	5,300	2011
Thailand	Bangkok	14,544,000	2013	13,500,000	2,331	6,200	2010
Bangladesh	Dhaka	14,399,000	2013	13,600,000	324	44,500	2011
China	Hong Kong, HK	7,162,000	2013	7,050,000	275	26,100	2011
Malaysia	Kuala Lumpur	6,608,000	2013	6,100,000	1,943	3,400	2010
Singapore	Singapore	5,287,000	2013	5,150,000	518	10,200	2010
Armenia	Yerevan	1,300,000	2013	1,300,000	324	4,000	2010
EUROPE							
United States	New York, NY-NJ-CT	20,673,000	2013	20,366,000	11,642	1,800	2010
United States	Los Angeles, CA	15,067,000	2013	14,667,000	6,299	2,400	2010
France	Paris	10,869,000	2013	10,355,000	2,845	3,800	2008
United Kingdom	London	9,576,000	2013	9,400,000	1,623	5,900	2011
United States	Washington, DC-VA-MD	4,825,000	2013	4,587,000	3,424	1,400	2010
Spain	Barcelona	4,604,000	2013	4,500,000	1,075	4,300	2011
United States	Phoenix, AZ	4,044,000	2013	3,879,000	3,276	1,200	2010
Greece	Athens	3,510,000	2013	3,500,000	583	6,000	2011
Belgium	Brussels	1,944,000	2013	1,900,000	751	2,600	2010
New Zealand	Auckland	1,310,000	2013	1,250,000	544	2,400	2008
Denmark	Copenhagen	1,218,000	2013	1,180,000	453	2,700	2010
Finland	Helsinki	1,159,000	2013	1,120,000	492	2,400	2010
Netherlands	Amsterdam	1,050,000	2010	1,050,000	414	2,500	2010
Russia	Moscow	15,788,000	2013	15,500,000	4,403	3,600	2010
Russia	St. Petersburg	4,899,000	2013	4,840,000	1,191	4,100	2010
LATIN AMERA AND THE CARIBBEAN							
Mexico	Guadalajara	4,567,000	2013	4,440,000	699	6,500	2010
Colombia	Medellin	3,732,000	2013	3,595,000	189	19,700	2010
Brazil	Sao Paulo	20,568,000	2013	19,900,000	3,173	6,500	2010
Brazil	Brasilia	2,394,000	2013	2,300,000	673	3,600	2010
Guyana	Gerogetown	135,000	2004	135,000	70	1,900	2004

Source: *Demographia World Urban Areas: 9th Annual Edition (2013.03)*

TABLE 6: URBAN POPULATION, PROPORTION OF URBAN POPULATION LIVING IN SLUM AREA AND URBAN SLUM POPULATION

	Proprotion of urban population living in slum area						Urban Slum Population at Mid-Year by Major Area, Region and Country (thousands)					
MAJOR AREA, REGION, COUNTRY OR AREA	1990	1995	2000	2005	2007	2009	1990	1995	2000	2005	2007	2009
AFRICA												
Angola				86.5	76.2	65.8				7,756	7,466	7,019
Benin	79.3	76.8	74.3	71.8	70.8	69.8	1,311	1,616	1,897	2,260	2,423	2,595
Burkina Faso	78.8	72.4	65.9	59.5	59.5		960	1,109	1,374	1,762	2,029	
Burundi				64.3	64.3					452	508	
Cameroon	50.8	49.6	48.4	47.4	46.6	46.1	2,532	3,160	3,826	4,585	4,870	5,188
Central African Republic	87.5	89.7	91.9	94.1	95.0	95.9	943	1,113	1,296	1,470	1,551	1,642
Chad	98.9	96.4	93.9	91.3	90.3	89.3	1,257	1,507	1,844	2,312	2,509	2,714
Comoros	65.4	65.4	65.4	68.9	68.9		80	91	101	119	124	
Congo				53.4	51.7	49.9				1,098	1,119	1,134
Côte d'Ivoire	53.4	54.3	55.3	56.2	56.6	57.0	2,674	3,366	4,158	5,066	5,496	5,979
Democratic Republic of the Congo				76.4	69.1	61.7				14,491	14,375	14,079
Egypt	50.2	39.2	28.1	17.1	17.1	17.1	12,607	10,704	8,447	5,677	5,903	6,143
Equatorial Guinea				66.3						157		
Ethiopia	95.5	95.5	88.6	81.8	79.1	76.4	5,819	7,562	8,653	9,729	10,067	10,427
Gabon				38.7						443		
Gambia				45.4	34.8					373	313	
Ghana	65.5	58.8	52.1	45.4	42.8	40.1	3,571	4,070	4,473	4,755	4,817	4,848
Guinea	80.4	68.8	57.3	45.7	45.7		1,385	1,517	1,490	1,390	1,489	
Guinea-Bissau				83.1						362		
Kenya	54.9	54.8	54.8	54.8	54.8	54.7	2,343	2,859	3,400	4,069	4,396	4,762
Lesotho				35.1	44.4	53.7				163	223	290
Liberia						68.3						1,282
Madagascar	93.0	88.6	84.1	80.6	78.0	76.2	2,470	2,997	3,486	4,046	4,225	4,460
Malawi	66.4	66.4	66.4	66.4	67.7	68.9	725	893	1,192	1,572	1,786	2,027
Mali	94.2	84.8	75.4	65.9	65.9	65.9	1,902	2,066	2,247	2,496	2,743	3,009
Morocco	37.4	35.2	24.2	13.1	13.1	13.1	4,490	4,904	3,713	2,205	2,308	2,416
Mozambique	75.6	76.9	78.2	79.5	80.0	80.5	2,161	3,216	4,381	5,714	6,311	6,940
Namibia	34.4	34.1	33.9	33.9	33.6	33.5	135	165	200	239	254	272
Niger	83.6	83.1	82.6	82.1	81.9	81.7	1,016	1,219	1,475	1,787	1,944	2,121
Nigeria	77.3	73.5	69.6	65.8	64.2	62.7	26,549	31,538	36,951	42,783	45,195	47,612
Rwanda	96.0	87.9	79.7	71.6	68.3	65.1	372	397	874	1,129	1,165	1,208
Senegal	70.6	59.8	48.9	43.3	41.1	38.8	2,071	2,051	1,955	2,010	2,030	2,048
Sierra Leone				97.0						1,824		
Somalia				73.5	73.6	73.6				2,161	2,316	2,486
South Africa	46.2	39.7	33.2	28.7	23.0	23.0	8,834	8,950	8,475	8,179	6,814	7,055

MAJOR AREA, REGION, COUNTRY OR AREA	Proprotion of urban population living in slum area						Urban Slum Population at Mid-Year by Major Area, Region and Country (thousands)					
	1990	1995	2000	2005	2007	2009	1990	1995	2000	2005	2007	2009
Togo				62.1						1,486		
Uganda	75.0	75.0	75.0	66.7	63.4	60.1	1,473	1,833	2,214	2,403	2,487	2,578
United Republic of Tanzania	77.4	73.7	70.1	66.4	65.0	63.5	3,719	4,539	5,335	6,271	6,713	7,200
Zambia	57.0	57.1	57.2	57.2	57.3	57.3	1,778	1,930	2,083	2,350	2,483	2,633
Zimbabwe	4.0	3.7	3.3	17.9	21.0	24.1	121	138	140	801	963	1,141
ASIA												
China	43.6	40.5	37.3	32.9	31.0	29.1	131,670	151,437	169,102	183,544	182,934	180,560
Mongolia	68.5	66.7	64.9	57.9	57.9		866	860	882	878	915	
Bangladesh	87.3	84.7	77.8	70.8	66.2	61.6	19,999	23,535	25,819	27,831	27,770	27,542
India	54.9	48.2	41.5	34.8	32.1	29.4	121,022	122,231	119,698	112,913	109,102	104,679
Nepal	70.6	67.3	64.0	60.7	59.4	58.1	1,194	1,585	2,100	2,630	2,850	3,075
Pakistan	51.0	49.8	48.7	47.5	47.0	46.6	18,054	20,688	23,890	27,158	28,529	29,965
Cambodia				78.9						2,052		
Indonesia	50.8	42.6	34.4	26.3	23.0	23.0	27,559	29,017	29,691	24,777	22,456	23,255
Lao People's Democratic Republic				79.3						1,277		
Myanmar				45.6						6,701		
Philippines	54.3	50.8	47.2	43.7	42.3	40.9	16,479	17,158	17,613	17,972	18,134	18,302
Thailand				26.0	26.5	27.0				5,539	5,841	6,146
Viet Nam	60.5	54.6	48.8	41.3	38.3	35.2	8,118	8,852	9,395	9,491	9,396	9,224
Iraq	16.9	16.9	16.9	52.8	52.8	52.8	2,131	2,439	2,828	9,974	10,361	10,759
Jordan				15.8	17.7	19.6				689	824	971
Lebanon				53.1						1,877		
Saudi Arabia				18.0						3,442		
Syrian Arab Republic				10.5	22.5					1,080	2,516	
Turkey	23.4	20.7	17.9	15.5	14.1	13.0	7,773	7,859	7,714	7,422	7,022	6,728
Yemen				67.2	76.8					4,088	5,140	
LATIN AMERICA AND THE CARIBBEAN												
Argentina	30.5	31.7	32.9	26.2	23.5	20.8	8,622	9,772	10,953	9,274	8,521	7,737
Belize					18.7						28	
Bolivia	62.2	58.2	54.3	50.4	48.8	47.3	2,305	2,590	2,794	2,972	3,030	3,080
Brazil	36.7	34.1	31.5	29.0	28.0	26.9	40,527	42,789	44,604	45,428	45,309	44,947
Chile				9.0						1,285		
Colombia	31.2	26.8	22.3	17.9	16.1	14.3	7,077	6,884	6,404	5,670	5,306	4,899
Costa Rica				10.9						291		
Dominican Republic	27.9	24.4	21.0	17.6	16.2	14.8	1,135	1,143	1,145	1,100	1,067	1,024
Ecuador				21.5						1,786		
El Salvador				28.9						1,079		
French Guiana				10.5						16		
Grenada				6.0						2		
Guadeloupe				5.4						24		

MAJOR AREA, REGION, COUNTRY OR AREA	Proprotion of urban population living in slum area						Urban Slum Population at Mid-Year by Major Area, Region and Country (thousands)					
	1990	1995	2000	2005	2007	2009	1990	1995	2000	2005	2007	2009
Guatemala	58.6	53.3	48.1	42.9	40.8	38.7	2,146	2,301	2,438	2,572	2,619	2,660
Guyana				33.7	33.5	33.2				73	73	72
Haiti	93.4	93.4	93.4	70.1	70.1	70.1	1,893	2,393	2,876	2,908	3,230	3,557
Honduras				34.9						1,170		
Jamaica				60.5						840		
Mexico	23.1	21.5	19.9	14.4	14.4		13,760	14,457	14,800	11,574	11,906	
Nicaragua	89.1	74.5	60.0	45.5	45.5		1,929	1,860	1,676	1,388	1,437	
Panama				23.0						526		
Paraguay				17.6						608		
Peru	66.4	56.3	46.2	36.1	36.1		9,964	9,566	8,776	7,540	7,801	
Saint Lucia				11.9						5		
Suriname				3.9						13		
Trinidad and Tobago				24.7						40		
Venezuela (Bolivarian Republic of)				32.0						7,861		

Source: *United Nations Human Settlements Programme (UN-Habitat), Global Urban Indicators Database 2012.*

Notes:

(a) United Nations Department of Economic and Social Affairs Population Division - World Urbanization Prospects: The 2009 Revision.

(b) Computed from country household data using the four components of slum (improved water, improwed sanitation, durable housing and sufficient living area.

TABLE 7: PROPORTION OF LAND ALLOCATED TO STREET AND STREET DENSITY SECONDARY URBAN CENTRES IN LAKE VICTORIA REGION

Country	Secondary Urban Centres	Proportion of land Allocated to street (%)	Street density (Km/Km^2)	Urban Population
Kenya	Bondo	7.1	7.1	47,056
	Homabay	8.8	14.0	59,293
	Kisii	12.2	13.4	142,274
	Migori	6.1	9.3	82,464
	Siaya	7.2	10.7	40,555
Tanzania	Bukoba	7.2	7.4	81,221
	Geita	10.5	14.4	52,487
	Muleba	4.9	9.1	10,732
	Musoma	7.0	10.2	108,243
	Mutukula	8.3	19.7	
	Sengerema	7.0	14.6	49,806
Uganda	Bugembe	6.5	8.6	26,268
	Ggaba	7.2	9.7	20,230
	Kyotera	6.9	11.8	7,590
	Masaka	6.3	8.7	67,768
	Mukono	4.1	6.4	46,506
	Mutukula	11.0	18.0	

Source: *United Nations Human Settlements Programme (UN-Habitat), Global Urban Indicators Database 2013*

TABLE 8: LAND AREA, STREET DENSITY AND INTERSECTION DENSITY, CITIES OF PHILIPPINES

PHILLIPINES INTRA CITY

Region	City	Land Area (Km^2)	Street Length (Kms)	Street density (Km/Km^2)
CORDILLERA	Benguet			
	Baguio City	57.5	142.70	2.48
	Kalinga			
	Tabuk City		5.11	
	TOTAL	**57.5**	**147.81**	**2.57**
ILOCOS	Ilocos Norte			
	Laoag City	127.5	124.44	0.98
	Batac City		347.37	
	Ilocos Sur			
	Candon City	103.3	13.59	0.13
	Vigan City	11.0	15.54	1.41
	La Union			
	San Fernando City	109.1	20.51	0.19
	Pangasinan			
	Alaminos City	137.0	13.74	0.10
	Dagupan City	37.2	17.58	0.47
	San Carlos City	169.0	194.81	1.15
	Urdaneta City	121.0	3.50	0.03
	TOTAL	**815.1**	**751.08**	**0.92**
CAGAYAN VALLEY	Cagayan			
	Tuguegarao City	114.0	41.10	0.36
	Isabela			
	Cauayan City	336.4	54.15	0.16
	Santiago City	255.0	29.80	0.12
	TOTAL	**705.4**	**125.05**	**0.18**
CENTRAL LUZON	Bataan			
	Balanga City	135.6	7.95	0.06
	Bulacan			
	Malolos City	67.3	30.79	0.46
	Meycauyan City	22.1	23.80	1.08
	San Jose del Monte	165.1	80.08	0.49
	Nueva Ecija			
	Cabanatuan City	252.8	29.81	0.12
	Gapan City	185.7	126.36	0.68
	Palayan City	45.6	15.99	0.35
	San Jose City	187.3	40.79	0.22
	Science City of Muñoz	163.1	85.88	0.53
	Pampanga			
	Angeles City	66.2	218.19	3.30
	San Fernando City	67.7	1.30	0.02
	Tarlac			
	Tarlac City	425.5	14.43	0.03
	Zambales			
	Olongapo City	170.3	148.25	0.87
	TOTAL	**1954.2**	**823.61**	**0.42**

Region	City	Land Area (Km^2)	Street Length (Kms)	Street density (Km/Km^2)
CALABARZON	Batangas			
	Batangas City	283.3	23.20	0.08
	Lipa City	229.4	7.12	0.03
	Tanauan City	147.2	39.02	0.27
	Cavite			
	Cavite City	24.8	63.72	2.57
	Dasmariñas City		29.22	
	Tagaytay City	66.1	29.83	0.45
	Trece Martires City	49.1	41.58	0.85
	Laguna			
	Binañ City		63.74	
	Calamba City	144.8	3.56	0.03
	San Pablo City	197.6	155.95	0.79
	Sta. Rosa City	39.1	59.49	1.52
	Quezon			
	Lucena City	83.2	30.09	0.36
	Tayabas City	301.8	7.29	0.02
	Rizal			
	Antipolo City	306.1	36.02	0.12
	TOTAL	**1872.5**	**589.82**	**0.32**
MIMAROPA	Oriental Mindoro			
	Calapan City	215.1	48.67	0.23
	Palawan			
	Puerto Princesa	2400.0	209.95	0.09
	TOTAL	**2615.1**	**258.62**	**0.10**
BICOL	Albay			
	Legazpi City	204.2	38.44	0.19
	Ligao City	308.9	12.05	0.04
	Tabaco City	117.1	24.31	0.21
	Camarines Sur			
	Iriga City	174.0	232.99	1.34
	Naga City	84.5	122.63	1.45
	Masbate			
	Masbate City	249.1	60.19	0.24
	Sorsogon			
	Sorsogon City	338.2	24.28	0.07
	TOTAL	**1476.0**	**514.89**	**0.35**
WESTERN VISAYAS	Capiz			
	Roxas City		38.91	
	Iloilo			
	Iloilo City	56.1	126.76	2.26
	Passi City	251.4	12.17	0.05
	Negros Occ.			
	Bacolod City	161.5	296.20	1.84
	Bago City		9.20	1.00
	Cadiz City	515.0	108.48	0.21
	Escalante City		47.70	0.42

Region	City	Land Area (Km^2)	Street Length (Kms)	Street density (Km/Km^2)
WESTERN VISAYAS	Himamaylan City	363.7	109.93	0.30
	Kabankalan City	726.4	439.09	0.60
	La Carlota City		15.90	
	Sagay City		63.12	
	San Carlos City		171.64	
	Silay City		29.46	
	Sipalay City		218.17	
	Talisay City	42.2	58.20	1.38
	Victorias City		75.07	
	TOTAL	**2116.2**	**1819.99**	**0.86**
REGION VII-CENTRAL VISAYAS	Bohol			
	Tagbilaran City	32.7	74.40	2.28
	Cebu			
	Bogo City		116.32	
	Carcar City		52.86	
	Cebu City	291.2	87.23	0.30
	Danao City	107.3	10.98	0.10
	Lapu-Lapu City	64.2	96.30	1.50
	Mandaue City	34.9	125.61	3.60
	Naga City		96.46	
	Talisay City	42.2	53.96	1.28
	Toledo City		12.07	
	Negros Oriental			
	Bais City	316.9	13.67	0.04
	Bayawan City	699.0	17.42	0.03
	Canlaon City		100.19	
	Dumaguete City	34.3	106.62	3.11
	Guihulngan City		7.57	
	Tanjay City	478.3	12.50	0.03
	Total	2101.0	984.14	0.47
EASTERN VISAYAS	Eastern Samar			
	Borongan City		70.53	
	Leyte			
	Baybay City		193.12	
	Ormoc City	490.5	42.87	0.09
	Tacloban City	201.7	110.10	0.55
	Southern Leyte			
	Maasin City	211.7	9.30	0.04
	Western Samar			
	Calbayog City		205.93	
	Catbalogan City	274.2	37.64	0.14
	TOTAL	1178.1	669.49	0.57
ZAMBOANGA PENINSULA	Zamboanga del Norte			
	Dapitan City		17.11	
	Dipolog City	136.3	30.59	0.22
	Isabela City	223.7	35.26	0.16
	Zamboanga del Sur			
	Pagadian City	333.8	154.03	0.46

Region	City	Land Area (Km^2)	Street Length (Kms)	Street density (Km/Km^2)
ZAMBOANGA PENINSULA	Zamboanga City	1483.4	16.79	0.01
	TOTAL	**2177.2**	**253.77**	**0.12**
NORTHERN MINDANAO	Bukidnon			
	Malaybalay City	984.4	257.03	0.26
	Valencia City	607.1	49.85	0.08
	Lanao del Norte			
	Iligan City	813.4	66.97	0.08
	Misamis Occidental			
	Oroquieta City		30.48	
	Ozamis City		28.18	
	Tangub City		32.54	
	Misamis Oriental			
	Cagayan de Oro City	488.9	165.18	0.34
	El Salvador City		50.84	
	Gingoog City	649.8	42.96	0.07
	TOTAL	**3543.5**	**724.04**	**0.20**
DAVAO	Davao del Norte			
	Is. Garden City of	201.3	181.36	0.90
	Panabo City	251.2	154.80	0.62
	Tagum City	192.0	142.64	0.74
	Davao del Sur			
	Davao City	2444.0	1637.38	0.67
	Digos City	287.1	69.25	0.24
	Davao Oriental			
	Mati City		28.35	
	TOTAL	**3375.6**	**2213.77**	**0.66**
SOCCKSARGEN	North Cotabato			
	Kidapawan City	340.1	37.07	0.11
	Sarangani			
	Cotabato City	176.0	151.01	0.86
	South Cotabato			
	Gen. Santos City	492.9	582.35	1.18
	Koronadal City	277.0	49.47	0.18
	Sultan Kudarat			
	Tacurong City	400.0	26.28	0.07
	TOTAL	**1685.9**	**846.18**	**0.50**
CARAGA	Agusan del Norte			
	Butuan City	817.3	89.22	0.11
	Cabadbaran City	252.8	35.21	0.14
	Agusan del Sur			
	Bayugan City		15.81	
	Surigao del Norte			
	Surigao City	245.3	37.27	0.15
	Surigao del Sur			
	Bislig City	488.9	221.97	0.45

Region	City	Land Area (Km²)	Street Length (Kms)	Street density (Km/Km²)
CARAGA	Tandag City		133.63	
	TOTAL	**1804.3**	**533.11**	**0.30**
MUSLIM MINDANAO	Basilan			
	Lamitan City	354.5	6.34	0.02
	Lanao del Sur			
	Marawi City	87.6	39.68	0.45
	TOTAL	**442.0**	**46.02**	**0.10**
METRO MANILA	Caloocan City	53.3	246.53	4.62
	Las Piñas City	41.5	75.84	1.83
	Makati City	27.4	227.58	8.32
	Malabon City	19.8	78.72	3.98
	Mandaluyong City	21.3	80.27	3.78

Region	City	Land Area (Km²)	Street Length (Kms)	Street density (Km/Km²)
METRO MANILA	Manila	38.6	490.75	12.80
	Marikina City	21.5	39.30	1.83
	Muntinlupa	46.7	63.67	1.36
	Navotas City	10.8	48.98	4.55
	Parañaque	47.7	174.43	3.66
	Pasay	19.0	59.26	3.12
	Pasig City	31.0	357.67	11.54
	Quezon City	166.2	1191.37	7.17
	San Juan City	5.9	83.60	14.07
	Taguig	47.9	165.78	3.46
	Valenzuela	47.0	54.27	1.16
	TOTAL	**645.5**	**3438.00**	**5.33**
	GRAND TOTAL	28565.0	14739.39	0.52

			Length	Proportion
Nationwide Length City streets	14739.39	Paved	9201.77	62.43
Nationwide Length Provincial Streets	31233.23	Unpaved	5120.43	34.74
Total Nationwide street Length	**45972.62**	**Unknown**	**417.18**	**2.83**
		TOTAL	**14739.39**	**100**

Source : *Department of the Interior and Local Govermennt (DILG) Philippines*

TABLE 9: PROPORTION OF LAND ALLOCATED TO STREET, STREET DENSITY AND INTERSECTION DENSITY CITIES OF UNITED STATES (PRE 1950 AND POST 1950)

PRE 1950				POST 1950			
City	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)	City	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)
ATLANTA				**ATLANTA**			
Ansley Park	15.3	9.6	36.3	Buckhead	13.8	8.7	26.7
Decatur	15.7	9.9	37.4	Crabapple	8.1	5.1	15.5
Downtown	26.4	16.6	90.4	Dunwoody	13.8	8.7	25.9
Va Highland	14.2	8.9	31.8	Peach tree city	10.4	6.5	20.0
BOSTON				**BOSTON**			
Brookline	21.2	13.4	73.2	Billerica	9.2	5.8	20.8
Cambridge	26.8	16.8	111.5				
Downtown	30.6	19.3	134.8				
CHICAGO				**CHICAGO**			
Oak Park	21.9	13.8	53.8	Heights	13.3	8.3	32.0
Riverside	15.6	9.8	40.0	Schaumburg	12.8	8.1	30.1
Skokie	20.8	13.1	53.8	Tinley Park	15.6	9.8	38.4
The Loop	29.8	18.7	98.4	Wheaton	14.9	9.4	35.3
DALLAS				**DALLAS**			
Downtown	29.8	18.7	108.7	Stonebriar	5.4	3.4	8.6
Fort Worth	17.9	11.3	55.9				
Lakewood	24.0	15.1	64.3				
Oak Cliff	19.9	12.5	47.5				
DETROIT				**DETROIT**			
Downtown	27.0	17.0	87.0	Bloomfield hills	11.5	7.3	23.7
Houston				Houston			
Downtown	29.7	18.7	101.4	Katy	14.2	8.9	30.3
Heights	24.4	15.4	72.4	Uptown/galleria	14.7	9.2	30.6
LOS ANGELES - RIVERSIDE				**LOS ANGELES - RIVERSIDE**			
Beverly Hills	19.8	12.5	44.0	S coast metro	15.3	9.6	35.0
Downtown	25.9	16.3	78.7	Tustin	17.2	10.8	43.7
Long Beach	28.4	17.9	107.2				
Santa Monica	30.1	18.9	93.1				
MIAMI				**MIAMI**			
Downtown	25.9	16.3	73.7	Boca Raton	9.3	5.9	15.7
				Orangebrook	17.7	11.1	41.8
				Villages - Oriole	12.9	8.1	24.2
NEW YORK				**NEW YORK**			
Bronx	26.8	16.8	83.0	Farmingville	13.1	8.2	30.0
Downtown	33.5	21.1	122.6	Scarsdale	14.9	9.4	36.7
Garden City	19.6	12.3	58.5	White plains	17.5	11.0	45.9
Levittown	22.3	14.0	69.8				
Midtown	29.8	18.7	80.3				
Radburn	20.7	13.0	57.4				
PHILADELPHIA- TRENTON							
City Center	41.4	26.0	201.1				
Levittown	17.9	11.3	45.8				
Trenton	32.7	20.5	118.2				
SAN FRANCISCO - SAN JOSE							
Berkeley	24.7	15.6	66.4				
Downtown	33.2	20.9	126.0				
Pacific Heights	24.5	15.4	75.4				

PRE 1950				POST 1950			
City	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)	City	Proportion of land Allocated to street (%)	Street density (Km/Km²)	Intersection density (#/Km²)
WASHINGTON DC							
Adam's Morgan	21.1	13.3	61.5				
Alexandria	19.8	12.5	58.4				
Chevy Chase	21.5	13.5	60.3				
Downtown	23.6	14.8	72.6				
Lincoln Park	23.4	14.7	72.0				
Average	23.9	15.0	78.2				
				PHILADELPHIA- TRENTON			
				Franklin Mills	14.1	8.8	33.8
				SAN FRANCISCO - SAN JOSE			
				Evergreen	17.5	11.0	49.3
				Palo Alto	18.9	11.9	54.2
				WASHINGTON DC			
				Falls Church	17.7	11.1	45.6
				Reston	12.1	7.6	26.0
				Tyson's corner	15.4	9.7	36.2
				Average	13.0	8.1	31.7

Source: *Measuring the configuration of street networks: the Spatial profiles of 118 urban areas in the 12 most populated metropolitan regions in the US*

TABLE 10: LENGTH OF STREET NETWORK AND PAVED STREETS SELECTED AFRICAN CITIES

Country	City	Length of street network (Km)	Paved streets as share of all streets (%)
Burkina Faso	Ouagadougou	1,827	11
Cameroon	Douala	1,800	25
Democratic Republic Congo	Kinshasa	5,000	10
Ethiopia	Addis Ababa	—	—
Ghana	Accra	1,899	50
Guinea	Conakry	815	32
Ivory Coast	Abidjan	2,042	59
Kenya	Nairobi	—	—
Mali	Bamako	836	24
Nigeria	Lagos	—	—
Rwanda	Kigali	984	12
Senegal	Dakar	—	—
Tanzania	Dar es Salaam	1,140	39
Uganda	Kampala	610	74
	Average	—	33

Source: *Ajay Kumar and Fanny Barrett (2008) Stuck in Traffic: Urban Transport in Africa, Africa Infrastructure Country Diagnostic (AICD), obtained from City authorities, published documents, various*

Note: — = not available

TABLE 11: SHARES OF VARIOUS MODES OF TRANSPORT IN USE IN SELECTED CITIES

Country	City	Walk
AFRICA		
Burkina Faso	Ouagadougou	—
Cameroon	Douala	60
Côte d'Ivoire	Abidjan	22
Ethiopia	Addis Ababa	30
Ghana	Accra	12
Guinea	Conakry	78
Kenya	Nairobi	47
Mali	Bamako	—
Nigeria	Lagos	
Rwanda	Kigali	5
Senegal	Dakar	—
Uganda	Kampala	—
United Republic of Tanzania	Dar es Salaam	26
ASIA		
China	Beijing	21
China	Shanghai	27
China	Taipei	15
India	Ahmedabad	22
India	Bangalore	26
India	Delhi	21
India	Mumbai	27
Japan	Osaka	27
Japan	Tokyo	23
Singapore	Singapore	22
LATIN AMERICA AND THE CARIBBEAN		
Brazil	Curitiba	21
Colombia	Bogota	15

Source: *Ajay Kumar and Fanny Barrett (2008) Stuck in Traffic: Urban Transport in Africa, Africa Infrastructure Country Diagnostic (AICD), obtained from City authorities, published documents*

Notes:

1) — = Not available. Rows may not total to 100 because of rounding.

2) The modal share shown for Bamako, Dakar, Kampala, Lagos, and Ouagadougou reflects motorized trips only

TABLE 12: CYCLING AND WALKING SHARE OF DAILY TRIPS CITIES OF EUROPE, NORTHERN AMERICA AND OCEANIA

	Year	Walking (%)	Cycling (%)
EUROPE			
Austria	2005	21	4
Belgium	1999	16	8
Denmark	2008	16	18
Finland	2005	22	9
France	2008	22	3
Germany	2009	24	10
Ireland	2006	11	2
Netherlands	2008	25	26
Norway	2009	22	4
Sweden	2006	23	9
United Kingdom	2008	22	2
North America			
United States of America	2009	11	1
Canada	2006	11	1
OCEANIA			
Australia	2006	5	1

Source: *Buehler, R. and Pucher, J. (2012a) ''Walking and cycling in Western Europe and the United States: Trends, policies, and lessons", TR News 280(May-June): 34–42.*

TABLE 13: OWNERSHIP OF BICYCLE AND MOTORCYCLE COUNTRY LEVEL

		BICYCLE			MOTORCYCLE		
Country	**Year**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
AFRICA							
Burkina Faso	2010	73.4	87.8	84.2	57	28.8	35.8
Burkina Faso	2003	63.2	81.8	78	55.4	16.1	24.2
Burkina Faso	1998-99	56.4	81.5	77.2	51.8	17.4	23.3
Burkina Faso	1993	48.3	71.2	66.8	57.9	17.4	25.2
Central African Republic	1994-95	9.7	12.4	11.5	8.8	2.1	4.5
Egypt	2008	5.8	13.5	9.8	1.9	3.1	2.5
Egypt	2005	9.4	19.2	14.5	1.4	1.7	1.6
Egypt	2000	11.5	16.5	14	1.7	1.9	1.8
Egypt	1995	13.5	16	14.7			
Egypt	1992	12.4	13.3	12.8			
Ghana	2008	19.7	31.2	25.7	4.7	4.4	4.5
Ghana	2003	16	29.1	23.1	2.6	1.7	2.1
Ghana	1998	11	20.9	17.4	1.6	0.9	1.1
Ghana	1993	10.3	19.4	16.1	1.6	0.9	1.1
Kenya	2008-09	17.7	34.4	30.1	2.8	1.9	2.1
Kenya	2003	17.7	33.1	29.3	0.9	0.6	0.7
Kenya	1998	15.3	26.6	23.9	1.8	0.6	0.9
Kenya	1993	16.9	23.3	22.1			
Morocco	2003-04	27.3	22.3	25.4	11.8	10.4	11.3
Morocco	1992	9.5	10.3	9.9	14.8	9	11.8

		BICYCLE			MOTORCYCLE		
Country	Year	Urban	Rural	Total	Urban	Rural	Total
AFRICA							
Nigeria	2008	11.3	29.3	22.9	23.5	24.9	24.4
Nigeria	2003	17.9	41	32.7	17.5	13.8	15.1
Nigeria	1999	9.8	30.5	24.2	13.9	13.3	13.5
Rwanda	2010	11	15.9	15.2	2.6	0.9	1.1
Rwanda	2007-08	10.2	12.5	12.2	2.6	0.6	0.9
Rwanda	2005	10.5	11.1	11	1.8	0.3	0.5
Rwanda	2000	11.5	6.9	7.6	3.1	0.3	0.7
Rwanda	1992	8.2	6.3	6.4	2.6	0.6	0.7
Senegal	2010-11	13.4	19.6	16.6	10.3	6	8.1
Senegal	2008-09	11.1	18.5	15	8.1	5.4	6.7
Senegal	2005	9.2	16.1	12.8	7.4	4.6	5.9
Senegal	1997	5.6	10.7	8.6	4.9	2.5	3.5
Senegal	1992-93	4.3	7.6	6.2	3.7	2.1	2.8
Tanzania	2010	33.7	46.7	43.3	5.2	2.3	3.1
Tanzania	2004-05	27.5	42.2	38.3	2.4	0.7	1.1
Tanzania	1999	27.3	34.1	32.3	1.5	0.5	0.7
Tanzania	1996	25	33.8	31.9	1.7	0.6	0.8
Tanzania	1991-92	21.4	21.6	21.5	1.3	0.6	0.8
ASIA							
Armenia	2010	2.4	6.9	4	0.2	0.3	0.2
Armenia	2005	1.9	11.6	5.2	0.2	1.2	0.6
Armenia	2000	5.3	8.4	6.6	0.8	2.8	1.6
Bangladesh	2011	16.6	28.4	25.4	7.1	4.9	5.4
Bangladesh	2007	20.5	27.9	26.3	4.7	2.4	2.9
Bangladesh	2004	18.3	25.8	24.2	4	1.3	1.9
Bangladesh	1999-00	18.5	20.7	20.3	4	1.3	1.8
Bangladesh	1996-97	18.4	19.4	19.3			
Bangladesh	1993-94	15.7	16	15.9			
India	2005-06	50.1	51.6	51.1	30.5	10.8	17.2
India	1998-99	53.4	45.7	47.8	25	6	11.2
India	1992-93	47.5	39.7	41.8	19.2	3.8	8.1
Indonesia	2007	52.5	43.4	47.2	55.7	37.3	45
Indonesia	2002-03	45.6	42.9	44.2	38.7	21.9	29.6
Indonesia	1997	48.1	47.2	47.5	30.8	16.5	20.6
Indonesia	1994	48.2	44.2	45.4	25.6	10.9	15.3
Indonesia	1991	38.7	40.8	40.2			
Philippines	2008	25.1	21.8	23.5	22.5	20.6	21.5
Philippines	2003	22	17.2	19.7	13.7	11	12.4
Philippines	1998	27	21.2	24.1	13.1	8.8	10.9
LATIN AMERICA AND THE CARIBBEAN							
Colombia	2010	35.3	27.2	33.3	18.1	16.4	17.7
Colombia	2005				8.9	5.8	8.2
Colombia	1995	45.3	32.5	41.5	8.9	3.6	7.3
Colombia	1990	31.5	17.4	27.4	5.4	4.3	5.1
Guyana	2009	47.8	53.8	52.1	14.6	6.6	8.9

Source: *United Nations Human Settlements Programme (UN-Habitat), Global Urban Indicators Database 2012.*

TABLE 14: **LENGTH OF STREET NETWORK, STREET DENSITY AND PERCENTAGE OF PAVED STREETS SELECTED COUNTRIES**

	Length of national road network (Km)	National Road Density km/100km²	National paved roads (%)
	2000-091	2009	2000-091
AFRICA			
Burkina Faso	92,495	34	4.2
Central African Republic	24307	4	...
Egypt	100,472	10	89.4
Ethiopia	44,359	4	13.7
Ghana	109,515	46	12.6
Kenya	61,945	11	14.3
Morocco	58,216	13	70.3
Nigeria	193,200	21	15.0
Rwanda	14,008	53	19.0
Senegal	14,825	8	32.0
United Republic of Tanzania	103,706	11	6.7
ASIA			
Armenia	7,705	26	93.6
Bangladesh	239,226	166	9.5
China	3,860,823	40	53.5
China, Hong Kong SAR	2,050	188	100.0
India	4,109,592	125	49.5
Indonesia	476,337	25	56.9
Japan	1,207,867	320	80.1
Malaysia	98,722	30	81.3
Philippines	200,037	67	9.9
Singapore	3,356	473	100.0
Thailand	180,053	35	98.5
EUROPE			
Belgium	153,872	504	78.2
Denmark	73,330	170	100.0
Finland	78,925	23	65.5
France	951,260	173	100.0
Greece	116,929	89	91.8
Netherlands	136,827	329	90.0
Russian Federation	982,000	6	80.1
Spain	667,064	132	99.0
United Kingdom	419,665	172	100.0
LATIN AMERICA AND THE CARIBBEAN			
Brazil	1,751,868	21	5.5
Colombia	129,485	15	...
Guyana	...	...	...
Mexico	366,807	19	35.3
NORTHERN AMERICA			
United States of America	6,545,839	67	67.4
OCEANIA			
New Zealand	94,301	35	66.2

Sources: *World Bank (2012) World Development Indicators 2012, World Bank, Washington, DC; World Bank (2004) World Development Indicators 2004, World Bank, Washington, DC.*

Note:

(1) Data are for the latest year available in the period shown.

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STREETS AS PUBLIC SPACES AND DRIVERS OF **URBAN PROSPERITY**

Streets are public spaces, and as such, they have contributed to define the cultural, social, economic and political functions of cities. They were – and continue to be – the first element to mark a change in the status of a place, from a village to a town, from a town to a city or from a commercial centre to a capital city. Streets define the very nature of cities and contribute to giving form and function to urban spaces, from neighborhood and community levels to the city as a whole and its surrounding region.

Streets as public space are often overlooked. When planning the city, the multiple functions of streets are poorly integrated and, in the worst cases, are neglected. Citizens are, today, reclaiming their streets as public spaces in many corners of the world. The planning and design of streets should take into consideration the needs of all users: age-groups, gender, economic status and modal means.

In recent years streets have been recognized as an integral factor in the achievement of sustainable urban development. The "livable streets" movement emphasizes streets as the fabric of social and urban life. Safety, security, social interactions are among the key components of livable streets. The notion of inclusiveness encompassed in "complete streets" is present in various projects around the world that advocate the planning and design of streets that take into consideration the needs of all users (ages, gender, economic status, modal means, etc.).

This publication establishes that, for a city to be prosperous, it must have prosperous streets. A prosperous street must promote infrastructure development, enhance environmental sustainability, support high productivity, and promote quality of life, equity and social inclusion. All this is possible in an environment where streets receive their just recognition for their multi-functionality as public spaces.

Cities with a weak City Prosperity Index are those that perform poorly in almost all components of the index. Much remains to be done in terms of city planning, quality of life, infrastructure and environment. Production of goods and services is still too low, a reflection of underdevelopment. Historic structural problems, poor urban planning, chronic inequality of opportunities, widespread poverty, and inadequate capital investment in public goods are critical factors contributing to such low levels of prosperity.

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