The Economist Intelligence Unit

THE SAFE CITIES INDEX 2015

Assessing urban security in the digital age

A report by The Economist Intelligence Unit

Sponsored by

NEC

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About the report

The Safe Cities Index 2015 is an Economist Intelligence Unit report, sponsored by NEC. The report is based on an index composed of more than 40 quantitative and qualitative indicators. These indicators are split across four thematic categories: digital security; health security; infrastructure safety; and personal safety. Every city in the Index is scored across these four categories.

Key


Overall Index


Digial security


Health security


Infrastructure safety


Personal safety

Each category, represented throughout the report by the icons shown in the key, comprises between three and eight sub-indicators. These indicators are divided between inputs, such as policy measures and levels of spending, and outputs, such as the frequency of vehicular accidents. A full explanation of the methodology is contained in Appendix 4.

The Index focuses on 50 cities (see box over the page for the full list and regional breakdown) selected by The Economist Intelligence Unit (EIU), based on factors such as regional representation and availability of data. Therefore, it should not be considered a comprehensive list of the world's safest cities (ie, a city coming number 50 in the list does not make it the most perilous place to live in the world).

The analysis of the Index results, conducted by the EIU, was supplemented with wide-ranging research and in-depth interviews with experts in the field. Our thanks are due to the following people (listed alphabetically by surname) for their time and insights:

- Alan Brill, senior managing director and founder of the global high-tech investigations practice Kroll
- Jonathan Brown, programme manager of city system integration, Future City Glasgow
- Vivien Carli, co-author of *Practical Approaches to Urban Crime Prevention*, International Centre for the Prevention of Crime
- Tim Chapman, director of the infrastructure design group at Arup
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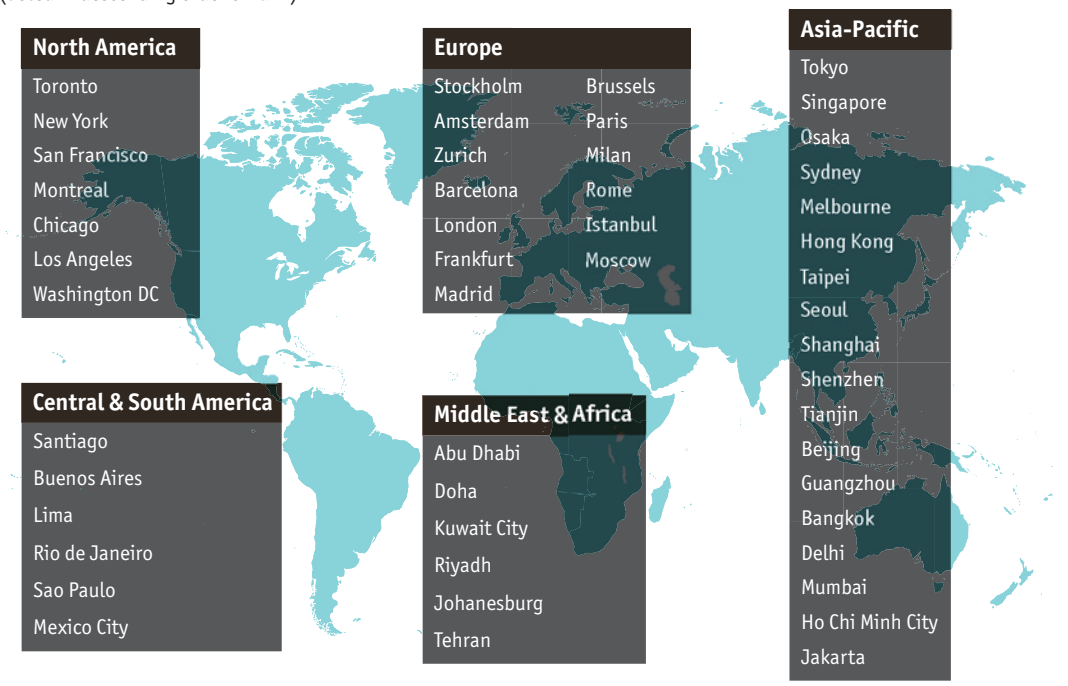
- Tom Lawry, director of worldwide health, Microsoft
- Dan Lewis, head of the urban risk reduction programme, UN Habitat

- Peggy Liu, chairperson, Joint US-China Collaboration on Clean Energy (JUCCCE)
- Yoichi Masuzoe, governor of Tokyo
- Toshiro Muto, CEO of the Tokyo organising committee of the Olympic and Paralympic Games 2020
- Patrick Otellini, chief resilience officer, the city and county of San Francisco
- Brian Quinn, adviser, Commission for Architecture and the Built Environment (Cabe) at the UK Design Council
- Josep Rius, chief of staff to the deputy mayor of Barcelona
- Andrew Smyth, professor of civil engineering and engineering mechanics, Columbia University
- Sandra Švaljek, deputy mayor of Zagreb
- Sameh Naguib Wahba, manager for urban development and disaster risk-management, World Bank.

The report was written by Sarah Murray and edited by James Chambers. Amie Nagano and Takato Mori conducted additional interviews. Chris Clague built the Index. Gaddi Tam was responsible for design. The Economist Intelligence Unit bears sole responsibility for the content of this report. The findings do not necessarily reflect the views of the sponsor.

Safe Cities Index: List of 50 constituents by region

(listed in descending order of rank)



Executive summary

Cities are already home to a majority of people on the planet. The current level of urbanisation ranges from 82% of the population in North America to 40% in Africa. But all regions are expected to follow this trend towards greater urbanisation over the next three decades. Lagos, the most populous city Nigeria, is predicted to double in size in the next 15 years.

However, cities should not take continued population growth for granted. As the UN's latest *World Urbanisation Prospects* study points out, some cities have experienced population decline because of, among other things, low fertility rates, economic contraction and natural disasters. The population of Seoul, the capital of South Korea, has shrunk by 800,000 since 1990.

Likewise, the safety of cities can ebb and flow. New York recorded a record high of 2,245 homicides in 1990, equating to six murders per day. Since then the population has grown by over 1m people, while homicide rates have fallen. The murder rate in 2013 stood at 335, a historic low, moving New York below Chicago—a city with under one-third of New York's population.

As some threats recede, others mature. The frequency of terrorism and natural disasters has changed the nature of urban safety: power, communications and transport systems must be robust and able to withstand new external shocks. Meanwhile, new risks emerge. Cyber risk has accompanied the advent of the digital age.

Urban safety is therefore a critical issue that is set to become even more important over time. Securing public safety means addressing a wide—and evolving—range of risks. The Safe Cities Index aims to capture this complexity. The Index tracks the relative safety of a city across four categories: digital security, health security, infrastructure safety and personal safety. The Index's key findings include the following.

- **Tokyo tops the overall ranking.** The world's most populous city is also the safest in the Index. The Japanese capital performs most strongly in the digital security category, three points ahead of Singapore in second place. Meanwhile, Jakarta is at the bottom of the list of 50 cities in the Index. The Indonesian capital only rises out of the bottom five places in the health security category (44).
- **Safety is closely linked to wealth and economic development.** Unsurprisingly, a division emerges in the Index between cities in developed markets, which tend to fall into the top half of the overall list, and cities in developing markets, which appear in the bottom half. Significant gaps in safety

exist along these lines within regions. Rich Asian cities (Tokyo, Singapore and Osaka) occupy the top three positions in the Index, while poorer neighbours (Ho Chi Minh City and Jakarta) fill two of the bottom three positions.

- **However, wealth and ample resources are no guarantee of urban safety.** Four of the five Middle Eastern cities in the Index are considered high-income, but only one makes it into the top half of the Index: at 25 Abu Dhabi is 21 places above Riyadh at number 46. Similar divides between cities of comparable economic status exist elsewhere. Seoul is 23 positions below Tokyo in the overall ranking (and 46 places separate the two on digital security).

- **US cities** perform most strongly in the digital security category, **while Europe struggles.** New York is the only US city to make it into the top ten of the overall index (at 10). However, it is third for digital security, with three of the four other US cities in the Index (Los Angeles, San Francisco and Chicago) joining it in the top ten. Meanwhile, European cities perform relatively poorly. London, at 16, is the highest-ranking European entry in the digital security index; Rome is the lowest, at 35.

- **Leaders in digital security must not overlook real-world risks.** Los Angeles falls from 6th place in digital security to 23rd for personal safety. San Francisco suffers a similar drop, falling from 8th to 21st. For these cities—both home to high-tech industries—a focus on technology and cyber security does not seem to be matched by success in combating physical crime. Urban safety initiatives need to straddle the digital and physical realms as the divide between them blurs.

- **Technology is now on the frontline of urban safety, alongside people.** Data are being used to tackle crime, monitor infrastructure and limit the spread of disease. As some cities pursue smarter methods of preventing—rather than simply reacting to—these diverse security threats, a lack of data in emerging markets could exacerbate the urban safety divide between rich and poor. Nonetheless, investment in traditional safety methods, such as bolstering police visibility, continues to deliver positive results from Spain to South Africa.

- **Collaboration on safety is critical in a complex urban environment.** Now that a growing number of essential systems are interconnected, city experts stress the need to bring together representatives from government, business and the community before threats to safety and security strike. Some cities have appointed an official to co-ordinate this citywide resilience. With the evolution of online threats transcending geographical boundaries, such co-ordination will increasingly be called for between cities.

- **Being statistically safe is not the same as feeling safe.** Out of the 50 cities, only Zurich and Mexico City get the same rank in the overall index as they do in the indicator that measures the perception of safety among their citizens. Urban citizens in the US, for instance, tend to feel less safe than they should, based on their city's position in the Index. The challenge for city leaders is to translate progress on safety into changing public perceptions. But cities also aspire to be attractive places to live in. So smart solutions, such as intelligent lighting, should be pursued over ubiquitous cameras or gated communities.

Introduction

SimCity was one of the first computer games to achieve mass popularity. First released in 1989, game players are given tax revenue with which to plan and build an urban environment. The city only develops if the player meets certain conditions, such as providing essential healthcare services and establishing sufficient energy supplies. From time to time disasters such as earthquakes sweep across the city, forcing players to rebuild.

As SimCity demonstrates, managing cities can be extremely complex. Get it wrong and your city becomes an unhealthy, crime-infested place in which citizens feel physically and emotionally insecure. Get it right and you can attract global executives, affluent tourists, creative minds and entrepreneurial adventurers—all of whom contribute to a city's economic, social and cultural dynamism.

Since the game's launch a quarter of a century ago, the safety challenges for genuine city planners and leaders have only increased. Rapid urbanisation is swelling city populations (see chart on page 7), straining existing infrastructure and adding to the human cost of accidents and disasters. Increased global mobility hastens the spread of disease in densely populated cities. Demographic ageing requires alterations to the built environment. Severe weather and rising sea levels, meanwhile, expose cities to flooding and tsunamis.

Building greater resilience into urban infrastructure has therefore become increasingly urgent. But cities are also facing entirely new safety challenges. The concept of the "smart city" is revolutionising the way in which everything—from transport systems to water and energy—is managed and delivered. At the same time, a growing dependence on digital technology to deliver everyday services brings with it new vulnerabilities.

Malicious programmers can bring about large-scale disruption of computer networks on which a city depends. (The main character of Watch Dogs, a computer game released in 2014, is a vigilante who can hack into Chicago's computer network to cause chaos.) Ordinary citizens, meanwhile, face new urban threats in the form of Internet fraud and identity theft. "When you think about smart cities, they have the potential of attracting the interest of smart hackers," says Alan Brill, senior managing director at Kroll and founder of the consultancy's global high-tech investigations practice.

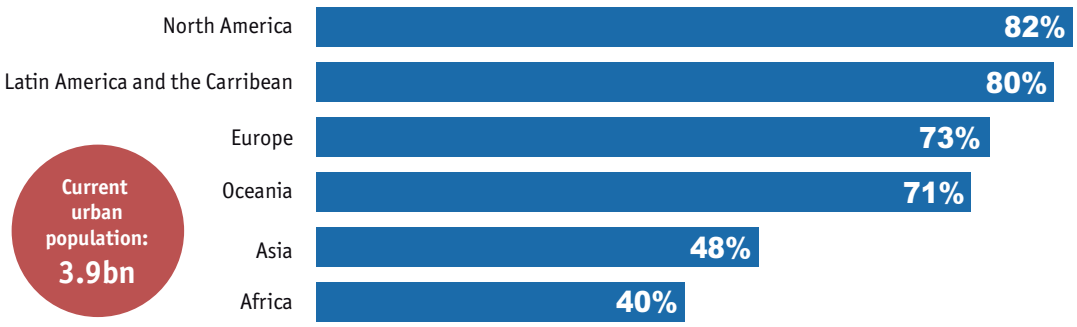
Against this altered landscape, The Economist Intelligence Unit (EIU) has undertaken a study designed to assess the safety of 50 cities around the world. The Safe Cities Index examines four categories of city safety and security: digital security, health security, infrastructure safety and personal safety. Separate chapters investigate each of these categories individually—although these should not be viewed as mutually exclusive. At some stage every city will need to develop a comprehensive and inclusive approach to urban safety.

> "When you think about smart cities, they have the potential of attracting the interest of smart hackers"
>
> *Alan Brill, senior managing director, Kroll*

Home invasion

Snapshot of city populations worldwide

(% urban population)



Breakdown by type of city

One half of the world's urban population live in settlements with fewer than 500,000 inhabitants. The other half are grouped into the following types of cities:

Megacities (10m+)

Number of megacities has nearly tripled since 1990

Total population: 453m

Percentage of urban population: 12%

Example in Index (rank): (30) Shanghai

Large cities (5-10m)

20 more cities will become 'large' by 2030

Total population: 300m

Percentage of urban population: 7%

Example in Index (rank): (16) Chicago

Medium-sized cities (1m-5m)

Represent the biggest city for 79 countries

Total population: 827m

Percentage of urban population: 20%

Example in Index (rank): (6) Sydney

Small cities (500k-1m)

Account for majority of the world's fastest-growing cities

Total population: 363m

Percentage of urban population: 11%

Example in Index (rank): (20) Frankfurt

Source: United Nations; World Urbanisation Prospects: The 2014 Revision, Highlights

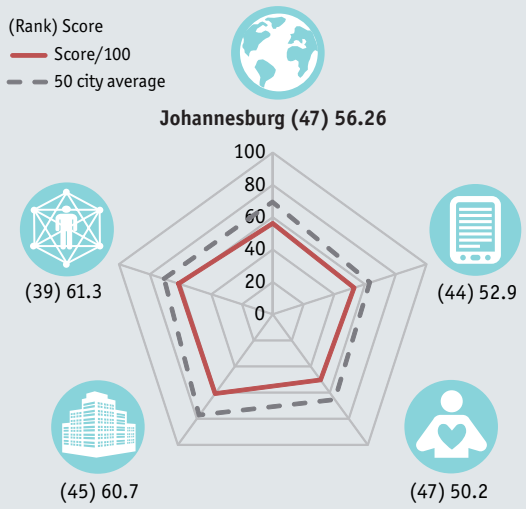
Urban Africa: Can African cities keep up with the pace of change?

None of the world's regions are urbanising as fast as Africa. At current rates of expansion, the UN estimates that Africa will cease to be predominantly rural by 2030.[1] Therefore, African cities are playing an increasingly important role in the economic development of the continent.

This presents opportunities to improve living standards for millions of urban citizens—but not without overcoming many challenges. For a start, rising metropolitan populations are putting severe pressure on essential services such as power, sanitation and water supplies. These services do not exist at all in many urban areas—particularly in slums—forcing residents to turn to unreliable informal service providers.[2] In Sub-Saharan Africa alone the slum population is 199.5m people, according to UN Habitat, the United Nations agency for human settlements.

Meanwhile, streets choked with cars and trucks are creating unhealthy levels of pollution in cities such as Ghana's Accra or Nigeria's Lagos. Wood biomass burning and pollution from industrial plants, which are often located in cities, exacerbate the problem. Without policies to change this, Africa's cities will become unstable and unsafe environments.

Some solutions are being explored. Cities such as Nairobi and Cape Town are developing bus rapid transit systems (BRT). Pioneered in Curitiba, Brazil, and Bogotá, the Colombian capital, BRT systems run along dedicated routes not used by other vehicles. With their speed and efficiency, the systems can help reduce the number of cars on the streets.



Elsewhere, encouraging examples of crime prevention have emerged. In Lagos, the establishment of a public-private partnership to mobilise resources from government, the private sector and private citizens (the Lagos State Security Trust Fund) is shifting the focus from policing to a broader community response. Strategies have included improved social services and the redevelopment of public spaces. Initial results were promising. In a 2009 evaluation the Lagos state government found that levels of insecurity and perceptions of crime problems had fallen.[3]

Given that African cities are often struggling to increase safety and security on extremely tight budgets, low-cost solutions are critical. In South Africa, for example, Cape Town's township of Khayelitsha has initiated a Violence Prevention Through Urban Upgrading[4] that uses small community centres to tackle crime. Built along pedestrian routes, the "active boxes", as they are known, are staffed with a caretaker 24 hours a day and offer services such as crèches and youth services.

However, the level of progress is difficult to measure. Johannesburg (47) is the only African representative selected to appear in the Safe Cities Index owing to the relatively poor quality of data available in the region. The South African city performs most poorly on health security (also 47), although the city does slightly better (position 39) on personal security. As Africa's economy develops, data should be collected systematically. Armed with this information, it will be possible to challenge the enduring perception that crime and insecurity still dominate a large number of African cities. Encouragingly, this data drought is now attracting significant global attention.

In July last year a report from the Centre for Global Development and the African Population and Health Research Centre highlighted weak national statistical systems in many parts of Sub-Saharan Africa, where even basic information about births and deaths can be shaky.[5] A few months later a report commissioned by Ban Ki-moon, the UN secretary-general, recognised the dangers of this data gap between rich and emerging economies, even acknowledging the impact it is having on the ability to measure the progress of the UN's high-profile Millennium Development Goals (MDGs).[6] A strategy to close these data gaps and launch an African data revolution is expected to play a key part in the successor to the MDGs, which are due to end in 2015.

[1] http://www.un.org/en/development/desa/publications/2014-revision-world-urbanization-prospects.html
[2] http://unhabitat.org/urban-themes/housing-slum-upgrading/
[3] Margaret Shaw and Vivien Carli, eds, *Practical Approaches to Urban Crime Prevention*, International Centre for the Prevention of Crime, 2011.
[4] http://i2ud.org/2013/02/violence-prevention-through-urban-upgrading-in-khayelistha-south-africa/
[5] *Delivering on the Data Revolution in Sub-Saharan Africa*, Centre for Global Development and the African Population and Health Research Centre, July 2014.
[5] *A World that Counts: Mobilising the Data Revolution for Sustainable Development*, UN Secretary-General's Independent Expert Advisory Group on a Data Revolution for Sustainable Development (IEAG), November 2014.

The Safe Cities Index: Overview

Tokyo (1) comes top in the overall Safe Cities Index 2015. The Japanese capital performs most strongly when it comes to the security of its technology assets: it tops the list in the digital security category, three points clear of Singapore in second—the widest gap at the top of any of the four categories.

Tokyo also ranks in the top five for personal safety and infrastructure safety, despite suffering regular earthquakes and being home to the world's largest urban population[7] (38m, according to the UN[8]).

Safe Cities Index 2015

Top 20 cities

Rank	City
1	Tokyo
2	Singapore
3	Osaka
4	Stockholm
5	Amsterdam
6	Sydney
7	Zurich
8	Toronto
9	Melbourne
10	New York
11	Hong Kong
12	San Francisco
13	Taipei
14	Montreal
15	Barcelona
16	Chicago
17	Los Angeles
18	London
19	Washington DC
20	Frankfurt

By contrast, **Jakarta** (50) is bottom of the overall rankings. The capital of Indonesia is third from the bottom when it comes to digital security and infrastructure safety. Its highest rank is on health security, at number 44, although it falls to the bottom again in certain sub-indicators, such as the number of doctors per 1,000 people. The two cities are also far apart for personal safety. Although Jakarta is not the worst performer when it comes to violent crime, the incidence of petty crime is high. By contrast, violent and petty crime affects relatively few residents of Tokyo.

Naturally, there is much else separating these two cites (see chart). The population of Indonesia (250m) is double that of Japan (127m), but the wealth of Japan measured in terms of GDP per head (US$36,000 at purchasing power parity) is four times that of Indonesia (US$9,000). This divide between cities in rich economies and those in emerging economies is broadly true for the rest of the Index.

The top half of the Index is generally occupied by rich cities from Europe, East Asia and North America. Meanwhile, the likes of **Bangkok** (39) and **Ho Chi Minh City** (48) join Jakarta in the bottom half, alongside all of the main cities of the BRICS economies (Brazil, Russia, India, China and South Africa): **São Paulo** (40), **Moscow** (43), **Delhi** (42), **Beijing** (37) and **Johannesburg** (47). But wealth is not a byword for safety: every Middle Eastern city in the Index falls in the highest income bracket, yet only one—**Abu Dhabi** (25)—makes it into the top half.

China's biggest cities (Shanghai, Shenzhen, Tianjin, Beijing and Guangzhou) cluster together in the lower half of the list, with **Shanghai** (30) the best performer of the group. Latin American cities also fail to make it into the top half of the ranking. The continent's best performer is **Santiago** (28), with **Buenos Aires** (31) not far behind.

> "We need to prepare for an even larger scale of attacks"
>
> *Toshiro Muto, CEO, Tokyo Organising Committee of the Olympic and Paralympic Games*

[7] http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf

[8] UN figures use a concept of urban agglomeration to provide population estimates for the entire metropolitan area of Tokyo rather than the city proper, as defined by its administrative boundaries. The official population figure for the Tokyo prefecture, published by Statistics Bureau of Japan in The Japan Statistical Yearbook 2015, is 13.3m.

Perception vs reality

Where do citizens feel safest and how does this compare to where they are actually safest?

Perception of safety		Perception of safety vs Safe Cities Index
(Top 10 cities in indicator; 1=feel safest)		
Rank	City	Up or Down (+/-)
1	Osaka	▼ 2
2	Abu Dhabi	▼ 23
3	Hong Kong	▼ 8
4	Singapore	▲ 2
5	Tokyo	▲ 4
6	Seoul	▼ 18
7	Zurich	–
8	Taipei	▼ 5
9	Doha	▼ 20
10	Stockholm	▲ 6

▲ : Citizens are overly fearful about their safety
▼ : Citizens should be more circumspect about their safety

+27 Chicago
Biggest gap
Riyadh -33

A tale of two cities

Perception of safety among city residents is one of the indicators[9] used to build the Index, falling under the personal safety category. Often the perception of safety is driven by the prevalence of violent and petty crime. As our overall index takes a more comprehensive and longer-term approach to urban safety, including new threats such as cybercrime, the ranking of a city according to the perception of safety among residents rarely matches its ranking in the Safe Cities Index.

Indeed, only two cities—**Zurich** (7) and **Mexico City** (45)—feature in the same position for both. Residents of US cities tend to be more fearful than their positions in the upper ranks of the Index suggest they should be. For example, New York, which is at position 10 in the overall list, falls to 31 when it comes to perceptions of safety.

Meanwhile, in the Middle East, citizens should be more safety-conscious than they are (see chart).

As cities become ever more complicated ecosystems, a safe environment must be created for citizens across the entire landscape, targeting crime online as much as on the street. **Singapore** (2) comes top of the group of high income cities (see Appendix 2). The wealthy city-state offers a practical example of the evolving safety landscape. Traditional crimes, such as burglary and theft, are at decade-long lows[10]. Yet the overall level of reported crime is being pushed up by an increase in the number of cyber-related offences, such as e-mail scams.

Cyber crime has been identified as a key concern for local police at a time when the government is taking proactive steps to improve the safety of its citizens across online and offline infrastructure. In 2014, the president of Singapore Tony Tan Keng Yam set out plans to use technology and data intelligence to create a "safer, cleaner and greener" urban environment[11], as part of a wider plan to become a so-called smart nation.

Future-proofed

As the nature of urban safety evolves, even the top cities city in our Index will have areas to improve upon. Yoichi Masuzoe, the governor of Tokyo, identifies two areas of focus for the city in the long term. The first is—not surprisingly—disaster prevention (see *Going for gold: Tokyo shapes up for the 2020 Olympics*). Many areas of Tokyo still contain wooden houses susceptible to outbreaks of fire. The plan is to replace these structures with modern residential and commercial complexes, improving the city's resilience to earthquakes. Achieving this goal without destroying significant parts of the city's cultural heritage is certain to complicate preparations for the 2020 Olympics.

Mr Masuzoe describes the second area, the environment, as the "key to enhancing the overall safety of Tokyo in the long term". Tokyo's poorest

[9] Source: Numbeo crime, Safety Index

[10] http://www.police.gov.sg/stats/crimebrief2014.html

[11] http://www.zdnet.com/article/singapore-unveils-plan-in-push-to-become-smart-nation/

Going for gold: Tokyo shapes up for the 2020 Olympics

When Tokyo revealed its eight goals for transforming the city in time for the Olympic Games in 2020, safety was number one. This is hardly surprising. The huge earthquake that struck the north of Japan in 2011, causing a tsunami and the subsequent reactor meltdown at the Fukushima Daiichi Nuclear Power Plant, ranks as the costliest catastrophe in human history, according to Munich Re and Swiss Re, two global reinsurance firms.

A direct hit to Tokyo, a city of 38m people, would be even more devastating. The Japanese capital's last major earthquake happened in 1923, so another event of similar magnitude is expected soon. A year after the Fukushima disaster Munich Re increased its risk assessment of a significant earthquake hitting Tokyo. Swiss Re ranks Tokyo as the city most at risk from natural disasters.

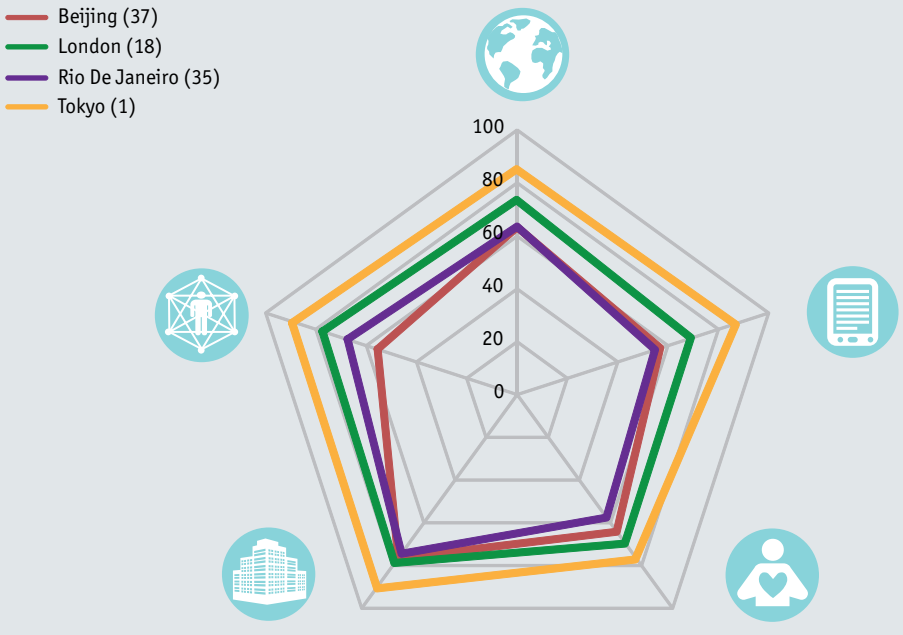
The city's vision for 2020 includes creating community-level disaster management teams and retrofitting buildings to withstand earthquakes. One in every five buildings in Tokyo was built before 1981, making them comparatively more vulnerable to earthquakes. According to Toshiro Muto, CEO of the Tokyo Organising Committee of the 2020 Olympic and Paralympic Games, safety will be also play a critical part in the basic planning document that the committee is submitting to the International Olympic Committee (IOC) in February 2015.

Of course, Japan has always been prone to earthquakes. As Tokyo strives to build a "sophisticated, disaster-resistant city", new safety challenges have emerged for host cities. Acts of terrorism overshadowed the Olympic Games in Munich in 1972 and in Atlanta in 1996. The scale of the event has also grown in the half-century since Tokyo last staged the Olympics. Over 10,000 athletes from 204 nations competed in more than 300 events at London 2012—double the size of Tokyo 1964. Increasingly, however, the source of security threats will be much less visible.

For Mr Muto, the success or failure of the Tokyo Games could ultimately be determined by the battle against cyber terrorism. "At the time of the Olympic Games, the London 2012 website was subject to over 200m cyber-attacks—tens of millions at the opening ceremony," he says. "We need to prepare for an even larger scale of attacks and develop systems strong enough to protect our Games system." However, he knows that a lot can change in eight years. Technology is developing at a rapid pace, making many of the lessons from the Summer Olympics in **London** (18) potentially irrelevant.

Competing on safety

The two previous Olympic cities vs the next two Olympic cities



During the build-up to the Olympics the organising committee will face global scrutiny of its plans and preparations. The organisers of the London Games received plaudits for constructing new stadiums and other infrastructure with zero casualties—a novelty for recent Games. Yet this was soon forgotten when a bus carrying foreign media to the Games collided with and killed a cyclist, highlighting a weakness in the city's safety record.

A similar level of scrutiny is now on **Rio de Janeiro** (35), the host of the 2016 Olympics, as it transforms its transport system, ports and urban slums (favelas). Media attention has focused on water pollution affecting its world-famous beaches. The untreated human sewage being pumped straight into Guanabara Bay, the location for sailing events, was already causing concern even before schools of dead fish began floating on the surface.

The Brazilian city has a year to ensure that pollution does not blight the Games. Creating a lasting legacy may be more difficult. Beijing invested heavily in tackling air pollution ahead of the 2008 Olympics. The temporary clean-up, involving factories closing and cars ordered off the roads, worked for the Games. Yet six years later the city had to resort to similar tactics when it hosted its next big event: the Asia-Pacific Economic Co-operation (APEC) meeting in November 2014. Rare blue skies greeted heads of state only weeks after many runners in the Beijing Marathon had worn masks to protect themselves against the toxic air.

Meanwhile, in London, the number of cyclists being killed or seriously injured has been increasing. The city has invested in more cycle paths as the cycling population has grown, but most are just roadside strips of blue paint. Now the mayor of London is pushing for segregated cycle lanes, inspired by the Netherlands. Close to £913m (US$1.5bn) has been allocated to improving cycling safety over the next decade.

Effecting improvements to road safety or pollution is clearly a challenge for city governments. But few would envy Tokyo's task of preparing for an unstoppable natural disaster. Nonetheless, the Japanese capital is the safest city in our index and the safest Olympic city—over 20 points and 30 places ahead of Rio de Janeiro in the overall index. Thus, the city has already gone some way towards realising its Olympic goal of demonstrating its safety to the world.

performance in the Index is in the health security category, where it ranks 8th overall. Although it remains in the top ten for indicators measuring inputs, such as the access to, and quality of, health services, it falls to number 17 for outputs in this category, which incorporate indicators such as air quality and water quality. The city is currently implementing a number of initiatives to improve air quality. A major target is reducing traffic congestion. Hence the construction of three major ring roads around the city. Other policies include a subsidy for hydrogen powered cars and pedestrian-only areas in the city centre.

"Tokyo's air quality has improved dramatically since the introduction of regulations banning diesel vehicles with poor emission from urban areas," says Mr Masuzoe. "We now need to accelerate our efforts to enhance the atmospheric environment in light of the 2020 games."

Aside from improvements to air quality, Mr Masuzoe has a much grander vision to affect a social awakening—or, more accurately, a reawakening—based around recycling and resource efficiency. Sustainability used to be an important feature of Tokyo's historical development, he says, rooted in the traditional spirit of '*mottainai*' (a term conveying the sense of regret concerning waste).

"Tokyo, called Edo at the time, functioned as one of the most advanced recycling-based societies between the 17th and 19th centuries. While we may have lost our sensitivity to wastefulness during the period of rapid economic growth after the Second World War, Tokyo is now re-establishing itself as a city that places strong emphasis on waste reduction and recycling measures."

As part of this recycling resurgence Tokyo has developed methods for extracting rare earth materials from discarded digital devices. Finding a viable solution to this growing mountain of electronic waste or e-waste will form part of the evolution of most, if not all, safe cities. As this report will show, technology is being deployed across cities to enhance urban safety in each of our four categories of safety and security: digital, health, infrastructure and personal. Cities pursuing these types of investments should consider the implications for the whole ecosystem and factor in the entire lifecycle of any project. After all, a safe city must also be sustainable.

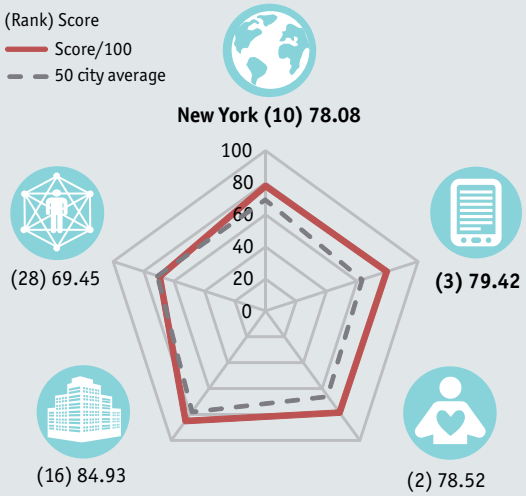
Category 1: Digital security

This category measures a city's digital security based on factors such as dedicated cyber security teams (input) and the frequency of identity theft (output)

Safety briefing

North American and East Asian cities dominate the upper echelons of the list, with four US cities (New York, Los Angeles, San Francisco and Chicago) in the top ten and four Asian cities (Tokyo, Singapore, Hong Kong and Osaka) in the top five.

Meanwhile, European cities perform relatively poorly, with London the highest-ranking European entry at position 16. Rome scores most poorly among European cities, at 35, based in part on its ranking in the bottom five in terms of indicators that measure factors such as privacy policies and the existence of dedicated cyber security teams.



Given Japan's prowess in the IT sector, it is little surprise to see two Japanese cities—Tokyo and Osaka—make it into the top five in this category. However, while Tokyo is in pole position, Osaka is ten points below it. The difference between the two could be explained by the investments being made in digital security. While Tokyo scores well when it comes to inputs such as dedicated cyber security teams, privacy policies and citizen awareness, Osaka falls far lower in the index on these measures, coming in at 20 places below Tokyo.

Yet both cities appear at the top of the index when it comes to the outputs indicator, that is, measures such as the sums of money lost through cybercrime and the frequency of identity theft. National initiatives, rather than city-level measures, may be helping these two cities to combat cybercrime. In 2013 Japan's National Police Agency announced the launch of a 140-strong nationwide cybercrime task force to be deployed in Osaka, Tokyo and other strategic locations.[12]

Notwithstanding this strong showing, Japan has previously come in for criticism for having a lackadaisical approach to cyber security. Indeed, Tokyo and Osaka both score poorly on the sub-indicator measuring public awareness of digital threats, even though attacks against state entities and companies are reported to

[12] "Japan police to launch national task force against cybercrime", *Japan Daily Press*, March 29th 2013. Available at: http://japandailypress.com/japan-police-to-launch-national-task-force-against-cyber-crime-2926076/

Top 10 cities: Digital security

Rank	City (overall rank)	Score/100
1	Tokyo (1)	87.18
2	Singapore (2)	83.85
3	New York (10)	79.42
4	Hong Kong (11)	78.78
5	Osaka (3)	77
6	Los Angeles (17)	74.99
7	Stockholm (4)	74.82
8	San Francisco (12)	73.85
9	Abu Dhabi (25)	73.71
10	Chicago (16)	72.9

happen every 30 seconds—twice as frequently as in 2010.[13] A new national Cyber Security Law, passed in late 2014, is seen as a sign that the government is now taking the matter seriously, spurred on by the Tokyo Olympics in 2020.

> "Are we thinking about the cyber vulnerability of things that have not traditionally been cyber?"
>
> *Alan Brill, senior managing director, Kroll*

Cities need to be particularly vigilant against this type of crime when they host large events, such as international sporting events or music festivals in venues where free Wi-Fi services are vulnerable to attack.

"What we're seeing is that those gatherings become attractive to hackers because they know there will be massive influxes of people," says Kroll's Mr Brill. "The statistics on the number of people at the World Cup [in Brazil in 2014] who connected to stadium Wi-Fi was astounding."

Cyber security is one of three key challenges for Tokyo ahead of the 2020 Olympics, according to Mr Muto, CEO of the organising committee.

Elsewhere in the Index, other cities have taken steps to shore up their ability to address cybercrime. Singapore, which ranks second in the digital security category, is establishing a Monitoring and Operations Control Centre to equip the government with the tools needed to respond to cybercrime.[14] And while Mumbai falls to the bottom of the list when it comes to incidences of cybercrime, it moves to the top in the inputs indicator. In 2004 the city launched the Mumbai Cyber Lab, a public-private partnership designed to train the city's police officers to investigate cybercrimes.[15]

Common sensors

Added vulnerability for cities comes in the increasing reliance on digital technology for running essential urban services, such as traffic management. Wireless-enabled sensors fitted to key infrastructure can generate real-time data that allow municipal authorities to better anticipate and solve road congestion. Known as the "Internet of things", these new systems are bringing convenience and efficiency to cities.

However, with these benefits come risks from hackers, who, if successful in their breaches, could bring city services to a standstill. Mr Brill cites the example of computer-controlled traffic lights. "Imagine if they all went green in both directions," he says. "The question is: are we thinking about the cyber vulnerability of things that have not traditionally been cyber?"

Despite these risks, technology is now playing a greater role in city safety across every category of this Index. As set out in the chapters to follow, diverse datasets are being called upon for everything from fighting disease to monitoring bridges and anticipating crime.

[13] http://www.businessweek.com/articles/2014-07-24/proposed-law-would-fix-japans-lax-cybersecurity

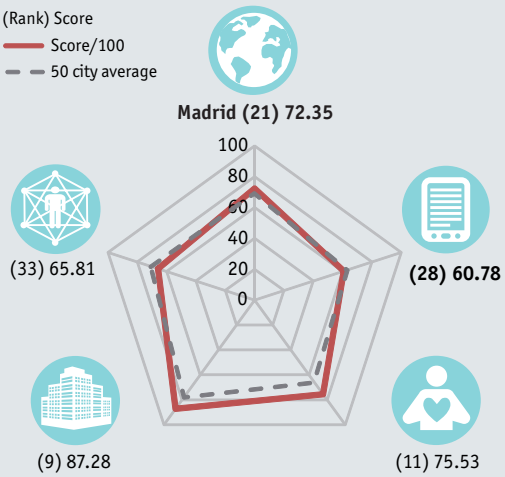
[14] http://www.ida.gov.sg/blog/insg/talent/strengthening-singapores-cybersecurity/

[15] http://cybercellmumbai.gov.in/html/write-ups/mumbai-cyber-lab.html

Caught on camera: Getting candid about CCTV

City inhabitants are increasingly on camera. The number of closed-circuit television (CCTV) cameras installed around cities continues to rise, as does the technical sophistication of these systems. Moreover, citizens are operating their own surveillance: in cities from Moscow to San Francisco a growing number of drivers are using dashboard cameras, or dashcams, to provide evidence in the event of an accident. But do round-the-clock digital recordings of almost every aspect of a city increase the safety and security of its residents? And if so, at what cost?

Some of the cities in the Index have aggressively adopted video surveillance. London has a camera for every six citizens.[16] In May 2014 the city began the UK's largest trial of body-worn cameras for police officers.[17] Madrid has more than 8,000 security cameras distributed throughout its mass transit system. Live feeds can be viewed from a wide range of local command posts in metro stations across the Spanish capital, as well as from the central command post, from where all emergencies and events are co-ordinated.



Facial recognition software makes it easier than ever to identify criminals or fraudsters picked up on video. But a debate continues to rage over the balance between security and privacy. Some say that this kind of surveillance makes them feel safer. "According to the public opinion surveys we conduct, users feel just as safe, or even safer than in the street, a factor that is closely related to the system of security cameras, which afford the public greater peace of mind," says Bruno Fernandez, head of security at Metro de Madrid.

But privacy advocates and some citizens do not like the idea that their every move is being monitored. Moreover, some studies suggest that CCTV does not in fact have an impact on levels of crime and violence. Often cited is research by the Campbell Collaboration, an international research network. It found that CCTV schemes in city and town centres, public housing and public transport did not have a significant effect on crime.[18]

In any case, such arguments are not deterring city governments or the vendors that supply them. Research by Electronics.ca, an electronics industry market research network, has estimated that the video surveillance market will be worth almost US$38bn by 2015.[19] What is more, the mass rollout of wearable technology, such as Google Glass (cameras built into eyewear), could mean there that there are an extra 21m mobile cameras on the streets in the next three years.[20] The debate is likely to keep rolling.

All the while the security risks are increasing. At the end of November 2014 national authorities became aware of a Russian website streaming live video feeds from thousands of webcams set up in homes, schools and businesses across the world, including the US, Japan and many European countries. Cyber criminals had hacked into private CCTV and other Internet-connected cameras using default password settings readily available online—effectively co-opting cameras meant to deter crime into a potential vulnerability.

This increased connectivity has brought the personal and online realms closer together. At the same time, the traditional boundaries between cities are being obscured. Tokyo is number one in the digital security category, while Moscow is at number 46 (and bottom when it comes to measuring the number of infected computers). Yet as the above example shows, digital safety in one city does not insulate it from poor policing or high levels of cybercrime in another. International co-operation here is more important now than ever.

[16] http://www.cl.cam.ac.uk/~rja14/shb10/angela1.pdf

[17] http://www.bigbrotherwatch.org.uk/research-and-reports

[18] "Effects of Closed Circuit Television Surveillance on Crime", Campbell Systematic Reviews, 2008.

[19] "Global Video Surveillance Market, Applications and Management Services Forecasts", Electronics.ca Research Network, March 2011. Available at: http://www.electronics.ca/presscenter/articles/1391/1/Global-Video-Surveillance-Market-to-reach-US-377-billion-By-2015/Page1.html

[20] http://www.businessinsider.com/google-glass-sales-projections-2013-11?IR=T

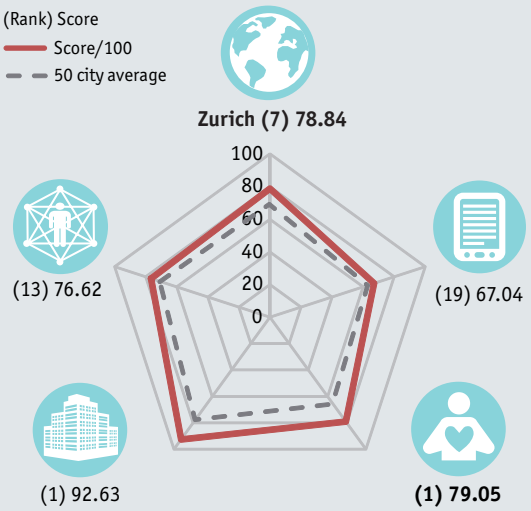
Category 2: Health security

This category measures a city's health security based on factors such as the ratio of hospital beds to population size (input) and life expectancy (output)

Safety briefing

Zurich is in top position for this category of the Index. European cities—with their universal healthcare systems—generally perform well. Six of the top ten cities in the list are European, compared with one (Stockholm) in digital security, three (Zurich, Amsterdam, Madrid) in infrastructure and two (Stockholm, Amsterdam) in personal safety. And only one European city (Milan) appears in the bottom half of the index. No lower-income city makes it into the top ten, which is dominated by high- and upper-middle-income cities.

Singapore, a high-income city, drops from second place overall to 12th for health security. This is remarkable because the city-state is often cited as a leader in healthcare. Indeed, it ranks joint first for its quality of health services, but falls into the bottom half for the number of hospital beds and doctors per 1,000 people. It is also out of the top ten for most of the outputs in this category. For air quality it ranks 17th, behind London and on a par with Paris.



The challenges of maintaining health security in any city are substantial. Cities need to be vigilant against sudden disease outbreaks or natural disasters such as earthquakes, establishing robust healthcare facilities and protocols that mean they are able to cope in the event of a crisis.

The recent spread of the Ebola virus has highlighted weaknesses not only in the health systems of West African cities in the most severely affected countries (Liberia, Sierra Leone and Guinea), but also in the US, where the city of

Top 10 cities: Health security

Rank	City (overall rank)	Score/100
1	Zurich (7)	79.05
2	New York (10)	78.52
3	Brussels (22)	77.63
4	Frankfurt (20)	77.38
5	Paris (23)	76.95
6	Osaka (3)	76.55
7	Barcelona (15)	76.35
8	Tokyo (1)	76.26
9	Taipei (13)	76
10	Stockholm (4)	75.83

Dallas made missteps in the handling of the first person in the country to test positive for Ebola.

But the concentration of industrial, human and transport activity in urban environments exposes cities to a number of more routine—and often more damaging—health hazards. Chief among these are deaths and injuries from traffic accidents, particularly in cities in developing countries, where public transport systems are underdeveloped, driving standards are poor and road rules are inadequately enforced. About 1.24m people die each year on the world's roads, and up to 50m sustain non-fatal injuries, according to the World Health Organisation (WHO).[21]

Cities also generate large amounts of pollution, posing long-term health risks to urban residents. Worldwide, just 12% of the residents of cities that report on their air quality are living in cities that meet WHO air quality guideline levels.[22] The main culprits are industrial and vehicle emissions as well as those associated with electricity generation (particularly coal-fired power plants).

In developing countries, additional risks are posed by indoor pollution. Kerosene lamps and other traditional cooking stoves burn solid fuels and biomass such as wood, coal and animal dung. Migration of rural populations into urban areas is exacerbating this problem. Globally, the WHO estimates that indoor air pollution from solid fuel use and urban outdoor air pollution are responsible for 3.1m premature deaths.[23]

Failing to tackle pollution can have a negative impact on a city's appeal to migrants. This is the case in China, where multinational companies are finding it hard to persuade expatriate workers to work in some cities because of severe air pollution. Beijing, at position 30, is the highest-ranked Chinese city in this category. It falls to position 47 on the air quality sub-indicator.

"It's a huge problem for cities that have consistent pollution over protracted periods of time," says Peggy Liu, chairperson of the Joint US-China Collaboration on Clean Energy (JUCCCE). "It's driving people away in droves, so retention of talent is a really big problem."

Working it out

In creating healthy environments for citizens, city governments need to adopt strategies that are preventive as well as reactive. For example, in addition to addressing pollution, cities can help keep residents healthy by creating green spaces and promoting diet and exercise. One powerful tool in improving the health of city residents is data analytics. Tom Lawry, director of worldwide health at Microsoft, points to an initiative undertaken by Meriter, a US health provider that is the main medical centre for the city of Madison, Wisconsin.

Researchers combined internal data from the medical records of people diagnosed with a chronic disease, such as diabetes, and married these with large amounts of external data on where people live, such as the amount of green space in their neighbourhoods and access to grocery stores. They found a correlation between levels of obesity and low-income neighbourhoods where the only convenient food stores were fast-food chains. "At a local level, you can define the issue and take proactive measures," says Mr Lawry. "It's going from descriptive analytics for cities to predictive analytics—and the data are all there."

Living in a safe and healthy urban environment can make a real and measurable difference to city inhabitants. The average life expectancy of citizens living in the top 25 cities in the Index is 81 years, compared with 75 years for those living cities in the bottom half of the table. The biggest gap is between Melbourne, Australia and Johannesburg, South Africa (86 years vs 60 years). While a gap in average life expectancy of some 25 years is a strong incentive to move elsewhere, only the wealthiest citizens are likely to be able to afford to relocate, placing a further strain on overstretched resources.

> "[Air pollution] is driving people away in droves, so retention of talent is a really big problem"
>
> *Peggy Liu, chairperson, joint US-China Collaboration on Clean Energy (JUCCCE)*

[21] http://www.who.int/features/factfiles/roadsafety/en/

[22] http://www.who.int/mediacentre/news/releases/2014/air-quality/en/

[23] http://www.who.int/ipcs/assessment/public_health/air_pollution/en/

Megacities: Keeping 10m people safe

Some of the cities that appear in the top ten of the Safe Cities Index are relatively small. The population of Amsterdam, which is in position 5, is roughly 780,000. Zurich, at number 7 overall (and first for health security), has an even smaller population of 380,000. However, some cities face the challenge of delivering a safe urban environment for a much larger number of residents.

Megacities are defined as cities with more than 10m inhabitants. Based on population figures from the UN,[24] the Index features 20 megacities (see Appendix [1]). Tokyo has a population of 38m people, making it the largest megacity on earth, a title it will keep up to 2030. Jakarta is the smallest megacity in the Index with a population of 10.17m.

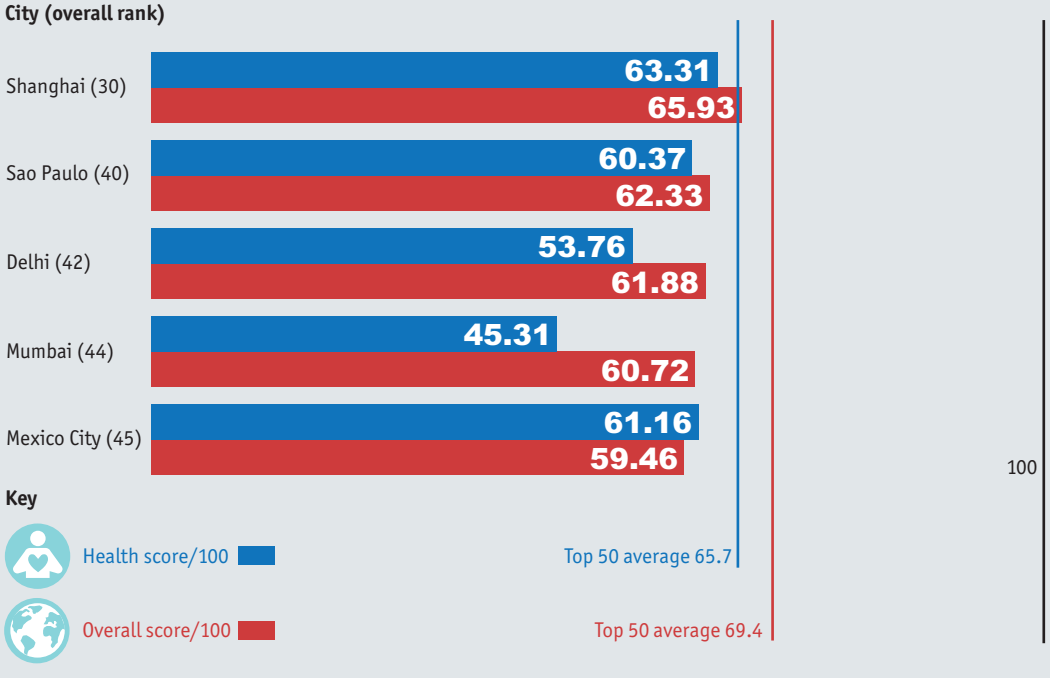
Megacities can be safe cities, as Tokyo shows, but only six make it into the top half of the Index: Tokyo, Osaka, New York, Los Angeles, Paris and London. Besides Buenos Aires, the 14 megacities in the lower half of the Index all come from emerging economies, either the BRICS countries (Brazil, Russia, India, China and South Africa) or the MINT countries (Mexico, Indonesia, Nigeria and Turkey).

As these cities grow, they need to provide services for greater numbers of citizens on budgets that are not necessarily expanding as fast. "Resources are stretched," says Vivien Carli, co-author of *Practical Approaches to Urban Crime Prevention*, a report published in 2011 by the International Centre for the Prevention of Crime. "Just providing basic security such as policing is becoming very difficult, and the majority of the megacities are suffering from that."

This can lead to the emergence of large lawless slums and "no-go areas" where organised crime flourishes and residents are put at high risk of exploitation and victimisation. Mumbai, for example (which is at position 44 in the

The big five

After Tokyo, the rest of the five largest cities are in emerging markets. These cities, each with 20m+ inhabitants, all feature in the bottom half of the Safe Cities Index 2015.



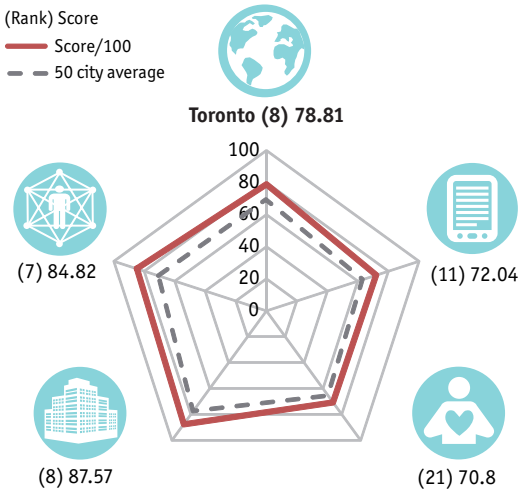
[24] http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf

overall index), is famous for its sprawling slum developments.

Megacities attract large numbers of migrants from rural areas and international migrants, whether legal or illegal. "Meeting their needs takes resources," explains Ms Carli. "In developed countries you have money going into healthcare. In most megacities there's nothing like that—it's chaos." This can also create vulnerable communities of "outsiders" and can lead to cultural clashes that result in violence. Moreover, the divide between rich and poor in megacities is growing. "We're seeing a lot more division occurring in megacities that's creating a lot of tension," says Ms Carli.

Index of indexes: Where is the best place to live?

Deciding where to live is a personal choice for many city residents. For some, safety will be paramount. Others will prioritise culture and creativity. Two neighbours may hold opposite views on democracy and the cost of living. But often choice will be based on a mixture of reasons: an entrepreneur looking for the best city to start a business may also intend to start a family.



Index of indexes: Top 25 cities

Rank (vs 50 cities in Safe Cities Index)	City	Average position across six EIU indeces
1	Toronto	17
2	Montreal	23
3	Stockholm	25
4	Amsterdam	25
5	San Francisco	26
6	Melbourne	27
7	Zurich	27
8	Washington DC	27
9	Sydney	28
10	Chicago	28
11	Los Angeles	30
12	Brussels	32
13	New York	33
14	Frankfurt	33
15	Osaka	33
16	Tokyo	35
17	Barcelona	36
18	Santiago	36
19	Paris	37
20	Madrid	40
21	Taipei	40
22	London	41
23	Seoul	45
24	Hong Kong	45
25	Rome	46

To provide a broad picture of how cities perform, we have tracked how the 50 cites in our Index perform across a range of other indexes created by The Economist Intelligence Unit. Three of these indexes are at the city level (Safe Cities, Liveability Rankings, Cost of Living) and three are at the country level (Business Environment Rankings, Democracy Index, Global Food Security Index).

The average rankings for the 25 best-performing cities are set out below. **Toronto** (8) in Canada is a consistent performer across the five other indexes, putting it top overall. The complete Index of Indexes is available in Appendix 3.

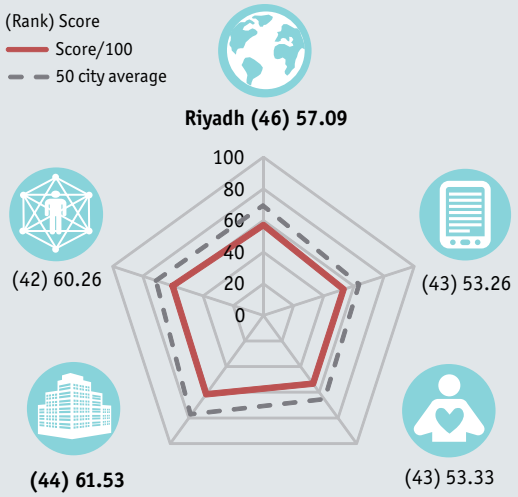
Category 3: Infrastructure safety

This category measures the safety of a city's infrastructure, based on factors such as the quality of its roads (input) and the number of deaths from natural disasters (output)

Safety briefing

High- and upper-middle-income cities dominate the top ten in this category, with a diverse geographical spread spanning Asia and Australia to North America and the Middle East. One outlier is Hong Kong. Ranked 11th overall, it drops to 40th for infrastructure safety. While it scores top for the quality of its roads, it is mid-table for the number of vehicle accidents per year and one from the bottom for the number of annual pedestrian deaths. It also ranks outside the top 15 for the percentage of the population living in urban slums.

By contrast, the bottom ten is made up of cities from low- or lower-middle-income countries (with the exception of Riyadh). For cities in these countries, investments in infrastructure, such as efficient transport systems or improved power generation, could help generate economic activity and create jobs, improving livelihoods for city residents. However, few can mobilise the funds needed to make these investments, making it hard to increase the safety and prosperity for urban citizens.



Infrastructure plays a vital part in city safety. Well-designed and constructed transport systems, for instance, allow for everything, from traffic calming measures to pedestrian zones, making life safer for everyone, from drivers and cyclists to subway and bus commuters. Maintaining the infrastructure and networks that support water, power, communications and sanitation services is also critical.

"A single point of failure can have consequences across a wide area," according to Frederick Krimgold, director of the disaster risk reduction programme at Virginia Tech.[25] "That is what makes infrastructure security so important."

The rapid expansion of urban populations poses big challenges for municipal authorities in developing countries. "Cities are growing at

[25] https://www.linkedin.com/pub/fred-krimgold/3/b24/234

Top 10 cities: Infrastructure safety

Rank	City (overall rank)	Score/100
1	Zurich (7)	92.63
2	Melbourne (9)	92.28
3	Sydney (6)	91.4
4	Amsterdam (5)	91.27
5	Tokyo (1)	89.79
6	Montreal (14)	89.47
7	Singapore (2)	88.86
8	Toronto (8)	87.57
9	Madrid (21)	87.28
=10	Abu Dhabi (25)	86.16
=10	San Francisco (12)	86.16

> "Cities are growing at a pace that's greater than the ability of some governments to develop and maintain additional services"
>
> *Dan Lewis, urban risk reduction programme, UN Habitat*

a pace that's greater than the ability of some governments to develop and maintain additional services," says Kenya-based Dan Lewis, who heads the urban risk reduction programme at UN Habitat. "City systems suffer as a result, and infrastructure begins to deteriorate."

Moreover, up to 80% of the world's urban poor live in slums in some cities, according to UN Habitat, with 55m new slum dwellers added to the global population since 2000.[26] Retrofitting these unplanned settlements with essential infrastructure, such as water and power networks and transport systems, is extremely difficult.

"In the 1970s people talked about slum upgrading and building sanitation systems into existing slums," says Mr Krimgold. "That turns out to be extremely expensive and not altogether successful."

But while some cities are failing to invest sufficiently in infrastructure, others in emerging markets are pushing ahead with rapid and large-scale urban infrastructure developments. In China, for example, the 12th Five-Year Plan (2011-15) allows for the construction or extension of metro links in many major cities.[27]

These systems will play a critical role in city safety, reducing both the pollution arising from increasing traffic congestion and the accidents caused by cars.

Reflecting such spending, this category of the Index features a group of Chinese cities (Beijing, Shanghai, Shenzhen, Guangzhou and Tianjin) appearing together at positions 30 to 34. Nevertheless, rapid infrastructure construction brings its own perils. China has a mixed record on the safety of everything from buildings to rail systems. In 2011, for instance, a high-speed rail crash in Wenzhou in eastern China resulted in 40 deaths and 200 injuries.[28]

Sensing danger

For some cities, the challenge is not the safe construction of new pieces of infrastructure but the maintenance and upgrading of existing structures and systems—some of which may be extremely old, particularly in European cities. However, western European cities are clearly winning this battle, since only one city (Paris) falls into the lower half of this category.

Technology has a role to play here. Data from wireless-enabled sensors are increasingly being analysed and used to monitor the safety of existing structures such as bridges, tunnels and water and sanitation networks. The Singapore government, for instance, plans to install 1,000 sensors across the city in 2015 to monitor conditions such as water levels, traffic congestion, crowds and air quality.

"We can't predict everything," says Andrew Smyth, professor of civil engineering and engineering mechanics at Columbia University. "But generally speaking, if you're looking and measuring, you'll probably see things that might be early indicators of problems coming down the road."

[26] http://unhabitat.org/urban-themes/housing-slum-upgrading/

[27] http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/documents/Infrastructure-in-China-201302.pdf

[28] http://www.bbc.co.uk/news/world-asia-china-16345592

In addition to natural wear and tear, city infrastructure must stand up to severe weather events of increasing frequency and intensity. Examples include the floods that swept across Bangkok in 2011 and Prague in 2013; Hurricane Katrina, which wrought devastation across New Orleans in 2005; and Hurricane Sandy, which hit New York and New Jersey in 2012, leaving millions of people without power and causing US$68bn in damage, according to Swiss Re, a global reinsurer.[29]

Building resilience into city infrastructure to mitigate the damage caused by natural disasters means thinking not only about the infrastructure itself, but also the systems that support it. Tim Chapman, director of the infrastructure design group at Arup, a global engineering firm, cites the example of London's Thames Barrier. The barrier's paddles, which can be closed under storm surge conditions to protect the city from flooding, are served by three independent sources of electricity.

"It is electricity that powers telecoms systems, which powers control systems—and without that everything fails," says Mr Chapman. "If all the traffic lights fail, for example, you have gridlock. If power failure means air traffic controllers can't even get to work, you end up with planes not taking off."

Community spirit

The interdependence of city infrastructure and services means that co-ordination between the different stakeholders in a city is becoming increasingly important. This is something that is critical both before and after crises, according to Sandra Švaljek, the deputy mayor of Croatia's capital Zagreb. "Whenever there's an emergency, or something that might happen, we have a meeting to which we invite all the institutions in charge of the different city services," she says.

Joining the institutional dots to build city resilience against a variety of shocks is something the World Bank is helping cities to do with financial support from the Global Facility for Disaster Reduction and Recovery. It has developed a diagnostic tool called CityStrength to help cities identify areas of weakness—whether in physical infrastructure and health systems or crime and violence—and the investments and institutional measures necessary to address them.

"Working across sectors and jurisdictions is a critical dimension of urban development," says Sameh Naguib Wahba, manager for the World Bank Group's social, urban, rural and resilience global practice. He argues that by understanding fully the various risks they face, cities can address them more holistically—and emerge stronger as a result. "Strengthening resilience is critical for a city's competitiveness," he argues.

[29] "Mind the risk: A global ranking of cities under threat from natural disasters", Swiss Re, 2013.

Safe pair of hands: Profile of San Francisco's first chief resilience officer

Until recently Patrick Otellini's title was director of earthquake safety for the city and county of San Francisco (ranked 12th overall).[30] Since April 2014, however, that has changed. Mr Otellini is now the world's first chief resilience officer.[31]

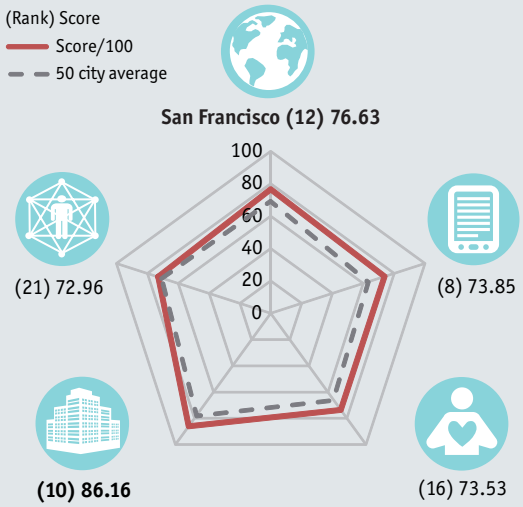
His position—which has been funded for two years by the Rockefeller Foundation as part of its 100 Resilient Cities programme—is designed to give San Francisco a leader with a holistic view of everything that could test the city and county, from population density, climate change and resource scarcity to social inequity and migration.

Given the position of the San Francisco Bay area on the San Andreas Fault, the threat of earthquakes remains a major focus for Mr Otellini. However, he sees his role as one of bringing different departments together to make collaborative plans that, in the event of a disaster such as an earthquake, will help the city bounce back stronger.

"The way I can be successful in bringing these people together is not to come in and claim ownership over this process," says Mr Otellini. "It's not my job to be the expert on rising sea levels or anti-terrorism efforts—it's my job to be the conduit that connects these people, so we can all realise the benefits of doing this work together."

When it comes to collaboration on safety and resilience, Mr Otellini sees the private sector playing an important role. In 2009 the city established its Lifelines Council, a group of city leaders who have regular meetings with members of the private sector, primarily the city's utility and service providers. "It started the conversation," says Mr Otellini. "That way, after a disaster we're not meeting for the first time."

Moreover, the council is now working on examining the city's interdependencies, such as the need for energy, so that communications systems can continue to function in an emergency. "You have things like telecoms, Wi-Fi connections and cell sites that are going down to a hard-wired fibre loop," says Mr Otellini. "If these systems don't have back-up power, we don't have communications."



Technology companies also have a role to play, particularly in a city dominated by the technology sector. "What we are seeing is that tech companies can have some amazing impact if they share their data with the right people," Mr Otellini explains. "You're able to understand some profound things about supply chains and how to become resilient and recover when you start analysing these data."

[30] https://www.linkedin.com/pub/patrick-otellini/5/601/419

[31] http://www.rockefellerfoundation.org/blog/q-with-worlds-first-chief-resilience

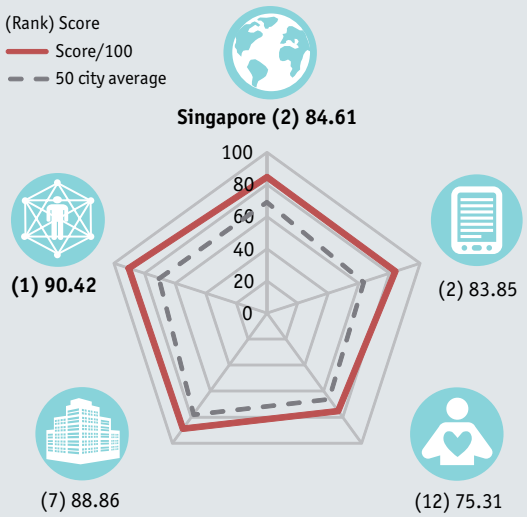
Category 4: Personal safety

This category measures the more traditional aspects of a city's safety in terms of its levels of crime and illegal activity, relying on factors such as the level of police engagement (input) and the prevalence of violent crime (output)

Safety briefing

Stockholm is the only non-Asian city in the top five in the personal safety category, which is led by Singapore. Rich-world cities generally fill the top half of this category, although economic success does not necessarily guarantee increased personal safety. Chile is a relatively prosperous nation, but Santiago's poor performance at the bottom is due in part to high levels of domestic violence and rape,[32] and low levels of trust in law enforcement authorities and the criminal justice system.[33]

Nor do Rome and Brussels perform well. Europe's ancient and modern capital cities are ranked 40th and 41st, respectively. This could be explained by the prevalence of petty crimes, such as muggings, bag snatching and pick-pocketing, which the US State Department warns American travellers about in its advisories on both cities.[34]



Personal safety and the threat of crime and violence are uppermost in the minds of urban residents. In a 2011 EIU survey on city liveability, respondents ranked safety and security third in importance in making a city an appealing place in which to live and work. With this in mind, city leaders and policymakers can consider making regulatory changes to mitigate the risks to personal safety, such as limiting gun possession or controlling drug use. But direct action usually requires substantial investment.

One city that has focused on developing a sophisticated policing strategy is Barcelona, which is at position 11 in the personal safety category. Three years ago the Barcelona city council decided to increase the police presence on the streets and in the subway. The strategy has yielded results. "In three years crime has dropped by 32%," says Josep Rius, chief of staff to the deputy mayor of Barcelona.

[32] http://santiagotimes.cl/despite-lowest-murder-rate-chileans-insecure-latin-america/

[33] *UNDP Human Development Report*, 2012, p. 10. Available at: http://www.undp.org/content/dam/rblac/docs/Research%20and%20Publications/IDH/IDH-AL-ExecutiveSummary.pdf

[34] Brussels US embassy: http://belgium.usembassy.gov/security_messages/security-messages-to-u.s.-citizens; US State Department: http://travel.state.gov/content/passports/english/country/italy.html

Top 10 cities: Personal safety

Rank	City (overall rank)	Score/100
1	Singapore (2)	90.42
2	Osaka (3)	90.2
3	Tokyo (1)	89.31
4	Stockholm (4)	87.51
5	Taipei (13)	85.67
6	Hong Kong (11)	85.09
7	Toronto (8)	84.82
8	Melbourne (9)	82.72
9	Amsterdam (5)	82.39
10	Sydney (6)	80.4

In addition to the actual drop in crime, the police presence has increased perceptions of safety among the city's residents. "Barcelona is not a dangerous city," says Mr Rius. "But people thought it wasn't a safe city. Now we have changed this perception—and that's really important."

> "In three years crime has dropped by 32%"
>
> *Josep Rius, chief of staff, deputy mayor of Barcelona*

Seoul, meanwhile, is considering the safety of its visitors. In October 2013 the city launched a new police unit called the "tourist police". Speaking English, Japanese and Chinese, the officers patrol major tourist areas to protect visitors not only from theft and other crimes but also from overcharging merchants and taxi drivers. Tourists experiencing problems can also call a special hotline.[35]

Being resourceful

High levels of police engagement and patrolling are instrumental to security. At the same time, some cities are recognising the power of technology in preventing crime.

Data analytics, for example, can also enable cities to track and predict incidences of crime.

To tackle its high levels of violent crime, Chicago—which is in position 25 in the personal safety category—has used an algorithm developed by an Illinois Institute of Technology engineer to identify a "heat list" of individuals likely to be either victims or perpetrators of crime. These individuals then receive visits and are issued warnings.[36]

Meanwhile, as part of an initiative called Future City Glasgow—a £24m (US$37m) programme to demonstrate how technology can make the city smarter, safer and more sustainable—the Scottish city is developing street lighting systems that react to environmental factors related to crime.

At times of low risk, the lights dim to save energy. But if sensors installed in the lamp posts detect activity or noise, such as someone walking alone at night or two large groups moving towards each other, the lights brighten. CCTV operators working in the city's new £12m (US$18.8m) integrated operations centre are alerted to any unusually high noise levels, such as shouting, which can then be notified to the police.

"It's a different approach for what's now referred to as the humble lamp post," says Jonathan Brown, programme manager of city system integration at Future City Glasgow. "What we're looking at is how the asset can drive added value."

Some interventions do not require any investment in technology, infrastructure or an increased police presence. The careful design and layout of residences and public spaces can do much to increase personal safety for citizens. For instance, a city at risk of terrorist attacks need not become a fortress of steel fences and concrete barriers. Instead, elements found in a typical streetscape—from information kiosks, benches and parking meters to lamp posts, news stands and bus shelters—can be strengthened to act as protective barriers.

"Water features can deflect the opportunity for anyone to approach the building with a vehicle," says Brian Quinn, Commission for Architecture and the Built Environment (Cabe) adviser at the Design Council. "Those create a pleasant

[35] http://english.visitkorea.or.kr/enu/FU/FU_EN_15.jsp?cid=1851556

[36] http://articles.chicagotribune.com/2013-08-21/news/ct-met-heat-list-20130821_1_chicago-police-commander-andrew-papachristos-heat-list

approach to the building and have public benefits, rather than being a hardened stand-off zone."

Seoul is implementing a range of "design against crime" projects.[37] Inspired by the work of the UK-based Design Against Crime Research Centre, the city is working with designers, public bodies and others to develop new products and systems that tackle crimes such as ATM muggings, bike theft and shoplifting.

Safe as houses

When it comes to residential areas, following certain basic design principles can do much to enhance personal safety for residents, says Mr Quinn, an urban designer who focuses on public spaces, streets, housing and crime prevention. He cites measures that include placing front doors facing the street and avoiding footpaths and cul-de-sacs at the back of homes, which might allow intruders to enter unseen.

But enhancing the safety of homes through good design does not only benefit residents. The advent of social media means that individuals are becoming more vocal about the places they live in. This, says Mr Quinn, means developers need to pay attention to what works and what does not work in terms of safety.

"In the past house developers could build what they wished," he says. "Now if the first phase has an unfortunate reflection, it can be harder for developers to sell the next phase."

Even in developing countries, there are ways of increasing security without additional cost to city budgets. UN Habitat's Mr Lewis says that talking to individuals and families about the kinds of crimes they may face can involve the community in crime prevention.

"Through consultation and engagement everybody gets a sense of the dimensions of crime," he says. "And the more people that are engaged in understanding the dimensions of crime, the more likely it is that the police will have increased assets outside the force working on their behalf."

[37] http://www.arts.ac.uk/research/research-impact/dac--crime-prevention-through-innovative-design/

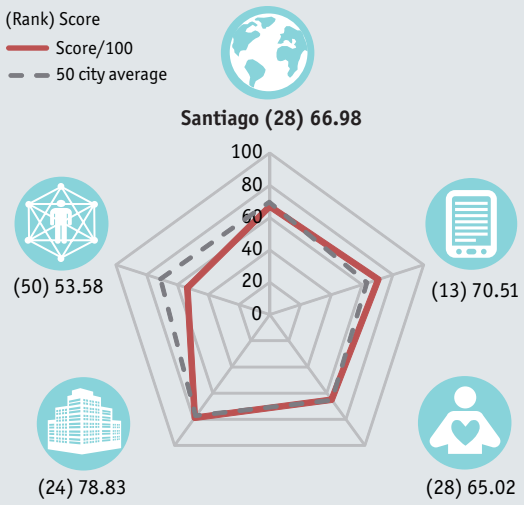
Gated communities: A false sense of security?

Built as communal courtyard houses, the Shikumen of Shanghai emerged in the mid-19th century as a response to the turmoil of the Taiping rebellion. With security a high priority for people shaken by violence, the Shikumen were an early form of gated community (shikumen means stone gate) with a single entrance often manned by a watchman. Two centuries later, gated communities are still a response to fear of urban crime and violence.

For this reason, gated communities often have high perimeter fences, 24-hour guard services and limited external access. They range from secure townhouse complexes or condominiums to larger security estates and enclosed neighbourhoods with schools, shops and offices within the enclosed area. Admittedly, many offer residents other benefits, such as shared amenities and privacy. But, tellingly, these kinds of residences can be found in many of the cities that appear at the bottom of the list in the personal safety category.

Take Johannesburg, which appears in position 39 in the personal safety category and at 45 in the outputs sub-indicator, which includes factors such as the prevalence of violent crime, criminal gang activity and perceptions of safety. The prevalence of violent crime in the South African city has seen a growth in the number of gated communities. By 2004 Johannesburg had 300 enclosed neighbourhoods and 20 security estates.[38]

Santiago—at the bottom of the list in the personal safety category—has also seen gated



communities flourish. In 2007 the authors of a paper on gated communities in the Chilean city reported that "the number of gated communities has increased significantly during the past few years".[39]

Ironically, however, the development of these residential fortresses can foster suspicion and lead to greater social divisions and increased prevalence of crime. With residents shut away behind high walls, what were previously public spaces outside gated communities can become deserted and dangerous. Nor are residents always safe when inside their communities. A 2013 study of South Africa's gated neighbourhoods found that moving to these residences actually increased the risk of burglary.[40]

[38] *National survey on gated communities in South Africa*, CSIR Building and Construction Technology, 2003, p.63. Available at: http://www.csir.co.za/Built_environment/Planning_support_systems/gatedcomsa/docs/Nat_survey_gated_com_SA.pdf

[39] Francisco Sabatini and Rodrigo Salcedo, "Gated Communities and the Poor in Santiago, Chile: Functional and Symbolic Integration in a Context of Aggressive Capitalist Colonization of Lower-Class Areas", Pontificia Universidad Católica de Chile, 2007.

[40] Gregory D. Breetzke and Ellen G. Cohn, "Burglary in Gated Communities: An Empirical Analysis Using Routine Activities Theory", International Criminal Justice Review, March 2013, Vol. 23, No. 1, pp. 56-74. Available at: http://icj.sagepub.com/content/23/1/56.refs

Conclusion

Modern cities are presenting increasingly complex safety challenges. New threats demand new approaches. Cities cannot simply allow the fearful to retreat behind the high walls of gated communities. The fortress mentality does not create an urban environment that is liveable and safe—even more so when the online world knows no borders.

Instead, cities can use intelligent design and carefully considered city layouts to reduce the threat of violent crime or terrorist attacks, while creating an urban environment that is visually attractive and easy for everyone, from pedestrians to cyclists, to navigate. Progress in the physical world should be matched online, since the separation between virtual and physical safety is becoming increasingly blurred.

Technology can help here, from energy-efficient street lighting to systems that allow many different local agencies to view the same data. Nonetheless, people continue to play a central role in creating a safe environment. Either way safe cities require resources. While cities in mature markets are making progress on shoring up the security of their cities, encouraging healthy citizens and concentrating efforts on prevention, the Index clearly shows the difficulties facing cities in developing countries.

These cities, with rapidly expanding populations and overstretched financial resources, need to become more creative at devising low-cost solutions to urban security. Drawing on a vast array of data may not be a realistic option for some time, so existing resources from the wider community should be called upon. Businesses in fast-growing markets have a clear economic interest in a safe city, populated with contented consumers untroubled by cybercrime and healthy and productive workers breathing clean air in green open spaces.

Ultimately, in mature and emerging cities alike, local governments and city leaders need to get better at collaborating with all city stakeholders from different departments, sectors and civil society groups. The arguments for taking such measures are compelling when most of the world now calls a city their home. Safe cities are those that can support a vibrant cultural life and a dynamic entrepreneurial environment in which everyone can thrive. The best examples of these will be at the forefront of economic and commercial growth for years to come.

Appendix:

1. Safe Cities Index
2. Safe Cities Index by income
3. Index of indexes
4. Index methodology

EIU Safe Cities Index 2015: Overall

Weighted total of all category scores (0-100 where 100=best)

OVERALL			FACT SHEET				
Rank	City	Score/100	Capital city	Country	Life expectancy (average number of years)	Population band*	Host of summer Olympic games (year)
1	Tokyo	85.63	Y	Japan	82	10m+	1964, 2020
2	Singapore	84.61	N/A	Singapore	82	5-10m	
3	Osaka	82.36	N	Japan	83	10m+	
4	Stockholm	80.02	Y	Sweden	82	0-5m	1912
5	Amsterdam	79.19	Y	The Netherlands	79	0-5m	1928
6	Sydney	78.91	N	Australia	81	0-5m	2000
7	Zurich	78.84	N	Switzerland	84	0-5m	
8	Toronto	78.81	N	Canada	81	5-10m	
9	Melbourne	78.67	N	Australia	86	0-5m	1956
10	New York	78.08	N	U.S.A	81	10m+	
11	Hong Kong	77.24	N	China	84	5-10m	
12	San Francisco	76.63	N	U.S.A	80	0-5m	
13	Taipei	76.51	Y	Taiwan	83	0-5m	
14	Montreal	75.6	N	Canada	81	0-5m	1976
15	Barcelona	75.16	N	Spain	82	5-10m	1992
16	Chicago	74.89	N	U.S.A	78	5-10m	
17	Los Angeles	74.24	N	U.S.A	80	10m+	1932, 1984
18	London	73.83	Y	U.K	82	10m+	1908, 1948, 2012
19	Washington DC	73.37	Y	U.S.A	76	0-5m	
20	Frankfurt	73.05	N	Germany	79	0-5m	
21	Madrid	72.35	Y	Spain	82	5-10m	
22	Brussels	71.72	Y	Belgium	81	0-5m	
23	Paris	71.21	Y	France	81	10m+	1900, 1924
24	Seoul	70.9	Y	Republic of Korea	83	5-10m	1988
25	Abu Dhabi	69.83	Y	U.A.E	77	0-5m	
26	Milan	69.64	Y	Italy	83	0-5m	
27	Rome	67.13	Y	Italy	82	0-5m	1960
28	Santiago	66.98	Y	Chile	78	5-10m	
29	Doha	66.41	Y	Qatar	78	0-5m	
30	Shanghai	65.93	N	China	80	10m+	
31	Buenos Aires	65.88	Y	Argentina	76	10m+	
32	Shenzhen	65.76	N	China	75	10m+	
33	Lima	65.01	Y	Peru	74	5-10m	
34	Tianjin	63.55	N	China	79	10m+	
35	Rio de Janeiro	63.52	N	Brazil	73	10m+	2016
36	Kuwait City	63.47	Y	Kuwait	78	0-5m	
37	Beijing	63.25	Y	China	81	10m+	2008
38	Guangzhou	62.79	N	China	76	10m+	
39	Bangkok	62.69	Y	Thailand	74	5-10m	
40	Sao Paulo	62.33	N	Brazil	71	10m+	
41	Istanbul	62.25	N	Turkey	72	10m+	
42	Delhi	61.88	Y	India	70	10m+	
43	Moscow	61.6	Y	Russia	76	10m+	1980
44	Mumbai	60.72	N	India	71	10m+	
45	Mexico City	59.46	Y	Mexico	77	10m+	1968
46	Riyadh	57.09	Y	Saudi Arabia	75	5-10m	
47	Johannesburg	56.26	N	South Africa	60	5-10m	
48	Ho Chi Minh City	54.93	N	Vietnam	73	5-10m	
49	Tehran	53.78	Y	Iran	77	5-10m	
50	Jakarta	53.71	Y	Indonesia	73	10m+	

*United Nations, World Urbanization Prospects: The 2014 Revision, Highlights

EIU Safe Cities Index 2015: Rankings by category

Weighted score per category (0-100 where 100=best)

DIGITAL SECURITY

Rank	City	Score/100
1	Tokyo	87.18
2	Singapore	83.85
3	New York	79.42
4	Hong Kong	78.78
5	Osaka	77
6	Los Angeles	74.99
7	Stockholm	74.82
8	San Francisco	73.85
9	Abu Dhabi	73.71
10	Chicago	72.9
11	Toronto	72.04
11	Montreal	72.04
13	Santiago	70.51
14	Sydney	70.48
15	Washington DC	69.99
16	London	69.42
17	Amsterdam	68.81
18	Mumbai	68.07
19	Zurich	67.04
20	Melbourne	65.42
21	Taipei	65.11
22	Brussels	64.6
23	Kuwait City	64.21
24	Delhi	63.33
25	Shenzhen	62.74
26	Milan	62.62
27	Mexico City	61.69
28	Madrid	60.78
29	Barcelona	60.29
30	Buenos Aires	59.58
31	Doha	58.73
32	Paris	58.4
33	Frankfurt	57.45
34	Beijing	56.87
35	Rome	56.67
36	Shanghai	56.14
37	Guangzhou	55.14
38	Lima	55.09
39	Sao Paulo	54.93
40	Rio de Janeiro	54.74
41	Tianjin	54.26
42	Ho Chi Minh City	53.31
43	Riyadh	53.26
44	Johannesburg	52.9
45	Bangkok	52.86
46	Moscow	51.54
47	Seoul	51.46
48	Jakarta	48.48
49	Istanbul	46.83
50	Tehran	46.58

HEALTH SECURITY

Rank	City	Score/100
1	Zurich	79.05
2	New York	78.52
3	Brussels	77.63
4	Frankfurt	77.38
5	Paris	76.95
6	Osaka	76.55
7	Barcelona	76.35
8	Tokyo	76.26
9	Taipei	76
10	Stockholm	75.83
11	Madrid	75.53
12	Singapore	75.31
13	Amsterdam	74.28
14	Melbourne	74.27
15	Hong Kong	73.61
16	San Francisco	73.53
17	Sydney	73.35
18	Seoul	72.86
19	Washington DC	72.53
20	Montreal	72.4
21	Toronto	70.8
22	London	69.78
23	Chicago	69.71
24	Moscow	68.93
25	Rome	67.13
26	Los Angeles	66.57
27	Milan	66.16
28	Santiago	65.02
29	Buenos Aires	64.64
30	Beijing	64.1
31	Shanghai	63.31
32	Shenzhen	61.85
33	Mexico City	61.16
34	Tianjin	60.93
35	Bangkok	60.5
36	Sao Paulo	60.37
37	Guangzhou	60.07
38	Rio de Janeiro	57.48
39	Kuwait City	56.81
40	Lima	54.44
41	Doha	54.16
42	Delhi	53.76
43	Riyadh	53.33
44	Jakarta	53.11
45	Abu Dhabi	52.06
46	Istanbul	50.77
47	Johannesburg	50.17
48	Ho Chi Minh City	48.39
49	Tehran	48.22
50	Mumbai	45.31

INFRASTRUCTURE SAFETY

Rank	City	Score/100
1	Zurich	92.63
2	Melbourne	92.28
3	Sydney	91.4
4	Amsterdam	91.27
5	Tokyo	89.79
6	Montreal	89.47
7	Singapore	88.86
8	Toronto	87.57
9	Madrid	87.28
10	San Francisco	86.16
10	Abu Dhabi	86.16
12	Osaka	85.71
13	Chicago	85.69
14	Barcelona	85.65
15	Seoul	85.64
16	New York	84.93
17	Brussels	84.34
18	Rome	83.77
19	Los Angeles	83.72
20	Frankfurt	82.79
21	Stockholm	81.92
22	Taipei	79.25
23	Milan	78.91
24	Santiago	78.83
25	London	78.78
26	Paris	78.22
27	Istanbul	77.71
28	Buenos Aires	77.03
29	Washington DC	77
30	Shanghai	76.63
31	Guangzhou	76.57
32	Beijing	76.54
33	Tianjin	76.53
34	Shenzhen	76.5
35	Sao Paulo	76.41
36	Doha	76.34
37	Lima	75.69
38	Rio de Janeiro	74.4
39	Kuwait City	73.4
40	Hong Kong	71.46
41	Moscow	70.65
42	Bangkok	66.44
43	Tehran	63.98
44	Riyadh	61.53
45	Johannesburg	60.67
46	Delhi	57.71
47	Mumbai	55.89
48	Jakarta	54.02
49	Mexico City	52.93
50	Ho Chi Minh City	52.41

PERSONAL SAFETY

Rank	City	Score/100
1	Singapore	90.42
2	Osaka	90.2
3	Tokyo	89.31
4	Stockholm	87.51
5	Taipei	85.67
6	Hong Kong	85.09
7	Toronto	84.82
8	Melbourne	82.72
9	Amsterdam	82.39
10	Sydney	80.4
11	Barcelona	78.36
12	London	77.35
13	Zurich	76.62
14	Doha	76.41
15	Lima	74.81
16	Frankfurt	74.57
17	Washington DC	73.95
18	Istanbul	73.7
19	Seoul	73.62
20	Mumbai	73.61
21	San Francisco	72.96
22	Delhi	72.7
23	Los Angeles	71.66
24	Paris	71.29
25	Chicago	71.27
26	Bangkok	70.97
27	Milan	70.87
28	New York	69.45
29	Montreal	68.48
30	Shanghai	67.66
31	Rio de Janeiro	67.45
32	Abu Dhabi	67.39
33	Madrid	65.81
34	Ho Chi Minh City	65.62
35	Tianjin	62.46
36	Buenos Aires	62.25
37	Mexico City	62.07
38	Shenzhen	61.96
39	Johannesburg	61.29
40	Rome	60.94
41	Brussels	60.31
42	Riyadh	60.26
43	Kuwait City	59.47
44	Guangzhou	59.37
45	Jakarta	59.23
46	Sao Paulo	57.59
47	Tehran	56.35
48	Beijing	55.51
49	Moscow	55.27
50	Santiago	53.58

Rankings by income classification (EIU data)

High income (Above US$50,000)

(GDP per capita, 2013)

Rank	City	Overall rank	Overall score
1	Singapore	2	84.6
2	Zurich	7	78.8
3	New York	10	78.1
4	San Francisco	12	76.6
5	Chicago	16	74.9
6	Los Angeles	17	74.2
7	Washington DC	19	73.4
8	Abu Dhabi	25	69.8
9	Doha	29	66.4
10	Kuwait City	36	63.47
11	Riyadh	46	57.09

Lower-middle income (US$10,000 to US$30,000)

(GDP per capita, 2013)

Rank	City	Overall rank	Overall score
1	Santiago	28	67
2	Shanghai	30	65.9
3	Buenos Aires	31	65.9
4	Shenzhen	32	65.8
5	Lima	33	65
6	Tianjin	34	63.6
7	Rio de Janeiro	35	63.5
8	Beijing	37	63.3
9	Guangzhou	38	62.8
10	Bangkok	39	62.7
11	Sao Paulo	40	62.3
12	Istanbul	41	62.3
13	Moscow	43	61.6
14	Mexico City	45	59.5
15	Johannesburg	47	56.3
16	Tehran	49	53.8

Upper-middle income (US$30,000 to US$50,000)

(GDP per capita, 2013)

Rank	City	Overall rank	Overall score
1	Tokyo	1	85.6
2	Osaka	3	82.4
3	Stockholm	4	80
4	Amsterdam	5	79.2
5	Sydney	6	78.9
6	Toronto	8	78.8
7	Melbourne	9	78.7
8	Hong Kong	11	77.2
9	Taipei	13	76.5
10	Montreal	14	75.6
11	Barcelona	15	75.2
12	London	18	73.8
13	Frankfurt	20	73.1
14	Madrid	21	72.4
15	Brussels	22	71.7
16	Paris	23	71.2
17	Seoul	24	70.9
18	Milan	26	69.6
19	Rome	27	67.1

Low income (under US$10,000)

(GDP per capita, 2013)

Rank	City	Overall rank	Overall score
1	Delhi	42	61.9
2	Mumbai	44	60.7
3	Ho Chi Minh City	48	54.9
4	Jakarta	50	53.7

EIU Index of indexes

Best overall
Best in category

City	City level index			Country level index			
	Safe Cities Index	Liveability Rankings (1-140; 1=most livable)	Worldwide Cost of Living (1 to 131; inverted so 1=cheapest)	Business Environment Rankings (1-82; 1=best for business)	Democracy Index (1-167; 1=most democratic)	Global Food Security Index (1-107; 1=most secure)	Average Index Rank
Tokyo	1	18	123	27	20	18	35
Singapore	2	52	131	1	80	16	47
Osaka	3	12	118	27	20	18	33
Stockholm	4	14	107	6	2	14	25
Amsterdam	5	26	86	16	11	5	25
Sydney	6	7	127	5	6	15	28
Zurich	7	11	128	2	7	5	27
Toronto	8	4	70	4	8	8	17
Melbourne	9	1	123	5	6	15	27
New York	10	56	104	7	19	1	33
Hong Kong	11	31	119	3	65	42	45
San Francisco	12	52	62	7	19	1	26
Taipei	13	61	72	14	37	42	40
Montreal	14	16	86	4	8	8	23
Barcelona	15	34	96	25	25	19	36
Chicago	16	36	91	7	19	1	28
Los Angeles	17	42	96	7	19	1	30
London	18	55	116	22	14	20	41
Washington DC	19	34	81	7	19	1	27
Frankfurt	20	18	121	12	15	11	33
Madrid	21	44	103	25	25	19	40
Brussels	22	28	96	17	23	7	32
Paris	23	16	130	24	27	3	37
Seoul	24	58	116	26	21	24	45
Abu Dhabi	25	79	49	30	152	NA	56
Milan	26	46	104	48	31	22	46
Rome	27	49	96	48	31	22	46
Santiago	28	64	54	13	32	26	36
Doha	29	86	15	21	139	NA	48
Shanghai	30	81	107	50	143	42	76
Buenos Aires	31	62	43	70	52	35	49
Shenzhen	32	84	93	50	143	42	74
Lima	33	80	34	49	60	50	51
Tianjin	34	75	56	50	143	42	67
Rio de Janeiro	35	91	54	43	44	29	49
Kuwait City	36	82	15	45	120	NA	50
Beijing	37	74	84	50	143	42	72
Guangzhou	38	90	62	50	143	42	71
Bangkok	39	102	70	34	72	45	60
Sao Paulo	40	91	73	43	44	29	53
Istanbul	41	108	76	44	93	38	67
Delhi	42	111	3	57	33	70	53
Moscow	43	73	84	60	125	40	71
Mumbai	44	115	1	57	33	70	53
Mexico City	45	105	73	32	51	30	56
Riyadh	46	108	10	41	160	31	66
Johannesburg	47	91	15	54	29	39	46
Ho Chi Minh City	48	121	39	59	134	60	77
Tehran	49	129	62	81	157	NA	80
Jakarta	50	117	39	56	54	66	64

Sources: Liveability Ranking, The Economist Intelligence Unit, 2014; Worldwide Cost of Living, The Economist Intelligence Unit, 2014; Business Environment Rankings (Global ranking 2014-2018), The Economist Intelligence Unit, 2014; Democracy Index, The Economist Intelligence Unit, 2013; Global Food Security Index, The Economist Intelligence Unit, 2013

Index methodology

The Safe Cities Index measures the relative level of safety of a diverse mix of the world's leading cities using four main categories of safety: digital security, health security, infrastructure safety and personal safety.

Every city in the Index is scored across these four categories. Each category comprises between three and eight sub-indicators, which are divided between security inputs, such as policy measures and level of spending, and outputs, such as the frequency of vehicular accidents.

Four categories:

Digital security measures the extent of resources dedicated to ensuring that citizens can use the Internet and other digital technologies without fear of privacy violations or identity theft. On the input side, cities are scored on their reliance on digital infrastructure, the level of technology employed and the existence of dedicated cyber security teams. On the output side, the index measures the frequency of identity theft and the estimated number of computers infected with a virus.

Health security measures how cities maintain the physical environment and the level of care available for their citizens. On the input side, cities are scored based on their environmental policies and access to and quality of healthcare services. On the output side, the index measures air and water quality, life expectancy and infant mortality, among other sub-indicators.

Infrastructure safety considers another aspect of the physical environment—the safety of a city's buildings and roads and its resilience against disasters. On the input side, the index takes into account the enforcement of transport safety and the quality of electricity infrastructure, while on the output side the frequency of accidents and pedestrian deaths are included, as well as the percentage of the population living in urban slums.

Personal safety considers how secure individual citizens are from theft and violence. On the input side, the index takes into account factors such as the level of police engagement, the use of data-driven crime prevention and the overall political stability of the country where each city is located. On the output side, the index takes into account the prevalence of petty and violent crime as well as drug use, and how safe people feel in the city.

Over 40 indicators:

The Index comprises 44 individual indicators. They fall into two categories: quantitative and qualitative; and two types: direct and proxy.

Quantitative indicators: Nineteen of the Index's 44 indicators are based on quantitative data—for example, the frequency of vehicular accidents per year per million inhabitants.

Qualitative indicators: Twenty-five of the indicators are qualitative assessments of a city's safety—for example, the level of police engagement.

Direct indicators: Thirty-four of the indicators are specific to that city and are based on available city-level data and EIU analysis. Examples of direct indicators would include

the number of hospital beds available per 1,000 citizens (quantitative) and the quality of electricity infrastructure (qualitative).

Proxy indicators: Ten indicators use regional or country-level data as a substitute for direct city-level data. Examples of proxy indicators include the percentage of computers infected (quantitative) and political stability risk (qualitative).

Data sources

A team of in-house researchers collected data for the Index from July to September 2014. In addition to data from The Economist Intelligence Unit, which has produced a number of similar indexes that measure cities on their competitiveness, liveability and other issues, publicly available information from official sources has been used where applicable. Primary sources include the World Health Organisation, Kaspersky Lab and various others (see table below).

Indicator normalisation

In order to be able to compare data points across countries, as well as to construct aggregate scores for each country, the project team had to first make the gathered data comparable. To do so, the quantitative indicators were normalised on a scale of 0-100 using a min-max calculation, where the score is the standard deviation from the mean, with the best country scoring 100 points and the worst scoring 0.

Many of the qualitative indicators were normalised in a similar way, but direct scores from previous and ongoing EIU city indexes and rankings were used. In some instances, those scores were on a scale of 0-100. In others, a scale of 1-5 was used, with 1 being the lowest or most negative score, and 5 being the highest or most positive score.

The status indicators were normalised as a two- or three-point rating. For example, "dedicated cyber security teams" was normalised so that neither a national- or city-level cyber security team scored 0, a national team only scored 50, and a city-level team scored 100.

Index construction

The index is an aggregate score of all the underlying indicators. The index is first aggregated by category—creating a score for each category (for example, personal safety)—and finally, overall, based on the composite of the underlying category scores. To create the underlying category scores, each underlying indicator was aggregated according to an assigned weighting. Sub-indicators are all weighted equally, as are the four main indicator categories.

1. Digital security — Weight: 25%

A. Inputs

Indicator	Unit	Source
1.1.1 Privacy policy	0 – 5, 5 = strong policy	EIU analysis
1.1.2 Citizen awareness of digital threats	0 – 3, 3 = very aware	EIU analysis
1.1.3 Public-private partnerships	0 – 2, 2 = close partnerships	EIU analysis
1.1.4 Level of technology employed	0 – 100, 100 = highest	EIU Global City Competitiveness Index
1.1.5 Dedicated cyber security teams	0 = none, 1 = national only, 2 = national and city level	EIU analysis

B. Outputs

1.2.1 Frequency of identity theft	%	EIU analysis
1.2.2. Percentage of computers infected	Scale 1 – 5, 5 = most	Kaspersky Lab
1.2.3 Percentage with Internet access	%	ITU

2. Health security — Weight: 25%

A. Inputs

Indicator	Unit	Source
2.1.1 Environmental policies	0 – 100, 100 = best	EIU Green Cities Index
2.1.2 Access to healthcare	0 – 100, 100 = best	EIU City Liveability Index
2.1.3 No. of beds per 1,000	#	Local data sources
2.1.4 No. of doctors per 1,000	#	Local data sources
2.1.5 Access to safe and quality food	0 – 100, 100 = best	EIU City Liveability Index
2.1.6 Quality of health services	1 – 5, 5 = best	EIU City Liveability Index

B. Outputs

2.2.1 Air quality	PM 2.5 levels	WHO
2.2.2 Water quality	0 – 100, 100 = best	EIU Green Cities Index
2.2.3 Life expectancy	Years, the longer, the better	Local data sources
2.2.4 Infant mortality	Deaths per 1,000 births	Local data sources
2.2.5 Cancer mortality rate	Deaths per 100,000	Local data sources

3. Infrastructure safety — Weight: 25%

A. Inputs

Indicator	Unit	Source
3.1.1 Enforcement of transport safety	0 – 10, 10 = best	EIU analysis
3.1.2 Pedestrian friendliness	1 – 5, 5 = best	EIU Green Cities Index
3.1.3 Quality of road infrastructure	1 – 5, 5 = best	EIU City Liveability Index
3.1.4 Quality of electricity infrastructure	1 – 5, 5 = best	EIU City Liveability Index
3.1.5 Disaster management/business continuity plan	1 – 5, 5 = best	EIU Global City Competitiveness Index

B. Outputs

3.2.1 Deaths from natural disasters	# / million / yr, average of the last five years	Local data sources
3.2.2 Frequency of vehicular accidents	# / million / yr	Local data sources
3.2.3 Frequency of pedestrian deaths	# / million / yr	Local data sources
3.2.4 Percentage living in slums	%	UNPD

4. Personal safety — Weight: 25%

A. Inputs

Indicator	Unit	Source
4.1.1 Level of police engagement	0 – 1, 1 = engagement plan, 0 = none	EIU analysis
4.1.2 Community-based patrolling	0 – 1, 1 = yes, 0 = none	EIU analysis
4.1.3 Available street-level crime data	0 – 1, 1 = yes, 0 = none	EIU analysis
4.1.4 Use of data-driven techniques for crime	0 – 1, 1 = yes, 0 = none	EIU analysis
4.1.5 Private security measures	0 – 1, 1 = yes, 0 = none	EIU analysis
4.1.6 Gun regulation and enforcement	0 – 10, 10 = strict enforcement	Local data sources
4.1.7 Political stability risk	0 – 100, 0 = no risk	EIU Operational Risk Model

B. Outputs

4.2.1 Prevalence of petty crime	1 – 5, 5 = high prevalence	EIU City Liveability Index
4.2.2 Prevalence of violent crime	1 – 5, 5 = high prevalence	EIU City Liveability Index
4.2.3 Criminal gang activity	US$ billion	Havoscope Global Black Market Data
4.2.4 Level of corruption	0 – 100, 100 = least corrupt	EIU City Competitiveness Index
4.2.5 Rate of drug use	% of population estimated to be users	UN Office on Drugs and Crime
4.2.6 Frequency of terrorist attacks	Average annual attacks over last 10 years	Global Terrorism Database
4.2.7 Gender safety	Incidences of rape in latest year	Local data sources
4.2.8 Perceptions of safety	0 – 100, 100 = perceived as most safe	Numbeo

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