THE NEW SCHOOL

The Habitat Commitment Project

MONITORING & ASSESSING PROGRESS

AT THE CITY LEVEL

PROGRESS REPORT

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FINANCIAL SUPPORT

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The work presented in this book is part of a larger research agenda of the Global Urban Futures Project (GUFP) at The New School. The research and analysis is a collective effort by students and faculty of the Milano School of International Affairs, Management, and Urban Policy at The New School.

DISCLAIMER

The views presented in this book are those of the author(s) and do not necessarily represent the views of The New School.

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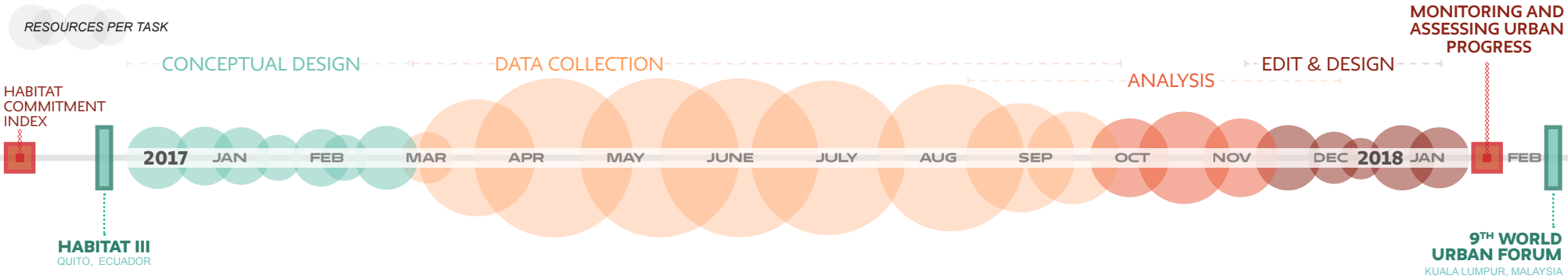

FOREWORD

by Michael Cohen

The Habitat Commitment Index (HCI) 2.0 is the result of an applied research project undertaken by the Global Urban Futures Project of The New School with the support of the Ford Foundation. It builds upon analytic work presented at the Habitat III Conference in October 2016 that measured the fulfillment of commitments made by national governments at the Habitat II Conference in 1996, weighted by GDP.

This methodological approach revealed significant findings, including that a country's wealth is not a sufficient condition for improvement in urban well-being and that more than half of the 169 countries studied had made little or no progress between 1996 and 2016. In contrast, some countries had demonstrated that good policies and political commitment were effective instruments in improving the lives of urban residents. A limitation of this analysis is the scarcity of urban data at the national level. Moreover, as we used national urban averages, the HCI does not provide insight into different levels of performance within countries.

The HCI 2.0 applies this same methodology to the city level in an effort to assess urban improvements in light of what might be expected from the implementation of the Sustainable Development Goals (SDGs) and the New Urban Agenda (NUA). It is one of the few efforts worldwide to study performance at the city level, rather than using national level averages as identified by the UN Statistical Commission.

This booklet presents a work in progress. The team of twelve New School graduate students (seven women and five men from eight countries), coordinated by Lena Simet, identified 47 indicators within 53 sources and applied them to 178 cities. Their conclusion is that there are very few indicators that can be applied across this sample of cities and that very few indicators of urban performance correlate with city-level GDP.

This finding calls for a more integrated effort and resource allocation to understanding the determinants of performance. Without such analysis it will be difficult to assess the impact of the SDGs or the NUA, and whether there is evidence at the city level.

Carrying out an appropriately ambitious applied research project will require coordinated work among many institutions in all countries. In some places, there are no data collected. In others, data are collected but not analyzed according to any comparative framework. This booklet is a first step. As an old Kikuyu proverb suggests, "*those who have arrived have a long way to go*". Continuing this journey will be both more productive and more enjoyable if it is a collective venture of partners seeking to make the world's cities better places to live.

Michael Cohen
Professor of International Affairs

THE HABITAT COMMITMENT INDEX 1.0

The research presented in this booklet builds on the Global Urban Futures Project's previous endeavor, the Habitat Commitment Index (HCI) 1.0. The HCI was the product of a year of work by a committed team of graduate and doctoral students at The New School, with funding generously provided by the Ford Foundation, culminating in presentations and dissemination at numerous venues including Habitat III in Quito, Ecuador, where the launch of *The Habitat Commitment Project: Assessing the Past for a Better Urban Future* (2016) was referred to as "the most important event at Habitat III," by a senior representative of the Ford Foundation.

As the world prepared for Habitat III, the HCI aimed to answer one very important, but overlooked, question: **Given the economic growth of the past two decades, how well had countries used their resources to meet the commitments of the previous agenda agreed upon at Habitat II?** To answer this question, the Global Urban Futures Project (GUF) developed the HCI—a way of measuring country performance on a set of indicators taking per capita income levels into account to gauge progress over time. In the run up to Habitat III, no such evaluation of the previous agenda had been done, and many argued that to do so would be prohibitively time and resource intensive. The HCI, using the SERF methodology developed by New School faculty member Sakiko Fukuda-Parr and colleagues, showed that not only was such an assessment possible, but that the results were in many ways unexpected.[1]

The HCI sought to analyze the progress made on the commitments, goals, and principles of the 1996 Habitat Agenda by dividing them into six broad categories: Infrastructure, Poverty, Employment, Sustainability, Institutional Capacity, and Gender. While socioeconomic indicators, such as measures of poverty, access to basic services, and education, can provide a meaningful representation of the well-being of individuals, the goal of the HCI is to look not only at well-being, but at levels of commitment on the part of national governments to meeting the goals and objectives set forth at Habitat II. After testing 116 data sets, only 15 were found to satisfy HCI requirements. The HCI scores range from 0 -100. Due to its methodology, a score of 100 does not mean full achievement in a particular indicator, but that a given country is performing as well as it possibly can considering its economic resources.

The results of the study were alarming. Overall, there had been extremely little progress, with the average HCI score increasing only 1.49 points, from a global average of 69.68 in 1996 to an average score of 71.17 in 2016.

[1] Fukuda-Parr, S., Lawson-Remer, T., & Randolph, S. (2015). *Fulfilling Social and Economic Rights*. Oxford University Press.

MOVING FROM HCI 1.0 TO HCI 2.0, AND THE CHALLENGES ON THE WAY.

Rio de Janeiro, Brazil
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The success of the HCI 1.0 led the Global Urban Futures team embark on a new initiative presented in this booklet - to apply the methodology used in the HCI to individual cities, rather than national averages. In doing so, we hope to tell a more complete story of urban progress that recognizes the vast differences that can exist between cities within a country.

"Localizing" the Habitat Commitment Index came with a series of challenges. The HCI 1.0 predominantly used indicators from development agencies (e.g. the United Nations and the World Bank) and data that have already been collected and harmonized to allow for cross-country comparison. However, such data do not yet exist at the city level, at least not in a comprehensive fashion.

As a first step in our analysis, we carefully reviewed commitments made in the NUA and the SDGs, which inspired the creation of a "wish-list" of 47 indicators relevant to assessing urban progress. Using this wish-list as a guide, we surveyed 53 data sources for a global sample of 178 cities, for the period 2000 - 2016.

In the next step, we assessed the comparability of the indicators collected and tested the applicability of the HCI methodology. **This process revealed that cities across regions use a range of different and often incomparable data collection methodologies, which require data harmonization**. In fact, only 4 of the 47 indicators showed a correlation with GDP per capita and had comparable data between 2000 - 2016, the main requirements of the SERF methodology.[1]

After 15 months of work, the **main findings** of the HCI 2.0 are:

- The indicators collected across cities often have different criteria, and in many cities the data are either non-existent or unavailable to the public. This stresses **the need for globally harmonized city data and universal data collection standards.**

- **There are not enough reported data to allow a meaningful comparative assessment between cities.** Given the current availability of city-level data, a global comparative assessment of the progress in the implementation of the NUA and the city-related SDGs cannot be done.

- This study provides an empirical basis to argue **for a new generation of urban data**. To assess the implementation of the NUA and the urban-related SDGs across cities, the international community, as well as national and local governments, supported by academia, should make additional efforts in collecting city-level data.

- Nonetheless, there are countries that are successful in collecting quality city-level data (see Brazil and Colombia). Instead of a global comparative urban assessment, **within country studies of urban progress can be conducted as a first step**, using the HCI methodology.

This progress report is divided into two sections. The first section presents an analysis of 4 indicators for which the HCI methodology worked – access to electricity, access to safe water, infant mortality, and employment rate. The second section presents 6 indicators for which the HCI methodology could not be applied, but which highlight interesting insights into urban well-being: poverty headcount, improved housing, urban inequality, urban form, gender education, and environment.

[1] Two additional indicators: poverty incidence and literacy rate (15 and up) showed the relationship with GDP per capita needed to apply the HCI methodology. However, the city sample for both were deemed insignificant and would provide little additional insight for this progress report.

DATA WISH-LIST

DIMENSIONS

	INDICATORS					
BASIC SERVICES	*Piped water on premises	Improved Sanitation Indicators	*Access to electricity			
HOUSING	Informal housing indicators	Overcrowding	Rent prices	Tenure: Owned or rented		
POVERTY	*Poverty headcount or rate	At-risk-of poverty	Female headship	Malnutrition and stunting	*Literacy Rate	*Infant / Under-5 Mortality
EMPLOYMENT	*Employment rate (share of working population)	Informal employment	Labor force	Productivity	Minimum Wage	Unemployment rate
ENVIRONMENT	CO_2 emissions per capita	Proximity to waste facility	PM10	PM2.5		
GENDER *Disaggregated: male, female*	Employment rate	Population completed primary education	Population completed secondary education	Health Insurance coverage	Land ownership	
INEQUALITY	GINI Index	Household Disposable Income	90:10 Ratio			
CHILDREN & YOUTH	Share of population enrolled in primary education	Share of population enrolled in secondary education	Transition rate (primary to secondary)	Vaccination Rates	Health Insurance coverage	Land ownership
NETWORK INFRASTRUCTURE	Access to landlines and/or mobile phone	Commuting time	Cost of commute	Internet Access		
SAFETY	Homicide Rates					
URBAN FORM	Density	Green Space				

**DATA WAS SUCCESSFULLY ANALYSED*

HABITAT COMMITMENT INDEX 2.0

This section presents the results of the indicators for which the HCI methodology was used and for which HCI variation scores were calculated for 2000-2016. Due to the limited availability and comparability of data across cities, the HCI methodology was applicable in only 4 of the 47 indicators. Of those, 2 are basic services-related (access to safe water and electricity), and 2 are socio-economic indicators (infant/under-five mortality and employment rate). The specifics of the HCI methodology are described in the technical appendix.

STATE OF URBAN DATA

START

WE FIRST **IDENTIFIED** A 'WISH-LIST' OF

47 INDICATORS

ACROSS 11 DIMENSIONS

CITY-LEVEL GDP WAS PROVIDED BY THE **GLOBAL CITIES DATABASE** OF **OXFORD ECONOMICS**

A FEASIBILITY STUDY OF MATCHING THE BOUNDARIES OF CITY-LEVEL GDP WITH AVAILABLE CITY-LEVEL INDICATORS FOR EACH CITY WAS CONDUCTED.

THIS PROVIDED OUR SAMPLE OF

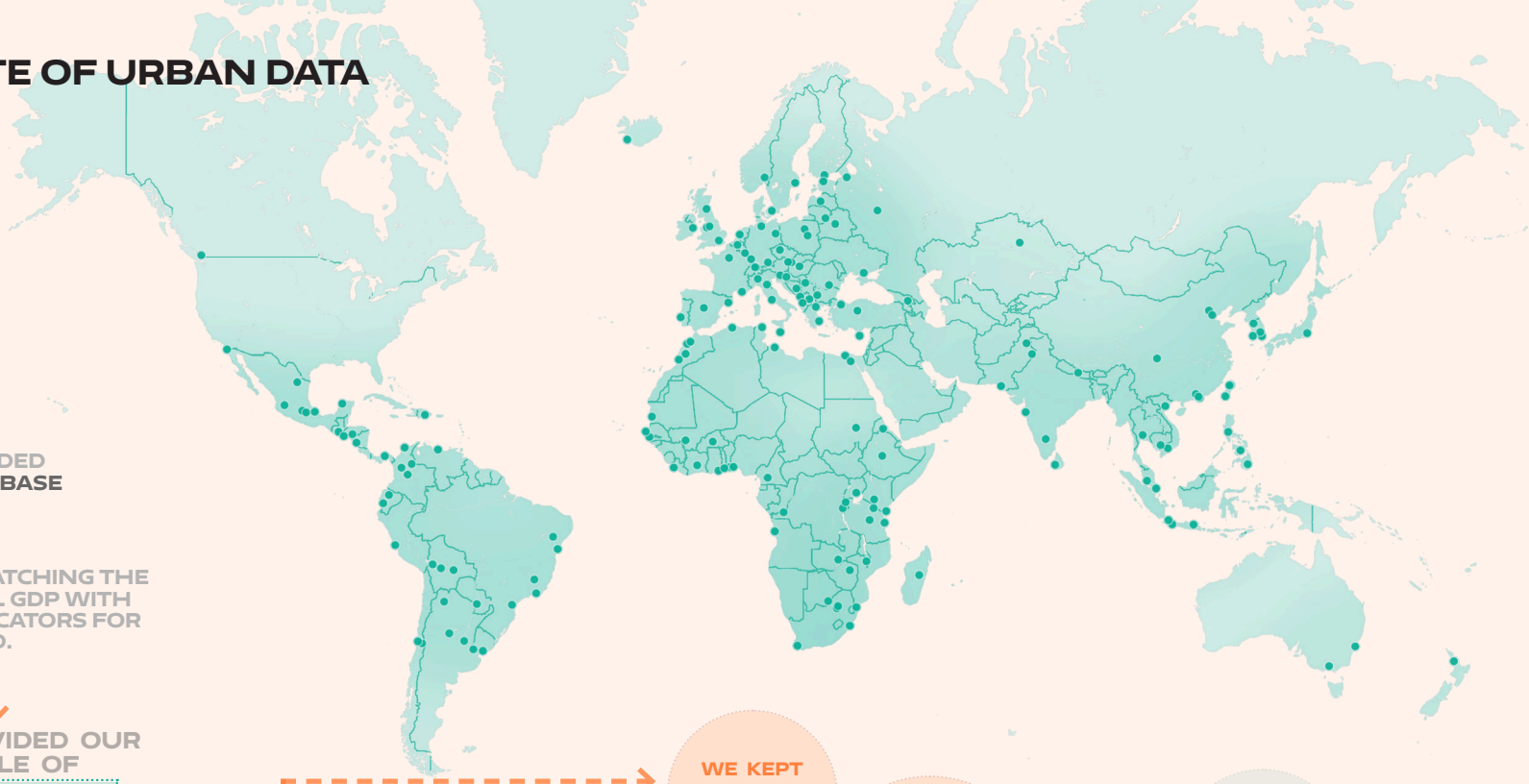
178 CITIES

WE THEN BEGAN **COLLECTING** TIME SERIES DATA RANGING FROM **2000 - 2016**, SURVEYING

53 SOURCES

WE **FOUND**

201 DIFFERENT INDICATORS TO MEASURE OUR INITIAL WISH-LIST AND **38,000+** DATA POINTS



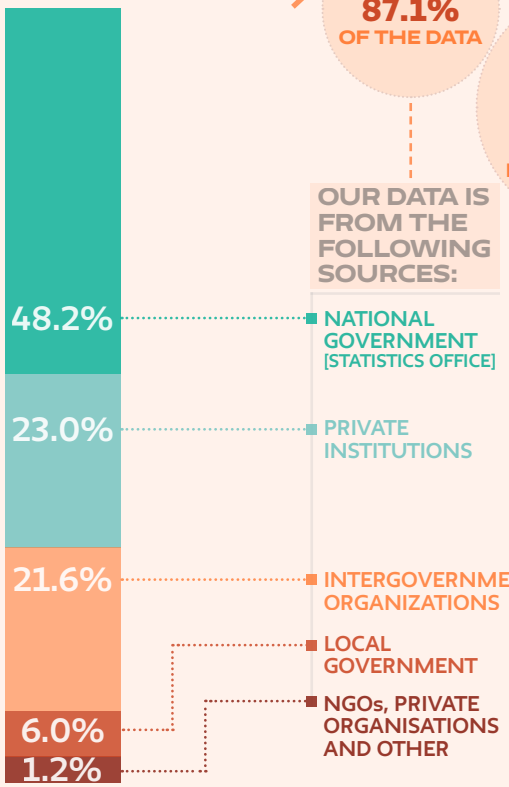
WE KEPT **87.1%** OF THE DATA

AND WERE ONLY ABLE TO SCORE **10.6%** OF THE DATA USING OUR HCI METHODOLOGY

4 INDICATORS WORKED WITH OUR HCI METHODOLOGY

AND FURTHER ANALYSIS WAS CONDUCTED ON 6 INDICATORS

OUR DATA IS FROM THE FOLLOWING SOURCES:



GIVEN THE CURRENT AVAILABILITY OF CITY-LEVEL DATA, A GLOBAL COMPARATIVE ASSESSMENT OF THE PROGRESS IN THE IMPLEMENTATION OF THE NUA AND THE CITY-RELATED SDGs CANNOT BE DONE.

ACCESS TO ELECTRICITY

229 DATA POINTS | **39** CITIES

Indicator Definition:
The percentage of households or population with access to electricity as part of housing characteristics

Of the 42 cities with comparable data on access to electricity, cities in Sub-Saharan Africa achieved the strongest progress since 2000. Especially Kigali (+25.8), Dar Es Salaam (+21.2), and Blantyre City (+16.5) show significant progress in the last decade, with HCI scores increasing by more than 15.

In 2000, Kigali had a HCI score of 50, and its GDP per capita was just above 1,900 USD. As income increased to 6,000 USD by 2015, access to electricity improved to 75.8. Yet, not all African cities made positive gains. In Monrovia and Harare, HCI scores on electricity declined by -6.5 and -26.8, respectively. During Liberia's 14-year civil war, which ended in 2003, the country's energy sector was the primary target for warlords. This left the capital Monrovia with scars still visible today, as *Al Jazeera* reported in 2012.[1]

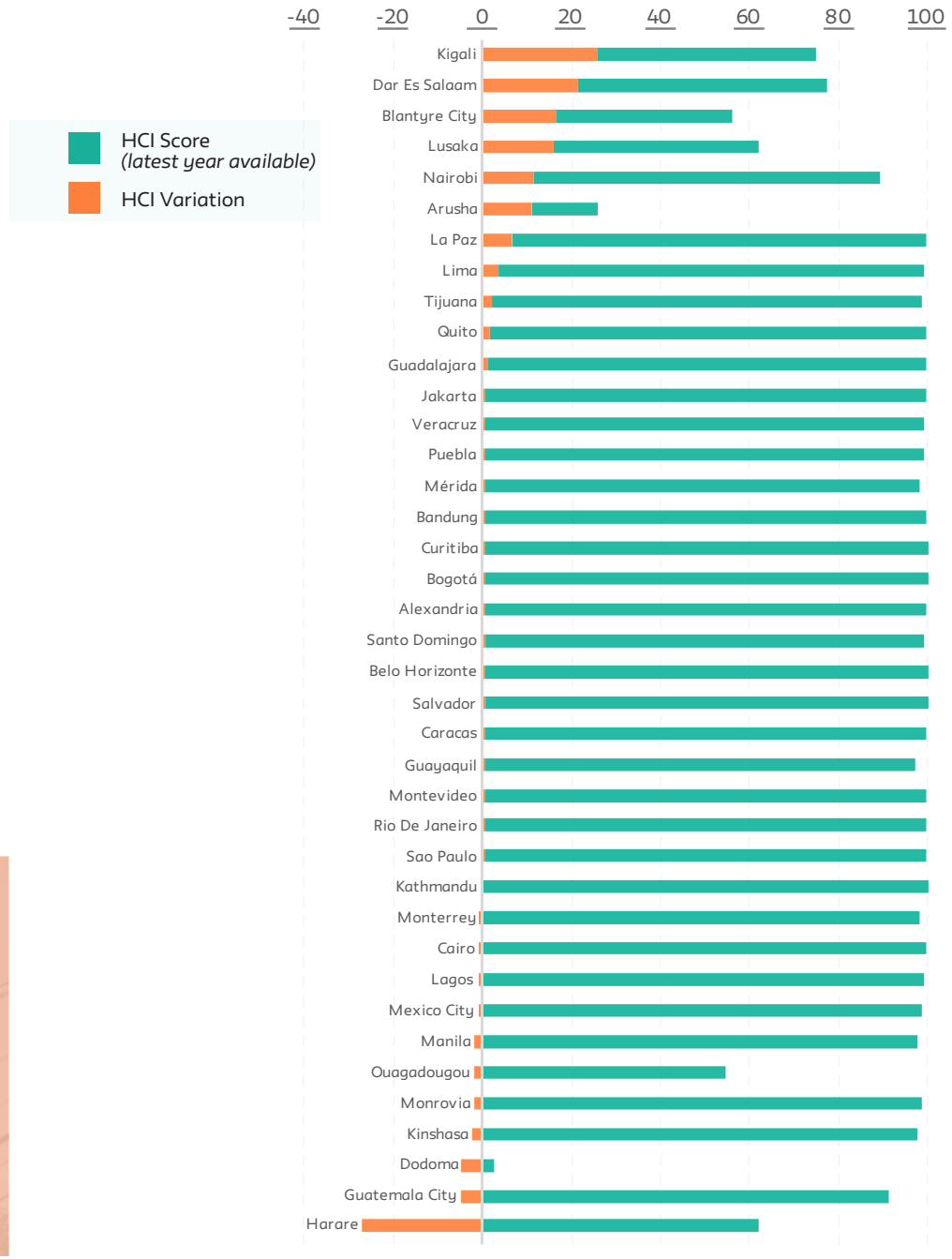
In 2016, 6 of the 7 best performers in providing access to electricity are Latin American cities. Belo Horizonte, Bogotá, Curitiba, and Medellin all had HCI scores of close to 100.

[1] "*Liberia's long wait to turn on the lights*" Al Jazeera. 22 June 2012.

HIGHLIGHTS

Liberia measures access to electricity through the Household Expenditure and Income Survey of the Liberian Institute of Statistics and Geoinformation Services (LISGIS). Official statistics - including Liberia's - often lack information on areas considered as "informal." Increasingly, civil society organizations address this lack of data, taking matters into their own hands. In Liberia for example, information on access to basic services in informal settlements is collected by Slum Dwellers International (SDI) through household surveys conducted by members of the respective community. Such surveys inquire access to electricity, but also the main source and type of the connection. SDI's community household survey is part of a joint project with Cities Alliance's Liberia Country Program.

FIGURE 1
Access to Electricity



ACCESS TO SAFE WATER

290 DATA POINTS | 52 CITIES

Indicator Definition:
The percentage of households or population with access to safe water

On average, the HCI for access to safe water declined by -5.5 HCI points between 2000 and 2016. The cities with the highest HCI increase are La Paz (+13.8), Ouagadougou (+12.8), Arusha (+9.7), and Santo Domingo (+8.17).

While Santo Domingo made the least progress of the top four cities, it had the highest HCI score (91.4) in 2016. This suggests that it not only grew economically, but that the gap between its actual performance and optimal performance is narrow, and that most people have access to safe water. Arusha on the contrary, despite its improvement, had an extremely low HCI score in 2016 (19.12). This means that, despite its progress, it still has a long way to go to reach a satisfactory level of safe water access. Arusha may need to allocate, or make better use of current resource allocations, to improve access to safe drinking water.

Cities like Buenos Aires, Tokyo, Marrakech, and Kinshasa performed optimally with HCI scores of 100, suggesting that they provided safe water to their residents as well as possible, considering local resources available.

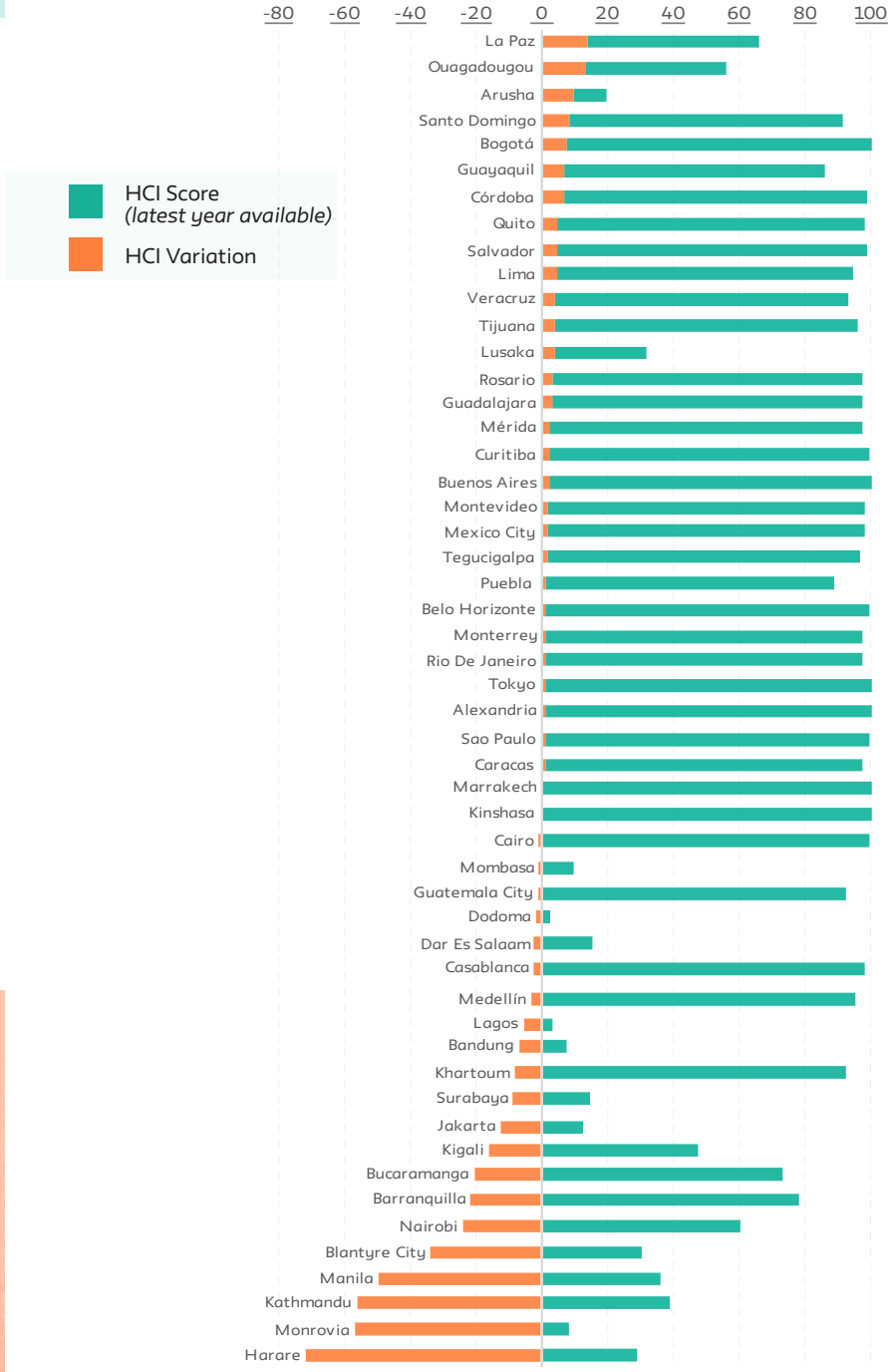
In terms of HCI variation, the cities with the highest decrease are Harare (-71), Monrovia (-56), and Kathmandu (-55.8). In terms of latest HCI scores, the cities with the lowest performances are Dodoma (2.3), Lagos (2.9), and Bandung (7.3).

HIGHLIGHTS

Harare's ability to provide safe drinking water to its residents has declined significantly since 2005. This decline in performance can be attributed to a number of factors, including poor maintenance of the water infrastructure, and the Operation Murambatsvina, which displaced many residents, leading to overcrowding and a lack of access to water. The economic decline experienced between 2000 - 2009 further resulted in government mismanagement, corruption, and a disinvestment in infrastructure.[1] The lack of access to safe water also caused a cholera outbreak, described by The Zimbabwean as the worst in Africa in the past 15 years.[2]

FIGURE 2

Access to Safe Water



[1] UNICEF. (2005). Zimbabwe Operation Murambatsvina. https://www.unicef.org/emerg/files/Zimbabwe_DU_24Nov2005.pdf ; Tabaijuka, A. (2005). Report of the Fact-Finding Mission to Zimbabwe to assess the Scope and Impact of Operation Murambatsvina. United Nations. http://www.un.org/News/dh/infocus/zimbabwe/zimbabwe_rpt.pdf

[2] "*Cholera outbreak in Zimbabwe, the worst in Africa.*" The Zimbabwean [Harare]. 27 May 2009. Print

UNDER-FIVE MORTALITY

251 DATA POINTS | **27** CITIES

Indicator Definition:
The probability of a child dying before his or her fifth birthday

While data on under-five mortality are collected widely across developing and developed countries, this indicator is predominantly collected at the country and not at the city level.[1] On average, the 27 cities for which data were available, improved by 3.7 HCI points between 2000 and 2015. Moreover, a significant number of cities reached their maximum possible achievement in the latest year: Barranquilla, Blantyre City, Lima, Medellin, Melbourne, Oslo, and Stockholm, were among those high achievers in 2015. Similarly as in the Access to Safe Water indicator, the cities with the lowest baseline scores had the greatest HCI increase over time: Dodoma (+34), Blantyre City (+33), and Kigali (+26).

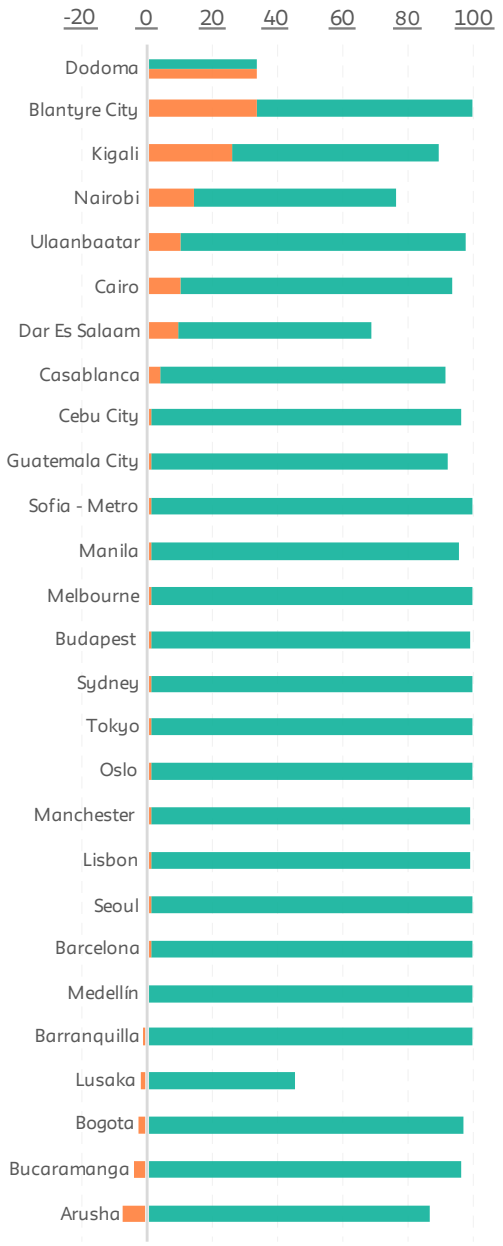
Data availability on under-five mortality varied greatly across the 27 cities in this sample. Some cities reported less than twice between 2000 - 2015, while others, including Tokyo, Melbourne, Guatemala City, and Arusha, reported yearly.

[1] For comparability between cities, we combined data on infant and under-five mortality.
[2] Kimani-Murage, E.W. et al. "*Trends in Childhood Mortality in Kenya: The Urban Advantage Has Seemingly Been Wiped out.*" Health & Place 29 (2014): 95–103. PMC. Web. 14 Jan. 2018.

HIGHLIGHTS

Nairobi made vast improvements in under-five mortality since 2000, with an increase of 14 HCI points. Before 2000, Kenya's under-five mortality declined only in rural areas, which Kimani-Murage, E.W. et al. (2014) attributed to "deplorable living conditions in urban slums."[2] In 2014 however, Nairobi achieved an under-five mortality HCI of 72.

FIGURE 3
Under-Five Mortality



EMPLOYMENT

2,893 DATA POINTS | **178** CITIES

Indicator Definition:
Employment rate is measured as the ratio of total employed (across 6 broad industries) to a country's working age population (ages 15 to 64).

Among the 4 indicators for which the HCI methodology was applicable, the employment rate was the only one with data for the total sample of 178 cities. Here, data were available from a single source, unlike the rest of the indicators for which many different sources had to be reviewed.

In general, the 10 best performers over time in the employment HCI are developing cities, with low GDP per capita and low levels of employment in the starting year. In all 10 cases, employment improved from less than 35% of the working age population being employed, to above 45%.

Four African cities and one Southeast Asian city had the highest improvement in the employment HCI: Lusaka (64.9), Cotonou (53.4), Blantyre City (50.9), Monrovia (50.4), and Phnom Penh (49.9) had excellent performances, with improvements exceeding 50 HCI points.

At the same time, African cities also had the largest decrease in the employment HCI: Antananarivo (-32.1), Yaoundé (-31.6), Durban (-23), Luanda (-20.7), and Kinshasa (-18.9). These cases are classic examples of jobless economic growth. Despite increases in the cities' GDP per capita, employment levels declined.

FIGURE 4
Employment Rate:
Cities with 10 best and worst trends

HIGHLIGHTS

Lusaka - the city with the highest HCI increase in employment (+64.9) - doubled its GDP per capita between 2000 and 2016. The city has been recognized as one of the fastest developing cities in southern Africa thanks to improving infrastructure and recent economic reforms. The city's employment rate increased from 30.6% in 2000 to 66.6% in 2016, which represents a change in the HCI score of 65 points. On the other side, Antananarivo's (-32) economy has slowly shifted from a labor-intensive agricultural, manufacturing and textile industry to a less intensive more technical production pattern, which has generated greater economic growth but lower employment. The city's employment rates declined from about 57.3% to 41.9% between 2000 and 2016, while per capita GDP improved from USD 4,948 to USD 5,419.


Sao Paulo, Brazil
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DATA WISH-LIST

INDICATORS

DIMENSIONS

BASIC SERVICES	Piped water on premises	Improved Sanitation Indicators	Access to electricity			
HOUSING	*Informal housing indicators	Overcrowding	Rent prices	Tenure: Owned or rented		
POVERTY	*Poverty headcount or rate	At-risk-of poverty	Female headship	Malnutrition and stunting	Literacy Rate	Infant / Under-5 Mortality
EMPLOYMENT	*Employment rate (share of working population)	Informal employment	Labor force	Productivity	Minimum Wage	Unemployment rate
ENVIRONMENT	*CO_2 emissions per capita	Proximity to waste facility	PM10	PM2.5		
GENDER *Disaggregated: male, female*	Employment rate	Population completed primary education	Population completed secondary education	Health Insurance coverage	Land ownership	
INEQUALITY	*GINI Index	Household Disposable Income	90:10 Ratio			
CHILDREN & YOUTH	Share of population enrolled in primary education	Share of population enrolled in secondary education	Transition rate (primary to secondary)	Vaccination Rates	Health Insurance coverage	Land ownership
NETWORK INFRASTRUCTURE	Access to landlines and/or mobile phone	Commuting time	Cost of commute	Internet Access		
SAFETY	Homicide Rates					
URBAN FORM	*Density	Green Space				

DATA WAS SUCCESSFULLY ANALYSED

FURTHER EXPLORING CITY DATA

The second section of this report presents indicators that either a) do not correlate with GDP per capita, or b) are measured differently across countries, which prohibits cross-city comparisons and the creation of an achievement possibility frontier. Instead of calculating HCI scores, this section presents indicator-specific analyses, such as controlling performance by region or analyzing relationships with other urban and socio-economic indicators. The findings in this section cannot be considered conclusive, but they provide useful insights for future research.

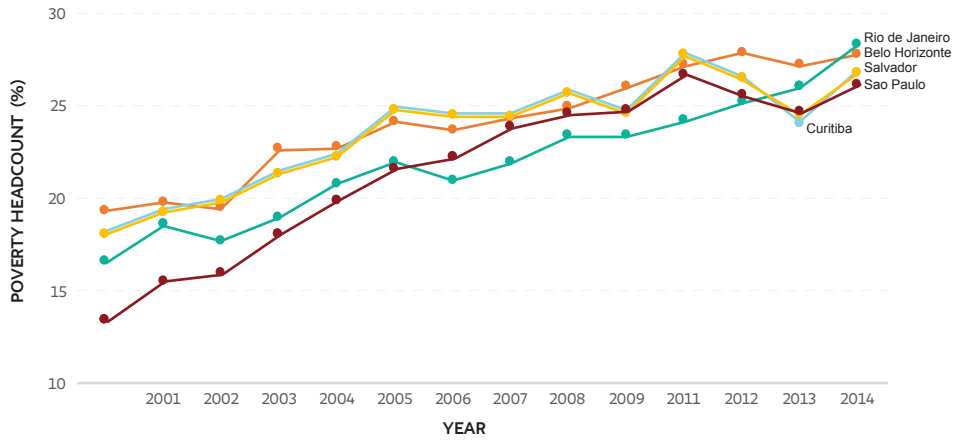
POVERTY HEADCOUNT

111 DATA POINTS **18** CITIES

The rationale for including a poverty indicator in this second section of the report is clear; Goal #1 of the SDGs calls to “End Poverty in all its forms everywhere”. Earlier in 2013, the World Bank announced the same goal, with a focus on data collection to measure progress in reducing poverty. It is undoubtedly a global issue and an even more pertinent one for cities.

In addition, we were curious to learn whether the findings at the national level (see Habitat Commitment Project, 2016) corroborated with city level results. After all, the Poverty HCI, with a global average of 85.5 HCI points, showed the best improvements of all 6 dimensions. At the local level, only 18 cities reported consecutive data on poverty: of these, 8 cities are African, 8 Latin American, and 2 are Asian. Ulaanbaatar and Johannesburg reported the biggest declines in poverty over time, 10% and 7% respectively. To our surprise, Brazilian cities did not perform as well. In fact, poverty increased on average by 10% between 2000 and 2015 in the 5 Brazilian cities included in this 18 city sample.

FIGURE 5
Poverty Headcount in Brazilian Cities



HIGHLIGHTS

In 2015, 26% of São Paulo’s residents were considered as “poor”. In Brazil, poverty is measured using the international poverty line of 3 USD a day. With the latest data available of 2015, our data only reflects the beginning of the country’s macroeconomic and political crisis, which led to speculations that poverty may have worsened significantly since. *The Seattle Times*, for example, suggests that millions more will fall back into poverty.[1]

[1] “*Millions return to poverty in Brazil as ‘boom’ decade erodes*” The Seattle Times [Seattle]. 23 October 2017. Print


Rio de Janeiro, Brazil
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IMPROVED HOUSING | ADEQUATE FLOORING

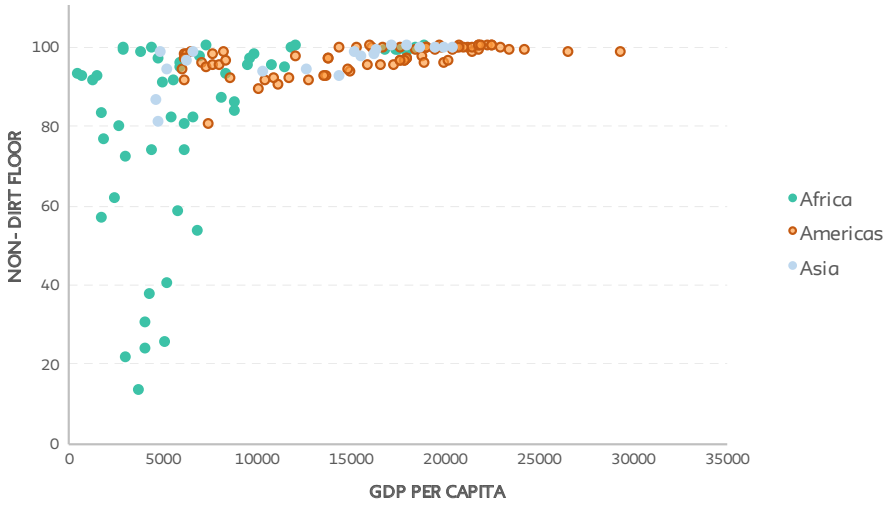
145 DATA POINTS | 38 CITIES

Adequate flooring is used as a proxy to determine the quality of housing in a city, using the reverse of the indicator *dirt floor*. Data for this indicator were collected for 38 cities: 15 cities in Africa, 18 cities in Latin America, and 5 cities in Asia.

As depicted in Figure 6, there appears to be a relationship between GDP per capita and quality of housing in a city. Cities like Arusha, Blantyre City, and Dodoma, whose income levels are less than 7,000 USD, had the lowest figures for this indicator. On the contrary, cities with higher incomes (e.g. Alexandria, Montevideo, and Jakarta) all had higher figures. Despite this apparent correlation between adequate flooring and GDP per capita, the lack of consistent data did not allow the application of the HCI methodology.

Similarly to trends in the Access to Safe Water and the Infant Mortality indicators, the cities that made the most progress in adequate flooring were not the cities with the highest overall scores in the latest year; it is the African cities Arusha (+23), Mombasa (+12), and Dar Es Salaam(+6) that performed best in 2015. Guatemala City, Lima, and La Paz showed the greatest improvements in Latin America; while Kathmandu and Manila were the best performers in Asia.

FIGURE 6
Adequate Flooring and GDP per Capita



HIGHLIGHTS

In 2003, 93% of houses in Ouagadougou had adequate flooring. By 2014, this figure dropped to 77%. An explanation for this significant deterioration in housing quality may be Burkina Faso's rapid urban population increase. The country's urban population grew by 6.5% annually since 2000, all while access to property and basic services remain limited to the well-off population, as was reported by *The Center for Affordable Housing Finance in Africa*.[1]

[1] "*Housing Finance in Africa 2017 Yearbook - Burkina Faso Profile*." Center for Affordable Housing Finance in Africa, Oct 2017. http://housingfinanceafrica.org/countries/burkina-faso/

Cape Town, South Africa
© AI

URBAN FORM | DENSITY

363 DATA POINTS | 41 CITIES

It is often argued that the compact city will contribute to harnessing agglomeration advantages and that people will have greater access to employment, with increased social inclusiveness.[1] Our analysis of density, however, brings mixed evidence about this claim and perhaps, the compact city is not necessarily a denser city.

We looked at the relationship between density and three socio-economic indicators. We found that as density increases, poverty decreases (-0.41 correlation), which brings evidence to support the alleged benefits of density.

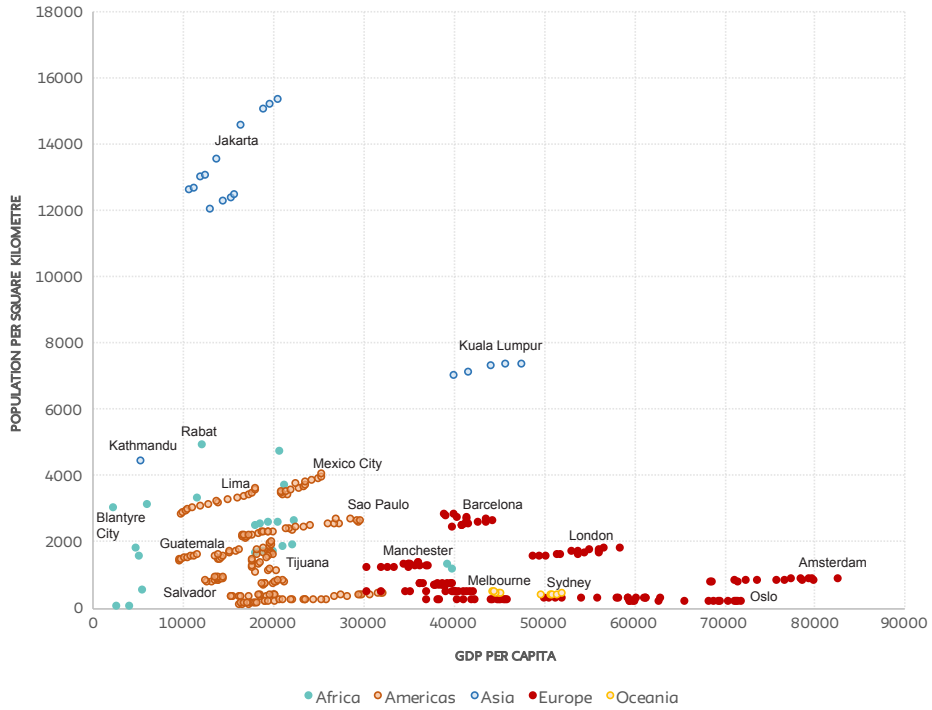
However, density has a moderate negative correlation with employment rate (-0.35) and a weak negative correlation with GDP per capita (-0.27). These results call into question the claims that higher density will generate economic growth and provide greater access to employment.

In addition to this, important claims have been made about the relationship between density and environmental sustainability. By reducing the ecological footprint of cities, it has been argued that more compact cities will bring greater efficiency in the use of land and decrease a city's greenhouse gas emissions.[2]

Our study finds that this holds true when looking at the relationship between density and CO_2 emissions (-0.29 correlation). However, the relationship between density and other environmental indicators is less clear. For instance, we found that density has a strong positive correlation with PM10 (0.60) and a moderate negative correlation with green space (-0.50), which means that higher density does not necessarily lead to increased sustainability.

[1] UN Habitat (2012) *Leveraging Density: Urban Patterns for a Green Economy*. United Nations Human Settlements Program.
[2] See Dodman (2009). *Blaming cities for climate change? An analysis of urban greenhouse gas emissions inventories*. IIED; UN Habitat (2015) Habitat III Issue Papers: 8 – Urban and Spatial Planning and Design. United Nations Human Settlements Programme.
[3] The Urban Expansion Program at the University of New York. https://marroninstitute.nyu.edu/programs/urban-expansion

FIGURE 7
Density and GDP per Capita



HIGHLIGHTS

As is depicted in Figure 7, cities with GDP per capita below $30,000 experienced an increase in population density over time. This finding challenges conclusions of previous research, which argue that the majority of cities are expanding at lower density rates. These could be the result of differences in the measurement of density. *NYU's Urban Expansion Program*, for example, measures density by taking the geographic expansion of cities into consideration.[3] Official statistics on the contrary work within the boundaries of their jurisdiction, which artificially increases a city's density figures. As the data used in this analysis mainly stems from official sources (e.g. Department of Statistics Malaysia), density appears higher, and is increasing.

URBAN INEQUALITY | GINI

2,905 DATA POINTS **178** CITIES

Intra-urban inequality greatly differs across regions and shifted significantly over time. As the two graphs depict, although inequality increased in European cities, it was the region with the lowest intra-urban inequality in 2016 (with a Gini Coefficient of about 0.37).[1] While Asia and Oceania had similar city inequality in 2010, Oceania became more unequal over time, making Asia the region with the second lowest city inequality.

A similar shift can be noticed in the Americas and Africa. In both regions, cities experienced declining inequality since 2000, yet the rate of decline was much faster in America's cities than in Africa, making Africa the region with the highest urban inequality in 2016. Africa also shows the greatest variation across cities. Dodoma ranks among the cities with the lowest inequality (with a Gini of 0.3 - similar to Gothenburg or Helsinki), whereas Harare is the most unequal city in our sample (0.66).

In an attempt to apply the HCI methodology to intra-urban inequality, our study finds no clear statistical correlation between GDP per capita and the Gini coefficient. This is of little surprise, considering that the relationship between macroeconomic performance and inequality is one of the most debated topics in economics.

Of the 178 cities included in this analysis, 41% experienced declining inequality between 2000 and 2016, 31% had no significant change, and 28% reported increasing inequality. The cities with the largest increases in inequality are Bangui (+0.15), Delhi (+14), Lomé (+0.12), Sofia (+0.11), Tirana (+0.10), and Bhilai Nagar (+0.10).

On the contrary, Ouagadougou had the most notable decline in inequality, with a drop of 0.28 Gini points. Moscow, Bamako, Freetown, Luanda, and La Paz also had large declines, ranging between 0.12 - 0.17 Gini points.

HIGHLIGHTS

Of 178 cities, Harare was the most unequal city, with a Gini of 0.66; Astana was the least unequal (0.23). In Asia, Mumbai ranked most unequal, with a Gini of 0.58. In Europe, Belgrade had the highest inequality (0.46), Reykjavik the lowest (0.28). In the Americas, Bogotá had the highest inequality levels (0.54), Vancouver the lowest (0.32). In 2016, among the six most unequal cities, five were South African (with Ginis of about 0.62).

FIGURE 8
Urban Inequality Across Regions Over Time 2000-2016

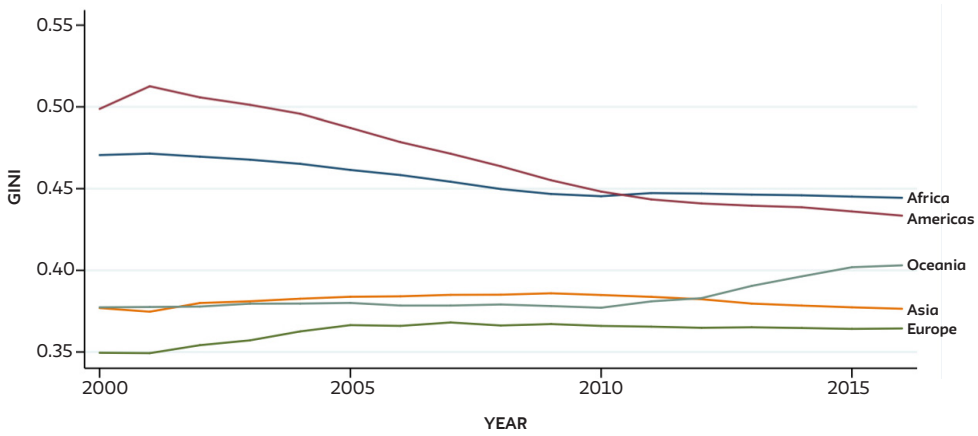
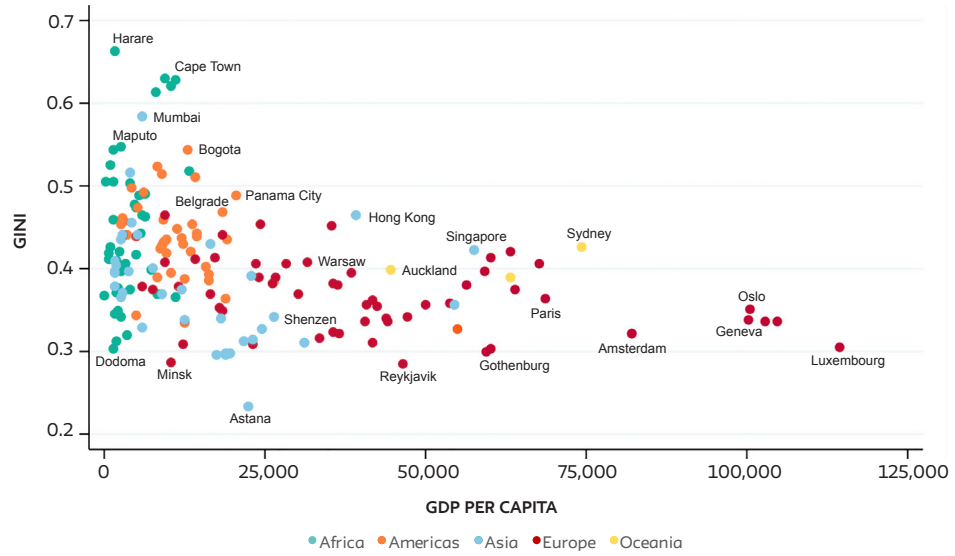


FIGURE 9
Urban Inequality and GDP per Capita 2016



[1] The Gini coefficient is a measure of statistical dispersion intended to represent the income or wealth distribution, and is the most commonly used measure of inequality (Atkinson 2015).

GENDER EQUALITY IN CITIES

2,353 DATA POINTS **72** CITIES

In total, we collected 34 indicators and approximately 2,353 data points for gender related indicators between 2000 - 2016, in 72 cities from the Americas, Asia, Africa, and Europe. Indicators seek to portray a better picture of gender equality in education, employment, ownership, access to health insurance, among others.

50.3% of all the data collected comes from African cities, which constitute about 40% of the 72 cities. African cities were also the most diverse in terms of data collection, with an average indicator count of 8 – followed by 5, for cities in the Americas.

A potential explanation for these trends in reporting is that many of the most prominent international indicators on gender only address the disparity of basic human rights in the form of education, employment, and health. Moreover, many of the socially aspirational goals on gender have yet to be adopted on an internationally comprehensive level. This indicates that the ability to collect data to assess the true nature of equality, at least at the urban scale, does not meet the requirements of SDG 5 on achieving gender equality.

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FIGURE 10
Distribution of Gender Data collected by Region

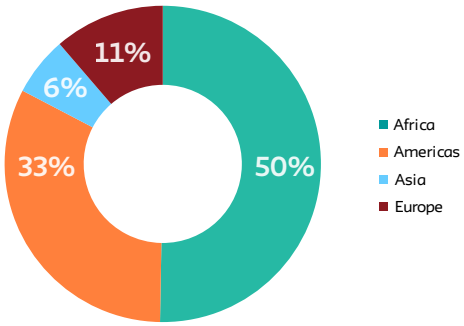
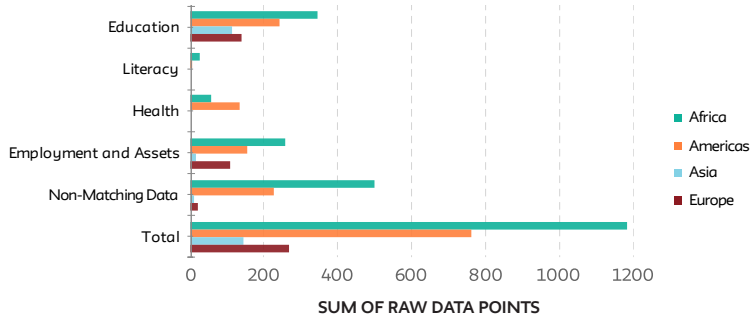


FIGURE 11
Comparison of Regional Data collected by Dimension



EDUCATION

2,269 DATA POINTS **67** CITIES

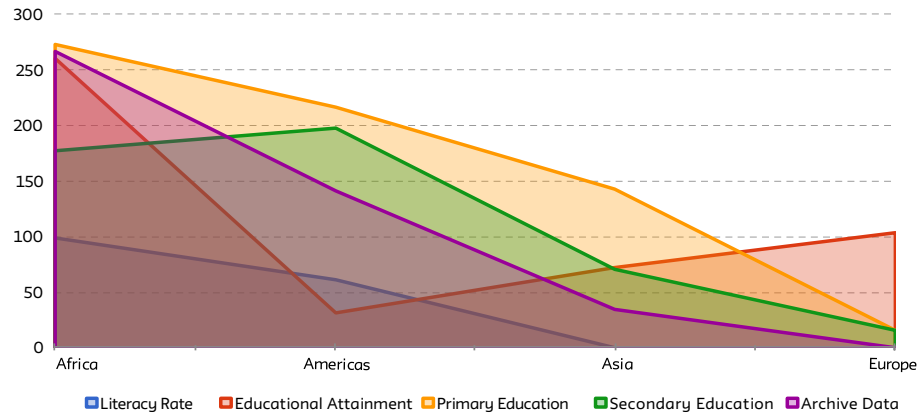
Goal 2 of the Millennium Development Goals was to achieve universal primary education, resulting in greater attention by national governments to monitoring and collecting education-related indicators.

This section identified a series of readily available indicators on education at the city-level. Among the most widely used are: literacy rate, educational attainment, educational enrolment, completion rates in primary and secondary education, just to mention a few. We collected over 2,000 data points in 67 cities across 31 indicators. Most of the data that we collected came from African cities, with over 1,000 data points. Here, Banjul had the largest number of data available - 250 data points and 16 education indicators. In Asia, Manila had more data than any other city that was analyzed (170 data points), followed by Jakarta (70), and Kathmandu (50).

The difference in collecting and processing data across cities and regions became particularly apparent in the educational variables. Most European cities, for example, collect data on educational attainment, which measures the highest level of education that individuals have completed.[1] Asian and African cities, on the other hand, collect information on completion and enrolment rates. While all three indicators are relevant and provide interesting insights in educational attainment, they cannot be compared. This in turn prohibits a ranking of cities by their performance in education.

[1] "*Attainment, Completion, and the Trouble in Measuring Them Both.*" The Chronicle for Higher Education, May 2015. https://www.chronicle.com/blogs/data/2015/05/04/attainment-completion-and-the-trouble-in-measuring-them-both/

FIGURE 12
Data points collected across Dimension



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CO_2 EMISSIONS

79 DATA POINTS

24 CITIES

As Figure 13 shows, our data indicate that as income levels rise, there is a strong tendency for CO_2 emissions to increase. These city-level data mirror known national-level trends for emissions to increase as countries industrialize and urbanize.

Although the data set is limited in both number of cities and time span, it shows no indication of what has been referred to as an "environmental Kuznets curve"—the hypothesis that environmental indicators decline along with economic development until a certain point at which the relationship reverses.

While some authors have reported evidence of a CO_2 Kuznets curve at the national level, our analysis seems to support findings indicating that, thus far, CO_2 emissions have not declined with economic development, but may instead stabilize.[1]

The next area related to CO_2 emissions we explored was the relationship between emissions and urban form. The relationship between CO_2 and economic development seems logical— higher productivity of urban areas requires more energy, as does the resulting high-consumption lifestyle of urban areas.

It's also reasonable to expect that urban density reduces transportation needs, and as the transportation sector is a primary culprit in greenhouse gas emissions, reduced transportation needs will result in reduced emissions. As Figure 14 shows, this is generally true, although the relationship between CO_2 and urban density is weaker than that between CO_2 and income.

[1] U Jaunky, Vishal Chandr. "*The CO_2 emissions-income nexus: evidence from rich countries.*" Energy Policy 39, no. 3 (2011): 1228-1240.

HIGHLIGHTS

On the one hand, cities like Amsterdam and Oslo, which Figure 13 indicates, are high-income, high-emission areas, which again stand out in the second graph as low-density, high emission cities. On the other hand, cities in the developing world like Marrakech, which is low-density, and Dar Es Salaam, which is high-density, both show a low level of per capita carbon emissions. This suggests that the level of economic development is more important in determining the level of carbon emissions of a city than density, but that density becomes an increasingly more influential factor as cities become wealthier and may be considered an important strategy for mitigating rising emissions with economic development.

FIGURE 13
CO_2 and GDP per Capita

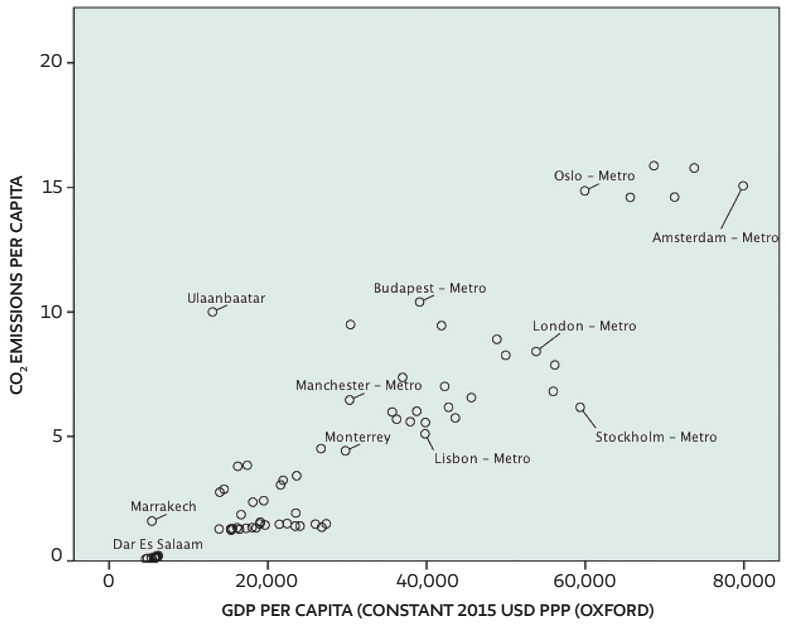
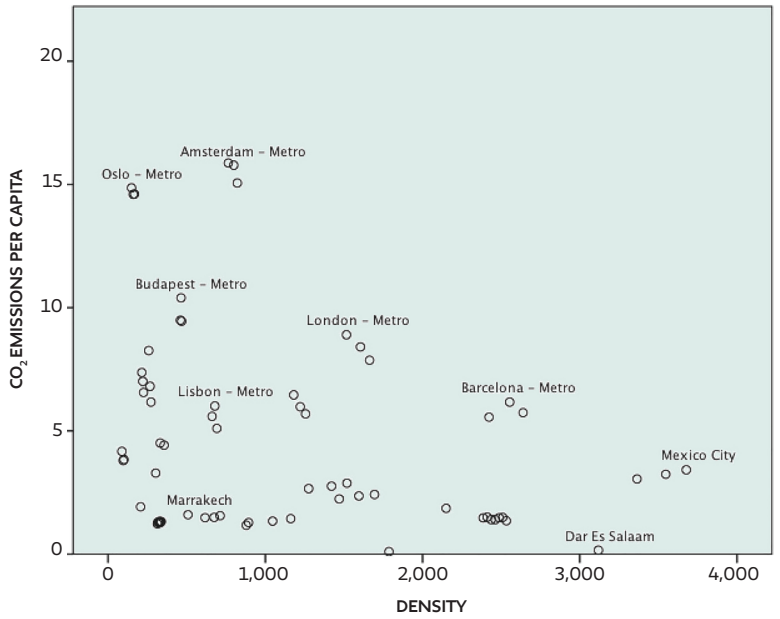


FIGURE 14
CO_2 and Density



CONCLUSION

This progress report on monitoring and assessing urban wellbeing highlights **the need for a new generation of city level data**. The international conversation regarding the implementation of the NUA and the SDGs must address this challenge. Urban data collection systems must be designed with strategies to ensure data comparability across cities that allow for a prioritization of indicators according to the local context.

The international conversation must address the financial and organizational challenges of implementing such city-level data initiatives. Implementing urban data collection systems is costly, but national and local governments should take advantage of their institutional and organizational structures to address this challenge. Overcoming this hurdle will be an important first step in successfully **moving from the "*what*" to the "*how*".**

This report is also a call for new and innovative quantitative and qualitative methodologies to better assess urban progress. The HCI is a useful econometric strategy, but, as this report shows, it can only be applied to a small set of indicators. The current HCI methodology relies on GDP per capita as a proxy for city capacity. Of course, there is more to city capacity than only the availability of economic resources. **Future research should therefore explore ways to more accurately measure city capacity.**

Moreover, the lack of "official" urban data calls for new forms of data collection and analysis. For example, missing data on informal settlements should be complemented with surveys conducted by community organizations. *The Know Your City* campaign by Slum Dwellers International (SDI) and UCLG represents a successful example of such collaborative efforts. **The commitments of the NUA cannot be monitored by one agency alone. Such an endeavor requires collaboration between academia, government, development agencies, and civil society organizations.**

In addition, "big data" and technological advances may help us understand cities and the effects of public policies better. In the time frame studied in the HCI 2.0, the use of cellphones and mobile broadband technology have skyrocketed. For example, in 2002, only 8% of Ghanaians owned a mobile phone, while today that figure is at 83%. In Nigeria and South Africa, abound a third of the population owns a smartphone with mobile internet access, and in Brazil, the number of smartphones is expected to exceed the population within the next two years.[1] **Continuing technological advances offer opportunities to collect data faster, more cheaply, and more comprehensively than ever before, and also to engage citizenry directly through location-based self-reported data.**

This progress report was prepared to be presented at the World Urban Forum in Kuala Lumpur (WUF9). However, the conversation needs to continue beyond the WUF. The need for a new generation of urban data is very clear. The WUF should serve as a space to draft a road map for this discussion, a discussion that includes national and local governments, the new Executive Director of UN Habitat, the United Nations Statistical Division, civil society organizations, academia, philanthropy and other international governance structures with interest in improving urban well-being, like the OECD.

Finally, implementing the NUA and the city-related SDGs requires a new urban practice. Continuing "practice" as usual won't accomplish the redistributive goals to which we aspire, nor will it collect city level data so urgently needed to monitor and assess the implementation of international agreements, which are necessary to hold governments accountable for their commitments.

[1] Pew Research Center, "*Cell Phones in Africa: Communication Lifeline.*" April 15, 2015. http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/

Cape Town, South Africa
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TECHNICAL APPENDIX

Calculating the HCI at the City Level

The HCI score is constructed using a process adapted from the SERF methodology developed by Fukuda-Parr et al. in Fulfilling Economic and Social Rights.1 While we used the SERF methodology for creating achievement possibility frontiers to predict maximum performance levels based on income, the HCI uses a larger number of indicators and also expands the SERF methodology to address changes over time.

> For each indicator the data are plotted in relationship to the city's per capita GDP (Constant PPP, 2015 International Dollars), using all available data from 2000 to present.

> Frontier points along the outer edge of the plot are identified using visual inspection, with the requirement that the frontier include observations from at least four cities.

> Econometric methods are used to specify the frontier, considering multiple functional forms— linear, logarithmic, inverse, quadratic, power, growth, and exponential, etc. The best fit relationship is determined by statistical measures of goodness of fit (R2), and visual inspection of the shape.

> The function plateaus at a point where the frontier indicates per capita GDP is high enough that countries at that level and beyond are capable of full or near-full achievement of the indicator.

> Indicator values (X) are rescaled as a percentage of achievement between the lowest level of achievement recorded by any country at any income (Xm), and the maximum possible level of achievement for the city's per capita GDP, as calculated by the Achievement Possibilities Frontier (Xf).

A problem arises for instance where a city's per capita income has met, and continued to grow beyond, the point which is determined to be sufficient to fully achieve an indicator. In these circumstances, the more that income rises above the point at which total fulfillment is possible without having actually achieved total fulfillment reflects a greater lack of commitment at the city level. Therefore, a city with capacity far beyond what is needed for total fulfillment of an indicator should be held to a higher standard than cities at or just above the level of income required for maximum achievement. To reflect this in the HCI, for cities with per capita GDP above the level at which the function levels out, Yp, scores are adjusted downwards as per capita GDP increases without achieving complete fulfillment of the indicator. The adjustment uses the following equation, with Y being the city's per capita GDP, Yp being the per capita GDP level at which the frontier levels out, S being the rescaled score, and ß is fixed at 0.5.

$$A = 100 \left[\left(\frac{S}{100} \right)^{(Y/Y_p)^{ß}} \right]$$

This mathematical formula for adjusting scores for cities with incomes above the point at which full achievement should have been possible was selected by Fukuda-Parr et. al for several reasons:

> No Penalty on 100% Fulfillment - For cities that have achieved total fulfillment of an indicator, there is no inappropriate penalty for continued economic growth.

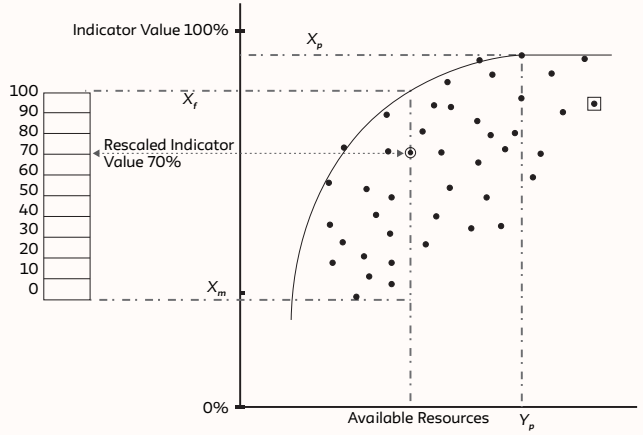
> Asymptotic Equality - The adjusted performance score approaches the observed indicator score as the value of the resource capacity indicator approaches Yp from above, ensuring there is no rapid drop in scores when a city's income reaches Yp .

> Increasing Penalty with Resource Capacity - The downward adjustment of scores increases as income grows beyond Yp. Two cities with sufficient capacity to fulfill an indicator and the same raw score will be scored differently according to the extent to which income exceeds Yp .

> Penalty Decreases with Rising Yp Values - Higher Yp values indicate lower feasible rates of transformation, and therefore a lower penalty.

> Penalty Declines with Increasing Achievement - as the adjusted scores approach 100, the penalty for failing to achieve total fulfillment becomes less severe.

Rescaled Score (S) = 100 (X-Xm) / (Xf - Xm)



Source: Randolph, Prairie, and Stewart 2012, Figure 2

[1] Fukuda-Parr, Sakiko, Terra Lawson-Remer, and Susan Randolph. Fulfilling social and economic rights. Oxford University Press, USA, 2015.

List of Data Sources

MAIN SOURCES	DIMENSION	INDICATOR	TIME RANGE*
NATIONAL GOVERNMENT (STATISTICS OFFICE), PRIVATE INSTITUTIONS	**BASIC SERVICES**	ACCESS TO ELECTRICITY	2000 - 2016
	CHILDREN & YOUTH	INFANT MORTALITY	2000 - 2015
	CHILDREN & YOUTH	EDUCATION INDICATORS	2000 - 2016
	HOUSING	NON-DIRT FLOOR	2000 - 2016
NATIONAL GOVERNMENT (STATISTICS OFFICE), PRIVATE INSTITUTIONS & INTERGOVERNMENTAL ORGANIZATIONS	**BASIC SERVICES**	ACCESS TO SAFE WATER	2000 - 2016
	URBAN FORM	DENSITY	2000 - 2017
NATIONAL GOVERNMENT (STATISTICS OFFICE), PRIVATE INSTITUTIONS & INTERGOVERNMENTAL ORGANIZATIONS, LOCAL GOVERNMENTS	**POVERTY**	POVERTY INDICATORS	2000 - 2016
	GENDER	GENDER INDICATORS	2000 - 2016
	ENVIRONMENT	CO_2 EMISSIONS	2000 - 2014
OXFORD ECONOMICS DATABASE	**EMPLOYMENT**	EMPLOYMENT	2000 - 2016
	INEQUALITY	GINI	2000 - 2016

**Time Range depends on data availability for each city*

GIVEN THE CURRENT AVAILABILITY OF CITY-LEVEL DATA, **A GLOBAL COMPARATIVE ASSESSMENT OF THE PROGRESS IN THE IMPLEMENTATION OF THE NUA AND THE CITY-RELATED SDGs CANNOT BE DONE.**

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