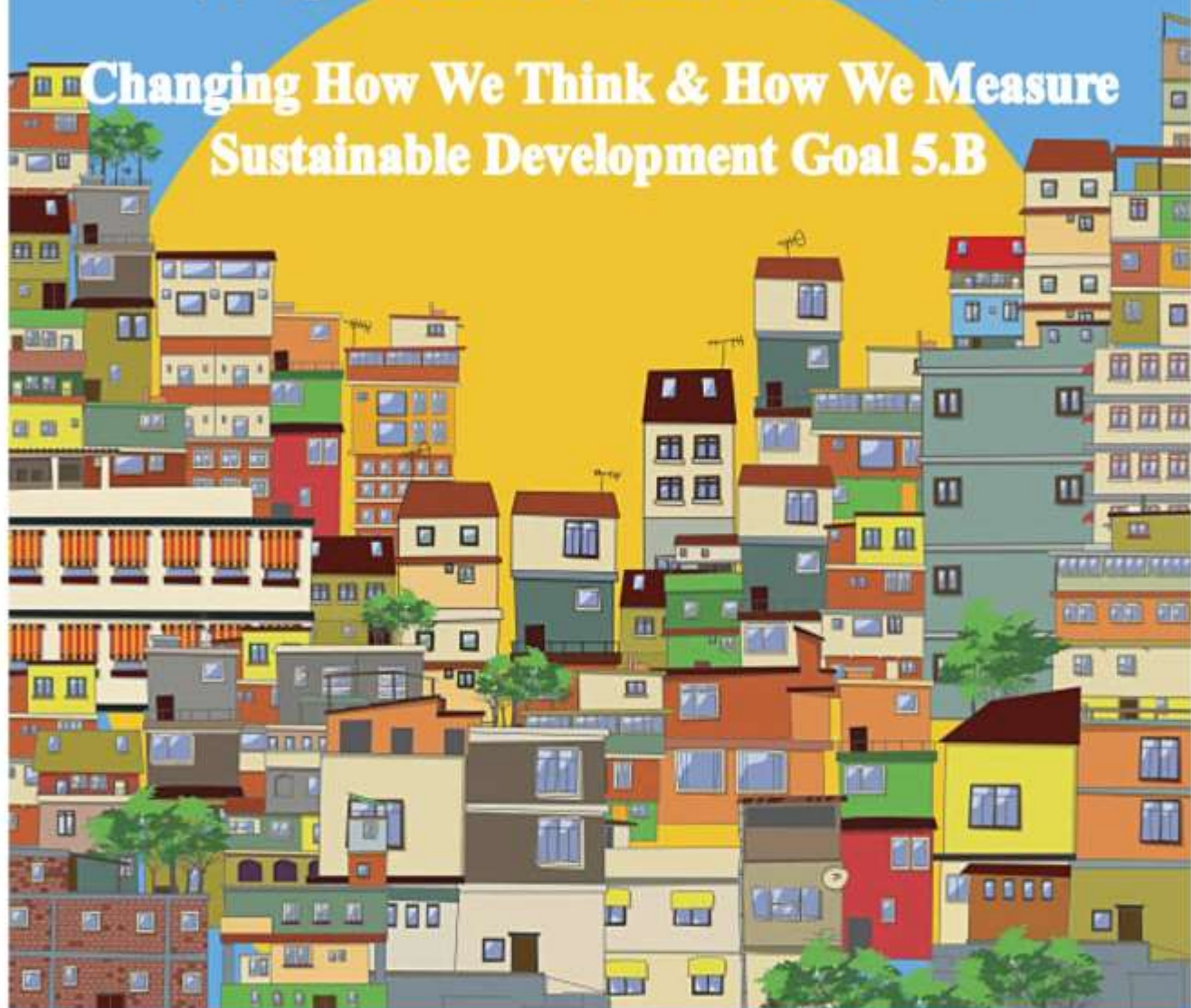


# SMART CITIES with WOMEN in MIND

Changing How We Think & How We Measure  
Sustainable Development Goal 5.B



By Natalie R. Gill

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## **Smart Cities with Women in Mind**

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Sustainable Development Goal 5.B

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## Summary

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This paper examines how smart city technology can advance gender equity and how planning for women in smart cities helps cities address their broader challenges more effectively. It argues that a smart city by itself does not advance inclusiveness, resilience, sustainability, and gender equality. Rather, urban stakeholders must align smart cities with just cities, which are urban centers that plan for equity, material well-being, diversity, and participation to foster better quality of urban life. IHC Global calls this a Smart City Just City approach.

The SCJC initiative can advance the 2030 Agenda for Sustainable Development, especially Sustainable Development Goal (SDG) 5 to end gender inequality and SDG 11 to create cities that are inclusive, safe, resilient, and sustainable. This is because to truly tackle the issues that face women around the world and to truly close the gender equality gap policies must focus on the position of women vis-à-vis urbanization and the data revolution. This paper pays particular attention to SDG 5.B “to enhance the use of enabling technology, in particular information and communications technology (ICT), to promote the empowerment of women.” In the twenty-first century “enabling technology,” and smart city technology will play a central role in ending gender inequality around the world.

Finally, the paper explores SDG Indicator 5.B.1 to measure SDG 5.B. progress by the “proportion of individuals who own a mobile telephone, by sex.” It demonstrates why Indicator 5.B.1 is an insufficient measure of 5.B and offers recommendations for other measurements of 5.B.



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## 1. Introduction

This paper examines how smart city technology can advance gender equity and how planning for women in smart cities helps cities more effectively address broader urban challenges. It argues that a smart city by itself does not advance inclusiveness, resilience, sustainability, and gender equality. Rather, urban stakeholders must align smart city technology with just city aims: equity, material well-being, diversity, and participation to foster better quality of urban life.<sup>1</sup> The smart, just city is the core aim of the IHC Global Smart City Just City initiative (SCJC) that aligns the two concepts.

The paper also explores the global applicability of the SCJC initiative, specifically how it can advance the 2030 Agenda for Sustainable Development. The 2030 Agenda, approved by all United Nations member states in 2016, is composed of 17 Sustainable Development Goals (SDGs) that guide countries towards peace and prosperity for all. SDG 5 seeks to end gender inequality and SDG 11 aims to create cities that are inclusive, safe, resilient, and sustainable. SCJC can advance SDG 5, 11, and the 2030 Agenda more broadly. This is because to truly tackle the issues that face women around the world and to truly close the gender equality gap, policies must focus on the position of women vis-à-vis the two most important global trends of our time: urbanization and the data revolution.

The paper positions its argument within United Nations 2030 Agenda for Sustainable Development, but is also relevant for local, regional, and national governments and other stakeholders involved in issues of urbanization and technology outside of the framework of the UN 2030 Agenda.

The 17 SDGs are broken down into a total of 169 Targets. The Targets provide a practical starting point for countries as they advance each Goal. This paper pays particular attention to how SDG Target 5.B manifest in cities. SDG 5.B aims “to enhance the use of enabling technology, in particular information and

communications technology (ICT), to promote the empowerment of women.”<sup>2</sup> Technology increasingly provides solutions to economic, social, political, and environmental problems. It therefore makes sense that in the twenty-first century “enabling technology,” and smart city technology will play a central role in ending gender inequality around the world.

The paper also explains the shortcomings of smart city technology and cities require a SCJC approach. Smart city technology promises efficiency and improved urban life. But, cities that use smart technology without the intention of fostering equity and inclusiveness, technology can inadvertently make women’s lives more difficult. At worst, this can impede their ability to determine their own life outcomes through social and economic empowerment.

The paper explores the limitations of SDG Indicator 5.B.1. The SDG Indicators offer countries a way to measure their progress in meeting the SDG Targets. Indicator 5.B.1 measures SDG 5.B. progress by the “proportion of individuals who own a mobile telephone, by sex.” Indicator 5.B.1 is currently the only Indicator offered for SDG Target 5.B. This paper demonstrates why Indicator 5.B.1 is an insufficient measure of SDG 5.B and offers further guidelines for 5.B instead.

## 2. Context

### Urbanization & the data revolution

Urbanization and the data revolution are the two most important global trends of this era. Over half the world’s population live in cities. Experts anticipate this number will rise to 68% by 2050.<sup>3</sup> One billion of these city-dwellers will reside in informal slums, typically characterized by overcrowding, lack of clean water and sanitation, substandard housing, insecure tenure, and vulnerability to health risks and natural

<sup>1</sup> Susan S. Fainstein, *The Just City*, (Ithaca: Cornell University Press, 2010).

<sup>2</sup> “Achieve Gender Equality and Empower All Women and Girls,” *SDG Tracker*, accessed 25 January, 2020. <https://sdg-tracker.org/gender-equality>

<sup>3</sup> 68% of the World Population Projected to Live in Urban Areas by 2050, says UN,” United Nations Department of Economic and Social Affairs, 16 May 2018, <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>.



disasters.<sup>4</sup> Without comprehensive and inclusive policies, cities are underprepared to address these considerable issues that can disproportionately affect women.



Smart city technology and the ability to gather large amounts of data means cities are better equipped to foster inclusiveness and equity than ever before. Yet, this is predicated on whether the city commits itself to advancing inclusiveness and how well other city stakeholders support their efforts to do so.

### The link between SDG 5 & SDG 11

SDG 5 and SDG 11 are intimately connected. Urbanization and the advancement of the “fourth industrial revolution” will define the course of the twenty-first century. It is unlikely that people will stop moving to cities in mass numbers and it is unlikely that stakeholders composed of governments, the private sector, and civil society will stop looking for ways in which technology can advance their aims. To effectively use technology as a tool to improve the lives of individuals and enhance shared prosperity, stakeholders must focus on where people live. In the twenty-first century that place will be cities.

<sup>4</sup> Population living in slums (% of Urban Population,” World Bank Development Indicators,

<https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS>.

<sup>5</sup> Tony Pipa and Caroline Conroy, “The Importance of City Leadership in Leaving No One Behind,” in *Leave No One Behind: Time for Specifics on the Sustainable Development Goals*, ed. by Homi Kharas, John W. McArthur, and Izumi

SDG 11, to create cities that are inclusive, safe, resilient, and sustainable is crucial for meeting the 2030 Agenda, given that urban living conditions effect over half the world’s population. No poverty (SDG 1), eliminating hunger (SDG 2), quality education (SDG 4), and clean water and sanitation (SDG 6), are just some of the SDG challenges prominent in cities. Cities are therefore the “places where the [2030] agenda’s must be translated into progress felt by real people living in real communities.”<sup>5</sup> As former UN Secretary-General Ban Ki Moon noted in 2016: “To transform our world, we must transform our cities.”<sup>6</sup>

Technology by itself is not enough to improve the lives of real people living in cities. Instead, it must be deployed purposefully for inclusion and equity. When governments and stakeholders prioritize SDG 11, they also advance SDG 5 because their inclusive urban policies will reach large numbers of women. Women comprise approximately 50% of the world’s population and nearly 70% of the world’s urban population. At the same time, prioritizing SDG 5 as cities are built and maintained will more sustainably support healthy cities broadly. Planning for women in cities is crucial for advancing SDG 11 as the health of a society can be tangibly and metaphorically measured by the status and empowerment of its women.

### 3. Exploring Smart City Just City

The IHC Global Smart City Just City initiative offers an inclusive and equitable framework that urban stakeholders can turn to as they employ smart technology to improve their cities. SCJC brings together two separate narratives that dominate discourse on urban development. It asserts that when smart technology is employed to advance equity and inclusion, it can lessen social divisions, increase economic opportunities, strengthen community capacity for resilience, and enjoyed shared prosperity.

Ohno, (Washington, DC: Brookings Institution Press, 2019), 282.

<sup>6</sup> Ban Ki Moon, “Secretary-General’s message on World Cities Day,” *United Nations Secretary-General*, 31 October 2016, accessed 15 October 2019,

<https://www.un.org/sg/en/content/sg/statement/2016-10-31/secretary-generals-message-world-cities-day-scroll-down-french>

The “Smart City” movement seeks to harness data and technology to make more efficient, integrated, and sustainable. The “Just City” centers on a number of discourses that advance solutions to social injustice, especially through participatory politics and decision-making. The just city movement relies on the input of all residents, regardless of race, age, gender, and socioeconomic position, to shape the urban experience. This provides the springboard for the service and infrastructure investments that foster greater opportunity for all, including the most marginalized.<sup>7</sup>

But, too often “smart cities” focus exclusively on the potential of technology to advance efficiency, improve the economy, and invite investors, rather than its potential to help underserved populations. On the other hand, the human-centred focus of “just cities” often fails to consider how smart technologies might advance its goals. *Smart City Just City* aims to bring these two approaches together to show that “technology” and “human centeredness” are not mutually exclusive.

### How the smart just city can reach marginalized urban populations

At both the local and international levels, stakeholders are increasingly turning to smart technology and open data to enhance urban development. The New Urban Agenda (NUA), introduced by UN-Habitat at Habitat III and adopted by 167 UN member nation-states asserts: “Big Data and the Internet of Things (IoT) allows city leaders to gain a more detailed, real time picture of what is happening within their city.”<sup>8</sup>

Although tech companies are sometimes criticized for large-scale data collection,<sup>9</sup> stakeholders as well as

varied UN bodies including UN-Habitat, accept that the data revolution is key to assessing and implementing effective policies to improve the lives of individuals and communities in cities. According to Brian English: “ICT and smart city technologies are a set of tools for connecting or reconnecting people to the resources, information, and services that can empower them,” especially urban populations that are socially, economically, spatially, or environmentally marginalized.<sup>10</sup> Similarly, the 2016 World Cities Report states: “Given favourable conditions, ICTs can support advocacy and empowerment, enabling excluded groups to leapfrog existing barriers and become better integrated within urban society.”<sup>11</sup>

But, smart city technology, carelessly or haphazardly employed in cities can also exacerbate social inequality. The same report warns that: “When ICT is deployed unevenly in cities, it can...exacerbate inequality, characterized by well-connected affluent neighborhoods and business districts coexisting with under-serviced and under-connected low-income neighborhoods.”<sup>12</sup> This is because: “the affluent have greater access to these technologies, and ICT can often serve to extend their reach and control while curbing that of the more socioeconomically marginalized residents.”<sup>13</sup>

### How the smart city can exacerbate inequality

Smart cities can exacerbate inequality if they pursue technology as the end goal, rather than the means to the end. They can also exacerbate inequality if they neglect their most pressing urban challenges for the allure of flashy technology. In practice, this often means a city will deploy a smart city solution before

<sup>7</sup> This is sometimes called the Right to the City movement.

<sup>8</sup> United Nations, “The New Urban Agenda,” *Habitat III*, 2016, <http://habitat3.org/the-new-urban-agenda/>

<sup>9</sup> The United States and the European Union are increasingly scrutinizing the ability of large tech companies like Facebook and Google to collect large amounts of data from their users and how they use the data. For instance, see Parmy Olson, “European Regulators Target Big Tech Companies,” *The Wall Street Journal*, 20 January 2020, accessed 21 January 2020. <https://www.wsj.com/articles/european-regulators-target-big-tech-companies-11579542357>

<sup>10</sup> Brian English, “Smart City | Just City: Can smart city technologies create more equity in an unequal world?” *IHC Global Policy Series*, vol. 1, 2019.

<sup>11</sup> Eduardo Moreno, Ben Arimah, Raymond Otieno Otieno, Udo Mbeche-Smith, Anne Klen-Amin, and Marco Kamiya, “World Cities Report 2016: Urbanization and Development: Emerging Futures,” *United Nations Human Settlements Program*, Nairobi, Kenya, 2016, p. 79, accessed 12 October, 2019, <https://unhabitat.org/sites/default/files/download-manager-files/WCR-2016-WEB.pdf>.

<sup>12</sup> *Ibid*, 42.

<sup>13</sup> *Ibid*.

finding the problem rather than first identifying the problem and assessing whether technology can help resolve it.

One reason for this is that cities are sometimes courted by large companies to purchase a number of technology products including smart traffic signals, digitized government services, and Wi-Fi kiosks. In turn, the cities are incentivized to award the corporations generous tax breaks.<sup>14</sup>

But, as Ayona Datta, a scholar of urban India has noted, the promoted products are not always applicable or appropriate for the cities to which they have market. This is because companies frequently ignore local context as they plug or implement their product. Datta explains: “IT companies will sell [smart technology] as a package without any kind of customization at the grassroots level.”<sup>15</sup> In developing countries, the lack of local customization often means that: “Technology may be introduced across a city to make transport or water services more efficient, but will likely only work in its richer areas... A 24 hour smart water meter can only be possible if you’re connected to the water system in the first place.”<sup>16</sup>

Smart city technology also offers “leapfrogging technology” to Least-Developed Countries (LDC). Leapfrogging technology is the idea that countries that are less economically developed, less globally competitive, and typically located in the Global South can still successfully adopt advanced technology. When less developed economies adopt the same advanced technology as high and middle income countries, they have the opportunity to “leapfrog the mistakes made by the West,” as they originally pioneered that technology. Executive Director of C40 Cities Mark Watts has said leapfrogging technology could enable an African city without a waste management system to build a modern treatment plan

that runs on clean energy, rather than trying to fix or improve older facilities.<sup>17</sup>

**“It is hard to imagine a country being able to leapfrog technological advantages without securing water and sanitation facilities for its population.” UN Chronicle**

Yet existing and pressing urban infrastructure challenges impede LDCs from fully profiting from “leapfrogging technology.” As United Nations Under-Secretary-General for Economic and Social Affairs Liu Zhenmin recently wrote: “How can we ensure that developing countries especially the LDCs can benefit from frontier technologies without paying a huge price to access them? If populations still lack basic water, sanitation and electricity, we cannot expect them to take advantage of online education and learn to write computer code.”<sup>18</sup> The Under-Secretary concluded: “It is hard to imagine a country being able to leapfrog technological advances without securing water and sanitation facilities for its population.”<sup>19</sup>

Below are examples of smart city solutions that demonstrate the necessity of using a SCJC framework to prevent exacerbating existing urban challenges and further marginalization of certain populations.

### **Example 1: Nairobi’s luxury satellite cities & Cotonou’s smart city**

Underserved urban populations often endure sub-standard housing. Smart cities promise to solve

<sup>14</sup> Brian Peccarelli, “Are Smart Cities the Next Disruptor,” *Forbes*, 27 June, 2019, accessed 15 October, 2019, <https://www.forbes.com/sites/brianpeccarelli/2019/06/27/are-smart-cities-the-next-great-disruptor/#558221d91594>.

<sup>15</sup> Ayona Datta quoted in Sophie Davies, “Wi-Fi but no water: Can smart tech help a city’s poor?” *Reuters*, 5 January, 2018, accessed 15 October, 2019, <https://www.reuters.com/article/us-global-cities-tech-inequality/wi-fi-but-no-water-can-smart-tech-help-a-citys-poor-idUSKBN1EU0JF>.

<sup>16</sup> *Ibid.*

<sup>17</sup> Mark Watts, interviewed in Sophie Yeo, “The Carbon Brief Interview: Mark Watts,” *CarbonBrief*, 13 July 2016, accessed 12 December 2019, <https://www.carbonbrief.org/carbon-brief-interview-mark-watts>.

<sup>18</sup> Liu Zhenmin, “Frontier Technologies: A Window of Opportunity for Leapfrogging!” *UN Chronicle*, 25 January 2019, accessed 12 November 2019, <https://www.un.org/en/un-chronicle/frontier-technologies-window-opportunity-leapfrogging>.

<sup>19</sup> *Ibid.*

overcrowding, unaffordable, inaccessible, and unsafe housing in the city and its periphery. But, sometimes the process of making room for smart cities further exacerbates poor and marginalized populations. Instead of upgrading poor housing or creating new affordable and safe housing units, luxurious satellite cities emerge adjacent to slums. In other instances, governments demolish slums to make room for smart cities, displacing large numbers of people.

Examples of both cases proliferate in rapidly urbanizing areas worldwide, but especially in sub-Saharan Africa and South and Southeast Asia. Recently, the Kenyan government announced plans to build a number of satellite cities to ease the burden of overcrowded and congestion Nairobi. The government and developers asserted that new cities Tilisi, Tatu City, and Northlands City, will provide alternative living for the approximately 2 million Nairobi residents who live in slums.

But, critics of the projects argue that the developers “rarely explain how they will deal with challenges like low-cost housing.”<sup>20</sup> Furthermore, satellite cities often fail because they increase the distance between residents’ homes and their jobs in the city center. Without low cost and affordable housing, residents of areas like Kibera, Africa’s largest slum, will not be able to take advantage of the new jobs and homes created by Tilisi, Tatu City, and Northlands City. Simply put, they will not be able to afford to move there. Critics warn the satellite cities will erode social and cultural relations between urban populations as they could “deepen class exclusion, segregation, and conflicts.”<sup>21</sup>

Other times governments demolish slums to make room for the construction of smart cities.

Demolishment typically follows forced eviction and displacement of the communities that live there. Currently, the Republic of Benin aims to build a new tech hub called Semé City in Cotonou, Benin’s largest city and economic center. Benin hopes that Semé City will help transition country into a digital and efficient economy as well as address other economic challenges.

To make room for Semé City Benin demolished 160 houses in Cotonou’s oldest slum Wxlacodji in August 2019. The authorities gave Wxlacodji residents a 72 hour notice to leave before demolition. It is expected 3,000 more individuals will soon face eviction.<sup>22</sup> The evictions and demolitions also occurred despite the fact that the Constitution and national law in Benin prohibits forced eviction and is mandated to provide certain protections to evicted persons.<sup>23</sup>

According to the World Bank, 40% of Benin’s population live in poverty. The Bank has also ranked it 153 out of 190 on its Doing Business Report which assess the ease of doing business in a country and by extension its economic health.<sup>24</sup> The statistics are noteworthy, because widespread poverty in Benin, as well as the challenges within the private and public sector over corruption, transparency, and the enforcement of basic laws suggest that structural political, social, and economic changes and reforms must at least accompany, but should likely be precede the transition to a digital economy.

While both examples provided above are in developing countries, both developing and developed countries have struggled to prioritize their most pressing urban challenges as they employ frontier technology. The allure of smart technology is

<sup>20</sup> Kevin Mwanza , “‘Islands of wealth in a sea of slums?’ Kenya divided over satellite cities,” *Thomson Reuters*, 18 March, 2019, accessed 19 March, 2019, <https://www.reuters.com/article/us-kenya-land-housing/islands-of-wealth-in-a-sea-of-slums-kenya-divided-over-satellite-cities-idUSKCN1QZORG>.

<sup>21</sup> *Ibid*.

<sup>22</sup> S. Emmanuelle Laurindo Godojo, “Smart Cities and Slum resilience,” *Urbanet*, 8 October 2019, accessed 10 October, 2019,” <https://www.urbanet.info/smart-cities-and-slum-resilience/>.

<sup>23</sup> Benin Federation of Slum/Informal Settlement Residents, Justice & Empowerment Initiatives, Nigerian Slum/Informal Settlement Federation, Federation of Urban & Rural Poor,

Center of Dialogue on Human Settlements and Poverty Alleviation, South African Federation of the Urban Poor, and Shack Dwellers Federation of Namibia, “Condemnation of Forced Eviction in Cotonou,” *Housing & Land Rights Network, Habitat International Coalition*, 29 August 2019, accessed 15 October 2019, <https://www.hlrn.org/news.php?id=p29law>.

<sup>24</sup> The World Bank Ease of Doing Business Index assesses business regulations and barriers to conducting business in countries, based on sub-indices of such as property registration, credit, transparency, enforced contracts, and efficient tax systems. Read more at, The World Bank, “Doing Business 2020,” <https://www.doingbusiness.org/>.

prominent in cities and countries across the world regardless of geographical location or GDP.

### Example 2: smart cities & safe, accessible transportation

Cities also embrace technology for its potential to alleviate traffic congestion. One digital traffic management company for instance, has gone as far as to say that digital parking management is “Where Smart Cities Fall Short.” Public transportation and traffic congestion are indeed equity issues. Recent protests in Santiago, Chile over fare increases and in Manila, Philippines over traffic congestion attest to the close relationship between equity and transit in a city. But, for most cities, parking is not the key transportation issue. Digital parking management should not distract cities from filling gaps in public transport and basic services.

In Brazil, Rio de Janeiro is pursuing a number of smart city initiatives. The city has stressed “advanc[ing] traffic management,” as a primary concern. Specifically Rio is employing radar technology sensors and mobile location analytics that measure car and foot traffic to more efficiently time traffic lights. Yet, as Camila Jordan has noted, Rio’s traffic and weather sensors have done little to address the fact that “more than one million residents of Rio de Janeiro live in poor, underserved, and forgotten low-income community.”<sup>25</sup>

Transportation is indeed relevant for Rio’s underserved low-income communities. But, traffic light timing is not their concern. Rather, these communities need close access to safe and affordable public transportation. Recently, the Brazilian government demolished a number of slum neighborhoods in Rio and relocated their former residents to newly constructed areas on the outskirts of cities. The new housing units are superior to the Rio slums, yet the eviction and relocations have exacerbated inequities because over 60% of the new

housing units are located 30 minutes from the nearest train or metro. With few jobs available in the vicinity, some residents are forced to commute up to three hours to downtown jobs using limited and unreliable transportation infrastructure. Undoubtedly transportation is a way in which “smart cities fall short,” but it is not for digital parking management. Rather, the failure is in the gap of access to safe, affordable, and close transportation.

### Example 3: Rejecting the smart city in Johannesburg

A number of urban and national governments in these same areas have rejected smart and satellite cities because of equity concerns. Recently, the government of Johannesburg, South Africa refused to approve construction of Modderfontein New City, proposed by the Chinese development corporation Zendai Group. The Zendai Group aspired to build a high-end, luxury, and mixed-use development aimed for the Johannesburg elite. As geographers, Frances Brill and Ricardo Prego Reboredo have observed, given prominent gaps in basic services in various parts of Johannesburg, there was a “substantial disjuncture between the ‘world class city’ aspirations [of Modderfontein] and the realities of the majority of the population [in Johannesburg].”<sup>26</sup>

Growing pressure in Johannesburg to provide affordable public housing led the City to demand Zendai include 5,000 affordable homes in their plans and ensure development complemented existing transport to make sure individuals could access work in other parts of the city. The City promised it would financially support these stipulations to ensure inclusive, sustainable, and accessible development. But, Zendai refused. One Zendai planner, interviewed by Brill and Reboredo, explained: “So [the City] Council wanted us to include social housing as a portion of the bigger development, which as a developer I have a problem with.” In return, the City

<sup>25</sup> Camila Jordan, “Smart City. Just City – Tools for Justice,” *IHC Global*, 16 April 2019, <https://www.ihcglobal.org/2019/04/16/smart-city-just-city-blog-series-2-2/>.

<sup>26</sup> Frances Brill and Ricardo Prego Reboredo, “Failed Fantasies in a South African Context: the case of

Modderfontein, Johannesburg,” *Urban Forum*, 20 October 2018, accessed 10 November 2019, <https://www.semanticscholar.org/paper/Failed-Fantasies-in-a-South-African-Context%3A-the-of-Brill-Reboredo/4ff1ae8c1e995ad2f561288cb8993afb778b8040>.

declined to approve the Modderfontein project. This demonstrates that when cities can commit themselves to advancing equitable urban policies and affirming agency in the face of flashy new technology.

Johannesburg’s rejection of Modderfontein development proves that governments, local and national, have the capacity consider equity impacts from smart cities. This suggests that cities can and should prioritize social justice for all city residents as they strategize for smart technologies. But, without a practical starting point, it may be conceptually overwhelming to create a smart and just city for all. Applying a gender lens to the smart city can provide an effective framework for municipal policymakers and stakeholders as they meet the positive and negative potentials of frontier technologies. This gender lens will integrate women’s diverse experiences and perspectives from across the city.

#### 4. SCJC to advance SDG 5 to end gender inequality

The smart, just city can empower women when it uses technology to foster inclusion. In turn, paying attention to women’s diverse experiences while planning for the smart city enhances inclusiveness for all urban residents. The following pages will look at some of the SDG 5 indicators in the smart city. It will highlight when smart city technology practices have or have not aligned with just city policies, empowering or limiting women in the urban space.

Specifically SCJC can advance SDG 5 targets:

- **Indicator 5.1:** End all forms of discrimination against women and girls everywhere:
- **Indicator 5.2:** Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
- **Indicator 5.4:** Recognize and value unpaid care and domestic work through the provision of public services, infrastructure, and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate

- **Indicator 5.5:** Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life

**Despite existing technical capabilities, large-scale data collected in cities is rarely disaggregated by gender. Without data on women, it will be difficult to understand the relationship between women’s status, urbanization, and economic development.**

Gender mainstreaming is a key component to the smart, just city. The United Nations defines gender mainstreaming as: “The process of assessing the implications for women and men of any planned action, including legislation, policies or programs, in all areas and at all levels... The ultimate goal is to achieve gender equality.” Gender mainstreaming means that: “City administrators create laws, rules and regulations to benefit men and women equally,” to tangibly improve city life for all.

For the most part, empowering women is widely accepted across the world as a core policy and value for international, national, and local governmental and non-governmental entities. Many are embracing gender mainstreaming to guide city planning. On the local level, cities like Vienna, Austria have mainstreamed gender into transportation planning, public spaces and filling gaps in city services. For over thirty years, Vienna has implemented a series of gender-cognizant initiatives under the conviction that improving women's experiences in the city improves the experiences of all its residents.

Among its initiatives, Vienna installed more lighting to alleviate women's anxiety about their safety in public areas, improved public transport and pedestrian walkways because women comprise 2/3 of transportation riders and pedestrians, and named streets after prominent women in the Aspern neighborhood to make women more visible in public

spaces.<sup>27</sup> For its efforts, Vienna has received international accolades: for the 2<sup>nd</sup> year in a row, the Economist has designated it the “World’s Most Livable City.”

### The lack of data on women in cities

But, without a view towards advancing justice, cities struggle with or ignore how smart city technology can help cities mainstream gender in their policies. Prestigious international and national leaders have vocally committed to advancing women’s

empowerment through mainstreaming gender in urban policies, supported by new digital technologies. UN-Habitat Executive Director Maimunah Mohd Sharif has said that addressing poverty, mobility, and gender inclusion requires UN-Habitat and cities to continue to embrace technological solutions and innovations.<sup>28</sup>

International national, and local research has yet to explore how technology can empower women in urban settings and drive greater inclusion. Furthermore, a lack of data on women impairs a city’s ability to mainstream gender in policy. For instance,

SDG 5: End Gender Inequality   targets	
5.1	end all forms of discrimination against women and girls everywhere:
5.2	eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
5.3	eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation
5.4	recognize and value unpaid care and domestic work through the provision of public services, infrastructure, and social protection policies ...
5.5	ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life
5.6	ensure universal access to sexual and reproductive health and reproductive rights...
5.a	undertake reforms to give women equal rights to economic resources...
5.b	enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women
5.c	adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

<sup>27</sup> Elle Hunt, “City With a Female Face: How Modern Vienna Was Shaped By Women,” *The Guardian*, 14 May, 2019. <https://www.theguardian.com/cities/2019/may/14/city-with-a-female-face-how-modern-vienna-was-shaped-by-women>

<sup>28</sup> Medha Basu, “Dato’ Maimunah Sharif, United Nations Under-Secretary General and Executive Director, UN

Habitat,” *GovInsider*, 14 December 2018, <https://govinsider.asia/innovation/women-in-govtech-2018-dato-maimunah-sharif-united-nations-under-secretary-general-and-executive-director-un-habitat/>.

the 2018 United Nations World Cities Report is an integral document to assessing urban development worldwide. But, the report does not explore women’s experiences through data collection and disaggregation.<sup>29</sup> As Laura Kirkpatrick at *PassBlue* notes, the growth of large and small cities has “enormous implications for sustainability and economic development in the decades to come,” understanding experiences and perspectives of women and also marginalized communities in cities.<sup>30</sup> Without disaggregated data on women, it will be difficult to understand the relationship between women’s status, urbanization, and economic development.”<sup>31</sup> This poses question: “Is this [urbanization] good news for women?”<sup>32</sup>

### The challenges women face in cities

Research must strive to better understand gender-specific experiences in cities. For a large number of women, cities have enabled economic empowerment, educational opportunities, and the freedom to determine their life outcomes. But, women often face urban challenges unique to their gender that both stem from and exacerbate their marginalization from city resources. This suggests that unplanned and rapid urbanization can negatively affect women.

According to the Women, Peace, and Security Index created by the Georgetown Institute for Women, Peace, and Security, and the Peace Research Institute of Oslo, there is a strong overlap between countries of expected intense population growth and countries with extreme gender inequality.<sup>33</sup> This is because

SDG 11: Make cities inclusive, safe, resilient, & sustainable	
11.1	ensure access for all to adequate, safe and affordable housing, and basic services and upgrade slums
11.2	provide access to safe, affordable, accessible, and sustainable transportation systems
11.3	enhance inclusive and sustainable urbanization and capacity for participatory, integrated, and sustainable human settlement planning and management
11.4	strengthen efforts to protect and safeguard the world’s cultural and natural heritage
11.5	reduce the number of deaths and people affected and decrease the direct economic losses caused by disasters, with a focus on protecting the poor and people in vulnerable situations
11.6	reduce the adverse per capita environmental impact of cities
11.7	provide universal access to safe, inclusive, and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities
11.a	support positive economic, social, and environmental links between urban, peri-urban, and rural areas
11.b	increase the number of cities and settlements adopting integrated policies for adaptation to climate change and disaster resilience
11.c	support least developed countries in building sustainable and resilient buildings

<sup>29</sup> Laura Kirkpatrick, “How Will Women Fare as Cities Grow Dramatically? The Data are Missing,” *PassBlue*, 13 January 2019. <https://www.passblue.com/2019/01/13/how-will-women-fare-as-cities-grow-dramatically-the-data-are-missing/>

<sup>30</sup> *Ibid.*

<sup>31</sup> “Vienna Remains the World’s Most Livable City,” *The Economist*, 4 September, 2019.

<https://www.economist.com/graphic-detail/2019/09/04/vienna-remains-the-worlds-most-liveable-city>

<sup>32</sup> *Ibid.*

<sup>33</sup> “Women, Peace, and Security Index,” *Georgetown Institute for Women, Peace, and Security*, <https://giwps.georgetown.edu/the-index/>.



cities engender and are the places of rapid population growth. According to the Index: “It is not a coincidence that some of the cities project to experience the greatest growth overlap with areas where the lowest rankings [are] in terms of security for women.”<sup>34</sup>

Often women migrants end up living in areas or slums where there are “dangers concerning their safety or where access to resources and services are limited,” impeding their ability to take advantage of urban opportunities.<sup>35</sup> Women are overrepresented in slum populations. As caretakers and managers of the household, they spend more time in the home, exposing them to the health and hygiene risks innate to slum life: lack of durable housing materials and lack of improved sanitation facilities, among conditions.<sup>36</sup> Substandard or gender-blind city infrastructure contributes to high rates of sexual violence in cities around the world. Poor lighting, gaps in public transportation services, the anonymity offered to perpetrators by crowded places, and high rates of women’s informal employment leave women more vulnerable to incidents of assault and harassment.

In cities, well-functioning and accessible urban infrastructure and services, including transportation, is especially important for women’s livelihoods, family security, and safety.<sup>37</sup> This is because globally women provide 76.2% of unpaid care work in the household, often at the same time as they work in informal or formal settings. Unpaid care work includes carry for children, looking after sick or older family members, preparing food, cleaning, and collecting water, fuel, and food.<sup>38</sup> On average women globally spend 4.5

hours of their day on unpaid work while men spend about half that time.

A recent Oxfam report on underpaid care work and global inequality explains that the unequal responsibility of care work is “detrimental to [women and girls] lives in profound ways.” The heavy burden “perpetuates gender and economic inequalities, undermines their health and wellbeing, limits their economic prosperity, fuels gender gaps in employment and amplifies existing vulnerabilities.” It furthermore leaves women and girls time-poor, unable to meet their basic needs for rest, personal

**Knowing the number of people in a country living under \$1.25 a day, for example, is one thing. But if, say 80% of those people are women, then that implies a very different set of problems and solutions to if the split is 50-50 between women and men.**

care and leisure or to participate fully in social and political activities.”<sup>39</sup>

This information attests to distinctly female experiences in cities that may require rethinking city policies and planning to address their living conditions and experiences. As the United Nations Data Revolution Group put it: “Knowing the number of people in a country living under \$1.25 a day, for example, is one thing. But if, say 80% of those people are women, then that implies a very different set of

<sup>34</sup> Jeni Klugman in Kirkpatrick, “How Will Women Fare as Cities Grow Dramatically? The Data are Missing.”

<sup>35</sup> Yodi Christiani, Julie E. Byles, Meredith Tavener, and Paul Dugdale, “Do women in major cities experience better health? A comparison of chronic conditions and their risk factors between women living in major cities and other cities in Indonesia,” *Global Health Action* vol. 8, 2015 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4685294/>

<sup>36</sup> “The World’s Women 2015 Trends and Statistics,” United Nations Department of Social and Economic Affairs, 2015, [https://unstats.un.org/unsd/gender/downloads/worldswomen2015\\_report.pdf](https://unstats.un.org/unsd/gender/downloads/worldswomen2015_report.pdf)

<sup>37</sup> Organization for Economic Co-operation and Development, “Gender Equality and Sustainable Infrastructure,” Presentation

at OECD Council on SDGs,” 7 March, 2019,

<http://www.oecd.org/gov/gender-mainstreaming/gender-equality-and-sustainable-infrastructure-7-march-2019.pdf>

<sup>38</sup> “What is unpaid care?” *Interactions*, accessed 28 January 2020, <http://interactions.eldis.org/unpaid-care-work/issues/what-unpaid-care>.

<sup>39</sup> Clare Coffey, Patricia Espinoza Revollo, Rowan Harvey, Max Lawson, Anam Parvez Butt, Kim Piaget, Diana Sarosi, and Julie Thekkudan, “Time to Care: Unpaid and Underpaid Care Work and the Global Inequality Crisis,” *Oxfam International*, January 2020, accessed 24 January, 2020. [https://ousweb-prodv2-shared-media.s3.amazonaws.com/media/documents/FINAL\\_bp-time-to-care-inequality-200120-en.pdf](https://ousweb-prodv2-shared-media.s3.amazonaws.com/media/documents/FINAL_bp-time-to-care-inequality-200120-en.pdf)

problems and solutions to if the split is 50-50 between women and men.”<sup>40</sup>

## 5. SCJC beyond mobile phones

### Rethinking SDG 5.B.1

SDG 5.B.1 suggests countries can determine their progress in empowering women through ICTs by identifying the proportion of individuals who own a mobile phone, by sex. Undoubtedly, this is a relevant and important indicator. Mobile phones connect individuals to a number of economic, educational, and social resources. Mobile phones have enabled women to become small business owners, own property, improve literacy and numeracy skills, and maintain the family and community networks that are integral for survival. In the twenty-first century, women who do not have a mobile phone are

frequently at a disadvantage for economic empowerment and social mobility.

However, mobile phone ownership does not equate women’s empowerment. Furthermore, understanding mobile phone ownership as the sole indicator of how to empower women through ICT does not do justice to the number of other possibilities offered by technology, especially in the smart city. A few cultural and practical limitations that 5.B.1 may skew or ignore include:

- **Phone sharing:** Women often share phones with their family members
- **Cultural attitudes:** In some places, women are discouraged from using their mobile phones and/or the internet
- **Wi-Fi Access:** Wi-Fi may be unavailable or too expensive

SMART CITY		JUST CITY	
<ul style="list-style-type: none"> <li>• Collection, processing &amp; use of large quantities of data on all aspects of city life;</li> <li>• Employment of information and communication technology (ICT) &amp; Internet of Things (IoT) through inexpensive sensors, widely distributed data collectors &amp; users, &amp; computing &amp; data storage</li> <li>• Applied to public functions such as schools, libraries, transportation systems, hospitals, power, water waste management &amp; law enforcement</li> <li>• Leads to efficiency &amp; better management to address city problems.</li> </ul>		<ul style="list-style-type: none"> <li>• Starts with a vision and commitment to justice - more equitable approaches;</li> <li>• Focused on better access to services and infrastructure for all;</li> <li>• Requires opportunity for good jobs for everyone;</li> <li>• Includes affordable housing, adequate investment in public services and fair taxes and charges;</li> <li>• Unifies the city through broad understanding and ownership of strategies.</li> </ul>	
VISION	MECHANISM	OUTCOME	
<p><b>SDG 11</b> a city that is inclusive, safe, resilient, &amp; sustainable</p>	<p><b>SMART TECHNOLOGY</b> Technology, data, private-public sector collaboration</p>	<p><b>SMART, JUST CITY</b> Efficient, integrated, inclusive, &amp; equitable city</p>	

<sup>40</sup> Shaida Badiee and Claire Melamed, “Making the Data Revolution A Gender Revolution” United Nations Data Revolution Group, 15 December 2014,

<https://www.undatarevolution.org/2014/12/15/gender-data-revolution/>

- **Digital Literacy:** Women may be unfamiliar or uncomfortable using various mobile functions and apps
- **Time Consumption:** Women especially urban poor may perceive phones as diminishing efficiency rather than improving livelihoods and living conditions

Mobile phones are key for women’s empowerment today and the smart city makes it possible for women to take advantage of what ownership and access can offer. That is because the smart city frequently focuses on public, accessible Wi-Fi spots which can enhance women’s ability to access city resources, conduct business, and maintain social networks.

Yet, 5.B.1 alone is insufficient to measure the empowerment of women through ICTs, as it also does not represent the gamut of possibilities offered by a just city that employs smart technology. In fact, a number of smart city tools can reconnect city residents, including marginalized populations and the most vulnerable, to city resources. This includes:

- **Big Data:** Large data sets collected by smart city technology offers insight into patterns, trends, and behavior to determine good city policy
- **Open Data:** the open data source movement makes collected data freely available for non-experts to use and take advantage of
- **Crowdsourced Applications:** Ordinary individuals & users can upload data into platforms that seek to improve city experiences
- **City services:** Online services can connect users to city services such as health or finance

The following pages examine how the above smart city technology tools can help meet, or impede, the fulfillment of SDGs 5.1, 5.2, 5.3, and 5.5. Each

section will also list cross-cutting SDG 11 Targets met by a smart, just city with a gender lens.

## 6. Using the Smart City to meet Target 5.1 to end all forms of discrimination against women and girls everywhere

[Cross-Cutting SDG 11 Targets: 11.1 Access to Safe Housing & Basic Services & 11.2: Safe, Transportation Systems]

Technology stimulates job growth, economic development, and improved life outcomes across the world. In some parts of the world, it seems that there is a natural link between technological progress and women’s economic and social advancement. Yet, in some instances technology has facilitated discrimination against women, even as it has improved or sought to improve other aspects of city life. New forms of discrimination against women are emerging side by side with technological advancements. This includes exclusion from digital access, harassment and forms of violence facilitated by ICTs, and algorithm bias. Smart, just cities present the opportunity to deploy technology to mitigate forms of discrimination, with a multiplying effect.

### The digital gender gap & digital empowerment

Wi-Fi and digital literacy can empower women and girls. But, a digital gender gap perpetuates inequalities between men and women. Globally, women are 26% less likely to have access to a smartphone and internet than men. This number rises to 34% in Africa and 70% in South Asia.<sup>41</sup> Women are also under-represented in ICT jobs and as ICT specialists. In developed countries, the digital gender gap is more prominent in rural areas, whereas in developing countries, it is more prominent in urban areas. Globally, women in urban poor communities are 50%

<sup>41</sup>Organization for Economic Co-Operation and Development, “Bridging the Digital Gender Divide: Include, Upskill, Innovate,” *OECD*, 2018, accessed 10 December 2019,

<http://www.oecd.org/internet/bridging-the-digital-gender-divide.pdf>.

less likely to access the Internet than men of similar age, education, and house income level.<sup>42</sup>

Smartphones and city Wi-Fi spots help women participate in their community, pursue economic opportunities, and reinforce their social ties through ICTs.<sup>43</sup> Mobile money accounts, for instance, offer an effective way to boost financial inclusion, but women are far less likely to own a phone and use such an account.<sup>44</sup> Digital services can also provide key information about health, legal rights, or public transportation. According to the Web Foundation, the internet allows poor urban dwellers the chance to “change their situation – gain a voice, seek information, enhance their livelihoods, or expand their networks beyond existing social boundaries.”<sup>45</sup> But currently, it is largely male urban dwellers taking advantage of digital services and their possibilities. Closing the digital gender gap is therefore a question of women and girl’s empowerment, as much as it is an issue of affordable technology.

Lack of Wi-Fi access and digital literacy, underlying patriarchal attitudes, and the unequal burden of care work compounds the digital gender gap. Without Wi-Fi or the knowledge of how to navigate existing online resources, women will not be able to use the internet to gain a voice, seek information, enhance their livelihoods, or expand their networks. At the same time, a city’s efforts to install free Wi-Fi access points throughout the city will not effectively include women as city participants or empower them if underlying attitudes and custom do not support women’s digital empowerment.

For instance, 65% of men surveyed in New Delhi and Manila agreed that men have a “priority over women when it comes to accessing the city,” “men have the responsibility to restrict what women access on the Internet,” and that “women should be restricted from using the Internet in public places on their own.”<sup>46</sup>

<sup>42</sup>Web Foundation, “Digging into Data on the Gender Digital Divide,” *World Wide Web Foundation*, 31 October 2016, accessed 10 December 2019, <https://webfoundation.org/2016/10/digging-into-data-on-the-gender-digital-divide/>.

<sup>43</sup> According to the Web Foundation, when access to basic services and resources is scarce, social ties become critical for survival in urban poor communities.

<sup>44</sup> Web Foundation, “Digging into Data on the Gender Digital Divide.”

One third of men surveyed in Yaoundé in Cameroon, Jakarta in Indonesia, Lagos in Nigeria and Kampala in Uganda agreed with the previous three statements.<sup>47</sup>

In surveys conducted by the World Wide Web Foundation on barriers to internet use, women were more likely to cite relevance as a determinant for their lack of internet use, “I’m not interested in it,” “I don’t need it/have no use for it” or “I use it enough for my own needs. The Foundation partially attributed this to the unequal burden of care in addition to formal and informal work. Their research also revealed that “lack of know-how” was the strongest determinant in poor urban women’s internet use, “lack of time” followed shortly behind.<sup>48</sup> Rather than understanding it as “I don’t have the time to go online more often,” the WWWF suggests it may mean: “the benefit I would get is not worth the time I would have to give up.”<sup>49</sup>

### When mobile phones & the internet perpetuate discrimination

While studies have been conducted and pilots implemented on improving women’s status with mobile phones, more research is needed on what phone usage means female empowerment and autonomy. This is especially true given that the anonymity of the internet has encouraged the proliferation of hateful speech in some instances, and that women often bear the brunt of online abuse.

Furthermore, a new study on “Mobile phones, gender, and female empowerment in sub-Saharan Africa,” suggests that mobile phone by young women and girls in some parts of Africa enabled their spouses and partners to control and constrain the women’s behavior, facilitating coercive control and emotional abuse. The study examined gendered practices of phone use in educational settings, businesses, and romantic/sexual relationships in Ghana, Malawi, and

<sup>45</sup>World Wide Web Foundation, “Women’s Rights Online: Translating Access into Empowerment,” *Web Foundation*, October 2015, <http://webfoundation.org/docs/2015/10/womens-rights-online21102015.pdf>.

<sup>46</sup> *Ibid*, 40.

<sup>47</sup> *Ibid*.

<sup>48</sup> *Ibid*, 18.

<sup>49</sup> *Ibid*, 21.

South Africa, and found “little support...for the concept of the mobile phone as an instrument of positive transformation.”<sup>50</sup>

The researchers found that because of wider structures of patriarchy and chronic poverty, existing inequalities were “being re-inscribed and reinforced.”<sup>51</sup> Specifically, the team found that: “The phone’s application in romantic and sexual relationships demonstrates particularly strongly the ways phone are complicit in constraining women’s empowerment...[with] wider repercussions including for educational and entrepreneurship trajectories.”<sup>52</sup> Their conclusion emerged from data that revealed both a large gap between men and women’s use of their phone to advance businesses and pursue entrepreneurial opportunities, as well as how mobile phones enabled male partners to surveil and control their female spouses.

Although it is difficult to monitor speech on phones and the internet, especially as laws on this vary across the world, the smart, just city can alleviate discrimination by supporting and enforcing just laws against harassment against women through digital means as well as also helping women identify entrepreneurial opportunities and advance their businesses through digital means.

## Facial recognition technology: possibilities & limitations

Across the world, smart cities are increasingly deploying facial recognition technology to improve city safety. For example, Singapore aims to install 100,000 facial-recognition cameras on lampposts, Chicago police have requested 30,000 additional

cameras, and Moscow wants to have 174,000 by the end of 2019.<sup>53</sup>

Women may have the most to gain through facial recognition technology that makes places more secure or helps police apprehend perpetrators of harassment or assault. But, facial recognition technology has stoked public criticism of privacy violations.<sup>54</sup> In addition, facial recognition technology is inconsistently accurate, with inaccuracy occurring more with people of color and most with dark-skinned women. MIT and Stanford study revealed that the technology failed to recognize light-skinned men less than 1%, but it failed to identify darker-skinned women 34% of the time. These inaccuracies could have significant safety repercussions.

For instance, in Brooklyn, New York, a landlord recently decided to replace the key-fob building access with facial recognition. His decision technology scandalized his tenants and the local community. Imagine if a residential building like that was located in a crime-dense, poorly-lit area. Imagine if a woman of color who lives in that building arrives home late one evening and is unable to enter the building because the facial recognition technology, rather than key-fob, will not let her in the building and to her own home. The safety technology will now leave her more vulnerable to crime or victimization.

Furthermore, the willingness of a property manager or landlord to employ facial recognition technology as a safety mechanism, in the face of such inaccuracies will erode the trust tenants should have in their own landlords. As lead MIT Media Lab Researcher Joy Buolamwin points out: “You have to ask, would that have been permitted if those failure rates were in a different subgroup?”<sup>55</sup>

<sup>50</sup> Gina Porter, Kate Hampshire, Albert Abane, Alister Munthali, Elsbeth Robson, Ariane De Lannoy, Augustine Tanl, and Samuel Owusu, “Mobile phones, gender, and male empowerment in sub-Saharan Africa: studies with Africa youth,” *Information Technology for Development*, vol. 26 no.1, 2020, 180-193, <https://www.tandfonline.com/doi/full/10.1080/02681102.2019.1622500>.

<sup>51</sup> *Ibid.*

<sup>52</sup> *Ibid.*

<sup>53</sup> Matthew Keegan, “Big Brother is Watching,” *The Guardian*, 2 December 2019, accessed 5 December, 2019, <https://www.theguardian.com/cities/2019/dec/02/big-brother->

[is-watching-chinese-city-with-26m-cameras-is-worlds-most-heavily-surveilled?utm\\_term=RWRpdG9yaWFsX1RoZUNpdHlzY2FwZS0xOTEyMDg%3D&utm\\_source=esp&utm\\_medium=Email&utm\\_campaign=TheCityscape&CMP=cityscape\\_email](https://www.nytimes.com/2019/03/28/nyregion/rent-stabilized-buildings-facial-recognition.html).

<sup>54</sup> Ginia Bellafante, “The Landlord Wants Facial Recognition in Its Rent-Stabilized Buildings. Why?” *The New York Times*, 28 March 2019, accessed 28 March 2019,

<https://www.nytimes.com/2019/03/28/nyregion/rent-stabilized-buildings-facial-recognition.html>.

<sup>55</sup> MIT News, “Study finds gender and skin type bias in commercial artificial-intelligence systems,” *MIT Media Lab*, 12 February 2018, accessed 10 November 2019,

The above example shows how technology can inadvertently perpetuate discrimination. But, scenarios can also be imagined in which technology is used to purposefully discriminate against women as well, especially in countries where women have historically been limited in the public sphere. For instance, in September 2019 elections in Afghanistan, the Afghan government turned to facial recognition software to prevent voting fraud. Fraudulent elections in 2009 and 2014 saw “rampant ballot stuffing,” which led Afghanistan’s electoral authorities to require voters to be photographed at polling stations.

However, in conservative areas where most adult women and girls cover their faces outside of the home, this has discouraged women from voting. Protest letters by women’s rights groups to the government asserted that: “Women in rural areas wanted to vote but believed it was against Islam or culturally inappropriate to allow themselves to be photographed by men.”<sup>56</sup> As governments increasingly turn to facial recognition technology to support safety, it is important to recognize this technology, when employed without women’s perspectives and experiences in mind, can make it more difficult for women to participate in public life due to safety and other concerns

## 7. Indicator 5.2 to eliminate all forms of violence against all women and girls in the public & private spheres

[Cross-Cutting SDG 11 Targets: 11.1 Access to Safe Housing & Basic Services, 11.2: Safe,

<https://www.media.mit.edu/articles/study-finds-gender-and-skin-type-bias-in-commercial-artificial-intelligence-systems/>.

<sup>56</sup>Abdul Qadir Sediqi and Storay Karimi, “Afghan women fear mandatory poll photos could stop them from voting,” *Thomson Reuters*, 25 September 2019, accessed 25 September 2019, <https://www.reuters.com/article/us-afghanistan-election-women/afghan-women-fear-mandatory-poll-photos-could-stop-them-from-voting-idUSKBN1WA2WU>.

<sup>57</sup> UN Women, “Gender Equality and the New Urban Agenda,” *United Nations Entity for Gender Equality and the Empowerment of Women*, 2016. <https://www.unwomen.org/-/media/headquarters/attachments/sections/library/publications/2016/unwhabitat3brief-en.pdf?la=en&vs=1812>, 2.

<sup>58</sup>“Statistics – The Prevalence of Street Harassment,” *Stop Street Harassment*, accessed 12 November 2019,

## Transportation Systems, 11.3: Inclusive urbanization & participatory, integrated planning, & 11.7: Safe, inclusive, and accessible green & public spaces]

The smart, just city can also help eliminate violence against women and girls in public spaces. Safety in public spaces is an issue that effects women worldwide. According to UN Women, 92% of women in cities around the world have experienced sexual harassment.<sup>57</sup> A Gallup study reveals similar findings: 79% of women in cities in India, 86% in Thailand, 89% in Brazilian cities, and 75% of women in London say they have been subject to harassment or violence.<sup>58</sup>

In addition to physical and emotional vulnerability and trauma, harassment and safety perceptions impairs women’s ability to participate in the local economy and social life. For instance, a study from New York University’s Rudin Center for Transportation describes a “pink tax”: that women in New York City are willing to spend an average of \$25-\$50 more than men on transportation a month in order to take safer routes. Women traveling as caregivers are willing to spend \$100 more.<sup>59</sup> As WIRED magazine asks: “The most worrying question is this: What opportunities are women missing because they can’t get around the city safely or cheaply?”<sup>60</sup>

Technology can facilitate women’s increased safety. But technology in itself cannot eliminate gender-based violence, harassment, and intimidation. Instead, the smart just city can advance SDG 5.2 to end violence against women by making use of technology in conjunction with established laws, awareness

<http://www.stopstreetharassment.org/resources/statistics/statistics-academic-studies/>

<sup>59</sup> Sarah Kaufman, Christopher Polack, and Gloria Campbell, “The Pink Tax on Transportation: Women’s Challenges in Mobility,” *NYU Rudin Center for Transportation Policy & Management*, November 2018, accessed 10 August 2019, <https://wagner.nyu.edu/rudincenter/2018/11/pink-tax-transportation-womens-challenges-mobility>

<sup>60</sup> Aarian Marshall, “The Pink Transit Tax: Women Spend More Than Men to Get Around NYC,” *Wired*, 12 November 2018, accessed 15 March 2019, <https://www.wired.com/story/nyc-public-transportation-pink-tax-gender-gap/>

raising and community initiatives that seek to advance safety as a part of a broader vision of a just city.

## Crowdsource applications & participatory technology

Freedom of movement is a human right according to the Universal Declaration of Human Rights, but it is also key to women's economic empowerment. When safety concerns, including harassment and violence influence women's mobility, they are limited in their ability to participate in the local economy and access education.<sup>61</sup>

In India, the SafetiPin app promotes women's safety by letting users rate streets and areas for safety criteria. It also uses night time photos of cities and currently collects data in 28 cities across 10 countries of night time photos. In Delhi, SafetiPin has collected data for more than 60,000 safety audits over 6,000 kilometers with the help and support of the Public Works Department, the New Delhi Commission, and UN-Habitat. In Bogota, SafetiPin has collected data for 3,000 km roads and 8,000 audits. SafetiPin shows how smart technology can have social justice outcomes as the Public Works Department and the New Delhi Commission have used SafetiPin data on poor light to improve lighting as well as their Safety Scores for bus stops. The Delhi police also have used their data on unsafe areas to determine where more patrolling of police vans is needed.

A crowdsource mapping initiative by Urban Institute (UI) and the Information Technology University (ITU) Punjab further underlines the need for technology to be supported by human-led policies and activities. In 2017, UI and the ITU Punjab partnered to map hotspots where users experienced violence or harassment or felt unsafe in Lahore.

<sup>61</sup> World Bank Group, "Women, Business, and the Law," (International Bank for Reconstruction and Development/The World Bank: Washington, DC, 2020) accessed 15 January 2020. <https://openknowledge.worldbank.org/bitstream/handle/10986/32639/9781464815324.pdf>

<sup>62</sup> Ammar A. Malik, Yasemin Irvin-Erickson, and Faisal Kamiran, "Using technology to improve women's safety in Pakistan's urban transit systems," *Urban Institute*, 19 December 2017, accessed 10 September 2019, [https://www.svri.org/sites/default/files/attachments/2018-07-24/ICRW\\_TFGBVMarketing\\_Brief\\_v8-Web.pdf](https://www.svri.org/sites/default/files/attachments/2018-07-24/ICRW_TFGBVMarketing_Brief_v8-Web.pdf).

Lahore had recently updated its Bus Rapid Transit System and added smart ticketing.<sup>62</sup> Lahore envisioned the smart ticketing would minimize women's vulnerability in public spaces because it would eliminate interactions between women and conductors or transport employees, further decreasing the time spent in transport sites. But, the initiative revealed that women in Lahore continue to feel unsafe as they take public transit. Data-gathering reveals that ticketing is not the challenge to women's safety, but rather that in Lahore transfers between different modes of transports are difficult or impossible with large distances and physical barriers between them and unreliable schedules.

Technology, therefore, must be accompanied by broader city policy and municipal stakeholder collaboration. Governments can effectively harness technology to improve women's safety if they are dedicated to empowering women as a component of an inclusive, equitable, and just city. For example, in Mexico City, the government has collaborated with the mobile application Vive Segura to help survivors of incidents of sexual harassment and violence on public transportation to report it directly. The government has backed the project by creating three support centers in metro and metro bus systems and 125 women only buses.<sup>63</sup>

Similarly, the Hwindi mobile app in Harare, Zimbabwe matches passengers to drivers in a rideshare arrangement similarly to rideshare companies Uber and Lyft, but it requires drivers to clear an official police report and background check before approval.<sup>64</sup> This example also highlights the importance of city-level exchanges that can take place between developing and developed countries. In the United States, Uber was recently mired in controversy over the number of convicted sexual predators allowed to drive Uber because the company does not

<sup>63</sup> "Improving Women's Safety in Mexico City," *UN Women*, 28 November 2016, accessed 4 December 2019, <https://www.unwomen.org/en/news/stories/2016/11/improving-womens-safety-in-mexico-city>.

<sup>64</sup> Sigauke, Maureen, "Getting Around the City With Kids, When Formal Transit Has Collapsed<" *CityLab*, 7 January 2019, accessed 7 January 2019, <https://www.citylab.com/perspective/2019/01/moms-families-transit-harare-zimbabwe-after-mugabe/579298/>

have a comprehensive background check policy. The two distinct policies of Uber and Hwindi in Harare and American cities underline how cities can engage with their international counterparts on these important issues.<sup>65</sup>

### Big data/Open data for safer mobility

The smart city also has the ability to collect large amounts of data, called big data, as well as the ability to make that data public and user-friendly or open data. The data collected and made available can provide insight into women’s perspectives and experiences in the city, which can help cities make data-informed and gender-inclusive policies to address crime. For example, big data can help assess women’s perception of safety, mobility, and their participation in the local economy. A 2018 Data Pop Alliance case study of “crime shocks,” in different Mexican cities used computational analysis of behavioral data to measure behavioral differences in urban areas after major crime events. It examined credit card transactions’ metadata to elicit the impact of crime and violence on affected communities and determined that crime shocks had a gendered effect on consumption patterns with differences across socioeconomic patterns.

The study concluded that women were less likely than men to travel freely and purchase things in the aftermath of a major crime event. Data Pop asserted that this was a significant finding given that: “Any difference in how crime dissuades economic activity and social mobility across gender groups would mean that a crime shock would potentially exacerbate the existing level of inequality between men and women.”

<sup>66</sup> Specifically, women may “be more constrained for a long period after a crime shock limiting their access to opportunities.”<sup>67</sup>

The massive data collection by smart technology can facilitate equitable urban development. Collecting data

<sup>65</sup>Jessica Guynn, “Uber safety review reports more than 3,000 allegations of sexual assault last year,” *USA Today*, 5 December 2019, accessed 6 December, 2019, <https://www.usatoday.com/story/tech/2019/12/05/uber-safety-report-nearly-6-000-sexual-assaults-2017-and-2018/2624893001/>.

<sup>66</sup> Rodrigo Lara Molina, Alejandro Noriega, Eaman Jahani, Julie Ricard, and Alex Pentland, “The Impact of Crime Shocks

on credit card transactions after crime shocks in Mexican cities provides information for governments on how their citizens spend their money. This information enables them to build and support inclusive infrastructure. Recognizing that women’s buying power is limited after a crime shock may motivate a government to prioritize women’s safety which has a broader effect on the city economy as a whole.

### 8. Target 5.4 to recognize & value unpaid care & domestic work through the provision of public services, infrastructure, & social protection policies

[Cross-Cutting SDG 11 Targets: 11.1 Access to Safe Housing & Basic Services, 11.2: Safe, Transportation Systems, & 11.3: Inclusive urbanization & participatory, integrated planning]

Insights provided the smart city can also help city governments provide better public services, infrastructure, and social protection for women involved in unpaid care and domestic work.

### Big data, burden of care, & social services & protections

Big Data provides insight on the gaps in public services, infrastructure, and social protection that women need. For instance, Call Detail Records (CDR) produced by telephone and telecommunication exchanges confirms that women in cities travel in different patterns than men. This is because the household division of labor produces gendered mobility patterns. Women, who are typically responsible for childcare and shopping for the home

Across Gender and Socioeconomic Groups: A Large-Scale Mapping of Behavioral Disruption,” in *Big Data: To Address Global Development Challenges*, edited by Data Pop Alliance, 2018, p. 12, accessed 20 November, 2019.

[http://datapopalliance.org/wp-content/uploads/2019/10/FINAL\\_AFDpaperseries.pdf](http://datapopalliance.org/wp-content/uploads/2019/10/FINAL_AFDpaperseries.pdf)

<sup>67</sup> *Ibid.*



in addition to formal or informal employment are more likely to take more multi-purpose, multi-stop trips than men. Given that women are also more vulnerable to crime than men and that they are more likely to travel with children, city resources should focus on making women's journeys safer in order to make the city safe and inclusive as a whole.

Using Call Detail Record (CDR) data produced by telephone and telecommunication exchanges, Data 2x conducted a study of Santiago based on where men and women travel that affirmed hypotheses of gendered mobility.<sup>68</sup> In Santiago, women moved less overall than men with a smaller radius of movement. The study suggested that women's mobility was limited by fewer public and private transportation options. This is in turn linked to lower average incomes and. But, because women are largely responsible for unpaid care work, they have more complicated travel patterns. They may "trip-chain" – or "drop the children off at childcare, go to work, and the grocery store after work before picking the children up again", in contrast to men who are more likely to do the twice daily commute.<sup>69</sup> When a woman has a child under five, her trip-chaining increases by 54% in contrast to the 19% for males with children under five.<sup>70</sup>

Some cities have begun to pilot smart city programs to facilitate women's travel based on their different mobility needs. Columbus, Ohio won the United States Smart City Challenge in 2016 which awarded it \$40 million from the U.S. Department of Transportation and \$10 million from Vulcan, Inc to support smart city technologies to improve people's quality of life, drive economic growth, provide better access to jobs and opportunity, become a world-class logistics leader, and foster sustainability.<sup>71</sup>

One component to their smart city is a program that focuses on women's mobility and their quality of life. From June 2019 to November 2019 they piloted a program "to connect pregnant women with on-

demand rides to doctor's appointments and other daily errands, such as grocery shopping and pharmacy trips," through mobile application. This pilot addresses the challenge of planning transport for women who "trip chain," but its primary aim was to use technology to address the rising rates of infant mortality in Columbus. The pilot aimed to "research whether lowering barriers to prenatal care and reducing gaps in transportation for low-income women can eventually treat the city's darkest public health issue."<sup>72</sup>

In this instance, the city of Columbus followed a SCJC framework: it identified an issue, basic service gap, and how a smart tech tool could fill that gap. The issue was a high-rate of maternal mortality especially among low-income women in Columbus and the gap was women's inability to access their doctor, pharmacy trips, and grocery shopping because transport was not inclusive throughout the city especially for pregnant women or mothers and their children. The tool identified to fill that gap was a mobile ride-share application to help women travel to the places they needed to go to support their health as well as their children's.

### Online information, unpaid care & domestic work, & public services

Women provide the majority of global unpaid care work, often at the same time as they work in informal or formal settings. Women in urban slums that care for their family, home, participate in the informal and cash economy, and live far from health services, schools, and infrastructure like water may spend as much as 17 hours a day work within and outside of the home. Because women are so busy, in this study of slum dwellers, on a minority felt the internet would "enhance their livelihood."

<sup>68</sup> Bapu Vaitla, "Big data, Big Impact? Towards Gender-Sensitive Data Systems," Data2x, November 2019, accessed 5 December 2019, <https://data2x.org/wp-content/uploads/2019/11/BigDataBigImpact-Report-WR.pdf>.

<sup>69</sup> Caroline Criado Perez, *Invisible Women: Data Bias in a World Designed for Men*, Abrams Press: New York, 2019, p. 30.

<sup>70</sup> *Ibid.*

<sup>71</sup> "Smart Columbus," *The City of Columbus*, accessed 10 December 2019, <https://www.columbus.gov/smartcity/>.

<sup>72</sup> Lara Bliss, "In Columbus, Expectant Moms Will Get On-Demand Rides to the Doctor," *CityLab*, 27 December 2018, accessed 28 December, 2018, <https://www.citylab.com/transportation/2018/12/smart-city-columbus-prenatal-ride-hailing/579082/>.

Yet digital services like “mobile money, e-government, agricultural market information, mobile learning, and health are critical to make internet more useful and more widely used by women.”<sup>73</sup> All of these resources would help women manage households including health, finance, and market access. City governments can recognize and value unpaid care work by teaching digital tech skills, eliminating the Wi-Fi and mobile phone affordability barrier, and making women’s civic, educational, and political engagement a component of digital literacy. Governments that pursue gender-minded smart city policies can help women use ICT to decent work, productive resources, childcare and financial services, and credit.

## 9. Target 5.5 to ensure women’s full & effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, & public life

[Cross-Cutting SDG 11 Targets: 11.1 Access to Safe Housing & Basic Services & 11.3: Inclusive urbanization & participatory, integrated planning]

The smart, just city can help ensure women’s full and effective participation and equal opportunities, by providing women with critical information to help themselves. For instance, in countries like Pakistan, India, and Uganda to name a few, there is a mobile gender gap. In India, over 70% of men have a cellphone, while just 38% of women have a phone. On average women are 26% less likely to have a smart phone than men and in South Asia and Africa the number stands at 70% and 34% respectively.

But, filling the “mobile phone gender gap” is not just about handing a cellphone out to women. As Michael

Gurstein, a community informatics pioneer noted in 2003, there is a difference between “access” and “wealth creation and economic development.” Simply providing ‘access’ to a mobile phone for women may not do anything to provide that “missing link.”<sup>74</sup> Instead, it should be supported that “while the mobile gender gap matters in its own right, it is particularly problematic because it can exacerbate other important forms of inequality in earnings, networking opportunities and access to information.”<sup>75</sup>

Women’s participation in political, economic, and public life also involves access and digital literacy. In the World Wide Web Foundation study on the gender data gap, one male interviewee explained: “TV and newspapers supply information but only give you what they want you to know. But if you want something personally, Google... Google tops it all.”<sup>76</sup> Information about medical services, for instance, is available online. Yet, sixty-five percent of women surveyed in Bogota, 60% in Jakarta, and 57% in Lagos had “never sought information anywhere especially with respect to sexual and reproductive health and legal rights.”<sup>77</sup>

Without information about their own health, finances, and market access, women are at a disadvantage from participating in decision-making in political, economic, and public life. A smart, just city that supports women’s digital literacy and empowerment can help place them at an equal playing field with men economically, socially, and professionally.

## Including women’s perspectives in the deployment of technology

In tech solutions, women must be both operationally and in leadership positions. For instance, an African Development Bank (AFDB) project in Cape Town, South Africa on helping community health workers monitor HIV-positive patients demonstrated the

<sup>73</sup> World Wide Web Foundation, “Women’s Rights Online.”

<sup>74</sup>Michael Gurstein, “Why I’m Giving Up on the Digital Divide,” *Informatics*, 15 April 2015, accessed 9 September 2019, <https://gurstein.wordpress.com/2015/04/15/why-im-giving-up-on-the-digital-divide/>.

<sup>75</sup> Giorgia Barboni, Erica Field, Rohini Pande, Natalia Rigol, Simone Schaner, and Charity Troyer Moore, “A Tough Call: Understanding barriers to and impacts of women’s mobile

phone adoption in India,” *Harvard Kennedy School: Evidence for Policy Design*, 2018 October, accessed 29 October 2019, p. 1., <https://epod.cid.harvard.edu/news/understanding-barriers-and-impacts-womens-mobile-phone-adoption-india>.

<sup>76</sup> Respondent cited in World Wide Web Foundation “Women’s Rights Online,” 28.

<sup>77</sup> *Ibid.*

importance of involving women’s perspectives to enable successful cross-gender tech development programs.

The developer aimed for the app to help community health workers monitor HIV-positive patients. The app “fulfilled all the usability requirements: it was easy to use, adaptable to local language and solved a very specific issue.” Yet, the app failed to garner the use community health workers hoped. But, the design team was unable to identify the app failure until a woman joined. According to Criado Perez: “It turned out that in order to more safely complete their daily commute into the townships where their patients lived, female health workers were concealing their valuables in their underwear. And the phone was too big to fit in their bras.”<sup>78</sup>

Consequently, smart technology in cities must involve a range of perspectives, including women’s, in order to be successfully inclusive.

### Enabling women’s leadership in the tech sector through women and girls’ tech programs

The smart, just city also provides an opportunity to reach large numbers of women and girls in technical classes and training. In Lagos, the Pearls Africa Foundation leads the GirlsCoding program to use tech to help girls from vulnerable communities meet their potential, begin careers, and possibly avoid teenage motherhood.<sup>79</sup> The program teaches skills in interface design, animation, and programming to girls ages 10-17 in slums, internally displaced camps, orphanages, and correctional homes. Currently women constitute 17% of science profession in Nigeria. The program aims to add 20,000 new female computer programmers to Nigeria’s tech industry by 2020. Similar programs exist across the world, such as Girls Who Code in Baltimore and Women Engineers Pakistan in Peshawar, that help girls and women in

<sup>78</sup> Caroline Criado Perez, 179.

<sup>79</sup> 23% of teenagers in Nigeria have their first child before age 19. See: NewsDeeply, “Girls Code Their Way Out of Nigeria’s Slums and Into the Tech Sector,” *Global Citizen*, 24 January 2018, accessed 15 December 2019, <https://www.globalcitizen.org/en/content/nigeria-lagos-girls-coding-tech-industry-computers/>

cities enter the tech economy and pursue leadership positions.

According to Mohini Ufeli, a communications associate from a local tech firm involved in the Pearls Africa Foundation project in Lagos, by women’s experience in the STEM fields “automatically increases the probability that they can transcend the conditions of poverty they currently exist in.”<sup>80</sup> They are furthermore encouraged to “envision a world where they work at the best tech companies, and where they build solutions to problems their parents and others like their parents face.”<sup>81</sup> Ufeli concluded: “This broadening of their minds and what they believe they are capable of is perhaps the most powerful effect.”<sup>82</sup>

## 8. Recommendations

Supporting Sustainable Development Goal Indicator 5.B to “enhance the use of enabling technology, in particular information and communications technology to promote women’s empowerment” will only gain salience as both developing and developed countries become more online. But, as the technology’s possibilities expand, policymakers and stakeholders would benefit from rethinking SDG Indicator 5.B.1 to measure the empowerment of women through the use of enabling technology through “the proportion of individuals who own a mobile telephone, by sex.” As the previous examples have demonstrated, there are a number of ways that smart technology, when employed within a SCJC framework, can support women’s empowerment beyond phone ownership. The recommendations below offer guidance for helping cities meeting SDG 5.B.

<sup>80</sup> Mohini Ufeli quoted in “Girls Who Code Their Way Out of Nigeria’s Slums and Into the Tech Sector.”

<sup>81</sup> Ufeli quoted in “Girls Who Code Their Way Out of Nigeria’s Slums and Into the Tech Sector.”

<sup>82</sup> *Ibid.*

### Recommendation 1: Reconsider 5.B.1

Phone ownership does not guarantee that women can or do take advantage of city services or mobile applications that empower women. Existing data on female phone ownership throughout the world highlights the necessity of addressing the digital gender gap, but this data obscures whether female phone owners share their phones with one or more family members. Furthermore, it does not provide answers to central questions posed by the Web Foundation's work on the gender digital divide such as both men and women's attitudes towards their phone use, Wi-Fi access, and digital literacy. All of these are as important to determining digital empowerment as the fact of owning a phone. SDG 5.B.1 is an important indicator, but phone ownership should be considered only one aspect of enhancing women's empowerment through ICTs.

### Recommendation 2: Consider the smart, just city instead

The smart, just city encompasses a range of measurements of women's empowerment through digital means. Other possible indicators for SDG target 5.B could include, but is not limited to:

- **Enhanced digital literacy:** Do women feel comfortable using their smartphones? Are they aware of the number of services offered to them by the city or other mobile applications?
- **Easily, accessible Wi-Fi:** Is Wi-Fi cheap and accessible? Does the city provide Wi-Fi spots that work? Are the Wi-Fi spots installed equally throughout the city, regardless of varying socioeconomic conditions across neighborhoods?
- **Number of women employed in tech capacity including leadership positions:** Are women employed in technology? Do they fill leadership positions, including in tech policy? Do girls and women have the opportunity or are they encouraged to learn tech skills?
- **Cultural & social attitudes:** Are women limited by familial or romantic male contacts

in their cellphone use? Do women believe they will benefit from using technology?

### Recommendation 3: Conduct comprehensive assessments of current smart city projects & social justice initiatives to consider alignment

Cities across the world are pursuing both smart city projects and policies that seek to improve the lives of their residents, including underserved populations. One way cities can conceive the integration of smart technology, equity, and gender, is to assess ongoing projects and policies. Cities can examine current smart city technology projects and ask: do these projects have an equity aim? Have they harmed any populations? Is there a possibility for them to improve women's conditions?

In turn, they can examine ongoing projects and policies to improve inclusiveness, safety, and sustainability in their cities by asking questions about gender and technology. Do these ongoing projects have the potential for meeting SDG 5? Can they potentially harm women? How can smart technology be employed to facilitate this ongoing projects?

### Recommendation 4: accompany technology with policy

Smart city technology must be accompanied by human-led and centered policies. As examples from SafetiPin in New Delhi, India and Segure in Mexico City, Mexico demonstrate, existing crowdsourced applications will improve women's safety and perception of their safety when accompanied by government and law enforcement policies and partnerships to enhance data collection and make more effective policies based on that data.

### Recommendation 5: Engage with best practice exchange & knowledge sharing

Both cities that are old or new, in the Global North and south, are grappling with smart city technology and its possibilities. It makes sense that cities in

different parts of the world can learn from and offer insight to each other on how to create smart and just equitable cities. In India, for instance, the 100 Smart Cities Mission, which aims to develop 100 smart cities in India, will be of note for other countries as well. How different ride-sharing apps approach safety, such as Hwindi in Harare, Zimbabwe and Uber in American cities also provides points of exchange between countries.

## 9. Conclusion

All of this highlights the fact that there are a number of possibilities for women's empowerment through digital means that extend not only beyond phone ownership, but beyond the smartphone itself. Because cities are the digital frontiers experimenting with new ways of using technology to improve life and advance equity, and because large numbers of women are living in and moving to cities, the smart city should and does have a key role in advancing women's gender equality. The possibilities of smart city technology means it can help women and girl's empowerment in a number of ways including making safer transport and infrastructure, opening up educational opportunities, stimulating women's entrepreneurship, and improving access to health and other city services.

But, the smart city will limit and even harm women if it does not also pursue a just city agenda of inclusion, safety, resilience, and sustainability. It is the smart, just city, accompanied by policy change and the intention to harness data and technology equitably, that will empower women and consequently enable their city to flourish and provide opportunities for all residents.

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