RESEARCH REPORT

Urban Resilience: From Global Vision to Local Practice

Final Outcome Evaluation of the 100 Resilient Cities Program

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Contents

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Executive Summary

Today, the term resilience is commonplace in the global discourse. Cities, states, and countries have pursued recovery initiatives that aim not only to bounce back from downturns, but also to learn from them and to transform in ways that that can accommodate uncertainty and flexibility. But people have been promoting urban resilience for much longer than the last few years. For city-level governance, one of the biggest champions for increasing resilience was The Rockefeller Foundation's 100 Resilient Cities (100RC) program.

In 2013, The Rockefeller Foundation announced the creation of 100RC to support the transformation of public institutions, functions, and operations in 100 cities around the globe, with the goal of enabling them to "survive, adapt, and grow in the face of chronic stresses and acute shocks." This holistic definition of resilience extends beyond responding to individual emergencies. It also includes addressing the economic, social, and physical challenges that cities continue to face, such as climate change, migration, civil unrest, and global pandemics. This vision of urban resilience addresses chronic "stressors," such as inequality, high unemployment, and access to basic services, as much as it does the hazard events that exacerbate them. The 100RC program was the largest and most well-resourced programmatic effort to date to build urban resilience by providing in depth support to a diverse selection of cities around the world.

Shortly following the launch of 100RC, The Rockefeller Foundation commissioned the Urban Institute to monitor and evaluate its core features. To assess the program, Urban selected a sample of 21 cities and monitored their progress toward increasing resilience over five years. The final report is the result of that monitoring and evaluation, beginning with a formative evaluation ("M&E Phase 1") conducted from November 2014 to March 2016, which led into the current outcome evaluation that began in September 2016 ("M&E Phase 2"). In 2018, Urban released a midterm report on progress to date with strategic insights (Martín and McTarnaghan 2018). The final report focuses on two parallel inquiries: the cities' outcomes that are attributable to 100RC's intervention and the salience and influence of the 100RC model within the pool of other civil-sector city resilience programs, contemporary scholarship, and related indicators of urban resilience in the global zeitgeist. Data assessed for this report were collected for each sample city first in 2017 (including retrospective baseline data collection for cities that were well into their 100RC membership), and at six-month intervals from the beginning of 2018 to a final data collection in the fall of 2021. For baseline and final data collection, we conducted qualitative interviews with local stakeholders in all sample cities.

Complicating both the long-term impact of the program and our evaluation, the funding for 100RC was terminated in July 2019. The program closed its offices two months later. At this time, 100RC was helping 24 cities finalize their remaining strategies and was supporting 73 cities as they implemented their resilience strategies. The program closure disrupted cities' progress toward institutionalizing resilience outcomes into city planning and operations. Previously high levels of buy-in from local political leadership and partners diminished, and those cities in the midst of completing 100RC-defined products received significantly less engagement and support. Several gaps remained in cities' tools, plans, and relationships . Six months after 100RC's closure, the devastating impacts from the COVID-19 pandemic exacerbated inequalities in cities and heightened the need for social and economic systems to be resilient to health crises—not the climate effects, environmental hazards, and political and economic upheavals on which the program had largely focused.

The discontinuation of funding and the COVID-19 pandemic had obvious effects on the cities' resilience outputs as defined by 100RC. Few new strategies were drafted, and fewer strategy-identified projects were launched. Turnover and demotion of Chief Resilience Officers (CROs), who had been embedded within governments as program interventions, increased. The sustained effect of 100RC on the expected midterm outcomes remains variable. Although several cities discarded their resilience plans and the proposed operational changes amid this internal and external turmoil, others are thriving. After 100RC's closure, new civil-sector and global multilateral programs have filled the urban resilience capacity-building space. Jurisdictions beyond the original 100RC member cities are producing their own resilience strategies. Scholars of urban resilience continue to reference 100RC as a touchstone, for better or worse. Ultimately, in ways both desired and unanticipated, 100RC's legacy continues.

Key Findings

How Did 100RC Work?

In size, scale, and ambition, 100RC was a highly unique global intervention. The 100RC theory of change assumed that cities did not integrate resilience into plans or institutional planning practices prior to the intervention but would begin to do so after undergoing the process. 100RC focused on transforming city government planning and operations to build a greater capacity for resilience. It posited that institutional de-siloing efforts, cross-functional collaboration, and a central coordinating role could improve a city's ability to implement resilience projects.

The program offered a relatively standard set of tools and milestones for member cities, which were dispersed over three major life cycles. Life cycle 1 included identifying and onboarding a CRO, who would lead the city's resilience efforts. Life cycle 2 saw the development and release of resilience strategies, and life cycle 3 was the implementation period. But not all cities accessed the services in each life cycle. Cities joined the program at different times, so cities that were admitted in 2013 had continued access to the program supports for several years after releasing their resilience strategy, whereas many cities that were admitted in 2016 did not publish resilience strategies because of 100RC's closure. The 100RC program also modulated the intervention based on the capacity and commitment of the cities, with more committed cities (as determined by 100RC staff and leadership) receiving more support.

Generally, 100RC met key targets for life cycle 1, as 97 percent of all member cities had a CRO at some point during 100RC membership. As of October 2021, 65 percent of member cities still have one. For all but one sample city, the CRO role was a new function within city government. Most sample cities saw value in the CRO in terms of leading the city through strategy development and continuing to facilitate connections over time. In city stakeholder interviews, the CRO position was far and away the most supported intervention, with the informal network of CROs also lauded.

A significant but smaller share of cities completed life cycle 2 goals, as 86 percent of member cities released resilience strategies. Stakeholders said that the holistic resilience concept helped them develop a coherent plan of action and an integrated way of working across multiple themes. Several cities emphasized that 100RC encouraged an inclusive and collaborative approach that differed from prior practice. Although the planning tools and methodologies were broadly appreciated, some cities noted that they were too complex, cumbersome, or difficult to implement. Additionally, the tools were difficult to adapt to local contexts, especially for regional efforts involving more than one jurisdiction, such as Santiago, Lagos, and Greater Miami and the Beaches. Interviewees in most sample cities noted that they still refer to the strategy, and about a third of sample cities have updated or evolved their strategies. In a handful of sample cities, stakeholders noted barriers to updating their strategies, such as existing planning institutions.

Life cycle 3's achievements are more varied and difficult to assess. No standard data on implementation are available after 100RC's closure, forcing a reliance on qualitative, self-reported accounts. Based on city documentation, physical interventions to build resilience were most common, especially those related to water control (flooding or drought) or water quality. Cities also have socially oriented resilience initiatives underway, such as racial equity dialogues or public education campaigns. European cities tended to have the highest self-reported rates of project implementation, and midsized

cities in middle- to high-income nations appear to have broader implementation efforts, which interviewees attributed to public and private financial resources.

Political will, access to funding, technical assistance, the ability of a CRO to advocate for an initiative, and, to some extent, having cross-functional working teams are all important to the successful implementation of projects. But lack of funding, lack of support from the mayor or local government, changing administrations, staff turnover, department restructuring, and difficulty coordinating across departments were all mentioned as major barriers.

Given the original 10-year targets, the closure of the 100RC program after 6 years came as a surprise to all member cities and caused a significant interruption in local progress, particularly for cities that were admitted later. Many stakeholders shared concerns that there was a mismatch in attention and support for the planning phase versus the implementation phase and that progress toward implementation was limited without access to the tools and partners they relied on. They also noted weaker connections to other cities and global resilience leaders. The COVID-19 pandemic challenged the durability of the 100RC intervention further, as only two cities included pandemic preparation in their strategies and neither had taken action following the strategies' release.

Ultimately, these disruptions severely hampered the fundamental vision of 100RC. The 100RC model put forward a standardized intervention with ample resources that would quickly scale to 100 city units (not metropolitan or urban conglomeration units, with a few exceptions). In theory, this intervention would occur through public-sector institutions and officials, with an emphasis on institutional changes. This model made two assumptions. First, that it would generate resilient institutions in cities, with discernable change within five years of the intervention. And second, that these interventions would build a global urban resilience movement.

Was 100RC Effective?

Through the evaluation, we tracked evidence of how cities were able to institutionalize resilience practices in city planning and operations. Across the 21 sample cities, almost all cities advanced on at least a few outcomes, but very few advanced across all domains. In several cases, cities with stronger capacity at baseline, such as Norfolk in the US and Wellington, New Zealand, were able to accelerate and institutionalize their resilience practices so that these practices are now part of business as usual for the city government. On the other hand, some cities that started out with a lower capacity for resilience, such as Addis Ababa, Ethiopia, were able to demonstrate incremental progress across

indicators but need more capacity support. A few cities demonstrated uneven progress across the evaluation period, showing early progress before being set back.

Key contextual factors, such as city size, development context, and governance capacity, also shaped cities' experience and progress, but the sample cities did not demonstrate consistent patterns across these domains. Cities in more stable and middle- to high-income countries generally improved their planning practices for resilience the most.

Across the five-year evaluation period, sample cities experienced a range of disruptions, including political and social unrest (Byblos), political transitions that affected city operations (Colima), and major national or regional shifts in power (Chennai, Athens, Medellin, and Santiago). Those with higher and more sustained levels of disruption were generally not able to generate positive change across the resilience outcomes of interest. All cities experienced the disruption of the COVID-19 pandemic, which further demonstrated the need for resilience but also pulled attention away from resilience efforts.

CITY PLANNING

Our evaluation tracked six constructs in order to understand the extent of resilience integration into city planning. These constructs are (1) explication of resilience in plans; (2) use of science and evidence in plans; (3) internal consistency across plans; (4) vertical planning integration; (5) community participation and access in planning; and (6) alignment with vulnerable populations in plans. These constructs are backed by the literature to assess whether the interventions increased resilience in a city's long-term planning processes. Across the six constructs, the M&E team found evidence of resilience integration in all the sample cities and modest movement to include all the measured resilience principles in planning.

In almost all cities, we observed progress toward the explication of resilience, or the degree to which plans outside of the resilience strategy either explicitly or implicitly include resilience priorities. Progress was observed on this indicator across cohorts, city size, and development context. Generally speaking, cities had limited to no integration of resilience at baseline, but almost all sample cities progressed.

For most of the planning constructs, a more patchwork pattern of resilience integration was observed. About half of the cities saw a positive change for the following four constructs: internal consistency of plans, vertical integration, community accessibility to plans and plan making, and alignment with vulnerable populations. Movement on these indicators was mostly observed in cities with stronger pre-existing planning capacity and some degree of resilience integration at baseline.

About a third of the cities started at a weak or middling baseline for those constructs and did not see positive movement, suggesting that more work is needed to increase capacity.

Finally, we did not observe any change in use of science and evidence for most cities. A significant share of cities, especially in those with high incomes, started strong in this construct. Byblos and Lagos started and remained weak on this construct. In a handful of cities with middle or low incomes, such as Chennai, Addis Ababa, and Can Tho, we observed benefits from the influx of international technical assistance including and beyond 100RC.

Although all sample cities made gains in one or more of the constructs, contextual factors such as development status and degree of disruption during the evaluation period had a large influence on which cities benefited the most. Cities in more stable and middle- to high-income country contexts were most likely to improve planning practices for resilience, while cities with high disruption—including shock exposures and political turnovers—were more likely to observe no change across planning indicators. Unlike development context and income, cohort, city size, and number of city leadership transitions showed no discernable effects on progress for planning outcomes.

CITY OPERATIONS

Our research team selected six core constructs to assess whether a city's CRO enhanced resilience efforts by affecting collaborations and administrative functions across city siloes. These constructs are (1) government structure (CRO); (2) function and government "silos;" (3) political/public discourse; (4) transparency and accountability; (5) budget integration; and (6) governance operations.

Across the sample cities, patterns regarding these changes mirror those found in planning. Overall, CROs showed moderate influence across departments. Although successes have not occurred in each city across all of the core constructs, most sample cities have made gains in one or more constructs. Only two cities, Byblos and Washington, DC, show little to no evidence of change from baseline to the present. Most cities progressed on three of the six operations indicators and stayed the same or regressed on the remaining desired outcomes. For three cities, the lack of change represented indicators they were already strong on, while the majority of cities failed to see positive change for constructs for which they were weak or middling at baseline. Five cities regressed on one or more indicators during the evaluation period. Change in government function (e.g., role of the CRO) was the most sustained outcome of the 100RC intervention. More than 85 percent of cities experienced and sustained positive change on this construct, from meeting the program milestone of hiring a CRO to institutionalizing that role within the city government even after the funding ended.

For other indicators, it was a mixed story. About half of all sample cities documented progress on government function, political commitment, budget commitments, and vertical governance operations. The transparency and accountability construct showed the least change. Across cohorts, nine cities started with moderate transparency and remained at that level over time, two cities began strong and remained strong, and two others held steady with weak transparency. This lack of change can partially be explained by the widespread pre-intervention practice of posting datasets, official reports, meeting notes, and other information online.

How Influential Was the 100RC Model?

A primary goal of the 100RC theory of change was to catalyze a movement around urban resilience. And, in contrast to the goal of transforming city-level outcomes, this vision was significantly achieved. 100RC's previously unmatched scale, resources, and visibility helped accelerate the urban resilience movement as evidenced by the proliferation of comparable programs to it during the evaluation as well as the scholarly attention paid to 100RC (in praise and in criticism).

As we indicated in our midterm report, 100RC sought "to transform fundamental public institutions, functions, and operations in city government as its primary strategy to impact how cities mitigate shocks and reduce chronic stressors, particularly among poor and vulnerable citizens" (Martín and McTarnaghan 2018, 1). With city institutions and governance continuing to solidify urban resilience in literature and practice and with significant attention on the resilience strategies produced across member cities, it would appear that this fundamental goal has been achieved. Multiple programs focused on urban resilience evolved at the same time as 100RC or have launched since its closure. Programs across the multilateral, nonprofit, and philanthropic spectrum vary in how they attempt to build urban resilience, but most were influenced by the 100RC program.

The 100RC program took the city as the unit of intervention to improve resilience locally, but there is increasing attention on the importance of national policy environments that enable coordination across levels of government. Recent efforts have emphasized the need for better national and regional coordination in addition to the innovation and proximity that city leaders bring to relevant local issues.

With its driving focus on cities, 100RC placed outsized importance on individuals within city government, starting with the professional and personal development of CROs but also on mayoral and related authorities. The verdict is still out as to whether intervention via individuals creates lasting change. Strong leadership is important but not everything. Practitioners and the literature acknowledge

that the amount of change a single person can affect is limited: the CRO function alone cannot ensure resilience. Other interventions points, such as grassroots activists, could enhance the resilience model.

Another dimension where 100RC did not fully manifest its vision is in the conceptualization of resilience. Definitions of resilience and resilience goals are still inconsistent, but there is a growing consensus that urban resilience extends beyond climate resilience. In fact, those in the field believe resilience should be considered through multiple dimensions, including infrastructural, ecological, social, and economic. The tendency of programs such as 100RC to allow for a broad set of goals can limit effectiveness, but one size or type of program does not work for all cities. The literature cites that inequality and social exclusion undermine resilience-building efforts, so inclusion is a necessary condition for effective programs. More voices are needed in planning processes, especially with the COVID-19 pandemic drawing attention to societies' underlying inequities. To date, the literature has not found evidence that 100RC successfully drove equity outcomes. To build a more cohesive definition of resilience, practitioners and the literature highlight a need for more data and methods to measure and monitor resilience but claim that doing so has been very difficult to date.

Lastly, a critical way that the 100RC model failed was beyond its control: its timeframe. Resilience takes a long time to build. Practitioners consider resilience-building a long game, with individual procedural changes and significant physical interventions like infrastructure construction requiring at least 10 years to grow. The closure of the 100RC program came before resilience could take hold in cities. Literature has also highlighted the short 100RC timeframe, critiquing the fast turnaround time for strategy development, which put cities at risk of compromising the quality of community engagement during planning, limiting the scope to municipal boundaries despite regional challenges, and lacking consideration for the most vulnerable communities.

Final Reflections

Reflections from city outcomes, resilience practitioner perspectives, and current trends in urban resilience have informed lessons and thoughts for future interventions.

The world is becoming more complex, with a multitude of shocks and stressors afflicting cities. In the second half of 2021, more than a third of sample cities experienced civil unrest. Fewer, but still a notable amount of cities experienced floods, shootings, terrorism events, and heat waves. All cities felt the impact of the COVID-19 pandemic. Despite the holistic nature of the 100RC model, not all vulnerabilities were accounted for, particularly the potential for a global pandemic. Programs should

help prepare cities for resilience in face of all shocks and stressors, but experience shows that prioritization of projects can be critical for implementation.

A prestigious brand can influence city leaders to support certain priorities, but this approach is vulnerable to changes in prioritization or direction. The level of familiarity and buy-in with resilience concepts has grown significantly in member cities, many of which attributed this increasing attention to the 100RC program. In some cities, such as Belfast, Ireland, and Semarang, Indonesia, 100RC served as a catalyst for climate resilience in city government. But the early closure of the program meant that the progress made in cities to adopt a resilience frame was called into question, and city leaders across multiple cities lost confidence in the approach.

Networks and city-to-city learning, especially around complex, new topics have value. Most cities noted that access to a global network of CROs was the most valuable program offering, as they could learn from others and share knowledge. Many CROs noted that they remain in communication with each other through formal and informal mechanisms. Despite the global nature of the program, regional networks and relationships proved particularly important, and CROs were most likely to be in close contact with their national or regional peers.

The success of program uptake is highly dependent on local political support and governance structures. Lack of support from city leadership was noted as one of the key barriers to resilience planning and implementation. The institutional arrangements in which cities operated, such as the degree of centralization, also influenced outcomes. Implementation of resilience projects was most successful in cities in middle- and high-income nations with considerable need, capacity, and resources, although the program yielded outcomes in planning and operations to support resilience across varied city contexts.

Chief resilience officers are important champions for pushing a resilience agenda within city government, but vulnerable to turnover and change. Most cities saw the CRO position as valuable for leading a shared resilience vision during strategy development and for making connections among diverse stakeholders. Indeed, most sample cities saw operational improvements, including breaking down silos in city government. Despite the general success of CROs, many cities are losing their CROs or downgrading their level of influence or authority. In many cases, the CROs were not the main lead in their respective cities' pandemic response, despite health shocks falling within their purview. Addressing the long-term role of the CRO with respect to other critical city functions is necessary.

Programs should focus on solutions delivery and funding barriers in addition to city planning. Urban resilience stakeholders want to see a greater focus on solutions delivery because risks and

shocks that cities can address are happening now. Resource investments in the 100RC program favored city planning versus implementation, and without additional external support, cities often lacked technical capacity and budget resources to advance priority projects in the resilience strategies. Now, practitioners have taken a renewed focus toward making connections with experts to substantively support project implementation. In addition, urban resilience practitioners see the need to bring experts from different sectors together to shift practices and policies surrounding the technical aspects of resilience building. Lack of funding remains the main barrier to following through on implementation. More than anything, cities need the resources to support staffing and the capital to get projects initiated.

Resilience building has a long timeline. The focus on planning that 100RC offered attempted to address an environment where there are too many siloes and short-term actions. Despite the urgency to implement these interventions, urban resilience practitioners have not overlooked the continued need to help cities understand their vulnerabilities and prioritize long-term interventions. The 100RC closure taught the field that losing support for long-term change can set a movement back. Programs that commit to providing consistent support to cities can help the field realize the potential of the urban resilience movement.

Authors' Note

This report was updated on September 20, 2022. On page vii, the percentage of member cities that had a chief resilience officer in October 2021 is 65 percent, not 76 percent.

100 Resilient Cities Program Overview

Program History and Core Definitions

The 100 Resilient Cities (100RC) intervention was designed to help cities mitigate shocks and reduce chronic stressors to build city-level resilience by fundamentally transforming the way that public institutions plan and operate. It was among the first global urban initiatives to employ a consistent set of tools, supports, and resources across so many diverse cities—and certainly the first of its size to have the explicit mission of building city-level resilience. The 100RC theory of change began with a broad problem statement (a "desire to build greater resilience to respond, particularly at the city level … as natural and man-made shocks grow in frequency, impact, and scale") and with the articulation of an intervention ("a global challenge to identify 100 cities to be part of the 100RC network and receive resilience-building support from The Rockefeller Foundation").

In its first year, 100RC identified the need to transform public institutions, planning functions, and operations in city government as its primary strategy to impact how cities mitigate shocks and reduce chronic stressors. The program promoted practices such as inclusive planning, comprehensive analyses of external shocks and internal stressors, consensus building, and cross-sector collaboration to effect systemic change in these cities' governance.

The program established three city cohorts; the first was announced in December 2013 (32 cities), the second in December 2014 (35 cities), and the third in May 2016 (37 cities) (see table 1).

TABLE 1

100RC Cities by Geography and Cohort

Cohort 1 (2013)	Cohort 2 (2014)	Cohort 3 (2016)
Africa		
▪ Dakar, Senegal	▪ Accra, Ghana	▪ Addis Ababa, Ethiopia
▪ Durban, South Africa	▪ Arusha, Tanzania	▪ Cape Town, South Africa
	▪ Enugu, Nigeria	▪ Lagos, Nigeria
	▪ Kigali, Rwanda	▪ Luxor, Egypt
		▪ Nairobi, Kenya
		▪ Paynesville, Liberia
Europe		
▪ Bristol, UK	▪ Athens, Greece	▪ Belfast, UK
▪ Glasgow, UK	▪ Barcelona, Spain	▪ Greater Manchester, UK
▪ Rome, Italy	▪ Belgrade, Serbia	▪ Tbilisi, Georgia
▪ Rotterdam, Netherlands	▪ Lisboa, Portugal	▪ The Hague, Netherlands
▪ Vejle, Denmark	▪ London, UK	
	▪ Milan, Italy	
	▪ Paris, France	
	▪ Thessaloniki, Greece	
Latin America and the Caribbean		
▪ Medellin, Colombia	▪ Cali, Colombia	▪ Buenos Aires, Argentina
▪ Mexico City, Mexico	▪ Juarez, Mexico	▪ Colima, Mexico
▪ Porto Alegre, Brazil	▪ San Juan, United States	▪ Guadalajara, Mexico
▪ Quito, Ecuador	▪ Santa Fe, Argentina	▪ Montevideo, Uruguay
▪ Rio de Janeiro, Brazil	▪ Santiago, Metro Region, Chile	▪ Panama City, Republic of Panama
	▪ Santiago de los Caballeros, Dominican Republic	▪ Salvador, Brazil
Middle East		
▪ Byblos, Lebanon	▪ Amman, Jordan	
▪ Ramallah, Palestine		
North America		
▪ Alameda, United States	▪ Boston, United States	▪ Atlanta, United States
▪ Berkeley, United States	▪ Chicago, United States	▪ Calgary, Canada
▪ Boulder, United States	▪ Dallas, United States	▪ Greater Miami and the Beaches, United States (Greater Miami)[a]
▪ El Paso, United States	▪ Montreal, Canada	▪ Honolulu, United States
▪ Los Angeles, United States	▪ Pittsburg, United States	▪ Louisville, United States
▪ New Orleans, United States	▪ St. Louis, United States	▪ Minneapolis, United States

Cohort 1 (2013)	Cohort 2 (2014)	Cohort 3 (2016)
▪ New York City, United States	▪ Tulsa, United States	▪ Nashville, United States
▪ Norfolk, United States		▪ Seattle, United States
▪ Oakland, United States		▪ Toronto, Canada
▪ San Francisco, United States		▪ Vancouver, Canada
		▪ Washington, DC, United States
Oceania		
▪ Melbourne, Australia	▪ Sydney, Australia	
▪ Christchurch, New Zealand	▪ Wellington City, New Zealand	
South, Southeast, and East Asia		
▪ Bangkok, Thailand	▪ Bengaluru, India	▪ Can Tho, Vietnam
▪ Da Nang, Vietnam	▪ Chennai, India	▪ Jaipur, India
▪ Mandalay, Myanmar	▪ Deyang, China	▪ Jakarta, Indonesia
▪ Semarang, Indonesia	▪ Huangshi, China	▪ Kyoto, Japan
▪ Surat, India	▪ Phnom Pehn, Cambodia	▪ Melaka, Malaysia
	▪ Singapore, Singapore	▪ Pune, India
	▪ Toyama, Japan	▪ Seoul, South Korea

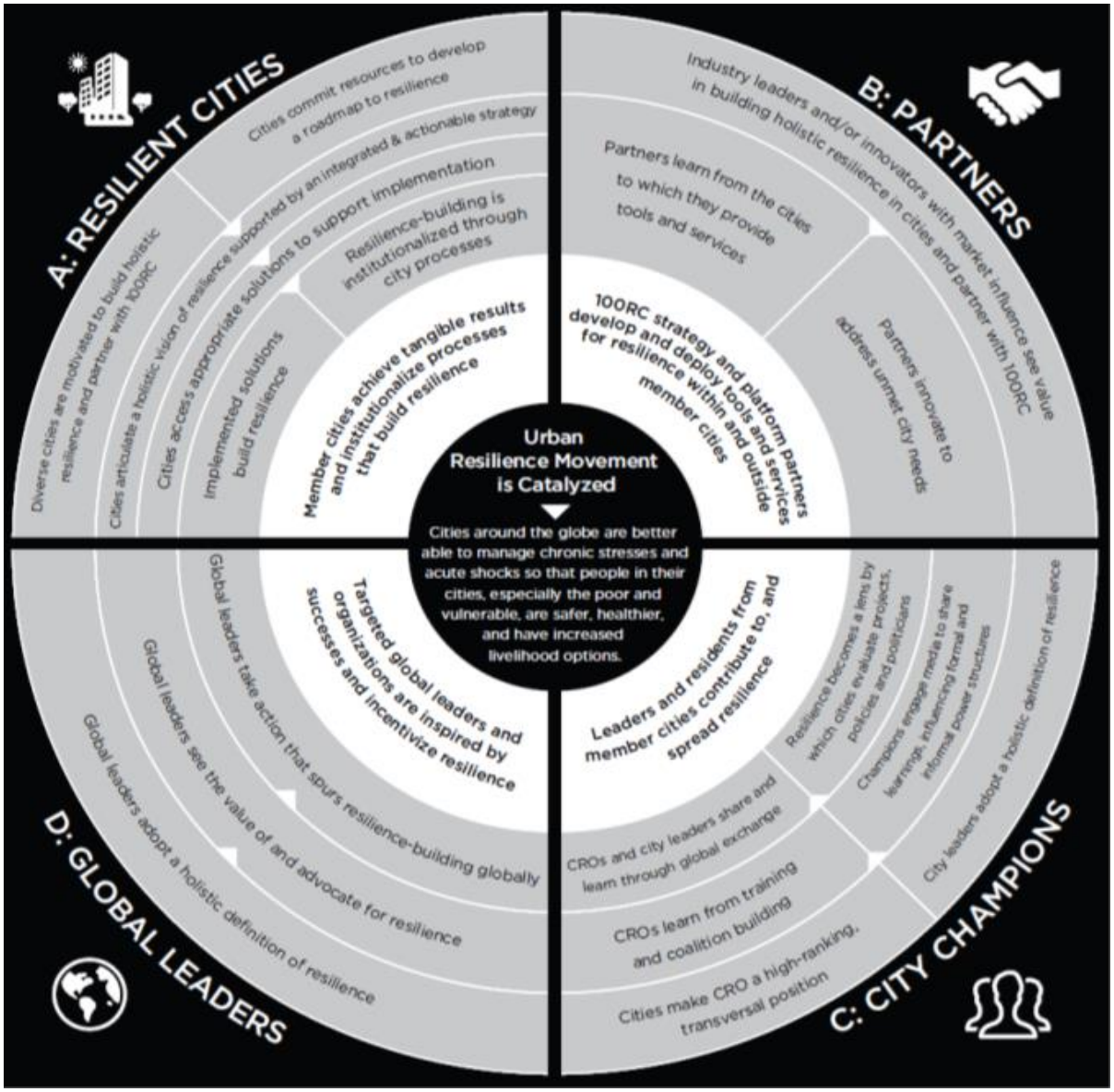
Source: Table developed by authors.
Notes: UK = United Kingdom.
[a] Greater Miami and the Beaches consists of the three jurisdictions in the Greater Miami coalition: City of Miami, City of Miami Beach, and Miami-Dade County

Program Theory of Change

Figure 1 is a simplified illustration of the program's theory of change, as developed by 100RC. There are four pathways that contribute to the overall goal of catalyzing an urban resilience movement. The theory of change was not formally developed until after the program was established; it evolved during the program's implementation as 100RC refined assumptions about the causal steps between strategy release, implementation, and the physical, noninstitutional changes in cities that will support quantifiable resilience improvements. The 100RC theory of change assumed that cities did not integrate resilience into plans and institutional planning practices before 100RC but, after undergoing the strategy process, would begin to do so. It posited that the institutionalization of formal de-siloing and cross-functional collaborations as well as the continuity of a coordinating role like a chief resilience officer (CRO) are correlated with a city's ability to implement resilience projects.

FIGURE 1

100RC's Theory of Change



Source: 100 Resilient Cities Program Document, n.d.
Note: 100RC = 100 Resilient Cities; CRO = chief resilience officer

Program Model and Interventions

The 100RC intervention provided a consistent set of tools, supports, and resources to each city, along with two years of funding to support an embedded CRO. The 100RC model focused on three explicit stages, or life cycles. The first life cycle involved placing CROs in cities to act as change agents in city

government operations. The CROs had access to a global network of CROs with whom they could engage in peer learning as well as a series of tools and resources provided by 100RC. This process was identified as life cycle 1 in 100RC's theory of change. CROs were selected and placed in cities to lead the coordination of resilience-building work and were envisioned to be highly visible and influential in city government, with no more than two degrees of separation from the mayor in the city's organizational structure. The program provided a standard job description that was customized to each city's context. The 100RC program funded CRO's salaries for two years through cash grants to cities. CROs received orientation and extensive guidance and other pro bono technical assistance from 100RC staff and partners.

Moving to life cycle 2, each CRO led a review, discovery, and engagement process supported by 100RC staff and partner resources and analytical tools that resulted in the publication of resilience strategies in their respective cities. Each city was tasked with developing a resilience strategy to prioritize specific, implementable initiatives for resilience building that could inspire city officials, constituents, and partners to act. CROs led the strategy-development process, which encouraged co-learning and co-creation across the 100RC member cities.

The strategy-development process involved two phases: phase I, in which the cities, led by CROs, identified priority "discovery areas" by actively engaging stakeholders in the public, private, and civil sectors as well as resilience experts; and phase II, in which cities went deeper with detailed diagnostic work and strategy implementation. The 100RC program developed a Resilience Strategy Guidance Manual and assessment exercises to aid cities in this endeavor.

The assessment tools that were used to guide the development of resilience strategies ranged in purpose and complexity. The principal tools included the following four:

- *City Resilience Actions Inventory*—to document and analyze existing plans, policies, and projects in a city
- *City Resilience Perceptions Assessment*—to gather stakeholder perceptions about a city's resilience
- *City Resilience Assets & Risks Tool*—to identify the key shocks and stressors a city faces and the impact of these on the city's assets
- *City Resilience Framework*—to generate a resilience profile based on 156 questions about urban systems in a city that reveal strengths and weaknesses across four dimensions: health and wellbeing, economy and society, infrastructure and environment, and leadership and strategy

Once a city's resilience strategy was in place, each city would move on to life cycle 3, in which the 100RC intervention intended to support cities in identifying technical and funding resources to implement projects or initiatives outlined in the strategies. Life cycle 3 in particular was interrupted by the closure of the program in 2019. The 100RC offerings were collectively meant to promote more inclusive planning, comprehensive analyses of external shocks and internal stressors, cross-sector collaboration and consensus building, and, ultimately, systemic change.

Across all three stages of the 100RC program, 100RC had three channels for supporting and engaging with cities: direct support from 100RC staff, engagement with strategy and platform partners, and peer learning through the network of CROs. The 100RC program engaged third-party partners from civil and private-sector entities to support strategy development and implementation. Pro bono strategy partnerships were offered to cities as a part of the strategy-development process, whereas platform partners had their own private-market offerings designed to support implementation of the resilience strategies. The goal was for partnerships between third parties and cities to lead to innovations in partners' tools and services that could in turn support resilience-related resources being offered at scale to member and non-member cities. Through the network, CROs and city leaders were given opportunities to share and learn through global exchange, trainings, and coalition building. Network participants were expected to emerge as leaders in the field of urban resilience as they convened from across the globe to share experiences and attempt to replicate transferable strategies.

While the program maintained a standard model throughout its implementation, not all cities accessed the same level of support. The biggest factor in the degree of support was the cohort in which cities entered the 100RC program (see table 1): cohort 1 cities had continued access to the program supports for several years after their resilience strategy launch, whereas for many cohort 3 cities the program closed abruptly before the launch. As a result, these cities had no formal access to life cycle 3. However, length of time in program was not the only factor that influenced the level of intervention; 100RC also modulated the intervention based on cities' capacity and commitment: cities showing higher commitment gained more access.

Status of Interventions

After approximately five years of implementation, The Rockefeller Foundation closed the program and ceased funding in July 2019 due to changes in organizational priorities. The closure came at a time when 100RC was evolving to intensify support to cities that were implementing resilience activities under the direction of their new resilience strategies.

Nearly all member cities (97 percent) had an official CRO at some point during their participation in the program.[1] As of October 2021, 64 member cities (65 percent) had an official CRO in place. Most cities (69 percent) experienced at least one CRO transition during the study period, reflecting both political transitions and regular turnover (with replacement) in cities where the CRO position has been more durable.

A new phenomenon is the increasingly prevalent downgrade of the standalone CRO position as a senior role in city government, replaced in several instances by a deputy CRO or a new resilience lead. The relative demotion of the CRO position in a few cities is an important development, since the 100RC model indicated that the CRO should be a full-time senior government official with no more than two degrees of separation from the mayor or city leader.

Finally, as of October 2021, 28 cities (29 percent) did not have a CRO in any form (including deputy CROs and resilience leads). Though some cities are looking for a replacement, there may be a continued movement toward institutional disinvestment and defunding of resilience efforts in these cities as CROs are not replaced.

As for strategy release (a life cycle 2 goal), a somewhat smaller share of cities reached this milestone compared to CRO onboarding: 86 percent of cities released resilience strategies.

No standard data on implementation of resilience initiatives are available due to lack of administrative data following the program's closure and limited data from cities on implementation progress to date.

Evaluation Design, Data, and Methods

Design

The final evaluation report contains two studies. The Resilient Cities Pathway Outcome Study (study 1) assesses the resilience institutionalization outcomes of the 100RC intervention in 21 purposefully selected sample cities. The 100RC Program Model Analysis (study 2) reviews the literature about urban resilience and the activities of programs that are comparable to 100RC to assess the influence of 100RC in the urban resilience movement.

The purpose of study 1 is to assess whether and to what extent member cities of the 100RC program have institutionalized resilience planning and operational practices introduced during their 100RC engagement. The evaluation also considers whether institutionalization happened more frequently in certain regions or contexts and the extent to which changes in cities' policies and practices are likely to persist. The core approach for evaluating 100RC's outcomes in member cities is to track the state of key resilience characteristics in a sample of 21 cities before 100RC membership, during the 100RC implementation (particularly through the CRO and the resilience strategy interventions), and after 100RC's direct funding.

To assess resilience institutionalization, the evaluation team tracked outputs and outcomes along four primary domains and 23 constructs of interest (table 2) from the baseline (2017) to final data collection period (2021) with semiannual updates in between. Each construct with respective indicators is detailed in appendix B along with the qualitative measures for each. The domains and constructs were identified based on a review of academic literature to assess the level of support for the various components of 100RC's theory of change.

Study 2 explores the 100RC program model by reviewing academic literature and comparable resilience-building programs. To complement the review of scholarly literature, the evaluation also tracked evolution in the global practice of urban resilience. The team identified resilience-building programs that were comparable to 100RC in content (urban resilience through institutional change), scope (global cities), or model (offerings such as learning networks, technical assistance, and embedded advocates in exchange for required deliverables). The first analysis, in 2017, reviewed 16 programs comparable to 100RC. As the resilience movement grew, the team added new programs to our analysis,

TABLE 2

Domain Summary

Domain	Summary	Constructs
100RC intervention	Activities and outputs were documented in relation to 100RC interventions—that is, the "dosage" of 100RC. These are not outcome constructs.	1. interest and motivation 2. need for resilience 3. resilience definitions 4. 100RC offerings 5. resilience strategy implementation status
Institutionalization of resilience city planning	A core 100RC hypothesis is that cities, through the 100RC resilience strategy process, will produce urban resilience plans during the 100RC intervention (the strategies) but will also transform and institutionalize their planning processes to increase resilience in the long term. By incorporating resilience thinking in urban planning processes, member cities can achieve tangible results such as incorporating resilience measures into land-use regulation or expanding community participation in major planning.	1. explication of resilience 2. use of science and evidence 3. internal consistency with other city plans 4. vertical integration with broader-scale plans 5. community accessibility to plans and participation in plan development 6. alignment with vulnerabilities and vulnerable populations
Institutionalization of resilience city operations	Another primary objective of the 100RC program for its cities is that, through the commitments of city leaders to resilience functions and activities, cities will transform their operations in the long term in ways that achieve tangible results and institutionalize processes that build resilience. In this domain, the CRO is the innovation—the catalyst for operational change. CROs facilitate coordination across city government (including applying resilience lenses to budgeting and programmatic decisions); with private and civil sectors; with counterparts in neighboring, regional, and national government; and with the citizenry.	1. governmental structure 2. function ("silos") 3. political and public discourse 4. transparency and accountability 5. budget operations 6. governance operations
External, contextual factors	Contextual factors were tracked to determine their contributions to the outcomes. These constructs are not expected to be altered directly by 100RC's intervention, but they may contribute to the expected outcomes or provide signals that other changes are occurring that 100RC did not intentionally plan.	1. general city characteristics and shocks 2. general planning operations and plans 3. general city operations 4. political conditions and policy context 5. social conditions 6. financial conditions and operations

Source: Framework development led by Carlos Martin with input from authors and technical reviewers and 100RC/RF staff.
Notes: 100RC = 100 Resilient Cities; CRO = chief resilience officer.

Resulting in 28 programs in the final review (table 3). For example, in later rounds the team incorporated 1000 Cities Adapt Now and Making Cities Resilient 2030, as well as programs that emerged after the 2019 closure of the 100RC program: the Resilient Cities Network (R-Cities), the Adrienne Arsht–Rockefeller Foundation Resilience Center at the Atlantic Council, and the Resilient Cities Catalyst.

TABLE 3

Baseline and Final 100RC Comparable Programs Reviewed

Baseline comparable programs	Final comparable programs
▪ African Development Bank's Pilot Program for Climate Resilience ▪ ASEAN Environmentally Sustainable City ▪ C40 City Adviser Program ▪ Cities Alliance Joint Work Programme on Resilient Cities ▪ IBM Smarter Cities Challenge ▪ ICLEI Resilient Cities Series ▪ ICMA Center for Sustainable Communities ▪ IDB Emerging and Sustainable Cities Program's Sustainable Cities Network ▪ Resilient America Network Communities ▪ UKAID (DFID) Future Proofing Cities ▪ UN-Habitat's Cities and Climate Change Initiative ▪ UNDRR Making Cities Resilient Campaign ▪ Urban Sustainability Directors Network ▪ USAID CCRD Climate Resilient Infrastructure Services City Pilots ▪ World Bank's City Strength Resilient Cities Program—CityStrength Diagnostic ▪ World Bank Global Facility for Disaster Reduction and Recovery	▪ 1000 Cities Adapt Now ▪ Adaptation Fund ▪ Adrienne Arsht–Rockefeller Foundation Resilience Center at the Atlantic Council ▪ ASEAN Environmentally Sustainable City ▪ Building the Climate Resilience of the Urban Poor Network ▪ C40 City Adviser Program ▪ Cities Alliance Joint Work Programme on Resilient Cities ▪ Climate Investments Funds' Pilot Program for Climate Resilience ▪ Climate Justice Resilience Fund ▪ Global Commission on Adaptation—Resilient Cities Action Track ▪ ICLEI Daring Cities ▪ ICMA Center for Sustainable Communities ▪ Partners for Resilience ▪ Partnership for Resilient Communities ▪ Resilient America Network Communities ▪ Resilient Cities Catalyst ▪ Resilient Cities Network (R-Cities) ▪ UN-Habitat's Cities and Climate Change Initiative ▪ UN-Habitat's RISE-UP: Resilient Settlements for the Urban Poor ▪ UN-Habitat's Urban Resilience Hub ▪ UNCDF International Municipal Investment Fund ▪ UNCDF Local Climate Adaptive Living Facility ▪ UNDRR Making Cities Resilient Campaign ▪ Urban Sustainability Directors Network ▪ World Bank Global Facility for Disaster Reduction and Recovery ▪ World Bank and GFDRR's City Resilience Program ▪ World Bank's City Strength Resilient Cities Program—CityStrength Diagnostic

Source: Author's compilation based on literature review.

Notes: ASEAN = Association of Southeast Asian Nations; IBM = International Business Machines; ICLEI = ICLEI—Local Government for Sustainability; ICMA = International City/Council Management Association; IDB = Inter-American Development Bank; DFID = Department for International Development; UN-Habitat = United Nations Human Settlement Programme; GFDRR = Global Facility for Disaster Reduction and Recovery; UNCDF = United Nations Capital Development Fund; UNDRR = United Nations Office for Disaster Risk Reduction; USAID CCDR = United States Agency for International Development Climate Change Resilient Development. Programs reviewed for both the baseline and final collection efforts are highlighted in blue.

City Sample and Sample Representativeness

Because there is no comparison group to determine a counterfactual condition, study 1 began with a purposively stratified sample of 22 cities, selected with 100RC input, from all cohorts and regions, of all sizes, and having other city characteristics assessed in 2016 to determine the sample (table 4). The sample would later be reduced to 21 cities after Durban, South Africa, suspended its relationship with 100RC in 2017 and was subsequently removed from the sample.[2]

Through each reporting period, the team tracked the distribution of city measures across several characteristics of the 21 sample cities at the time of sample selection, such as population, geography, developmental context, 100RC cohort, and national urban governance authority. These characteristics mirrored the state of the wider pool of cities and did not significantly change from one reporting period to another. However, following the midterm report published in December 2018, the team anticipated that new characteristics would arise that could make the sample less generalizable and potentially bias the monitoring themes and evaluation outcomes, including key intervention indicators (release of resilience strategies and CRO stability) and key exogenous factors (city leadership transitions and the experience of shocks). Therefore, the team reassessed the representativeness of the 21-city sample against the full population of 100RC cities for all these characteristics, particularly for those key intervention and exogenous indicators, semiannually.[3]

The team monitored key indicators across all participating cities to validate the degree of representativeness of the sample and to further understand the variations in cities' experiences during the program. Key *intervention indicators* included the release of resilience strategies and CRO stability, since these were the primary innovations that 100RC brought to the urban resilience field. We also tracked city leadership transitions and the experience of shocks as key *exogenous indicators* that may influence resilience outcomes but that 100RC's offerings did not have any control over. This section describes how the sample varies from the full population with regard to these indicators and sheds light on cities' overall participation in key program offerings and resilience challenges.

Overall, the sample sustained the relevance of the full 100RC intervention with only a few minor disclaimers. There were no major changes in the original sampling criteria. However, sample cities more accurately reflected the full population regarding changes in exogenous factors than in the intervention indicators; this does present a degree of bias that is detailed in this report as sample cities were more likely to reach major program milestones like hiring and retention of a CRO and publication of a resilience strategy. We incorporated this bias into our findings by making clear when a finding could be influenced by a specific bias and adjusting the strength of our conclusion in that case.

TABLE 4

Monitoring and Evaluation City Sample by Original Sampling Criteria

		Sampling Criteria (September 2016)				
Sample city	**Country**	**Region**	**100RC cohort**	**Most recent natural disaster**	**Size**	**Level of national development**
Addis Ababa	Ethiopia	Africa	3	3 years or less	Midsized	Low income
Athens	Greece	Europe	2	3–10 years	Midsized	High income
Belfast	UK	Europe	3	Over 10 years	Small	High income
Boston	United States	North America	2	3 years or less	Midsized	High income
Byblos	Lebanon	Middle East	1	Over 10 years	Small	Upper middle income
Can Tho	Vietnam	Asia	3	3–10 years	Small	Lower middle income
Chennai	India	Asia	2	Over 10 years	Large	Lower middle income
Colima	Mexico	Latin America	3	Over 10 years	Small	Upper middle income
Durban[a]	South Africa	Africa	1	Over 10 years	Midsized	Upper middle income
Greater Miami	United States	North America	3	3 years or less	Large	High income
Lagos	Nigeria	Africa	3	Over 10 years	Large	Lower middle income
Los Angeles	United States	North America	1	3 years or less	Large	High income
Medellin	Colombia	Latin America	1	Over 10 years	Midsized	Upper middle income
Melaka	Malaysia	Asia	3	Over 10 years	Small	Upper middle income
Montreal	Canada	North America	2	3–10 years	Midsized	High income
Norfolk	United States	North America	1	3 years or less	Small	High income
Paris	France	Europe	2	3 years or less	Large	High income
Rotterdam	Netherlands	Europe	1	Over 10 years	Midsized	High income
Santiago	Chile	Latin America	2	3–10 years	Large	High income
Semarang	Indonesia	Asia	1	3–10 years	Midsized	Lower middle income
Washington, DC	United States	North America	3	3–10 years	Midsized	High income
Wellington	New Zealand	Oceania	2	3–10 years	Small	High income

Source: Author tabulations based on 100RC application materials and World Bank income criteria.

Note: [a]Durban was later eliminated from the sample.

Data Collection and Analysis

Study 1 relied on a qualitative approach with baseline and final data collected via city site visits and extensive document review, as well as interim data tracking involving document review and interviews with CROs and staff from comparable programs semiannually.

The first stage of data collection produced a baseline dataset in the summer of 2017. The term *baseline* is used inexactly because the 100RC program had been in effect since 2013. To measure the city's "pre-100RC" conditions, the monitoring and evaluation team collected retroactive data for the study's indicators based on sources from three months and up to five years or more before each sample city's 100RC entry. The team also collected information from 100RC entry onward to measure the city's "during 100RC" status. The combination of the "pre-100RC" and "during 100RC" data constitutes the baseline dataset. In this report, final data ("post-100RC") collected in 2021 are compared to the baseline to provide a summative assessment of 100RC's outcomes.

For both baseline and final data collection, the research team engaged in intensive reviews of city documents and site visits consisting of structured interviews with city officials and nongovernmental stakeholders and observations of events. Key data sources for the document review included city government documents, data, websites, and reports; state or national documents, data, and reports (such as a census) as well as multilateral development or cooperation sources; scholarly monographs or publications; and advocacy or media reports. Site visits included approximately 20–30 interviews per city with a range of local stakeholders having varying levels of familiarity and involvement with the 100RC program. Key respondents during the site visits included 100RC associate directors and program managers (baseline only); CRO and CRO staff; other city government officials (senior and administrative); other local 100RC-engaged parties (nongovernmental organizations, private-sector entities, members of resilience steering committees); other local resilience stakeholders (i.e., bellwethers or interested parties without engagement in 100RC efforts); and neighborhood (sub-city), regional, state, and national government officials. Following data collection, teams produced a dataset by coding the data for each construct in each sample city, triangulating data sources, and noting likely source bias. The final data collection in 2021 was altered because of the COVID-19 pandemic, which required all site visits to be conducted virtually.

Throughout the evaluation period, the research team engaged in a streamlined data collection effort every six months to assess any notable changes in the outcome measures that were first tracked at baseline and to reduce the burden on city respondents in advance of final data collection. The interim

updates drew from the same types of document data sources used in the document review for the baseline assessment, as well as an interview of about 60–90 minutes with the CRO of each city.

For study 2, comparable models were systematically reviewed by looking at comparable program websites and written products to compare program goals, offerings, and projects being implemented. A subset of key program informants was selected and contacted for phone interviews. Through the document review and interviews, the team sought to glean lessons from trends in the program's key conceptual and programmatic aspects, trends in the program's operational and funding structures, other programs' successes or challenges, and urban resilience practitioners' perceptions of 100RC. The document review for programs was conducted biannually; interviews were conducted less frequently to avoid interviewee burnout given the limited number of comparable programs.

Data Collection Challenges and Biases

The intensive data collection efforts across 21 cities in 15 countries for study 1 was not devoid of challenges. As noted above, the COVID-19 pandemic forced the team to conduct the site visits virtually, which limited opportunities to observe interactions and projects in person, as well as potentially limiting the richness of data collected in face-to-face conversations. The pandemic unarguably decreased interviewee availability, as many people—particularly government officials—had busier schedules as they responded to the health crisis in addition to their regular responsibilities. Unfamiliarity with the 100RC program also impacted interviewee responsiveness, as many key leaders came into their position only after the program closure during the evaluation period. Likewise, high levels of staff turnover across city governments and within resilience offices reduced availability of people who were involved with the early 100RC intervention in their city. Lastly, a few cities experienced local shocks or important local events during key data collection periods that limited responsiveness. For example, Addis Ababa and Byblos experienced local crises in addition to the pandemic, and Colima, Santiago, Chennai, Boston, Montreal, and Paris experienced local elections that resulted in large-scale government turnover. Fortunately, many of these challenges occurred in a minority of cities.

The challenges noted above meant that some cities' analyses included more information from government officials (specifically, government officials directly working in resilience) than from nongovernmental leaders, while other cities' analyses included the opposite, leading to potential bias in the final round of data collection. In a few cities, the team noticed that government officials working more directly with city resilience projects—such as the CRO or staff in the resilience office—were more likely to be supportive of those initiatives. In a few instances, the CRO or other resilience officials would

claim to be more directly involved in resilience activities, while other informants suggested their involvement was limited. In four cities, teams indicated limited participation by bellwethers (non-100RC-involved and nongovernment stakeholders) in interviews, likely due to lack of familiarity with the program, which may bias a few cities to a more positive portrayal of their resilience story.

Similarly, access to public information varied significantly across the sample. Document review for a few cities was difficult because of a lack of publicly available documents, such as government plans and data, or poor-quality government websites. The team relied on secondary and nongovernmental sources in such instances. Similarly, due to staff turnover among the evaluation team, we experienced language barriers in reviewing documents or interviewing key informants in a few cities.

The early closure of the 100RC program in 2019 also limited the evaluation team's access to internal tracking and performance management information about the program's "dosage" in various cities—that is, the frequency and nature of the engagement between the CRO or other city officials and 100RC program offerings. Similarly, the program's efforts to track implementation of resilience initiatives was halted, meaning the evaluation relies only on qualitative findings related to resilience strategy implementation.

To mitigate these challenges, the evaluation team added several quality control and triangulation steps. Before the site visits, the Urban team undertook quality checks for teams' lists of potential interviewees and document-review data and sources for completeness, consistency, and rigor. After the site visit, the Urban team also undertook quality checks of data submitted by the site visit teams.

For study 2, tracking resilience-building programs over time posed some challenges. Insights into programmatic goals and activities mostly depended on documents being available on the web. Therefore, the study did not always capture the evolution in program thinking or project accomplishments that were not profiled on a program's website. In particular, outcome information for comparable programs was not available publicly. Programs that offer networking through public webinars, for example, were easier to track than programs whose networking takes place in more private settings. For programs that offer downloadable tools, it was not always clear to what extent and how those tools are used. The team intently tracked the emergence of new programs focused on urban resilience building, but we acknowledge that programs comparable to 100RC may have been overlooked.

The interviewee pool included practitioners whose programs were active at the time 100RC was active, practitioners representing newer programs, and former 100RC staff or collaborators. Interviewees varied in level of familiarity with program specifics, which impacted the confidence with which some interviewees commented on 100RC's model efficacy. However, all interviewees were able

to share a perspective regarding whether 100RC had broad influence in the field of urban resilience. There was potential for bias in terms of which interviewees decided to speak with us, but ultimately the interviewee pool included a mixture of views on 100RC, both positive and negative.

Resilient Cities Pathway Outputs and Outcomes

The 100RC intervention was intended to transform member cities' planning institutions and city operations and to help each city hire CROs, produce a resilience strategy, and implement initiatives. The monitoring and evaluation (M&E) team tracked these outcomes as well as contributing external factors to assess each city's preexisting capacity and commitment to resilience-building independent of 100RC.

Across the 21 sample cities, there was uneven progress on outcomes, with almost all cities advancing on at least a few outcomes but very few advancing across all domains. In several cases where a city had a stronger capacity at baseline, such as Norfolk in the US and Wellington, New Zealand, cities were able to accelerate and institutionalize their resilience practices so that these practices are now part of business as usual for the city government. On the other hand, some cities that started out with a lower capacity for resilience, such as Addis Ababa, Ethiopia, were able to demonstrate incremental progress across indicators but need more capacity support. A few cities demonstrated uneven progress across the evaluation period, showing early progress but then suffering setbacks, especially in the context of major disruptions or political transitions.

Some key contextual factors, such as city size, development context, governance capacity, and level of disruption, also shaped the experiences and progress (or lack thereof) observed across cities, although the sample cities did not demonstrate consistent patterns across these sampling criteria, especially for city size and development context. Disruptions included political and social unrest (Byblos); political transitions for which we have evidence of operational disruption (Colima, Santiago, and Boston); changes to the administrative structure of the city aside from de-siloing and resilience-building efforts (Paris and Medellin); and changes in the governance context, such as major national or regional political shifts or changes in divisions of power (Chennai, Athens, and Medellin). Generally speaking, cities beset by such disruptions could not generate or sustain positive change across resilience outcomes of interest. All cities experienced the disruption of the COVID-19 pandemic, which further demonstrated the need for resilience but also, in most cases, interfered with cities' attention to resilience efforts.

Dosage

Among the sample cities, the intensity of support received from 100RC varied by city. Assessing this dosage at a cohort level, Wave 1 and Wave 2 cities received the greatest intensity of support from 100RC. Regionally, North America, Latin America, and Europe received the most intense support, followed by Oceania and Africa, with Asia and the Middle East receiving the least support. Although the level of support was generally similar within regions, there were some variations. For example, within Latin America, Santiago and Medellin received the greatest intensity of support while Colima notably received minimal support.

The sample cities that received significant support (Greater Miami, Medellin, Norfolk, Paris, and Santiago) not only received the offerings listed in the Program Model and Interventions section above, but also talked frequently with 100RC staff and engaged with strategy partners. The senior leadership of 100RC visited both Medellin and Santiago; Medellin was considered a model, or pilot, for other cities to reference.

Most cities (13) received medium support from 100RC, meaning they received the core offerings, such as strategy partner support for resilience strategy development, assistance recruiting and hiring a CRO, and access to the network of CROs, but they often did not use other 100RC tools and resources (such as platform partners) and/or had limited communication with 100RC staff.

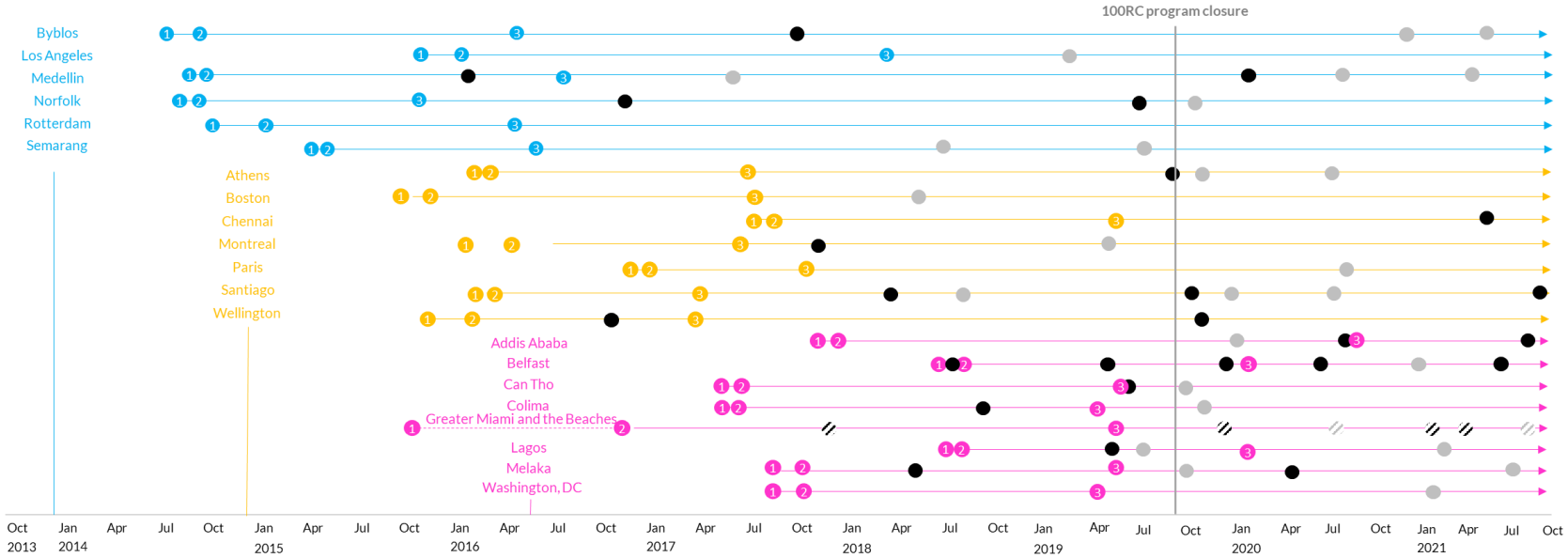
Just three cities (Byblos, Can Tho, and Colima) received minimal support, meaning they received the core offerings noted above but at a lower intensity and were less engaged with 100RC staff. Can Tho and Colima were specifically affected by the 100RC closure. Can Tho's CRO left right after the 100RC closure, and the office was eventually discontinued. Colima published its resilience strategy in 2019, so the city never got to experience 100RC support during project implementation.

In this section we review and interpret feedback from the sample cities on the various components of the 100RC model. Through qualitative interviews during baseline and final site visits with a range of local stakeholders and semiannual check-ins with the CROs, the team collected city feedback on the program model, including the need for resilience building, resilience definitions, uptake and feedback on core program components, implementation experience of strategy initiatives, and, after 2019, the repercussions of the 100RC program's closure.

Figure 2 visually depicts the sample cities' current state across select factors during the 100RC program's implementation period and after its closure.

FIGURE 2

100RC Timelines across M&E Sample Cities



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Source: Author tabulations.

Notes: Blue cities make up cohort 1 (announced December 2013), yellow cities cohort 2 (December 2014), and pink cities cohort 3 (May 2016). Numbers represent life cycle milestones: 1 is CRO hire; 2 is strategy launch; 3 is strategy publication and implementation launch. Black dots are significant mayoral or equivalent transitions, and gray dots represent CRO transitions. Striped dots represent one CRO (gray) or mayoral (black) transition among the three jurisdictions in the Greater Miami coalition: City of Miami, City of Miami Beach, and Miami-Dade County.

The Need for Resilience Building

Cities expressed a variety of resilience-building needs when they applied to participate in 100RC, including building capacity to handle the shocks and stressors that threaten their communities. Those needs reflect the growing complexity of the world in the face of climate change and rising inequality, emphasized by the holistic nature of the program's approach to resilience. However, both the cities and the 100RC program did not anticipate a global health shock on the scale of the COVID-19 pandemic, which challenged, and in some cases reshaped, the need for resilience locally and globally.

Most cities emphasized a need to build resilience with regard to climate change. Some were specifically motivated by the threat of climate-related shocks—disasters such as hurricanes and floods—while a few saw climate change as a stressor that is inextricably linked to social and economic outcomes. A few mentioned aging infrastructure or the need to modernize infrastructure to adapt to the times, and others pointed to resource constraints such as water scarcity or a lack of landfill capacity. For some cities, such as Belfast and Semarang, 100RC was a catalyst for elevating climate resilience needs, whereas in other cities, such as Rotterdam and Boston, climate change had already been a priority. In the latter examples, since climate resilience was already on these cities' agendas, their strategies focused on much wider resilience needs. In fact, Boston's initial application centered around climate change shocks and rising sea levels, but during the program, the scope of its resilience strategy shifted to focus more on social resilience and racial justice.

The emphasis on stressors in addition to shocks in the holistic approach to resilience helped cities stay focused on social vulnerabilities and inequality. This was apparent in Boston and Rotterdam as well as Los Angeles, Lagos, Greater Miami, Montreal, Paris, Santiago, Semarang, and Washington, DC.

Finally, some cities grounded the need for resilience in economic stability and growth. Washington, DC, and Los Angeles organized their resilience strategies around drivers of economic growth and security. Cyber, or digital, resilience and internet connectivity, two topics that intersect with the economic domain, were also priorities in a few cities, namely, Belfast, Medellin, and Rotterdam (all midsized or small cities). Some of the cities' growing focus on economic resilience—more specifically, economic recovery—can be attributed to the COVID-19 pandemic. Melaka, Paris, and Semarang, for example, all saw support for small- and midsized enterprises as important to economic recovery and resilience during the pandemic.

Today, the COVID-19 pandemic is driving the need for and attention to resilience in some cities, although these cities vary in how much they integrate pandemic response into resilience activities. In Semarang, for example, COVID-19 is noted as a factor driving the progress of resilience initiatives; and

in Addis Ababa, the resilience strategy released in 2020 was tweaked to respond to the impacts of COVID-19. But in addition to ushering a new era of resilience thinking, the pandemic disrupted some of the planned resilience-building interventions in cities, such as Chennai's urban horticulture program, and halted initiatives in other cities including Athens, Byblos, and Colima. Even in Melaka, where COVID-19 response and recovery activities were grouped under the resilience umbrella, COVID-19 was also cited as a factor constraining progress on resilience initiatives due to implementation delays, loss of city income, and budget diversions or cuts. In several cities, pandemic response and management was seen as outside the mandate of the resilience office.

Resilience Definitions

The 100RC program envisioned resilience as a holistic integration of shocks and stressors with a defined objective to change the planning and operational institutions in member cities to "survive, adapt, and grow in the face of chronic stresses and acute shocks." The 100RC program defined shocks as typically single-event disasters, such as floods or earthquakes, and stressors as recurring pressures on a city, such as water shortages, an overtaxed transportation system, endemic violence, or high unemployment. 100RC's holistic concept of resilience extends beyond responding to any one shock, focusing on collective resilience to all economic, social, and physical challenges in the 21st century.

Cities varied in the extent to which they adopted 100RC's broad definition of resilience (incorporating the economic, social, and physical realms) versus focusing on one shock or stressor. Despite some movement toward a more holistic definition, many cities' conceptions of resilience continue to put the strongest emphasis on climate- and disaster-related challenges. But emphasis on the link between the physical and other domains has grown, especially for midsized cities. For example, Boston's resilience strategy highlighted how inextricably linked climate resilience is to racial inequality; and in Rotterdam, projects were designed to look beyond physical and social aspects in isolation. In Semarang, interviewees said that 100RC broadened the city's understanding of resilience beyond the context of climate change and highlighted new sectors as entrance points for resilience building. In Washington, DC, climate change is only one of three main drivers around which the resilience strategy is organized (the others are economic and population growth and a technological transformation). Furthermore, stakeholders in Greater Miami reported that 100RC helped popularize a more holistic understanding of resilience. However, in Belfast, the 100RC planning process prompted the city to shift from a wider resilience lens to a more specific focus on climate mitigation and adaptation.

Some cities have begun talking about resilience more in terms of shocks *and* stressors as opposed to shocks only. The focus on stressors is most prevalent in North American cities. For example, in Los Angeles, the 100RC program prompted the city to discuss stressors specifically, which they had not done in the past; local planners shifted from focusing on infrastructure for earthquake preparedness to emphasizing social equity and community empowerment to address stressors as well as shocks. In Boston, stakeholders noted that the shocks-and-stressors framing encouraged agency leads to incorporate long-term stressors into recovery work and planning processes that traditionally spoke only to shocks. Cities outside North America discussed stressors as well, such as Colima, where 100RC is credited with catalyzing discussions among a wide range of actors to address the diverse stressors the city faces, including crime and violence.

A few cities saw local partners inside and outside of government come to increasing agreement around the definition of resilience (although a consensus was not reached). Other cities still deal with the challenge of competing interpretations of resilience. This is in part linguistic. *Resilience* is an English word and concept (from the Latin *resilire*, to jump back or recoil) that is not recognized in some other languages and cultures. For example, the Vietnamese translation of "resilience" is closer to the definition of the English word "adaptation" and is used primarily to focus on climate change. A Los Angeles interviewee commented that 100RC's broader definition of resilience had some drawbacks: while it captures more issues under the resilience umbrella, it loses a level of specificity that is needed for implementing projects. Greater Miami stakeholders pointed to the area's lack of consensus on the definition of resilience in its broader sense, though many have embraced an expanded understanding of the term to include economic and community resilience. Overall, familiarity with, and buy-in of, resilience concepts in 100RC participating cities has grown significantly: many cities said 100RC resulted in a better understanding of resilience in their cities and greater attention paid to the concept.

100RC Offerings

As described previously, the core features of the 100RC intervention provided city governments with financial assistance to hire a CRO and support other staffing and logistical resources for two to three years after entry into 100RC membership; technical support in the form of a strategy partner to help the CRO develop a holistic "resilience strategy"; inclusion in the 100RC network to facilitate the sharing of best practices among CROs and other city government and resilience stakeholders; and access to a wider pool of technical supports for implementation of resilience strategies through 100RC's curated platform partners.

CHIEF RESILIENCE OFFICER

All cities in the sample hired a CRO, and nearly all have maintained a CRO over the evaluation period. For all but one city (two of the three jurisdictions in the Greater Miami and the Beaches partnership), the role of CRO represented a new function in city government spurred by the city's acceptance into the 100RC program. Most cities saw value in the CRO both in terms of leading the city through the development of a strategy and continuing to facilitate connections over time. In some cities, the CRO led conversations that made the resilience link between domains—for example, between resilience and racial equity in Boston. Generally, CROs brought people together from different fields and involved a broader-than-typical set of stakeholders in planning processes. The integration of the CRO in city governments as a reflection of resilience-building institutionalization is further discussed later in the subsection "Domain 2: Resilience in City Operations."

RESILIENCE STRATEGIES

All cities took advantage of technical support to write and release resilience strategies between October 2015 and December 2020. Many cities still refer to this strategy; some, including Athens, Montreal, Paris, Rotterdam, and Semarang, plan to update or evolve their strategy. Only two cities—Belfast and Greater Miami—mentioned that progress on their strategy is formally monitored. On the other hand, stakeholders in a few cities, especially Los Angeles and Washington, DC, noted drawbacks to their strategy planning, such as duplicated planning effort. Some cities appear to have shelved their resilience strategies altogether.

Some cities credited the 100RC program with giving them the structure and framework to approach urban resilience beyond their resilience strategy. Those cities felt that the program gave them strategic direction. Though early critiques of the program characterized it as being too "one-size-fits-all," stakeholders reflected in the final round of monitoring that the holistic resilience concept helped them develop a coherent plan of action and an integrated way of working across multiple themes. Several cities also emphasized that the nature of engagement that 100RC encouraged in order to arrive at the resilience strategy allowed for an inclusive and collaborative approach that differed from prior practice. This was true across city sizes and regional contexts: Athens, Can Tho, Chennai, Colima, Los Angeles, and Semarang all reported it. A few also found that 100RC created a space that allowed stakeholders to discuss challenges and break siloes, as well as bring stakeholders together from different parts of the city to "shift toward a culture of transversality," as noted by stakeholders in Paris.

The set of tools to support cities in strategy development—including the City Resilience Actions Inventory, City Resilience Perceptions Assessment, City Resilience Assets & Risks Tool, and the City

Resilience Index— were used by cities the most during the strategy-setting phase, but some continue to note the tools' ongoing relevance. In fact, city representatives in Chennai said the city is again using the City Resilience Index to develop a new resilience strategy. On the other hand, a few cities shared that some tools, such as the City Resilience Assets & Risks Tool, and the City Resilience Index, were too complex to understand, were cumbersome, or were difficult to implement. For example, stakeholders from Greater Miami found that the tools, admittedly intended for cities, did not always translate well to a multijurisdictional approach and were often too prescriptive, sometimes complicating the work for understaffed CRO teams.

NETWORK

In final-round interviews, most cities referenced the 100RC network, particularly access to a global network of CROs, as a primary 100RC offering that they valued. Cities appreciated access to external knowledge sharing, workshops, and opportunities to learn from others in a similar position. Even after the 100RC closure, most CROs remain in touch both through R-Cities and by other means. Several mentioned being active in the WhatsApp group for all 100RC cities or a region-specific WhatsApp group facilitated by R-Cities for ongoing collaboration. Despite having wide enthusiasm for the network throughout the program, a few cities thought the program might have been more successful if the cities had been connected in smaller networks grouped by need rather than primarily engaging as a full cohort of member cities.

PLATFORM PARTNERS

Only a few cities said they benefited from the 100RC platform partners. For example, in Medellin, the platform partner Build Change helped the city reinforce 50 homes in a housing settlement. The City of Miami Beach accessed support from Urban Land Institute for an evaluation of its sea-level-rise interventions. The limited uptake of the platform partners likely has to do with the early closure of the 100RC program, just as many cities were reaching implementation; however, a midterm report identified other barriers, such as the match of service offerings and needs and procurement capacity of cities (Martín and McTarnaghan 2018).

FUNDING

Several cities noted that the funding to support a CRO in their city for two years was a critical program component, enabling them to launch the CRO position. A few cities said the program helped them attract attention or funding from other sources. For example, an interviewee in Medellin shared that the program brought the city closer to partners such as the World Bank, Visa, and the Inter-American

Development Bank; in Norfolk, the program helped the city win federal funding from the Choice Neighborhoods Initiative and the National Disaster Resilience Competition. On the other hand, a stakeholder from Byblos suggested that it may have been better if donors were able to match contributions from The Rockefeller Foundation.

Notably, some cities acknowledged that part of what 100RC had to offer was reputational. Being part of the 100RC cohort was an endorsement for the city. It put cities on the map, and provided them some level of credibility, prestige, or validity. It also gave cities a platform with which to display their success and serve as a national or global model for other cities. For a few cities in Latin America where government buy-in to the program was generally lower, the program offered a means for participants to identify key priorities that the municipal government was neglecting or missing, as occurred in Colima.

Strategy Implementation and Initiatives

Data collected about projects implemented since the program's closure in 2019 are entirely qualitative, based on the accounts in stakeholder interviews. The stages of implementation and the nature of projects vary widely.

The final round of stakeholder interviews revealed that some 100RC cities implemented activities in as many as 10 thematic areas while others had very low implementation rates for priorities identified in their respective resilience strategies. European cities tended to have the highest rates of project implementation. For example, in Paris it was reported that 30 of 35 resilience strategy initiatives are under way and on track.

Looking thematically at the type of resilience initiatives that grew out of the strategies, physical interventions to build resilience were most common, especially those related to water control (flooding or drought) or water quality. For example, in Can Tho, the resilience strategy proposed actions to revive riverside spaces, including transforming a landfill site into a public park, establishing a building control strategy, supporting new businesses, enhancing a watershed plan for flood risk prevention, and upgrading flood mitigation and drainage infrastructure. Progress to date includes the establishment of new standards and guidelines for flooding and drainage; tree planting funded by the private sector; and the construction of a new sewage and wastewater collection system. Half of sample cities have launched green infrastructure projects such as parks, tree plantings, green corridors, or other nature-based solutions. Transportation projects were also common, in the form of either mass transit, electric vehicles, walking, or cycling initiatives. Relatedly, some cities, including Melaka, Athens, Colima, Montreal, and Paris, were advancing projects to improve streets, road safety, and trail systems. A few

cities, such as Wellington, mentioned buildings, including making buildings more resilient to earthquakes or more energy efficient.

In addition to infrastructure initiatives, socially oriented resilience initiatives are under way in some cities. They address such issues as equity, culture, education, or vulnerable populations such as the elderly. Only a few cities mentioned health- or disease-related initiatives, one being Greater Miami, where COVID-19 information pages were created and public–private working groups were formed across many cities to guide recovery efforts. A few cities note initiatives focused on improving access to resources such as food or emergency services (for example, resilience hubs or resilient public spaces in Colima, Los Angeles, and Montreal, or Chennai's urban horticulture program). Finally, several cities also have initiatives to improve their data and evidence bases related to resilience. There were no obvious trends between city features (size, location, or cohort) and project themes.

Although an accurate accounting of project implementation is difficult given inconsistent reporting across cities on implementation and no centralized data collection since the program's closure, resilience initiative implementation appears to have been most successful in midsized cities in middle- and higher-income nations that have the right amount of need, the right capacity, and the resources. Evidence from monitoring activities since the 2018 midterm report supports past observations that a successful project implementation depends on political will, access to funding, technical assistance, and the ability of a CRO to advocate for an initiative, and to some extent, on having cross-functional working teams. For example, in Norfolk, the progress of the city's redevelopment of the Ohio Creek neighborhood to address neighborhood connectivity and environmental challenges is attributed in part to the city managers' consistent and strong support for resilience efforts and to strong buy-in by key city staff, including the planning department head, with respect to the resilience concept. The Ohio Creek project also benefited from ample funding from a National Disaster Resilience Competition grant, Community Development Block Grant entitlement funds, and city budget support. In Rotterdam, the Multifunctional Roof Programme, a project that was part of the city's original resilience strategy, serves as an example of an integrated approach to resilience with a long-term outlook. The project aims to expand the use of roofs for greenery, water storage, solar photovoltaics, and other purposes; it is being carried forward by a technical team in the municipality with an annual budget of 800,000 euros, and the resilience team now has minimal involvement.[4] And in Boston, one of the city's largest contracts is with a consultant who the CRO identified to implement racial equity training for all city staff.

But almost all cities identified challenges to implementing their 100RC strategies. The most common barrier cited was lack of funding, which is consistent with previous reporting. Cities of all sizes faced this problem, which was exacerbated by the COVID-19 pandemic. Another common barrier to

implementation was a lack of support from the mayor or local government. Additionally, city stakeholders noted difficulty coordinating across departments that were busy, had competing priorities, or were bureaucratic—although Norfolk cited strong buy-in from government staff in addition to government leaders as a strength. Relatedly, some respondents in a few cities, including Addis Ababa, Colima, Melaka, and Montreal, cited changing administrations, staff turnover, or department restructuring as obstacles to strategy implementation. Such governance-related barriers match previously reported implementation barriers. Other barriers included lack of operational support or the need for support beyond planning, unclear ownership of the strategy or a change in ownership of projects, lack of measurement, and the absence of onboarding and continuity from the previous CRO.

Program Closure Repercussions

Cities were at different stages of the 100RC intervention when The Rockefeller Foundation announced the closure of the program in April 2019. In September 2019, when 100RC formally shut its doors, 24 member cities and two sample cities had not yet released their resilience strategies and advanced into the implementation phase of the program model life cycle. All sample cities eventually released their resilience strategies, but for those cities that had not released their strategies before program closure (mostly cities in cohort 3) the closure meant they were not accompanied in the implementation stage as originally anticipated. This had varied repercussions for cities regarding how they prioritized resilience and implemented their resilience strategy, creating a major setback for some cities and minor disruptions in others. For cohort 3 cities in particular, the program closure significantly disrupted the intended program model.

Outside of limiting program exposure or dosage, 100RC's sudden termination had a negative impact on the reputation of the 100RC network among city government officials in several cities; it created doubts about the stability of the network and buy-in from major donors. Additionally, a few cities said that the closure led to a loss of support for implementation or that there was a mismatch between planning and implementation, with not enough funding and attention given to the later. In Chennai, for example, stakeholders said that resilience needs to be built over time and with a permanent resilience office. When the program withdrew, the work being done in Chennai slowed. Similarly, stakeholders in several other cities noted that progress toward implementation became limited when they lost access to tools or partners that they had relied on for planning and implementation. Further, due to the reduction in activities, network relationships suffered and communication with actors outside the city decreased. A few others—midsized cities in Europe and North America—said the closure of the program limited their ability to track progress over time.

Most cities continue to participate in the network started by the 100RC program via R-Cities, which received follow-on funding from The Rockefeller Foundation in 2019 to support the ongoing connection between cities. This includes use of a WhatsApp group started by R-Cities to facilitate communication among CROs from around the globe, as well as participation in webinars and other technical programming from the network. All the sample cities in Asia (Can Tho, Chennai, Melaka, and Semarang) said they are engaged in the Urban Ocean program initiated by R-Cities, which is a program that aims to improve waste management and recycling and reduce ocean plastic. Cities have also participated in a range of other urban resilience program offerings including C40, Making Cities Resilient 2030 (MCR2030), the Mayors Migration Council, the Asian Cities Climate Change Resilience Network, the World Resources Institute, the Adrienne Arsht–Rockefeller Foundation Resilience Center at the Atlantic Council, and Resilient Cities Catalyst, reflecting a shift to a more decentralized network of tools and resources available to cities to support resilience-building efforts.

Domain 1: Resilience in Planning

The evaluation team identified six core constructs by which to measure whether a city's resilience strategy has affected the quality and relevance of the city's other plans and planning processes over the long term. The constructs are (1) explication of resilience in plans; (2) use of science and evidence in plans; (3) internal planning consistency across plans; (4) vertical planning integration; (5) community participation and access in planning; and (6) alignment with vulnerable populations in plans. Definitions for each construct are included in the following discussion.

Overall, there is evidence of resilience integration in the sample cities and some movement on the inclusion of resilience principles in planning approaches. Although such advances are not universal across sample cities, all cities have made gains in one or more construct. For explication of resilience and internal consistency with other plans, cities attributed progress to the 100RC intervention, especially the development of a resilience strategy to set priorities However, progress (or lack thereof) in other domains was also attributed to other factors, such as political will or governance capacity.

On average, sample cities made advances in three of the six desired planning outcomes of interest. Contextual factors, such as development status and degree of disruption during the evaluation period, had a large influence on which cities benefited the most. Cities characterized by more stability and middle to high incomes generally made the largest advances in making resilience part of their planning practices.

Although cities at all levels of development experienced progress, there was variation, and it is important to pay attention not only to whether a change was observed but also to whether cities that experienced no change in an outcome were ranked relatively high or low at baseline. Cities in a higher-income context were less likely to have no movement in planning constructs in which they were ranked as weak or middling at baseline, and they were likely to observe no change in constructs in which they started out strong. On the other hand, cities in the low- and middle-income contexts had on average positive change on three indicators while remaining middling or weak in the others.

Unlike development context and income, there are no discernable differences in progress on planning outcomes by cohort, city size, or number of city transitions.

Analyzing which constructs demonstrated the most positive growth reveals some interesting elements about the strengths and limits of the 100RC program model and desired results vis-à-vis changing planning practices to institutionalize resilience.

One core construct stands out in terms of progress made in almost all cities: explication of resilience. This is the degree to which cities are explicitly or implicitly integrating resilience concepts into plans outside the resilience strategy. These integrations may specifically use the term *resilience* or go beyond it and refer to the mitigation of *shocks* by reducing *stressors*. Progress was observed on this indicator across cohorts, city size, and development context. Generally speaking, cities displayed limited or no integration of resilience at baseline, but progress across cities shows that cities that had some or no resilience integration alike benefited from the 100RC program in making progress on this core construct. Byblos is the one exception: it began with limited planning capacity and experienced major disruptions during the study period and showed no sustainable changes with integrating the resilience concept into its planning practices.

For the majority of the core planning constructs, a more patchwork pattern of integrating resilience into planning was observed. About half the cities made progress with the following four constructs: internal consistency of plans, vertical integration, community accessibility to plans and plan making, and alignment with vulnerable populations. Movement on those indicators was most commonly observed in cities with stronger pre-100RC planning capacity and some degree of resilience integration at baseline. However, about a third of the cities began with weak or middling capacity in those constructs and did not see positive movement, perhaps due to obdurate planning institutions.

Finally, for most cities we find no evidence of change in the use of science and evidence in planning. However, a significant share of cities, especially high-income cities, were already in a strong position with respect to this core construct at the beginning of the intervention. Where change was observed, it

happened in middle- or low-income cities, such as Chennai, Addis Ababa, and Can Tho. There was no change in Byblos or Lagos, despite both of those cities' weak scores on this construct at baseline.

Tables 5A and 5B show the sample cities' evolution on each of the core planning constructs from baseline to final. For better understanding of the scoring values, the reader should refer to appendix B and should note that some of the sample cities that did not graduate to better scores had high scores at baseline. Positive changes are coded in blue in the "Final" columns, negative change is coded in orange (when applicable) and no change is coded in black.

TABLE 5A

Baseline and Final Scoring for Resilience-Planning Constructs

Summary for explication of resilience in plans, use of science and evidence in plans, and internal planning consistency across plans

	1. Explication of Resilience in Plans		2. Use of Science and Evidence in Plans		3. Internal Planning Consistency across Plans	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	None	Implicit	Minimal	Modest	Inconsistent	Modestly consistent
Athens	None	Implicit	Modest	Modest	Largely consistent	Largely consistent
Belfast	None	Explicit	Modest	Extensive	Largely consistent	Consistent
Boston	Implicit	Explicit	Extensive	Extensive	Modestly consistent	Consistent
Byblos	None	None	Minimal	Minimal	Inconsistent	Inconsistent
Can Tho	Implicit	Explicit	Modest	Extensive	Largely consistent	Consistent
Chennai	None	Explicit	Minimal	Modest	Modestly consistent	Modestly consistent
Colima	None	Explicit	Modest	Modest	Largely consistent	Consistent
Greater Miami & the Beaches	Implicit	Explicit	Extensive	Extensive	Modestly consistent	Consistent
Lagos	None	Strongly implicit	Minimal	Minimal	Inconsistent	Modestly consistent
Los Angeles	Strongly implicit	Explicit	Extensive	Extensive	Modestly consistent	Largely consistent
Medellin	None	Implicit	Extensive	Extensive	Largely consistent	Largely consistent
Melaka	Implicit	Strongly implicit	Modest	Extensive	Largely consistent	Largely consistent
Montreal	Explicit	Explicit	Extensive	Extensive	Largely consistent	Consistent
Norfolk	Explicit	Explicit	Extensive	Extensive	Largely consistent	Consistent
Paris	None	Explicit	Extensive	Extensive	Modestly consistent	Largely consistent
Rotterdam	Strongly implicit	Explicit	Extensive	Extensive	Largely consistent	Consistent
Santiago Metro Region	None	Implicit	Extensive	Extensive	Modestly consistent	Modestly consistent
Semarang	Strongly implicit	Explicit	Extensive	Extensive	Largely consistent	Largely consistent
Washington, DC	Implicit	Explicit	Extensive	Extensive	Modestly consistent	Consistent
Wellington	Strongly implicit	Explicit	Extensive	Extensive	Consistent	Consistent

Source: Author tabulations.

Note: Blue text in the Final columns indicates positive change; black indicates no change.

TABLE 5B

Baseline and Final Scoring for Resilience-Planning Constructs

Summary for vertical planning integration, community participation and access in planning, and alignment with vulnerable populations in plans

	4. Vertical Planning Integration		5. Community Participation and Access in Planning		6. Alignment with Vulnerable Populations in Plans	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	Largely integrated	Largely integrated	Inaccessible	Satisfies reqs.	Exclusive	Modestly inclusive
Athens	Largely integrated	Integrated	Satisfies reqs.	Satisfies reqs.	Modestly inclusive	Modestly inclusive
Belfast	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Modestly inclusive	Inclusive
Boston	Satisfies reqs.	Largely integrated	Largely accessible	Largely accessible	Modestly inclusive	Inclusive
Byblos	Not integrated	Satisfies Reqs.	Inaccessible	Inaccessible	Exclusive	Exclusive
Can Tho	Satisfies reqs.	Largely integrated	Satisfies reqs.	Satisfies reqs.	Modestly inclusive	Modestly inclusive
Chennai	Largely integrated	Largely integrated	Inaccessible	Satisfies reqs.	Exclusive	Modestly inclusive
Colima	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Satisfies Reqs.	Modestly inclusive	Modestly inclusive
Greater Miami & the Beaches	Largely integrated	Integrated	Satisfies reqs.	Accessible	Modestly inclusive	Inclusive
Lagos	Satisfies reqs.	Satisfies reqs.	Inaccessible	Satisfies reqs.	Exclusive	Modestly inclusive
Los Angeles	Satisfies reqs.	Largely integrated	Satisfies reqs.	Largely accessible	Modestly inclusive	Modestly inclusive
Medellin	Satisfies reqs.	Satisfies reqs.	Largely accessible	Largely accessible	Inclusive	Inclusive
Melaka	Satisfies reqs.	Largely integrated	Satisfies reqs.	Accessible	Modestly inclusive	Modestly inclusive
Montreal	Satisfies reqs.	Largely integrated	Satisfies reqs.	Accessible	Modestly inclusive	Inclusive
Norfolk	Satisfies reqs.	Integrated	Satisfies reqs.	Accessible	Modestly inclusive	Inclusive
Paris	Largely integrated	Largely integrated	Satisfies reqs.	Largely accessible	Modestly inclusive	Modestly inclusive
Rotterdam	Largely integrated	Integrated	Satisfies reqs.	Largely accessible	Modestly inclusive	Inclusive
Santiago Metro Region	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Modestly inclusive	Modestly inclusive
Semarang	Integrated	Integrated	Satisfies reqs.	Accessible	Modestly inclusive	Inclusive
Washington, DC	Satisfies reqs.	Satisfies reqs.	Satisfies reqs.	Largely accessible	Modestly inclusive	Inclusive
Wellington	Integrated	Integrated	Largely accessible	Accessible	Inclusive	Inclusive

Source: Author tabulations.

Notes: Blue text in the Final columns indicates positive change; black indicates no change. Satisfies reqs. = Satisfies requirements

Explication of Resilience

From 100RC's perspective, a clear explication of a city's resilience goals within its published plans is an essential aspect of good planning. Thus, a measure of the success of 100RC was whether and to what extent cities included language in their resilience strategies and subsequent relevant city plans that described, explicitly or at least implicitly, their stance on comprehensive resilience building.

Since the baseline measure, the majority of sample cities demonstrated progress on this indicator, with nearly all cities reporting at least implicit reference to the resilience concept in plans outside of their 100RC resilience strategy. The majority of cities incorporated explicit references to resilience issues, priorities, and concepts into their plans, which represents a major shift from the situation at baseline, where only two cities (Wellington and Norfolk) referred to resilience in formal planning documents. For some cities (Addis Ababa, Athens, Lagos, Medellin, Santiago, and Melaka), the references remain implicit: they are aligned in concept but not in literal language. Byblos is the only outlier as no formal plans were published by the municipality before 2017. Across cities, resilience was most commonly integrated into topical or functional plans rather than in comprehensive plans, in part due to their more frequent development and updates.

Comprehensive planning processes represent the most critical opportunity for integrating resilience, as they typically set the tone for all other municipal plans, either by statute or informal influence. However, the research team observed relatively few updates to comprehensive or master plan documents in the evaluation period, likely due to the extended time typically dedicated to developing such documents and the relatively long periods between updates. Evidence from the sample cities suggests that a failure to update such critical plans has hindered cities' resilience integration. Stakeholders in Chennai, for example, noted that the city had not revised its Second Master Plan during the evaluation period, and that the document remains primarily a land use and zoning plan where shocks and stressors are mentioned but not clearly addressed.

The sample cities of Semarang, Montreal, Wellington, Colima, and Los Angeles did undergo comprehensive planning processes during the evaluation period, and they released plans that incorporated resilience. In Semarang, the updated 2021–2026 midterm plan made significant progress on resilience incorporation focusing not only on physical resilience indicators but also on health and economic ones. As all city agencies are mandated to follow the midterm plan, resilience initiatives contained in the midterm plan must be prioritized by the city council. In Los Angeles, the Comprehensive Plan comprises 35 community plans, each of which is updated independently, leading to variation in the degree of resilience integration. For example, the guiding principle of the harbor plan

includes the goal of fostering a "climate-resilient built environment that reduces energy and water usage, carbon footprint, and greenhouse gas emissions and promotes renewable energy and low/zero emission vehicles." On the other hand, the Westside community plan makes fewer and more vague references to the term *resilience*.

In a few cases, national regulatory changes that apply to planning processes set the stage for greater resilience incorporation in future planning. For example, although Can Tho did not release or update its Socio-Economic Development Plan (the local equivalent of a comprehensive plan) during the evaluation period, Resolution 120/NQ-CP for the Sustainable and Climate-resilient Development of the Mekong Delta, which includes Can Tho, calls for a general revision of master plans in the region to address climate resilience, suggesting that future updates will be required to integrate resilience.

In contrast to the sparseness of comprehensive plan releases or updates, all sample cities except Byblos released at least one functional or topical area plan during the evaluation period. Plans with more topical proximity to resilience, such as climate change or hazard mitigation plans, were more likely to incorporate the concept of resilience than new housing, transportation, or other traditional urban development plans. In Addis Ababa, for example, the Climate Action Plan 2021–2025 makes multiple direct references to resilience building, while the Transport Development Plan 2021–2030 released during the same year includes no discussion of resilience. Athens, Belfast, Miami-Dade County, Montreal, and Paris all also released climate plans during the evaluation period that included significant references to resilience. The Montreal 2030 Climate Plan adopts the definition from the city's resilience strategy, signaling alignment. Other topical plans incorporating resilience that cities adopted during the period include emergency management plans, COVID-19 recovery plans, biodiversity plans, food system plans, heat plans, sea-level-rise plans, and water management plans.

In two sample cities, the inclusion of a resilience frame in their topical plans helped elevate stressors and social vulnerabilities or inequalities that could easily have been overlooked. In Boston, the vision for a new Boston Urban Forest plan strongly reflects equity goals stated in Resilient Boston and uses the 100RC "stressors" language: "Recognizing that environmental injustice exists in Boston, the planning process will embed support for communities that have been disproportionately impacted by environmental stressors." Similarly, Chennai's recently published District Disaster Management Plan 2021 foregrounds a comprehensive understanding of resilience that includes social vulnerabilities and recognizes how both structural and nonstructural measures "are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment."

Whereas incremental and positive explication of resilience was seen in planning documents of most cities, the research team observed some backsliding in Medellin and Santiago. Although those cities made advances in resilience explication during the study period, their more recent documents do not include the concept or its underlying principles. For example, in Medellin, the incorporation of the 100RC resilience vision into the 2016–2019 Plan de Desarrollo Medellín (PDM)—the city's master development plan—was a major step toward institutionalizing resilience for subsequent plans. However, the 2020–2023 PDM did not substantially use the term *resilience* beyond its socio-psychological meaning and did not replicate the previous PDM's lens of resilience. Similarly, stakeholders in Santiago noted that whereas the term was widely used by the 2014–2018 regional administration, its use had "died down" in the 2018–2021 period, reviving only in the context of the city's 2019 *estallido social* (social outbreak) political protests and the COVID-19 pandemic.

Cities that referred to resilience more implicitly noted two principal challenges: translation of resilience to a relevant word in the local language and competition with other concepts or global frameworks that have achieved local buy-in. Several cities, including Can Tho, Addis Ababa, and Athens, noted the difficulty of translating the word *resilience* into their local language for the purpose of incorporating the concept into plans, which often meant that it became connected to other concepts, such as sustainability or climate adaptation. Stakeholders in Melaka, Belfast, Semarang, and Montreal noted that constructing their city plans around an explicit or primary resilience framework posed a challenge because they had committed to other international, national, or city government goals and frameworks, such as the Sustainable Development Goals, green and smart cities, low-carbon cities, ecological transition, conflict resolution, or sustainability. But despite the differences in vocabulary, stakeholders generally felt that the concepts were still aligned, and that the intent of the document still met the shared goals.

Use of Science and Evidence

To be effective, resilience planning should leverage physical and social scientific analysis of data to understand the relevant shocks and stressors that a city faces, and to identify what interventions and programs will generate the most impact. Overall, most of the sample cities had a high score for this resilience-planning construct at baseline (especially those in higher-income/higher-development contexts) and maintained that high score over the course of the study. However, five cities (Belfast, Can Tho, Melaka, Addis Ababa, and Chennai), moved either from minimal to modest or from modest to extensive use of science and evidence (a positive change). Conversely, four cities (Byblos, Lagos, Athens,

and Colima) had modest or minimal use of science and evidence for planning at baseline and saw no improvement.

New or updated climate plans represented some of the strongest examples of using evidence to understand relevant shocks and stressors across the sample cities; such plans include data on future trends, hazard exposure, and social vulnerabilities. Several cities conducted vulnerability assessments as part of these planning efforts, many of them relying on the methodologies advanced by C40 cities. For example, the 2018 Paris Climate Action Plan drew on a climate change vulnerability assessment and social, environmental, and economic assessments of mitigation actions and included prioritization by stakeholder consultation.

Several cities invested in new data-collection capacity during the study period to improve the availability of data for future planning efforts. Washington, DC, secured $5 million to develop an integrated flood model as well as heat island initiatives. The integrated flood model will incorporate Federal Emergency Management Agency data on riverine flooding with modeling from the district's flood records that incorporate systems backups from rainfall and National Oceanic and Atmospheric Administration climate change projections to create a predictive model that incorporates climate change and more accurately identifies key areas of flooding not included in current flood insurance rate maps. The integrated flood model is on track to be incorporated into the 2023 hazard mitigation plan update. In Belfast, the Linen Quarter BID has carried out a "metabolic" analysis of buildings in Belfast to guide other districts, businesses, and buildings in their decarbonization and recycling approaches.

Similarly, several cities (Can Tho, Greater Miami, Norfolk, Rotterdam, Montreal, and Wellington) deepened research partnerships with local universities to support greater collection, analysis, and use of data during the evaluation period. Stakeholders in Norfolk cited increased collaboration with universities, the Army Corps, and other partners to gather and analyze data relevant to resilience concerns, especially those related to sea-level rise.

Although widespread, such advances were not universal: several cities still point to internal capacity and resource constraints in this domain, despite efforts to advance. For example, stakeholders in Athens said the city had made efforts to centralize data for increased availability, particularly on specific shocks, but the municipality currently lacks the capacity and ability to identify the studies required for projects. In Byblos, the use of science and evidence appears to be an ad hoc practice, highly dependent on the project leader or funder.

Similarly, whereas data might be readily available and included in planning documents, stakeholders, especially those outside government, said that decisions on implementation of planned

interventions and initiatives are still highly political and are not guided by the data and evidence presented within plans. These stakeholders highlighted that investment in high-quality analysis and strategic planning is a necessary, but not sufficient, component for improving resilience outcomes.

Internal Consistency with Other City Plans

Because they are by nature strategic plans without mechanisms for legal enforcement, resilience strategies rely on commitment from city departments to succeed. Integration into the larger municipal context requires alignment of resilience goals and efforts with the constellation of other plans that a city has adopted or operates under, as well as with the day-to-day operations of key personnel responsible for establishing and implementing government policy. We measure this by assessing the degree of cross-referencing between the resilience strategy and other city plans to illuminate how well the city has integrated its resilience strategy into other planning work; we pair that assessment with an estimate of the level of knowledge city and departmental leaders have of the plan and their level of buy-in to the city's resilience efforts. This core construct focuses on how well resilience has been integrated into traditional planning silos—such as housing, economic development, transportation, and so forth—as well as into the thinking of the people responsible for those operations.

The majority of the sample cities demonstrated positive improvement on resilience integration through plan cross-referencing and buy-in over the study period. This was particularly the case for cities that demonstrated some level of integration at baseline (with internal planning being either largely or modestly consistent) and improved from there. Two cities demonstrating very little integration (Lagos and Addis Ababa) at baseline also saw modest improvement over the study period. Five cities saw no change from baseline on this core planning construct; however, most of those cities began with a consistent (Wellington) or largely consistent (Athens, Medellin, Melaka, and Semarang) level of integration. Only three cities that began the period with more modest or a complete lack of integration did not progress on this indicator between the baseline and final assessments (Byblos, Chennai, and Santiago). No cities worsened on this indicator.

Updates to master or comprehensive plans offer critical opportunities for the cross-referencing of resilience concepts and priorities; these plans carry particular weight because of their scope and, in some cases, because of their legal nature. Several cities that undertook major plan updates during the study period seized on the opportunity to integrate resilience, namely, Montreal, Norfolk, Semarang, and Wellington, and to a lesser degree Washington, DC. For example, with its new comprehensive plan titled Montréal 2030, the city of Montreal executed a major pivot toward increasing internal

consistency in its plans: following the plan's release in late 2020, most new plans have been aligned with one of its four objectives. The new plans typically refer to the major goals of Montréal 2030 and explain how they align with Montréal 2030 objectives. Now, city staff are in agreement that Montréal 2030 is the throughline for all recently released plans. That consistency has enabled resilience, as well as concerns for the environment and climate change, to play a role in all plans. One interviewee described the Montréal 2030 plans and the city's resilience strategy as "Russian dolls" that fit together.

Functional or topical plans also create opportunities for cross-referencing, as was observed in several cities, especially those with a greater planning capacity and extensive planning activity. Norfolk's long-term emergency operations recovery strategy, for example, instructs readers to understand its content in the context of other planning efforts: "STOP! Before you read this Long-Term Recovery Framework, be sure you are aware of Norfolk's Resilience Strategy (adopted by City Council on June 22, 2015), Vision 2100 (adopted November 22, 2016), plaNorfolk2030 (adopted March 26, 2013) and the 2017 Southside Hampton Roads Hazard Mitigation Plan (adopted January 10, 2017). These documents, developed with an inclusive whole community vision and approach, are both the foundation and the driving documents for Norfolk's Long-Term recovery from a catastrophic incident." The fiscal year 2020 update to Boston's Climate Action Plan mentions the 2019 Climate Action Plan, Climate Ready Boston, neighborhood-specific coastal resiliency plans, Zero Waste Boston, and Greenovate Boston. Released around the same time as the resilience strategy, Sustainable DC 2.0 is an update to Washington, DC,'s original 2013 sustainability plan. The plan includes a section titled "How Sustainable DC Relates to Other District Plans" that describes the intersections of plan subject areas and related Washington, DC, plans. Overall, the plan refers frequently to other Washington, DC, plans and includes a recommendation to "fully implement and regularly update the Climate Ready DC plan." In interviews, Washington, DC, government staff from relevant agencies said that they see Sustainable DC 2.0 as linking all environmental efforts in the District, especially noting cross-references to Climate Ready DC and Carbon Free DC, as well as the resilience strategy.

Many cities cited the importance of intentional and cross-functional staff collaboration to support the consistency of plan documents, and stakeholders reflect that this has improved since baseline. In higher-capacity cities, it involves committing staff resources to support integration. For example, Miami-Dade County recently hired a director of resilience planning who was given the mandate to integrate the county's various plans. Similarly, Paris employs a specific staff member in charge of ensuring compliance between the Plan Local d'Urbanisme (Local Urban Plan) and existing environmental and social plans in the city, including the Paris Climate Action Plan and the Paris Resilience Strategy. Other cities in the sample sought integration through participation of city staff and

relevant experts from multiple departments during the development and release of plans. For example, the Addis Ababa Plan and Development Commission organized a committee comprising external experts and stakeholders to inform the cities' priorities and provide technical and operational oversight for planning processes.

Belfast, Colima, Greater Miami, Norfolk, Paris, Melaka, Lagos, Semarang, and Wellington all released topical and strategic plans that made explicit reference to their respective resilience strategies and related initiatives. Jurisdictions in Greater Miami have consistently referred to Resilient305—the resilience strategy for Greater Miami and the Beaches—in plans published since the strategy's launch. For example, Miami-Dade County's Sea Level Rise Strategy says that all adaptation actions must align with other initiatives, including the Resilient305 Strategy. In Melaka, the city's new midterm local plan, MBMB 2035, includes 100RC-identified shocks and stressors such as flooding and congestion and more than 100 resilience actions relating to the 100RC resilience strategy including cultural heritage, flooding prevention, traffic congestion, waste, energy, and recycling programs.

Whereas many cities saw progress in this domain, several still struggle with integration, especially in less developed contexts where cities face significant capacity constraints. For example, interviewees in Lagos said that making cross-references between city plans was not common practice and that there was a lack of coordination between area-specific model city plans and major topical plans such as the Lagos Transport Master Plan. Similarly, in some contexts such as Chennai, where agency plans are not made publicly available, it is difficult to assess progress on this indicator.

Vertical Integration with Broader Jurisdictional Plans

Just as a resilience plan must make sense within the local context, it also must make sense within the broader context, be it regional, state, national, or international. Here, meaningful and thoughtful reference to higher-level plans is important, but so is the involvement of higher levels of authority in the local plan. Relative to other planning indicators, there was less progress on this indicator; roughly half of cities in the sample saw positive progress on this indicator during the study period, while half had no observable change. No cities downgraded. At baseline, 12 cities satisfied requirements for vertical integration following relevant state and national regulations. Of that group, half progressed toward more integration (Boston, Can Tho, Los Angeles, Melaka, Montreal, and Norfolk) while others maintained prior practice (Belfast, Colima, Lagos, Medellin, Santiago, and Washington, DC). Athens, Greater Miami, and Rotterdam progressed on this indicator and joined Semarang and Wellington as being "integrated" with vertical plans.

Alignment with higher levels of government is important, especially in contexts where local plans must be vetted and approved by regional, state, or national government actors, as is the case in several Southeast Asia cities. For example, in Can Tho, vertical integration of planning processes is guaranteed by the tightly hierarchical structure of policymaking in Vietnam. The Socio-Economic Development Plan (SEDP) of Can Tho is updated by the central government and approved by the prime minister of Vietnam with a direct decision. The plan is concretely aligned with regional and national gross domestic product (GDP) targets, particularly regarding its contribution to the country's wider economic growth. Similarly, in Melaka, the state government has a statutory obligation to implement local action plans that comply with the National Physical Plan and the Malaysia Plan. Therefore, the local plan must comply with state-level and national government policies. In Athens, alignment with national priorities is necessary to unlock funding resources, and the city's resilience office had to revise its Strategic Monitoring Plan to align it with the priorities of the national Resilience and Recovery Plan to be eligible for funding. Compliance with national or other government priorities can limit a city's autonomy in prioritizing resilience or other issues in its local planning, revealing the need for engagement in a national political dialogue on these issues.

Despite this, cities often lack the influence to effect change in the higher-level plans, and they often have differing political priorities or ambitions. For example, in Greater Miami, the South Florida region's ambition to address climate change and sea-level rise has been in conflict with the state's limited will to address those issues, although the situation has evolved recently and the state has created some resilience programming. Stakeholders in Colima, Mexico, note that the six-year national development plan cycles set by the president make planning priorities highly subject to political will. Every six years, when a new president takes office and publishes a new national development plan, both the state and the municipal governments must update their plans accordingly. An academic noted that municipal development plans last only one administration and that municipal, state, and national administrations are not always politically aligned, which causes issues in medium- and long-term continuity and support: "Public issues cannot be addressed in three or six years, as [a] new administration starts from scratch every time there is a turnover, the cycle restarts, and the same problems remain."

In other cases, the challenges were more logistical. In Addis Ababa, stakeholders noted the existence of a vertical disconnect and misalignment between plans resulting in the planning process running in parallel instead of fitting into one another. In Belfast, interviewees mentioned that planners would benefit from a more unified approach to vertical integration of plans between the Belfast city council and the government of Northern Ireland.

Whereas the research team found multiple examples of the ways that city resilience strategies were cross-referenced in other city plans since the publication of the resilience strategy, we did not see the same degree of vertical integration for regional-, state-, or national-level plans, except in Wellington, where several regional efforts build directly on the resilience strategy. For example, the Greater Wellington Regional Council's 2019 Natural Hazard Management Strategy acknowledges the influence of the National Disaster Resilience Strategy, the Wellington Region Emergency Management Office's Community Resilience Strategy, the Climate Change Strategy, and the Wellington resilience strategy.

For most cities, the resilience strategy was not mentioned in higher-level planning documents, but we did find some early signs of influence in a few cities. For example, Paris's resilience planning has inspired movement at the national level. The national Ministry of Ecological Transition is seeking to develop a standard national approach to resilience planning, inspired by Paris's and international standards. Stakeholders within and outside city governments commented that in general city plans are more advanced than national plans, particularly in the fields of climate change and resilience. Similarly, in Indonesia, although there is no national-level resilience strategy yet, Semarang and Jakarta have sought to champion resilience at the national level. Related to this, Indonesia's National Development Agency is drafting a law for city planning that will include resilience as one of its legal principles. Interviewees in Lagos referred to national and some state government efforts to develop a resilience strategy but noted that those processes had been stalled by the COVID-19 pandemic.

Community Accessibility to Plans and Participation in Plan Development

Resilience begins not with government but with the communities and individuals who make up the city. Their access to plans and participation in plan development ensures not only that the plans will reflect the needs and values of the local community but also that the public will be knowledgeable about and feel ownership of a plan, and will therefore expect local authorities to respect it in their decisionmaking. Resident engagement in planning improved in 13 sample cities during the evaluation period (Wellington, Melaka, Montreal, Norfolk, Semarang, Greater Miami, Los Angeles, Paris, Rotterdam, and Washington, DC). In the remaining eight cities, no change was observed: Boston and Medellin stayed at "largely accessible," while Athens, Belfast, Can Tho, Colima, and Santiago were assessed as "satisfies requirements" and Byblos as "inaccessible" at both baseline and final data collection.

In many cities, requirements at the national level having to do with public participation and planning govern actions at the local level, but significant variation exists among cities' expectations for planning. For example, in Colombia, the 2015 national Statutory Law 1757 of Democratic Participation remains

valid and aims to promote, protect, and guarantee the right to participate in political, administrative, economic, social, and cultural life, and also to control political power. This law regulates popular and normative initiatives before public corporations, such as referendums, popular consultations, plebiscites, and open councils; and it establishes the fundamental norms by which the democratic participation of civil organizations is governed. Some city governments have also advanced their own protocols for city participation, exceeding the requirements of the national government. For example, Paris adopted a charter of participation in 2018, setting out 10 founding commitments to the exercise of local democracy, including free and inclusive participation and promoting inclusive participatory approaches, particularly regarding children, young adults, seniors, foreign residents, and people in precarious situations.

Cities were divided as to whether efforts engaged the "grasstops" (i.e., civil society actors) or the "grassroots" (a more resident- or community-focused model). Recent planning efforts in Addis Ababa, Can Tho, Montreal, and Santiago, for example, rely more heavily on grasstops engagement. Some stakeholders were critical of consultation processes that take a top-down approach—that is, the stakeholders with a say are limited to leadership, authorities, consultancies, and organizations. In other cases, reliance on advisory councils or expert committees was seen as valuable to identify and prioritize suitable responses. A few planning efforts represented a more grassroots approach. For example, for the Melaka 2035 midterm city plan, developed over two and a half years, the city council relied on questionnaires, discussions, and public hearings through which residents presented their priorities and gave feedback or suggestions. Semarang employs annual processes to involve the community in city planning at the local, subdistrict, district, and city levels, and the participation rate is good. The consultation involves an annual process called *musrenbang* during which residents meet to discuss the issues facing their communities and decide upon priorities for short-term improvements. As part of planning efforts in Paris for the Climate Action Plan and the Plan Local d'Urbanisme, participants in a citizen conference were drawn by lot by an independent organization specializing in the constitution of groups of panelists so as to represent as faithfully as possible the diversity of the municipality in age, place of residence, household composition, and socio-professional categories. Finally, Wellington city relied on multiple rounds of surveys, web feedback platforms, and public hearings to inform its Long-Term Plan 2021–31.

In other cities, efforts to involve the public in planning are more limited and have not evolved past basic statutory requirements, with significant variation in the depth and quality of engagement required. Some interviewees attributed this to weak political support for public participation, whereas others referenced resource and time constraints. For example, despite Addis Ababa's efforts,

respondents noted the lack of sustainable public planning and stakeholder engagement. As one respondent put it, the planning process is often "top-down," whereby discussions with stakeholders are held after the plan has been developed as opposed to before. Respondents also wanted to unpack what is meant by "community," as the planning process fails to identify or define key stakeholders. Respondents pointed out the need to engage a broader range of stakeholders—including end users, the private sector, civil society, and nongovernmental organizations (NGOs)—in the early stages of planning and in areas that are safe spaces in which to voice full opinions. Similarly, many interviewees described the process for consultation on Chennai's Second Master Plan, released before the 100RC program, as largely delayed and inaccessible. A few interviewees from civil society remembered how the process of consultation had been opened on an already finalized document and only felt like a formal duty. However, during the final site visit most interviewees said that in the preparation for the Third Master Plan—under way in Chennai—they saw strong signals of an increased commitment on the part of the Chennai Metropolitan Development Authority to run a more inclusive consultation, with the agency already consulting a variety of stakeholders and international consultancy agencies specifically on how to create a more participatory discussion.

New technology and partnerships emerged in several cities during the evaluation period to modernize and improve public outreach. For example, Athens' municipal platform synAthina connects citizens with city hall, which is especially useful as citizens have not been so trusting of government in the past. The platform is user generated, meaning that citizens can upload data on how they want to improve the city; it is a co-creative process that supports community participation. Similarly, in Belfast, the city council is using interactive tools, such as social media, to increase participation from groups and youth. An example is the recently published Engagement Plan of the Belfast Agenda, which seeks feedback on the long-term vision and outcomes for Belfast up to 2035 and the short-term priorities for community planning from 2022 through 2026. The Engagement Plan outlines how it will use online workshops organized by local partners, as well as newsletters, media briefings, and social media advertising, to encourage better participation rates. After the mayoral transition in Miami-Dade County, the new mayor conducted a survey called Thrive305 to engage the public with questions about what they wanted their county to look like and their local government to do. More than 26,500 residents responded. One finding was that residents now see parks and public spaces as a top priority, whereas in the previous year they were one of the lowest priorities.

The COVID-19 pandemic accelerated some changes in public participation strategies, inspiring a shift to more digital engagement to enable social distancing. Interviewees across cities were mixed on whether this was an asset—allowing city governments to reach more, and more diverse, groups of

residents—or further extended the barrier between city government and its constituents. In Los Angeles, for example, the planning department shifted toward a virtual setting and virtual office hours, and the incorporation of geographic information system story maps, by which people can see what the community themes are. Senior city officials noted that the shift to virtual public engagement actually increased public participation given its flexibility: one estimated that public engagement was up five to six times the participation rate before the pandemic. In other contexts, such as Semarang, there were concerns that online participation was not inclusive as some people lack online access or are uncomfortable using the necessary technology.

Another issue pertaining to resident engagement in plan making and with the finished plans is that plan documents may not be accessible once they are finished, because either the documents themselves are not publicly available or searchable online, or the language is too technical and cannot be understood by a layperson. This point was raised in interviews in cities of all sizes and all development contexts.

Alignment with Vulnerabilities

A core aspect of resilience is to address the needs of the populations most at risk of negative impact from shocks and stressors. However, vulnerable populations vary greatly by geography, culture, and political context. Typically, people with low incomes and those experiencing poverty are the most common correlates to vulnerability, but other characteristics (including geographic location) may apply. This core construct requires a meaningful definition of vulnerable populations, and an explicit focus on those populations' resilience in planning processes and documents.

During the evaluation period, approximately half of sample cities made progress in this area, especially midsized cities like Belfast, Boston, Miami, Norfolk, Montreal, and Rotterdam. Byblos again is an outlier, starting and ending with a score of "exclusive," despite some modest progress and setbacks in between. Two cities (Medellin and Wellington) already had inclusive practices at baseline and did not backslide during the evaluation period.

Several newly released plans reflect alignment with vulnerable populations and present new methodologies for measuring vulnerabilities. For example, in Rotterdam, The Resilient BoTu 2018–2028 Neighborhood Plan cites a "social index" that shows that BoTu lags far behind the Dutch national average on such indicators as income, education level, health, language, and debt. Montreal increased its attention to vulnerabilities in planning and processes over the reporting period. Recent plans, in particular those under the Montréal 2030 umbrella, emphasize social and environmental vulnerabilities,

such as substandard, expensive housing, transportation barriers, and neighborhood displacement in addition to heat islands/heat waves and poor air quality. In addition, through its new Solidarity, Equity, and Inclusion Plan, the city has instituted an ADS+ (gender and intersectoral analysis) test to address social vulnerabilities. ADS+ is a way of conceptualizing and disaggregating vulnerabilities, which in Québec was initially focused on gender but has been expanded to take a more intersectional approach. It now includes race, age, language, and other identities. The city plans to apply this kind of analysis to future projects and municipal decisions. Boston became the first US municipality to include Affirmatively Furthering Fair Housing (AFFH) requirements in its zoning code in March 2021. Development project proposals in Boston must include a displacement analysis (part of the AFFH goals) and an analysis of historical exclusion. The regulation relies on data from Inclusionary Development Policy zone designations. Any planned development area must "consider impacts on area residents historically discriminated against so that steps can be taken to reduce those impacts, provide new housing opportunities, and address past histories of exclusion" using a new AFFH assessment tool.

During the evaluation period, some cities, such as Athens, Colima, Melaka, Montreal, Paris, Rotterdam, and Semarang, addressed the problem of unavailability of data. For example, because of a lack of data, Project Athens had no definitions of spatial vulnerability or other vulnerabilities. As a result of increased data availability, procedures for identifying vulnerable populations have improved since the baseline, with a defined strategy included in the Project Athens 2020 strategic plan.

Again, national-level policies often govern city-level action, and that is true for this core construct. Cities in Latin America (Santiago, Medellin, and Colima), especially, reported that their poverty and vulnerability methodologies are established by national ministries. Byblos, as was true at baseline, continues to have no official procedures to identify vulnerable populations in its plans; and interviewees confirmed that data on vulnerable populations are very limited. However, interviewees agree that given the multifaceted crisis unfolding in Lebanon, the number of vulnerable people is growing exponentially.

Domain 2: Resilience in City Operations

Domain 2 is made up of six core constructs selected by the research team to evaluate the CRO's effect on collaboration and administrative functioning across city siloes, with the aim of enhancing the overall effect of resilience efforts. These constructs are (1) government structure (CRO); (2) function and government "silos"; (3) political/public discourse; (4) transparency and accountability; (5) budget integration; and (6) governance operations. Definitions for each construct are included in the following discussion.

Overall, a picture emerges of moderate CRO influence across departments and some degree of systems change. The sample cities did not make universal progress with these core constructs, unsurprisingly, but most of them made gains in one or more measures. Only two cities, Byblos and Washington, DC, show little to no evidence of positive change. While cities consistently attributed the change in government structure to embed a CRO to their participation in the 100RC program, other changes in domain 2 outcomes were also enabled (and constrained) by external factors, such as political priorities and governance capacity.

On average, cities progressed on three of the six planning indicators and stayed the same or regressed on the remaining desired outcomes. For three cities, the lack of change represented indicators they were already strong on, while the majority of cities failed to see positive change for constructs that they were weak or middling on at baseline. Five cities regressed on one or more indicators during the evaluation period.

Eight of the 21 cities made positive changes since baseline or began with moderate to strong ratings at baseline and held steady. Those cities are Norfolk and Rotterdam (cohort 1), Athens, Montreal, and Wellington (cohort 2), Addis Ababa and Greater Miami (cohort 3), and Belfast (cohort 4). Five of them are midsized, six are high income, and two are low income. All but three of the cities experienced no shock or disruption during the study period. It is difficult to surmise which of these cities might have taken their path without the benefit of the 100RC program, but the ones that began the review period more resilient, as indicated by construct ratings, might have made gains on their own.

Another way to examine that possibility is to look at cities that scored low at baseline and had realized modest change by the final evaluation. Five cities changed over time from a weak to moderate rating on at least three constructs: Athens and Chennai (cohort 2), Addis Ababa and Washington, DC (cohort 3), and Belfast (cohort 4). Three of those cities are midsized, three are high income, and two are low income. Three also experienced some shock or disruption in contextual conditions during the study period (Athens and Chennai with low-to-medium disruption and Addis Ababa with high disruption). Addis Ababa, a midsized city with low income, gained ground in the greatest number of constructs, moving from a weak to a moderate rating on five of the six constructs. It achieved those gains even in a context of high disruption. It is possible that 100RC made the most difference in these five cities, which began with lower resilience yet made at least some gains during their time in the program.

Analyzing progress by cohort reveals some patterns, suggesting that the variations in program model and dosage between the three cohorts may have had some effect on outcomes in the operations domain. Cohort 2 cities show the most positive change across operations constructs compared with

other cohorts. No city in this group was found to have regressed on any construct, whereas two cities in cohort 1 and three cities in cohort 3 backslid on at least one construct. This is unsurprising because the program staff were able to learn from the first cohort cities' experiences and refine the offerings and supports. The cohort 2 cities also could learn from the first cohort, and the second cohort was in the program longer than the other two cohorts. Cohort 3 cities had comparatively more moderate and weak final ratings across constructs and more negative change over time. These cities spent less time in the program and perhaps were more affected by the program's closure than cities in cohorts 1 and 2.

City size also has some influence over outcomes observed in the operations domain, unlike in the planning domain where there was no observable difference by city size. Larger cities documented change across a higher number of operations outcomes of interest, whereas small cities had more regression in outcomes or no change, staying weak, middling, or strong. Income context, number of CRO transitions, and degree of disruption did not appear to shape progress on operations outcomes.

Looking at the constructs themselves, certain outcomes were more likely to change from baseline to final data collection and to be attributed to the 100RC intervention itself. Notably, government structure (i.e., role of the CRO) was the most sustained outcome of the 100RC intervention. Eighteen cities experienced and sustained positive change on this construct—moving from meeting the program milestone of hiring a CRO to institutionalizing the position within the city government organization chart even after the end of program funding in support of a CRO and the eventual end of the 100RC program. For the majority of indicators, it was a mixed story, with about half of all sample cities documenting progress on government function (or "silos"), political commitment, budget commitments, and vertical governance operations.

The transparency and accountability construct showed the least change, positive or negative, of the operations constructs. Nine cities across cohorts were found to have started with moderate transparency and remained so over time, two cities began and remained strong, and two others held steady with weak transparency. This could be expected given the pre-100RC practice of many cities posting various datasets, official reports, notes from meetings, and other information online, and the ease, relative to making budgetary changes or reducing silos, of doing so.

Tables 6a and 6b show the evolution of each sample city's scores on the operations constructs from baseline to final. For better understanding of the scoring values, the reader should refer to appendix B and should note that some cities that did not raise their scores had high scores during baseline. Positive changes are coded in blue in the "Final" columns, negative changes in orange, and no change in black.

TABLE 6A

Baseline and Final Scoring for Resilience Operations Constructs

Summary for government structure, government function, and political/public discourse

	1. Government Structure (CRO or Equivalent)		2. Government Function—Silos (Strength)		3. Political/Public Discourse (Strength)	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	No	Partially	Modest	Weak	Weak	Modest
Athens	No	Yes	Strong	Modest	Modest	Strong
Belfast	No	Partially	Modest	Modest	Modest	Strong
Boston	No	Yes	Strong	Modest	Modest	Strong
Byblos	No	Partially	Weak	Weak	Modest	Weak
Can Tho	No	No	Strong	Strong	Modest	Modest
Chennai	No	No	Strong	Strong	Weak	Modest
Colima	No	Partially	Modest	Strong	Modest	Weak
Greater Miami & the Beaches	Yes	Yes	Strong	Modest	Strong	Strong
Lagos	No	Yes	Modest	Modest	Weak	Modest
Los Angeles	No	Yes	Strong	Modest	Modest	Strong
Medellin	No	Partially	Modest	Modest	Strong	Weak
Melaka	No	Yes	Strong	Weak	Weak	Weak
Montreal	No	Yes	Strong	Modest	Modest	Strong
Norfolk	No	Yes	Modest	Weak	Strong	Strong
Paris	No	Yes	Strong	Strong	Modest	Strong
Rotterdam	No	Yes	Modest	Weak	Strong	Strong
Santiago Metropolitan Region	No	Yes	Strong	Modest	Modest	Strong
Semarang	No	Yes	Strong	Modest	Modest	Strong
Washington, DC	No	Partially	Strong	Strong	Modest	Weak
Wellington	No	Yes	Modest	Weak	Strong	Strong

Source: Author tabulations.

Note: Blue text in the Final columns indicates positive change; orange indicates negative change; black indicates no change

TABLE 6B

Baseline and Final Scoring for Resilience Operations Constructs

Summary for transparency and accountability, budget operations, and governance operations

	4. Transparency and Accountability		5. Budget Operations (Leveraged Funds)		6. Governance Operations (Commitment, Duplication)	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	Low	Satisfies reqs.	None	Some	None	Some
Athens	Satisfies reqs.	Satisfies reqs.	None	Some	None	Some
Belfast	Satisfies reqs.	Satisfies reqs.	None	Some	None	Some
Boston	Significant	Significant	Some	Extensive	Some	Some
Byblos	Low	Low	None	None	None	None
Can Tho	Satisfies reqs.	Satisfies reqs.	Extensive	Some	Extensive	Some
Chennai	Low	Some	None	Modest	None	Some
Colima	Satisfies reqs.	Satisfies reqs.	None	Some	None	None
Greater Miami & the Beaches	Satisfies reqs.	Satisfies reqs.	Some	Extensive	Extensive	Extensive
Lagos	Low	Low	None	Modest	None	Modest
Los Angeles	Low	Significant	Some	Some	Some	Extensive
Medellin	Significant	Satisfies reqs.	Extensive	None	Some	Some
Melaka	Satisfies reqs.	Satisfies reqs.	Some	Some	Some	Some
Montreal	Satisfies reqs.	Satisfies reqs.	None	Extensive	Some	Extensive
Norfolk	Satisfies reqs.	Significant	None	Extensive	Some	Extensive
Paris	Satisfies reqs.	Satisfies reqs.	None	Some	None	Some
Rotterdam	Satisfies reqs.	Significant	Extensive	Extensive	Extensive	Extensive
Santiago Metropolitan Region	Low	Satisfies reqs.	None	None	Some	Some
Semarang	Low	Significant	Some	Some	Some	Some
Washington, DC	Satisfies reqs.	Satisfies reqs.	None	Some	None	Some
Wellington	Significant	Significant	Some	Extensive	Some	Extensive

Source: Author tabulations.

Notes: Blue text in the Final columns indicates positive change; orange indicates negative change; black indicates no change. Satisfied reqs. = Satisfies requirements.

Government Structure

A government's organizational structure determines how likely resilience building is to be established across city government operations. Analyzing that structure allowed the team to see where changes were expected, and, over time, changes in structure also indicated the permanence and influence of new structural elements designed to embed resilience thinking in city operations, such as the CRO.

Of the 21 sample cities, 19 maintained the position of CRO, though in most cases that position within the structure of government changed significantly. An additional city, Byblos, never created the position within city government but worked instead with a CRO as an external consultant. Fourteen cities saw various changes in the CRO's structural position, although in most cases those involved departmental mergers or shifts in lines of authority. Two cities went further to formalize the CRO or the resilience office through a permanent budgetary allocation. In Paris, the CRO and the resilience office is being moved from the General Secretariat into the Directorate of Ecological Transition and Climate as part of a broad restructuring of the municipal government. That move is seen as formally institutionalizing the resilience office within the municipal structure and strengthening the CRO's ability to integrate resilience across directorates. In Belfast as well, the CRO, or resilience commissioner, position was made permanent in 2021, although it was renamed "climate commissioner." That permanent position, along with the resilience team, was moved from under the chief executive office into the city council's City Organizational Strategy Department. The position title and its place in the government structure underscore the city's shift in focus toward climate, though there is intent to maintain the broader resilience perspective.

Other cities have also modified the CRO's focus and scope. Santiago's CRO now has a dual role, serving indefinitely as interim chief of the international relations unit of the regional government. Respondents said the change has taken time away from resilience work. In Washington, DC, the CRO was moved from under the city administrator to the city's Homeland Security and Emergency Management Agency after 100RC ended. The CRO position was renamed chief of resilience and emergency preparedness (CREP) and now includes responsibility for resilience strategy implementation and long-term risk reduction planning and training. At the time of data collection, the position was filled by an acting CRO/CREP after the departure of the former CRO in early 2021.

A few cities (Chennai, Athens, and Medellin) have shifted the CRO position outside of city government. In Chennai, the CRO office was absorbed into a resilience center within a nongovernmental entity in 2021. The center was developed with support from the Adrienne Arsht–Rockefeller Foundation Resilience Center at the Atlantic Council and R-Cities. Perspectives vary on

whether the move will aid or hinder the CRO's ability to influence planning and operations. In Athens and Medellin, the CROs are or were positioned outside of city government. The Athens CRO works under subcontract as an external adviser to the mayor and the resilience office while serving as chief heat officer, a new government position as of summer 2021. In Medellin, the resilience office became a private, nonprofit organization in 2017; however, as of 2021 it has been reintegrated into the city government as the CRO is also the director of the city's administrative department of planning.

Can Tho is the sole city that eliminated an existing CRO position; the city did not allocate additional funding when the CRO's contract ended in summer 2019. The CRO continued working in a reduced capacity until early 2020. Functions of the resilience office were moved to the Climate Change Coordination Office (CCCO) within the Department of Agriculture and Rural Development. The CCCO was created in partnership with the Asian Cities Climate Change Resilience Network and has ties to R-Cities. The CCCO continues to implement projects that had been under way, although it is unclear whether it will retain the 100RC goal of transforming planning and operations processes.

Function (Silos)

In contrast to structure, function refers to the specific subjects, procedures, and practices that each entity manages or has authority over. With this measure we can examine the degree to which "silo busting" occurs to reduce the incidence and negative impact of the dysfunction that results as a consequence of bureaucracy that prevents collaboration among units that need to be working together to accomplish resilience outcomes.

Most sample cities have effected some degree of reduction in functional silos. In the 14 cities that made progress in reducing silos and that continue their de-siloing efforts, the city leadership—including mayors and department heads—have leant their support to the CROs' efforts. In Melaka, for example, the efforts of the CRO and deputy CRO have resulted in most all city departments having at least one person who promotes resilience efforts. Coordination among departments is noted in formal efforts, such as plan preparation, and informal communications, such as working together to problem-solve on project implementation challenges. The take-up of de-siloing efforts suggests that city leaders and staff are realizing benefits from cross-departmental coordination and collaboration, or, as one respondent in Rotterdam put it, "There is a feeling in the city that silos are not helpful." Even where city leaders and other departmental staff have assumed roles in silo reduction, the CROs continue to play important roles in cross-departmental networking and convening.

Interviewees in a couple of cities noted that the increase in cooperation or collaboration among city departments was related to more recent racial equity efforts (Boston) and to the pandemic (Can Tho). Whether any pandemic-related changes become embedded in departmental functioning is not possible to determine at this time.

Two cities had no change with regard to the silo concept, although their circumstances are distinct. Efforts to de-silo government secretariats in Medellin predate the 100RC program, and there are no new efforts under way although engagement across secretariats continues. In Chennai, government agencies continue to collaborate effectively in response to disasters, but otherwise siloing remains strong.

Silos have strengthened in one city (Colima) and have stayed the same since baseline in several others. After progress in collaboration was made in Colima, silos strengthened following changes in city administrations. Respondents there attribute the strengthening of silos to a change in city leadership following the most recent elections and to the end of 100RC, after which the CRO has found it difficult to coordinate efforts with city agencies. In Athens, respondents report that although silos are not as strong as they were at baseline, they have strengthened somewhat under current city leadership; the lack of a mandate for departmental collaboration has left earlier gains unprotected. Byblos made no focused effort to de-silo and city staff's commitment to resilience overall has declined since baseline. In Washington, DC, de-siloing efforts never materialized or were minimal. Some respondents there think silos have strengthened again since the CRO position was moved to the District's Homeland Security and Emergency Management Agency.

Political/Public Discourse

Sustained political buy-in is needed to institutionalize resilience in city operations. This concept covers the degree to which resilience discourse, as a result of the intervention, was mobilized in political and public discourse.

In 14 of the 21 sample cities, the research team found evidence of political, civil, or private leaders making statements about resilience since baseline. In seven of those 14 cities, public resilience discourse appears to have been consistent since baseline, and in six it increased. The discourse varies in those six cities, however, with respect to how the term is used. Use of the term *resilience* in Chennai and Norfolk, for example, tracks with 100RC's definition of the term, whereas in Boston and Montreal, the concept shows up in political and public discourse even if the term *resilience* itself does not. For example, Boston's newly elected mayor spoke of inclusion, housing protections, climate progress, and other

relevant themes in her acceptance speech, but not resilience per se. This is in contrast with public discourse in Athens and Belfast, where statements on resilience reflect a narrower, climate-related definition. For Athens, this was largely due to difficulty in translating the word *resilience* from English to Greek, as the meaning does not carry across. The word for resilience in Greek refers solely to physical resilience or durability. Thus, it was difficult to transfer the idea to city departments, organizations, and the public, particularly those in city departments or organizations that were not internationally facing. Colima is the only city of the 14 to manifest recent resilience discourse that then disappeared, potentially because of a newly elected center-right government. Talk of resilience figured in the mayoral candidates' campaigns, but there have been no documented statements on resilience by the mayor or other city leaders since the 2021 election. We cannot say whether the lack of public statements postelection reflects a lull or a reduction in attention and support since rollout of the strategy in 2019.

In two cities, Addis Ababa and Washington, DC, political and public discourse on resilience has clearly fallen off. In the case of Addis Ababa, although there are documented, public statements by city leaders on resilience and the city's resilience strategy, the current leadership has yet to make any comments. During a speech in response to a flood that claimed a number of lives in the summer of 2021, resilience was not mentioned. In Washington, DC, the mayor hasn't used the term *resilience* since the strategy release in 2019, and the CRO's efforts to encourage other city leaders and agency heads to promote the concept have been unsuccessful.

We found limited or no evidence of political or public discourse vis-à-vis resilience throughout the monitoring period in three cities: Melaka, Paris, and Byblos. Respondents from Melaka vaguely recalled hearing the mayor talk about resilience in his inauguration speech, but most of the talk revolved around individual rather than community or societal resilience. The absence of a resilience discourse is most surprising in Paris, given the strong commitment. The only documented occurrence is in a talk by the deputy mayor during a university event in 2021. However, several interviewees noted that this was in part due to not wanting to overpoliticize the concept/term resilience, which could impede efforts to integrate it on a wider scale or curb the public's positive sentiment regarding the concept.

Transparency and Accountability

The transparency/accountability construct measures the degree to which the city's operations are open to public scrutiny and accountable, including ease of access to city documents and resources, openness

of public data, open performance monitoring, and other forms of transparency in relation to resilience shocks, stressors, and other risks.

Most of the cities—17 of the 21—make data and information available to the public. Evidence points to gains in transparency and accountability in roughly half the cities and no declines. The 11 cities that have increased the publicly available data and information include all four cities in Asia and four of the five cities in North America. Efforts to increase transparency and accountability in Semarang include a new website that enables citizens to access planning information and learn about current development priorities in the city's subdistricts. There also is a city data portal. Likewise, relevant plans in Lagos include launching an effort to use pictures in the city's publicly accessible project management platform that allows citizens to track project progress.

Eight cities showed no signs of change over time. Of those, five show evidence of city governments' making data and information available but not of change. For example, in Santiago, a 2014 law requires that all meetings meant to influence public decisions must be recorded and made available to the public, and officials' trips and any gifts they receive also are made public. Wellington's city council's website continues to post minutes from committee meetings, information and data on plans, various data maps, and the city budget, and it has implemented a new system of comprehensive geographic information system maps for public use. Plans and budget documents also are available in hardcopy at libraries and community centers. The council maintains a complaint registry and offers a discussion portal for citizen feedback. Two other cities in which we saw no change, Addis Ababa and Byblos, however, offer little to no public access.

Budget Operations

The funding of city operations is an important mirror of changes in operations that suggests resilience institutionalization and level of commitment. From changes in revenue sources to the formal methods for allocating funds and procuring services, budgetary operations reflect immediate city priorities as well as long-term institutional transformation.

Overall, we found little evidence that 100RC has led city governments to use a resilience lens in their budgeting processes. Four cities appear to apply a resilience lens, although the evidence is tenuous in all but one of them (Norfolk). In Can Tho, the budget allocation process includes an "implicit" lens reflecting a directive in a 2017 resolution that agencies place a priority on sustainable development and climate resilience. Medellin's city government claims to use such a lens, but the city budget for 2021 did not include a line for a resilience office or for efforts explicitly related to resilience.

Among the 16 cities where there is no indication of such a budgeting lens, one city has tried since baseline to introduce one. An assessment grid created by Paris's resilience office to inform the city's selection of investments was rejected but has been picked up by other jurisdictions. Paris's new resilience office is designed to provide stronger links to the city's finance department and is anticipated to strengthen staff's ability to review the city's budget for a resilience focus. It remains to be seen whether the office's mandate to screen the budget will translate into real authority over decisions. In response to a national law implemented in 2021, Santiago has committed to finance projects that support water and energy sustainability goals. Previously, in response to a regional funding source, the city linked project proposals to the resilience strategy, but that requirement ended. Three other cities include a resilience-related lens: Belfast has shifted from a lens focused on resilience to one focused on climate; Boston uses a racial equity lens; and Montreal considers carbon emissions of new capital projects.

Budgets for resilience efforts have increased in five cities. Notably, the Paris resilience office now has its own budget to cover operational expenses and various studies. Resilience projects continue to be funded through the budgets of other departments. Another five cities have seen budget decreases for resilience. In Lagos and Melaka, the decrease was tied to shifts in priorities because of the pandemic. There has been a small budget increase in Melaka recently, suggesting that the budget reduction may be temporary, although whether the budget there, or in Lagos, will return to pre-pandemic levels is unknown. Colima's 2021 city budget includes no funding for the city's resilience office or projects. Byblos is the only city that has lost all funding for resilience-related staff and projects, including funding from external sources. Plans and projects that were under way have been halted because of the city's financial challenges.

Most of the cities in our sample receive funding from one or more sources external to city government, including regional, state, and national governments, and local or nonlocal NGOs, such as state, national, and international foundations. Among NGOs, the World Bank is cited as a funding source in several cities, including Chennai and Semarang. Universities are cited as a source in Lagos, Paris, and Norfolk, while a church provides support in Addis Ababa. Funding from such sources is important in all the cities to complement or provide full funding for various planning and project implementation efforts, but for at least a few cities, it is crucial. For example, Colima's city government does not have resources for project implementation and depends instead on limited federal funds. Similarly, Chennai receives fiscal transfers from the state and national governments and is dependent on those sources, along with NGOs, for resilience-related funding.

Governance Operations

Although the sample cities' relationships with other governmental entities of all kinds is beyond the purview of 100RC's intervention, explicit commitments or refusals to commit by those entities in support of a city's resilience efforts in the long term may suggest a changing relationship spurred by the 100RC intervention. In some cases, that included the creation or mirroring of the 100RC intervention within the external entity (e.g., a state CRO or a national resilience plan) with explicit connection to the city's 100RC work. Like the city leaders' commitments, the term *commitment* here refers to public statements about resilience at first, and then budget or project advocacy as applicable.

Most of the sample cities have at least some vertical operational engagement for resilience efforts with regional, state, or national governmental entities. Among the 13 cities with evidence of vertical operations, seven cities have seen an increase: most of those are located in Europe and North America, and four are in cohort 2. Los Angeles has had an influence on county and state governments, which have incorporated resilience into some of their operations. For example, the Los Angeles county government is establishing a CRO position based on the city's position and the state is developing a spending package for resilience efforts in southern California. Montreal is the only city in this group that included mention of downward-facing vertical operations—that is, city staff are helping boroughs develop neighborhood-level resilience efforts. Byblos was the only city with a decline in vertical operations. The remaining five cities showed no evidence of change.

Interjurisdictional resilience operations were in evidence in slightly more cities than vertical operations. Among the 16 cities in this group, nine show evidence of an increase and the remaining seven have no clear indication of change. Examples include Rotterdam's collaboration with The Hague to develop and implement resilience trainings; the two cities' resilience teams meet regularly. Wellington's city council participates in a regionwide effort whereby city councils are developing a regional hazard mitigation strategy in the face of increasingly frequent and severe natural hazard events. The effort is leading to increased planning and operations.

Only six cities showed indications of overlapping operations. Overlapping operations have not shown signs of changing except in Norfolk, where they have increased. The partnership between the city and one of its universities is increasing under new leadership of the university's resilience institute. Looking across governance operations, four cities—Paris, Rotterdam, Athens, and Norfolk—are the only cities that displayed evidence of all three types of governance operations.

Domain 3: External Factors

In addition to collecting data in the domains tied to the 100RC intervention, the M&E team collected information for all sample cities on various contextual factors intended to provide insight into events and situations outside the evaluation that have the potential to influence outcomes of interest. Those factors include (1) general planning practices, such as the level of autonomy cities enjoy in planning, the tier of government responsible for local planning, and the level of independence of the planning body within the local government; (2) general city operations, such as staffing and general organizational structure; (3) political conditions and policy contexts, such as turnover mayoral transitions and party turnovers; (4) social conditions, such as levels of economic development, social stability, and poverty rates; (5) financial conditions and operations, such as budget processes and revenue; and (6) governance conditions, including level of government centralization, public participation, and relationships with neighboring localities.

As a component of the contextual analysis, the team identified which sample cities had experienced significant disruptions to regular operations across contextual factors. Such disruptions included political and social unrest (Byblos); political transitions for which we had evidence of operational disruption (Colima, Santiago, and Boston); changes to the administrative structure of the city aside from de-siloing and resilience-building efforts (Paris and Medellin); and changes in the governance context, such as major national or regional political shifts or changes in divisions of power (Chennai, Athens, and Medellin).

Despite these disruptions, the sample cities remained largely stable across these factors during the 100RC intervention period with some notable exceptions, including the worsening crises of governance and inflation in Byblos and the lifting of strong austerity measures in Athens that previously prevented them from acquiring debt. Similarly, the few cities that have seen significant shifts in governance or political context (Boston, Santiago, Athens, and Chennai) are exceptions. While most cities saw dips in economic activity and planning during the peak of the COVID-19 pandemic, those effects are not universal, and are largely thought to be temporary in nature.

Tables 7a and 7b show the evolution of scoring for each external factor from baseline to final. For help in understanding the scoring values, the reader should consult appendix B as a reference and should also note that some (but certainly not all) cities that failed to better their scores had high baseline scores. Positive changes are coded in blue in the “Final columns, negative changes in orange, and no change in black.

TABLE 7A

Baseline and Final Scoring for External (Contextual) Factors

Summary for general planning practices, general city operations, and political conditions and policy context

	1. General Planning Practices		2. General City Operations		3. Political Conditions and Policy Context	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	Weak	Weak	Weak	Weak	Stable	Unstable
Athens	Strong	Strong	Strong	Strong	Stable	Stable
Belfast	Modest	Strong	Modest	Modest	Unstable	Unstable
Boston	Strong	Strong	Strong	Strong	Stable	Stable
Byblos	Weak	Weak	Modest	Weak	Unstable	Very unstable
Can Tho	Modest	Strong	Modest	Modest	Stable	Stable
Chennai	Modest	Modest	Weak	Weak	Stable	Stable
Colima	Strong	Strong	Modest	Strong	Stable	Stable
Greater Miami & the Beaches	Strong	Strong	Strong	Strong	Stable	Stable
Lagos	Weak	Weak	Modest	Modest	Stable	Stable
Los Angeles	Strong	Strong	Strong	Strong	Stable	Stable
Medellin	Strong	Strong	Strong	Strong	Stable	Stable
Melaka	Strong	Strong	Strong	Strong	Stable	Stable
Montreal	Strong	Strong	Strong	Strong	Stable	Stable
Norfolk	Strong	Strong	Strong	Strong	Stable	Stable
Paris	Strong	Strong	Strong	Strong	Stable	Stable
Rotterdam	Strong	Strong	Strong	Strong	Stable	Stable
Santiago Metropolitan Region	Strong	Strong	Modest	Strong	Stable	Stable
Semarang	Strong	Strong	Modest	Strong	Stable	Stable
Washington, DC	Strong	Strong	Strong	Strong	Stable	Stable
Wellington	Strong	Strong	Strong	Strong	Stable	Stable

Source: Author tabulations.

Note: Blue text in the Final columns indicates positive change; orange indicates negative change; black indicates no change.

TABLE 7B

Baseline and Final Scoring for External Factors

Summary for social conditions, financial conditions and operations, and governance conditions

	4. Social Conditions		5. Financial Conditions and Operations		6. Governance Conditions	
City	**Baseline**	**Final**	**Baseline**	**Final**	**Baseline**	**Final**
Addis Ababa	Low income	Low income	Weak & opaque	Modest & opaque	Strong & centralized	Strong & centralized
Athens	High income	High income	Modest & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Belfast	High income	High income	Modest & transparent	Modest & transparent	Strong & centralized	Strong & decentralized
Boston	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Byblos	Upper middle	Lower middle	Modest & opaque	Modest & opaque	Modest & centralized	Modest & centralized
Can Tho	Lower middle	Lower middle	Strong & opaque	Strong & opaque	Strong & centralized	Strong & centralized
Chennai	Lower middle	Lower middle	Modest & opaque	Modest & opaque	Strong & decentralized	Strong & decentralized
Colima	Upper middle	Upper middle	Modest & transparent	Modest & transparent	Modest & decentralized	Modest & decentralized
Greater Miami & the Beaches	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Lagos	Lower middle	Lower middle	Strong & opaque	Strong & opaque	Modest & decentralized	Modest & decentralized
Los Angeles	High income	High income	Strong & transparent	Strong & transparent	Modest & decentralized	Modest & decentralized
Medellin	Upper middle	Upper middle	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Melaka	Upper middle	Upper middle	Strong & opaque	Strong & opaque	Modest & centralized	Modest & centralized
Montreal	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Norfolk	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Paris	High income	High income	Strong & transparent	Strong & transparent	Strong & centralized	Strong & centralized
Rotterdam	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Santiago Metropolitan Region	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized
Semarang	Lower middle	Lower middle	Strong & transparent	Strong & transparent	Strong & centralized	Strong & centralized
Washington, DC	High income	High income	Strong & transparent	Strong & transparent	Modest & decentralized	Modest & decentralized
Wellington	High income	High income	Strong & transparent	Strong & transparent	Strong & decentralized	Strong & decentralized

Source: Authors tabulations

Note: Blue text in the Final columns indicates positive change; orange indicates negative change; black indicates no change.

Shocks

Resilience planning supports cities in facing anticipated and unknown shocks that might disrupt operations in the city. During the evaluation period, 100 percent of the cities in both the sample and the full population experienced a major shock during their 100RC membership, given the shared experience of COVID-19, which includes the pandemic and the economic downturn that followed. However, many cities experienced multiple shocks.

Following the pandemic, the most common shock experienced by cities was protests or civil unrest, which in many cases reflected public discontent due to pandemic measures; 39 percent of all member cities and 38 percent of sample cities experienced civil unrest in the first six months of 2021. Other shocks included climate-related effects, such as floods (17 percent and 24 percent, respectively); shooting or terrorism events (8 percent and 5 percent, respectively); and major heat waves (7 percent and 5 percent, respectively).

COVID-19 AS A CROSS-CUTTING SHOCK

Over the past two years, all cities in the sample felt the shock and ongoing stress of the COVID-19 pandemic, hindering their ability to meet the needs of their populations. The pandemic revealed and worsened preexisting social and economic disadvantages among city populations, and increased cities' vulnerability to other shocks and stressors against the backdrop of the health and economic crisis the pandemic set in motion.

Such challenges did not occur in a vacuum but were ensconced in the unique social, economic, and political conditions of cities, resulting in some national and regional nuances worth noting. For Paris, a large European city, the dual forces of COVID-19 and migration increased the size of the vulnerable population in need of services. In Belfast, a small city in Europe, the pandemic challenge was compounded by a Brexit-induced energy shortage that increased the risk of fuel poverty among city residents. In Chennai, a large developing city where 70 percent of employment is informal, the pandemic particularly hurt the livelihoods and health of the urban poor, who are also the most vulnerable to natural hazards like flooding because they usually reside in flood-prone coastal areas. Addis Ababa and Santiago reported an increase in urban poverty rates due to the pandemic, reversing recent progress made in poverty reduction. As the pandemic unfolded, Addis Ababa was also experiencing the shock of civil unrest due to political conflict within and beyond its borders. Elsewhere, in Melaka, the start of the pandemic coincided with a national-level political crisis in early 2020 that continued into 2021. The crisis, described as a "shock" by the previous deputy CRO, was exacerbated by

COVID-19 and contested government emergency measures and led to the resignation of two prime ministers in less than 18 months.

Wealthy, midsized cities in the US, including Boston and Washington, DC, reported that the pandemic exposed a need to address vulnerabilities rooted in racial inequity, trauma, and affordable, quality housing as evidenced by the pandemic's disproportionate impacts (e.g., infections, hospitalizations, and deaths) on people of color. Since joining the 100RC cohort, Boston's resilience strategy focused on racial equity. And the city has maintained this focus on equity throughout the pandemic, recognizing that it needs to first address underlying social and economic conditions in order to become more resilient to shocks.

The key takeaway from these cities' experiences is that the COVID-19 pandemic increased their attention to the need for policies and programs to support vulnerable groups, as a means not only to mitigate the pandemic's impact but also to build resilience in the long term. Across the 100RC sample cities, this translated to the formulation of new plans to address the pandemic, incorporation of COVID-19 response in existing plans, and the launch of ad hoc activities and campaigns to help people cope with the impact of the pandemic.

Local authorities in a few cities reported that they applied the resilience concept to their COVID-19 response plan, while others that didn't have a plan in place still felt that their efforts to address the pandemic were aligned with the city's resilience strategy. Byblos and Belfast offer examples of explicit application of the resilience concept. The latter saw the pandemic, and the resilience questions it raised, as providing a new lens to think about how best to advance the city's longstanding ambitions of reducing inequalities. And in Can Tho, stakeholders felt that leaders' understanding of resilience had improved—an outcome they attribute to the COVID-19 pandemic, which facilitated a citywide pivot toward resilience thinking. In this vein, cities of all sizes reported increased use of the term *resilience* in city planning documents, as was the case in Montreal, Paris, and Medellin. Moreover, stakeholders in other cities (e.g., Wellington) mentioned plans that were resilience-adjacent, meaning that such plans were linked to the objectives of the city's resilience strategy even though they did not apply the terms *shocks* or *stressors.* Outside city planning documents, cities further reported increased appearance of resilience in public discourse (including in public speeches) as the pandemic worsened. For example, in describing his city's handling of the pandemic, Medellin's mayor used the term *resilience* to say that Medellin has been resistant to the COVID-19 pandemic.

Viewed this way, the pandemic marked a case in point for why resilience matters. One city official in Melaka put it well: the resilience frame helped them think about future shocks and while they would

never have imagined having to deal with a pandemic on the scale of COVID-19, they felt convinced that the resilience frame gave them a head start by preparing them to respond. Informed by their experience with the Zika virus, leaders in the Greater Miami and the Beaches region espoused a wider-reaching application of resilience in the wake of COVID-19. For them, resilience is increasingly about building systems that thrive (i.e., "bouncing forward")—a step beyond the desired objective of "bouncing back."

However, not all cities had the same experience with the intersection of the pandemic and resilience. Even though COVID-19 provided a critical opportunity for cities to put their resilience tools and knowledge to the test, a couple of them reflected that they did not seize the moment in the best manner possible relative to expectations stemming from their involvement in the 100RC program. One official in Los Angeles noted that the city and 100RC missed the opportunity to create programming addressing the pandemic through a resilience lens. And Colima, instead of building on its 100RC strategy to address the pandemic, set its resilience strategy aside and created new road maps for economic recovery and sanitary measures, suggesting that resilience has yet to gain firm ground in the city's operations let alone its pandemic response.

Challenges. Stakeholders from various cities reported that the COVID-19 pandemic diverted leaders' attention and city resources away from the implementation of their resilience strategy. In a few cities, the shift in focus was fueled by both the pandemic and civil unrest.

Combined with its toll on city and national budgets, the pandemic caused setbacks in activities, including planning exercises as well as community and stakeholder engagement practices, essential for resilience building. The financial challenges of the pandemic also cast doubt on whether it would be possible to sustain funding for resilience functions (e.g., ongoing funding for a resilience office). The cities of Greater Miami were exceptions to this pattern. Despite the health and economic shocks brought on by the pandemic, leaders of the three jurisdictions remained committed to implementing the resilience strategy and even reported progress on several action items in the strategy.

Though several cities reported a pandemic-related economic downturn, some cities had the opposite experience. Can Tho, for example, saw its economy grow even after the pandemic hit, with projections showing that the growth trajectory will persist over the next five years, although dips in tourism revenue may cause more sustained challenges to the economy as the pandemic continues. Similarly, midsized cities in North America, such as Boston and Washington, DC, were less likely to report pandemic-induced financial challenges. Despite the pandemic, Washington, DC, managed to increase its budget and its revenue and even expanded resilience-related services, such as transport,

fire and emergency medical services, planning, and public works, along with a large increase in transfers and subsidies to address pandemic-related issues.

Finally, cities generally had limited authority and formal roles in the pandemic response relative to national governments—a factor that inhibited local initiative and action. A few cities, however, departed from that pattern by acting despite constraints on their authority or role. In Colima, for example, local initiatives enshrined in the mayor's response measures were set aside once the national government issued its pandemic response strategy. Colima's interim CRO described that outcome as resulting from the shortsightedness of the mayor's measures—that is, they did not span a long enough time horizon, which, according to interviewees, was understandable as leaders could not accurately predict how long the pandemic would last. From this perspective, the elevation of the national strategy over the mayor's could be considered a matter of necessity rather than disregard for local leadership, as is often the case with resilience actions in small, large, wealthy, and under-resourced cities alike. Although a shock may warrant a top-down response, local stakeholders observed that top-down responses are not always effective because they can engender poor implementation of policies and programs. These challenges aside, some cities (e.g., Athens) took action to assist communities despite having a significantly smaller, if any, formal role in the pandemic response.

Resilient Responses. Roughly three-quarters of cities in the sample took action in response to the COVID-19 pandemic that aligned with and/or advanced their resilience goals. Those activities varied by city but often focused on meeting the needs of vulnerable populations; de-siloing city functions while enhancing coordination between the city and the national government; and increasing citizen engagement and community participation vis-à-vis shocks.

As mentioned previously, the pandemic drove cities to focus on meeting the needs of vulnerable populations, with a few cities, particularly mid- and large-sized ones in developing countries, pivoting their overarching resilience strategies to address needs made pressing by the pandemic. That was the case in Addis Ababa, as well as in Chennai, where the CRO repurposed an urban horticulture program to deliver vegetable garden kits to urban poor communities. The program was part of the city's resilience strategy, and its initial purpose was to embed green infrastructure on the rooftops of government schools. The mayor of Athens created a Help at Home Plus program to offer at-home services to vulnerable populations. Athens also responded to the pandemic by providing hotels and COVID-19 tests to homeless people. Cities reported engaging a diverse cast of actors and exploring new partnerships with private-sector and civil society groups with a goal of helping vulnerable communities cope with the pandemic. Such initiatives were started or supported by city leaders and private actors alike. For instance, a $6 million initiative endorsed by the deputy mayor of Addis Ababa was launched to

provide scarce resources such as water and soap and behavioral change education to vulnerable communities. Similarly, Greater Miami leveraged its relationship with The Rockefeller Foundation to provide financial assistance to working families. Besides corporate partnerships, collaboration with civil society formed part of the strategy to help people during the pandemic, as seen in Rotterdam, where community groups were mobilized to provide essential services, such as support with groceries, care for the elderly, and homeschooling.

Cities in the sample show mixed evidence of the de-siloing of city functions and enhanced coordination with national governments in their COVID-19 responses. Collaboration has always been a challenge for most of the cities in the 100RC sample. In some ways the pandemic made it difficult for government stakeholders to work together, but it also prompted more collaboration. Two factors stand out as supporting de-siloing and better intergovernmental coordination in cities' pandemic responses: (1) the designation of a point person or entity to coordinate action, and (2) the pivot toward virtual work. These patterns hold across big and small cities alike, though the former were more likely to create new coordinating structures to drive the response.

On the one hand, the officials or entities charged with coordinating efforts helped diverse stakeholders—including representatives of national governments, city agencies and departments, and political units—work well together. Examples of such entities include the chief resilience office in sample cities, Boston's Health Inequities Task Force, and Athens' joint crisis cell. That the pandemic's urgency made new collaborations necessary was a shared sentiment among a few cities. As one respondent noted, "To some extent it [the recent pandemic-related budget cuts] has given them [city officials] the opportunity to apply the co-benefits approach to optimize the implementation of their programs to give additional benefits rather than focusing on siloed programs." The coordinating units provided timely information and advice to decisionmakers, helping them strike a balance between pandemic control and planning for long-term growth and development as well as coordinating with national governments. One example comes from Chennai, where a stakeholder we interviewed considered the creation of a control room to monitor COVID-19 data a useful effort to integrate data sources and produce analysis to support various city actors in their response to the pandemic.

To further illustrate, interviewees credit Paris's creation of a crisis management unit in its newly established Department for Public Health as enabling collaboration among city departments on the twin objectives of public health and economic recovery. The crisis management unit involved leaders from the city's health, planning, public works and police departments, as well as, importantly, resilience offices. One government stakeholder noted that the pandemic "really brought together departments in the way they work." On this point, a few cities noted the CRO's active role in promoting greater

coordination, particularly by easing communication between different offices at the city, regional, and national levels.

On the other hand, the pivot to virtual work enhanced cities' capacity for coordination, according to a few stakeholders, who also thought that the benefits of virtual work would persist over the long term. In Norfolk, a city stakeholder observed that virtual work made it much easier for staff to collaborate across silos, perhaps because it reduced the transaction costs of doing so. That feeling was replicated in Chennai, where stakeholders say the use of WhatsApp helped improve communication among city officials as well as top-down communication for disaster management. More broadly, a few stakeholders described the increased use of technological tools for virtual work (e.g., video- and teleconferencing) as "making the bureaucracy more agile," with the pandemic serving as "a catalyst for digital transformation of city government operations," in ways that support better-run internal processes.

Still, not everyone was convinced that de-siloing had taken place or that intergovernmental coordination had improved over the course of the pandemic response. A few stakeholders, within and outside city government, thought that departmental silos actually had worsened as the pandemic caused people to "revert to working as they did before" and to focus on their area of expertise. In theory the CRO should promote collaboration, but that promise did not always materialize. That was partly because a lack of resources and capacities diminished the relevance of the office in decisionmaking processes. Other stakeholders were hesitant to say that the improvements in collaboration would last—from their perspective, different city actors can come together to address a crisis but are likely to go back to old, noncollaborative ways of working soon after the crisis ends. That is, collaboration seen during crisis periods may not be sustained through noncrisis periods.

Notwithstanding these reservations—and building upon the pivot to virtual work—a few cities experimented with new ways of engaging citizens and communities in the response to the COVID-19 shock. A few cities reported moving community consultations online by means of WhatsApp groups and using online surveys, virtual webinars, and town halls for participatory planning efforts (with recordings saved for those unable to attend live). They also reported creating user-friendly websites to disseminate plans and update citizens on municipal actions taken to address the pandemic as well as employing social media (e.g., Facebook and Twitter) to share information on testing, caseloads, and death rates. Some city stakeholders lauded such online engagement practices for increasing access and public participation because of the flexibility the virtual platforms offer. These steps count as resilient responses because of the fundamental principle they embody—that citizens are better prepared to face shocks when they have access to risk information and knowledge and are engaged in the formulation

and execution of resilience plans or responses to shocks. However, some city stakeholders questioned the benefits of the new mediums for citizen engagement. Such stakeholders—often in cities where some people thought the virtual platforms were beneficial—noted that while the virtual platforms may have made consultations more accessible, they did not broaden the pool of citizens the city engaged. Nor did they improve upon the reality that public access to city data remains a challenge.

General Planning Practices

The sample cities' general planning capacity and practices vary based on the governmental body in charge of local planning, as well as on the degree of administrative separation between planning bodies and other aspects of local government. A similar but distinct measure is the level of political independence enjoyed by the primary planning body—that is, how much control it has over local planning decisions

The level of government responsible for planning can determine the level of control a municipal government has over planning operations and over the political influences that can affect planning practices. The main planning body in most sites is the municipal government, indicating that the municipalities themselves are responsible for planning, and may have more direct control over how planning is conducted within their boundaries. However, a few cities in the evaluation sample have different arrangements. In Athens, for example, the city has control over local planning practices, but master planning occurs at the regional level, indicating that both the regional and local governments are important actors in local planning outcomes, and that coordination between local and regional government is of particular importance. In Santiago, the regional government has a planning division, but it does only high-level planning, leaving the more practical, local planning to *comunas.* The two levels overlap but, according to local stakeholders, do little to coordinate their efforts.

In Chennai and Lagos, the second-tier governmental body is responsible for the bulk of planning, leaving the municipalities with little control over planning practices. In Greater Miami and the Beaches, planning practices are split between the various local governments, which produce their own strategic short- and long-term plans for land use and issue-specific areas, and Miami-Dade County, which focuses on high-level planning around regional issues such as transportation and emergency management.

The sample cities are split between those with independent planning bodies such as commissions that are responsible for developing and implementing land use and zoning functions and are administratively separate from the main structure of the municipal body (Chennai, Colima, Los Angeles, Norfolk, Washington, DC, and Santiago) and those where core planning practices are either conducted

as a standard municipal office or overseen by city leadership directly (Addis Ababa, Athens, Belfast, Byblos, Can Tho, Greater Miami, Lagos, Melaka, Montreal, Rotterdam, Wellington, and Semarang). Independent planning bodies, including those with elected leadership, often function separately from other government offices and are ceded responsibilities such as establishing and enforcing zoning codes and approving variances. In locations with administratively separate planning bodies, city leadership may have less ability to change structures and practices within the planning bodies.

Planning capacity and practices outside the domains targeted by the 100RC intervention have largely remained unchanged, although planning practices vary significantly. North American and European cities, along with Chennai, with some variation, have significant autonomy in their planning practices and frequently engage with external stakeholders as a matter of course. This applies to Chennai's and Athens' planning bodies at the regional level, and in Greater Miami where planning authority is shared between municipal and regional governments. Conversely, Can Tho, Melaka, and Semarang have some autonomy but are required to conform to highly centralized planning at the national level. Byblos has a highly centralized planning structure as well, but in the absence of a stable national governmental body, no planning or approval of local plans is occurring.

The intensity of planning activities among our sample cities has varied significantly; some cities have shown relative stasis during the study period—especially since the beginning of the COVID-19 pandemic—whereas others have increased the number and/or frequency of plans. Cities noted as having ramped up planning efforts include Belfast, Los Angeles, Medellin, Rotterdam, and Washington, DC. Athens noted a decline in the frequency of planning processes. Greater Miami showed a consistently high level of planning productivity during study period, including during the pandemic.

Although most cities noted stability in their planning practices, several observed changes that have weakened or undermined the effectiveness of planning efforts. In Colima, for example, stakeholders observed that a large number of high-quality plans and technically qualified staff have been undermined by day-to-day operations, political issues, and lack of resources, leading to weak implementation. In Addis Ababa, the planning processes have become a political battleground for control and influence over municipal resources, leading to difficulty with plan implementation and service provision. In Byblos, the marked weakening of government institutions has effectively stymied efforts at municipal planning. Despite reforms intended to improve engagement, stakeholders in Santiago saw planning as fragmented and fragile, partially due to tensions between two bodies, one elected and one appointed by the national government, as well as the differing visions of interdependent municipalities. Whereas few cities expanded their planning capacity, Paris underwent a restructuring of the city's governance structure (as described below) that did potentially expand capacity. Implementation of resilience

strategies such as the greening of schoolyards and establishing park cooling and shade centers, as well as efforts toward the "fifteen-minute city" (i.e., self-sufficient enclaves with amenities close by), may indicate increased activity.

In general, cities with higher baseline planning capacity were more likely to adopt more resilient planning practices as described in domain 1. However, the 100RC intervention did support lower planning capacity cities with progress in explication of resilience, suggesting that may have created capacity and momentum for changes across more domains moving forward.

General City Operations

Most cities have not seen a change in the structure of city operations since baseline. North American cities are largely structured around a mayor–council system with administrative functions separate from political leadership; European cities have similar structures, albeit with some greater variation. Can Tho, Melaka, and Semarang, all of which function in the context of a highly centralized government, rely on more administrative leadership—such as, for example, Can Tho's coordinating economic development councils, which are in effect bodies of the national government.

However, three cities in our sample underwent significant reorganization. Paris is creating a new tier in its organizational structure between the executive and departmental directors to focus on ecological transition and climate. Likewise, Montreal underwent a significant structural transition in 2019 to improve transparency and accountability in government, including the establishment of a new position of inspector general. Lastly, Santiago introduced a series of modifications based on a 2018 law to strengthen regionalization, including establishing new regional government offices. In the cases of Paris and Santiago, these changes are still under way and not yet finalized. Although it is too early to assess the impacts of these changes, Montreal could lose some level of absolute power but could gain more regional influence, as the change may allow for greater collaborative impact with other governmental bodies within the region. Paris, on the other hand, may have increased the efficiency of and orientation toward environment- and climate-related efforts, especially if leveraged along with greater coordination with the other Île-de-France governments.

Several other cities have had temporary shocks upset their normal operations. In Byblos, rapid inflation has cost the city 50 percent of its employees as they can no longer live on government salaries. Likewise, in Addis Ababa, recurring political instability has led to frequent turnover in governmental positions. These and other capacity constraints presented significant barriers for cities' participation in 100RC programming and demonstration of improved resilience outcomes.

Several cities saw modest increases in staffing levels during the study period, including Washington, DC, Los Angeles, Paris, Montreal, and Colima. Belfast, on the other hand, saw a modest decline.

Other developments of note include a significant shift toward digital governance in Athens, the establishment of a Committee for Ethnic Minority Affairs in Can Tho, and the creation of the Department of Housing and Community Development in Norfolk. Also of note are major changes at the state level in Chennai, where the state of Tamil Nadu broke up a long-term same-party government, with the new government hoping to spur economic development through reorganization.

Political Conditions and Policy Context

Four cities in our sample had significant political turnover during the study period. In Athens, the mayor and all council seats were up for election in 2019, with leadership shifting conservative. Twenty-one of the 49 councilors belong to the new mayor's party, with the remaining 28 in minority. Likewise, Belfast saw significant turnover in its city council staff following local government reform in 2015, leading to some backlog of planning activities, according to stakeholders. Boston saw three mayors in one year as elected Mayor Marty Walsh left to join the Biden administration. Kim Janey filled in as acting mayor for less than a year before Michelle Wu won a municipal election. Some stakeholders observed that, as in Belfast, this period of transition has led to some backlog. Colima saw a shift from the neoliberal centrist Institutional Revolutionary Party to the center-right National Action Party in 2015, another turnover to a left-wing government in 2018, and a shift back to center-right parties in 2021. Wellington also had two mayoral transitions, noting a shift from labor to center-right influences in local government. In Boston and Belfast, evidence does not suggest that these transitions will lead to major changes in city policy. However, the shifts in Athens may signal a change away from regional priorities. Likewise, political transitions in Colima and Wellington may change policy priorities significantly, although the direct effect on resilience efforts is not known.

In addition to administrative turnovers, five cities experienced significant events affecting their political contexts during the study period. In Boston, a ballot measure passed in November 2021 significantly weakening the mayor's power by allowing the city council to overturn the mayor's budgets, as well as establishing an office of participatory budgeting. As noted earlier, the Indian state of Tamil Nadu, in which Chennai lies, underwent its first significant political transition in many years, leading to new local engagement from the state government as well as widespread restructuring at the state level. Likewise, a 2018 reform in Chile (where Santiago lies) replaced the regional political leadership position of *intendente* with elected regional governors. Chile's ongoing Constitutional Convention and recent

presidential election represents a major shift in political leadership, as traditional conservative parties were largely replaced by the center and far left.

Melaka and Byblos have both seen de facto erosion of local power. Apropos to Melaka, the Malaysian government declared a nationwide state of emergency on January 12, 2021, and suspended Parliament and state legislative assemblies. While this did not affect city operations directly, it changed the policy context significantly as local government actions are largely determined by the central government. In Byblos, the Lebanese national government lacks a fully functioning executive authority and is currently forming its third government in a little over a year. According to the World Bank, this lack of political consensus over effective policy initiatives means there is no clear turning point for Lebanon on the horizon. The crisis has further undermined an already weak system of public services—as more and more people are left in poverty and unable to afford to privately pay for services—and it is threatening the viability of the public sector by raising its expenses and lowering its revenues. Shortages of water, food, medicine, petrol for cars, and electricity are being experienced across the country.

Local political buy-in for resilience proved critical for progress on resilience outcomes targeted by the 100RC program, especially for domain 2 outcomes. Political transitions proved challenging for the program model, which heavily invested in relationship building with local political leadership and valued a close relationship between the CRO and the mayor.

Social Conditions

Evidence suggests that most cities were relatively stable on social conditions during the period. However, a few cities in our sample did show signs of declines in social conditions. Those signs of decline are likely in part due to the global shock of COVID-19 pandemic as well as various local changes in condition. In Athens, large populations—originating primarily in Syria and Lebanon—remain in refugee camps. Available data do not allow us to say whether this population has been growing or shrinking, but statements from local politicians indicate growing anti-refugee sentiment. While data for Byblos itself are unavailable, the precipitous decline of Lebanon's GDP by 40 percent between 2018 and 2020 along with inflation have left many Lebanese, including those in Byblos, with significantly worse social conditions. In addition, stakeholders interviewed noted increased lapses in basic services, including plumbing and garbage collection. Interviewees noted that the difficulty securing basic needs has become a challenge nationwide.

Despite its relative prosperity in India, Chennai has seen rapid growth and, with it, rapidly increasing poverty. Many new residents are living in informal settlements, and new census data show about 40 percent living below the poverty level in the city.

Santiago has seen several new social challenges. The share of people living in poverty in Chile rose during our study period from 8.6 percent in 2017 to 10.8 percent in 2021, while extreme poverty increased from 2.3 percent in 2017 to 4.3 percent over the same period. Regarding inequality, in 2020, Chile's Gini coefficient reached 0.510, reverting to a value previously observed between 2003 and 2006. Nongovernmental stakeholders observed that the COVID-19 pandemic exacerbated social inequalities such as access to formal education, irregular housing, and unemployment, particularly for women. Additionally, in recent years, Chile has received a considerable number of migrants who are excluded from the country's health care system and who often live precariously in irregular settlements.

Conversely, several generally poorer cities in our sample, including Semarang, Medellin, Colima, and Can Tho, showed some improvement on social indicators during this period.

While the social conditions in sample cities certainly influenced the resilience priorities, they did not dictate outcomes of the 100RC program.

Financial Conditions and Operations

At baseline, sample cities varied significantly in their financial conditions and operations. Several cities, including Athens, Addis Ababa, and Montreal, were hampered by budget deficits, either a result of the global recession following the 2008 housing crisis or because of local financial conditions. Most other European and American cities (Rotterdam, Boston, Norfolk, and Los Angeles) were either financially stable or in strong recovery. Melaka, Chennai, Colima, Lagos, Can Tho, and Semarang were in periods of growth and increased fiscal strength. Overall, most cities sourced most of their own revenue, with just a few (Rotterdam and Lagos) showing high proportions of their budgets coming from intergovernmental transfers. In all cases, the local municipality had general control over budget appropriation and procurement.

Few cities in our sample had significant changes in their general budget operations. Paris, Boston, and Montreal established participatory budgeting processes; because they are nascent, however, meaningful outcomes are not yet determined. The only other major change came in Athens, which can now take on debt due to the end of Troika requirements. Athens also established a set of priorities with respect to innovation and is investigating participatory budgeting.

As expected, in the context of the pandemic most of our sample cities saw significant declines in revenue and GDP. Whereas most expect a relatively quick recovery, Colima and Semarang have taken on substantial damage, likely due to relatively weak fiscal conditions at the outset of the pandemic. Colima saw its GDP fall 7.2 percent between 2019 and 2021, leading to reduced tax revenues and stretched budgets. As a result of the loss of revenue due to COVID-19, Semarang has had to drastically cut its municipal budget. The city switched from allocating its budget across all sectors to focus on only three sectors related to the fight against COVID-19: health, the economy, and the social safety net. Most of the budget for infrastructure has been cut. The budget for the development planning office and agency was cut by 90 percent with the funds reallocated to help address the pandemic.

Budgetary conditions, such as access to international finance or level of autonomy in generating local revenues for resilience initiatives proved critical for life cycle 3 of the 100RC intervention, as the program did not provide resources for resilience strategy implementation. As a result, implementation tended toward cities with greater financial resources.

Governance Conditions

At baseline, the sample cities varied in the level of independence they enjoyed from their respective national and subnational government bodies, as well as in their levels of local engagement with neighboring jurisdictions. The biggest variation can be seen between cities in centralized systems, which include Semarang, Melaka, Can Tho, Santiago, Byblos, and Medellin, and those with higher levels of local autonomy, including Boston, Los Angeles, Norfolk, Washington, DC, Lagos, Colima, and Santiago.

Several cities in our sample possessed only nominal local control with significant higher-level government involvement (e.g., Addis Ababa and Chennai) or had to share power with regional governmental structures (Montreal, Athens, Rotterdam, and Wellington). Although such cities may be more constrained in their activities, they also may benefit from regional collaboration.

Few changes in general governance conditions were noted in our sample cities during the evaluation period. For those cities functioning in highly centralized systems (Semarang, Melaka, Can Tho, Santiago, and Byblos), their limited ability to operate outside the approval and framework of their respective national governments continue to hamper the individual cities' attempts to implement resilience measures that require changes to government structure or operations. However, the relative capacity and wealth of the national government has a significant impact on welfare: Can Tho and Santiago in particular appear to be able to move forward more readily with policy when aligned with national interests.

Whereas most cities have some level of engagement with other jurisdictions, the frequency and quality of interaction with higher-level, neighboring, and overlapping entities varies. For example, Athens and Belfast both report limited interaction, while Medellin notes that its political differences with government departments regarding approaches to COVID-19 protective policies have caused tensions. Paris, on the other hand, shows modest improvement in its relationship with the more conservative communities of its *bainlieues*, while Montreal remains engaged with its neighboring cities through a complex governance structure known as urban agglomeration, as well as a regional planning body. The American cities of Boston, Los Angeles, Norfolk, and Washington, DC, all have regional governance bodies, although in all cases they are limited in scope and capacity.

Conclusion

The progress of the sample cities sheds light on the effectiveness of the 100RC program model in meeting the desired goals of the program and building the resilience of member cities. Reflecting on the program's desired *output*, the sample reflects a large degree of success in meeting key milestones , such as hiring and retaining chief resilience officers and publishing resilience strategies. The program also influenced the framing and understanding around holistic resilience within sample cities. While the application varied locally, in most cities, interviewees reported greater understanding and concurrence around a more holistic vision of resilience that includes shocks and stressors. This enables local actors to align and act on resilience principles and has created interest in new methodologies to support planning.

However, the lasting impact of the program understood through its *outcomes* in institutionalizing resilience principles in city planning and operations presents a more mixed picture, suggesting that the program model itself was not enough to dramatically shift city practices. The outcomes of interest most directly in the sphere of influence of the CRO were observed across the largest range of sample cities, including explication of resilience, government structure (CRO), and internal consistency with other plans. On the other hand, changes in budget operations or community participation, which arguably are further from the CRO's control, showed limited progress; and in cities where progress was observed, it was often attributed to factors beyond the 100RC program. Furthermore, the unit of intervention at the city level proved challenging for several other outcomes that often depend on national legislation or delegation of power, including those outcomes that require vertical integration.

The 100RC program proposed a standard intervention model across a heterogenous group of cities. As noted in Domain 3, the sample varied greatly in governance conditions, planning capacity, and social conditions. The evaluation did not find that the 100RC model was consistently effective or ineffective in

one context versus another, but the program's potential for impact varied widely. Some cities with relatively strong resilience capacity at baseline further refined and embedded their resilience practices due to the resources, credibility and visibility provided by the 100RC program. On the other hand, several cities with more limited planning capacity saw initial seeds of uptake of resilience practices but would need far greater and sustained support for such practices to be codified within their city governments. Furthermore, cities experiencing multiple or intense crises or disruptions during the program period were generally unable to sustain participation, political buy-in, and direct sufficient resources to benefit from the program model.

This experience suggests that intervening directly in city institutions via hiring and supporting chief resilience officers and providing technical support to adapt planning and operational practices for resilience can yield positive change in cities, but it requires significant attention to the context and capacity of each city and associated tailoring of the program intervention.

100RC Program Model Analysis

The 100RC program was the first global attempt to build resilience in city institutions: an attempt to embed resilience principles in city planning and operations. Study 2 tracks the theoretical basis for the 100RC model over time through a periodic literature review and assesses the model's influence and reception in the urban resilience field through a document review of comparable models and interviews with urban resilience practitioners.

At the core of the 100RC theory of change was the goal to catalyze a movement around urban resilience. The previously unmatched scale, resources, and visibility of 100RC helped accelerate the urban resilience movement—as evidenced by the proliferation of comparable programs during the evaluation and by scholarly attention to the field.

The solidification of city institutions and governance as an important theme in urban resilience across literature and practice corroborates 100RC's fundamental goal at the outset of the program, as indicated in our midterm report: "to transform fundamental public institutions, functions, and operations in city government as its primary strategy to impact how cities mitigate shocks and reduce chronic stressors, particularly among poor and vulnerable citizens" (Martín and McTarnaghan 2018, 1).

Recent urban resilience scholarship has dedicated significant attention to the 100RC program and the resilience strategies produced across member cities. As cities began to develop their resilience strategies and implement projects, the literature assessing the 100RC program grew. This work focused on the 100RC model and approach and included case studies highlighting cities' 100RC membership and overall resilience-building efforts.

Other multilateral, nonprofit, and philanthropic programs focusing on urban resilience were evolving at the same time as 100RC or have launched since its closure in 2019. These programs attempting to build urban resilience have varied in approach and focus, but most have been somehow impacted by the role that the 100RC program played in the urban resilience field.

100RC and Comparable Programs

In this section of the report, we position 100RC within the global urban resilience movement while illuminating trends in urban resilience programming to evaluate the influence 100RC has had on the

field. We also summarize urban resilience practitioners' perceptions of the 100RC program and its closure and draw out lessons learned and reflections on the future of the urban resilience field.

Sample Programs

We tracked the opening, closure, and evolution of programs through the five-year evaluation period in six-month increments. In the final six-month tracking period, we identified 25 active programs as comparable to 100RC in some fashion (table 8), either in content (urban resilience through institutional change), scope (global cities), or model (offerings such as learning networks, technical assistance, and embedded advocates in exchange for required deliverables). No other program is exactly comparable to 100RC.

TABLE 8

100RC Comparable Models and Primary Offerings

Program	Sponsor	Primary offerings
1000 Cities Adapt Now	Global Commission on Adaptation, World Resources Institute, Resilient Cities Network, UN-Habitat	Network; TA
Adaptation Fund	UN Framework Convention on Climate Change	Funding
Adrienne Arsht–Rockefeller Resilience Center at the Atlantic Council	Atlantic Council and The Rockefeller Foundation	TA
Building the Climate Resilience of the Urban Poor	Cities Alliance	TA
Center for Sustainable Communities	International City/County Management Association (ICMA)	TA
Cities and Climate Change Initiative	UN-Habitat	TA
Cities and Climate Change Joint Work Programme	Cities Alliance	Network
City Adviser Program	C40 Cities	Network; TA
City Resilience Program	World Bank, Global Facility for Disaster Reduction and Recovery (GFDRR)	Funding; network; TA;
CityStrength Diagnostic	World Bank	TA
Climate Justice Resilience Fund	New Venture Fund, Arabella Advisors	Funding; TA
Environmentally Sustainable City	Association of Southeast Asian Nations (ASEAN)	TA
Global Commission on Adaptation – Resilient Cities Action Track	Global Center on Adaptation; World Resources Institute	Funding; network; TA
International Municipal Investment Fund	Inter-American Development Bank (IDB)	Funding
Local Climate Adaptive Living Facility (LoCAL)	UN Capital Development Fund (UNCDF)	Funding; TA

Program	Sponsor	Primary offerings
Making Cities Resilient 2030	UN Office for Disaster Risk Reduction (UNDDR)	Network; TA
Partners for Resilience	Netherlands Red Cross; CARE; Cordaid; Red Cross Red Crescent Climate Centre; Wetlands International	Network; TA
Partnership for Resilient Communities	Institute for Sustainable Communities	Funding; network; TA
Pilot Program for Climate Resilience	African Development Bank	Funding; TA
Resilient America Program	National Academies of Sciences, Engineering and Medicine Office of Special Projects (NASEM OSP)	Network
Resilient Cities Catalyst	Various	TA
Resilient Cities Congress Series / Daring Cities 2020	ICLEI – Local Governments for Sustainability	Network
Resilient Cities Network (R-Cities)	The Rockefeller Foundation; Singapore Economic Development Board	Network
RISE-UP: Resilient Settlements for the Urban Poor	UN-Habitat	Funding; TA
Urban Resilience Hub	UN-Habitat	Network; TA
Urban Sustainability Directors Network	Member group	Network

Note: TA = technical assistance

Programs vary in their definition of resilience, focus areas, theories of change, geographic scale, and sponsors and funders and are administered by a mixture of multilateral organizations, foundations, research organizations, and consortiums. The primary program offerings tend to include networking, technical assistance, or funding. Technical assistance varies but may include assessment support, planning support, sector-specific substantive support, and implementation support. The following section compares the 100RC model to other models seen in the field today.

Urban Resilience Program Concepts, Activities, Structure, and Funding

DEFINITIONS AND APPROACHES

The 100RC program proposed a holistic definition of urban resilience that takes a broad view of cities' systems and their ability to withstand physical, social, and economic shocks and stressors. The program's theory of change purposefully did not articulate a problem statement, so that cities could set their own priorities; this approach allowed for variation in how individual cities defined shocks and stressors. The 100RC program's holistic, broad approach to urban resilience building is not widely shared by other programs, which tend to focus more narrowly on climate adaptation or hazard

mitigation, for instance, or on a specific economic or geographic scale. For example, the Adaptation Fund's focus is on climate resilience in developing countries.

But although many practitioners interviewed prefer to focus on a particular subtopic of resilience, they shared that there is a growing consensus that urban resilience extends beyond climate resilience. Non-climate-specific use of the term *resilience* was growing among social scientists and engineers even before the COVID-19 pandemic in relation to such topics as refugee crises, terrorism, and global pandemics (Martín and McTarnaghan 2018). But the pandemic mainstreamed the broader understanding of this term among practitioners.

Nevertheless, climate resilience remains the most important priority for many practitioners in urban resilience building, even as resources originally intended for climate resilience were diverted to respond to the COVID-19 emergency. In fact, one of the latest programs to join the mix of comparable programs, in January 2021—1000 Cities Adapt Now—was launched to accelerate adaptation to climate change. Within the climate resilience realm, specific emphases include water resilience, energy resilience, and nature-based solutions. For example, 1000 Cities Adapt Now helps cities adopt resilience policies that focus primarily on urban water resilience to reduce climate risks.[5]

Hazard risk reduction and management remains a key component of urban resilience programming. Several programs look beyond climate threats, but not always beyond the disaster realm—a focus on shocks and emergencies. For example, the Making Cities Resilient 2030 (MCR2030) campaign launched in 2021 intends to provide strategic capacity development for disaster risk reduction.[6] And multiple programs are developing resilience hubs to support disaster preparedness and response. For example, the Adrienne Arsht–Rockefeller Resilience Center at the Atlantic Council is building a hub network of "community resilience pods" in Miami-Dade County—a place where community members can go for information about preparing for disasters or to find safety during a crisis.[7]

The shock of the ongoing COVID-19 pandemic ushered in a greater focus on economic resilience. Some programs, such as those supported by Cities Alliance, were already focused on equitable economic growth before the pandemic.[8] But the pandemic brought economic resilience to the forefront in practitioner discussions. Organizations and initiatives such as the UN Capital Development Fund (UNCDF), UN-Habitat, and the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR), for example, collaborated to deliver online training on urban economic recovery and resilience.[9] Most recently, UN-Habitat's City Resilience Global Programme and partners launched a project through the Urban Resilience Hub to strengthen the capacity of local governments to design, implement, and monitor COVID-19 economic and financial recovery plans.[10]

Many programs have launched with a mission to support vulnerable populations. The 100RC program's focus on vulnerable populations is carried on by programs that spun out of 100RC following its closure, including R-Cities and the Resilient Cities Catalyst, which includes a focus on vulnerable populations in its vision statement.[11] The identity of vulnerable populations varies from program to program but includes the urban poor, especially in the Global South; minority populations; and women. For example, several programs, including UN-Habitat's RISE-UP: Resilient Settlements for the Urban Poor, the Adaptation Fund, and Building the Climate Resilience of the Urban Poor, are focused on the Global South, given its exposure to climate change and the reality that inaction could catalyze massive migration.[12] But the COVID-19 pandemic punctuated a point that some programs were already making, that socioeconomic risks cannot be separated from climate resilience, and more support for vulnerable populations is needed. The pandemic shed a light on racial, income, and other socioeconomic disparities in cities and revealed that a great deal of work remains to be done to build more inclusive resilience agendas that put the needs of vulnerable populations at the forefront.

Programs are trending toward more inclusive and participatory urban resilience planning with an emphasis on bringing diverse voices from different fields together. Many programs focus on increasing the involvement of subpopulations such as women, youth, immigrants, indigenous people, various racial and ethnic groups, or the urban poor. In US-based programs, an emphasis on inclusivity and equity followed the George Floyd murder in May 2020 and Black Lives Matter protests. Across the globe, cities want opportunities for holistic and cross-cutting discussions to bolster integrated local action (Roberts 2020). But while practitioners broadly agree on the need for greater inclusion, they do not agree on the most effective approach to achieve this representation.

The 100RC program's governance capacity-building approach, of starting with a government official and working to build cross-sector collaboration on resilience issues, is unique. No other programs place personnel in city governments, though the C40 City Adviser's Program formally placed advisers in cities for up to two years, and other programs work directly with city governments to make expert advisers available to mayors and relevant city agencies.[13] Some programs, such as the Climate Justice Resilience Fund, for example, support community groups or nonprofit organizations leading local initiatives and take a bottom-up, community-driven approach to resilience building, including through advocacy building.[14] In other cases, programs take a sectoral approach to urban resilience building. For example, the Urban Water Resilience Initiative in Africa starts its work in the water sector by recruiting technical experts before looking to build broader collaboration across the array of relevant sectors and political leaders.[15]

Practitioners said that although it is important to gain political support for resilience, it is also critical to lay a strong substantive foundation for an intervention. This imperative has manifested in some programs focusing on narrower sets of interventions; for example, C40 Cities has established networks, research, and technical assistance around specific topics such as water security and extreme heat.[16]

Of the programs reviewed, MCR2030 defines an approach that is most similar to that of 100RC, with a focus on capacity-building in cities to help them implement resilience measures that address disaster risk, inclusivity, safety, and sustainability .[17] Events hosted by Making Cities Resilient highlight the need for a more systemic approach to understanding the synergies between disaster risk reduction, climate adaptation, and urban development.[18] But even this program, which uses a diagnostic tool to help cities understand risks (the Resilience Roadmap–Stage Assessment), seems to be targeted to a specific topical area: disaster resilience.[19]

Although the COVID-19 pandemic certainly diverted resources from resilience interventions that had been planned before the pandemic, some programs have incorporated pandemic response into the resilience domain. Though some were faster to do so than others, all active programs enacted programmatic changes in response to the COVID-19 pandemic. Incorporation of pandemic knowledge and resources, or acknowledgment of the pandemic's complicating effects, is nearly ubiquitous in new materials emerging from programs. Demand for content and training specific to health hazards grew. For example, the UN Office for Disaster Risk Reduction (UNDRR) provided training on the use of its health scorecard, which had gone largely unused before the pandemic, and in April 2020 released a Public Health System Resilience Addendum to its Disaster Resilience Scorecard for Cities.[20]

Several programs are working to help improve data related to urban resilience. Program leaders, especially leaders of climate resilience–focused programs, emphasize that data are critical to understanding both baseline conditions in a city and the impacts of interventions. Some limited progress has been made toward improving data availability. For example, GFDRR created its Open Data for Resilience Initiative (OpenDRI), which provides grants for Open Data Day participants to explore environmental data; the Know Your City Campaign by Cities Alliance promotes data triangulation and use; and the International City/County Management Association's (ICMA's) Sustainable Advisory Committee is helping members better understand plug-in electric vehicles and data.[21]

Finally, many programs that the monitoring and evaluation team studied are searching for ways to expand implementation. Practitioners are eager to see the urban resilience field move beyond funding planning, workshops, and conferences and into execution. This view is illustrated by a July 2021 ICMA

blog post titled, "Local Governments Have Ambitious Climate and Equity Goals," with the subhead, "Now They Have to Fund Them."[22] The prioritization of implementation was made evident by the number of programs that forged ahead with planned projects despite pandemic obstacles. For example, in January 2021 the Institute for Sustainable Communities moved forward with a project to promote water stewardship and climate resilience with cotton farmers in India's largest cotton-growing region.[23]

UNIT OF INTERVENTION

By virtue of this study's bounds, all the urban resilience programs we tracked included the city or metropolitan areas as a possible unit of intervention, though the set of actors addressing urban resilience varied from model to model. Some members of the urban resilience community see the city as an appropriate unit of intervention because cities are a common unit globally—they are perceived as relatively similar in terms of political governance across the world, as compared to states, which can be defined very differently. Nevertheless, no two city governments are organized exactly the same way, and there is no common guide for navigating a city government. Some resilience practitioners have cast doubt on the assumption that cities have sufficient authority to undertake meaningful resilience-building reforms. The authority cities exercise varies from country to country, and in more centralized countries, the national government yields more legislative and budgetary power to intervene in cities. Furthermore, the resilience issues facing cities expand beyond an individual jurisdiction's political boundaries; and some programs prefer to intervene at the regional level, especially to address environmental or other hazards that cut across city boundaries. The focus on city leadership for resilience that 100RC spearheaded has certainly continued through other comparable programs studied; however, practitioners reflected increasing awareness of these complex governance and authority issues.

SCALE

The 100RC program aimed to transform governance and support project implementation in 100 cities, an aspiration that dwarfed the scope and scale of the efforts of any previous single program. Other programs tend to have smaller scales, typically delineated by a geographic or sectoral focus, and most do not set out to affect a specific number of cities. This changed more recently with the launch of the 1000 Cities Adapt Now, which aims to have an impact on 1,000 cities by 2030, reflecting increasing ambition for scale.[24] Unlike 100RC, which launched three cohorts in short succession, Many programs start slowly with proof-of-concept projects and then build up. For example, 1000 Cities Adapt Now, according to an interviewee, is developing and implementing strategic water resilience plans in six

African cities that the program hopes to showcase at the UN Climate Change Conference 2022 (COP27).

FUNDING

Funding in the emerging urban resilience field is not abundant, and 100RC was unique in that it had such a prominent philanthropic backer providing an unprecedented and predictable flow of funding. Funding sources for other programs vary and include multidonor funds and cities paying directly for services. Private-sector investment in the resilience field does not yet have a track record, though it remains a topic of popular discussion, as demonstrated by the World Bank's 2021 report *Enabling Private Investment in Climate Adaptation and Resilience: Current Status, Barriers to Investment and Blueprint for Action*.[25] Urban resilience practitioners sense that significant funding could be available for climate resilience projects in particular. And even though private investment is not currently prevalent, the philanthropic arms of private organizations could become more interested in the field. For example, in 2018, Shell Oil Company provided $1.8 million in funding to sponsor the City of Houston's membership in the 100RC network, though, as one interviewee noted, "The Houston model is not common."[26]

Reflections on 100RC

All participants in the urban resilience practitioner interview sample were familiar with 100RC, but some did not know the details of the program. In fact, one interviewee who had heard of the program and of the existence of chief resilience officers in cities was not aware that the position had originated with the 100RC program. A lack of reporting from 100RC cities on their progress was a common critique of the program from other field stakeholders; several reported that they did not know anything about the results of the program. But this is an area in which some in the field have noted the contributions of R-Cities in moving data initiatives forward. One urban resilience practitioner pointed to data as "the most expensive piece of the puzzle" and a particularly difficult challenge in resource-constrained cities. But practitioners and reports from multiple programs indicate that M&E should be strengthened to inform resilience field activities.

Those who reflected on the scale of 100RC's intervention highlighted two primary challenges to achieving success in both planning and implementation at scale: time frame and scope. Members of the urban resilience community suggested that the time frame of the program was too short to see any change at scale; had the program been sustained and developed for a longer period, attributable impact might have been achieved. In addition, the lack of focus areas and failure to demonstrate early successes prevented the program from gaining momentum in implementation. The diversity of

interventions across cities and the different pacing in cities, plus the program's early closure, prevented one of 100RC's core assumptions from being confirmed: the assumption that interventions working well in one city could be replicated in other cities at scale, according to resilience practitioners. Still, the program created one of the broadest coalitions of resilience-focused city government officials.

PERCEPTIONS OF 100RC VALUE

Overall, most urban resilience practitioners agreed that 100RC was successful in stimulating conversations about resilience in cities where they might not have occurred otherwise. In addition, many perceived 100RC's resilience work as foundational and pioneering in terms of strategic planning for urban resilience. But despite the boost that most interviewees acknowledge 100RC gave to urban resilience in terms of attention to the field, a majority of practitioners suggested that urban resilience is not yet a mainstream concept and the field is still emerging.

The 100RC program's attempt to build urban resilience was not unanimously viewed in a positive light by the broader urban resilience community. One interviewee described the 100RC program as harmful and duplicative of unsuccessful approaches already attempted. Others described the program as unfocused, with a few stating that focusing on climate resilience could have kept 100RC from "trying to be everything for everyone." In addition, a few interviewees viewed 100RC as The Rockefeller Foundation's attempt to brand resilience as its own, which they believed had the potential to deter other funders or programs from entering the urban resilience field and made collaboration difficult.

Interviewees reflected on the various components of the 100RC model and the legacy, if any, of the multipronged intervention.

Chief resilience officer. Most program respondents viewed CROs as valuable staff resources for cities because they raise awareness of resilience, initiate work on local plans, make connections, and sometimes raise interest in resilience investments. CROs can speak clearly to city-level planning processes, political challenges, and projects that others might not typically think about in resilience terms, according to one interviewee. Interviewees stated that a CRO can serve as an anchor and champion of resilience, which some interviewees believed to be an important step in altering how cities think about planning. Interviewees recognized that to establish a new position in a city government is no small feat, and retention of the CRO role is an indicator of a change in governance. The longevity and the value that CROs provide as champions of resilience is something that can be attributed to 100RC, and the recognition of this role's value can even be seen at the state level in the United States, where 11 states have established CROs.[27] A few interviewees also pointed to the emergence of chief heat officers as evidence of a shift in how resilience-related governance is approached.

Many interviewees emphasized that it takes more than a resilience officer for a city to become resilient—that the real impact is brought not by the person but by the policies being implemented at the city level and the interconnections created between different areas of the city government. Some interviewees still questioned the long-term durability of the CRO function, and one felt that 100RC had encouraged CROs to connect with politicians rather than community members, making initiatives vulnerable to political transitions.

Network. Urban resilience practitioners saw value in the network of CROs established by 100RC, and some valued opportunities for city-to-city learning through communities of practice. Many practitioners have had opportunities to interact with members of CRO teams, either as part of 100RC programming, as part of programs that spun out of 100RC, or simply as a result of being in the urban resilience field. For example, Cities Alliance served as a platform partner and supported 100RC operation in several cities before the program's closure. The network of CROs that continues to be supported by R-Cities is still visible to those working in the urban resilience field, and the speaker series Cities on the Frontline, co-organized by R-Cities and the World Bank, has garnered participation from a wide set of CROs and urban experts.[28]

Resilience strategies. Members of the urban resilience community made largely positive comments about the resilience strategies for which 100RC provided development support. Some of the strategies were viewed as robust—foundational strategies that other programs could build on. However, there was some variance in the perceived quality of strategies, particularly as they related to climate adaptation, and some interviewees did not have a clear understanding of the process that led to the publication of strategies. In addition, a lack of reporting about progress on the strategies was a common critique: practitioners did not understand what steps were undertaken to track projects and other activities and did not tend to be aware of the project-related outcomes of 100RC. The general consensus was that the program was well suited for resilience strategy planning but lacked clarity and support for strategy execution (i.e., project implementation).

Tools. Interviewees viewed some of the 100RC tools, such as project-level assessments, technical analysis and assistance, and mapping and risk-based planning tools, as contributing to the urban resilience field. Some interviewees were not familiar with specific tools. And practitioners did not tend to view the tools as being helpful beyond the planning phase. Beyond planning, urban resilience practitioners emphasized the need for targeted, sector-specific, substantive capacity building and technical assistance to support project implementation.

Funding. The quantum of funding made available to 100RC enabled the program to be very bold in terms of its communication and implementation goals, according to an interviewee. Other programs report having unpredictable budgets that pale in comparison and, as a result, are forced to be more targeted in their approaches. And even with the large, dependable flow of funding (until the program's closure), many practitioners agreed that the program's ambitions were oversized.

Several interviewees said that 100RC was a missed opportunity in terms of strategically deployed project funding, comparing the $165 million program size to the considerably smaller amounts their own programs used strategically to support cities.

100RC CLOSURE

The closure of 100RC came as a surprise to members of the urban resilience community. Participating cities were at different stages of the 100RC intervention when The Rockefeller Foundation announced the closure of the program in April 2019, and practitioners in the field recalled the confusion the termination caused for these cities. Though they may not all have agreed with the approach taken by 100RC, most interviewees viewed its closure as an unfortunate setback for the field in general, as well as for participating cities specifically. The program did not live up to the expectation that it would provide continued support for strategy implementation. Many interviewees commented on 100RC's unfulfilled potential and said that the program could, in fact, have implemented more of the resilience strategies developed in the cities. Practitioners agreed that the closure took some of the wind out of the cities' sails, as they transitioned very abruptly and sharply away from feeling supported. Many stakeholders were frustrated that the termination of the program set the field back at a time when it should have been moving full steam ahead.

After what one interviewee referred to as "a very public walking away from the agenda" on the part of The Rockefeller Foundation, some members of the urban resilience community were left asking, "What's the next step?" Many 100RC participating cities have found continued or renewed support from a range of other organizations and programs, including C40 Cities, MCR2030, Mayors Migration Council, Asian Cities Climate Change Resilience Network, World Resources Institute, Adrienne Arsht–Rockefeller Resilience Center at the Atlantic Council, and Resilient Cities Catalyst. But even though some peer organizations did not fully agree with the 100RC approach to urban resilience building, several program leaders acknowledged that The Rockefeller Foundation was the go-to organization for resilience issues because of its strong foundational backing for the 100RC program. Without 100RC, some interviewees said there is no organization taking the lead on resilience. Some believed the establishment of R-Cities following the program's closure assuaged panic, and, indeed, most cities

continue to participate in the network formed during the 100RC era through engagement with R-Cities. For example, participants from three cities in three different regions specifically mentioned their use of a WhatsApp group started by R-Cities to communicate with other CROs from around the globe, and all the sample cities in Asia (Can Tho, Vietnam; Chennai, India; Melaka, Malaysia; and Semarang, Indonesia) are engaged in the Urban Ocean program initiated by R-Cities that aims to improve waste management and recycling and reduce ocean plastic.[29] Yet, one interviewee noted that despite R-Cities' best effort to "hold the center," 100RC's closure still left a hole.

100RC in the Urban Resilience Literature

The evaluation team reviewed hundreds of academic and gray literature documents on urban resilience published since the initial review of the 100RC theory of change in 2015. The team tracked the use and prevalence of resilience terminology in literature and monitored new scholarship and evaluation on urban resilience building in six-month increments during the evaluation period from the third quarter of 2017 to the third quarter of 2021 to understand the influence of the 100RC model. This time frame for the literature review is particularly noteworthy, as it coincides with the expansion of urban resilience research. Sharifi (2020) indicates that the urban resilience field was fragmented before 2010 and began converging around adaptation themes and proposals for assessing resilience between 2010 and 2015. Since 2015, previous themes have consolidated and new themes have emerged, particularly around climate change and governance. Our review of the literature during the latter period matches these findings. The main themes focused on

1. conceptual frameworks for urban resilience;
2. the operationalization of resilience in policies, planning, and governance;
3. tools to support resilience decisionmaking; and
4. evaluations of the 100RC program in literature.

Conceptual Frameworks for Urban Resilience

DEFINITION OF RESILIENCE

A persistent theme across reporting periods is the lack of a common definition of resilience, which leads to variation across disciplines, difficulties in measurement and evaluation, and challenges in prioritizing goals in practice. Studies highlight the need to properly define resilience so that it serves as a boundary object—that is, one that can be commonly recognized across disciplines and operationalized within each

(Meerow and Newell 2019; Keeley and Benton-Short 2019). Despite various efforts on this front, the application of resilience still diverges across fields, resulting in disconnected policies (Huck and Monstadt 2019; Torabi, Dedekorkut-Howes, and Howes 2021).

While some authors have offered new conceptualizations of resilience, most scholars have simply enhanced the existing conceptualization of urban resilience as a multifaceted issue by adding new political and spatial dimensions to the more mainstream dimensions (infrastructural, ecological, social and community, economic, and institutional) (Torabi, Dedekorkut-Howes, and Howes 2021; Elburz, Kourtit, and Nijkamp 2020; Feng, Lei, et al. 2020; Feng, Xiu et al. 2020; Feinberg, Ghorbani, and Herder 2020; Zhang, Zhang, and Li 2021). For example, one group of scholars suggests that political resilience, "the interplay of political will, leadership, commitment, community support, multilevel governance, and policy continuity," is a crucial dimension of urban resilience that has been overlooked (Torabi, Dedekorkut-Howes, and Howes 2021, 14). The authors assert that political resilience "sits above other dimensions" by shaping city transformation.

The conceptualization of urban resilience remained an important theme in the latest round of the literature review, with studies highlighting, in particular, the discrepancy between research and practice. While many researchers advocate for the social-ecological view of resilience, others have found that "on the ground," resilience is still associated with notions of "robustness" (Sitas et al. 2021; Muñoz-Erickson et al. 2021). The literature continues to raise the issue of a lack of a common definition of resilience as a constraint limiting the comparability of assessments of resilience (Tong 2021).

MEASURING RESILIENCE

The journal *Sustainability* recently published a special issue called "Bridging the Gap: The Measure of Urban Resilience" that synthesizes the most relevant research on the theory and practice of measuring urban resilience (Brunetta, Faggian, and Caldarice 2021). This research indicates that barriers to accurately measuring resilience include (1) a lack of conceptual precision, which translates into imprecise measurement; (2) an inability to assign a value to resilience capacity when resilience is a continually changing process; and (3) a dearth of techniques and data for measuring a systemwide, dynamic process of transformation as opposed to measurements limited to specific disturbances.

Resilience in Policy, Planning, and Governance

THEORY VERSUS PRACTICE

Since Urban Institute began monitoring urban resilience literature in 2017, scholars have identified a discrepancy in how practitioners think about resilience relative to theorists. A survey of 134 local governments in the US found that practitioners tended to favor "bouncing-back" or engineering-based notions of resilience rather than the "bouncing forward," ecological notions of resilience emphasized in the literature (Meerow and Stults 2016). Studies have highlighted this discrepancy both in the US context and internationally (Wardekker et al. 2020; Chelleri and Baravikova 2021).

Resilience scholars point to a wide breadth of topical coverage but the lack of a unifying goal among practitioners (Torabi, Dedekorkut-Howes, and Howes 2021; Therrien et al. 2021). Scholars note that it is not difficult to define resilience as a term, but it can be difficult to translate that definition in order to identify resilience challenges and initiatives to address them (Sharifi 2016). A survey of European resilience scholars found that descriptions of resilience generally fail to offer a framework for implementation (Chelleri and Baravikova 2021).

GOVERNANCE CAPACITY

Various scholars have focused on the governance capacity for urban resilience (Johnson 2018a, 2018b; Leitner et al. 2018; Dietz 2018; Leal Filho et al. 2018). Indeed, authors recognize resilience as an "ambitious policy objective" that has required a paradigm change in both goals and governance (Normandin et al. 2019). Embedding the principles of resilience, such as social learning and environmental adaptation, into planning practices is arguably an influence of new forms of governance (Davidson et al. 2019). Researchers have identified several necessary conditions for good resilience governance, namely, a systems approach, a clear resilience definition, strong leadership, meaningful stakeholder engagement, transparency, and inclusion (Fastiggi, Meerow, and Miller 2021; Therrien, Usher, and Matyas 2019). Key limitations to effective resilience governance include political turnover, trade-offs between centralized and decentralized structures, and the challenge of assessing resilience needs, as well as fatigue, complacency, and overconfidence (Fastiggi, Meerow, and Miller 2021; Shamsuddin 2020; Normandin et al. 2019; Vicari, Tchiguirinskaia, and Schertzer 2019; Boussalis, Coan, and Holman 2019). Limitations to effective resilience building identified in the literature include many of the factors that the 100RC intervention was designed to address, and they persist as challenges, as detailed in other sections of the evaluation.

In the most recent literature, from mid to late 2021, urban resilience governance remained a major theme. Particularly in the US context, scholars analyzed how resilience is operationalized in resilience

strategies, policies, and the perceptions of government officials. Researchers have found that resilience policies in US cities vary based on local contexts and do not "coalesce around any particular sets of programs" (Woodruff et al. 2021, 8). Indeed, an analysis of 38 resilience plans found that the multifaceted nature of resilience goals can render them ineffective (Lambrou and Loukaitou-Sideris 2021). In the international context, one study has found that governance structures for urban resilience exist in so-called popular settlements, but residents are not included in formal decisionmaking processes (Rivero-Villar and Vieyra Medrano 2021).

PUBLIC PARTICIPATION

Finally, scholars have noted the increasing space for public participation in resilience planning. A historical review of resilience practice shows that the process has evolved from a technical approach in which urban networks are asked to identify vulnerabilities in critical infrastructure, to an organizational approach involving a more expansive set of public administration tools, including participatory methods (Heinzlef and Serre 2020). Researchers suggest that inequality and social exclusion undermine actions to promote greater resilience, and therefore inclusion should be part of any resilience governance agenda (Adger et al. 2020). While the literature identified in the midterm report (Martín and McTarnaghan 2018) argued that community participation and engagement were a time- and resource-intensive undertaking, newer literature seems to suggest that it is nevertheless an investment worth making.

Decisionmaking Tools for Urban Resilience

A considerable amount of research has examined the role of knowledge systems—tools and structures to produce knowledge and improve decisionmaking—for urban resilience planning, given the uncertainty surrounding future shocks (Muñoz-Erickson et al. 2017). Many researchers highlight the important role of institutions in knowledge practices, such as the role of experienced resilience professionals in changing institutional practices; the inclusion of voices from marginalized groups to create an informal space for innovation; and the role of global networks that allow cities to share and learn from each other (Feagan et al. 2019). Authors argue that knowledge systems should be comprehensive, addressing factors such as current weather conditions and climate trends, the vulnerability of urban systems to specific shocks, and potential strategies to adapt to such shocks (Rosenzweig et al. 2019).

Scholars and practitioners have introduced knowledge systems and tools for addressing multiple hazards, as well as for evaluating resilience through multiple ecological, economic, social, and

infrastructural dimensions (Yumagulova and Vertinsky 2019; Ma et al. 2020). Recent contributions include tools to incorporate uncertainty in flood risk planning (Brandt et al. 2021), scenario modeling based on dynamics across urban systems (Feofilovs and Romagnoli 2021), new frameworks for incorporating resilience in landscape architecture (Kwak, Deal, and Mosey 2021), and a framework to analyze the spatial distribution of resilience in high-density cities (Sajjad, Chan, and Chopra 2021).

100RC in the Literature

Recent urban resilience scholarship has devoted significant attention to the 100RC program and the resilience strategies produced across member cities. As cities began to produce their resilience strategies and implement projects, the literature assessing the 100RC program grew. This work generally focused on the 100RC model and approach, along with case studies on cities in the context of their 100RC membership and their overall resilience-building efforts.

100RC MODEL AND APPROACH

In our midterm evaluation, we identified evidence on the potential for philanthropic and nonprofit partnerships to effect city government change, the resilience strategy development process, and the role of city networks in influencing local resilience building. However, we found no evidence to expect positive or negative outcomes for the CRO role (Martín and McTarnaghan 2018). Our literature monitoring after the midterm report identified studies that reviewed resilience strategies and explored other key offerings such as the CRO network and CROs' role in their specific cities (Woodruff et al. 2018; Grønnestad and Nielsen 2018; Heinzlef et al. 2020). Two studies evaluated 100RC through an equity lens in 2019 which concluded that while resilience strategies showed considerable variation in their equity focus, strategies lacked specific considerations of equity and justice action (Fitzgibbons and Mitchell 2019; Meerow, Pajouhesh, and Miller 2019). This limitation may be a consequence, according to these studies, of the apolitical nature of 100RC's definition of resilience, a heavier concentration of member cities in wealthier countries, and a lack of equity-oriented indicators in measuring resilience needs and goals. Later research focused on 100RC's role in improving resilience governance, while acknowledging the difficult task of "mainstreaming" urban resilience practice. Findings suggest that 100RC was effective in achieving breakthroughs in public debate and resilience institutionalization, but resilience practices are not yet the norm across global cities (Huck, Monstadt, and Driessen 2020). Making resilience building a common practice will require structural changes at both the local and national level, along with increased support for networks and greater capacity building for urban policymakers.

CASE STUDIES

Case studies of 100RC member cities generally mirrored the themes highlighted above and focused on the cities' participation in the 100RC program, the effectiveness of resilience institutionalization in the cities, and the challenges encountered during the program. For example, a case study of Athens and Rome showed that 100RC successfully provided the cities with tools to assess and improve their capacity to face shocks and stressors (Galderisi, Limongi, and Salata 2020). Some drawbacks identified included the short timing for strategy development, which possibly compromised the quality of community engagement during the planning process; limitation of the scope of the strategy to the municipal boundaries, despite regional challenges; and a lack of consideration for the most vulnerable communities.

A case study of the Melbourne experience reflects themes in the prior literature on 100RC (Moloney and Doyon 2021). The authors argue that the 100RC model was effective in overcoming fragmented governance structures in Melbourne by promoting a metropolitan, cross-municipal collaborative model. But these scholars suggest that the 100RC model is "unlikely to challenge entrenched power imbalances or address the root drivers of vulnerability" (Moloney and Doyon 2021, 10) and thus offers limited prospects for advancing equity. Incorporating more community-based actors in the decisionmaking processes could enable practitioners to leverage 100RC's governance strengths to promote equity. Indeed, the need for more participatory processes, a greater focus on vulnerable communities, and explicit policies to address equity in resilience work has been highlighted in other studies of 100RC cities, a review of 75 100RC resilience strategies across the world, and a review of resilience plans in the US (Shamout and Boarin 2021; Hofmann 2021; Lambrou and Loukaitou-Sideris 2021).

Conclusion

Study 2 revealed commonalities between what scholars are finding and what practitioners are seeing and doing in the urban resilience field. It also highlighted 100RC's influential role in global resilience practice. Researchers and practitioners are converging on several conclusions:

- **Definitions of resilience and resilience goals remain inconsistent.** In both the literature and the field, there is a growing consensus that urban resilience extends beyond climate resilience and that multiple dimensions should be considered, including infrastructural, ecological, economic, and social and community (Sharifi 2020; Torabi, Dedekorkut-Howes, and Howes 2021). However, there is still no consensus around a definition of the term, and the tendency of

programs such as 100RC to pursue a broad set of goals can limit effectiveness (Lambrou and Loukaitou-Sideris 2021).

- **The 100RC program succeeded in bringing attention to resilience.** Both the literature and practitioners find that the 100RC program brought the concept of resilience to public attention, even if the approaches to delivering resilience remain a topic of debate (Huck, Monstadt, and Driessen 2020). Following 100RC's closure, many programs have adopted the urban resilience framework and an emphasis on building planning and governance capacity as a means to address the dynamic challenges of urbanization, climate change, migration, and other shocks and stressors.
- **Cities are critical players, but national enabling policy environments and coordination between local and national actors to build resilience are increasingly viewed as important.** The 100RC program—with its focus on planning and governance capacity within one jurisdiction (with the exception of a few regional efforts)—took the city as the unit of intervention to improve resilience locally. While the literature and peer programs similarly underscore city leaders' role, innovative nature, and proximity to the relevant issues—making the city an appropriate level for change—recent efforts have emphasized the need for better national and regional coordination.
- **Inclusion and equity are important to urban resilience.** The literature draws attention to the need to include more voices in planning and cites inclusion as a necessary condition for good resilience governance (Feagan et al. 2019). Furthermore, the literature states that inequality and social exclusion undermine actions to promote greater resilience, and therefore inclusion should be part of any resilience governance agenda (Adger et al. 2020). Urban resilience practitioners and program mission statements also emphasize inclusion and equity, especially since the COVID-19 pandemic has drawn attention to societies' underlying inequities, which the literature also addresses. However, to date, researchers have not found evidence that 100RC successfully drove improved equity outcomes (Fitzgibbons and Mitchell 2019; Meerow, Pajouhesh, and Miller 2019).
- **It is important but difficult to measure resilience.** Both urban resilience practitioners and the literature highlight a need for more data and better ways to measure and monitor resilience. Measurement and monitoring have been very difficult to date, due to either a lack of data or the cost of data, or to a lack of effective techniques to measure the complex systems change that building resilience involves (Brunetta, Faggian, and Caldarice 2021).

- **Strong leadership is important but not everything.** The literature highlights strong leadership as a condition for good resilience governance, and urban resilience practitioners generally see value in the CRO position in that someone in proximity to political power is focused on coordinated resilience efforts (Fastiggi, Meerow, and Miller 2021; Therrien, Usher, and Matyas 2019). Yet, there is also acknowledgment from both practitioners and researchers that the amount of change a single person can effect is limited: the CRO function alone cannot ensure resilience (Huck, Monstadt, and Driessen 2020).
- **Resilience takes a long time to build.** Urban resilience practitioners and researchers both consider the element of time in resilience building. Practitioners discussed this primarily in the context of the closure of 100RC, critiquing the program for ending before resilience could even take hold in cities. The literature also highlights the short 100RC time frame, but in the context of the fast turnaround time for strategy development, which risked compromising the quality of community engagement during the planning process (Moloney and Doyon 2021).

Appendix A. Sample Confirmation and Indicator Monitoring

Through each 6-month reporting period from the third quarter of 2017 to the third quarter of 2021, the monitoring and evaluation (M&E) team tracked the distribution of baseline city characteristics across several characteristics of the 21 sample cities, such as population, geography, developmental context, 100RC cohort, and national urban governance authority. These characteristics mirrored the state of the wider pool of cities and did not significantly change from the time of sample selection. However, following the midterm report published in December 2018, the team anticipated that new characteristics would arise that could also make the sample less generalizable and potentially bias the monitoring themes and evaluation outcomes, including key intervention indicators (release of resilience strategies and chief resilience officer [CRO] stability) and key exogenous indicators (city leadership transitions and the experience of shocks). Therefore, the team reassessed the representativeness of the 21-city sample against the full population of 100RC cities for all the original characteristics plus the key intervention and exogenous indicators on a semiannual basis.[30]

The team monitored key indicators across all participating cities to validate the degree of representativeness of the sample and to better understand the variations in cities' experiences during the program. Key *intervention indicators* included the release of resilience strategies and CRO stability, as these were the primary innovations that 100RC brought to the urban resilience field. The team also tracked city leadership transitions and the experience of shocks as key *exogenous indicators* that could influence resilience outcomes but that 100RC's offerings did not have any control over. This appendix describes how the sample varies from the population with regard to these indicators and sheds light on cities' overall participation in key program offerings and resilience challenges.

Overall, the indicators suggest that the M&E team studied an appropriate sample that can shed light on the full 100RC intervention, with only a few minor disclaimers. There were no major changes in the original sampling criteria. However, sample cities reflected the population more accurately with regard to the exogenous indicators than with regard to the intervention indicators, which introduces a degree of bias into this report, as sample cities were more likely to reach major program milestones such as the hiring and retention of a CRO and publication of a resilience strategy. We incorporated this bias into our findings by making clear when a finding could have been influenced by a specific bias and adjusting the strength of our conclusion in that particular case.

Differences in Intervention Indicators

The release of resilience strategies and the stability of the CRO role are key 100RC intervention indicators that reflect city governments' commitment to resilience priorities. The rate of strategy releases was higher and CRO turnover was lower for our sample cities relative to the full population of member cities. This bias suggests that the sample cities the M&E team selected may have invested more time and effort in the 100RC engagement than some peers and may be more committed to seeing their resilience efforts persist. In other words, sample cities seem to have had slightly higher fidelity to the 100RC program model than the general population of participating cities.

Resilience Strategy Release

Releasing resilience strategies is the most critical milestone of the 100RC model, and the one that best reflects life cycle 2, the resilience strategy–development phase of 100RC support (table A.1). As of October 2021, 86 percent of all 100RC member cities had released their strategies, whereas 100 percent of sample cities had reached this milestone.[31] The gap widened in 2019, a year of intense strategy production, and persisted through our last round of reporting.

TABLE A.1

Resilience Strategy Release Indicators: Full Membership and M&E Sample Comparisons

	Cities	
Categories	**Full membership**	**M&E sample**
Strategy release		
Cities with released strategies	86%	100%
Cities with strategies released by date		
February 2019	52%	57%
September 2019	75%	86%
February 2020	81%	95%
September 2020	83%	100%
February 2021	84%	100%
October 2021	86%	100%

Source: Urban Institute tabulations of public reports in all member cities and earlier 100RC administrative data.
Note: *N* = 96 member and 21 sample cities (grouping the 3 jurisdictions in the Greater Miami and the Beaches coalition).

Chief Resilience Officer Stability

The existence and stability of the CRO role, as measured by the number of CRO transitions, is a key indicator of the degree of resilience institutionalization (table A.2). All (100 percent) of the sample cities have had an official CRO at some point since their program entry, a share that is roughly comparable to

the share across all member cities (97 percent).[32] The sample, however, has been biased toward cities with more stable CRO positions, as reflected in both the number of cities with an active CRO and the number of CRO transitions. As of October 2021, 64 cities in the full member population (65 percent) had an official CRO in place; in the sample, 19 cities (83 percent) had an official CRO, suggesting a likely higher degree of resilience institutionalization in our sample relative to the population.

Most cities experienced a CRO transition between the start of the program in 2013 and the end of the study period in October 2021, reflecting both political transitions and regular turnover (with replacement) in cities where the CRO position has been more durable. The sample cities were both more likely to have maintained the CRO position and considerably more likely to have experienced just one transition (61 percent for the sample, compared to 38 percent for the full membership population); the full population was more likely to have had two or more transitions (31 percent for the population, compared to 17 percent for the sample), which may reflect less overall stability.

TABLE A.2

CRO Stability Indicators: Full Membership and M&E Sample Comparisons

	Cities	
Categories	**Full membership**	**M&E sample**
Cities with a CRO		
Cities with a CRO at some point in the intervention	97%	100%
Cities currently with an official CRO	65%	83%
Cities with a CRO in any capacity	71%	87%
Cities with an active CRO by date		
February 2019	80%	90%
September 2019	77%	91%
February 2020	71%	86%
September 2020	71%	91%
February 2021	67%	78%
October 2021	65%	83%
CRO transitions		
Cities with no CRO transitions	31%	22%
Cities with 1 CRO transition	38%	61%
Cities with 2 CRO transitions	23%	17%
Cities with more than 2 CRO transitions	8%	0%
Cities with at least 1 CRO transition	69%	78%
Cities with a CRO transition in the last 6 months	13%	22%

Source: Urban Institute tabulations of public reports in all member cities and earlier 100RC administrative data.
Notes: CRO = chief resilience officer; M&E = monitoring and evaluation. Transitions refer to either the movement out of the CRO position of an incumbent without replacement or the actual replacement. N = 95 member and 23 sample cities that had a CRO at some point during membership (including 3 jurisdictions in the Greater Miami and the Beaches coalition). Cities with a CRO in any capacity refers to cities with a CRO as defined by 100RC as well as cities whose CRO has been demoted to a deputy CRO or resilience lead following the closure of 100RC. CRO transitions are analyzed from the start of the program in 2013 (and the start of each city participation in the program) to October 2021.

A new occurrence that we noticed in the later rounds of reporting is the downgrading of the stand-alone CRO position as a senior role in city government; in several instances, the CRO has been replaced with a deputy CRO or a new resilience lead. The relative demotion of the CRO position in a few cities is an important development, considering that the 100RC model specified that the CRO should be a full-time senior government official with no more than two degrees of separation from the mayor or city leader. The emerging resilience lead positions are generally individuals in city governments who oversee planning activities. For example, while Guadalajara does not have an official CRO, R-Cities now recognizes the city's general director of the Institute for Planning and Development Management, Mario Silva, who had served as a resilience lead under 100RC.[33] In all cases, we include these categories in the tracking of CRO transitions, given that R-Cities recognizes them as CRO representatives in the network.[34] In the full membership, one city reported having a deputy CRO as an alternative to a CRO and five reported a resilience lead. In the sample, one city reported having a deputy CRO but none had established a resilience lead as an alternative to a formal CRO position.[35]

Finally, as of October 2021, 25 cities in the full membership population (26 percent) did not have a CRO in any capacity (including a deputy CRO or resilience lead), compared to 3 cities (13 percent) in the sample. Though some cities were looking for a replacement, the field could see a continued movement toward institutional disinvestment and defunding of CROs as champions of resilience efforts if more and more CROs are left unreplaced.

Differences in Exogenous Indicators

The research team also tracked two key external indicators (i.e., factors beyond the control of 100RC's offerings) that could introduce bias in the event of differences between our M&E sample cities and the full 100RC member city population. These indicators are transitions in city leadership and the experience of acute shocks that can influence a city's commitment to or prioritization of resilience programming. In contrast to the intervention indicators, our M&E sample was generally reflective of the full population of cities with regard to both exogenous indicators.

City Leadership Transitions

A leadership transition—that is, a change of mayor or other senior political figure—is an exogenous factor that can affect the continuity of and commitment to the resilience-building efforts laid out in the 100RC model. In a few cases, such as Belfast, UK, these transitions are more perfunctory than

substantive. In most cities, however, a change in the mayor, city manager, or equivalent can lead to funding, policy, and related changes in planning and operations underway—particularly if the transition involves a major shift in political philosophy and partisanship.

With regard to this characteristic, the sample generally mirrors the full membership population (table A.3). Since the beginning of their participation in 100RC, 81 percent of the full population of member cities have experienced at least one city leader transition, while the share is 87 percent for our sample. The pattern also holds when analyzing by number of transitions: cities with one transition (49 percent of the full population and 52 percent of the sample), cities with two transitions (20 percent of the population and 22 percent of the sample), and cities with three or more transitions (11 percent of the population and 13 percent of the sample).

TABLE A.3

City Leadership Transition Indicators: Full Membership and M&E Sample Comparisons

	Cities	
Categories	**Full membership**	**M&E sample**
City leader transitions		
Cities with no leadership transitions	19%	13%
Cities with 1 leadership transition	49%	52%
Cities with 2 leadership transitions	20%	22%
Cities with more than 2 leadership transitions	11%	13%
Cities with at least 1 leadership transition	81%	87%
Cities with a leadership transition in the last 6 months	9%	22%
Cities with at least one city leader transition by date		
February 2019	60%	52%
September 2019	72%	74%
February 2020	73%	74%
September 2020	73%	74%
February 2021	78%	78%
October 2021	81%	87%

Source: Urban Institute tabulations of public reports in all member cities and earlier 100RC administrative data.
Notes: M&E = monitoring and evaluation. Transitions refer to either the movement out of the city leadership position of an incumbent without replacement or the actual replacement. N = 98 member and 23 sample cities for all categories of characteristics (including 3 jurisdictions in the Greater Miami and the Beaches coalition). The data were tracked from the time each city joined 100RC through October 2021.

One notable challenge in monitoring this factor is the variations in power sharing of executive city functions across the member cities. For example, Belfast's lord mayor changed during the city's 100RC membership, but the chief executive, who controls most administrative authorities, remained the same during the evaluation period. Greater Miami and the Beaches—with its three jurisdictions—was also difficult to synthesize, with differing executive authorities for the mayor and city manager in each of the jurisdictions. The Miami Beach city manager controls most executive functions in the city, while the

mayors of the City of Miami and Miami-Dade County hold more power over their respective jurisdictions. For the purposes of this indicator, each of these jurisdictions is tracked separately, rather than as a coalition.

Shocks

The second exogenous factor monitored is the occurrence of shocks—acute events that transform the nature and focus of cities' efforts. The M&E sample is representative, though largely due to the unique phenomenon of the global COVID-19 pandemic; 100 percent of the cities in both the sample and the full population have now experienced a major shock during their 100RC membership, given the shared experience of COVID-19. But the pattern between the two groups was consistent across reporting periods (table A.4).

TABLE A.4

Shock Indicators: Full Membership and M&E Sample Comparisons

	Cities	
Categories	**Full membership**	**M&E sample**
Shock experience		
Cities that experienced a shock during membership	100%	100%
Cities that experienced a shock in the last 6 months	100%	100%
Cities that experienced more than one shock in the last 6 months	63%	76%
Cities that experienced more than two shocks in the last 6 months	23%	10%
Cities that experienced more than three shocks in the last 6 months	5%	5%
Shock experience by date		
February 2019	52%	57%
September 2019	69%	76%
February 2020	81%	76%
September 2020	100%	100%
February 2021	100%	100%
October 2021	100%	100%

Source: Author tabulations of public reports in all member cities and earlier 100RC administrative data.
Notes: M&E = monitoring and evaluation. N = 96 member and 21 sample cities (grouping the 3 jurisdictions in the Greater Miami and the Beaches coalition). The data were tracked from the time each city joined 100RC through October 2021. "The last 6 months" refers to March through October 2021.

Given the uniqueness of the COVID-19 shock (which includes the pandemic and the economic downturn that followed), in our later data collection periods we also tracked whether cities experienced any other acute shocks. Based on our media review, between March and October 2021, 63 percent of all participating cities and 76 percent of the sample cities experienced more than one shock. Further, 23 percent of all cities and 10 percent of sample cities experienced more than two shocks.

The experience of multiple shocks in a short time frame could bias our study, as the cities in question could either be more inclined to invest in resilience building than those with fewer shocks, or potentially abandon previous resilience-building efforts in light of the characteristics of new shocks. Consequently, the M&E team explored these characteristics to better track their potential effects on the study's outcomes.

In addition to the pandemic, the most common shock experienced by cities was protests or civil unrest, which in many cases reflected public discontent due to pandemic measures; 39 percent of all member cities and 38 percent of sample cities experienced civil unrest. Other shocks included climate-related effects such as floods (17 percent and 24 percent, respectively), shooting or terrorism events (8 percent and 5 percent, respectively), and major heat waves (7 percent and 5 percent, respectively).

Summary of Differences

Overall, the sample cities are fairly comparable to the full population of member cities. The differences in the intervention indicators may reflect cities with a stronger commitment to resilience programming, which may bias our sample toward greater resilience institutionalization relative to the population at large. However, these differences are relatively minor, and our sample remains a meaningful group of cities to represent the experience of the overall 100RC population and allow us to extract lessons from the 100RC program.

Appendix B. Evaluation Constructs

TABLE B.1

Intervention Constructs

These constructs are meant only to document activities and outputs in relation to 100RC interventions—that is, the dosage of 100RC. These are not outcome constructs.

Construct	Definition
Interest and motivation	The intensity of interest (categorized as "Low," "Middling," or "High") is measured qualitatively by the consensus of respondents' explicit desire to be in global networks such as 100RC. Motivation is a descriptive identification of the primary reasons for participating: funding, global recognition, city-to-city network involvement, knowledge resources or technical assistance, and intrinsic city transformation are the goals defined from past data collection.
Need for resilience	Alignment between respondents' perceptions of the local need for resilience building, as demonstrated by shared reporting of specific shocks and stressors, is scaled into the following categories: "Dispersed" (that is, not aligned), "Converging" (increasingly aligned), "Converged" (largely aligned), and "Dispersing" (increasingly not aligned).
Resilience definition	The consistency of respondents' definitions of resilience with The Rockefeller Foundation's original definition is identified simply as "Mixed" or "Consistent" based on respondents' depiction of the holistic integration of shocks and stressors.
100RC offerings	Respondents' ongoing use of any past 100RC services and tools, categorized as "Low," "Mixed," or "High."
Resilience strategy implementation status	The quantity and level of advancement of strategy initiatives are collectively categorized as "Limited" if only 1–2 initiatives have seen early advancement, both by CRO accounts and detectable planning or financing evidence; "Modest" if 1–2 initiatives have advanced almost to completion or a larger number (3–6) are in early stages; or "Strong" if more than 3 initiatives are completed or have advanced detectably.

TABLE B.2

DOMAIN 1: Planning Institutionalization Outcomes of interest

Construct	Definition
1. Explication of resilience	**Definition:** The clear explication of plan goals is an essential aspect of good planning, but the explicit and implicit integration of comprehensive resilience building into the plan goals is 100RC's objective. Without clearly identified resilience goals, a plan is susceptible to multiple interpretations and can function to divide, rather than unite, various municipal and external efforts to address potential shocks and stressors. In plans beyond the strategy, we look for the intent to integrate resilience and the form of integration. **Indicators:** a. Explicit and implicit references to resilience in plans other than the strategy b. Definition and topical operationalization of resilience in plans other than the strategy c. Definition and topical operationalization of shocks and stressors in plans other than the strategy d. Articulation of resilience projects or actions in relevant plans other than the strategy **Scoring:** No references in planning documents beyond the strategy to resilience and resilience-building efforts merits a "None" explication score. Some loose references to the word *resilience* earn an "Implicit" score. References with a clear understanding of the term and of the city's shocks and stressors earn a "Strongly implicit" score. Clear cross-references between planning products and a robust definition, consistent identification of shocks and stressors, and links to the strategy (as developed) earn an "Explicit" explication score.
2. Use of science and evidence	**Definition:** The use of physical and social science and related evidence is critical in creating a strong resilience plan. This refers to using evidence to understand the relevant shocks and stressors that a city faces, but also to estimating the changes that could be most impactful. While citations and references provide an indicator of this use, evaluators should take care to ensure that metrics and studies are appropriate, appropriately used, and integrated into future planning. **Indicators:** a. Cited basis (such as credible data, scenarios, or forecasts) for defining uncertainty and dealing with uncertain futures b. Cited reliance on or use of evidence for plan priorities and decisions in plans other than the strategy **Scoring:** The use of evidence in planning (particularly in terms of accurate assessments of shocks and stressors) is categorized as "Minimal" (a few references to secondary demographic or land use data and no linkages to planning decisions or recommendations), "Modest" (references to risk assessment data in addition to the "Minimal" data, along with clearer logic for decisions), or "Extensive" (the use of primary data for conditions and risks and sound linkages to decisions).

Construct	Definition
3. Internal consistency with other city plans	**Definition:** A resilience plan cannot stand on its own. Integration into the larger municipal context requires internal consistency within the constellation of other plans that the city has adopted or operates under, as well as with the day-to-day operations. Cross-referencing can illuminate this, but to truly understand how well integrated a plan is, one must also look to the level of knowledge and buy-in. Where "explication of resilience" focuses on how resilience is integrated into traditional planning processes, this construct is concerned with how traditional planning boundaries (e.g., housing, economic development, etc.) are blurred through a more holistic resilience vision. **Indicators:** a. Existence and depth of cross-references across plans (particularly with shocks but with stressors as applicable) b. Familiarity of plan authors and implementing agents beyond their purview (including with the eventual strategy) **Scoring:** "Inconsistent" planning means no collaboration was engaged in or reference made to other institutions' planning in the same city. "Modestly Consistent" suggests some review or singular references. "Largely Consistent" means that there is formal collaboration in the development of planning products and explicit cross-references (often in the form of defined roles). "Consistent" denotes formal, extensive collaboration and shared references and state of development. Teams should be aware of health and COVID-19 recovery-related plans in particular and include these in determinations.
4. Vertical integration with broader-scale plans	**Definition:** Just as a resilience plan must make sense within the local context, it also must make sense within the broader context, be it regional, state, national, or international. Here, meaningful and thoughtful reference to higher-level plans is important, but so is outlining the involvement of higher levels of authority in the local plan. (In some cases, the municipal and state or national planning cycles may not coincide and cross-references are not available. Researchers are then tasked with describing the traditional linkages and authority in planning between governance entities.) **Indicators:** a. Existence and depth of plan cross-references across higher- and lower-level governance entities' plans (especially with regard to shocks) b. Familiarity and involvement of state, regional, or national entities with city plans (including the strategy) **Scoring:** Vertical integration measures mirror the internal consistency measures, using the same collaboration and cross-referencing standards and a similar scale ("Not Integrated," "Largely Integrated," or "Integrated"), but with an added middling measure of "Satisfies Requirements," as many cities must adhere to regulatory and constitutional specifications for submitting plans to state, regional, or national entities (though this process does not necessarily lead to detectable integration). Again, this measure includes nontraditional resilience plans (such as public health).

Construct	Definition
5. Community accessibility to plans and participation in plan development	**Definition:** Resilience does not start with the government but with the communities and individuals that comprise the city. Their ability to access the plan and participate in its development ensures both that the plan will reflect the needs and values of the local community and that the public will feel ownership of the plan and expect local authorities to respect it in their decisionmaking. Researchers are tasked with documenting changes in public participation in planning. **Indicators:** a. Procedures (formal and informal requirements) for community participation in plan development b. Representativeness and diversity of participants in recent and current plan developments c. General community access to, awareness of, and familiarity with published plans d. Media access to, awareness of, and familiarity with published plans (both existence of reporting and nature of commentary) **Scoring:** The ability to participate and the quality and representativeness of engagement in city planning for the diversity of constituents is rated as "Inaccessible" (no formal requirements and no detectable informal engagement), "Satisfies Requirements" (formal requirements and modest documentation), "Largely Accessible" (formal requirements and extensive documentation), or "Accessible" (formal requirements and processes, extensive documentation, and measurable engagement outcomes with clear feedback links to planning).
6. Alignment with vulnerabilities and vulnerable populations	**Definition:** A core aspect of resilience is ensuring that the needs of populations most at risk of negative impact from shocks and stressors are addressed. However, vulnerable populations will vary greatly by geography, culture, and political context. Typically, low-income and poverty status are the most common correlates to vulnerability, but other characteristics (including geographic location) may apply. The construct requires a meaningful definition of vulnerable populations and an explicit focus on those populations' resilience. **Indicators:** a. Procedures (including quantification) to identify vulnerable populations in plans b. Procedures to plan for vulnerabilities **Scoring:** City planning with an "Exclusive" score for alignment with vulnerable populations makes no reference to specific income, racial, gender, physically challenged, and other groups facing a disproportionate effect from the shocks or stressors in question. "Modestly Inclusive" scores are earned by directly referencing these communities. "Inclusive" city planning foregrounds the vulnerable populations in reference to every shock and stressor, if not as a core stressor, and makes specific recommendations for initiatives that address these groups' vulnerabilities.

Note: Each construct includes (1) a narrative definition, (2) individual indicators that collectively measure the construct, and (3) the scoring that Urban Institute uses across all cities.

TABLE B.3

DOMAIN 2: Operations Institutionalization Outcomes of Interest

Construct	Definition
1. Government structure	**Definition:** Government structure (the organization form) establishes the context for understanding how resilience building is likely to be developed across city government operations. This construct also focuses on the permanence of new structural elements designed to embed resilience thinking in city operations, such as the chief resilience officer (CRO). **Indicators:** a. Existence of CRO position, office, or other central resilience entity b. Organizational position of CRO role or office **Scoring:** A binary "Yes" or "No" score is assigned for the presence of a CRO or similar coordinating entity within city government, though a "Partially" score was introduced for when the position exists but has detectably reduced coordinating powers or reassigned roles that de-emphasize resilience-building efforts. Other examples of this category are demoted CROs. Further, teams must inquire about the CRO role in the pandemic (or other major shock) to better articulate the placement and structure of resilience in city government before and after shocks.
2. Function ("silos")	**Definition:** In contrast to structure, function refers to the specific subjects, procedures, and practices that each entity manages or has authority over. This construct tracks the degree to which "silo busting" occurs to reduce the incidence and negative impact of bureaucratic dysfunction, which prevents collaboration among units that need to be working together to accomplish resilience outcomes. **Indicators:** a. Connections and communications between the CRO and other city officials b. Non-CRO staff commitments to CRO office and activities across city departments (including Steering Committee) c. Connections and communications between city officials beyond the CRO (task groups, etc.) d. Distribution of explicit authority or missions over resilience-related functions e. Evidence of "de-siloing" or coordinated action across city functions (only around stated shocks) **Scoring:** The persistence of silos is measured by the number and quality (formal versus informal) of collaborations between government agencies and sectors. In this case, a "Strong" score is a negative, depicting few cross-silo collaborations. A "Modest" score means that silos remain in place but with some informal collaboration and rare formal cross-functional work. A "Weak" score indicates that silos have roles that are more porous, both formal and informal communications are strong, and there is distributed or shared authority. Teams should be aware of the breadth of silos that may not have been originally associated with resilience building during the strategy phase but that have since become the focus of major shocks (e.g., public health and pandemics).

Construct	Definition
3. Political/public discourse	**Definition:** This construct tracks the degree to which resilience discourse is mobilized in political and public discourse in a way that is attributable to the intervention. **Indicators:** a. City leadership commitments to resilience activities (including public statements only) **Scoring:** "Weak" commitment scores equate to no public statements of support for (and the occasional rumbling against) the CRO or resilience building. A "Modest" score means some formal support only, through perfunctory press releases and the like. "Strong" support means active and involved support from city leadership as well as resilience being a subject of political debate.
4. Transparency and accountability	**Definition:** Transparency and accountability refer to the degree to which the city's operations are open to public scrutiny and accountability, including through ease of access to city documents and resources, openness of public data, open performance monitoring, and other forms of transparency in relation to resilience shocks, stressors, and other risks. **Indicators:** a. Use of evidence in relation to risks or shocks for performance b. Public access to city data, reports, and organizational resources relating to risks or shocks **Scoring:** "Low" transparency and accountability in relation to shocks, stressors, and resilience efforts assumes minimal efforts to document and monitor CRO and related activities and publicly track them. "Satisfies Requirements" means that there are formal requirements and modest documentation, comparable to other governmental activity. Earning a score of "Significant" transparency requires not only meeting the basic requirements but also paying special attention to highlighting and monitoring these efforts (such as new public interfaces or city scorecards).
5. Budget operations	**Definition:** Funding of city operations is an important mirror of changes in operations that suggest resilience institutionalization. From changes in revenue sources to the formal methods for allocating funds and procuring services, budgetary operations reflect immediate city priorities as well as long-term institutional transformation. **Indicators:** a. Nongovernmental revenue sources (private and civic financial commitments) b. Resilience "lens," screens, justifications, or other framework for budget allocation c. CRO office or explicit resilience administration budget line item and funding d. Project or action budget line item and funding for strategy and relevant plans **Scoring:** A score of "None" connotes the absence of both resilience-focused budgeting and attempts to leverage other funds. "Some" resilience budget operations can reflect movement toward either objective, while an "Extensive" score requires movement toward both budgetary objectives, with additional significant movement toward one or both.

Construct	Definition
6. Governance operations	**Definition:** Though a city's relationships to other entities of all kinds are beyond the purview of 100RC's intervention, explicit commitments (or denials of commitment) from those entities in support of the city's resilience efforts in the long term may suggest a relationship that is changing due to the 100RC intervention. In some cases, this change includes the creation or mirroring of the 100RC intervention within this external entity (such as a state CRO or a national resilience plan), with explicit connection to the city's 100RC work. Like the city leaders' "commitments," commitments here refer to public statements about resilience at first, and then budget or project advocacy as applicable. **Indicators:** a. Vertical governance actors' (higher and lower levels of government) commitments to city resilience b. Interjurisdictional governance actors' (neighbors and metropolitan entities) commitments to city resilience c. Overlapping governance actors' commitments to resilience. (Governance actors are utilities, watersheds, etc., but are limited to shocks identified in the resilience strategy.) **Scoring:** A score of "None" connotes no functional changes or cross-governance relationships between the city and its state, regional, or national government, and no commitments in support of a city's resilience-building efforts. "Some" means that there is a limited amount of coordination (usually seen in areas such as watershed management or emergency response and preparedness). "Extensive" cross-governance operations require frequent and regular state or national commitments in support of the city's efforts. Teams should be aware of nontraditional resilience operations such as public health during the pandemic.

Note: Each construct includes (1) a narrative definition, (2) individual indicators that collectively measure the construct, and (3) the scoring that Urban Institute uses across all cities.

TABLE B.4

DOMAIN 3: Contextual Factors

Construct	Definition
1. General city characteristics and shocks	**Definition:** This construct includes general geographic and population statistics of the city, and tracking the evolution of the shocks experienced during the city's participation in 100RC. **Indicators:** a. Population (city and metropolitan region, if applicable) b. Land size (city and metropolitan region, if applicable) c. Evolution of shocks during 100RC d. Recentness of shocks e. Severity of recent shocks (economically or socially) **Scoring:** Secondary sources (including Demographia, the city's application to 100RC, and internal 100RC administrative documents) are used to monitor this descriptive data.
2. General planning operations and plans	**Definition:** This construct covers existing plans and planning processes and differs from the 100RC planning outcomes of Domain 1. **Indicators:** a. Number, frequency, and product of major city plans b. Number, frequency, and product of functional city plans (e.g., "silos" such as housing, transportation, economic development, etc.) c. Number, frequency, and product of topical city plans potentially related to resilience (e.g., "sustainability," "climate," or "green" plans) d. Number, frequency, and product of city plans related to shocks (e.g., water management, or emergency mitigation and preparedness) e. Planning authority and delegations **Scoring:** The team tracks the update frequency and robustness of city plans and assigns a score from "Weak" to "Modest" to "Strong" based on increasing frequency and quality—the latter using urban planning scholarship.

Construct	Definition
3. General city operations	**Definition:** This construct covers general city functions and operations and differs from the 100RC city operations outcomes of Domain 2. **Indicators:** a. Organizational charts or structures with staffing distribution b. Government size and capacity c. Functional authority per department d. Non-resilience-related "de-siloing" or coordinated action efforts e. "Open government" initiatives and other transparency efforts f. "Big data," city command centers, and other initiatives involving broad city data and monitoring g. City performance monitoring and evaluation requirements and implementation **Scoring:** Secondary sources (including the United Nations and World Bank reports and cities' own public documents) are used to monitor this descriptive construct. Functional strength is categorized into three tiers based on city service delivery to citizens. Teams must include major changes in functional authorities (and new COVID-19 response and recovery offices) explicitly under 3a, 3b, and 3c.
4. Political conditions and policy context	**Definition:** This construct covers general city politics and differs from the resilience politics outcomes of Domain 2. **Indicators:** a. Frequency of executive transitions b. Nature of leadership's political beliefs regarding public investments and governmental organization c. Use of resilience language in mayoral/manager political campaigning d. Insulation of bureaucratic function from politics e. Public engagement activities with the private sector f. Public engagement activities with the civil sector **Scoring:** Stable and unstable values are the only measures used for this construct, and these are determined based on qualitative assessment of a city's continuity but with a required descriptor for any change in the above indicators.

Construct	Definition
5. Social conditions	**Definition:** This construct includes general demographic and social analyses, and tracking the evolution of stresses since the city joined 100RC. **Indicators:** a. Standard of living and development (national and/or regional) b. Largest (in terms of budget and staff count) city-provided social services c. Civil sector size (particular to shocks and stressors) d. Existence of community engagement functions and their location in city organization e. Evolution of stressors during 100RC participation f. Vulnerable population types (income, race, gender) and their risk levels **Scoring:** A proxy (World Bank Indicators) is used for social conditions. To the extent possible, teams should find documented information about the economic and social impacts of the pandemic in the cities and new social services or safety net programs in addition to the overall development scores for 5b and 5e.
6. Financial conditions and operations	**Definition:** While budgeting is the key focus here, this construct is not simply a measure of expenses for and revenue from resilience-building actions. It also focuses on how cities use available funds, and on the extent to which their budgeting methods and priorities support the achievement of targeted resilience outcomes. Note that this differs from the budget. **Indicators:** a. City annual GDP per capita or economic output measure b. Procedures for taking debt or debt capacity c. Sources and recent magnitude ($) /proportions (%) of revenue by source for city government d. Authority over budget allocations e. Budget allocation process (frequency and duration) f. Nontraditional budget allocation processes (including participatory budgeting, performance-based budgeting, etc.) g. Existence, use, and nature of procurement procedures **Scoring:** Both the strength of a city's budgeting conditions (revenue and debt capacity) and the transparency of those systems are tracked—the former categorized as "Weak," "Modest," or "Strong" financial positions and the latter as "Opaque" or "Transparent." Both assessments are based on city budget reports and, as applicable, national budgets.

Construct	Definition
7. Governance conditions	**Definition:** Through 100RC, cities produce and implement resilience strategies that include specific resilience-building projects, programs, and policies. In many instances, these efforts are enabled by or in conflict with the needs (resilience and otherwise) of neighboring jurisdictions, regions, states, or national entities. The city is the primary unit of 100RC's intervention, and the focus of the 100RC M&E effort. However, the interplay with other governmental entities is critical as context and as a factor in the cities' outcomes. **Indicators:** a. Qualitative centrality of the city to the region, province/state, and nation b. City's relationship to higher-level entities (county, state, province, nation, international development agencies) c. City's relationship to lower-level entities (neighborhood or sub-municipality, if applicable) d. City's relationship to neighboring cities and metropolitan entities e. City's relationship with overlapping entities (utilities, watersheds, etc.) **Scoring:** The status of relations between the city and its state and national governments is qualitatively assessed as "Weak" or "Strong" based on key informant interviews and reviews of documents from constitutional divisions of authority. A special note is tracked for the level of national centralization of city governments, as well.

Notes: These are not outcomes of interest but important contextual factors that need to be tracked to determine their contributions to the outcomes. Each construct includes (1) a narrative definition, (2) individual indicators that collectively measure the construct, and (3) the scoring that Urban Institute uses across all cities.

Notes

[1] Three 100RC member cities that were active at the time of the program's termination never appointed a CRO: Guadalajara, Luxor, and Nairobi.

[2] After the independent publication of the Durban strategy in August 2017, Durban notified the monitoring and evaluation (M&E) team that the city had "suspended its relationship with 100RC ... due to ideological differences" and that Durban would no longer participate in the M&E effort. From Progress Report 2 (March 2018) to the midterm report (December 2018), analysis of Durban's outcomes relies on public document review. From Progress Report 3 (February 2019) forward, Durban was eliminated from the sample.

[3] Ninety-six cities make the 100RC population in total, including one count for the three jurisdictions in the Greater Miami coalition and excluding Durban, which had been in both the first cohort and the original sample but subsequently refused participation in the study. For some sampling characteristics, the three Miami jurisdictions are treated separately, thereby increasing the population to 98 cities and the sample to 23 cities for tabulation purposes only.

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[30] The 100RC population consists of 96 cities in total; this figure counts the three jurisdictions in the Greater Miami and the Beaches coalition as a single city and excludes Durban, South Africa, which had been in both the first cohort and the original sample but subsequently declined to participate in the study. For some of the sampling characteristics, the three Miami jurisdictions are treated separately, thereby increasing the population to 98 cities and the sample to 23 cities for tabulation purposes only.

[31] Cities that did not release strategies with 100RC or subsequent programs include Barcelona, Spain; Belgrade, Serbia; Guadalajara, Mexico; Jaipur, India; Kigali, Rwanda; Lisbon, Portugal; Luxor, Egypt; Mandalay, Myanmar; Milan, Italy; Minneapolis, US; Nairobi, Kenya; Nashville, US; Paynesville, Liberia; and San Juan, US—all outside the M&E sample. However, Barcelona and Milan released related reports independently, and San Juan released a territory-wide resilience strategy for Puerto Rico.

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[35] This new nuance of who is recognized as the CRO makes tracking transitions difficult, as many deputy CROs or resilience leads are not new to their role, so it is unclear in some cases when they officially took the role of CRO.

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