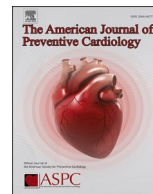




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CARDIO4Cities: A roadmap for improving urban cardiovascular health

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ABSTRACT

This roadmap reviews CARDIO4Cities, a whole-of-city approach designed to reduce cardiovascular risk and disease at population level. As urbanization accelerates globally - with 68% of the global population projected to live in cities by 2050 - cities across income settings face a growing burden of cardiovascular disease, yet often lack operational models that translate evidence into scalable action. CARDIO4Cities responds to this gap by combining a simple, standardized population-health framework with locally adaptable implementation pathways that can be embedded within existing city systems. The approach is organized around six reinforcing pillars: quality and coordination of Care, Access to early diagnosis and management of cardiovascular risk factors, policy Reform, Data and technology, Intersectoral collaboration, and local Ownership. Rather than relying on new parallel infrastructures, CARDIO4Cities integrates evidence-based interventions into routine health services and leverages non-traditional community and private-sector actors, enabling replication across cities with varying levels of health-system maturity and resources. This document provides city health officials and their partners with a step-by-step implementation pathway, including governance structures, target-setting frameworks, intervention design processes, monitoring systems, and scaling strategies. Evaluations from the first three implementation cities—São Paulo (Brazil), Dakar (Senegal), and Ulaanbaatar (Mongolia)—demonstrated significant improvements in hypertension control and reductions in acute cardiovascular events within one to two years. Modeling projected that, without further CARDIO4Cities interventions, 2.7–7.9% of premature deaths would be averted over the subsequent decade, at costs meeting WHO—CHOICE cost-effectiveness thresholds. These results, achieved in diverse geographic, economic, and health-system contexts, illustrate the transferability of the model across income settings. Since standardization of the approach, CARDIO4Cities has expanded to more than 40 cities worldwide, including major cities in Europe and the Americas, equipping city leaders with operational guidance to implement evidence-based cardiovascular population health programs adapted to local contexts and resources. We position CARDIO4Cities as a replicable and scalable model for improving cardiovascular population health across diverse urban contexts, from resource-constrained cities initiating basic risk-factor detection to data-rich cities advancing toward precision population health.

1. Introduction: the case for action

Cardiovascular disease (CVD) remains the leading cause of death and disability worldwide, causing approximately 19 million deaths annually, representing a 47% increase from 1990 levels [1]. While the burden is ubiquitous, underserved populations are disproportionately affected, both in high- and low-income countries. Critically, approximately 80% of this burden is attributable to modifiable risk factors, with high systolic blood pressure as the dominant contributor [1–2].

The proportion of the global population living in urban areas is projected to grow from 58% in 2024 to 68% by 2050 [3]. The United

Nations has described this pace of urbanization—the rapid growth of city populations, increased population density, and the economic shift from agricultural to industry- and service-driven economies—as one of the most important global health challenges of the 21st century [4]. Urban environments shape dietary patterns, physical activity levels, air quality exposure, and access to healthcare services, all of which are determinants of cardiovascular health. Within cities, social determinants of health and cardiovascular risk factors vary substantially by neighborhood, requiring population health strategies that are sufficiently granular to address local variation while maintaining the scale needed for population-level impact [5].

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Despite robust evidence for effective cardiovascular prevention and treatment strategies, a persistent gap exists between what is known and what is practiced. The WHO HEARTS technical package, the American Heart Association and American Medical Association implementation strategies, and numerous clinical guidelines provide clear recommendations for hypertension control and cardiovascular risk reduction [6–11]. Yet global hypertension control rates remain low and a substantial proportion of people with cardiovascular risk factors remains undiagnosed, often until they experience an acute cardiovascular event [11–13]. This implementation gap reflects not a lack of evidence but a lack of operational pathways for translating evidence into practice at scale. Cities need structured approaches that specify not only what to do but how to do it within existing systems and resource constraints.

1.1. The *CARDIO4Cities* framework

CARDIO4Cities is a whole-of-city approach designed to reduce cardiovascular risk and disease at the population level. Rather than creating parallel infrastructures, the framework embeds evidence-based interventions into routine health services and engages non-traditional community and private-sector actors. The approach was piloted beginning in 2018 in three cities characterized by rapid urbanization and high cardiovascular disease burden but with different geographic, economic, and cultural contexts: São Paulo in Brazil, Ulaanbaatar in Mongolia, and Dakar in Senegal [14].

Within 1 to 2 years of implementation, analysis of records from nearly 19,000 patients across primary health centers serving a combined catchment area of 3.5 million people showed substantial improvements. Patients achieving hypertension control increased from 12% to 31% in São Paulo over 15 months, from 7% to 19% in Dakar over 19 months, and from 3% to 19% in Ulaanbaatar over 21 months [15]. During the same period, interventions averted an estimated 13% of strokes and 12% of heart attacks across the three cities. Projections using a Markov statistical model estimated that between 2.7% and 7.9% of premature deaths would be averted over the subsequent 10 years, even without further interventions, at costs of USD \$748–784 per quality-adjusted life year gained, meeting WHO—CHOICE cost-effectiveness thresholds [16]. In São Paulo and Dakar, stroke outcomes during preintervention, intervention, and follow-up periods were compared from 2016 to 2021. In both cities, age-standardized stroke hospitalization rates (Dakar: –26%; Sao Paulo: –54% on average across 2 districts) and the risk of death from stroke declined over the intervention period. With comparable baseline risk of stroke hospitalization across São Paulo, the risk was 24.5% lower in the intervention districts compared with the rest of the city in the follow-up period [17].

Following these positive outcomes, the approach was standardized in 2021, and at the time of this publication, more than 40 cities globally are in various stages of implementation.

Three mutually reinforcing attributes enable scalability across diverse urban contexts. First, simplicity of design ensures that the approach prioritizes a limited number of modifiable cardiovascular risk factors—hypertension, diabetes, and elevated LDL cholesterol—that account for most premature cardiovascular deaths. Standardized clinical algorithms, simplified decision-support tools, and clearly defined targets streamline implementation, aligning with evidence that simple, linear treatment protocols facilitate health worker training, reduce therapeutic inertia, and enable task-shifting to non-physician providers [14–15]. Second, data-driven implementation ensures that participating cities use quantitative targets and routine health data to guide planning, monitor progress, and inform course corrections. Cascade-of-care targets for detection, treatment, and control of cardiovascular risk factors promote shared accountability, while performance indicators integrated into health information systems enable longitudinal monitoring of both individual- and population-level outcomes. Third, local ownership ensures that a structured governance framework places local authorities and health-system managers in leadership positions, with iterative

engagement of frontline providers and communities fostering sustained commitment and aligning resources with local priorities.

1.2. The six pillars of *CARDIO4Cities*

Six reinforcing pillars structure the *CARDIO4Cities* approach, with the acronym *CARDIO* representing quality and coordination of Care, Access to early diagnosis and management, policy Reform, Data and technology, Intersectoral collaboration, and local Ownership. The first two pillars are essential for improving cardiovascular population health management, increasing health system efficiency, and empowering individuals to manage their own health, while the remaining four pillars serve as enablers of sustainable implementation.

The quality of care pillar (C) ensures that care delivery follows cardiovascular risk factor management guidelines aligned with established evidence, including the WHO HEARTS technical package, the American Medical Association MAP framework, World Heart Federation roadmaps, European Society of Cardiology guidelines, and relevant national recommendations [18–20]. These are translated into simplified clinical algorithms and decision-support tools, with training provided for health workers at all care levels including pharmacists and community health workers. Evidence from the Global Hearts Initiative demonstrates that standardized treatment protocols facilitate team-based care, reduce therapeutic inertia, and streamline drug procurement [6].

The access pillar (A) brings health interventions closer to where people live, work, and spend time by engaging stakeholders outside traditional health systems. A hallmark of *CARDIO4Cities* is making cardiovascular risk-factor measurement available at the entrance of every health facility for all visitors, regardless of visit reason, as well as at high-traffic public venues throughout the city, such as transit stations, markets, sport stadia, and workplaces. To improve access while containing costs and ensuring quality, cardiovascular risk-factor measurement is performed by trained non-health actors using validated automated devices, with clear referral pathways to the health system for individuals requiring follow-up.

The policy reform pillar (R) aims to create environments that support cardiovascular health through evidence-based policy changes informed by local needs and opportunities. These include fiscal policies such as taxes on tobacco, alcohol, and sugar-sweetened beverages; regulatory measures such as salt reduction in processed foods and elimination of trans fats; urban planning interventions to improve walkability, green spaces, and air quality; and health system policies addressing essential medicines lists and reimbursement for team-based care. Cost-effectiveness analyses identify fiscal and regulatory policies as among the most affordable and effective population-level interventions [6].

The data and technology pillar (D) establishes data-driven processes that improve decision-making and enable continuous adaptation. Cities establish real-time data collection and monitoring through dashboards for periodic review by local decision-makers, replacing less efficient systems that may lag real-time events by a year or more. Innovation continuously expands opportunities for real-time monitoring and precise decision-making through machine learning, smart sensors, smartphone and smartwatch applications, remote monitoring technologies, and self-screening capabilities. Digital health information systems improve health worker satisfaction and performance, enable timely quality improvement, and eliminate duplicate data entry [21].

The intersectoral collaboration pillar (I) involves participation from partners across the public and private sectors, encompassing health, urban planning, finance, technology, education, sports, transport, and food. Partners align around shared goals and targets with a mutual understanding of challenges and opportunities, establishing formal partnership agreements with defined roles and responsibilities and regular coordination meetings across sectors.

The local ownership pillar (O) ensures that local partners own responsibility for co-designing, implementing, and monitoring progress. Governance structures place city authorities and health-system

managers in leadership positions through a steering committee comprising members with decision-making authority—including the city mayor or political representatives, senior health department officials, and representatives from education, transport, urban planning, and finance sectors—and an operations committee responsible for implementation comprising health system managers, clinical leaders, technical experts, and representatives from implementing partner organizations (Fig. 1).

1.3. Implementation pathway

Implementation follows six sequential steps, each building on the previous, with the pathway designed to be iterative and incorporating built-in learning cycles that allow for course correction based on emerging data and experience. The first step establishes governance structures over approximately two to three months, creating the organizational infrastructure to lead, coordinate, and sustain implementation. This involves establishing the steering and operations committees, formalizing partnership agreements that define roles, responsibilities, resource commitments, and data-sharing arrangements, and securing initial funding through city or health department budgets, catalytic philanthropic contributions, or private-sector co-investment.

The second step sets targets for cardiovascular risk factor control over approximately one to two months, defining measurable goals that will guide intervention design and enable progress monitoring. This begins with a baseline assessment that reviews existing cardiovascular health data, maps the current cascade of care to show the proportions detected, treated, and controlled, identifies neighborhoods and populations with the highest burden and lowest coverage, and assesses health system capacity and resources. The Davos Declaration on Urban Heart Health recommends ambitious targets: 90% of individuals with cardiovascular risk factors detected, 80% of those detected on treatment, and 70% of treated individuals achieving control [22]. While ambitious, these targets reflect the Declaration's intent to aim high, with cities setting targets appropriate to their baseline and capacity, along with interim milestones.

The third step co-designs the cardiovascular population health roadmap over approximately two to three months, developing a tailored package of interventions aligned with local needs, capacity, and the six CARDIO pillars. This involves mapping existing interventions to identify current programs addressing cardiovascular risk factors and assess gaps in the cascade of care, selecting interventions through a participatory design process that considers evidence of effectiveness, feasibility within local context, cost and resource requirements, and alignment with existing initiatives, and developing implementation plans that specify responsible organizations and individuals, timelines and milestones, resource requirements, and indicators for monitoring progress.

The fourth step uses modeling tools over approximately one month to forecast the health and economic impact of proposed interventions,

enabling evidence-informed prioritization. A simulation tool developed using a health system dynamic model based on global evidence and local data supports local decision-makers in projecting expected improvements in cascade-of-care indicators, reductions in cardiovascular events including heart attacks and strokes, lives saved and disability-adjusted life years averted, and implementation costs and return on investment [23]. Based on projections, the roadmap is refined to prioritize highest-impact interventions, sequence interventions appropriately, and allocate resources efficiently.

The fifth step tests interventions and innovations over approximately six to twelve months, piloting interventions on a limited scale to assess feasibility, acceptability, and effectiveness before broader rollout. Pilot sites are selected based on adequate capacity and leadership commitment, ensuring diversity across urban and peri-urban settings and different population characteristics, and starting with communities positioned for early success. Implementation incorporates learning cycles with clear timelines for pilot phases, regular pause-and-reflect sessions, and documentation of implementation challenges and adaptations. Monitoring tracks both process indicators such as training completed and protocols adopted and outcome indicators such as cascade-of-care improvements, while gathering qualitative feedback from providers and patients.

The sixth step replicates and scales successful interventions on an ongoing basis, expanding throughout the city and establishing mechanisms for sustainability. Successful interventions are standardized through documented protocols, training materials, and tools, with implementation guides developed for new sites and quality standards and monitoring mechanisms established [24]. Scale-up is phased, expanding to additional sites in waves while building capacity progressively and maintaining quality while increasing coverage. Sustainability is ensured by integrating interventions into routine health system operations, securing ongoing funding through city or health budgets, and building local capacity for continuous improvement.

1.4. Adapting to city context

Cities vary in their baseline capacity and readiness for cardiovascular population health interventions, and the CARDIO4Cities approach can be adapted to three maturity levels. Launching cities are characterized by limited standardized cardiovascular risk detection, absence of treatment guidelines or clinical decision support, limited awareness of cardiovascular risk factors among population and providers, and fragmented or paper-based health information systems. Partners in launching cities focus on establishing basic detection and treatment protocols, training frontline health workers, implementing simple data collection systems, and building foundational partnerships.

Progressing cities have established cardiovascular disease data collection mechanisms, defined pathways to detection and care, some standardized treatment approaches, and emerging digital health

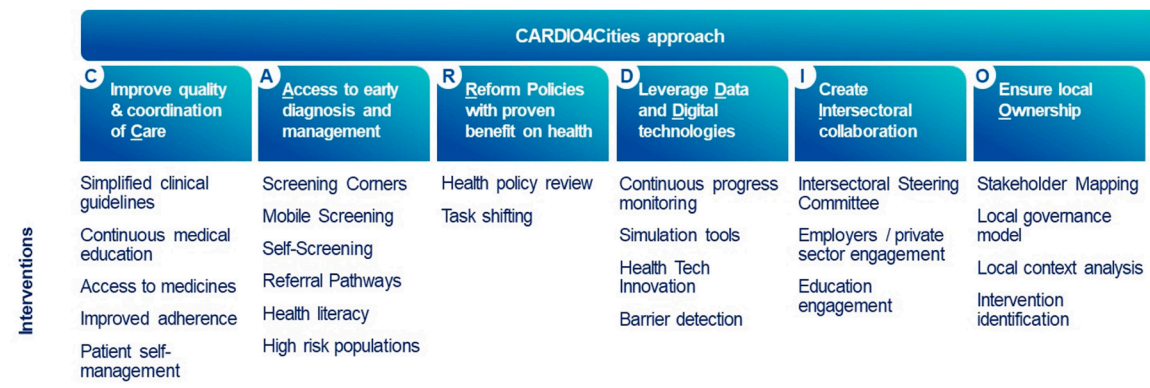


Fig. 1. The CARDIO pillars.

infrastructure. Partners in progressing cities focus on standardizing and expanding access to quality care, improving cascade-of-care indicators across the city, strengthening intersectoral collaboration, and enhancing data systems for real-time monitoring.

Optimizing cities provide regular monitoring and follow-up for people at cardiovascular risk, support decisions with continuous data collection and review of key indicators, have capacity for personalized treatment approaches, and possess advanced digital infrastructure. Partners in optimizing cities focus on improving coordinated team-based care, narrowing disparities in outcomes across population groups, implementing precision population health approaches, and leveraging artificial intelligence (AI) and advanced analytics.

1.5. Data requirements and technology

Regardless of technological sophistication, all participating cities should collect and monitor a minimum set of indicators to track progress against cascade-of-care targets for the three main cardiovascular risk factors. For hypertension for example, monthly indicators include the number of adults detected with elevated blood pressure at or above 140/90 mmHg or local threshold, the number on antihypertensive treatment, and the number of treated patients achieving control. Quarterly indicators include detection rate calculated as detected divided by estimated prevalence, treatment rate calculated as on treatment divided by detected, and control rate calculated as controlled divided by detected. Annual indicators include cardiovascular event rates for heart attacks and strokes where available.

Cities should progressively build digital capacity to support implementation, moving from basic paper-based registries with periodic data entry into spreadsheets, through intermediate electronic registries with standardized data entry and periodic dashboard generation, to advanced integrated electronic health records with real-time dashboards and automated alerts and reminders, and ultimately to optimized interoperable systems across facilities with predictive analytics and AI-enhanced decision support.

For cities with advanced data infrastructure, AI can enhance precision in four domains. Machine learning models can quantify local determinants by identifying social, economic, and environmental factors driving cardiovascular risk at neighborhood level, enabling targeted interventions [5]. Integration of health data with intersectoral datasets covering sectors such as housing, food access, security, education and transportation can generate actionable insights revealing intervention opportunities beyond the health sector. Predictive models can direct resources by identifying individuals and communities at highest risk, enabling proactive outreach and efficient resource allocation [25]. Real-time analytics can enable continuous improvement by supporting rapid learning cycles and adaptive implementation.

1.6. Regional scaling

Regional coalitions of funders and implementation partners can accelerate scaling by sharing mechanisms across multiple cities. Benefits include common governance structures reducing administrative burden, pooled digital infrastructure lowering per-city costs, standardized technical tools enabling rapid replication, shared learning networks accelerating improvement, and collective advocacy strengthening policy influence. In Latin America, for example, a regional coalition anchored in São Paulo enables cities across the region to adopt CARDIO4Cities through shared cascade-of-care dashboard platforms, standardized training curricula and materials, common quality improvement frameworks, regional learning exchanges, and coordinated advocacy for supportive policies.

Smaller cities face similar challenges but often with more limited technical and financial resources. Regional coalitions can lower barriers by providing ready-to-use implementation tools, offering technical assistance and mentorship, enabling participation in shared digital

platforms, and facilitating access to catalytic funding.

1.7. Overcoming implementation challenges

Stakeholders charged with implementing a population-level approach typically face several challenges. Fragmented health information systems, whether undigitized or digitized across different technology platforms, make it difficult to obtain timely and actionable insights. Solutions include starting with simple registries, using standardized tools, and building toward interoperability progressively through strategic partnerships with digital health providers, academic institutions, and multilateral organizations. Limited digital literacy and technical capacity constraints often result in decision-making that remains opinion- rather than evidence-based, requiring training, intuitive interfaces, and adequate technical support. Data privacy concerns complicate the use of data and technology, requiring clear governance, security measures, and transparency to build public trust.

Insufficient political priority for addressing cardiovascular disease hampers action, particularly in low- and middle-income countries where noncommunicable disease initiatives received less than 2% of global development assistance. Solutions include demonstrating the economic case, engaging champions, and aligning with existing priorities [26]. Limited funding can be addressed by starting with low-cost interventions, leveraging existing resources, and building the case for investment through demonstrated impact. Provider resistance to change requires engaging providers in the design process, demonstrating the benefits, and providing adequate training and support. Weak intersectoral coordination requires establishing formal governance, defining shared goals, and creating accountability mechanisms.

When detection rates are not improving, partners should review screening protocols and coverage, assess whether screening is reaching target populations, consider additional community-based screening venues, and evaluate provider adherence to universal measurement. When treatment rates are not improving, partners should review referral pathways from screening to treatment, assess medication availability and affordability, evaluate provider adherence to treatment protocols, and consider barriers to patient access and follow-up. When control rates are not improving, partners should review treatment intensification practices, assess medication adherence support, evaluate follow-up frequency and quality, and consider patient-centered barriers, including side effects, costs, and access.

1.8. Monitoring, evaluation, and learning

Regular monitoring enables adaptive implementation and continuous improvement. Monthly review by the operations committee examines cascade-of-care indicators by facility and district, implementation progress against milestones, and emerging challenges and proposed solutions. The quarterly steering committee review examines progress toward targets, resource utilization, and the strategic adjustments needed. Annual evaluation includes comprehensive outcome assessment, cost-effectiveness analysis, lessons learned documentation, and target and strategy refinement.

Built-in learning cycles are essential for effective implementation. Pause-and-reflect sessions provide regular structured discussions to review data, gather feedback, and identify improvements. Rapid cycle testing enables small-scale tests of changes before broader implementation. Systematic documentation captures lessons learned, adaptations made, and outcomes achieved. Knowledge sharing through participation in city-to-city learning networks contributes to the regional and global evidence base.

2. Conclusions: a call to action

Cardiovascular disease remains the leading cause of death worldwide, with a burden that continues to grow in underserved populations

despite the availability of ample scientific evidence and technology innovations, coupled to effective prevention and treatment strategies. Cities, as the locus of an increasing majority of the global population, have both the imperative and the opportunity to address this challenge.

CARDIO4Cities provides a structured, evidence-based pathway for translating what is known about cardiovascular health and care into population-level action. The approach has demonstrated feasibility and impact across diverse urban contexts, from São Paulo to Ulaanbaatar to Dakar, and is now being implemented in more than 40 cities worldwide. This roadmap equips city health officials and their partners with the operational guidance needed to establish governance structures that enable sustained action, set ambitious but achievable targets for cardiovascular risk factor control, design locally appropriate intervention packages, implement with built-in learning and adaptation, scale successful approaches throughout the city, and contribute to regional and global efforts to reduce cardiovascular disease burden.

The tools and strategies presented here are not theoretical—they have been tested and refined through real-world implementation. Cities that adopt this approach join a growing network of urban leaders committed to improving cardiovascular health for their populations. The time for action is now. With nearly 80% of cardiovascular disease burden attributable to modifiable risk factors, the opportunity to prevent millions of premature deaths is within reach. CARDIO4Cities provides the roadmap; city leaders must provide the commitment to follow it.

Disclosures

Dr. Aerts is an employee of the Novartis Foundation, which has developed and executed the CARDIO4Cities Program globally.

Dr. Narula is President of the World Heart Federation, which is the Scientific Lead for the Program. Dr. Narula also serves on the CARDIO4Cities Advisory Board of Novartis Foundation as a volunteer.

CRedit authorship contribution statement

Ann Aerts: Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Jagat Narula:** Writing – review & editing, Writing – original draft, Supervision.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Ann AERTS reports administrative support was provided by Novartis International AG. Ann AERTS reports a relationship with Novartis International AG that includes: employment. Ann AERTS is an employee of the Novartis Foundation. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in

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References

- [1] World Health Organization. Global health estimates: leading causes of death. Available at: <https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/gho-leading-causes-of-death>. Accessed March 2026.
- [2] Yusuf S, Joseph P, Rangarajan S, et al. Modifiable risk factors, cardiovascular disease, and mortality in 155,722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study. *Lancet* 2020;395(10226):795–808.
- [3] United Nations, Department of Economic and Social Affairs, Population division. World urbanization prospects: the 2018 revision. United Nations; 2019.
- [4] World Health Organization United Nations Human Settlements Programme. Hidden cities: unmasking and overcoming health inequities in urban settings. World Health Organization; 2010.
- [5] Tanner D, Zhang Y, Chang JE, et al. Machine learning to evaluate the relationship between social determinants and diabetes prevalence in New York city. *BMJ Public Health* 2024;2:e001394.
- [6] World Health Organization. HEARTS: technical package for cardiovascular disease management in primary health care. WHO; 2020.
- [7] Moran AE, Gupta R, Global Hearts Initiative Collaborators. Implementation of global hearts hypertension control programs in 32 low- and middle-income countries. *J Am Coll Cardiol* 2023;82(19):1868–84.
- [8] Banigbe BF, Moran AE, Gupta R, et al. Lessons learned from treating 34 million people with hypertension: the global hearts initiative. *J Am Coll Cardiol* 2025;86(23):2374–87. <https://doi.org/10.1016/j.jacc.2025.09.324>.
- [9] Jones DW, Ferdinand KC, Taler SJ, et al. 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol* 2025;86(18):1567–678. <https://doi.org/10.1016/j.jacc.2025.05.007>.
- [10] Abdalla M, Bolen SD, Brettler J, et al. Implementation strategies to improve blood pressure control in the United States: a scientific statement from the American Heart Association and American Medical Association. *Hypertension* 2023;80(10):e143–57.
- [11] Zhou B, Carrillo-Larco RM, Danaei G, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet* 2021;398(10304):957–80.
- [12] Campbell NRC, Ordunez P, Giraldo G, et al. WHO HEARTS: a global program to reduce cardiovascular disease burden: experience implementing in the Americas and opportunities in Canada. *Can J Cardiol* 2021;37(5):744–55. <https://doi.org/10.1016/j.cjca.2020.12.004>.
- [13] Khan T, Moran AE, Perel P, et al. The HEARTS partner forum-supporting implementation of HEARTS to treat and control hypertension. *Front Public Health* 2023;11:1146441. <https://doi.org/10.3389/fpubh.2023.1146441>.
- [14] Aerts A, Boufford JL. A new whole-of-city strategy for addressing cardiovascular population health. *Cities Health* 2021;7:296–302.
- [15] Boch J, Venkitachalam L, Santana A, et al. Implementing a multisector public-private partnership to improve urban hypertension management in low- and middle-income countries. *BMC Public Health* 2022;22:2398.
- [16] Reiker T, Rosiers SD, Boch J, et al. Population health impact and economic evaluation of the CARDIO4Cities approach to improve urban hypertension management. *PLOS Glob Public Health* 2023;3:e0001480.
- [17] Ferrer JME, Boch J, Aerts A, et al. Stroke outcomes in a population-focused urban hypertension program in Brazil and Senegal. *J Am Heart Assoc* 2025;14:e038816. <https://doi.org/10.1161/JAHA.124.038816>.
- [18] Egan BM, Sutherland SE, Rakotz M, et al. Improving hypertension control in primary care with the measure accurately, act rapidly and partner with patients (MAP) protocol: results at 6 and 12 months. *Hypertension* 2018;72:1320–7.
- [19] Visseren FLJ, Mach F, Smulders YM, et al. 2021 ESC guidelines on cardiovascular disease prevention in clinical practice. *Eur Heart J* 2021;42:3227–337.
- [20] US Preventive Services Task Force, Krist AH, Davidson KW, et al. Screening for hypertension in adults: US preventive services task force reaffirmation recommendation statement. *JAMA* 2021;325(16):1650–6.
- [21] ITU/UNESCO Broadband Commission for Sustainable Development. Reimagining global health through artificial intelligence: the roadmap to AI maturity. Broadband Commission; 2023.
- [22] World Heart Federation. Davos declaration on urban heart health. World Heart Federation; 2023.
- [23] Shan Loo P, Silveira M, et al. Hypertension management in São Paulo: insights from a computational simulation approach. *Lancet Reg Health - Am* 2026;57:101449. <https://doi.org/10.1016/j.lana.2026.101449>.
- [24] Novartis foundation knowledge center with CARDIO4Cities playbook, intervention catalogue, and progress tracker available on www.cardio4cities.org.
- [25] Aerts A, Williams M. AI-driven evolution of precision population cardiovascular health in cities. *Nat Rev Cardiol* 2025;22:213–4.
- [26] Jailobaeva K, Falconer J, Loffreda G, et al. An analysis of policy and funding priorities of global actors regarding noncommunicable disease in low- and middle-income countries. *Glob Health* 2021;17:68.