

CARDIO4Cities In Practice



CARDIO4Cities in Practice

The interventions listed below have been implemented in CARDIO4Cities cities and have been validated to positively impact control rates of at least one of the three main cardiovascular (CV) risk factors (**hypertension**, **hypercholesterolemia** and **diabetes**). The interventions follow the cascade of care sequence, starting with accelerating early detection of CV risk factors (**A** – Early **A**ccess to health and care) followed by adequate management with improved quality of care (**C** – Improve quality and coordination of

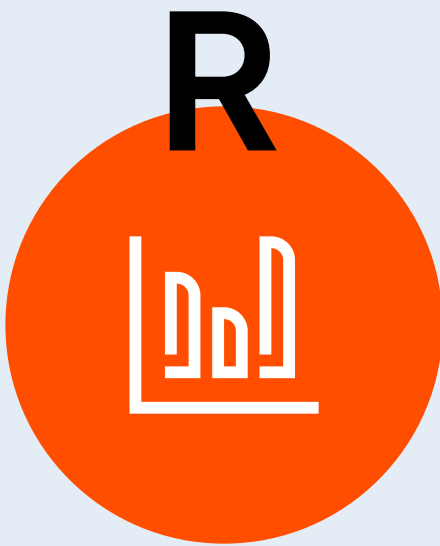
Care). These interventions directly affect the patient journey by improving knowledge, engagement, diagnosis, and follow-up management. Subsequently, we have listed interventions addressing the supporting environment and infrastructure for better CV health: **R** – Reform policies with proven health benefit, **D** – Leverage **D**ata and **D**igital technology, **I** – Create **I**ntersectoral collaboration, and **O** – Ensure local **O**wnership.



Quality
of Care



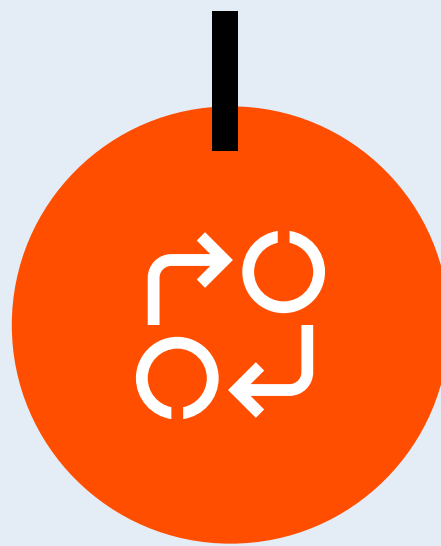
Early
Access



Reform
policies



Data and
Digital



Intersectoral
collaboration



Local
Ownership

Simplified clinical guidelines

Continuous medical education (CME)

Access to medicines

Progress tracking in primary care

Treatment adherence

Patient self-management

Simplified clinical guidelines



Objective

Improve the quality and consistency of care for individuals with CV risk factors by adapting, simplifying and often standardizing CV risk factor guidelines, while translating them into algorithms and clinical decision support (CDS) tools for health providers and monitoring adherence to the guidelines.

How to do it

Review existing guidelines for CV risk factor management in the country, align them with currently existing evidence, and identify opportunities for simplification or standardization. **Collaborate** with professional associations, e.g., cardiologists,

neurologists, or general practitioner’s associations, to streamline and standardize these guidelines and make them more user-friendly where appropriate. **Create** a diagnosis and treatment protocol for use during the consultation by frontline health workers, a protocol for (referral to) specialist providers, and a management protocol for health facility or system managers. **Translate these protocols** into simple clinical decision-making tools and standardized treatment algorithms. **Provide training and resources** to ensure all staff are familiar with the simplified guidelines and can apply them consistently in their practice, ideally through the existing (online) continuous medical education for the entire health corps of the city (including pharmacists). **Use an online**

dashboard to track the rollout of the protocol, including technical meetings and trainings, and integrate that in the existing health information system. **Aggregate data** by health center (and health district) to measure progress and change in patient outcomes.

Why implement this

Lengthy, complex, or poorly executed guidelines for CVD and other conditions are a common barrier to quality care. Simplifying and standardizing guidelines helps reduce variability in care, improves adherence to best practices, and enhances the overall quality of CV care. This eventually leads to better patient outcomes and more efficient use of healthcare resources.



City Insights

In **São Paulo**, simplifying guidelines for hypertension led to increased BP control rates, significantly reducing strokes and acute heart infarctions. In Dakar, simplified hypertension treatment algorithms were rolled out across primary healthcare facilities, enabling nurses to diagnose and manage hypertension in accordance with national standards, and allowing for task shifting, which contributed to improved BP control rates.

The same was done in **Ulaanbaatar**, where workflows for hypertension management were revised into easy digital formats that were integrated into the EHR, enabling more standardized, higher quality care delivery by general practitioners and nurses.

In all these settings, integration of the simplified care protocols into routine practice, strongly enlarged the number of health providers equipped to properly manage CV risk.

In newly joining CARDIO4Cities such as in **Leuven, Belgium**, a barometer is used for primary providers/ practices to monitor their adherence to guidelines and compare their CV risk factor control rates to those of their peers and to the best performing practices, or to the % CV risk factor control target set at the launch of CARDIO4Cities.

Continuous medical education (CME)



Objective

Address the need for up-to-date knowledge and skills among health professionals – especially frontline providers such as those in community or primary health services – to effectively diagnose and manage CV risk and improve patient outcomes, by providing continuous training.

How to do it

Roll out CME on the simplified guidelines (see [Simplified clinical guidelines](#)) and their clinical decision support tools to the entire health corps of the city, including pharmacists.

Develop a comprehensive curriculum focusing on CVD, including prevention of acute complications, early detection and management of CV risk and disease. **Utilize a mix of in-person workshops, online courses, and webinars.** Make sure to **incorporate interactive case studies and simulations** to enhance understanding. **Use local health data** to tailor content and regularly update the curriculum. **Partner with local health authorities**, professional associations and medical schools, and establish a system to track participation and assess adherence.

Why implement this

Regular updates in medical knowledge and protocols make continuous education essential – especially where task shifting to less skilled health workers is used and non-specialist providers manage chronic conditions such as CVD. Implementing CME enhances the knowledge and skills of health professionals, leading to better patient care, earlier detection, standardized and effective management of CV risk factors. It also supports health worker motivation, and the sustainability of CARDIO4Cities by strengthening local capacity.



City Insights

In **Dakar**, CARDIO4Cities implemented training and supportive supervision of health workers across the entire city to enhance health providers’ skills in hypertension management. The effort resulted in significant improvements in hypertension knowledge among health workers from 76% to 98%, and an increase in their ability to recognize at least three warning signs of hypertension complications from 26% to 88%¹.

Such improvements underscore the effectiveness of CME in enhancing health providers competencies.

¹ www.intrahealth.org/news/health-worker-training-improving-hypertension-care-and-prevention-senegal



Access to medicines



Objective

Ensure the availability and affordability of essential medicines for the management of CV risk factors across all levels of the health system.

How to do it

Implement a comprehensive strategy to enhance access to quality CV medicines. This involves **advocating** for the inclusion of necessary medications on the

essential drugs lists, **ensuring coverage** by health insurance or national subsidies, and **maintaining a continuous supply** in pharmacies and primary health practices. Additionally, explore options to **subsidize** medication costs, **negotiate** bulk purchasing discounts, **educate** the public about medication availability, and **regularly monitor and evaluate** medication access and affordability.

Why implement this

Access to medicines is a critical component of improving CV risk. Accelerated early diagnosis will only result in improved CV risk control rates if patients have access to the required therapies.



City Insights

In **Ulaanbaatar** and **Dakar**, CARDIO4Cities worked with health authorities and partners to improve the supply of antihypertensive medicines across public health facilities¹. The national essential drug list was revised to allow prescription of antihypertensives at lower-level health facilities (community health centers).

¹ doi.org/10.1186/s12913-023-10432-8



Progress tracking in primary care



Objective

Ensure that all primary health care centers or practices monitor diagnosis, treatment, and control rates for CV risk factors in their population, use these data to guide local decision-making and improve accountability. Making data public can also build trust.

How to do it

To track progress for improved CV health in each facility, start by **aligning** local authorities, health system or facility managers, and health providers **behind the same goal** and its definition of success (targets for % people with CV risk factors diagnosed, treated and controlled).

Agree on a minimal set of data to be collected within the existing data system. **Describe each data source**, including properties like the entity and frequency of the collection, **and integrate** the minimal set of essential data within the health information system (HIS) or EHRs **to enable the flow of data**. **Create dashboards** to regularly review data, identify potential data issues, inform decisions, **and make these available** to health facility/practice managers and encourage routine use. **Continuously improve and adapt** the CARDIO4Cities interventions based on these dashboard review meetings. Make the data publicly available to ensure and inform actionability and further improvements.

Why implement this

Regular tracking of a minimal set of essential data in primary health services empowers local teams to take ownership of outcomes and identify bottlenecks in the cascade of care. It also allows for data-driven decision-making and tailoring health interventions to where they are needed most, which leads to rapid improvements in CV health outcomes. Comparisons across facilities can create “healthy” competition and lead to replication of best practices. Moreover, publicly available data strengthens transparency and build community trust.



City Insights

In **São Paulo**, CARDIO4Cities implemented an online dashboard that monitors the implementation of the Clinical Protocol. The tool provides and visualizes data on indicators such as the number of technical meetings and trainings, number of patients treated in each stage of the care pathway described in the clinical protocol and its outputs and outcomes by primary care facility and the up-stream health system

management entities. The tool supports primary care facility managers and health system supervisors in day-to-day management and decision-making.

Treatment adherence



Objective

Increase the proportion of patients with CV risk factors who adhere to their treatment plans.

How to do it

Implement digital tools for patients, general practitioners and pharmacists to send medication reminders, (remotely) monitor BP and other CV risks, and schedule follow-up appointments.

Patient-facing tools include mobile applications that provide personalized treatment guidelines, digital CV risk education tools, and web-based platforms for tracking BP and lifestyle changes. Additionally, self-care plans such as treatment contracts help patients track their own health metrics. Educational tools like flip charts, medication organizers, and adherence games engage patients in their treatment plans.

Why implement this

Non-adherence is one of the most significant barriers to effective control of CV risk factors, leading to poor health outcomes, increased hospitalizations, and higher healthcare costs. Improving treatment adherence ensures that patients follow their treatment plans, achieve better health outcomes, reduce hospitalizations, and lower healthcare costs. It enhances the overall effectiveness of CVD management in the city.



City Insights

In São Paulo, CARDIO4Cities implemented a comprehensive solutions package to enhance hypertension management. Starting with paper-based cards with self-care plans (Plano de Autocuidado Pactuado), digital tools to improve patient adherence were ultimately included throughout the health system. Pharmacists were engaged to offer patient counseling and adherence support, and best practices for patient

management were discussed in multidisciplinary team meetings. These efforts contributed to a significant increase in BP control rates.



Patient self-management



Objective

Encourage patients with CV risk factors to actively contribute to the management of their own heart health through self-monitoring, education and other support.

How to do it

Train health workers to educate patients on interpreting and managing their CV risk factors using effective communication and education materials. **Consider providing patients with self-management tools and apps** to track appointments, medications, and progress in reducing CV risks. **Ensure these tools are user-friendly and accessible** to patients of all literacy levels. **Establish regular follow-ups** through digital platforms or in-person visits to monitor patient progress, provide feedback, and adjust self-management plans as needed. **Encourage the formation** of patient support groups and partner with community organizations to provide additional resources. **Coordinate with healthcare providers** to align self-management tools with existing care protocols and use data from these tools to inform clinical decisions.

Why implement this

Chronic CV conditions require consistent, long-term management beyond single health system visits. Empowering patients to take ownership in the management of their own health, improves treatment adherence, control rates, and health outcomes while reducing the burden on health systems. It also addresses limitations within the health system, such as provider time.





Introduction



EARLY ACCESS

Screening Corners

Mobile Screening

Self-screening

Referral pathways

Health literacy

Targeting of high-risk populations

Screening Corners



Objective

Optimizing opportunities for CV risk factor measurement with the implementation of screening corners in all (primary) health facilities, to accelerate diagnosis of CV risk in urban populations. Everyone visiting the health facility, regardless the reason (caregiver, parent, or patient), gets BP, LDL and/ or HbA1C measurements and is automatically referred for consultation when screening positive. In many cities, pharmacies offer such CV risk screening corners as well.

How to do it

Create an engaging physical space in the reception area of (primary) health facilities, that enables all incoming individuals to undergo a measurement of BP, HbA1C

and LDL cholesterol, as well as weight and height (BMI) or waist-hip ratio. **Screening corners** should include a scale, stadiometer, BP measurement device, point of care tests for HbA1C and LDL, and information materials about cardiovascular disease, risk factors and self-care. Where only self-measurement of BP and weight/height is offered, the screening corner should be equipped with visually engaging instructions and record-keeping materials. **Results should be made available** to the patient and the health staff, and positive screens should be automatically referred for consultation to confirm the diagnosis and potentially initiate treatment.

Why implement this

A CV risk screening corner in each health facility ensures that no opportunities are lost to offer CV risk factor measurement, as CV risk often goes unnoticed given their long asymptomatic phase. It generates minimal disruption and makes good use of waiting times. A permanent installation also provides familiarity to patients and helps build habits.



City Insights

In **São Paulo**, **Patos** and **Aracaju**, over 500 primary health centers have adopted BP screening corners. When the first screening corners were installed in the health centers of the first implementation district in São Paulo, average monthly BP measurements increased by 22%, helping primary care teams streamline anamnesis and extend doctor-patient time. The average cost per BP measurement

was less than USD 1, as estimated by dividing the cost of equipping the screening corners by the incremental number of BP measurements.

In **Helsinki**, the city government launched screening corners (or self-care points) in health facilities, early 2023. These self-service stations, developed in collaboration with Health Proof Helsinki, allow residents

to perform basic health checks – including height, weight, BP measurements, etc. – and receive guides and brochures without needing an appointment. The goal was to empower individuals to monitor their health regularly and catch potential issues early. By mid-2025, over 30 screening corners had been installed.

Mobile screening



Objective

Optimizing opportunities for CV risk factor measurement with Mobile Screening in high traffic venues of the city, with a special focus on places that are frequented by population groups that don't have regular contact with the health system. Systematic referrals and facilitation of health service consultations of positively screening individuals brings CV risk diagnosis and management closer to where people are.

How to do it

Mobile CV risk screening units are deployed to specific locations within the city to **conduct measurement of CV risk factors**, such as BP, LDL cholesterol, and HbA1C. Venues can include high-traffic locations such as subway

stations or events in highly populated neighborhoods, e.g., football matches or meetings for the elderly. Just like the fixed screening corners, mobile screening units should be equipped with necessary measurement tools and staffed by trained health professionals who can **perform CV risk factor assessments and provide immediate feedback to individuals**. When only BP testing is offered, non-traditional health players – if properly trained – can perform the measurements and deliver adequate health information following the test result As operational cost for mobile screening were found to be higher than those of fixed screening corners, **mobile approaches to optimize CV** risk factor detection in urban populations should be targeted properly and **complement the screening corners in the health facilities**.

Why implement this

The mobile CV risk detection intervention stands out due to its ability to bring diagnosis (followed by adequate referral) and management closer to where people are, and reach underserved and high-risk communities, as well as healthy individuals that may not regularly interact with the health system. By bringing the CV risk detection services directly to the population, it ensures broader access and convenience, thereby increasing the likelihood of early detection.



City Insights

In **São Paulo**, primary care teams included in their community engagement activities mobile screening solutions, including backpacks with a scale, measurement tape, a BP monitor, urine glucose detection strips, CARDIO4Cities branded T-shirts or jackets, and a pop-up stand. They delivered BP measurements for USD 0.44, 85% below the external

benchmark¹ for incremental cost-effectiveness per BP measurement.

Ho Chi Minh City, Vietnam, successfully trained staff to provide mobile screening in barber shops and beauty salons.

¹ [Effectiveness of a Barber-Based Intervention for Improving Hypertension Control in Black Men: The BARBER-1 Study: A Cluster Randomized Trial – PMC](#)



Self-screening



Objective

Self-screening aims to improve the early detection and management of CV risk factors.

By enabling and empowering individuals to self-screen, the intervention seeks to broaden reach into the population and connect individuals into the health system before they develop symptoms or experience an acute CV event.

How to do it

Utilize AI-driven tools on mobile phones to facilitate convenient and accurate self-screening. Note that not all patients have access to smart mobile devices or sufficient digital literacy for self-screening. Roll out as appropriate and avoid widening the digital divide.

Why implement this

Implementing self-screening allows for early detection of CV risk factors and alerting individuals to seek formal diagnosis, which can significantly reduce the burden of CVD through timely management. The use of AI-driven tools and virtual health options makes the process more accessible and efficient, reaching populations not otherwise seeking healthcare and enabling continuous health monitoring as follow-up to diagnosis and treatment.



City Insights

While specific self-screening initiatives have not been a primary focus in the pioneering cities implementing CARDIO4Cities, this intervention aligns with its overarching goal to enhance CV health through accessible and person-centered interventions. For instance, community health centers participating in the **US National Hypertension Control Initiative** implemented self-measured BP programs, resulting in

a 12.3% increase in BP control rates from 2020 to 2022 among at-risk populations.

Referral pathways



Objective

Establish efficient and standardized referral pathways that ensure individuals detected with potential CV risk factors are automatically and effectively connected to appropriate diagnostic and treatment services.

How to do it

To implement this intervention, cities should **focus on developing robust communication channels among healthcare professionals** from different disciplines, such as doctors, nurses, pharmacists, nutritionists, patient counselors, and coaches. Where CV risk factor screening is offered within or outside the health facilities, health system managers have to **ensure automated (e.g. Bluetooth enabled) referral** to the health system of people screening positive.

Why implement this

Robust and watertight referral pathways help streamline CV health services and are critical to turn early detection into improved outcomes. Such referral ensures that individuals do not fall through the cracks after initial screening, particularly in settings with limited resources or limited geographical access to health services. It enhances the continuum of care, ultimately leading to better health outcomes for populations and more efficient use of healthcare resources.



City Insights

Implementations of referral pathways in CARDIO4Cities have shown significant improvements in patient care coordination and satisfaction. For instance, cities that adopted this intervention reported smoother patient transitions and more effective management of CV risk factors, as it reduced healthcare costs and improved patient health outcomes.

In **Dakar**, CARDIO4Cities implemented standardized referral protocols to strengthen the link between community-based screening and facility-based diagnosis and treatment. This approach facilitated the creation of a hypertension registry and improved coordination across different levels of care, ensuring that individuals identified with high BP during community or workplace screenings were effectively referred for further evaluation and management.

Health literacy



Objective

Improving the health literacy of the population by engaging and empowering the urban population to understand and ideally monitor their own CV health – especially BP, glucose, and cholesterol levels. “Knowing your own numbers” motivates people to take proactive steps towards taking responsibility for improving their own CV health.

How to do it

Raise awareness about CV risk factors through social media and participation in community events, encouraging people to “know their own numbers” (be aware of their BP, cholesterol and HbA1C). **Prioritize at-risk populations** to maximize impact of the

intervention (see [Targeting of high-risk populations](#)). **Partner with schools and workplaces** to promote heart-healthy behaviors and offer CV risk factor measurements. Provide resources and training for health professionals to educate their patients effectively. **Provide access to counseling and lifestyle modification programs**, as part of the personalized health plans for people with CV risk factors (see [Improve Quality of Care](#)).

Why implement this

Increasing health literacy of the overall population is essential for improving population health, but large scale awareness campaigns offer little benefit. Personalized care plans, tailored to an individual’s specific need, can be more efficient to change behaviors (see [Improve Quality of Care](#)).



Targeting of high-risk populations



Objective

Maximize impact of limited resources by prioritizing the most socio-economically vulnerable populations for early detection and targeting interventions to population groups (that live in neighborhoods) with those SDOH that best predict CV risk and events, as identified through the AI4HealthyCities initiative.

How to do it

Use AI4HealthyCities insights (delivered by advanced analytics based on electronic health records (EHR), claims, city statistics and data from health-influencing sectors) to identify patients with high social vulnerability that should be prioritized for early detection and management of CV risk.

Prioritize areas with **high avoidable emergency department visits** or high MACE incidence without prior diagnosis of CV risk factors for early detection efforts.

Use machine learning to predict the prevalence of CV risk factors based on social determinants of health and prioritize early detection and management efforts to those areas with a high concentration of the leading SDOH for CV outcomes. Also, a comparison between predicted and observed prevalence of CV risk factors, can prove useful to prioritize areas with high discrepancies between the two, for early detection as it may indicate a high proportion of undiagnosed. The Novartis Foundation and its partners at Microsoft AI for Good and Weill Cornell Medicine have developed the relevant analytic software to analyze the association between key drivers of health and cardiovascular risk factors based on small area data, e.g., at the district level.

Analyze claims data to identify patients who have not re-filled prescriptions of medications that treat hypertension, high cholesterol or diabetes, as a lack of adherence may lead to uncontrolled CV risk.

For the same reason, an **analysis of EHR data can prove useful** to identify patients who were diagnosed with a CV risk factor and haven't been seen by a health provider for more than 12 months.

Why implement this

Focusing efforts for early detection and management of CV risk factors in high-risk or vulnerable populations ensures a more efficient use of resources and delivers a higher diagnostic yield than that of random population-based screening.



City Insights

Prioritizing high-risk populations is an essential part of CARDIO4Cities.

In **Dakar**, interventions targeting the workplace used data-driven methods to direct detection and management efforts to where it was needed most.

In **São Paulo**, when it became clear that mainly women were diagnosed through the screening corners in the health facilities, football stadia were identified as useful venues to detect men with hypertension. In addition, the Novartis Foundation's AI4HealthyCities initiative showed

that underlying SDOH explain over 70% of the variation in diabetes and hypertension prevalence in different populations, indicating that SDOH can inform targeting.



Introduction



REFORM POLICIES

Health policy review

Task shifting

Health policy review



Objective

To strengthen the enabling environment for CV health by advocating for policies with proven benefit on health, e.g., sin taxes, banning salt and trans fats in processed food, increased physical activity in schools, task shifting of hypertension diagnosis and management to less skilled health workers.

How to do it

The multi-stakeholder CARDIO4Cities Steering Committee (SteerCo), led by the local health authority, conducts a **structured review of the policy environment relevant to CV health** in their context. This includes

mapping of the existing health policies, city and national regulations, and CVD-plans that influence how prevention, diagnosis, and treatment services are delivered in the city. The SteerCo identifies regulatory and operational gaps that limit effective prevention or care, such as outdated screening protocols, unclear task-shifting authorizations, or fragmented referral pathways. Where needed, the SteerCo **proposes revisions or new policies to improve continuity of care**, and those with proven benefit on population health, such as e.g., sin taxes, banning of salt and trans fats in processed food, or prohibiting sugar marketing in schools.

Why implement this

Public health is often constrained by outdated or poorly aligned policies that limit effective interventions. By institutionalizing a structured, local policy review process within a collaborative governance platform, cities can make reforms more responsive, coordinated, and sustainable. This mechanism also strengthens alignment between health planning and frontline service delivery, enabling change beyond individual interventions.



City Insights

In **Dakar**, the CARDIO4Cities policy review process supported regulatory clarity on non-physician prescribing, contributing to the formalization of nurse-led hypertension care.

In **Ulaanbaatar** the reduction of salt in processed foods became an integral part of the CV population health approach.

In **São Paulo**, the policy level gaps were more prominent in medical and operational spheres, reflecting the local priority on strengthening streamlined care delivery rather than high-level policy change.¹

¹ <https://pubmed.ncbi.nlm.nih.gov/38178108/>



Task shifting



Objective

Where possible, shift tasks to less skilled health professionals for diagnosis, treatment and follow-up of patients with CV risk and disease.

How to do it

To address the global shortage of healthcare workers, health systems can shift diagnosis, and follow up to less skilled health workers, a model that empowers nurses and pharmacists to take on expanded roles across the care continuum. This approach involves standardized protocols and decision-support tools to guide

non-physician providers in managing hypertension, diabetes, and hypercholesterolemia, supported by collaborative practice agreements and continuous training. Nurses can lead patient education, lifestyle counseling, and medication titration, while pharmacists can monitor adherence, adjust medications, and manage polypharmacy. Integration into electronic health records (EHR) ensures continuity and oversight, while performance metrics and feedback loops help maintain quality and outcomes. This model not only alleviates physician workload but also enhances access, continuity, and patient-centered care.

Why implement this

Diagnosis and long-term follow-up can be a bottleneck in the management of CV risk factors. Task shifting optimizes human resources and can significantly enhance diagnosis, treatment and long-term control rates.



City Insights

In **Dakar**, CARDIO4Cities supported task shifting of diagnosis and follow up of hypertension to non-physicians, by training nurses, community health workers and pharmacists on the standardized protocols and responsibilities for the management of hypertension, including adequate referral of patients to specialist care.

This helped relieve the burden on specialists and general practitioners, allowing them to focus on more complex cases, and contributed to strengthening continuity of care.¹

¹ <https://www.intrahealth.org/news/health-worker-training-improving-hypertension-care-and-prevention-senegal>



Introduction



LEVERAGE DATA AND
DIGITAL TECHNOLOGIES

Continuous progress monitoring

HealthTech Innovation

Simulation tools

Detecting barriers to care

Continuous progress monitoring



Objective

Integrate a shared measurement system for progress and outcome monitoring on CV risk reduction within the health information system or EHRs and compile its data in a standard dashboard for periodic review by the local multisector CARDIO4Cities SteerCo.

How to do it

Based on the minimal set of essential data as defined by the local CARDIO4Cities SteerCo, **ensure the collection of these data in the existing health data systems**, for regular review of progress and outcomes. **Start** with

assessing **current data sources**, **create flowcharts to visualize** data pathways, identify data gaps, **and assess data quality**. If several health information/data systems are used in parallel, ensure the data can be combined to develop a city-wide dashboard with the agreed minimal set of indicators. Where necessary, transitioning from paper-based processes to digital technologies will help improve data quality and reduce errors. **Create an interactive dashboard to facilitate review and actionability of the minimal essential data, and/or introduce a population health dashboard** that also offers the opportunity to compare progress per level of CV risk in the population, or per health facility.

Why implement this

Reliable data are essential throughout CARDIO4Cities planning, implementation and follow-up for progress and outcomes tracking, and for continuous improvement of intervention design. A set of minimal essential data, summarized in a simple dashboard (albeit at population level), provides the information to enable the local CARDIO4Cities SteerCo to prioritize interventions, compare progress within different health settings and identify missed population groups to be targeted with early detection.



HealthTech Innovation



Objective

Leverage HealthTech innovations that enhance early detection and management of CV risk factors and tools that enable data-driven action, increase access to care, or improve healthy behavior.

How to do it

During the co-design of the CARDIO4Cities population health roadmap, **the local SteerCo identifies HealthTech innovations that address gaps in the roadmap.** Examples can range from wearable devices, telemedicine platforms, to AI-powered diagnostic tools. **Start by assessing local CV health challenges, engage stakeholders** (e.g., hospitals, providers, tech companies, community groups) for input, **and prioritize** scalable and user-friendly solutions. **Ensure end-users are involved** as from the design phase, and that technologies are validated and provide adequate training to users. Track metrics such as adoption rates, patient outcomes, and cost-effectiveness over time. **Encourage ongoing collaboration** between tech vendors and health providers for continuous learning and improvement.

Why implement this

HealthTech innovations can help cities adopt future-proof strategies for CV health, bridge gaps in access and quality of care. The adaptability of HealthTech makes it a sustainable and impactful choice for improving long-term outcomes in urban health.



Simulation tools



Objective

Address the need for data-driven decision-making by predicting health and cost outcomes of various interventions to improve CV health through the CARDIO4Cities intervention simulator. Equip the local CARDIO4Cities SteerCo with simulations forecasting the cost and health impact of different interventions in the CV population health roadmap, enabling more informed decision-making, and optimizing resource allocation to achieve the largest possible health impact on the greatest number of people.

How to do it

Collect relevant information on the current CV health burden, and on the cost and impact of different interventions, through data gathering, analysis and expert consultations. **Configure the simulator** by setting parameters such as target population and geographic area. **Run simulations to test** different scenarios and **analyze** the projected outcomes. **Use the results to refine and improve interventions** through iterative consultations and workshops. Use the simulator results to refine and improve interventions through iterative consultations and workshops.

Why implement this

The simulator allows the city to forecast the health impact and cost of proposed interventions, making it easier to plan and scale successful strategies and optimize the population health roadmap. These predictions support informed decision-making and can improve outcomes. They can also help secure funding by demonstrating cost effectiveness of a specific set of interventions.



City Insights

In **Aracaju, Brazil**, the simulator was used to pilot interventions in six primary health centers, which were then expanded to all centers in a district and eventually city-wide. This approach led to improved health outcomes and more efficient use of resources, showcasing the simulator’s effectiveness in planning and scaling interventions.



Detecting barriers to care



Objective

Map the environment of people living with CV RFs and CVDs and identify current barriers and opportunities for improvement by interviewing diverse stakeholders and analyzing responses to inform intervention design, selection and implementation.

How to do it

Use the stakeholder landscape to identify a diverse set of stakeholders who are involved along the cascade of care, from disease awareness to early detection to diagnosis to treatment to follow-up to control. **Focus on stakeholders who have hands-on/lived experience**, including city managers (health, public health, urban planning), community health workers, nurses, pharmacists, physicians (primary care and cardiology), patient representatives and others. Make sure to capture the patient perspective (patient journey) to uncover how people seek and experience care, manage their

condition over time, what motivates or discourages them, and where they face barriers. Don't forget marginalized voices, e.g., people without health insurance or migrants. This will help **identify emotional, social, and practical barriers that data alone cannot reveal**. Use insights from desk research and initial stakeholder discussions to **focus the interview questions**.

Synthesize the responses to **identify key barriers and related key opportunities**, along with quotes that illustrate the situation. It may be useful to **develop “personas” that represent people with similar characteristics and patient journeys** and provide details about their needs, behaviors and goals. They make specific populations relatable for intervention design and decision making. **Capture all insights in a report** that can be distributed to participants in the assessments, but also to the wider stakeholder landscape. Make sure to include visuals and quotes for key insights to make them more relatable.

This can provide valuable insights for the co-design workshop and/or step-wise implementation of the population health roadmap. Make sure to do this in a focused manner; the implementation should not take more than 4-6 weeks.

Why implement this

Challenge pre-conceived notions and senior stakeholder beliefs by incorporating input and views from people directly affected in their daily work or life to enrich the discussions and identify unexpected opportunities to improve control rates.



City Insights

In AI4HealthyCities, the Novartis Foundation complemented quantitative analyses with qualitative research in **New York City, Helsinki and Singapore**.

While the qualitative results largely confirmed insights from data analysis, they provided additional depth and detail that added credibility and was used to refine interventions and improve targeting.





Introduction



CREATE INTERSECTORAL COLLABORATION

Intersectoral Steering Committee

Employers/private sector engagement

Education/schools

Intersectoral Steering Committee



Objective

Ensure that the Steering Committee includes representatives from sectors beyond health to take into consideration and address social and environmental determinants most predictive of cardiovascular disease (CVD).

How to do it

Include representatives from education, sports, work, food, IT, transport, urban planning and/or the social sector **in the CARDIO4Cities Steering Committee.** **Collaborate** with these multidisciplinary stakeholders **to implement initiatives that can address unhealthy**

living conditions in underserved neighborhoods, or that can make lifestyle options healthier by default. Classic examples are promoting healthy nutrition and physical activity in schools and workplaces, advocating for safer neighborhoods, promoting intergenerational living to reduce social isolation, creating access to healthier food options throughout the city, and partnering with local businesses to offer healthy food options¹. **Ensure regular SteerCo meetings and clear communication to align goals, review progress and adjust interventions** where needed.

Why implement this

By involving stakeholders from various sectors, the city can create a more supportive environment for heart healthy living. This holistic approach addresses multiple determinants of health, making it more effective in reducing CV risk factors, and ultimately able to prevent CV risk.



City Insights

Previous implementations in CARDIO4Cities and another Novartis Foundation supported initiative, Kazibantu², have shown positive outcomes, such as increased physical activity levels and improved access to healthy foods. For example, a city that partnered with local schools and transportation departments saw a significant increase in students

walking or biking to school, leading to **better overall health outcomes and reduced CVD risk factors.** **In another city,** introducing active dance on the playgrounds not only improved CV fitness of students and teachers, it also enhanced cognitive performance of students. The Kazibantu program makes materials available online, including Toolkits for implementation

at schools³ for both students and teachers, and in work environments⁴.

¹ www.novartisfoundation.org/news/novartis-foundation-and-syngenta-foundation-partner-improve-heart-health-through-sustainable-agriculture-and-nutrition
² www.kazibantu.org
³ www.kazibantu.org/kazikidz
⁴ www.kazibantu.org/kazihealth

Employers/private sector engagement



Objective

Engage employers and the local private sector in implementing workplace health, to offer early detection of CV risk factors and health education. Doing so can contribute to reducing the CVD burden, particularly hypertension, through early detection and management strategies within the workplace.

How to do it

This intervention engages employers and local private sector actors in the implementation of workplace health programs to address CV risk factors. The programs integrate regular on-site screening for blood pressure and other risk factors, health education sessions to promote awareness and behavior change, and training for occupational health staff on managing CV risk factors. The approach encourages companies **to form coalitions, facilitating shared learning, resource optimization, and collective monitoring of outcomes** (such as screening coverage, diagnosis rates, and CV risk factor control rates).

Why implement this

This approach leverages the workplace as a strategic setting for health interventions, capitalizing on existing organizational structures to reach a significant portion of the adult population (and their families). The coalition model fosters shared learning and resource optimization among companies. By integrating health initiatives into the workplace, the program addresses barriers to healthcare access and promotes a culture of health within organizations.



City Insights

In **Dakar**, CARDIO4Cities successfully engaged 18 companies, covering over 36,000 employees and their families. Between Q4 2018 and Q1 2019, these companies conducted 21,392 hypertension screenings. Among employees receiving antihypertensive treatment, BP control rates improved from 34% to 39%¹.

¹ [11 Ndione et al. BMC Public Health \(2021\) 21:1108.](#)



Education/schools



Objective

Promote CV and overall health in schools by integrating nutritional education, physical activity, and preventive screening in daily routines of students and teachers, thereby fostering lifelong healthy behaviors and reducing long-term risk of CVD.

How to do it

This intervention promotes CV health through school-based programs that **integrate physical activity, nutritional education, and regular health screenings**

into the school environment. It targets both students and teachers by incorporating structured movement sessions, classroom-based health and nutrition promotion, and screening for CV risk factors such as hypertension and obesity. Teachers are trained to support these efforts through adapted curricula and are offered digital support and coaching to reinforce their daily routines that reinforce healthy behaviors¹. Schools can also become ideal settings to **specifically target population groups who don’t regularly interact with health services**, for early detection, such as e.g. single parents.

Why implement this

Integrating health into schools and education curricula is both feasible and effective in high and low-resource settings, supporting equity and long-term impact by shaping and nurturing healthy behaviors. By addressing the well-being of both students, their parents and teachers, this approach leverages educators as role models and enablers of a healthy school culture. When teachers improve their own health, particularly through better awareness and management of hypertension and obesity, they are better positioned to support healthy behaviors in students.



City Insights

In **South Africa**, the Kazibantu initiative applied this model across eight disadvantaged primary schools². The program led to improvements in children’s physical fitness and cognitive performance. While Kazibantu was implemented as a standalone innovative model in the frame of CARDIO4Cities, its goals and methods closely align and complement, particularly in

emphasizing the need for community-engagement to improve urban heart health in different settings.

¹ www.kazibantu.org/kazikidz
² [Front. Public Health 11:1199381. doi: 10.3389/fpubh.2023.1199381](https://doi.org/10.3389/fpubh.2023.1199381)





Introduction



ENSURE LOCAL OWNSHIP

Stakeholder Mapping

Local governance

Local context analysis

Mapping of existing interventions



Stakeholder Mapping



Objective

Identify and prioritize stakeholders across city government, healthcare, civil society and the private sector to inform governance and engagement and ensure local ownership and implementation of CARDIO4Cities.

How to do it

To ensure successful CARDIO implementation, engage all relevant stakeholders – not only those already involved in heart health management but also those who should become more actively engaged. Stakeholders may be involved in CARDIO4Cities in multiple ways, including providing input to the rapid assessment, participating in workshops, and supporting – or managing – the implementation of interventions. Develop a comprehensive stakeholder registry/map that captures organizations and individuals across the following groups:

- Senior city health officials, e.g., the Health Director, NCD Director and CVD director
- Senior representatives for primary care, cardiology, community health workers, as well as related associations

- Someone responsible for pharmacies (including private sector heads of large pharmacy chains)
- Heads of civil society organizations focusing on cardiovascular health, e.g., NGOs, foundations, patient advocacy/voice of the patient
- Senior academics focusing on cardiovascular disease and prevention
- Heads of organizations that have implemented population health projects successfully and could be potential implementation partners
- Heads of health insurance organizations, public and private

Consider the best mode of engagement to involve a broad set of stakeholders early on in the process. This will help with both local ownership and intersectoral collaboration, both key to success for CARDIO4Cities. While a webinar can be useful to introduce CARDIO4Cities and answer questions, an in-person meeting will help build new or reinforce existing connections and support collaboration. In either format, allow time for networking and follow-up conversations.

Why implement this

Early, structured stakeholder mapping challenges pre-conceived notions and helps ensure diverse perspectives are included from the outset. A clear view of who is involved along the cascade of care – from disease awareness to early detection, diagnosis, treatment, follow-up and control – enables targeted outreach, strengthens intersectoral collaboration, and lays the groundwork for governance and co-design. Prioritizing stakeholders and capturing underrepresented voices provides practical insights beyond data alone and increases the likelihood of coordinated, effective implementation.



Local governance



Objective
Establish the program’s governance structures with clear roles, decision rights, and approval pathways to enable coordinated, accountable implementation.

How to do it

Based on stakeholder map and engagement discussions, identify the key collaborators in the design and implementation. We propose organizing them in three levels:

Steering Committee (SteerCo): senior decision-making body providing overall direction, resolving

escalations, and endorsing major program decisions. It sets strategic priorities, ensure alignment with city and health system goals, approves major scope changes and resource shifts, reviews program progress and risks, and provides guidance on escalations from the Operational Committee. It typically includes senior leaders from relevant city departments, health authorities, as well as civil society or private sector partners.

Operational Committee: program leadership forum that integrates workstreams, manages delivery risks, and prepares decisions for SteerCo endorsement when needed. It translates strategy into an integrated delivery plan and track execution across workstreams, coordinates interdependencies, manages risks and

issues, and escalates decisions beyond its remit, and maintains light secretariat tasks implicitly (agenda setting, action tracking, follow-ups). It typically includes the program lead, workstream leads, and key enabling functions (e.g., data, operations).

Implementation Working Groups: task-focused teams responsible for designing and implementing specific workstream activities and deliverables. The number of teams depends on the implementation plan. Implementation Working Groups develop and execute detailed implementation plans and deliverables for their scope, surface operational risks, resource needs, and decision requests to the Operational Committee, coordinate with adjacent workstreams to ensure coherence and avoid duplication, and document progress and lessons that inform program-wide decisions and improvements. They typically include technical specialists and implementers aligned to each working group’s scope.

Why implement this

A clear and transparent governance model is key to success for an effective CARDIO4Cities implementation. It provides clear accountabilities, enables effective communication, and creates accountability at each level of the initiative.



Local context analysis



Objective

Understand the structure, strengths, and limitations of the local health system and policy environment to identify opportunities for improvements and alignment with CARDIO4Cities goals. This mapping helps ensure that CARDIO4Cities interventions are feasible, sustainable, and embedded within the existing health system.

How to do it

Conduct a structured mapping of the health system and policy landscape relevant to cardiovascular (CV) health. This includes reviewing existing health policies,

regulations, and strategic plans, as well as assessing the organization and functionality of the health system – particularly in relation to data systems, service delivery, workforce, financing, and governance. The mapping process should combine desk research with stakeholder interviews and workshops to validate findings and uncover practical barriers and enablers. GenAI, e.g., via Deep Research or a Researcher agent, can be very helpful create a first draft of this context map that can be validated with local experts. Key areas of focus include interoperability of health information systems, clarity of task-shifting regulations, referral pathways, and alignment of national guidelines with local

practice. The output is a concise report that informs the CARDIO4Cities co-design workshop and guides implementation planning.

Why implement this

Health system and policy mapping ensures that CARDIO4Cities interventions are grounded in local realities and aligned with existing structures. It helps identify regulatory gaps, operational bottlenecks, and opportunities for integration or reform. By understanding the current system, cities can better prioritize interventions, advocate for necessary policy changes, and ensure long-term sustainability.



City Insights

Health system and policy mapping was conducted in **Ulaanbaatar, Mongolia, Dakar, Senegal, and São Paulo, Brazil**, as part of CARDIO4Cities implementation. In São Paulo, mapping efforts focused on streamlining care delivery and integrating simplified protocols into routine practice. These efforts helped align interventions with local priorities and strengthened the enabling environment for CV health. Health system

maps are now routinely created for every new city implementation¹.

¹ bmchealthservres.biomedcentral.com/articles/10.1186/s12913-023-10432-8
bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-14833-y

Mapping of existing interventions



Objective

Identify current and past cardiovascular (CV) health interventions in the city to build on successful efforts to create the local context to identify opportunities for further improvements.

How to do it

Conduct a comprehensive mapping of CV-related interventions across the city. This may include desk research, stakeholder interviews, and validation workshops. GenAI, e.g., via Deep Research or a Researcher agent, can be very helpful in creating a

first list of interventions that can be validated with local experts. The mapping should cover interventions across the cascade of care and its enablers. The 6 CARDIO pillars can guide the search. It should include both government, civil society, and private sector efforts. Where available, capture outcomes or even impact, lessons learned, and implementation challenges. The final output is a concise but comprehensive report that informs the co-design workshop and guides the development of the population health roadmap, including implementation and scaling strategies.

Why implement this

Mapping current and past interventions helps implementing teams avoid duplication, build on what works, and identify gaps in CV care. It provides a shared understanding of the local landscape and ensures that CARDIO4Cities builds on existing strengths while addressing unmet needs. This process also fosters stakeholder engagement and ownership by recognizing their past contributions and integrating their insights into future planning.



City Insights

In several CARDIO4Cities cities, this mapping has helped uncover underutilized community-based screening programs, identify successful workplace health initiatives, and highlight policy gaps that hindered continuity of care. It also helped align stakeholders around a shared vision and informed the prioritization of interventions during co-design workshops.

