MONITORING AND EVALUATION FRAMEWORK FOR HYPERTENSION CONTROL PROGRAMS

A collaboration between
the Pan American Health Organization and the World Hypertension League

Pan American Health Organization

World Health Organization
REGIONAL OFFICE FOR THE Americas

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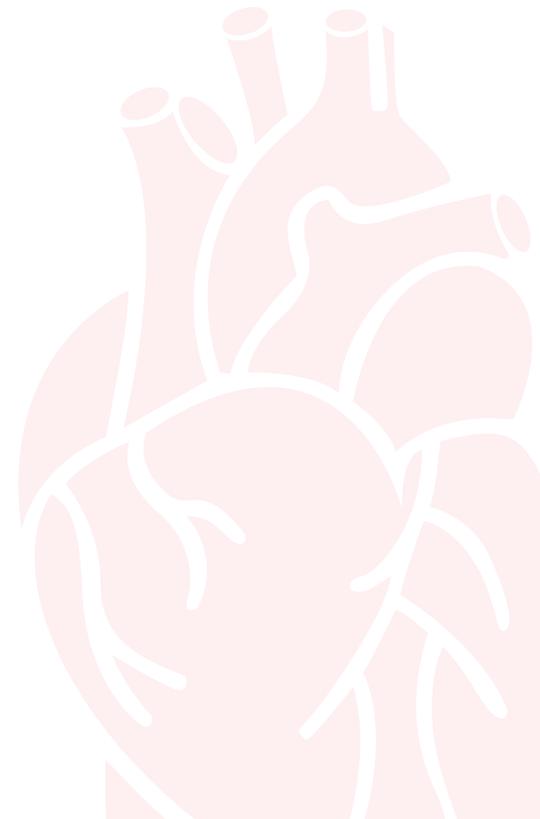
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Pan American
Health
Organization

World Health
Organization

REGIONAL OFFICE FOR THE **Americas**

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TABLE OF CONTENTS

INTRODUCTION

This document describes the Monitoring and Evaluation Framework for Hypertension Control Programs, a collaboration between the Pan American Health Organization (PAHO) and the World Hypertension League (WHL). It provides a foundation that allows countries, based on their own resources and priorities, to select indicators for their monitoring and evaluation efforts and strongly recommends the use of the five core indicators of the Global HEARTS cardiovascular disease management technical package and one additional PAHO-WHL core indicator. The framework is designed to be used at different intervention levels: national, regional, and even at the community or clinic/facility-level. The intention is for hypertension programs to select quantitative indicators based on the current surveillance mechanisms that are available and what is feasible and to use the framework process indicators as a guide to program management. Programs may wish to increase or refine the number of indicators they use over time.
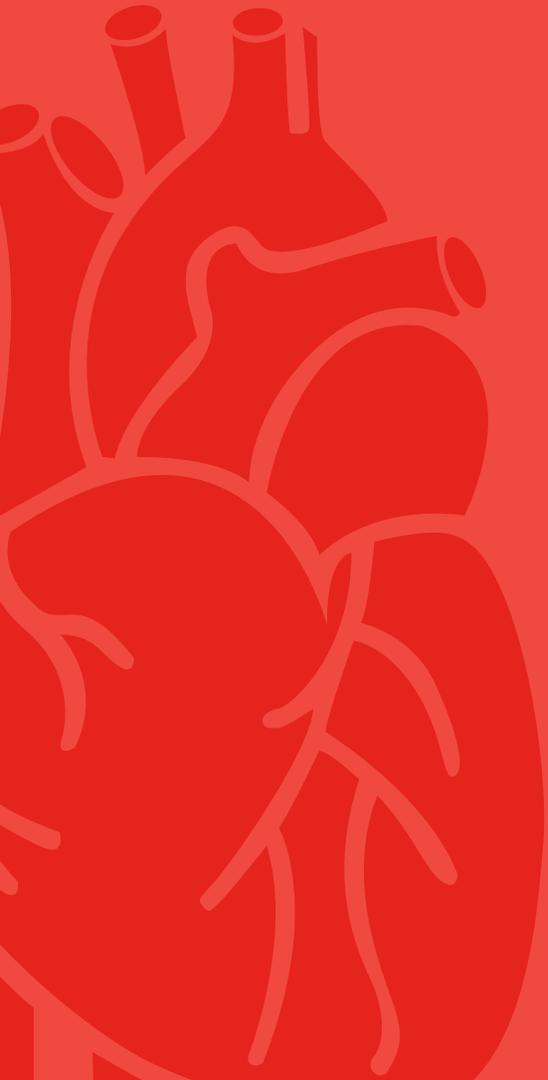
Global Approach

The Global HEARTS Initiative (http://www.who.int/cardiovascular_diseases/hearts/en/) provides global best practices for control of cardiovascular disease (CVD) through three technical packages: MPOWER for tobacco control, SHAKE for salt reduction, and HEARTS for primary care clinical management of hypertension, diabetes, and dyslipidemia, counseling on lifestyle factors, and secondary prevention [1]. As the main driver of the initiative, HEARTS prioritizes systematic hypertension management that incorporates well-established, inexpensive diagnostic and therapeutic interventions [2-4]. To monitor the global CVD burden, core cardiovascular disease management indicators are included in the HEARTS Systems for Monitoring module. These core indicators are based on successful experiences in controlling chronic diseases (e.g., tuberculosis and HIV/AIDS) and must be a part of all hypertension control programs [5-7]. PAHO-WHL framework builds upon the HEARTS core indicators by providing a menu of optional indicators that can further guide and optimize hypertension management programs.

Regional Approach

In the Region of the Americas, PAHO, in collaboration with the United States Centers for Disease Control and Prevention and other partners, initiated a specific program to improve hypertension control in Barbados (2014) and in Chile, Colombia, and Cuba (2015) [8]. The program was intended to be an attractive option for patients and providers from a clinical standpoint, and action-oriented for the health care organizations and administrators, with the ultimate goal of reducing the CVD burden. This was to be achieved through a set of clinical and managerial integrated interventions wherein hypertension control has a central role but secondary prevention of CVD is also included. The PAHO approach utilizes hypertension as an entry point to the CVD cascade of care and as a potential tracer to evaluate CVD/NCD quality of care. This focus recognizes that any broader cardiovascular health approach, such as the one outlined in HEARTS, would benefit from a refined and effective clinical approach to hypertension for the following reasons:

- The approach makes it easier for clinicians to transition from a physician-centered model to a broader health care systemic change that includes the adoption of a new clinical intervention and the active participation of the primary health care team.
- The approach makes it easier for interventions to be tailored based on situational analyses, progress, and specific challenges in the Region [1, 9-11].

The PAHO hypertension program was inspired by achievements in the Region. For example, a focused program to improve blood pressure control in Canada achieved 5-fold control rates (from 13% to 68%) within 6 years [12]. Similarly, great success was achieved in California, United States through a hypertension control initiative in the Kaiser Permanente health system [13]. In parallel with improvements in hypertension control, there were rapid reductions in cardiovascular mortality [12, 13]. Similarly, the multifaceted North Karelia project in Finland successfully reduced cardiovascular disease outcomes by promoting lifestyle changes [14, 15]. Evaluation of the impact of the more focused approach of the PAHO hypertension program may provide new insights on how to best initiate CVD prevention and control programs.

Measuring Success

Monitoring and evaluation are critical elements of any initiative targeting improvements in prevention and control of hypertension [16-18]. Process and structure indicators are helpful to assess whether programs achieve critical success factors for improving hypertension control [18, 19] and are able to disseminate the best clinical and managerial practices. The quantitative indicators assess the number of people who are at risk of hypertension, whether the health care system and community programs can effectively identify and diagnose people with hypertension, and whether the health care system is effective in treating and controlling people diagnosed with hypertension. Quantitative indicators can also provide an overview of critical gaps in community programs and clinical care. Sociodemographic analyses are important for identifying vulnerable groups in which community and clinical programs are less effective, in order to reduce the unacceptable disparities and inequalities in term of access and quality of care. These eval-

uations allow more appropriate resource allocations and guide the major focus of interventions. Ongoing monitoring and evaluation show where interventions have had success and where they have failed or had suboptimal effects. Monitoring and evaluation also provide a basis for developing new interventions, revising established interventions, and ending ineffective interventions.

Best practices for monitoring and evaluation will require adaptations based on national expertise, resources, and infrastructure. Hypertension control programs at the subnational level also need to adapt their monitoring and evaluation efforts because national monitoring may not be able to provide reliable data [16]. Hence, each country will be likely to evaluate its hypertension programs differently. Nevertheless, there are core components that will be common in evaluating these initiatives. Standardizing the definitions of indicators in monitoring and evaluation will facilitate tracking changes over time and across jurisdictions and allow sharing of best practices and lessons learned. The HEARTS technical package provides a system for data collection at the primary health care facility-level, including a set of core indicators for use by all programs. This globally standardized approach is outlined further in the HEARTS Systems for Monitoring module. Indeed, the PAHO-WHL evaluation framework adopted the core HEARTS indicators proposed in January 2018.

The PAHO-WHL Hypertension Monitoring and Evaluation Framework and its optional indicators complements the HEARTS technical package systems for monitoring, utilizing a more focused hypertension approach. The optional indicators recommended by PAHO-WHL are more specific and include process and structure indicators for program evaluation, population and clinical facility indicators and mortality indicators. They are designed to take ad-vantage of potential surveillance mechanisms, already available but poorly utilized, and include indicators that can be used to identify effective and ineffective interventions [17]. The PAHO program uses ≥ 20% 10-year cardiovascular risk–high CVD risk–as a standard. Controlling hypertension in people with > 20% cardiovascular risk is likely to be cost effective, as well as feasible, in the context of most middle-income countries. In contrast, many low-income countries may not have established health care systems or resources for managing health risks, and even intervening with those who have a 30% or higher cardiovascular risk may be very challenging.[1] While the level of risk for intervention will likely depend on local costs, priorities, and resources, evaluations of interventions based on different levels of risk may provide insights on costs and benefits that can aid other countries starting their own interventions. As indicated by WHO, it is expected that countries will define their own risk targets or use blood pressure thresholds for treatment based on their national priorities and resources. WHO is developing country-specific risk charts (expected to be released in the near future) to help ensure accurate risk assessments.

How to use this document

The intent of the PAHO-WHL evaluation framework is to provide standardized definitions of process, structure, and outcome indicators that can be used, in addition to all the core indicators, for assessing hypertension control programs. The PAHO-WHL indicators are designed to assess alignment with global best practices as outlined by HEARTS and to supplement the HEARTS indicators. Each PAHO-WHL indicator is assessed in categories for process and structure indicators and numerically for outcome indicators, and there are opportunities to provide supporting information by entering comments in text boxes.

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1   In this document, high risk is defined as > 20% risk of a cardiovascular event in 10 years, moderate risk as 10%-20% risk of a cardiovascular event in 10 years, and low risk as less than 10% risk of a cardio-vascular event in 10 years.

CORE INDICATORS

HEARTS CORE INDICATORS

1. Six-monthly control of blood pressure among people treated for hypertension

2. Control of blood pressure among people with hypertension within the program

3. Availability of core cardiovascular disease/diabetes mellitus drugs

4. Hypertension control in the population

5. Proportion of eligible persons receiving drug therapy and counseling (including glycemic control) to prevent heart attacks and stroke

PAHO-WHL CORE INDICATOR

6. Registry Coverage
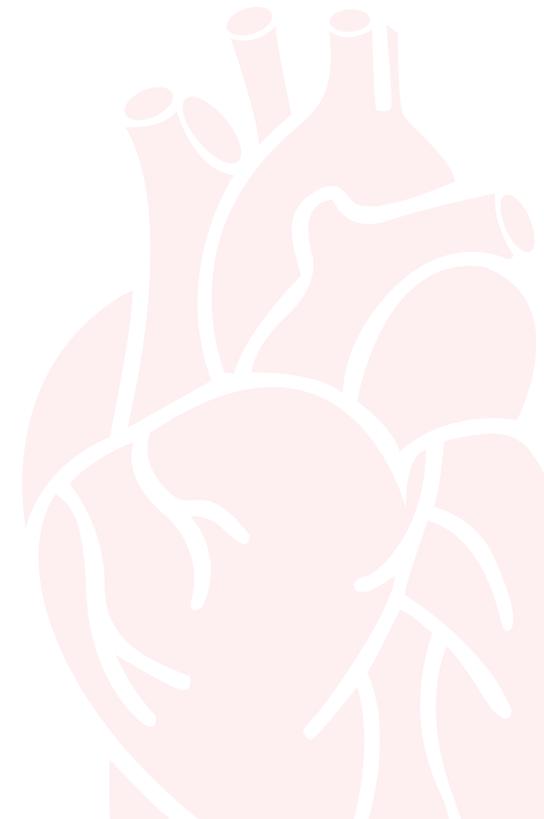
PART 1: CORE INDICATORS

HEARTS CORE INDICATORS[2]

The HEARTS indicators address the estimated number of adults with hypertension and hypertension control. They are the most important indicators for assessing the burden of disease associated with elevated blood pressure and for determining the success of programs designed to prevent and control hypertension.

This section outlines a list of indicators to be used for monitoring HEARTS implementation. Some of these data come from the health facilities providing the services, while other components will need to be collected by community- or population-level surveys. Monitoring needs to take place in three settings to get the data needed for these indicators: at the health care delivery (facility setting), the district or subnational level for aggregated indicators, and at the population level.

Health facility-level indicators				
N°	Indicator	Source of data	Reporting frequency	Health system considerations
1	Six-monthly control of blood pressure among people treated for hypertension	Hypertension treatment register in the facility	Once in 3 months	Feasible in all settings in primary health care and a core indicator for quality of services
Subnational (District/Province/State)-level aggregated indicators from health facilities offering the services within the program				
N°	Indicator	Source of data	Reporting frequency	Considerations in the interpretation
2	Control of blood pressure among people with hypertension within the program	Aggregated reports from all the health facilities reporting the hypertension indicator in a defined subnational area; estimation of hypertension prevalence	Once in 12 months	This will give estimated community control rates with the numerator coming from facilities reporting as part of the program (in some instances patients maybe receiving BP meds from private sector or other levels of care within the public system)
3	Availability of core cardiovascular disease/diabetes mellitus drugs	Aggregated reports from all the health facilities reporting drug availability indicators in a defined subnational area	Once in 3 months	This is for the program quality control and will assist with forecasting of medicines and improvements in supply chain management

(Continued on next page)

2   The core Global HEARTS indicators 1 – 5 are reprinted with permission from WHO, from their latest draft of the Global HEARTS Systems for Monitoring (Jan.22, 2018). The HEARTS modules are available at http://www.who.int/cardiovascular_diseases/hearts/en

(Continued)

Population-level indicators of control of hypertension				
N°	Indicator	Survey method	Frequency	Other considerations
4	Hypertension control in the population	Population-based sample survey (STEPS or similar survey)	Once in 3-5 years	Population-level survey as part of national survey or a special survey for the program
5	Proportion of eligible persons receiving drug therapy and counseling (including glycemic control) to prevent heart attacks and stroke[3]	Population-based sample survey (STEPS or similar survey)	Once in 5 years	Population-based (preferably nationally representative) survey including behavioral parameters with physical and biochemical measurements

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3   http://www.who.int/nmh/ncd-tools/indicators/GMF_Indicator_Definitions_Version_NOV2014.pdf

1. SIX-MONTHLY CONTROL OF BLOOD PRESSURE AMONG PEOPLE TREATED FOR HYPERTENSION	
Definition	Proportion of patients registered for hypertensive treatment at the health facility whose blood pressure is controlled 6 months after treatment initiation
Purpose	To measure the effectiveness of clinical services in the program to control blood pressure among treated patient cohorts
Method of calculation	A= Number of patients with controlled blood pressure (SBP<140 and DBP<90) at the last clinical visit in the most recent quarter (just before the reporting quarter) out of B. B= Number of patients registered for treatment of hypertension during the quarter that ended 6 months previously. Calculation: A÷B
Source of data	Health facility register for hypertension
Recommended target	Fix a target as per the local context.
Key data elements	Date of registration, date of last visit, systolic blood pressure, diastolic blood pressure
Frequency of reporting	Quarterly
Users of data	• Facility managers: to understand what proportion of patients at their facility are achieving the blood pressure goal • District-level manager: to assess the overall quality of hypertension treatment services, to identify poorly performing facilities and rectify problems at an early stage
Data collection tool	Facility register for hypertension-Annex 2 included in WHO module (Available at http://www.who.int/cardiovascular_diseases/hearts/en/Systems for monitoring module)

2. CONTROL OF BLOOD PRESSURE AMONG PEOPLE WITH HYPERTENSION WITHIN THE PROGRAM

Definition	The proportion of hypertensive people at health facilities in a given geographical area such as a district, province, or state with controlled blood pressure.
Purpose	To measure the increase in coverage of the program to treat and control hypertension in a given geographical area such as a district, province, or state
Method of calculation	A= Cumulative number of registered patients with controlled blood pressure (SBP<140 and DBP<90) in the most recent quarter at all health facilities in a given geographical area, such as a district, province, or state B= Estimated number of people with hypertension at the subnational level Calculation: A÷B
Source of data	Numerator: Registers from health facilities reporting in the given geographical area such as a district, province, or state Denominator: Prevalence of hypertension from population-based survey (STEPS or similar survey)
Disaggregated by	Health facility
Recommended target	Fix a target as per local context.
Key data elements	Date of last visit, systolic blood pressure, diastolic blood pressure
Frequency of reporting	Annual
Users of data	• District, province, or state program managers to monitor increase in program coverage of hypertension services within a geographical area • National program managers to monitor progress towards universal health coverage.
Data collection tool example	Health facility register for hypertension Annex 2 Health facility report –Annex 3 included in WHO module (Available at http://www.who.int/cardiovascular_diseases/hearts/en/Systems for monitoring module)

3. AVAILABILITY OF CORE CARDIOVASCULAR DISEASE/ DIABETES MELLITUS DRUGS

Definition	The proportion of facilities in a given geographical area which have core CVD drugs available
Purpose	To ensure uninterrupted supply of essential CVD drugs and thereby improve patient treatment adherence.
Method of calculation	A= number of health facilities in the program reporting "no stock-out" of core CVD/Diabetes Mellitus drugs in the last quarter B= Number of health facilities participating in the program Calculation: A÷B
Source of data	Aggregated health facility drug stock register; health facility report
Disaggregated by	Health facility
Recommended target	No stockout
Key data elements	Count of number of facilities reporting "no drug stock-out" in the last quarter Number of days of drug stock-out of selected medicine at each health facility
Frequency of reporting	Quarterly
Users of data	District- and Province-level managers to focus supervision on health facilities reporting drug stock-outs, prevent drug stock-out situations and strengthen health systems to ensure uninterrupted drug supply
Data collection tool example	Health facility report –Annex 3 included in WHO module (Available at http://www.who.int/cardiovascular_diseases/hearts/en/Systems for monitoring module)

* Core CVD/DM drugs
- Thiazide diuretic or thiazide-like diuretic
- Calcium channel blocker (CCB)(long acting) (amlodipine)
- Angiotensin converting enzyme inhibitor (ACEI)(long acting) and Angiotensin REceptor Blocker (ARB)
- Statin
- Insulin
- Metformin
- Glibenclamide
- Beta-blocker
- Aspirin

4. HYPERTENSION CONTROL IN THE POPULATION	
Definition	Proportion of all hypertensive people with controlled blood pressure in the population
Purpose	To measure population-level hypertension control, including trends over time
Method of calculation	A= Number of respondents with SBP ≤140 and DBP ≤90 who are EITHER (being currently treated with medications for hypertension OR have been diagnosed with hypertension. B= Number of survey respondents with SBP ≥140 or DBP ≥90 OR who are currently treated with medicines for hypertension OR who report having been diagnosed with hypertension by a health professional Calculation: A ÷ B
Source/Methodology	Population-based sample survey (National or subnational health survey
Disaggregated by	Age, sex, socio-economic status
Frequency of reporting	Once in 3-5 years
Users of data	National policy makers to measure progress toward universal health coverage, formulate national health policies, allocate programmatic budget Global policy makers to compare progress in UHC across countries
Data collection tool example	http://www.who.int/ncds/surveillance/steps/en/

5. PROPORTION OF ELIGIBLE PERSONS RECEIVING DRUG THERAPY AND COUNSELING (INCLUDING GLYCEMIC CONTROL) TO PREVENT HEART ATTACKS AND STROKES [4]

Definition	Percentage of eligible persons (defined as aged 40 years and older with a 10-year cardiovascular disease (CVD) risk ≥30%, including those with existing CVD) receiving drug therapy and counseling (including glycemic control) to prevent heart attacks and strokes.
Purpose	To measure change in population-level CVD risk management
Method of calculation[5]	A= Number of eligible survey participants who are receiving drug therapy and counseling[6]. B= Total number of eligible survey participants. (defined as aged 40 years and older with a 10-year cardiovascular risk ≥30%, including those with existing cardiovascular disease) Calculation: A÷B
Source/methodology	This is generated from population-based surveys such as a population-based sample survey (STEPS or similar survey)
Disaggregated by	Age, sex, socio-economic status
Recommended target	5% increase every year
Frequency of reporting	Once in 5 years
Users of data	• National policy makers to measure progress towards NCD global action plan targets • Global policy makers to compare progress in NCD global action plan targets across countries
Data collection tool example	http://www.who.int/ncds/surveillance/steps/en/

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4   Feasible in settings which have a comprehensive population-based survey with behavioral parameters along with physical and biochemical measurements.
5   More information on the indicator is available at http://www.who.int/nmh/ncd-tools/indicators/GMF_Indicator_Definitions_Version_NOV2014.pdf
6   Use of the term "eligible persons" does not imply that others should not receive treatment. Jurisdictions may wish to consider analyses which include persons at high risk as defined by the jurisdiction, and analyzing control of, rather than taking medicine for hypertension.

PAHO-WHL Core Indicator

6. REGISTRY COVERAGE	
Definition	Proportion of people in the catchment area (clinical facility, municipality, district) who have been registered as hypertensive based on the best estimate of expected prevalence in the catchment area or larger geographical unit in a specific period of time (month, quarter, year)
Purpose	To measure the capacity and effectiveness of the program to recruit/diagnose and register all people with hypertension
Method of calculation	A= Number of adult patients who have been registered as diagnosed with hypertension (>140 mm Hg and >90 mm Hg or taking hypertensive medications) in the catchment area in a specific period of time (month, quarter, year)
	B= Expected number of adults with hypertension based on best estimate of age-adjusted prevalence of hypertension (based on physical measures surveys) in the catchment area in a specific period of time (month, quarter, year)
	Calculation: A÷B * 100
Source of data	Health facility register for hypertension AND physical measures surveys
Recommended target	Target: At least 70%
Key data elements	For numerator: Date of registration, number of people registered as hypertensive, sex, age group, (other demographic and socio-economic dimensions, if available), period of time (month, quarter, year) For denominator: age adjusted number of people with hypertension in the region in a specified period of time
Frequency of reporting	Monthly, quarterly, annually
Users of data	• Facility managers: to understand what proportion of patients with hypertension based on the best estimate of expected prevalence at their facility are being recruited and registered • District-level manager: to assess the overall quality of hypertension programs and services, to identify poorly performing facilities and rectify problems at an early stage • Registry coverage is well aligned with at least two important concepts: 1. Territoriality or geographically-based coverage as an important organizational characteristic of a health system based on primary health care, and 2. universal health care, both in access and coverage. Therefore, registry coverage is an actionable indicator to guide program implementation as it is critical to improve control at population level and to reduce the burden of CVD.
Data collection tool	Hypertension facility registry -Annex 2 included in WHO module (Available at http://www.who.int/cardiovascular_diseases/hearts/en/Systems for monitoring module)

OPTIONAL INDICATORS (PAHO-WHL)

OPTIONAL INDICATORS FOR PROGRAM PROCESS AND STRUCTURE

Action plan

    Action plan with goals

Situational analysis

Stakeholders

Political, policy and decision-maker support

Financial and other resources

Organized structure and governance

Pilot site(s)

Operational plan

Monitoring and evaluation team

Baseline evaluation

Initiative costs and benefits

Scale up

Accessibility to selected indicators and accountability

Initiative success
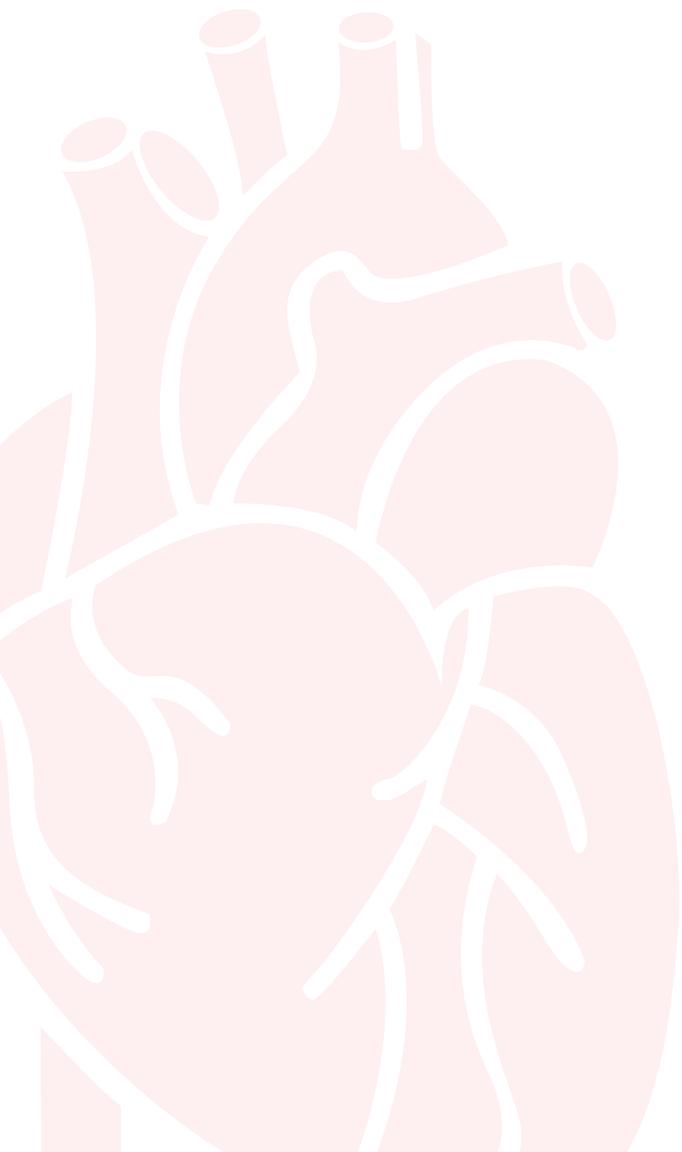
OPTIONAL OUTCOME INDICATORS

POPULATION-BASED SURVEYS (PHYSICAL MEASUREMENTS)

Prevalence of hypertension

Alternative method of assessing prevalence of hypertension

Hypertension awareness (of diagnosis)

Hypertension drug treatment rate

Lack of hypertension drug treatment in those with low cardiovascular risk

Lack of hypertension drug treatment in those with moderate cardiovascular risk

Lack of hypertension drug treatment in those with high cardiovascular risk

Hypertension control rate

Lack of hypertension control in those with low cardiovascular risk

Lack of hypertension control in those with moderate cardiovascular risk

Lack of hypertension control in those with high cardiovascular risk

Uncontrolled hypertension in those with either systolic blood pressure of 160 mm Hg or higher or diastolic blood pressure of 100 mm Hg or higher

POPULATION-BASED SURVEYS (QUESTIONNAIRE-BASED ONLY)

Blood pressure measurement

Prevalence of those who have had their blood pressure assessed

Prevalence of those who have had their blood pressure assessed within 6 months

Prevalence of those who have had their blood pressure assessed 6 months to < 1 year ago

Prevalence of those who have had their blood pressure assessed 1 year to < 2 years ago

Prevalence of those who have had their blood pressure assessed 2 years to < 5 years ago

Prevalence of those who have had their blood pressure assessed ≥ 5 years ago

Hypertension awareness (of diagnosis)

Hypertension drug treatment rate

Ratio of drug treatment to diagnosis of hypertension

Antihypertensive drug prescription rate

Core antihypertensive drug prescription rate

CLINIC REGISTRIES

Prevalence of hypertension

Cardiovascular risk assessment

High cardiovascular risk during drug treatment

High cardiovascular risk without treatment

Controlled hypertension

OPTIONAL MORTALITY INDICATORS

DEATH FROM HYPERTENSION-RELATED DISEASES

Total cardiovascular disease death rate

Hypertensive heart disease death rate

Ischemic heart disease death rate

Stroke death rate

PART 2: PAHO-WHL RECOMMENDED HYPERTENSION PROCESS AND STRUCTURE INDICATORS

Process and structure indicators assess whether an initiative is optimally designed to improve and sustain hypertension control [16]. The indicators can guide the development and revision of the initiative over time. For each indicator, enter the dates (day, month, and year) in the applicable columns to the right under the description that best matches your initiative at the time the indicator is evaluated. In the text box below the dates, describe lessons learned and success factors related to the indicator and attach any key documents related to the indicator. For several indicators, it is suggested that additional information be provided to interpret progress. The additional information, lessons learned, and success factors are important to enter and retain over time to optimize your initiative and share results with other initiatives.

PROCESS AND STRUCTURE INDICATOR

STEP 1: Action plan (strategy or framework)

The basis of any successful hypertension control program is a well-thought-out action plan that accounts for unique national and local circumstances [16, 18]. The action plan should, where possible, be integrated into more comprehensive efforts to prevent and control cardiovascular diseases or noncommunicable diseases. Nevertheless, a feasible initial step towards a more comprehensive strategy could be the development and implementation of an action plan for hypertension prevention and control. Given that there are well-established, cost-effective interventions for hypertension prevention and control, these interventions can be used as models for evolving health care systems to become effective and efficient [2].

Resources to aid the development of action plans are available. The HEARTS initiative outlines best practices in hypertension and cardiovascular disease management [1], and SHAKE outlines best practices in reducing population salt intake (high dietary salt intake is a major global health risk, attributed to approximately one-third of hypertension cases) [20]. The Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020 outlines other key health promotion interventions to prevent and control cardiovascular and other diseases [3]. The World Hypertension League website (http://www.whleague.org/) provides links to other national, regional, and local hypertension resources and strategies. Also, the World Heart Federation has published road maps to improve hypertension control, secondary cardiovascular disease prevention, and tobacco use reduction (http://www.cvdroadmaps.org/whf-global-roadmaps) [21].

There is an action plan for preventing and controlling hypertension that is preferably integrated into a cardiovascular disease, noncommunicable disease, or overall health strategy	No progress	Action plan partially developed	Action plan developed but not implemented	Action plan developed and implemented and there are plans to expand the hypertension focus to include other major health risks
Please enter dates in applicable columns to the right				

- Provide brief description of the action plan or attach the plan

To ensure clarity in communications and accountability, it is important to have initiative goals with short-, medium-, and long-term targets and timelines that track whether the initiative is having its desired impact.

The action plan has goals with clear short-term (1-2 years), medium-term (2-5 years), and long-term targets and includes timelines for preventing and controlling hypertension	No goals or targets with timelines	The goals or targets or timelines are unclear	The goals or targets or timelines are clear but not feasible	There are clear, feasible goals with short-, medium-, and long-term targets and timelines
Please put enter dates in applicable columns to the right				

Comments: Please indicate goals, targets, and timelines if developed.

PROCESS AND STRUCTURE INDICATOR

STEP 2: Situational analysis

A situational analysis is important at the start of the implementation and during reviews of the program to identify potential challenges and barriers to achieving goals, as well as to identify opportunities for and facilitators of success. Situational analyses assess such key parameters as drug availability and clinical capacity to manage large numbers of people with hypertension. The HEARTS initiative is developing guidance for a standardized situational analysis.

A situational analysis has been completed to support implementation of the hypertension action plan	No situational analysis has been done	The situational analysis is in progress	A partial situational analysis has been done	A comprehensive situational analysis has been done
Please enter dates in applicable columns to the right				

Comments: Please attach the situational analysis if it has been completed.

PROCESS AND STRUCTURE INDICATOR

STEP 3: Stakeholders

Broad intersectoral collaboration is considered optimal for full implementation of a hypertension action plan. The engagement should occur early during strategic planning to fully involve stakeholders in identifying their role and encouraging ownership of the action plan and its tasks. Government, academic, and nongovernmental organizations should be engaged and collaborate in setting goals, targets, and timelines. Interdisciplinary (and, most importantly, primary care) health care providers need to be fully engaged, as well as researchers and civil society organizations. Patient groups are important to engage to ensure that the action plan is patient oriented and serves patients' needs and values. Engaging the private sector needs to be carefully considered with respect to advantages and disadvantages given the inherent conflicts of interest. Depending on the scope of the action plan (national, subnational, clinic level), multiple levels of organizations may need to be engaged. Furthermore, a number of different government departments may also need to become involved (e.g., surveillance, health, agriculture, education).

Key stakeholders are engaged in the hypertension action plan	A single (governmental, academic, patient, or nongovernmental) organization is involved	Some key government, academic, patient, and nongovernmental organizations are engaged	Most key government, academic, patient, and nongovernmental organizations are engaged	All relevant intersectoral organizations (government, academic, patient, civil society, and health and scientific sector organizations) are fully engaged in supporting the hypertension control action plan
Please enter dates in applicable columns to the right				

Comments: Please list the stakeholders that are engaged and the sector/constituency they represent.

PROCESS AND STRUCTURE INDICATOR

STEP 4: Political, policy, and decision-maker support

To obtain needed resources to start, sustain, spread, and scale the initiative, political, policy, and decision support at appropriate levels is important. This support should occur within appropriate jurisdictions (i.e., community to national) to initiate as well as scale and spread the program. Furthermore, the supporter(s) should be sufficiently influential to ensure that needed resources can be obtained and that policy and political barriers can be overcome. Small clinic-based interventions may not require high-level national political support; however, the lack of such support may impede the scale up required to impact the greater national population. Fact sheets with calls to action [22], situational analyses, national commitments made at the World Health Assembly [23], and the emerging global priority to prevent and control hypertension [2] can be used to gain political support. Advocacy on the part of prominent local, national, and international champions of hypertension control can also be important in gaining political support.

Political, policy, and/or decision-maker support has been obtained for the action plan	There is little political, policy, and/or decision-maker support	There is political, policy, and/or decision maker support, but it has not led to changes in policies (e.g., public funding for essential medications) and/or provided adequate resources for optimal program implementation	There is high-level, influential political, policy, and decision maker support in all of the relevant jurisdictions, and policy changes (e.g., public funding for essential medications) and resources are adequate for optimal program implementation
Please enter dates in applicable columns to the right			

Comments with examples of changes in policy and resources:

PROCESS AND STRUCTURE INDICATOR

STEP 5: Financial and other resources

The implementation of the initiative will require added resources (financial, personnel, equipment, and materials, including medication). Ensuring that adequate resources are available will be one of the success factors in achieving the initiative's goals, targets, and timelines. Most hypertension control initiatives reprioritize existing resources. Changes in procurement policies, standardized education, task sharing, care algorithms, and registries with performance reporting can lead to more effective and efficient hypertension management.

Resources have been identified to start and sustain the initiative	There are no additional resources	Inadequate resources have been obtained to start the initiative	Inadequate resources have been obtained to fully start and sustain the initiative	Adequate resources have been obtained to fully start and sustain the initiative
Please enter dates in applicable columns to the right				

Comments: Where are the needed resources coming from? If the initiative needs to be scaled up to a national initiative, indicate whether the resources for a full national scale up have been obtained.

PROCESS AND STRUCTURE INDICATOR

STEP 6: Organizational structure and governance

To allow effective decision making and to sustain long-term collaboration, a simple, effective, and efficient organizational structure and a good governance networking model with strong, committed leadership are essential. The structure and governance should clearly identify responsibilities, accountability, and communications while being efficient for those operation-alizing the action plan. Leaders should be able to effectively implement and make substantive changes in the initiative. Leaders need to effectively communicate with each other to ensure that barriers and challenges are overcome and that successful interventions are shared.

Organizational structure, governance, and leadership	The organizational structure with governance is under consideration	The organizational structure with governance is being developed	The organizational structure with governance is almost complete, committees are almost fully populated, and most committees have strong leaders	The organizational structure with governance is fully established, and the various committees are fully populated and functional with strong leaders
Please enter dates in applicable columns to the right				

Comments: Please attach organizational chart and governance documents if available.

PROCESS AND STRUCTURE INDICATOR

STEP 7: Pilot site(s)

To adapt international best practices to the national context, pilot or test sites may be needed. The pilot sites should be selected intentionally to ensure successful introduction of the initiative (taking advantage of strengths and opportunities identified in the situational analyses) and to find solutions to identified challenges and weaknesses. In cases in which success of the pilot site is needed to ensure resources for the national program, most countries will select sites where success is more likely and the capacity to overcome barriers is higher. The optimal number of pilot sites will depend on the geographical distribution of sociodemographic and health care system factors thought to influence the program's uptake and success. In most countries, especially those with several different cultures in different locations and/or different health care systems, multiple pilot sites are advisable.

Initiative pilot sites	There is no pilot site	Pilot site(s) have been selected by convenience and do not represent important differences in national sociodemographic characteristics and health care systems	Pilot site(s) have been selected intentionally with specific criteria (e.g., readiness to change, motivation, leadership) that in, large part, represent important differences in national sociodemographic characteristics and health care systems	Pilot site(s) have been selected intentionally and represent national sociodemographic characteristics and health care systems
Please enter dates in applicable columns to the right				

Comments: Please describe the features of the pilot site(s). Indicate how the population in the pilot site compares to the national population and whether it contains vulnerable groups. Indicate whether the pilot sites address differences within the health care system if they exist (e.g., private vs. public health care).

PROCESS AND STRUCTURE INDICATOR

STEP 8: Operational plan

The HEARTS technical package (http://www.who.int/cardiovascular_diseases/HEARTS/en/) was specifically developed to aid countries in adopting best clinical practices to reduce cardiovascular disease. Aimed at a global audience, HEARTS needs to be adapted to the local and national circumstances and resources available. To do this, a well-structured operational plan is important in systematically applying the core components of HEARTS [1]. Regular program review and revision is an important aspect of an operational plan.

An operational plan including key interventions has been agreed to and includes the following core components of the HEARTS initiative and regular initiative review and revision a) Standardized health care professional education on how to prevent and control hypertension b) Public and patient education and interventions to improve self-efficacy and management in preventing and controlling hypertension c) Evidence-based care algorithms with a core set of antihypertensive medications that integrate assessment and management of cardiovascular risk d) Comprehensive hypertension patient registry e) Performance reporting on quality of care metrics publicly available and shared regularly and broadly with the initiative directors, clinic managers, and health care professionals f) Initiative monitoring and evaluation framework	An operational plan is in development	The completed operational plan includes some of the core components of the HEARTS initiative	An operational plan including key interventions is in place and includes most of the core components of the HEARTS initiative	An operational plan including key interventions is in place and includes all of the core components of the HEARTS initiative
Please enter dates in applicable columns to the right				

Comments: Please indicate whether any of the core components of the HEARTS initiative are missing from the operational plan.

PROCESS AND STRUCTURE INDICATOR

STEP 9: Monitoring and evaluation team

A joint government academic team is desirable to assess what surveillance and monitoring resources are available and what resources are feasible for the team to develop in the short, medium, and long term. The team should develop analytic plans for examining and reporting on the core HEARTS indicators and select what is feasible and useful for the program from the PAHO-WHL indicators. A key task should be to regularly assess what gaps in care exist, what populations are most vulnerable, and what interventions are working well or not working. New interventions and changes in approach should be evaluated.

Monitoring and evaluation team	There is no monitoring and evaluation team	There is a monitoring and evaluation team, but it lacks expertise and access to data and analysts	There is a joint governmental academic monitoring and evaluation team, but it lacks expertise or access to data and analysts	There is a strong joint governmental academic monitoring and evaluation team with adequate access to all relevant data and analysts to regularly evaluate the hypertension program at all system levels
Please put dates in applicable columns to the right				

Comments: Please indicate any strengths and weaknesses of the monitoring and evaluation team.

PROCESS AND STRUCTURE INDICATOR

STEP 10:	Baseline evaluation

A baseline evaluation of key outcome indicators is necessary to allow tracking of the progress of the initiative. Baseline outcome indicators need to be assessed early in the initiative. (Recommended baseline indicators are described in part 3 of this document.)

Baseline evaluation of key outcome indicators (e.g., hypertension prevalence, hypertension control rate)	There has been no baseline evaluation or a very limited evaluation	A partial baseline evaluation of key outcome indicators has been completed	A baseline evaluation of most key outcome indicators has been completed	A comprehensive baseline evaluation of key outcome indicators has been completed
Please put dates in applicable columns to the right				

Comments: Please list the outcome indicators that were evaluated at baseline.

PROCESS AND STRUCTURE INDICATOR

STEP 11: Initiative costs and benefits

The major components that increase the direct costs of an initiative include health care professional salaries, new equipment, medication costs, laboratory costs, and costs for monitoring, evaluating, and administering the initiative. Reduced direct costs relate to fewer people with acute and chronic heart disease (heart failure and ischemic heart disease) and stroke. In economic models, direct benefits can be estimated in dollars, and they can also be expressed in the form of disability-adjusted life-years (DALYs) or quality-adjusted life-years (QALYs). Epidemiological trends (in deaths and/or hospitalizations) before and after the intervention can be used to calculate overall cost estimates of numbers of people prevented from having heart disease and stroke. A wide variety of economic models are available that can assess overall direct costs and benefits. HEARTS is developing a costing tool to help assess program costs and benefits for implementing the Global HEARTS Initiative.

Initiative direct costs and benefits are examined	There is no tracking of costs or association of costs with improved outcomes	Some costs are tracked, but they are not formally examined in relationship to improved outcomes	Most costs are tracked, and an economic analysis of costs and benefits is planned	There are economic analyses of direct costs and benefits of the initiative
Please put enter dates in applicable columns to the right				

PROCESS AND STRUCTURE INDICATOR

STEP 12:	Scale-up

In order to reduce CVD/NCD at a national level, pilot initiatives may have to be implemented to address unique national circumstances and heterogeneous populations, including those who are most vulnerable. The goal of such pilot initiatives within each country is to adapt international best practices from the HEARTS initiative and the PAHO program. Once the adaptation has occurred and best practices for hypertension control have been established, a rapid scale up should be undertaken. This requires substantive advance planning to secure needed resources for success. The new interventions should be adapted, as most as possible, to culture, priorities, and to the organizational model of the health system in place.

Scale-up plans are developed	There is no scale-up plan	Scale up is planned but not resourced	Scale up is planned, and there are resources allocated for partial scale up	There is a comprehensive plan with resources allocated for scale up to a national initiative
Please put dates in applicable columns to the right				

Comments: Please indicate any learnings or barriers from your work on cost-benefit analyses.

PROCESS AND STRUCTURE INDICATOR

STEP 13: **Accessibility to selected indicators and accountability**

At multiple levels, initiatives are advantaged by having indicators and outcomes accessible. A patient-centered approach is greatly facilitated by ensuring that patients know their blood pressure and what it means, know whether they have hypertension, and know whether it is adequately treated and controlled. Having this information empowers patients to be proactive and engaged. Similarly, ensuring that health care professional and clinic indicators are publicly available can aid patients in selecting health care professionals/clinics and allow health care professionals/clinics to compare their results with others, aiding quality improvement. Publicly available health care professional, clinic, and population indicators also aid initiative accountability. Greater transparency and accountability are likely to facilitate achieving initiative objectives. In contrast to the other process indicators, each column below is independent and should be filled in. Frequent and accurate feedback is critical to guarantee the acceptability and to promote the active participation of the main stakeholders, including patients and community.

The selected indicators are accessible	There is no mechanism to release relevant indicators to the public, patients, health care professionals, or clinics	There is a functioning mechanism for patients to be aware of their personal blood pressure indicators, to know how to interpret them, and to act on the results	There is a functioning mechanism for health care professionals to be aware of their indicators and it is preferable if these indicators are publicly available	The main overall initiative indicators are publicly available
Please enter dates in applicable columns to the right				

Comments: Comment on learnings related to efforts to make the indicators accessible.

PROCESS AND STRUCTURE INDICATOR

STEP 14: **Initiative success**

The success of the initiative in achieving its goals, targets, and timelines is the ultimate process evaluation.

The goals and targets have been achieved	There are no initiative goals or targets	The initiative is under way but is not at a point where goals and targets have been evaluated	There has been little or no progress towards achieving targets	There is significant progress towards the goals and targets	The goals and targets have been achieved
Please put dates in applicable columns to the right					

Comments: Comment on key learnings related to challenges, barriers, success factors, and facilitators in achieving or not achieving initiative goals, targets, and timelines.

PART 3: HYPERTENSION OUTCOME INDICATORS

The HEARTS technical package provides a set of core outcome indicators recommended for all hypertension control programs (see part 1 of this document). The PAHO-WHL framework is designed to provide a menu of optional indicators to identify vulnerable subpopulations facing inequity in health care, determine specific areas where clinical practices are deficient (care gaps), and track which interventions are successful in achieving the intended targets [24-26].

Some surveillance methodology allows rapid tracking of surrogate markers of targets that facilitate regular initiative monitoring (e.g., number of antihypertensive drug prescriptions, hypertension control from sentinel clinic registries) [13, 24, 25, 27], while other mechanisms may be more relevant but may not be feasible to regularly assess (e.g., physical measures surveys involving a representative sample of the population) [28]. Several countries currently have or are planning a population survey such as the WHO STEPS survey [28] and should ensure a robust module for assessing blood pressure and hypertension, with an analytic process that includes the core HEARTS and PAHO-WHL indicators.

The intent of outcome indicators with standardized definitions and methods is to help facilitate comparisons of changes over time and across jurisdictions, which can assist in assessing and modifying hypertension control targets. While it is expected that different countries will select different optional indicators, there will likely be overlap, and thus standard definitions will facilitate examinations of time trends within and between different populations to identify best practices and lessons learned.

Forms include each indicator to facilitate standardized reporting of indicators. For each indicator, fill in baseline values and the target value. Values for intermediate time points can be added, along with additional columns. Enter a date (day, month, and year) in the top of each column to allow tracking of changes in the indicator over time. In addition, there is space for commentary to provide more details on your experience using the indicator to evaluate and modify the hypertension control initiative. There is also a standard definition of the indicator provided. Indicator forms should be "cut and pasted" into a separate document to facilitate modification and adaptation of the indicators and forms.

POPULATION SURVEYS

Population surveys should be designed to assess key indicators using a representative sample of the population being studied [28]. If a non-representative population is used for sentinel surveillance, care should be taken to ensure that the sample can be reproduced for tracking changes over time.

PHYSICAL MEASURES POPULATION SURVEYS

For hypertension, the global standard method for a population physical measures survey is the WHO STEPS survey [28]. Detailed survey methods are well established and supported by WHO documents. Specific advantages of the STEPS survey include the following: (1) the questionnaire and physical and biochemical measures are standardized; (2) the instrument has been translated into many languages; (3) hypertension and other major cardiovascular risks are assessed, allowing determination of overall cardiovascular risk; (4) there are comparative data from multiple countries; and (5) there is extensive field and analytic experience with the survey. The main STEPS hypertension indicators are assessed via standardized measurements of blood pressure using a digital blood pressure monitor that has passed international accuracy validation protocol and uses two simple yes/no questions:

- Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?
- During the past 2 weeks, have you been treated for raised BP with drugs (medication) prescribed by a doctor or other health worker?

Other indicators below require assessments of cardiovascular risk. Household surveys such as STEPS or other physical measures surveys are usually conducted with a frequency of 4 to 5 years and in most settings they provide reliable estimates only at the national level. If a survey other than STEPS is being con-

ducted, care must be taken to ensure that an accurate, validated blood pressure device is used and that those measuring blood pressure are specifically trained to do so (including an assessment of their technique and accuracy).

The WHO Global NCD Monitoring Framework currently has a single blood pressure indicator ("uncontrolled hypertension") with a target and timeline to reduce uncontrolled hypertension by 25% by 2025 [29]. The World Health Assembly supported the voluntary target and timeline [30]. A World Hypertension League expert group developed more detailed recommendations for standardized analyses of population blood pressure surveys with multiple additional indicators [31]. These additional indicators are designed to assess where care gaps [32] exist so that hypertension control initiatives can be modified to improve quality of care. Templates were developed for reporting survey data to aid comparability [31]. The initial WHL recommendations have been updated and expanded to cover monitoring and evaluation in clinics in collaboration with PAHO [17], and these recommendations are modified in current the PAHO-WHL framework. The PAHO-WHL expert group provided standard definitions of the various indicators described below [17]. An abbreviated set of core physical measures indicators is presented here; a more extensive list can be obtained from the original publications.

It is important to note that hypertension indicators incorporating cardiovascular risk have not been formally tested in population surveys to our knowledge. Nevertheless, the indicators are important to evaluate the effectiveness of an initiative among people with different levels of risk. Field experiences will provide more information on the limitations (such as statistical power) and usefulness of these indicators in populations differing with respect to prevalence of cardiovascular risk. For countries able to implement a risk-based approach, additional guidance is provided in the HEARTS technical package.

It has been recommended that positive indicators be used as the primary indicators for reporting (proportion aware of diagnosis, drug treated, and controlled) [31]. Nevertheless, it is critical to perform sociodemographic analyses of negative hypertension indicators (proportion unaware, untreated with drugs, and uncontrolled) to identify subpopulations that may need enhanced or modified interventions [26, 33, 34].

It is important to analyze the indicators and report them in a standardized fashion. According to the expert committee:

"It is recommended that prevalence, awareness, treatment, and control be expressed as percentages including a 95% confidence interval for each estimate, using the estimation method appropriate for the study design. It is also crucial to report the size of the sample and the features of the sample design used to obtain the above statistics. To facilitate comparison across settings, the core indicators should be reported in the adult population aged 18 to 69 years. This age range represents the newly revised minimum target population of the WHO's STEPwise approach to surveillance (STEPS) (personal communication, WHO), a survey designed to obtain standardized data on established risk factors for chronic disease. It is also recommended that core indicators be presented for men and women separately and by age group (18–29 years, 30–49 years, and 50–69 years), in keeping with the age groups recommended by STEPS. Because hypertension prevalence and risk increases with age also including an age category of age 70 and over is recommended. To assess the impact of hypertension prevention and control action plans, it is essential that changes in core indicators be monitored consistently over time. Reporting of time trends involves tracking both the crude and where feasible age standardized estimates. Crude estimates over time indicate changes in the true burden of a condition, whereas age-standardized estimates show the amount of change that is not the result of the changing age structure of the population. Age-standardized estimates are to be calculated using direct age-standardization to the WHO World Standard (2000–2025) (http://seer.cancer.gov/stdpopulations/world.who.html). Comparability over time may also be affected by other factors, such as changes in sociodemographics, risk factors, or changes to survey methodology (such as changes to the sampling methods, population coverage, questionnaire wording, or survey protocol), which should be reported" [31].

The WHL expert committee statement is also valid for the other hypertension outcome indicators such as questionnaire surveys that lack physical measures.

PHYSICAL MEASURES POPULATION SURVEYS: Hypertension prevalence

The definition of hypertension for this document is the proportion of the adult population who report being diagnosed with hypertension, who are currently taking medication for high BP, or who have a systolic blood pressure (SBP) level of 140 mm Hg or higher or a diastolic blood pressure (DBP) level of 90 mm Hg or higher. This definition is identical to the HEARTS core indicator.

A common alternative definition excludes people who have been diagnosed with hypertension and have normal blood pressure but are not taking med-ications. People who have been diagnosed with hypertension and have normal blood pressure but are not taking medications may represent individuals with hypertension controlled by lifestyle changes, those who have been erroneously diagnosed with hypertension, and those whose blood pressure is fluctuating between the hypertensive and normotensive ranges. Assessing the prevalence of hypertension using both methods allows tracking of this potentially important group. The sociodemographic characteristics (age, gender, education, socioeconomic status, and ethnicity) of those with hypertension should be examined to identify vulnerable groups of people.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Prevalence of hypertension* *Please enter the hypertension prevalence in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target. Describe the sociodemographic features of groups that have higher rates of hypertension. Have any interventions been introduced to reduce the prevalence of hypertension in groups with higher rates of hypertension?

* Definition of indicator. The proportion of the adult population (age 18 yrs and over) who report being diagnosed with hypertension or who are currently taking medication for high BP or have an SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Alternative method of assessing prevalence of hypertension* *Please enter the hypertension prevalence in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target if different from the indicator above.

* Definition of indicator. The proportion of the adult population who report currently taking medication for high BP or who have an SBP ≥ 140 mm Hg or a DBP ≥ 90 mm Hg.

PHYSICAL MEASURES POPULATION SURVEYS: Hypertension awareness (of diagnosis)

Awareness of having hypertension relates to the effectiveness of the health care system and community-based initiatives in screening for and diagnosing hypertension. The sociodemographic characteristics of those who are un- aware that they have hypertension should be assessed to identify population subgroups that may need enhanced screening and diagnostic interventions.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertension awareness (of diagnosis) * *Please enter the percentage of hypertension awareness in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target. Provide a sociodemographic profile of those who have hypertension but are "unaware." Has the initiative been modified to enhance screening and diagnosis in those populations where lack of awareness is highest?

* Definition of indicator. The proportion of those with hypertension who report either having been diagnosed with high blood pressure or currently being treated with medication for high blood pressure.

PHYSICAL MEASURES POPULATION SURVEYS: Hypertension drug treatment rate

The hypertension treatment rate relates to the effectiveness of the health care system to treat those who have hypertension with antihypertensive medications. The prevalence of untreated hypertension among people with moderate and high cardiovascular risk is a key indicator of the need for interventions in these people, with drug treatment having the greatest benefits relative to costs.

The sociodemographic characteristics of those who are not treated with hypertension medications should be assessed to identify population subgroups that may need enhanced therapeutic interventions. For countries that are implementing a risk-based approach, the analyses could specifically assess those populations in which drug treatment is recommended or not recommended based on cardiovascular risk. In these settings, risk-based indicators can be used to direct resources and programs to those with the highest risk and lowest cost-to-benefit ratios.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertension drug treatment rate*				
Please put the percentage of hypertension treatment in applicable columns to the right				
■ **Lack of hypertension drug treatment in those with low cardiovascular risk** *Please enter the percentage of untreated hypertension among those at low cardiovascular risk in applicable columns to the right*				
■ **Lack of hypertension drug treatment in those with moderate cardiovascular risk** *Please enter the percentage of untreated hypertension among those at moderate cardiovascular risk in applicable columns to the right*				

* Definition of indicator. The proportion of those with hypertension who report being treated with medication for high blood pressure.

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(Continued)

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
■ **Lack of hypertension drug treatment in those with high cardiovascular risk** *Please enter the percentage of untreated hypertension among those at high cardiovascular risk in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress to achieving the indicator target.

- Provide a sociodemographic profile of those who have hypertension and who are aware but "not treated with drug therapy."

- What proportion have high cardiovascular risk (10-year cardiovascular risk ≥ 20% or cardiovascular event, diabetes mellitus, or chronic kidney disease) and are not treated with drugs? (Definitions of cardiovascular event, diabetes mellitus, and chronic kidney disease should be based on survey questions; laboratories prefer to use WHO STEPS definitions.)

- Have any interventions been introduced to increase hypertension control in low-control groups?

- Cardiovascular risk should be assessed using country-specific risk charts developed by WHO.

* Definition of indicator. The proportion of those with hypertension who report being treated with medication for high blood pressure.

PHYSICAL MEASURES POPULATION SURVEYS: Hypertension control rate

The hypertension control rate relates to the effectiveness of clinical initiatives to control hypertension. The prevalence of uncontrolled hypertension among people with moderate and high cardiovascular risk is a key indicator of the need for interventions targeting this group, with drug treatment to achieve the greatest benefit relative to costs.

The PAHO-WHL indicator for control is identical to the HEARTS core indicator for population control but it also includes other complementary control indicators

For countries electing to implement a risk-based approach, PAHO-WHL recommends assessments of the sociodemographic characteristics of those who have uncontrolled hypertension and are at moderate and high cardiovascular risk to identify population subgroups that may need enhanced therapeutic interventions. The risk indicator can be used to help design interventions for those with the highest risk and lowest cost-to-benefit ratios. The sociodemographic characteristics of those who have uncontrolled hypertension and are at moderate or high cardiovascular risk should be assessed to identify population subgroups who may need additional therapeutic interventions. For this document, we define controlled hypertension as treatment with antihypertensive medications and both an SBP < 140 mm Hg and a DBP < 90 mm Hg. Definitions of controlled hypertension are subject to national guidelines and change over time.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertension control rate*				
Please enter the percentage of hypertension control in applicable columns to the right				
■ **Lack of hypertension control in those with low cardiovascular risk** *Please write the percentage of uncontrolled hypertension in those at low cardiovascular risk in applicable columns to the right*				

* Definition of indicator. The proportion of adults with hypertension who report taking medication for high BP or who have a diagnosis of hypertension and both an SBP < 140 mm Hg and a DBP < 90 mm Hg.

(Continued)

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
■ **Lack of hypertension control in those with moderate cardiovascular risk** *Please enter the percentage of uncontrolled hypertension in those at moderate cardiovascular risk in applicable columns to the right*				
■ **Lack of hypertension control in those with high cardiovascular risk** *Please enter the percentage of uncontrolled hypertension in those at high cardiovascular risk in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress to achieving the indicator target. Provide a sociodemographic profile of those who have hypertension and are treated with drugs but are not controlled.

- What proportion have high cardiovascular risk (10-year cardiovascular risk > 20% or cardiovascular event, diabetes mellitus, or chronic kidney disease) and are not controlled? (Definitions of cardiovascular event, diabetes mellitus, and chronic kidney disease should be based on survey questions; laboratories prefer to use WHO STEPS definitions.)

- Have any interventions been introduced to increase hypertension control in low-control groups?

- Cardiovascular risk should be assessed using country-specific risk charts developed by WHO.

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* Definition of indicator. The proportion of adults with hypertension who report taking medication for high BP or who have a diagnosis of hypertension and both an SBP < 140 mm Hg and a DBP < 90 mm Hg.

The prevalence of uncontrolled hypertension in people with either a systolic blood pressure level of 160 mm Hg or higher or a diastolic blood pressure level of 100 mm Hg or higher identifies those at high risk for progression of hypertension and at high cardiovascular risk directly related to blood pressure level.

The sociodemographic characteristics of people with SBP ≥ 160 mm Hg and/or DBP ≥ 100 mm Hg should be assessed to identify population subgroups that may need enhanced therapeutic interventions.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Uncontrolled hypertension in those with either systolic blood pressure of 160 mm Hg or higher or diastolic blood pressure of 100 mm Hg or higher *Please enter the percentage of uncontrolled hypertension in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. Prevalence of uncontrolled hypertension is defined as the proportion of adults with an SBP > 160 mm Hg and/or a DBP > 100 mm Hg of those with hypertension.

POPULATION HEALTH QUESTIONNAIRE SURVEYS

Population health questionnaire surveys are less expensive to conduct than physical measures surveys and are often conducted through telephone interviews. Similar to physical measures surveys, the respondents should be representative of the population. Hypertension questions from the STEPS physical measures survey can be used to track some of the hypertension indicators included in questionnaire surveys [28].

POPULATION HEALTH QUESTIONNAIRE SURVEYS:
Proportion of people who have never or infrequently had their blood pressure assessed

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The STEPS survey asks: "Have you ever had your blood pressure measured by a doctor or other health worker?" This information can be used to assess people who have never had their blood pressure assessed. In more economically developed countries, most individuals will have had their blood pressure assessed, and an additional question can be asked to determine when the most recent blood pressure assessment occurred.

The Canadian Community Health Survey asks those who respond affirmatively that they have had their blood pressure assessed "When was the last time?"

(response options are < 6 months ago, 6 months to < 1 year ago, 1 year to < 2 years ago, 2 years to < 5 years ago, ≥ 5 years ago) [33]. The sociodemographic characteristics of those who have never had a blood pressure measurement should be assessed to identify population subgroups that may need targeted screening and diagnostic interventions. Similarly, those who have had infrequent blood pressure assessments can be examined to determine whether they may need targeted screening and diagnostic interventions.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Blood pressure measurement *				
■ **Please enter the prevalence of those who have had their blood pressure assessed in applicable columns to the right**				
■ **Please enter the prevalence of those who have had their blood pressure assessed within 6 months in applicable columns to the right**				

(Continued)

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
■ Please enter the prevalence of those who have had their blood pressure assessed 6 months to < 1 year ago in applicable columns to the right				
■ Please enter the prevalence of those who have had their blood pressure assessed 1 year to < 2 years ago in applicable columns to the right				
■ Please enter the prevalence of those who have had their blood pressure assessed 2 years to < 5 years ago in applicable columns to the right				
■ Please enter the prevalence of those who have had their blood pressure assessed ≥ 5 years ago in applicable columns to the right				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

- Provide a sociodemographic profile of those who have not had their blood pressure assessed as well as those who have not had their blood pressure assessed within 2 years to < 5 years and ≥ 5 years ago.

- Have intervention initiatives been introduced to increase screening for or diagnosis of hypertension in subgroups who either have not had their blood pressure assessed or have had it assessed infrequently?

* Definition of indicator. The proportion of the adult population who report having had their blood pressure assessed and the proportion of the adult population with a blood pressure measurement 6 months ago, 6 months to < 1 year ago, 1 year to < 2 years ago, 2 years to < 5 years ago, and ≥ 5 years ago.

POPULATION HEALTH QUESTIONNAIRE SURVEYS: Hypertension awareness (of diagnosis)

As noted, the STEPS survey asks the following two yes/no questions: Have you ever been told by a doctor or other health worker that you have raised BP or hypertension? and During the past 2 weeks, have you been treated for raised BP with prescribed drugs (medication) These two questions are used to track awareness of a hypertension diagnosis [28].

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertension awareness (of diagnosis)* *In applicable columns to the right, please enter the prevalence of the adult population who report having been diagnosed with hypertension by a health professional or who report currently taking medication for high BP*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. The proportion of the adult population who report either having been diagnosed with high blood pressure by a health care worker or currently being treated with medication for high blood pressure.

POPULATION HEALTH QUESTIONNAIRE SURVEYS: Hypertension drug treatment rate

The STEPS survey question "During the past 2 weeks, have you been treated for raised BP with drugs (medication) prescribed?" is used to track hypertension treatment rates. The ratio of rate of hypertension treatment to awareness of diagnosis can help track whether there is an increasing proportion of those with diagnosed hypertension who are being treated [28].

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertension drug treatment rate *In applicable columns to the right, please enter the prevalence of the adult population who report currently taking medication for high BP*				
■ **Ratio of drug treatment to diagnosis of hypertension** *In applicable columns to the right, please enter the ratio of those reporting hypertension drug treatment to those who report having been diagnosed with hypertension*				

• Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. The proportion of the adult population who report being currently treated with medication for high blood pressure.

ANTIHYPERTENSIVE DRUG PRESCRIPTIONS

Antihypertensive drug prescriptions can be monitored from several sources and can provide a rapid surrogate assessment of hypertension drug treatment at the population level [25]. Multiple sources of drug prescribing or drug sales data may be available. National drug plans, large pharmacy chains, commercial data companies, and drug importation data can also be used. The data will have differing validity according to how well the data source represents overall drug use, precluding comparisons across jurisdictions with different data sources. It is also useful to track drugs that are core drugs (recommended to be used in standardized hypertension management algorithms) as well as overall antihypertensive drug use.

The numerator and denominator are likely to depend on the data source and the population covered by the data source, and they can be expressed per drug sale or drug prescription in the population covered by the data source over a given time or expressed simply by numbers of drugs or drug prescriptions over given time periods (e.g., 40,000 antihypertensive prescriptions per 100,000 adult population in 2016).

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Antihypertensive drug prescription rate* _Please enter the antihypertensive drug prescription rate in applicable columns to the right_				
■ **Core antihypertensive drug prescription rate**** _Please write the antihypertensive drug prescription rate in applicable columns to the right_				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

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* Definition of indicator. The rate of prescribing total antihypertensive drugs per annum. Antihypertensive drugs include all BP-lowering drugs available in the country, excluding short-acting high-potency (loop) diuretics and drugs predominantly used for management of heart failure (carvedilol) and arrhythmia (sotalol).

**Definition of indicator. The rate of prescribing basic antihypertensive drugs per annum. Basic antihypertensive drugs are those recommended in the standardized hypertension being used in the hypertension control program.

CLINIC REGISTRIES

It is highly recommended that programs designed to control hypertension have clinic registries with performance reporting to enhance clinical control [13]. Registries also serve a dual purpose of monitoring and evaluating clinic-based interventions and clinic/clinician performance. Aggregate data can provide population estimates of hypertension prevalence and control rates at the community, subnational, and national levels; however, they cannot be used to evaluate those who do not access the health care system or those who have hypertension but are not registered. Sentinel surveillance of clinic registries can also provide estimates of clinic-based interventions if the clinics surveyed are representative.

CLINIC REGISTRIES: Prevalence of hypertension

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Prevalence of hypertension* *Please enter the hypertension prevalence in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. Percentage of the clinic adult population who have been diagnosed with hypertension (i.e., registrants).

CLINIC REGISTRIES: Cardiovascular risk assessment

This indicator is used to evaluate clinics' assessment of cardiovascular risk in those with hypertension. The indicator can be used where programs use cardiovascular risk as a threshold for treatment or a standard of care. In these programs, a change in risk status (i.e., a known increase in a risk factor such as blood pressure) should cause the risk to be reassessed.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Cardiovascular risk assessment* *Please enter the percentage of registrants who have had a cardiovascular risk assessment in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. The percentage of registrants with a recorded cardiovascular risk assessment within 5 years.

CLINIC REGISTRIES: High cardiovascular risk during drug treatment

This indicator is intended to track registrants with high cardiovascular risk who are being treated with medication for hypertension. The indicator can be used where programs use cardiovascular risk as a threshold for treatment.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
High cardiovascular risk* *Please enter the percentage of registrants at high cardiovascular risk taking antihypertensive medication in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

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* Definition of indicator. The percentage of registrants with calculated 10-year cardiovascular disease risk ≥ 20% or cardiovascular disease, renal disease, or diabetes mellitus and an SBP ≥ 140 mm Hg or a DBP ≥ 90 mm Hg while taking antihypertensive medication.

CLINIC REGISTRIES: High cardiovascular risk without treatment

This indicator is intended to track registrants with high cardiovascular risk who are not being treated with medication for hypertension. The indicator can be used where programs use cardiovascular risk as a threshold for treatment.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
High cardiovascular risk without antihypertensive medication* *Please enter the percentage of registrants at high cardiovascular risk who are not taking antihypertensive medication in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. The percentage of registrants with calculated 10-year* cardiovascular disease risk ≥ 20% or cardiovascular disease, renal disease, or diabetes mellitus and an SBP ≥ 140 mm Hg or a DBP ≥ 90 mm Hg and not taking antihypertensive medication.

CLINIC REGISTRIES: Controlled hypertension

This indicator is designed to track the overall hypertension control rate in all registrants. The HEARTS indicator provides the control rate in a recent cohort of clinic registrants and tracks the short-term impact, which is especially important at the start of an initiative. The PAHO-WHL indicator evaluates the overall impact of the effort to control hypertension at the clinic level.

Outcome indicator	Baseline	First time point	Current time point	Target level Target date
Controlled hypertension* *Please enter the control rate in applicable columns to the right*				

- Description of key actions relating to progress in achieving the indicator target.

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* Definition of indicator. Percentage of registrants with controlled hypertension (systolic blood pressure < 140 mm Hg and diastolic blood pressure < 90 mm Hg). Registrants without a valid blood pressure measurement in the last year are considered "uncontrolled."

DEATH FROM HYPERTENSION-RELATED DISEASES

Rates of death from hypertension-related diseases in the geographical area where the initiative is being implemented should be tracked to ensure that the initiative is having its desired impact on population health.

The indicators selected are among those recommended to be used by WHO for reporting country-level causes of death [35]. They include total cardiovascular diseases (International Classification of Diseases (ICD) (10 codes I00-I99), hypertensive heart disease (ICD 10 codes I10-I15), ischemic heart disease (ICD 10 codes I20-I25), and stroke (ICD 10 codes I60-I69).

The analysis can include changes in age-adjusted death rates over time in relationship to the start of the hypertension control initiative, as well as associations between changes in age-adjusted hypertension-related death rates and changes in antihypertensive prescription patterns or changes in hypertension treatment and control rates. If feasible, a control area can be used for comparison. Non-age-adjusted data can be used to assess short-term trends.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Total cardiovascular disease death rate* *Please enter the age-adjusted total cardiovascular disease death rate in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. Age-adjusted rate of death from cardiovascular disease (ICD 10 codes I00-I99) per 100,000 population.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Hypertensive heart disease death rate*				
Please enter the age-adjusted hypertensive heart disease death rate in applicable columns to the right				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. Age-adjusted rate of death from hypertensive heart disease (ICD 10 codes I10-I15) per 100,000 population.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Ischemic heart disease death rate*				
Please enter the age-adjusted ischemic heart disease death rate in applicable columns to the right				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

* Definition of indicator. Age-adjusted rate of death from ischemic heart disease (ICD 10 codes I20-I25) per 100,000 population.

Outcome indicator	Baseline (add date)	First time point (add date)	Current time point (add date)	Target level Target date (add target and date)
Stroke death rate* *Please enter the age-adjusted stroke death rate in applicable columns to the right*				

- Description of key actions and learnings with dates relating to progress in achieving the indicator target.

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* Definition of indicator. Age-adjusted rate of death from stroke (ICD 10 codes I60-I69) per 100,000 population.

FINAL REMARKS

This document has provided three sets of indicators. First the core indicators that have been defined by WHO Global HEARTS Initiative in its Systems for Monitoring module which allows for global comparisons and the PAHO-WHL core indicator for registry coverage. Secondly, the PAHO-WHL process and structure indicators and thirdly, the optional outcome indicators.

PAHO-WHL outcome indicators are optional and need to be selected based on the surveillance mechanisms in place and what is feasible to implement. Although the number of indicators selected by each country is important, more important are sustainability, standardization of reporting, and indicator and reporting quality.

Other indicators apart from those proposed in this document may be useful to consider. Patient-centered indicators for hypertension are being developed by the International Consortium for Health Outcomes Measurement (http://www.ichom.org/) and should be available in early 2018. Countries could integrate unique patient-centered indicators to enhance monitoring of the outcomes most important to patients. Countries report DALYs for hypertensive heart disease, ischemic heart disease, and stroke, and these outcome measures could also be useful to assess [35]. In Canada and elsewhere, administrative re-cords are used to track the diagnosis of hypertension and to link diagnoses to various relevant outcomes [36]. Electronic clinical records, although not essential, should be considered as a very good investment because they allow for better accountability, better clinical monitoring, and better performance evaluations of health care organizations. Assessing the validity of administrative data is important prior to using this form of information. Monitoring knowledge, attitudes, and practices among health care professionals can also help assess barriers to and facilitators of initiatives. The World Hypertension League has recently developed a knowledge, attitudes, and practices (KAP) survey for health care professionals designed to assess barriers and facilitators related to hypertension control initiatives and the core concepts of the HEARTS technical package [37]. Some national hypertension initiatives have also developed KAP surveys to assess patients with hypertension [38, 39]. To our knowledge, however, there is no patient- or user KAP survey specifically designed to assess the HEARTS concepts.

Monitoring and evaluation offer much needed feedback to program managers, implementers and decision makers, in addition to tracking progress and helping to identify critical programmatic success factors. Supporting countries to adopt agile and sustainable monitoring and evaluation systems, strengthens health systems response and moves us forward to global NCD control goals.

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