National strategic planning and adaptation manual for integrated NCD case management in low-resource settings

WHO PEN- HEARTS- IMAI

Draft

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Contents

1. Introduction

Noncommunicable Diseases (NCDs) are growing as a public health challenges in all parts of the world. In low resource settings, this can be especially pronounced in the absence of systematic NCD case management within health services, leading to high morbidity, premature mortality and financial hardships for the patients and their families. In many low resource settings, the only substantial public health efforts to date have been population-based prevention approaches to reduce NCD risk factors. These are critically important and must be given high priority but early detection, secondary prevention and good case management are also important. A substantial proportion of NCD premature mortality can be prevented and controlled through good case management using a structured delivery system.

This manual, *National strategic planning and adaptation manual for integrated NCD case management in low-resource settings,* suggests a framework for strategic planning for service delivery of Global HEARTS and other WHO-PEN case management interventions with an emphasis on delivery through primary health care. Strategic planning at national level should precede implementation planning for NCD management in a district (which is a defined geographic area with a specified catchment population, a number of primary health facilities and at least one hospital). The manual is aimed at national managers and partners, although it can also be referred to by the district management team.

It describes the governance and national level support required for successful implementation of the integrated NCD service delivery model in a district.

A goal is to develop a district-based approach to integrated NCD case management which is capable of going to scale in phases in a district, then more districts, and eventually the entire country.

WHO PEN provides the evidence-based, cost effective interventions for NCD case management and many suggestions for the efficient use of limited health care resources to produce patient centered, community based and sustainable health care.

This manual and the companion district implementation planning manual and operations manual for primary health care facilities are focused on delivery at through the primary health care system, with back-up from the district hospital and close collaboration with the community.

National CVD/NCD case management strategic planning and adaptation should result in:

- adapted health facility survey instrument for baseline assessment of CVD/NCD case management
- estimated national needs for HEARTS/NCD case management plus survey data which can be used for district estimates
- prioritized HEARTS/NCD case management interventions
- decisions on NCD services by level of health system
- decisions on human resources including task-sharing/task-shifting policy decisions
- decisions on provision of NCD medicines, essential technologies and laboratory by level of health system
- adapted NCD clinical guidelines
- choice and adaptation of training materials
- adapted first-level facility operations manual
- adapted longitudinal patient monitoring system.

This manual should be used alongside the *HEARTS monitoring guide* and the *WHO/PATH national and district manual on essential medicines and technologies*, once available.

These decisions, adapted tools, and data for estimates should be provided to the district management team, to use in their implementation planning and support. This is guided by a separate manual, *Integrating NCD case management interventions into district health services- for district managers,* suggests a service delivery and implementation planning framework for NCD case management interventions at district level.

2. Scope, purpose and assumptions of the manual

This manual is aimed at national managers, key partners and stakeholders, and collaborating programmes. The manual aims to describe in a specific and practical way, service delivery models and system requirements to implement quality NCD case management, particularly in low resource countries. This is a global tool for regional and country adaptation.

This is a manual, not a training course, although it could be used within a training with additional development of training materials.

In proposing steps to national strategic planning and adaptation, we aim to

- help managers at the national level to develop a strategic plan for strengthening NCD case management with emphasis on risk-based cardiovascular and diabetes management
- to suggest how the interventions can be effectively delivered, by which cadre and at what level of the health system
- guide the adaptation of clinical guidelines, training curricula, and monitoring tools

The overall framework of this manual and the NCD district implementation manual are that CVD/ NCD case management services are being added and integrated within existing health services:

- Integration of quality NCD case management interventions is into an existing health care delivery system.
- Service delivery is integrated, for the range of NCDs which can be cared for as well as acute care, “acute on chronic” care, and referral between levels of the district health system.
- Emphasis is on decentralized service delivery at the front lines of the health system.
- Patient-centered primary care is delivered through a team approach with community participation[1].
- The system aims to be both sustainable and capable of going to scale, to reach high coverage within the districts.

There is an important intersection of NCD care with the core functions of primary health care: care that is longitudinal, coordinated, patient-centered, integrated, comprehensive, equitable, and accessible[2], delivered at the front lines of health systems. This recognition is particularly important given evidence that some averted NCD-related mortality is due to case management, including primary prevention, anti-thrombotic and reperfusion therapies, and secondary prevention.[3]

The manual aims to guide integration of core NCD case management services, based on WHO PEN and Global HEARTS, into primary care and hospital referral care within a district. Because of the very large number of cases of NCDs or risk factors needing management and the limitation in human resources, in most low-resource countries:

- Task-sharing and task-shifting are essential- basic services need to be delivered by a non-physician health worker, delineating what can be done at a primary health centre and outpatient of district hospital. This requires training, mentoring and ongoing support for high quality NCD case management.
- CHWs and NCD “expert patients” will often need to play a role in both screening and monitoring treatment adherence.

NCD related service delivery – like other complex health interventions– requires strong district level organization and management to support decentralized service delivery, access, and quality of care for the very large numbers of patients requiring chronic NCD care.

Why integrated service delivery within primary health care makes sense for NCD case management[4]

Most people have more than one risk factor and/or NCD. Therefore, it makes sense to treat their conditions and risk factors within an integrated framework of care.	Many NCDs have common primary and secondary risk factors- smoking, diet, physical inactivity. Patient often have more than one condition or risk factor, for example, hypertension and obesity, or hypertension and diabetes and/or asthma.
Most NCDs and chronic infectious diseases such as HIV care with antiretroviral therapy (ART) or TB place similar demands on health workers and health systems.	Comparable ways of organizing chronic care and managing these conditions are similarly effective regardless of aetiology. [5],[6],[7]
Patients with NCDs have other acute health problems and "acute on chronic" episodes of deterioration that lead them to acute care settings.	
There are important associations between NCDs and communicable diseases.	• Diabetes triples the likelihood of developing TB.[8] • Patients in HIV care on ART can develop metabolic syndrome characterized by high blood glucose, high cholesterol, insulin resistance, fatty liver, increased abdominal fat and increased risk of diabetes and cardiovascular disease[9] and therefore CVD morbidity and mortality, requiring treatment (and suggesting the value of an integrated management strategy with co-management of metabolic syndrome and HIV). • HPV infection leads to cervical cancer and can be prevented with adolescent immunization. • Hepatitis B immunization can prevent many liver cancers. • Group A streptococcal pharyngitis can lead to acute rheumatic fever/chronic rheumatic heart disease. • Common severe infections such as pneumonia and sepsis are common complications and causes of mortality in patients with NCDs especially diabetes. [10]
NCDs may be discovered or cause special problems for pregnant women.	Pregnant women may • Have NCD precursors such as gestational diabetes or pre-eclamptic hypertension or • Have already established chronic NCDs (hypertension, diabetes) or • Suffer higher maternal mortality due to valvular heart disease such as rheumatic heart disease (RHD), or particular maternal problems such as peripartum cardiomyopathy.
Infants, children, adolescents and young adults may present at various times in under 5 clinic, adolescent clinic or acute care clinic with signs of cardiovascular disease.	They may present with: • congenital heart disease • acute rheumatic fever or • rheumatic heart disease.

While acute medical problems will always require the attention of the clinical team, approaches that are oriented toward acute illnesses are inadequate to address the growing number of people with NCDs. Chronic care of NCDs needs to be integrated across time, place, and conditions. The health system needs to provide full health care services, from clinical prevention through treatment and end of life. This needs to be done collaboratively within clinical teams and with patients and their families. These special requirements have been summarized as the general principles of good chronic care. [11]

These general principles of good chronic care were derived from the WHO NMH Innovative Care for Chronic Conditions framework for assisting countries to reorganize their health care for more effective and efficient prevention and management of chronic conditions.[12] The Framework is centred on the idea that optimal outcomes occur when a health-care triad is formed. This triad is a partnership among patients and families, health-care teams, and community supporters that functions at its best when each member is informed, motivated, and prepared to manage their health, and communicates and collaborates with the other members of the triad. The triad is influenced and supported by the larger health-care organization, the broader community, and the policy environment. When the integration of the components is optimal, the patient and family become active participants in their care, supported by the community and the health-care team.

Individuals with chronic conditions will need to interact with the health system on a regular basis, often for life; follow up with medical appointments and laboratory testing; sustain healthy behaviours, such as treatment adherence, good nutrition, physical activity, and smoking cessation. This requires a good chronic care system. Many will be familiar with this approach as it was embodied in most chronic HIV care/ART programs.

General principles of good chronic care

1. **Develop a treatment partnership with your patient.**

2. **Focus on your patient's concerns and priorities.**

Patient-centred care is health care that establishes a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect the patients' wants, needs, and preferences, and that patients have the education and support they need to make decisions and participate in their own care. Studies show that orienting health care around the preferences and needs of patients improves a range of clinical outcomes.

3. **Use the 5 A's: Assess, Advise, Agree, Assist, and Arrange[13],[14].**

The 5 A's approach is a proven behavioural strategy to guide clinical interactions.

4. **Support patient self-management.**

5. **Organize proactive follow-up.**

6. **Involve "expert patients", peer educators and support staff in your health facility.**

- Choose patients who:
  - understand their disease well;
  - are good communicators;
  - are respected by other patients; and
  - have time to be involved on a regular basis.
- Ensure they understand and will respect shared confidentiality.
- Ensure they do not exceed their expertise or areas of responsibility.

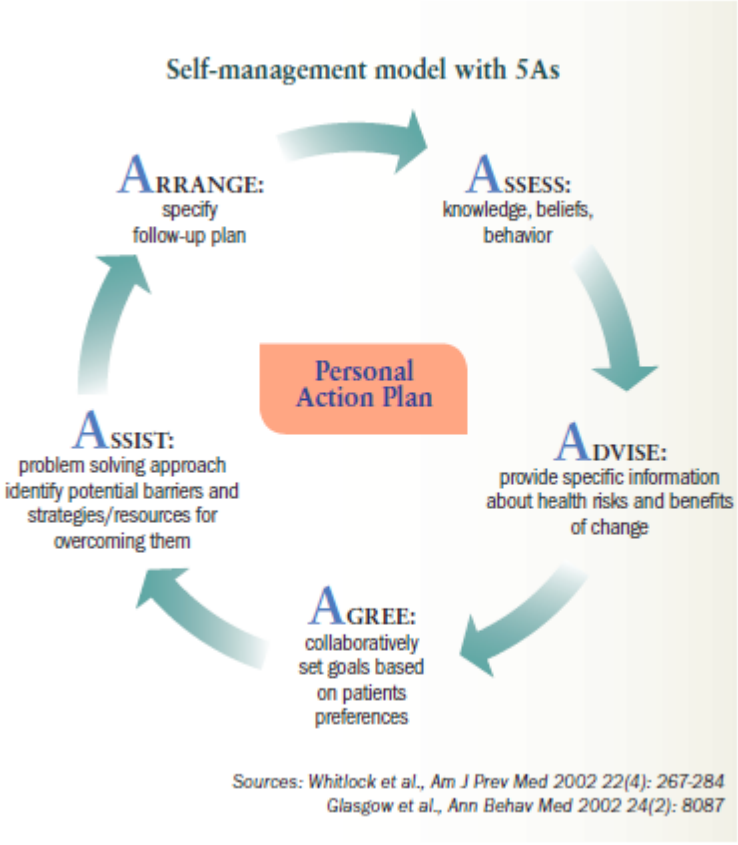
7. **Link the patient to community-based resources and support.**

8. **Use written information – registers, treatment plan, treatment cards and written information for patients – to document, monitor and remind.**

9. **Work as a clinical team.**

10. **Assure continuity of care.**

FIGURE 2. The "5As" Self-Management Model



Sources: Whitlock et al., Am J Prev Med 2002 22(4): 267-284
Glasgow et al., Ann Behav Med 2002 24(2): 8087

3. Strategic planning for NCD case management- process and requirements

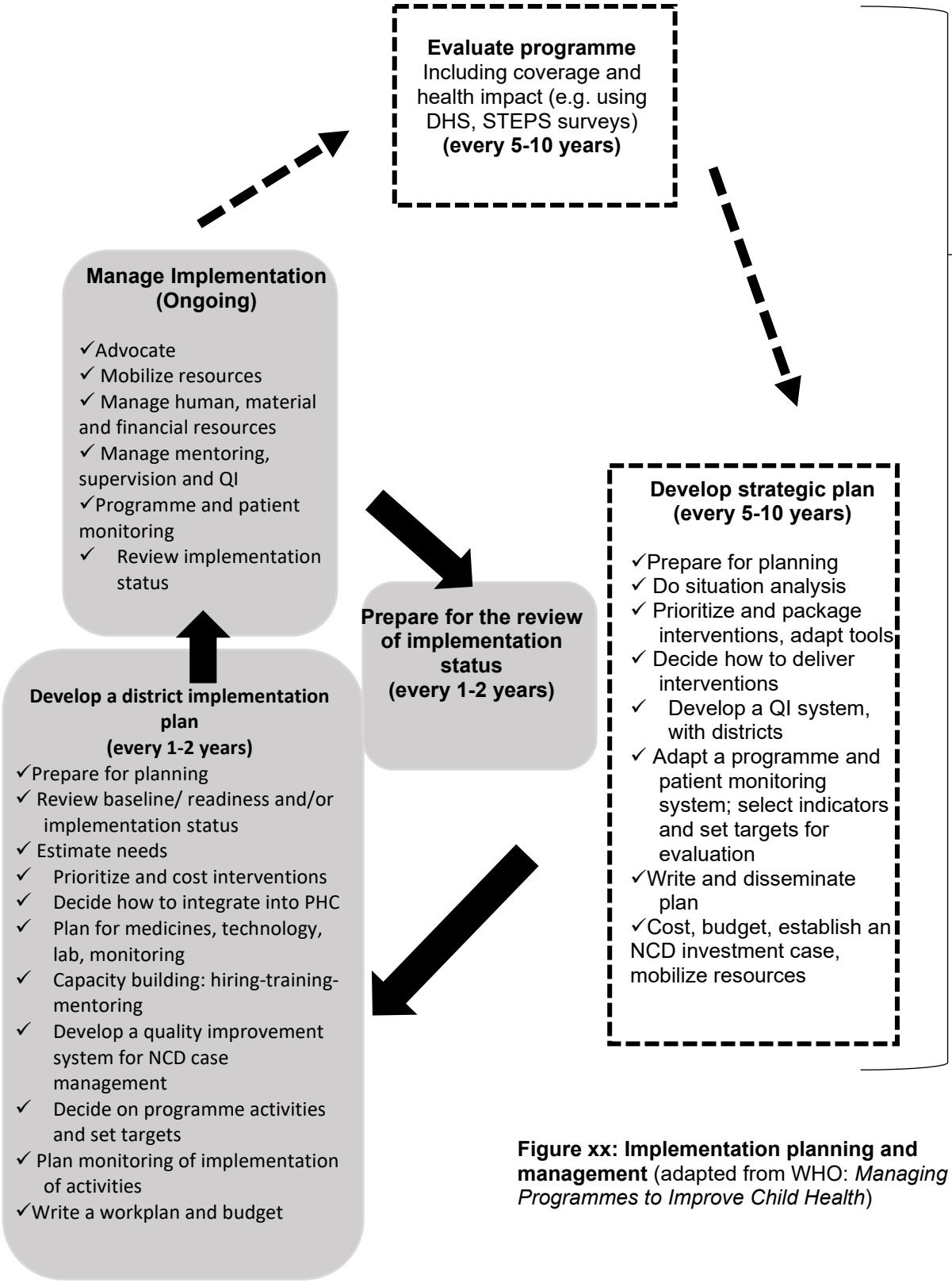


Figure xx: Implementation planning and management (adapted from WHO: *Managing Programmes to Improve Child Health*)

In many low-resource settings, the only substantial public health efforts to date have been population-based prevention approaches to reduce NCD risk factors. This emphasis may appear in the current national NCD strategic plan. An updated strategic plan for NCD case management needs to be added to the current plan or included in the next version. As national strategic plans often require a long formal process for adaptation, strategic planning to update the case management component could be provisional, with initial implementation in a demonstration or pilot district, then revised before formal inclusion in the next NCD national strategic plan.

Strategic planning and adaptation of tools for implementation requires substantial data review and many policy decisions. In some countries, these decisions will be made in the context of setting up a demonstration district.

- Assess country baseline and readiness for NCD case management and review the health system (chapter 4)
- Estimate national need for NCD case management (chapter 5).
- Prioritize what case management interventions should be offered (chapter 6).
- Review the current service delivery models and develop policies/directives on how to integrate core CVD/NCD case management into primary care and hospital referral care (chapter 7)
- Adapt the CVD/WHO-PEN NCD clinical guidelines and tools to operationalize these guidelines (chapter 8)
- Adapt and establish a patient and programme monitoring system and integrate it into the national HMIS (chapter 9)
- Health workforce and capacity building: make decisions/set policies on what services by level of care and cadre; task-shifting/task-sharing; choice and adaptation of training materials (chapter 11); mentoring
- Consider linkages with the community (chapter 14)
- Establish and maintain essential laboratory and other diagnostic capacity for NCD case management (chapter 15) and essential medicines and technologies for NCD treatments (chapter 14 and WHO/PATH national/district manual when available)
- Bring all these components together within a national strategic plan (chapter 12)
- Support a quality improvement system for NCD case management (chapter 16)
- Make a budget, develop an investment case for NCD case management, and find financing (chapter 17)

National CVD/NCD case management strategic planning and adaptation should result in:

- adapted health facility survey instrument(s) for baseline assessment of status of (CVD)/NCD case management
- estimated national needs for HEARTS/NCD case management plus survey data which can be used for district estimates
- prioritized HEARTS/NCD case management interventions
- decisions on NCD services by level of health system
- decisions on human resources including task-sharing/task-shifting policy decisions
- adapted clinical guidelines
- choice and adaptation of training materials
- adapted first-level facility operations manual
- adapted patient monitoring system

4. Assess country baseline and readiness for NCD case management- health system overview

It is important to assess the current baseline of NCD care and to estimate readiness of health facilities to begin, improve or expand NCD case management. Readiness assessments have been conducted in many countries to assess the capacity of health systems to implement NCD case management[15], [16], [17], [18].

> Example: A 2015 study of the readiness of Ugandan health services for chronic disease management showed little current preparedness of lower level facilities to delivery NCD services, specifically identifying lack of operational guidelines, diagnostic equipment, and essential medicines for the primary management of NCDs, as well as weak reporting systems and training among clinical and nursing officers. They did, however, identify substantially better HIV services at this level as an indication of the feasibility of NCD care and as a platform from which to build.[16]

A readiness assessment assumes that an organized NCD case management programme does not already exist; if one does, you should refer to the implementation plan and review status of indicators related to availability, access, demand and quality of health services and knowledge of the population related to NCDs (see Chapter 16). Often, various components of NCD case management have been included in national clinical guidelines linked with an essential medicine list, but have not been systematically supported by an NCD programme and are not broadly implemented.

Readiness assessments should include an estimation of the current NCD case management baseline in each district, or in selected district(s) planned for initial NCD case management activities. Districts should list the current number of patients receiving NCD case management services, availability of trained staff, existing within-hospital processes for case management and referral, etc. See chapter 3 in the *NCD district implementation planning manual*.

At national level, data from specific research studies or WHO Services Available and Readiness Assessment (SARA) Tool[19] data related to NCD case management readiness may be available. These often focus on medicine and equipment availability. (SARA addresses many domains and indicators; those relevant to NCD case management readiness are listed in Annex A). Summarize these data.

The national team can also adapt the HEARTS-specific health facility survey (see *HEARTS monitoring module*), then provide this to district teams, for use in their health facilities.

5. Estimate the national needs for NCD case management

You should estimate the expected numbers of people with specific NCDs, focussing on elevated cardiovascular risk and diabetes. This will help you estimate the requirements for NCD health services, both clinical care and lifestyle counselling, to reduce risk factors and managed established disease. You also should gather key data that provides the context to these case management efforts (see list at the end of this Chapter).

Potential sources for estimating NCD case management needs:

Data source	Comments
HMIS data may summarize outpatient visits, data from dispensing registers, and inpatient registers.	Data on NCDs such as hypertension and diabetes may be aggregated from this. The only details recorded in these registers are often the diagnosis and treatment given on that particular visit or hospitalization. No link exists to previous visits. Chronic care visits are often mixed which also contain data from all acute conditions. Estimates of NCDs in HMIS data from adults seeking care in primary health care thus often have several problems. They can seriously underestimate hypertension and diabetes as many ambulatory cases are asymptomatic ("invisible" in a medical OPD[20]) prior to initiating and supporting screening for cardiovascular risk and diabetes assessment. Many health facility outpatient registers from which HMIS indicators are extracted track visits, not cases; patients returning several times are counted more than once in the absence of a longitudinal record and register.
STEPS survey results or results from DHS surveys which have added NCDs with measurements of fasting blood glucose and blood pressure.(USAID DHS 2015).	Most STEPS surveys can provide population data on hypertension, diabetes, BMI/obesity, smoking, alcohol use, physical inactivity, cholesterol, calculated cardiovascular disease risk percent over next 10 years, and cervical cancer screening. (In some countries, using the STEPs survey results for these estimation purposes may require going back to the original EpiInfo database or detailed reports; summary reports may not provide CVD risk percents). This usually needs to be done at national level, then data provided to the districts, divided by urban and rural estimates.
Demographic surveillance system sites may provide verbal autopsy and other specific data.	InDepth DSS sites exist in many countries in Africa and Asia. An InDepth NCD analysis included a total of 80,726 adult (over 15 years) deaths were documented over 7,423,497 person-years of observation. NCDs were attributed as the cause for 35.6% of these deaths. Slightly less than half of adult NCD deaths occurred in the 15_64 age group. Detailed results are presented by age and sex for leading causes of NCD mortality. [21] may be relevant. These analyses separate with separate consideration of premature (15-64 years) and older (65_ years) NCD mortality.
National data from research studies or vital registration system.	
National estimates provided by the GBD or GHE on the burden of cardiovascular and chronic respiratory disease by cause, cancer, other NCDs, with breakdown of cause of death by age groups	The Global Burden of Disease (GBD) studies produce estimates for all countries, with the most recent findings for 1990-2015 in five-year intervals. Numerical estimates can be downloaded at http://ghdx.healthdata.org/gbd-results-tool or visualised dynamically at http://vizhub.healthdata.org/gbd-compare/. Of note, the WHO Global Health Estimates (GHE) project also produces estimates of cause-specific mortality; their data can be downloaded at http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html. GBD and GHE use many of the same data inputs and statistical methods, but their final estimates vary somewhat due to different demographic methods. One caveat with mortality data for Africa is that there is very low coverage of vital registration systems and has few cause-specific mortality datasets.

WHO regional estimates of the percent of the population by age with CVD risk >= 30%	
Estimates by clinicians	Sometimes you will need to rely on a qualitative estimates by clinicians, hoping to later have better data.

For other NCDs, you may need to look at cause of death calculations and use research study results in your country or neighboring countries. Demographic surveillance systems may have verbal autopsy and other specific data. Sometimes you will need to rely on a qualitative estimate, hoping to later have better data. Remember that these are only estimates for planning purposes, and to estimate current and achieved coverage of interventions. Data at the start of the programme may be inaccurate.

5.1 Use STEPS and other survey results

WHO STEPS survey:
Primary data collected in WHO STEPwise approach to chronic disease risk factor surveillance survey include (note that this may vary between countries):

- socio-demographic information
- tobacco and alcohol use
- nutritional information
- Physical Measurements
  - Blood Pressure
  - Heart Rate
  - Height
  - Weight
  - Waist Circumference
  - Hip Circumference
- Biochemical Measurements from blood collection
  - Blood Glucose
  - Cholesterol
  - Triglyceride

Use national data for national strategic planning. Use the most recent STEPS survey from your country:

- Use the most recent population data, with age breakdowns that match STEPS and with figures for men and women.
- List the population 18-29 years, 30-49 years, and 50-69 years.
- Use the detailed results with age breakdowns rather than the combined age category of 18 to 69 in the simplified fact sheets.
- Use fasting blood glucose >7 for prevalence diabetes, rather than >6.1 which includes prediabetes.

In addition to the national calculations, it is important to also provide both rural and urban STEPS data, to support subsequent district level calculations, using population data from each district. For district calculations, it is better to use the national data rather than the limited sample from participating districts. The district planning team should choose either the rural or urban estimates, depending on the characteristic of most of their district.

Calculate approximate number in the district by multiplying district population figure for (men+women) x disease or risk factor percent.

This will provide separate numbers for people with hypertension, diabetes, cardiovascular risk >30% in the next 10 years.

STEPS data can be re-analyzed to produce CVD risk in the several categories. Other sources of this data may be available.

Use the data to estimate the total size of the problems as well as the current treatment rate for both hypertension and diabetes.

To estimate the number of women that still need cervical cancer screening:

- Use only the population of women, from 30-49 years of age. This figure indicates those who have had screening; subtract this from the total population to obtain the number of women in this age bracket to obtain the number that still need screening.
- This estimate includes both women with and without HIV. To match the guidelines, add the number of women living with HIV from 18 to 29 years. If there are HIV program figures as to the proportion screened, apply these to this number or use an estimate from someone knowledgeable with this population, to calculate the additional women in this age group that need cervical cancer screening.

These calculations provide very basic population needs estimates. They are not exact numbers. *You can compare them in a general way to the current numbers in care for various conditions, to get a sense of the gap and estimated coverage.*

Note that the STEPS surveys often include focus group discussions and were conducted with groups of men and women separately to explore their knowledge, beliefs, perceptions and behavioural practices regarding non-communicable diseases. In-depth interviews were conducted with purposively selected people with NCD risk factors (obesity, diabetes, hypertension) and they were intended to provide a deeper understanding and more insights on broader issues related to NCDs such as experiences lived, changes in lifestyle brought about by their new condition, health care seeking behaviour and patterns, support provided (facility, family, community), and difficulties encountered as a patient suffering from NCD etc. Review this information and provide a summary for district managers, in addition to the STEPS rural and urban quantitative data, to support district estimations.

(1) List district population (do this twice)				(2) STEPS results in percent-- choose rural or urban (3) calculate approximate number in district by multiplying district population figure for (men+women) times percent (except cervical cancer screening- women only)															
	Men	Women	Both	SBP ≥140 and/or DBP ≥ 90mmHG, excluding those on medi-cation for raised BP	N	SBP ≥140 and/or DBP ≥ 90 mmHg or currently on medi-cation for raised blood pressure	N	Raised fasting blood glucose >7 mmol	N	Diagnosed with diabetes, on medi-cation	N	Raised blood glucose OR currently on medi-cation for diabetes	N	Tobacco smokers	N	Total cholesterol ≥ 5.0 mmol/L or ≥ 190 mg/dl or currently on medi-cation for raised cholesterol	N	Cardio-vacular risk for 10 years ≥30%	N
18-29 years				%		%		%		%									
30-49 years				%		%		%		%									
50-69 years				%		%		%		%									
	Men	Women	Both	Obesity >30 BMI	N	Physical inactivity	N			Ever had cervical cancer screening									
18-29 years										xxxxxx									
30-49 years												women only							
50-69 years										xxxxxx									

	Distribution of cardiovascular risk % in 10 years from various data sources		
CVD risk	STEPS survey	Health facility monitoring data-source:……	Health facility monitoring data-source……
PCVD			
CVR >=30%			
CVR 20-30%			
CVR 10-20%			
CVR <10%			

5.2 Look at the breakdown of cause of death by age groups and review mortality reduction targets and definition of premature mortality

> "In 2012, WHO Member States at the World Health Assembly made a resolution to 'adopt a global target of a 25% reduction in premature mortality from non-communicable diseases by 2025' (4), although this has been widely misquoted with the omission of the word 'premature'. The biological reality is that human beings who survive into their 80s and 90s, thereby having avoided death from many other causes, are extremely likely to die of NCDs. The public health imperatives around NCDs therefore relate to preventing or delaying NCD incidence (including risk factor management) and effectively managing chronic conditions in the decades of mid-life."- from InDepth review of NCD mortality[22]

Note that some NCD mortality strikes children and young adults, including rheumatic heart disease, asthma and cancer.

5.3 Estimate the burden of cardiovascular disease by cause

Estimating the burden of ischaemic heart disease/myocardial infarction and rheumatic heart disease will usually have to rely on national data or data from districts, neighbouring countries or regional data.

Cardiovascular disease- estimating the national causes by age group

With increasing CVD risk factors and increasing life expectancy, most low-resource countries are beginning to experience ischaemic heart disease as a problem. The extent of the transition from a predominance of hypertensive and rheumatic heart disease to ischaemic heart disease varies. Within some countries, some experts report a substantial difference between urban and rural districts, with more rheumatic heart disease in rural districts and most ischemic heart disease in urban areas.

Where possible, locally derived data should be used to estimate the relative importance of the many types of cardiovascular diseases, in order to help guide prioritization of interventions. Try to fill out Table z which follows.

The cardiovascular causes of death and disability data seem to vary considerably. Sources include:

- Local research studies such as community studies on CVD morbidity, national prevalence surveys, studies on causes of heart failure, etc
- Aggregated data on CVD morbidity and mortality from the records of specialized cardiovascular treatment centres, district level health facilities where available
- National data on the distribution of CVD risk %

- National cardiology experts
- Clinicians are an important source of data. At national level, what are the clinical experts' impression of the distribution of disease? (This is difficult when ECG and echo data are not available and hospitals lack cardiology expertise. Reliance only on central referral clinical specialists may provide distorted data due to various referral and survival biases.) Also include district clinicians in these discussions.
- Studies on causes of heart failure. Ischemic heart disease (IHD), hypertension, rheumatic fever and other valve disease, cardiomyopathy, cardiopulmonary disease, congenital heart disease, and other factors may all lead to heart failure. See the Thesus-HF study on non-fatal heart failure[23] and the 2013 systematic review and pooled analysis of the major underlying risk factors for heart failure in six world regions,[24] in which the crude IHD prevalence among heart failure patients was >50% in Europe and North America, approximately 30–40% in East Asia and Latin America and the Caribbean, and <10% in sub-Saharan. Specific data may be available from your country. However, these studies summarize data from tertiary centres, whereas most heart failure deaths occur at home.
- InDepth DSS verbal autopsy data[25] may be relevant.
- GBD and GHE estimates. The GHE estimates by cause, age, sex and country can be found at
  http://www.who.int/healthinfo/global_burden_disease/estimates/en/index2.html
  Note that verbal autopsy cannot be used to identify deaths from certain cardiovascular causes such as RHD, which probably biases estimates from these causes downward. Review these data and ask clinicians to assess their reliability- for example, the high rates of ischemic heart disease in children in some country DALY estimates [for example, Uganda GBD]. SubSaharan analyses show more deaths from stroke than ischaemic heart disease.[26]

Bukhman has pointed out that whereas death from heart failure (HF) in high income countries is largely a problem of the very elderly with ischaemic heart disease, in sub-Saharan Africa it often causes death and suffering among the young due to a more varied set of conditions, of which coronary artery disease is still a small contributor in many countries.[27] Sliwa describes the "..high burden of complex cases in young individuals and women (a pattern rarely seen in high-income countries) and also the intrinsic balance between historically prevalent and emergent forms of heart disease."[28]

Summarize the available data as follows in Tables A and B:

Table A Review cardiac data from various sources relevant to your country

	Causes of heart failure	Cause of CVD death from studies within your country	InDepth verbal autopsy studies	Local clinical experts' impression-urban districts	Local clinical experts' impression-rural districts	Summary estimate of relative importance (including GBD, table B) + ++ ++++ +++++
Ischemic heart disease						
Hypertensive heart disease						
Rheumatic heart disease						
Congenital heart disease						
Endomyo-cardial fibrosis						
Idiopathic dilated cardio-myopathy						
Right heart failure						
TB pericardial effusion tamponade						
Peripartum cardio-myopathy						
HIV-related cardio-myopathy						

Table B National global burden of disease data – use 2015.

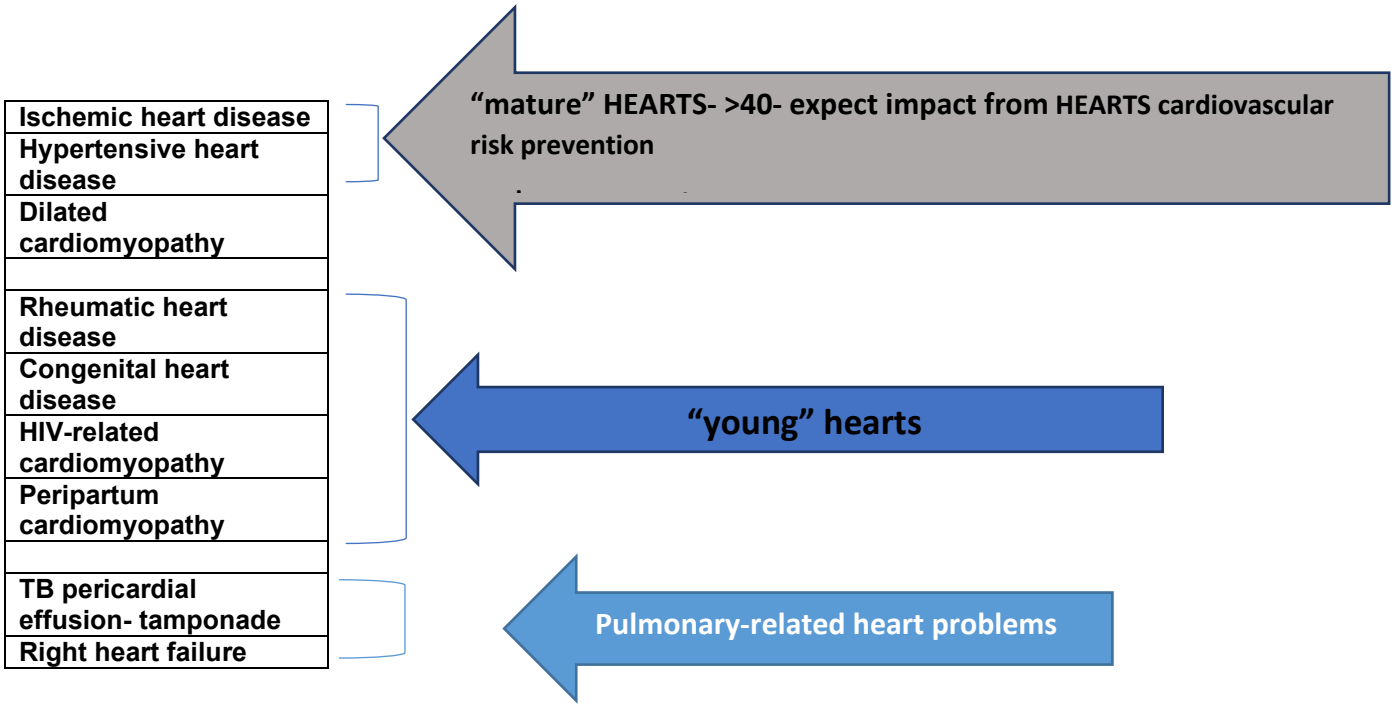
Insert national data from 2015 GBD				AGE							
DALYs				0 to 4	5 to 14	15-29	30-49	50-59	60-69	70+	All ages
Cardiovascular diseases											
1.	Rheumatic heart disease										
2.	Hypertensive heart disease										
3.	Ischaemic heart disease										
4.	Stroke										
	a.	Ischaemic stroke									
	b.	Haemorrhagic stroke									
5.	Cardiomyopathy, myocarditis, endocarditis										
6.	Other circulatory diseases										
YLLs											
Cardiovascular diseases											
1.	Rheumatic heart disease										
2.	Hypertensive heart disease										
3.	Ischaemic heart disease										
4.	Stroke										
	a.	Ischaemic stroke									
	b.	Haemorrhagic stroke									
5.	Cardiomyopathy, myocarditis, endocarditis										
6.	Other circulatory diseases										

Estimate the number of people potentially requiring RHD secondary prophylaxis

Most deaths occur in childhood or early adulthood. Screening for RHD at a population level has been most consistently carried out in children ages 5 to 15 years. See Annex B in the *NCD national strategic planning manual* for a summary of echocardiographic screening results.

RHD is a cumulative disease such that there are more people over 15 years old with the disease than under 15 years. The GBD 2015 study produced estimates of RHD prevalence based on all available data sources globally, including several African countries. The focus of the GBD study was "definite" RHD rather than "borderline" or "possible" RHD, therefore the prevalence estimates in GBD can be viewed as a reliable approximation of the need for secondary prophylaxis in older children and adults. Estimates of RHD prevalence by age, sex, and country can be extracted at http://ghdx.healthdata.org/gbd-results-tool. Summaries of screening studies and prevalence estimates by country are available.

It may be useful to consider the following groupings:



5.4 Estimate the burden of chronic respiratory disease: asthma and COPD

Chronic respiratory diseases (CRDs), particularly asthma and chronic obstructive pulmonary disease (COPD), are major public health problems accounting for a considerable share of the disease burden in low- and middle-income countries (LMICs); their prevention and control can and should be addressed through a public health approach, including the implementation of key interventions at a primary health care level. [29]

Children often account for a substantial proportion of the asthma burden due both to their high proportion of the population and the substantial prevalence of asthma in this age group in many low-resources countries. Management of asthma is a common country adaptation to IMNCI.[30] However, mortality from asthma rises exponentially with age and predominantly occurs in later adult life. Asthma in adults is causing an increasing burden on health services in LMICs, probably related both to increasing prevalence and poor control.[31] Established and cost-effective treatments exist for asthma but are often not available and require continuity of chronic care for effective management. The prevalence of asthma is often lower in rural than in urban districts.[32]

The burden of COPD can be substantial from tobacco with contributions from indoor air pollution and the increasing size of the older population.

Sources include:

- National GBD data
- National cause of death data
- PAL (practical approach to lung health) surveys
- International studies attempting to obtain high quality, well-standardized spirometry from many countries are in progress
- The Burden of Obstructive Lung Disease (BOLD) Initiative has developed a set of methods for estimating COPD prevalence and a model for assessing its economic impact
- ISAAC-3 studies of asthma in children aged 6–7 years and 13–14 years
- National studies such as FRESH AIR Uganda[33]
- GBD estimates for your country (summarize in Table C below)
- Aggregated data on chronic respiratory disease morbidity and mortality from the records of specialized treatment centres, district level health facilities where available
- National pulmonary experts
- Clinicians are an important source of data. At national level, what are the clinical experts' impression of the distribution of disease? This is difficult when spirometry and other pulmonary function data are not available and hospitals lack pulmonary expertise. Reliance only on central referral clinical specialists at the teaching or speciality hospital may provide distorted data due to various referral and survival biases. Also include district clinicians in these discussions.

Table C National global burden data – use 2015

Insert national data from 2015 GBD	AGE							
DALYs	0 to 4	5 to 14	15-29	30-49	50-59	60-69	70+	All ages
Chronic respiratory diseases								
1. Chronic obstructive pulmonary disease								
2. Asthma								
3. Other respiratory diseases								
YLLs								
Chronic respiratory diseases								
1. Chronic obstructive pulmonary disease								
2. Asthma								
3. Other respiratory diseases								

Consider the scale of the NCD problems, particularly CVD/DM. Given the size of the cardiovascular disease, particularly hypertension, diabetes and elevated cardiovascular risk, systems and strategies are needed to diagnose and treat millions with the disease- similar to the ART challenge and response to HIV/AIDS (3x5, PEPFAR), although the treatments are simpler.

Both the HIV/AIDS epidemic and chronic diseases like cardiovascular disease, hypertension and diabetes have many similarities in implementation planning. In both cases, millions of people are in need of diagnosis and treatment. Both HIV and NCDs require life-long chronic care delivered through a system that is capable of scaling up care to a large number of patients who are then retained in care and treatment. The community, patients and families need to be educated. There needs to be easy and wide access to screening (Chapter 6); a large increase in medicines (Chapter 9), diagnostics (Chapter 10), infrastructure; increase in health worker numbers and capacity, using simplified and standardized guidelines, standardized training nation-wide (see Chapter 13); a health system able to deliver these. All this depends on policies to address a complex and large-scale public health with strong district implementation.[34]

5.5 Other contextual data including co-morbidities

Co-morbidities

- Prevalence HIV, number on ART
- Prevalence/incidence TB- is yours a high TB burden country?
- Prevalence wasting / stunting
- Malaria incidence
- Mental health

Health expenditure

- Total Health Expenditure (THE) per capita
- THE as % of GDP
- Government Health Expenditure (GHE) as % of THE
- Private Health Expenditure (PHE) as % of THE
- Out-of-pocket (OOP) expenditure as % of PHE
- Head count ratio of catastrophic health expenditure

Health workforce

- Doctors per 10,000 population
- Nursing and midwifery personnel per 10,000 population

Health Services

- PHC facilities per 10,000 population
- Hospital beds per 10,000 population
- Number of outpatient department visits per person per year (excluding immunization)
- Patient preferences for providers (public/private, hospitals/PHC)
- Births attended by skilled personnel
- Immunization coverage:
  - Hepatitis B
  - HPV
  - DPT3/Penta3 coverage

Community awareness/involvement/careseeking

- Any data related to community involvement / health education / CVD risk awareness activities
- Health care seeking behavior

6. Strategic planning- prioritize what case management interventions should be offered

There are several global strategic plans and/or initiatives for tackling key NCDs in limited-resource settings which are relevant to a strategic plan for the case management component of NCD control:

- **NCD Action Plan 2013- 2020**[35]
- **WHO Package of Essential NCD (WHO PEN) interventions**[36]

> From WHO PEN:
> There are numerous barriers for delivery of NCD interventions at the primary care level, however, there are a large number of NCD conditions and several hundred interventions to address them. Not all of them can be integrated into "close-to-client" primary care facilities in resource-constrained settings. Apart from the lack of resources, there are many other reasons why this is the case. First, interventions available for some NCDs are not cost effective. Second, high technology facilities required for diagnosis and treatment may preclude the delivery of such interventions in primary care. Third, the health financing schemes available may not be able to cover all NCD interventions. Fourth, the skills needed for delivery of all NCD interventions are too complex to be learnt by the primary care workforce. Finally, as there are many competing priority conditions that countries need to address at the primary care level, it is unrealistic to expect low-income countries to integrate care of all NCDs into primary care at once."….. "*What can be done for NCD prevention and control in PHC with a modest increase in investment ?*". As such guidance needs to go well beyond pilot projects and result in sustainable national initiatives…The priority conditions that have been selected …include cardiovascular disease, diabetes, chronic respiratory disease (asthma and COPD) and cancer. The selection was based on the following criteria:
> - They are major public health issues that contribute the most to the global NCD burden.
> - Evidence-based interventions are available for addressing the condition.
> - These conditions share behavioural risk factors: tobacco use, unhealthy diet and physical inactivity.
> - They are the focus of the Global NCD Action Plan."
>
> …..A minimum set of interventions is defined in the WHO Package of Essential NCD (WHO PEN) interventions. Interventions selected are those that are feasible for implementation even in low-resource settings with a modest increase in investment. They can be delivered by primary care physicians and nonphysician health workers in primary care.

- **CDC-WHO Global HEARTS Initiative**- focused on the prevention of heart attacks and strokes through cardiovascular risk based management of hypertension, diabetes, elevated cardiovascular risk.
  - This initiative includes three technical packages to prevent and control CVDs- MPOWER focuses on tobacco cessation interventions; SHAKE, to support governments with evidence-based policy options and examples to help lower sodium consumption; and **HEARTS**, which provides primary care health systems with best practices and tools to improve clinical preventive care for cardiovascular disease. The aim is to prevent cardiovascular disease (heart attacks and strokes) by ensuring equitable access to continuous, standardized, high-quality care for people at high risk. HEARTS is aligned with and builds on the WHO Package of Essential Noncommunicable Disease Interventions for Primary Health Care in Low-resource Settings for strengthening NCD management, and it complements WHO strategies and packages for population-based primary prevention of CVD, including tobacco control and salt reduction.
- **Rheumatic heart disease:**

- The World Heart Federation (WHF) on the Prevention and Control of Rheumatic Heart Disease has issued a position statement supporting action on rheumatic heart disease.[37]
- RHD Action (http://rhdaction.org/) was launched in September 2015 as a global initiative to end RHD in endemic countries with WHF and RhEACH (Rheumatic Heart Disease, evidence, Action Communication and Hope) as the global partners and demonstration sites in Uganda and Tanzania.

> **Demonstration project:** In Uganda, RHD Action is a collaboration of Case Western Reserve University (Cleveland, USA) with several foundational Ugandan partners—Makerere University, the Uganda Heart Institute, and the Joint Clinical Research Center. Other affiliated partners include Children's National Medical Center (Washington, USA), Mbarara University of Science and Technology, and Gulu University School of Medicine. The program aims to leverage a network of existing HIV/AIDS infrastructure (the Joint Clinical Research Center) and expertise of the Uganda Heart Institute to expand access to RHD care throughout the country. By improving RHD care, we will strengthen the health system's capacity to provide basic cardiovascular services (e.g. echocardiography, heart failure management, and anticoagulation monitoring) outside of Kampala. Core components of our program include an electronic online national RHD registry, portable ultrasound, secondary prophylaxis clinics, adherence initiatives, health worker training, school screening and education, and a community/patient advisory board and support group.

•Addis Ababa Communique-In 2006, experts across Africa formulated the ASAP model to end ARF/RHD on the African continent.[38] Using methodologies proposed in this model and the WHF/ RhEACH's "Tools for implementing RHD Control Programmes",[39] the Social Cluster of the AU Commission hosted a consultation with RHD experts in February 2015 to develop a roadmap to eliminate ARF and eradicate RHD in Africa. Seven key actions are recommended for Health Ministers in the Addis Ababa Communiqué on ARF and RHD to reduce mortality from RHD by 25% by the year 2025 in those under the age of 25; Heads of State of member countries adopted this communiqué in June 2015.[40]

- **Avert premature cardiovascular death in people under 30 years**, a complementary strategy focusing on rheumatic heart disease and congenital heart anomalies.[41]
- **Cancer control**
  - WHO guidance on cancer early diagnosis and screening[42]
- **Cervical cancer prevention and control:**
  - Programme guidance[43] and a WHO Cervical Cancer Prevention and Costing (C4P) tool[44] have been developed specifically to assist low and middle income countries (LMICs) in planning cervical cancer control strategies.

Most NCD control activities to date in low-resource countries have emphasized population-based strategies. The NCD Action Plan 2013-2020 includes "At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes. An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities. With little input to improve case management to date, many low-resource countries are still experiencing extremely high case fatality rates as consequences of late diagnosis, lack of access to early detection and care and sub-optimal management of important NCDs.

The 2030 Agenda for Sustainable Development recognizes the huge impact of noncommunicable diseases (NCDs), including CVD, worldwide. It aims to reduce premature deaths from NCDs by one third by 2030 (Sustainable Development Goal target 3.4); strengthen implementation of the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) (3.a); strengthen prevention and treatment to reduce the harmful use of alcohol (3.5); support research and development for medicines for NCDs that primarily affect developing countries (3.b); and achieve universal health coverage (3.8).

Most national strategic plans already include (or should include) the formulation of a national policy for the prevention and control of NCDs, banning the sale of tobacco and smoking in public places, and policies on promotion of a healthy diet and physical activity.[45] Although population-based interventions have been emphasized to date in limited-resource country NCD strategies, many Ministries of Health have progressively added medicines and intervention guidelines for individual level risk reduction and management and treatment of established disease. Some countries have developed national strategic plans for NCD control, usually integrating primary prevention with case management.

A strategic plan for case management is needed before developing a concrete implementation plan at district level.
Input should be obtained from multiple stakeholders. Hopefully development of this national NCD case management strategy included input from "expert patients" with long experience of their conditions.[148] This is also advisable during district level implementation planning.

How to prioritize
All interventions in the table below are evidence-based, derived from WHO-PEN, HEARTS or other sources, although questions remain on the evidence base in Africa and other low-income countries for certain interventions such as aspirin or statins for primary prophylaxis. Consider them systematically by the many factors that can affect priority:

- How cost-effective are the interventions? Several case management interventions have been ranked by WHO as "best-buys."
- Burden of disease-
  - Epidemiology: Are the main causes of premature mortality and serious morbidity being targeted or are there large gaps?
  - Is there a substantial burden in your countryaddressed by the intervention?
  - Will the intervention(s) target those who are mostly likely to benefit due to high risk?
- Feasibility:
  - Already supported by relevant initiatives? What is the coverage? (though may be undersupplied; limited in coverage) What are barriers to improve coverage?
  - What is the quality of existing interventions? What are the barriers to improve quality?
  - How complex is the intervention?
  - What are system requirements?
  - Is there political will to support it? Do policies support or hinder the intervention?
- Are they affordable- in cost of medicines, diagnostics; HR requirements?
- Community: Is there a population demand for the services (felt need)? Is the community likely to accept the intervention?
- Equity: Will all individuals with same needs have same access to the intervention? Does the intervention particularly benefit the poor/those in most need?
- Has the intervention been prioritized nationally as an essential service?

Table 6a. Estimate and prioritize which NCD case management interventions should be offered or expanded* (list includes vaccines for prevention of cancer)

Choice of interventions and thresholds for treatment should then be reflected in adaptation of clinical guidelines, training materials and other implementation tools (chapter 9); if adaptation of chosen or current tools is required, put a tick in that column.

Each intervention is in a row; interventions in primary health care (health centre or hospital outpatient) and at hospital (inpatient and outpatient referral care) are separated.

Clinical conditions**	**Case management interventions: primary care- health centre and hospital outpatient**	**Additional case management in the hospital- inpatient, district clinician in OPD**	**Relevant WHO initiative***	**Already implemented in government health facilities?**	**Adaptatoin needed?**	**NATIONAL PRIORITY INTERVENTIONS FOR NEXT 2 YEARS- check, add notes**
CARDIOVASCULAR/DIABETES						
CVD risk and diabetes assessment	Measure BP		HEARTS / WHO PEN*			
	Measure height, weight and calculate BMI		HEARTS / WHO PEN			
	Measure FBG		HEARTS / WHO PEN			
	Measure HgbA1c (preferred if resources permit)		HEARTS / WHO PEN			
	Measure cholesterol		HEARTS / WHO PEN			
	Calculate CVD risk% in next 10 years based on WHO/ISH or new country-adapted CVD risk charts; make treatment plan based on risk		HEARTS / WHO PEN			
Determine if prior CVD or chronic kidney disease (CKD)	Refer for secondary prevention treatment plan		HEARTS / WHO PEN			
	Monitor anticoagulant treatment for atrial fibrillation after initiation at hospital		HEARTS			
All levels CVD risk	Lifestyle counselling – physical activity, smoking cessation counselling, healthy diet, weight loss if overweight or obese,		HEARTS / WHO PEN			

	avoid harmful use of alcohol					
	Glycaemic control DM (see below Diabetes)		HEARTS / WHO PEN			
	Hypertension control –treat with antihypertensives if persistent BP≥160/100 or lower BP with target organ damage		HEARTS / WHO PEN			
	Severe hypertension- detect, refer urgently to hospital, prereferral Rx if delayed referral with two oral antihypertensives		HEARTS			
		Manage severe hypertension				
	Cholesterol- treat total cholesterol ≥8 mmol/l with statin and advise to follow lipid-lowering diet					
Cardiovas-cular risk- 10 year ≥30% or prior CVD or CKD or DM with overt nephropathy	Treat to control BP≥ 130/80		HEARTS / WHO PEN			
	Give statin and advise patient to follow lipid-lowering diet		HEARTS / WHO PEN			
	Give low dose aspirin (ASA) if no contraindications		HEARTS / WHO PEN			
	Nicotine replacement or other pharmacotherapy to motivated smokers who fail to quit with counselling		HEARTS / WHO PEN			
+Diabetes	Treat BP >130/80 Give statin Low dose ASA if no contraindications		HEARTS / WHO PEN			
Cardiovas-cular risk- 20 to <30%	Antihypertensive treatment (plus lifestyle measures) ifpersistent BP ≥ 140/90 if no response to lifestyle measures in 4-6 months		HEARTS / WHO PEN			
	Give statin for cholesterol >5 mmol/l		HEARTS / WHO PEN			

	in addition to lipid lowering diet					
	Nicotine replacement or other pharmacotherapy to motivated smokers who fail to quit with counselling		"			
+Diabetes	Treat BP > 130/80 Give statin		"			
CVD risk-10-< 20%	Manage BP≥ 140/90 and <160/90 with lifestyle measures and follow/up.		HEARTS / WHO PEN			
	Advise to follow lipid lowering diet if total cholesterol <8 mmol/l		"			
+Diabetes	Treat BP > 130/80 Give statin if Type II DM and age >40		"			
CVD risk <10%	Manage BP≥ 140/90 and <160/90 with lifestyle measures and follow/up.					
	Advise to follow lipid lowering diet if total cholesterol <8 mmol/l					
+Diabetes	Treat BP > 130/80					
+Diabetes	Give statin if Type II DM and age >40					
Postpartum hypertension screening of pregnant women with elevated BP during pregnancy*	Measure BP at 6 weeks postpartum		IMPAC PCPNC			
Ischemic heart disease/ myocardial infarction	Primary and secondary prevention as above					
	Acute care: suspect, give aspirin, refer.					
		Manage acute MI- aspirin, atenolol, thrombolytic therapy (streptokinase), morphine				
Stroke	Primary prevention as above					
	Acute care: suspect, refer		HEARTS /WHO PEN			

		Manage stroke/TIA. ECG to diagnose atrial fibrillation. Initiate anticoagulation if safe monitoring possible and low risk bleeding.				
	After stroke: secondary prophylaxis with statin; if not hemorrhagic, low dose aspirin		HEARTS			
Heart failure	Acute care: suspect, give furosemide, refer					
	Chronic care for heart failure	Chronic care for heart failure- ACE inhibitor, beta-blocker, diuretics				
Rheumatic heart disease	Primary prevention- treat streptococcal pharyngitis – using a clinical prediction rule		Addis Ababa Commu nique			
	Screening for RHD- clinical exam					
		Echo screening for RHD				
	Secondary prophylaxis with benzathine penicillin		WHO PEN			
	Pre-conceptual counseling to child-bearing aged women especially those with mitral and /or aortic stenosis					
		Refer for surgery- in country or refer out				
		Post-surgical care (anticoagulation+)				
Congenital heart disease		Detect, acute management				
		Refer for surgery- in country or refer out				
	DIABETES					
Prediabetes						
Diabetes type 1 and 2	Screening, diagnosis, refer as indicated		HEARTS / WHO PEN			

	Treat DM type 1- insulin		HEARTS / WHO PEN			
	Treat DM type 2- glycaemic control – oral agents (requires metformin, sulphonylurea)		HEARTS / WHO PEN			
	Treat DM type 2- , insulin as needed		HEARTS / WHO PEN			
	Statins to DM type 2 if age≥40, antihypertensives if BP>130.80- see CVD management above		HEARTS / WHO PEN			
	Preconception care for women reproductive age including patient education and intensive glucose management					
	Foot exam and care, refer ulcer	Manage ulcers/ severe infection	HEARTS / WHO PEN			
	Detect, initial treatment severe hyperglycaemia with IV normal saline		HEARTS / WHO PEN			
		Manage sepsis	WHO sepsis- in Quick Check+			
	Acute care for hypoglycemia: 50% glucose (dextrose) IV or other hypertonic glucose solution.		HEARTS / WHO PEN			
	Assess vision, refer if deterioration or no eye exam in 2 years		HEARTS / WHO PEN			
		Examine for retinopathy, intervention if available	HEARTS / WHO PEN			
	Check urine for protein, refer for any proteinuria		HEARTS / WHO PEN			
		Add ACE inhibitor to prevent progression of renal disease				
Distinguish diabetes from gestational diabetes			IMPAC			

during pregnancy*						
	CHRONIC RESPIRATORY					
COPD	Diagnose, assess severity		WHO PEN			
	Manage- chronic, exacerbations		HEARTS / WHO PEN			
		Spirometry				
		Manage severe exacerbation	WHO PEN			
Asthma	Diagnose, assess severity		WHO PEN			
	Chronic care, manage exacerbations		WHO PEN			
		Manage severe exacerbations	WHO PEN			
CANCER						
Cervical cancer	HPV immunization		WHO PEN			
	Screening: VIA test and treat (cryotherapy)		WHO PEN& cervical cancer			
		Surgical Rx				
Breast cancer	Teach women breast self-awareness, when to seek care		WHO PEN			
	Early referral of suspicious cases: breast exam, when to refer		WHO PEN			
		Biopsy- excisional, fine needle				
		Surgical Rx, refer for chemotherapy to cancer center				
Liver cancer	Hepatitis B immunization		WHO viral hepatitis strategy [46]			
Curable childhood cancers						
Other adult cancers	Identify presenting features of cancer and refer to next level for confirmation					
	Sickle cell disease					

* The WHO PEN guidelines are operationalized in WHO WHO IMAI-PEN Integrated NCD Chronic Care and updated WHO-PEN Acute Care guideline modules, sponsored by WHO AFRO regional office. The first protocol in the *WHO IMAI-PEN Integrated NCD Chronic Care* guideline module presents the same clinical materials as the Global HEARTS clinical guidelines.

**This table assumes mental health, substance use, and injury are covered by other initiatives and strategic planning documents; gestational diabetes and hypertension are covered in Maternal health initiatives and strategic planning documents; and children not fully addressed here.

Large, public health–scale programs need the support of national policies and step-by-step guidelines that establish evidence-based, cost-effective protocols at every level of the health system: prevention, screening, diagnosis, treatment and support. For example, a national system might identify the "essential minimum package" for elevated cardiovascular risk, diabetes, hypertension and prior cardiovascular disease or stroke; management of asthma/COPD; and cancer screening/early disease detection services. These decisions lead to:

- guideline and training material adaptations,
- calculation of staffing needs and task-sharing/shifting policy decisions
- calculation of medicine and equipment needs
- plans of how to provide standardized training and mentoring after training to a large numbers of clinicians, auxiliaries/counselors, pharmacists and lab technicians.

Deciding on an appropriate and feasible mix of priority strategic interventions then adapting available tools for their delivery are crucial steps.

Comments on various interventions [this section is draft/incomplete pending final HEARTS clinical guidelines, CVD risk charts etc]:

Preventing recurrent heart attack, stroke and death by <u>secondary prevention</u> with statins, aspirin and antihypertensives for patients with prior cardiovascular disease (established heart attack, angina, stroke, TIA or peripheral vascular disease) **is a WHO best buy.**[47] In adults who have had a previous heart attack or stroke, use of aspirin and statins, as well as antihypertensives (beta-blockers and ACE inhibitors)[48] and glycemic control for diabetes mellitus are cost- effective, significantly reducing reoccurrence of cardiovascular events.

The PURE study provides prospective data for individuals in numerous countries from the community rather than data from patients who were in the care of doctors in a hospital, clinic setting, or active follow-up by general practitioners. It shows the large gap that exists in secondary prevention worldwide, with extremely low rates of use of effective therapies in middle-income and low-income countries compared to high-income countries. The country's economic status accounted for about two-thirds of the variations in drug use, whereas only a third was accounted for by individual factors. Fewer women in all settings took drugs for unclear reasons. The study also showed fewer patients with diabetes with previous vascular events were receiving secondary prevention. "…a large effect on reduction in global cardiovascular disease can be achieved by systematically enhancing secondary prevention. Improvements to the uptake of effective secondary prevention strategies are probably more feasible than are lifestyle modifications in primary prevention (although both are desirable)."[49]

Multi-drug therapy (including glycaemic control for diabetes mellitus) to individuals with a high risk (>30%) of a CVD event in the next 10 years is a WHO best buy.[50] This aims at primary prevention of heart attack and stroke by reducing elevated cardiovascular risk. Most premature deaths due to CVD can be avoided. Many high-income countries have seen significant decreases in age-adjusted CVD mortality rates with a combination of preventive interventions to avert disease, early treatment to prevent death during acute events (heart attacks and strokes) and treatment to prevent recurrent events and to prolong the lives of people with prior CVD. Reductions in the burden of modifiable CVD risk factors are estimated to contribute as much as 50% to the observed decrease in mortality from CVDs in high-income countries, reflecting a combined impact of population interventions to reduce risk factors and clinical treatment [insert ref HEARTS technical package;].

Within the HEARTS cardiovascular risk-based approach:

Impact on ischemic heart disease and ischemic stroke: The CVR % in 10 years from based on Framingham and European cohorts is based predominantly on the risk of ischemic heart disease and ischemic stroke. The risk categories:low risk (<10%), moderate risk (10% to <20%), high risk (20% to <30%) and very high risk (≥30%) suggest decisions about preventive and treatment interventions for each individual with this risk % and concentrate more intensive management on those at high risk.[51],[52],[53].

The multi-drug therapy recommended for high risk patients includes antihypertensives, statins, low dose aspirin, and hypoglycemics, as well as lifestyle interventions to stop smoking, increase physical activity, maintain healthy BMI and waist circumference, and reduce alcohol use to less than 2 units per day.

Impact on hypertensive heart disease and hemorrhagic stroke
In addition to heart attacks and ischemic strokes, the recommended antihypertensive regimens in WHO-PEN/HEARTS would also contribute substantially to the prevention of hypertensive heart disease and hemorrhagic stroke.

Hypertension is the most important risk factor for the development of intracerebral hemorrhage. Statins do not prevent hemorrhagic stroke.

Analyses of the 2010 GBD and a systematic review of population-based studies showed a greater proportion of haemorrhagic stroke in low-income and middle-income countries compared with high-income countries but also noticeable geographical variation in the incidence of major pathological types of stroke, and diverging trends in stroke incidence between low-income countries (increase in rates) and high income countries (decrease in rates).[54] A 2013 GBD analysis showed a predominance of cerebrovascular disease over cardiovascular disease in many LIC, especially in the African region. [55]

In Subsaharan Africa, this predominance of cerebrovascular disease/stroke over ischemic CVD; the greater proportion of hemorrhagic stroke than in high income countries; the occurrence of strokes and heart failure at younger age; and the clear link of stroke with hypertension all emphasize the important of careful management and follow up of patients with hypertension even if they are low risk of ischemic CVD because of their age and absence of smoking or diabetes.

WHO will soon release country-adapted CVD risk charts which take these epidemiological differences into account. This approach is based on using the risk charts that have been prepared for your country, based on the risk factor profiles of each country population

- **Management of hypertension**

Hypertension control interventions within a total cardiovascular risk approach are a crucial and priority component of any cardiovascular disease prevention and control program. The large scale of the hypertension and elevated cardiovascular risk problem requires a public health approach to CVD management. High blood pressure is a major contributor to stroke, heart failure and coronary heart disease and stroke. Even small decreases in the incidence of high blood pressure can have a large effect on lowering cardiovascular disease rates and health benefits accrue in a relatively short time.[56]

- **Limiting treatment of hypertension in those at high and very high risk** To achieve a more cost-effective approach than treating all patients with hypertension, the HEARTS guidelines recommend lifestyle measures only for those at low or moderate risk andonly starting pharmacological treatment for hypertension at a BP of ≥160/100; hypertension with target organ damage; or, if high CVR, if lifestyle measures fail to reduce hypertension or very high CVR with persistent BP ≥130/80. Modeled analyses have shown that this is a more cost-effective approach to reducing ischemic CVD; for example, a South African analysis estimated that hypertension guidelines based on an absolute risk for cardiovascular disease are both more effective at saving lives from ischemic CVD and stroke and less costly than those based predominantly on a blood pressure level.[57]

This may differ from current national guidelines which are not based on a cardiovascular risk-based approach and provide treatment for all patients with hypertension who have not responded to lifestyle measures.

- **Primary prevention with statins**

  Statins are recommended for primary prevention in the generic HEARTS guidelines for cardiovascular risk>30%; for CV risk <30% with cholesterol >8, for diabetics >age 40, and for CKD.

  Statins can have substantial impact in preventing ischemic cardiovascular disease and ischemic stroke in high risk patients.[58] The statin recommendations are focused on those at high cardiovascular risk, not solely on lipid levels, as treatment will be most effective in patient at high risk of ischemic cardiovascular disease. [59,60] Drug price is the primary determinant of statin cost-effectiveness within a given risk group. As more statin drugs become generic and substantially less expensive, patients at medium and even low risk for coronary disease may be treated cost-effectively.[61] With falling statin prices, they are now available at comparable cost with ACE inhibitors, calcium channel blockers and metformin. All of these medicines are many times more expensive than glibenclamide and hydrochlorthiazide.

  Ischemic heart disease (IHD) deaths include deaths attributed to AMI and sudden cardiac deaths. Additionally, a proportion of heart failure deaths are attributed to IHD in the GBD/GHE, as this is not classified as a primary cause of death. AMI in earlier GBD analyses (using WHO MONICA study criteria) was based on any 2 of the following 3 criteria: ischemic symptoms; electrocardiographic changes; and elevated serum biomarkers. Newer biomarkers of cardiac ischemia, especially troponins, have improved the sensitivity of AMI diagnosis without a loss in specificity.[62]

  Data supporting the importance of statins in high and intermediate CVD risk patients for primary prevention is growing although still limited to high- and middle-income countries. The recent HOPE-3 trial[63] included two lower middle income (Ukraine and Philippines) and 5 upper middle income (Argentina, Brazil, China, Colombia, South Africa). Most countries were high income; no low income countries were included. The outcomes included all cardiovascular deaths including heart failure. In a diverse population of

persons who did not have cardiovascular disease and who were at intermediate risk (men ≥55 years and and women ≥65 years of age or older with at least one cardiovascular risk factors and women ≥60 years with two risk factors; 20% of the participants were white, 49.1% Asian, 27.5% Hispanic, 3.3% were black or belonged to another ethnic group. HOPE-3 evaluated both:

- Cholesterol lowering with the use of a low dose of rosuvastatin (fixed dose 10 mg without blood tests to initiate or monitor) "There was a significant reduction in the risk of cardiovascular events with the use of rosuvastatin."[64]
- The combination of rosuvastatin (10 mg per day), candesartan (16 mg per day), and hydrochlorothiazide (12.5 mg per day) was associated with a significantly lower rate of cardiovascular events than dual placebo among persons at intermediate risk who did not have cardiovascular disease."[65]

The evidence summary for the addition of statins to the WHO essential medicines list (for secondary prevention of CVD) focused on data from high income countries with analyses of the cardiovascular risk percent by ethnicity, to estimate the potential benefit in low income settings where direct data are not available.

This is in the context of almost a total lack of direct IHD epidemiology data in most Sub-Saharan African countries, especially Central and East Africa. Most African IHD data is from South Africa. Until the Heart of Soweto studies, the IHD epidemiological studies only addressed the white population.[66] In a recent systematic review of the prevalence of acute myocardial infarction in hospitalized patients in sub-Saharan Africa, the two studies with the largest and most broadly defined study populations were conducted among all patients who presented to an emergency department in Dakar, Senegal and all medical inpatients at a hospital in Ilorin, Nigeria, showing a prevalence of MI of 0.1% and 0.2%, respectively. [67] This is much lower than in hospitalized and critically ill patients admitted in high-income countries.

Khatibzadeh's 2013 systematic review and pooled analysis of causes of heart failure[68] shows a substantial proportion of hypertensive heart disease in SSA, whereas ischemic heart disease accounts for less than10%. In African patients, the Sub-Saharan Africa Survey of Heart Failure (THESUS–HF) carried out in university hospitals in 9 countries showed that acute heart failure has a predominantly nonischemic cause, most commonly hypertension, and occurs in middle-aged adults, equally in men and women, and is associated with high mortality.[69]

A considerable proportion of DALYs and YLLs are attributed to IHD in the GBD/GHE in both low- and middle-income countries, often exceeding those from hypertensive heart disease and RHD. This may run counter to heart failure data from hospitalized patients (although biased by collection in tertiary centers) and the impression of clinicians in some low-income countries or rural districts that they are not encountering acute MI or sudden cardiac deaths.[70]

However, there are multiple reports that suggest a population transition to more risk factors for ischemic heart disease and ischemic stroke over time,[71],[72]with increasing rates of uncontrolled hypertension, high cholesterol, diabetes, sedentary lifestyle, poor diet, and survival into old age. In addition, the cardiovascular disease and stroke in PLHIV on ART have been characterized as ischemic/atherosclerotic. In recent years, some parts of SSA have experienced a sharp rise in risk factors for ischemic heart disease, including aging of the population, reduced exercise, poor diet, and uncontrolled hypertension.

Although some evidence suggested a possible detrimental impact on hemorrhagic stroke, recent summaries suggest this is not be the case[73] and that statins can reduce the incidence of ischemic stroke without an increase in hemorrhagic strokes.

On the addition of statins in diabetics > age 40 years, from WHO PEN 2013 (p. 106): "……the recommendation is conditional on availability of resources for statins, after complete coverage by metformin, sulfonylureas, and antihypertensives." This should be updated given the current lower cost of statins and increasing evidence for the importance of cardiovascular risk reduction in diabetics by statins..

- **Primary prevention with aspirin (low dose)**
  Aspirin and statin studies in high income countries have shown them to be highly cost-effective in patients with elevated cardiovascular risk where ischemic heart disease is predominant. The absence of benefit of aspirin for the prevention of the first stroke in the general population in some high income countries questions its overall benefit in primary prevention of CVD in populations where stroke is the prevailing CVD.[74]

  The case- mix and epidemiology of cardiovascular disease remain important.

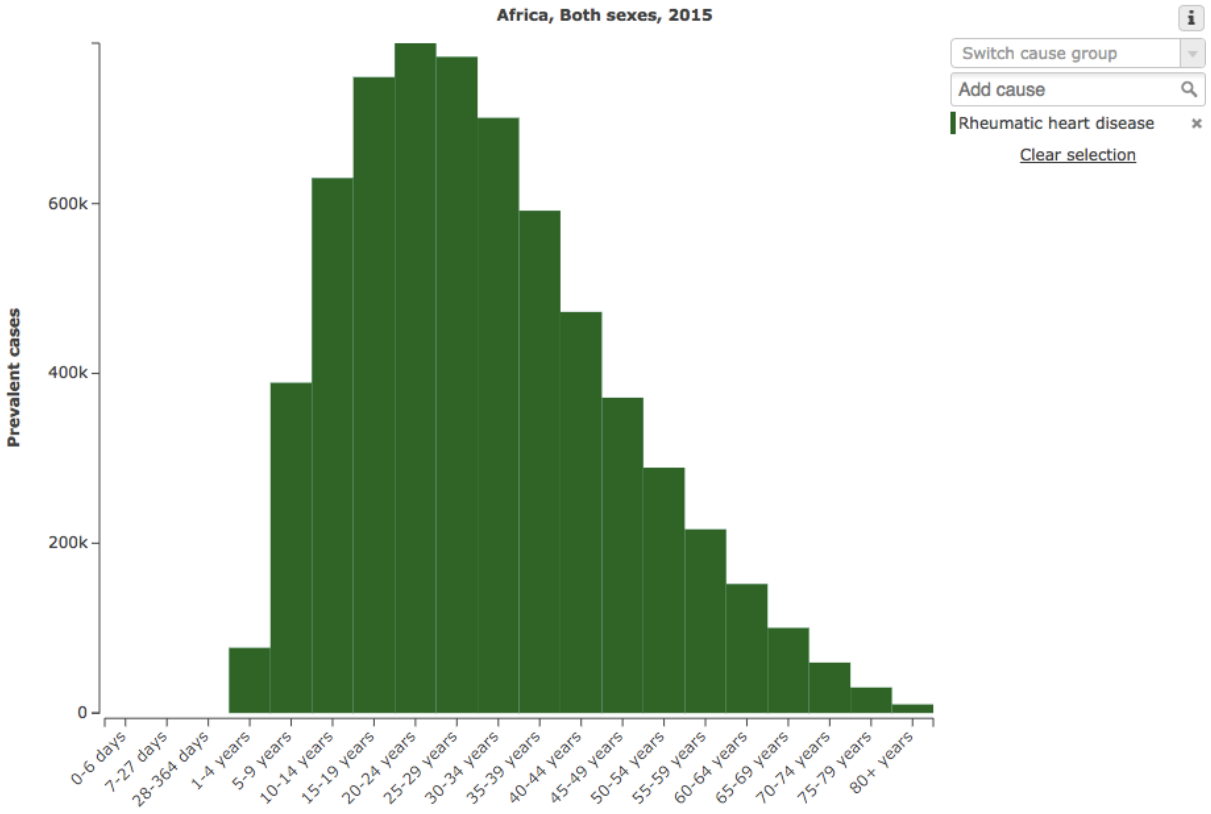
Manage acute MI WHO PEN 2013 also lists aspirin for acute MI as a **best buy.** Although aspirin is now only used for initial emergency management of acute coronary syndrome in high income countries, prior to very urgent thrombolysis or primary percutaneous coronary intervention, one study comparing aspirin and streptokinase in 1988 showed improved survival with aspirin alone and with streptokinase alone compared to placebo.[75] In this study, for every 1000 patients treated with one month of medium dose aspirin (such as 162 mg daily), about 25 deaths and 10-15 non-fatal reinfarctions or strokes were avoided during the first month. A 10-year follow-up showed that the survival benefits of short term aspirin treatment in acute myocardial infarction persisted long term and are additional to those of fibrinolytic therapy. [76] Other studies show that these benefits can be increased by continuing aspirin treatment for some years after myocardial infarction (see secondary prevention above). A 2005 analysis showed incremental cost-effectiveness ratios (ICERs) per QALY gained for both the aspirin and beta-blocker interventions were under $25 for all 6 regions.[77]

Manage heart failure
The WHO PEN protocol 1 and the HEARTS evidence-based guideline indicate referral for patients with signs suggesting heart failure, but do not provide primary care guidelines. Furosemide is included in the WHO PEN core list of medicines required for implementing essential NCD interventions in primary care, instructions for its use in HEARTS is limited to preferral treatment of acute congestive heart failure (If new breathlessness, leg swelling, or heaving of the cardiac apex, give low dose loop diuretic if available and urgently refer to hospital. Heart failure management is not listed as a WHO best buy.

In the Partners in Health (PIH) NCD model, heart failure treatment initially takes place at the district hospital NCD clinic and not at health centres, due to the requirement for echocardiography and the fact that heart failure management is often more complex than for other NCDs, requiring a greater level of clinician training for appropriate classification. In some cases, patients who are on stable therapy for many months are referred back to the health centre for follow-up.[78]

Rheumatic heart disease (RHD) remains a major cause of cardiovascular morbidity and mortality in low-resource countries. Most deaths occur in older children or early adulthood. RHD can result in heart failure, stroke[79] and premature death[80] (median age 28.7 in a referral level multi-country registry which enrolled symptomatic patients[81]). RHD is a

significant contributor to maternal and perinatal mortality in many low- resource countries.[82],[83],[84],[85], [86] In the Pacific, RHD is a leading cause of maternal mortality; in South Africa and Senegal, RHD is associated with higher mortality and morbidity[87],[88] The highest rheumatic heart disease rates occur in sub-Saharan Africa, with an estimated 5.7 cases per 1,000 children aged 5–14 years, and in the Pacific region and indigenous populations of Australia and New Zealand, with 3.5 cases per 1,000.[89]



RHD is a chronic complication of acute rheumatic fever (ARF), an autoimmune reaction to group A streptococcus pharyngitis which causes carditis. ARF mainly occurs from 5 years of age through adolescence. Significant valvular regurgitation or stenosis may occur during the initial episode or after repeated damage to the valve from recurrent bouts of ARF. Congestive heart failure then develops, leading to death if the valve is not repaired.

All this despite the availability of effective prevention and treatment interventions. These consist of treatment of streptococcal sore throats, secondary prophylaxis with benzathine penicillin, and valvular surgery:[90]

- Primary prevention (PP): Intramuscular benzathine penicillin is the mainstay of treatment for both primary prevention (treating possible streptococcal pharyngitis) and secondary prevention.
- Secondary prevention (SP): The same intramuscular benzathine penicillin given by IM injection every 3-4 weeks is effective in preventing recurrent acute rheumatic fever attacks, subsequent development of rheumatic heart disease, regression of existing heart valve lesions[91] (insert additional refs) and reduced RHD mortality (insert refs). WHO recommends secondary prophylaxis with benzathine penicillin.[92],[93] “Equitable access to quality-assured benzathine penicillin injections (BPG) for the prophylaxis of rheumatic fever helps prevent recurrences and rheumatic valve disease. This intervention can be delivered in primary health care settings and is cost saving. “ [94]

- Valvular surgery. The current treatment of choice in developed countries for rheumatic mitral valve stenosis without significant regurgitation is percutaneous balloon valvuloplasty.[95] However the REMEDY study demonstrates multiple valve involvement especially in young people, which can only be addressed with surgery.[96]

Although secondary penicillin prophylaxis is an important strategy to reduce ARF recurrence and RHD development, the persisting rapid and high progression rate from ARF to RHD in some populations reinforces the need for new strategies and some emphasis on primary and 'primordial' prevention strategies.[97]

The limited evidence suggests that preventive interventions for RHD are economically attractive. The most robust and up-to-date economic evidence was presented within a recent methods paper that provided a cost-effectiveness tool for the design of programs in African countries.[98] While primary cost data from African countries have never been published, reasonable assumptions and cost inputs from other settings were used in this model for illustrative purposes. This study found that in a typical low-income African country with very low coverage of all interventions, scaling up primary prevention was cost saving, and secondary prevention was cost-effective, with cardiac surgery being potentially cost-effective under certain circumstances (Table).

Intervention	**Incremental cost-effectiveness ratio** (increasing coverage from 10% to 90%)
Primary prevention	- US$ 2500 (95% CI: - US$ 3000 to - US$ 2000)
Secondary prevention	US$ 750 (95% CI: - US$540 to US$ 22,000)
Cardiac surgery using referral to international programs (e.g., India)	US$ 4000 (95% CI: US$ 3200 to US$ 4700)
Cardiac surgery using a local program (including up-front cost of building program)	US$ 24,000 (95% CI: US$ 21,000 to US$ 27,000

There is also some evidence that primary and secondary prevention can achieve synergistic effects by rapidly reducing both new and recurrent cases of ARF at the same time. An evaluation of a combined primary and secondary prevention program in Cuba, modeled after the WHO's recommendations for RHD programs, reduced the total burden of RHD by about 90% over a decade. This program also led to an approximately 90% reduction in health expenditures on ARF and RHD over that ten-year period.[99]

Prioritization needs to take into account the marked variation between countries in access to in-country cardiac surgery for advanced RHD (now available in x countries; average cost $6000) versus sending children and young adults from a waiting list to other countries for surgery (average costs $10,000- $12,000). Surgical activities should not be embarked on in the absence of simultaneous or preceding efforts to scale up primary and secondary prevention to full coverage.

In summary, for low- and lower middle-income African countries, primary prevention of RHD can be considered a "best buy" according to the usual WHO criteria. Combined primary and secondary prevention, integrated into a disease control program, can also be considered a "best buy." The evidence suggests that secondary prevention in isolation could be cost-effective, but the literature presents a higher degree of uncertainty about the effectiveness (and thus cost-effectiveness) of secondary prevention, with relative risk reduction estimates ranging from 22% to 92% (Table). There I also a limited role for cardiac surgery in some settings, especially if strong referral linkages can be established with regional centers that operate at greater economies of scale and scope.

"The cost of end-stage interventions [surgery/management of heart failure] is economically and socially higher than that of comparatively low-cost comprehensive control programmes with an emphasis on prevention"[100] with many Ministries of Health spending considerable funds on international surgery plus several NGOs dedicated to providing surgical services.

Decentralizing diagnosis from specialized referral centers to district hospitals is feasible given the available echocardiography technology (with significant lowering of cost), if accompanied by a training programme. PIH has developed and implemented such a programme in Rwanda for advanced nurses, clinical officers, and generalist physicians.[101],[102] This training also addresses management of heart failure. See Chapter 13.

Identifying at-risk individuals participating in other health-care services:

Diabetes and hypertension identified during pregnancy or postpartum

- High blood pressure and gestational diabetes both increase adverse pregnancy and maternal health outcomes. Diabetes and hypertension can impair fetal growth and development, and increasing evidence shows a mother's physiological condition during pregnancy predisposes her newborns to adult diseases such as coronary heart disease and stroke.[103]

  Pre-existing hypertension and diabetes are contributors to maternal morbidity and mortality owing to their prevalence in the general population, in addition to the development during pregnancy of hypertension in pre-eclampsia/eclampsia and of gestational diabetes.

  WHO does not have current recommendations on whether or how to screen for GDM. It is stated that hyperglycaemia that is first detected in pregnancy should be classified as GDM or diabetes mellitus according to WHO criteria[104].

  Follow up of gestational diabetes (GDM) and hypertension continue to be challenging in many LMIC[105]. For ongoing care if these problems persist after delivery, it is important that the woman returns for her postpartum follow-up, ideally at 6 weeks after delivery[106]. Many women with gestational diabetes will have normal blood glucose levels after delivery, but they are at higher risk for recurrent gestational diabetes, intermediate hyperglycaemia or "prediabetes," and overt type 2 diabetes over the next 5 years. If hyperglycaemia persists postpartum and is diagnostic for diabetes, it is reasonable to refer to chronic NCD care for ongoing management. If the results are borderline or normal, then she may be counselled on lifestyle modifications and to consider checking glucose every 1-3 years[107]. Similarly, for hypertension in pregnancy, postpartum follow-up is important. For a woman with pre-eclampsia or eclampsia in pregnancy, deliver or after delivery and continued moderate to severe hypertension at the postpartum (diastolic BP≥90 and 110, respectively), a referral protocol to hospital is indicated.

RHD or cardiomyopathies identified during pregnancy or postpartum .

- Hypertensive disease, rheumatic heart disease and cardiomyopathies contribute to maternal mortality.[108] Heart disease severely impacts maternal and foetal outcome. Pregnant women who underwent appropriate valve replacement before pregnancy

had a better prognosis.[109] However, this is not currently included in the WHO antenatal package, but should be linked with activities focused on maternal and newborn mortality reduction. In addition to hypertension and diabetes, clinical management of pregnant women may reveal other prevalent cardiovascular diseases, including rheumatic heart disease, cardiomyopathies, cardiovascular manifestations of HIV/AIDS, haemoglobinopathies and undetected/untreated congenital heart defects (presenting as pulmonary hypertension and severe heart failure complicating pregnancy in surviving girls who reach their reproductive years). Active cardiac screening with interventions could prevent some proportion of maternal morbidity and mortality.

- **HIV/AIDS- see section 7.2.1**

- **TB- see section 7.1.1**

Cancer prevention and control-VIA test and treat and **hepatitis B immunization** are both identified in WHO-PEN as 'best buys' for individual patient management.

Taking financing into account in prioritizing interventions:

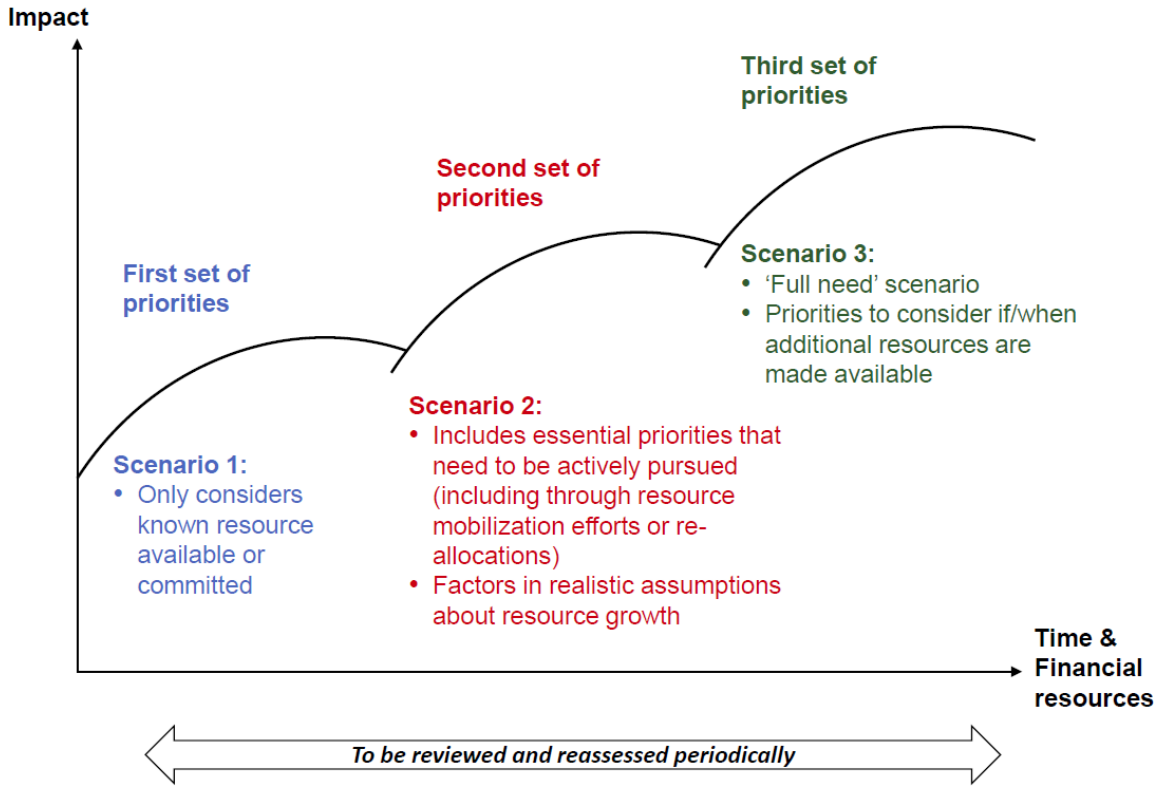
Prioritization decisions need to take into account the available resource envelope and costed plans.

Most limited- resource countries face a significant gap between the costs of the ideal set of interventions with full implementation and the resources available, both from the national budget and from donors. Explicit prioritization and costing interventions and various options for implementation and scale-up are an important part of getting buy-in and commitment from stakeholders. The following advice, modified from a presentation on making an investment case for RMNCAH, may be useful for efforts to finance NCD case management based on Global HEARTS/WHO PEN:

- Investment Case should contain prioritized set of interventions and strategies that can be implemented within the envelope of available and projected resources
    - ✓ **Scenario planning** may be useful, given uncertainties about resource availability and desire to include "full need" scenario
    - ✓ **Sequencing** key interventions based on resource projections/scenarios
- Across all interventions:
    - ✓ **Driving toward long-term results**, rather than just incremental scaling-up
    - ✓ **Optimizing inputs**: focus on efficiency gains
    - ✓ **Maximizing outcomes**: cost-effectiveness analysis
    - ✓ **Prioritization is not a one-time event but an on-going process**
    - ✓ **Periodic reviews** of priorities as part of implementation and monitoring, and as new information comes to light or financing is made available

Consider using scenarios to exploring competing priorities and changing availability of resources:[1]

[1] From RMNCAH Investment Case powerpoint on Prioritization


Impact
Third set of priorities
Second set of priorities
First set of priorities
Scenario 3:
• 'Full need' scenario
• Priorities to consider if/when additional resources are made available
Scenario 2:
• Includes essential priorities that need to be actively pursued (including through resource mobilization efforts or re-allocations)
• Factors in realistic assumptions about resource growth
Scenario 1:
• Only considers known resource available or committed
Time & Financial resources
To be reviewed and reassessed periodically

Prioritization by level of care and prevention versus treatment

- Given the likely limitations in financing, for cardiovascular disease: it is more cost-effective to invest more in services to detect and treat hypertension, diabetes and elevated cardiovascular risk early, with medicines and lifestyle counselling, than in improving the management of heart failure, stroke, kidney failure and heart attacks. Primary care interventions should happen in the context of population-based interventions to reduce smoking, salt, harmful alcohol use, and unhealthy diet and sedentary behavior which have been estimated to be highly cost-effective/best buys (PEN ref).
- NCD chronic care requires long-term commitments to beneficiaries with costs for care for an individual often rising over time if complications develop or disease severity progresses.
- Chronic NCD disease care can be expensive if delivered late in the disease course. However, it is important to realize that most patients with NCDs are still consuming health system resources even without well-organized care; this care is often more expensive and "…wasteful when patients "fall through the cracks" due to fragmented care. Poor-quality care results in health complications, poor patient outcomes, long hospitalizations and frequent hospital readmissions, decline in functional status, and increased dependency. Individuals, families, health care organizations, governments, and taxpayers collectively pay the price." [110]

Decide how to deliver interventions
After choosing the strategic case management interventions to reduce morbidity and mortality from NCDs, select strategies for the delivery of each intervention.

A component of most case management interventions includes standardizing and simplifying diagnostic and treatment protocols; preparing nurse-led teams at primary care level; ensuring a consistent supply of essential quality-assured medicines; and systematic monitoring and evaluation of outcomes and patients.

This manual assumes that you will want to achieve broad coverage of most NCD case management interventions by decentralizing interventions to health centres where they are integrated within primary health care, close to communities, rather than limiting delivery to the district hospital (or in specialist or tertiary facilities). (See next chapter 6: How to integrate core NCD case management/ HEARTS services into primary care and hospital referral care within a district).

Decisions on NCD services to deliver by level of your health system and how to integrate them within primary health care (section …), with back-up by hospital referral care.

These include key decisions on what level of the health system to implement each intervention. It is important to think this through in the context of your district health system and the volume of patients you anticipate will require care (section …)

Related decision on task-shifting and task sharing are in section…

In selecting delivery strategies, for each intervention/intervention package review

- What is being done now and is it working?
- Should the existing delivery strategy be continued?
- If existing delivery strategy should be continued, how can they be improved?

- What new delivery strategies should be added?
- Are new policies or guidelines needed to support implementation?
- What are the cost implications of different delivery strategies?

Taking all this into account, many districts will likely emphasize the WHO PEN-prioritized NCDs and, within them, the HEARTS cardiovascular and diabetes interventions.

An approach which emphasizes integration into primary care of screening/early disease detection and chronic care for NCDs by nurse-led teams can provide strong support for rapid scale up of a focused choice of interventions.

Pulling together the strategic plan

The strategic plan should provide a framework for implementation. It should state the goals, objectives, the priority case management interventions, and impact and coverage targets (usually these are only evaluated every 3-5 years).

A strategic plan usually last for 5-10 years. Therefore not all interventions and delivery strategies will be implemented at the same time.

A strategic plan should consider the overall cost of such a programme of work. WHO has developed a costing tool [ref] which is currently being updated. It is useful to cost several different scenarios.

For each delivery strategy, identify areas for implementation in the following groupings:

- Immediate actions
- Medium term actions
- Longer term actions

Immediate actions will often include setting up a demonstration site in one or two districts, with careful monitoring and evaluation.

Strategic planning should include an approach to scale-up, even if these scale-up plans require further refinement and funding based on results in the initial demonstration sites. The national programme and partners should be involved in systematic supervision and evaluation.

7. National governance: service delivery model- policies/directives on how to integrate core NCD case management/ HEARTS services into primary care and hospital referral care

- ☐ Review current PHC service delivery models and clinical team organization
- ☐ Define service delivery model(s) for
  - Screening for CVD risk and diabetes
  - CVD risk-based management of CVD/DM within primary health care –
    - in first level health facilities
    - use of CHWs
- ☐ Review current PHC / CVD service delivery model & team organization:
- ☐ Decide whether adaptation is needed

Cost-effective and feasible integration of the priority cardiovascular and diabetes interventions and other core NCD case management interventions into ongoing primary health care services requires careful attention to who can do what and plans for task-sharing/task-shifting (see chapter ..). It is important to decide and specify:

- which CVD risk management and other NCD services should be performed at different levels of the health system
- which tasks that can be performed by different levels of health workers, with clear definition of the roles and responsibilities of health staff at each level
- what tasks can be performed by lay providers/expert patients/auxiliaries and how they should be supervised and supported.
- the supervisory/mentoring/quality improvement system that sustains this
- guidance or options for how to collaborate with other disease control programmes.

Screening, risk factor identification, early disease detection	NCD chronic care	Acute care for NCDs/ emergency management
Screening for cardiovascular risk, hypertension, diabetes, obesity and identifying risk factors (smoking, physical inactivity, poor diet): <u>In the community by</u> • Trained CHWs (choose expert patients where possible) • Community health campaigns, camps, mobile units, other approaches to screening in the community <u>In primary care (health centre and district outpatient) by</u> • Trained auxiliaries and expert patients in the health centre • Health workers- nurses, clinical officers Where to screen in primary care: • Acute care/general medical clinic • Chronic NCD clinic • Antenatal/postpartum clinic • TB clinic (high yield diabetes) • HIV care/ART clinic* By clinicians: screening for cervical cancer, early disease detection for breast cancer	**NCD chronic care clinic, at health centres and outpatient of hospitals** In health facilities where there is also an HIV clinic*, several models have been used: • All chronic care together- NCDs and HIV care/ART • Separate chronic clinics: ▪ HIV care/ART clinic expands to provide cardiovascular and diabetes care for their patients. ▪ HIV negative patients receive NCD care in a separate NCD chronic care clinic (still using same health systems approach as HIV care/ART)	**First-level health facilities:** • Emergency triage, refer with pre-referral treatment for- ◦ Suspect acute MI ◦ Hypertensive emergency ◦ Diabetic with sepsis, DKA, hypoglycaemia ◦ Neurological – stroke ◦ Acute heart failure • Acute on chronic- ◦ exacerbations asthma, COPD ◦ pneumonia **Hospital:** manage severely ill patients, complications
* in health centres or hospital outpatients which have a HIV care/ART clinic- either contiguous or one-several days/week in same space		

7.1 Screening, risk factor identification, and early disease detection

Systems to detect patients at risk for NCDs like CVD must take into account the heavy workload of scarce health workers - and their limited time for additional tasks. **An important decision is where to screen patients: in the community, in primary care health facilities or other clinics, or both.** Both professional health workers and auxiliary providers (such as expert patients and CHWs) can be trained to do cardiovascular risk and diabetes assessments, in either in the community or in a primary health care clinic.

Because persons with NCDs such as hypertension and diabetes (like persons living with HIV) are often asymptomatic, they may not visit health clinics, and therefore must be contacted and screened elsewhere.

7.1.1 Screening and risk factor identification at health care facilities

Patients who present to health facilities for acute complaints present an opportunity for "passive screening" for NCDs and their risk factors: examining patients who have already reached a point of care, rather than actively seeking out a population to screen. Although this approach overlooks persons who do not access existing facility-based care, it targets persons at potentially higher risk for NCDs, such as those with an acute illness or living with HIV/AIDS. Furthermore, this approach is cheaper and simpler to implement than active case-seeking. Some therefore argue that a facility-based approach is "the only feasible and affordable way of identifying patients with NCDs."[111]

Most adults visit a primary care health facility for acute complaints; pregnancy; or seeking care for their children. Each of these is an opportunity for NCD screening. During acute care visits, – for example, for hypertension; diabetes; other cardiovascular risk factors such as smoking; or lumps that may be cancer. Incidental complaints such as polyuria, weight loss, and blurry vision can alert a health worker to screen for diabetes; conversely, a patient with no acute complaints may still have significant hypertension. In any case, the screening process must not slow down the through-put of the acute care/OPD or overburden its health workers – otherwise, the clinical team may be unable to prioritize the presenting complaints of acutely ill patients.

One solution for CVD or diabetes screening is to recruit additional auxiliary staff (including CHWs or expert patient lay providers) to carry out an initial screening (sometimes called "pre-assessment") including BP, BMI, RBG, or perhaps FBG; and link patients who screen positive with appropriate follow-up services. This might happen in a corner near the queue of patients waiting to be seen, so as not to disrupt or delay acute care. Ideally, the patients would already have been triaged for severity (and have been judged not to have emergency signs requiring immediate attention). This approach requires task-sharing policy decisions that authorize auxiliaries to play these roles once trained (see Chapter 10). A simple form can streamline and standardize this work. The form records the patient's history; auxiliary or CHW observations and measurements; and additional laboratory tests as required. The auxiliary or CHW presents the completed form to the health worker (or sends with the patient) – either immediately or at a follow-up NCD clinic – to register a new patient for further evaluation and follow-up. Review and adapt the form as appropriate, taking into account the country-adapted CVD risk tables.

Examples: NCD screening at primary care clinics

Studies demonstrate that CHWs can and do perform testing for risk factors for CVD with comparable accuracy to physicians in primary care settings. A study evaluating use of the World Health Organization's Cardiovascular Risk Management Package[112] a predecessor to HEARTS, in primary care clinics in Bangalore, India and Islamabad, Pakistan,[113] found that CHWs' ability to measure blood pressure, weight, body mass index, and weight circumference was no different than that of physicians. Although these CHWs were not charged with referring or linking persons with elevated blood pressure or obesity for follow-up care, this work suggests they can identify eligible persons accurately on-site.

Screening at NCD clinics.

CHWs can also likely manage CVD risk factors in persons who already suffer from NCDs such as hypertension. A pending trial in the Ashanti region of Ghana randomized community health officers (trained as nurses) to screen for elevated glucose level; elevated cholesterol; obesity; and

other risk factors.[114] Although final results are not complete, initial work suggests that these health officers have gained substantive knowledge on testing and treatment for diseases such as hypertension.[115]

Antenatal screening.

In addition to screening for gestational hypertension and diabetes[68], antenatal clinics have piloted general NCD risk factor screening, although end-outcome data is pending. The Jom Mama initiative in Malaysia, a pilot project of the Steno Diabetes Center and Novo Nordisk, is training community health providers to screen pregnant women for unhealthy diet, sedentary behavior, and elevated fasting glucose as risk factors for gestational and non-gestational diabetes.[116] [117] Initial work suggests women's social stress is a key driver of unhealthy behavior;[118] future work may involve treatment of other CVD risk factors.[81]

Other clinics at primary care level (often on different days of the week, or in different sections in large health facilities) can also prove fruitful for screening. This effort not only facilitates NCD case detection, but also provides opportunities to integrate patient care. Examples include

- Postpartum clinics: check BP at 6 weeks postpartum,[106] especially if elevated earlier
- Chronic NCD clinics: following referral/presentation for one NCD (by CHWs, pharmacists, family, self, or others), patients can be screened for others (e.g., diabetes in addition to hypertension)
- Gynecology/reproductive health clinics: in many locations, VIA cervical cancer screening occurs here.
- Tuberculosis clinic: high-yield for diabetes screening
- HIV care/ART clinics

Screening for NCDs in antenatal/postpartum care and linking with ongoing NCD care

Because pregnant and postpartum women are among the most likely young adults to seek medical attention, antenatal and postnatal care represents an opportunity to render NCD treatment. Additionally (see 6.1 above), common NCDs such as hypertension and diabetes can be caused or exacerbated by pregnancy, so antenatal and postnatal clinics can serve as NCD screening sites as well. See examples as follows:

Diabetes

WHO guidelines stipulate that all pregnant women should be screened for hyperglycemia and, if positive, diagnosed with gestational diabetes mellitus (GDM) or diabetes mellitus according to WHO criteria.[119] In both cases, the patient should return for her postpartum follow-up, ideally at 6 weeks after delivery.[120] Many women with GDM have normal blood glucose levels after delivery, but are at higher risk for recurrent gestational diabetes, intermediate hyperglycemia or "prediabetes," and overt type 2 diabetes over the next 5 years.

If hyperglycemia persists postpartum and is diagnostic for diabetes, the patient should be referred for chronic NCD. If the results are borderline or normal, then she may be counselled on lifestyle modifications advised to recheck glucose every 1-3 years.[121] Both services can occur within the postnatal clinic.

Hypertension

Similarly, all women should receive blood pressure screening during pregnancy, to evaluate for pre-eclampsia or eclampsia.[122] For women who develop either condition, postpartum follow-up is important. Continued hypertension at the postpartum visit should prompt hypertension referral and treatment, potentially within the postnatal clinic

Other cardiovascular disorders

Although further cardiac screening (such as echocardiograms) is not a routine antenatal recommendation, cardiovascular symptoms or signs such as syncope, palpitations, or cardiac murmurs should prompt such evaluation. Such women may be identified as having rheumatic heart disease or cardiomyopathies, which can be further treated either at the antenatal clinic or at other specialty sites.

In countries or districts with a substantial TB burden (? Can skip this box if low TB burden/TB prevalence is less than 100 per 100000 population), screen for diabetes in TB clinic

According to Stop TB (STB)'s 2016 report, persons with DM should "be considered for systematic TB screening only in countries with a TB prevalence of over 100 per 100 000 population, as the number needed to screen to detect a new case of TB can be very high when TB prevalence is low." Screening approaches start with symptoms such as cough and weight loss, and progress to chest radiography and either sputum-smear microscopy (SSM) or Xpert MTB/RIF (XP) for symptomatic persons.[123]

However, TB patients should always be screened for diabetes. Some countries have established agreements for "bidirectional screening" – screening for TB in diabetics and for diabetes in TB patients.

TB clinics in health centers and hospitals can also potentially serve as NCD clinics and vice versa although patients receiving NCD care based in the TB clinic would need to be transferred to ongoing NCD care after their TB treatment is completed.

Given the significant association of DM with TB, health-care facilities, including NCD clinics at health centres and in the outpatient of hospitals, should have in place an infection control plan that includes administrative and environmental control measures to reduce transmission of TB (adhering to WHO's international guidelines for TB infection control.[124]

7.1.2 Screening and risk factor identification in the community

In addition to passive screening at clinic sites, CHWs can reliably diagnose NCDs and their risk factors via active case-finding. These programs include door-to-door campaigns; organized community gatherings (such as "community health campaigns"), as well as outreach at clinic sites. Each approach has advantages and drawbacks. Screening can occur either en masse – at stationary or portable mass screening sites – or through one-by-one visits. Specific activities include

- CHWs traveling door-to-door with a digital scale and tape to screen community members for elevated BMI and obesity (see examples below) [125] [126]
- CHWs performing fingerstick glucose screening – according to the WHO Integrated Community Case Management of Malaria (ICCM) development team, CHWs can learn to perform fingerstick blood screening in under 2 hours[127]
- CHWs in primary care clinics performing traveling cardiovascular risk factor screening at clinics (e.g., for obesity and hypertension, per the form above), and referring persons with a positive screen for laboratory testing and follow-up

CHWs can screen for NCDs such as CVD both en masse - at stationary or portable mass screening sites, for example – and through one-by-one campaigns such as household visits. Examples of these approaches are described below.

Published work demonstrates that CHWs can screen substantial numbers for NCDs.[86] However, rates of patient linkage to follow-up care following a positive test are sometimes low[86,87]– at times because existing facilities lack capacity to absorb so many new patients. **Therefore, it is crucial to establish the NCD care capacity in local clinics before screening and referring a large number of patients to an already busy system.**

Examples: NCD screening at community sites

Community health campaigns (CHC). This approach encourages community members to appear at a specific time and place for disease screening. An archetype is the ongoing Sustainable East African Research in Community Health (SEARCH) study in Uganda and Kenya, which has screened more than 100,000 persons in 30 rural communities in this region for hypertension and diabetes in the setting of a randomized trial of HIV treatment for prevention of new infection.[128]

A SEARCH pilot study in the Mbarara district of Uganda in 2011 demonstrated that a 5-day CHC attracted 2,323 of 3,150 adult residents (74%) to receive on-the-spot testing for HIV, HTN, diabetes, and (if symptomatic) malaria and tuberculosis, and referral to a local health center (HC) if screened positive. 43% of persons with HTN and 61% of persons with diabetes linked to care. Subsequent work demonstrated a HTN linkage rate of 83%,[129] and identified transport difficulties and lack of symptoms as the main barriers to care linkage. Further evaluation of SEARCH HTN and HIV care is underway in Uganda and Kenya.

Door-to-door screening. CHWs can also test and refer for NCDs through door-to-door visits. In Kenya, for example, the Academic Model Providing Access to Healthcare (AMPATH) initiative has performed routine hypertension screening alongside home-based HIV counseling and testing since 2010.[83] An ongoing randomized trial is evaluating whether smartphones and behavioral health counseling can improve their rates of linkage to subsequent care from 40% at baseline to 80% or greater.[130]

CHWs can provide accurate home-based screening for other NCDs and risk factors as well. A pilot study in Bangladesh, Guatemala, Mexico, and South Africa demonstrated that CHWs with 1-2 weeks of training could evaluate the body mass index, blood pressure, and diabetic status of patients, both on home visits and at CHCs, as accurately as physicians.[84]

Mobile screening. Mobile mass screening can also occur at public sites in target communities at preset, migrating sites: essentially a portable version of the CHC model. A mobile unit screened 9,806 patients for HIV, TB symptoms, diabetes and hypertension in Cape Town, South Africa between March 2010 and September 2011. The yield of newly-diagnosed cases of these conditions was the yield of new diagnoses was: HIV (5.5%), TB suspects (10.1%), diabetes (0.8%) and hypertension (58.1%). Linkage to care for HIV-infected clients, TB suspects, diabetics and hypertensives was: 51.3%, 56.7%, 74.1% and 50.0%. Patients reported that the main barrier to linkage to care was lack of time.[131]

7.2 NCD chronic care

In addition to screening and referring for NCDs and their risk factors, CHWs and other auxiliary health workers can treat these conditions. This work can occur both within formal health facilities (usually under supervision of physicians or nurses) or in supplemental health posts (see 7.2.2).

7.2.1 NCD chronic care within facility-based primary health care

Because the burden of NCD care may be substantial, and some patients invariably require a higher level of care than others, successful integration of care often requires careful consideration of both a) how to divide services between auxiliary and professional providers and b) when and how to refer patients to more specialized care. Examples of solutions to these challenges include

- Basic services delivered by non-physician clinicians, often on nurse-led teams
- Adding auxiliaries and trained "expert patients" to this nurse-led team to help manage the enlarging numbers of patients in chronic care
- Designating specific NCD clinic days or half-days each week
- Delineating specific rules on what level of care is acceptable to provide at a primary health centre/outpatient clinic, and what care requires referral to hospital (or other first-referral care center within the district)
- Building new capacity to treat NCDs at district-level primary care centers (through mentoring and ongoing quality improvement activities).

All of these concepts also require facilities to embrace effective chronic care principles as outlined in Chapter 1: identifying opportunities for task shifting and task sharing; attending to the needs of families as well as individuals; and ensuring access to both clinical and psychosocial care.

Additionally, they require sufficient supplies, medications, and other health system "building blocks" to provide adequate care – otherwise, NCD patients may be reluctant to seek this care after an initial positive screening test. Evidence to date suggests that linking a patient with a new asymptomatic disease to follow-up care is often harder than initial diagnosis – for example, initial linkage rates within the SEARCH study were approximately 40-60%, as above.[86] Moreover, even patients who do link to follow-up care often find their clinics' capacity to treat NCDs is weaker than for infectious disease.[132]

Evidence from multiple settings demonstrates that NCD treatment (like screening) can integrate with other facility-based primary health care, under the purview of CHWs, nurses, or physicians. In particular, this strategy can integrate NCD treatment with antenatal care; HIV care; and tuberculosis care (see boxes below).

Integrated NCD and HIV care (in high-prevalence areas)

In countries or districts with a substantial HIV burden (skip this box if HIV is low prevalence, less than 1%), HIV care with antiretroviral treatment (ART) will be available in hospital outpatient clinics and sometimes decentralized to primary health centres. In PHC facilities which also provide HIV care/ART, establish CVD risk/diabetes assessment and management within the HIV clinic for PLHIV on ART if such co-management has been agreed between the relevant national or regional programmes/partners. A summary of experience and options for integrated HIV-NCD care in these setting follows. These options should have been discussed during national

strategic planning. The decision then needs to be operationalized at the district, particularly where there are motivated implementing partners for such collaboration. (Local clinics have also integrated NCD and HIV care even in the absence of a national or district-level strategy.)

- Establish or strengthen collaboration between NCD and HIV care services in your district
- Estimate how many patients in your district would benefit from "one-stop-shop" co-management of their HIV/ART and an elevated CVD risk/DM/HTN co-management or established CVD.
- Calculate what percent of the estimated total burden of elevated CVD risk/DM/HTN this represents.
- Discuss with health facility managers and HIV implementing partners to identify feasible sites for initial experience with co-management.

Some programmes have successfully integrated the treatment of NCDs and HIV, both among people living with HIV and the general population. Because hypertension and diabetes management, like HIV care, requires simplified monitoring and treatment regimens; point-of-care tests; decentralization of care to local levels; task-shifting; and use of adherence counsellors and treatment supporters rather than directly observed treatment, there are ample opportunities to treat these conditions simultaneously. Moreover, the global response to HIV/AIDS from 2003 onwards provides an operational model for this work that the NCD treatment community can emulate.[133]

In countries with a moderate or high HIV prevalence:

In health facilities where there is also an HIV clinic (in health centres or hospital outpatients which have a HIV care/ART clinic- either contiguous or held once to several days/week in same space), several models have been used:

1. Separate clinics: HIV care/ART patients continue to get comprehensive HIV care and treatment services AND are referred to NCD chronic care for diabetes/CVD risk management, where they are seen alongside HIV negative patients with NCDs. (An HIV-positive patient who needs cardiovascular/diabetes care would need to attend two different clinics).
2. A fully integrated chronic care clinic- all patients needing care for NCDs and HIV care/ART are managed in the same clinic session (or series of clinic sessions, several days per week) attend the same clinic. If an HIV-positive patient needs cardiovascular risk-based management, both HIV care/ART and cardiovascular/diabetes management are provided by the same clinician during the same visit.
3. Separate integrated chronic clinics:
    a. HIV care/ART clinic expands to provide cardiovascular disease risk and diabetes care for their patients AND
    b. HIV negative patients receive NCD care in a separate NCD chronic care clinic (still using same health systems approach as HIV care/ART).

    The same health workers may work in both clinics.

The WHO Global Strategy for People–Centred and Integrated Health Services[134] calls for a fundamental shift in health care delivery away from vertical care systems towards integrated health care delivery to meet the burden of treating long-term, chronic conditions including HIV and NCD, and examples of this work exist worldwide.

Because HIV is an independent risk factor for CVD and related NCDs, integrating NCD care for people living with HIV (PLHIV) within an existing system for HIV care and ART can cover

a proportion of the national requirement for NCD care for patients with elevated cardiovascular risk, hypertension and diabetes. In countries with a moderate or high prevalence of HIV, integrating NCD care for PLHIV within an existing system for HIV care/ART can cover the care of a large number of patients with elevated cardiovascular risk, hypertension and diabetes. [expand with example]

An example strategy is the Tanzania HIV and AIDS Strategic Plan for 2013-2017, which includes a priority to implement HIV collaborative activities to reduce co-morbidities including cancers, hypertension, diabetes, and coronary heart disease.[135]

Integrated HIV-NCD programs can also treat patients with HTN, DM, and other NCDs regardless of their HIV status. For example, one program in Cambodia treats patients with HIV, diabetes and hypertension in the same clinics, using the same tools and medical record systems for all three conditions, staffed by counselors, nurses, and supervisory physicians. The program retained more than 90% of patients with diabetes after the first 3 months- and lowered the mean hemoglobin A1c level to 8.6%. It also succeeded in lowering blood pressure below 160/90 for 68% of patients with HTN, and raising the mean CD4 count of HIV patients on antiretroviral drugs from 53 at baseline to 316 after two years. Although it required physician-level care, this model demonstrates that NCD chronic care for multiple conditions can integrate with HIV and other specialty services within a primary care models.[136]

A clinic in Uganda uses the same staff and systems to provide services for HIV on some days and for diabetes and heart disease the rest of the week.[34] In Swaziland and Ethiopia, recent data suggests HIV clinics can be similarly adapted for diabetes care. [137] In a rural and urban HIV clinic in Zomba district Malawi, hypertension prevalence was 23.7% but amongst these 59.9% had stage I (mild) hypertension. Diabetes prevalence was 4.1%. Only 3.4% had a WHO/ISH score, risk >20%).“Among adult Malawian HIV patients in care we found high combined prevalence of mostly newly diagnosed hypertension and diabetes. Integrated HIV-hypertension diabetes care may be individually beneficial but increases the burden of care for busy HIV clinics. Excluding patients with mild hypertension and low CVD risk from drug treatment would half the overall burden of HIV patients in need of integrated pharmacotherapy for diabetes and/or hypertension.”[138]

In remote Neno district in Malawi, NCD case management was added onto an HIV platform, without additional financial or human resources (although in the context of a PIH project), allowing for a single visit for patients for all conditions.[139] In Malawi, a pilot study found that 27% of persons in treatment in rural and urban HIV clinics had HTN or DM [insert ref].

In another report from Malawi, all 25 health centres and five hospitals supported by the EQUIP project in two rural northern districts of Malawi were surveyed. At health centres, integrated NCD and ART care was more common, with 48% (12/25) providing ART and NCD treatment in the same consultation.[140] “They saw the advantage of a separate clinic being in terms of providing separate patient education, including patients educating each other, ensuring vital signs are taken on all patients and having clinician time more focussed on providing specific care issues. However, interviewees were much more hesitant about integrating ART care with NCD care, citing stigma and work load as the main concern, although they did admit that integration with ART services would be more convenient to patients with comorbidities.”

Regardless of whether NCD care is offered only to PLHIV, or to all comers, several models are possible for integrating clinic facilities and staff.

7.2.2 Extending NCD chronic care using CHWs linked with health facilities

In addition to integrated facility-based care, CHWs and other non-physician providers can provide NCD care in separate outreach sites in communities – or through door-to-door care.

A 2005 randomized trial in China and Nigeria trained community health workers in 10 primary care clinics in each country to treat persons with known hypertension – both through blood pressure control and risk factor management - according to the WHO-PEN algorithm now contained within HEARTS. [141], [ref].The protocol included counseling on exercise, tobacco cessation, and healthy diet, as well as thiazide medication to lower blood pressure. The program lowered patients' blood pressures more than paired control clinics in both countries – and in Nigerian clinics, succeeded in changing behavioral risk factors. Although the revised HEARTS protocol has not been similarly tested, this work provides a blueprint for how to implement its components to treat patients in the absence of nurses and physicians. Similar work is now underway in Ghana, where a cluster-randomized trial is randomizing both district hospitals and local community health centers to implement the WHO-PEN initiative for blood pressure control, and measuring the impact of this nurse-led intervention on blood pressure relative to usual clinical care.

CHWs can screen and treat patients more frequently at community clinics if provided with adequate tools for reporting and supervision, and strong linkages with the health facility team. Linkage and oversight from the health facility needs to be particularly strong and frequent if CHWs or other non-physicians are dispensing and/or refilling medications. Most non-facility CHW roles in LMICs have been in maternal, child and neonatal survival (35 % of total); followed by HIV/AIDS (16 %), and reproductive health (6 %), rather than non-communicable diseases (4 %) and mental health (4 %).[142] However, as discussed above, integrated care for these conditions is possible at multiple levels of treatment.

Some countries have created large cadres of CHWs: for example, the health extension workers (HEWs) in Ethiopia, the health surveillance assistants (HSAs) in Malawi and the Behvarzs in Iran. These cadres are government employed and receive basic training ranging from 3 months (HSA) to 1 year (HEW) and 2 years (Behvarz). In some cases (such as the Behvarz), these CHWs can and do also provide NCD treatment through home visits[143]. In all cases, however, adding NCD tasks to CHWs' existing workload may be infeasible without recruitment of additional cadres – such as trained NCD expert patients.

7.3 Acute care for NCDs/ emergency management

At health centre level Most patients with NCDs still require periodic acute care, sometimes referred to as "acute on chronic". An NCD patient with an acute exacerbation or other complication may attend the general medical/acute care clinic for adults. Those working in the general medical/acute care clinic will benefit from integrated guidelines that support their recognition and correct treatment of complicating conditions, as well as screening and early disease detection. Or an NCD patient may come to his or her follow-up appointment in NCD Chronic Care clinic, complaining of new symptoms or showing signs of an acute problem. Basic acute care (They can be treated here, rather than requiring these patients to wait in the medical OPD queue. Provision of basic acute care can also occur here, rather than requiring these patients to wait in the medical OPD queue. Health workers should be trained in both acute and chronic care.

Whenever a patient arrives at either an acute care clinic or at the Chronic NCD clinic, it is important to do a rapid “ABCD” triage for emergency signs then the rapid provision of emergency treatments.

Some interventions to avert mortality in severely ill patients require initial detection and referral from the primary care facility to hospital, after lifesaving pre-referral treatments such as aspirin for suspect acute MI; glucose for hypoglycaemia; antihypertensives to lower BP in severe hypertension; furosemide for acute heart failure/pulmonary oedema; saline infusion in suspected DKA. The hospital team needs to be prepared to manage these conditions.

7.4 Role of the district hospital

Skilled management of severe illness can avert many deaths. These include the management of severe hypertension, acute myocardial infarction, arrhythmias, stroke, diabetic ketoacidosis, sepsis and severe pneumonia (which can complicate diabetes and COPD). To strengthen these interventions may require improved provision of specific medicines (see Chapter 9), laboratory tests (such as potassium and creatinine) (see Chapter 10), diagnostic equipment (such as an ECG machine) (see Chapter 10), updated and country-adapted guidelines, mentoring from the central or referral hospital to the district hospital, and support for quality improvement of the management of these severely ill patients (see Chapter 14).

Most primary care NCD case management interventions assume back-up and supportive supervision and mentoring from the hospital level.

Local decisions regarding which NCDs to treat at each health facility level (and with what level of provider) usually require policy consultation with district and national health leadership. This dialogue allows each clinic to align its approach with national strategic decisions on what interventions to prioritize; which clinical guidelines to adapt (see section 7); and how to employ task-shifting and task-sharing within the health workforce. See Figure A for an example guideline sheet.

. **Figure A: CVD/NCD services by level of health system**

Date:
Initial decisions:

CVD/NCD services by CHWs in the community

CVD/NCD services at health centre:

- x
- x
- x
- x
- x

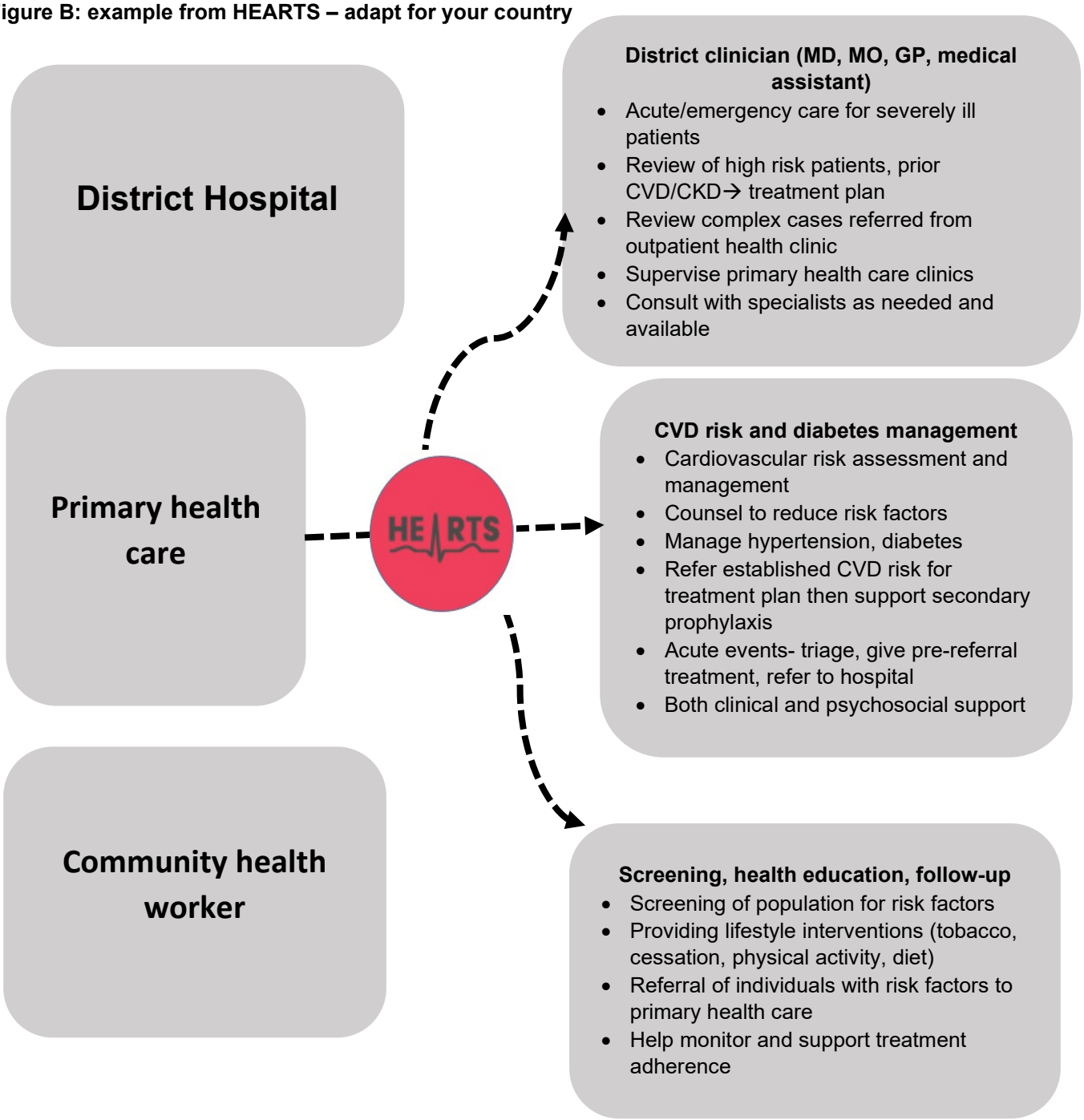
Additional CVD/NCD services in hospital outpatient clinic:

-

Conditions requiring referral for management/treatment plan at the district hospital:

- y
- y
- y
- y
-

Figure B: example from HEARTS – adapt for your country



8. Adapt the CVD/NCD clinical guidelines and tools to operationalize these guidelines

Country adaptation is an essential and important step before using one of the several generic NCD guidelines, training curricula, and communication aides to support lifestyle changes, or using national versions which are updated and adapted to incorporate new materials and policy decisions.

Advantages of adaptation

- Provides an opportunity to update current national guidelines, given the changing global normative guidelines, new interventions, and data on the most cost-effective interventions.
- Often results in the guidelines being "taken apart and put back together" with key modifications (usually with most content intact).
- Results in substantial country ownership by involving key stakeholders in the process of review and adaptation of the generic package.
- Can potentially develop more effective prevention and behavioral change materials and approach
- Allows integration of existing country tools such as patient education materials or existing approaches to certain clinical problems or prevention interventions.
- Supports a rapid but thorough review of the relevant NCD national policies, guidelines, and epidemiology.

There are several domains of adaptation required to support a strong NCD case management programme:

- Clinical guidelines and training materials
- Sociocultural adaptation, especially of the patient education materials
- Nutrition adaptation
- Patient monitoring system (see chapter 9)

Principles of adaptation of evidence-based clinical guidelines provided by WHO—

- Provide access to the evidence during the policy review and adaptation process (see chapter 5, the WHO PEN evidence reviews, relevant recent publications, country data)
- Suggested adaptations should be accompanied by the evidence for the adaptation, as well as an analysis of the cost implications!
- Allow for meaningful integration of global recommendations with resources available

Adaptation of the clinical guidelines and training materials is a systematic process which follows work and important policy decisions guided by other sections of this manual and other tools [to be updated once finalized]:

- prioritized HEARTS/NCD case management interventions and thresholds for treatment (chapter 6- see especially Table 6a)
- decisions on NCD services to be delivered by level of health system (chapter 7)
- decisions on human resources including task-sharing/task-shifting policy decisions (chapter 7).
- decisions on provision of NCD medicines, essential technologies and laboratory by level of health system (chapters 14 and 15 and the WHO/PATH national and district essential medicines and technology manual)

- adapted patient monitoring card or record, to be included in the clinical training materials (chapter 9 and the HEARTS monitoring module)

Adaptations of clinical guidelines need to address:

- both NCD primary health care (health centre or hospital outpatient) and NCD hospital care (inpatient and outpatient referral care), as well as those to be delivered by community health workers
- both emergency/acute care of NCD complications, screening for CVD risk and early disease detection, and chronic care.
- the operationalization of the clinical guidelines—the sequence of care, division of tasks between PHC clinicians and auxiliaries, etc (see *Integrating cardiovascular and diabetes case management into your health facility- an operations manual for health centres and outpatient clinics in low-resource settings).*

Any changes in clinical guidelines need to "ripple through" the related training materials and communication aides.

See Annex C Checklist to facilitate rapid adaptation of HEARTS/NCD guidelines, training and communication tools

Sociocultural adaptation:
Sociocultural adaptation is important to strengthen the behavioral change messages and counselling approaches to promote healthy lifestyle; to identify the best expressions and explanations for adherence to treatment, reasons to stop smoking, etc; to strengthen the approach to prevention, taking into account behaviors and cultural norms and gender relationships; to counter myths; to improve the effectiveness of the illustrations; and to improve the language (this is more than translation).

There are many methods to support sociocultural adaptation—ethnographic and communication/behavioural change methodologies for making modifications and testing their effectiveness with the local population, including focus groups.

Nutrition recommendations for a heart healthy diet and for management of diabetes need to be adapted to insert appropriate locally available foods. Al communication messages regarding the diets (heart healthy, diabetic, low lipid) should be adapted to local context.

How to support policy review and adaptation

- Orient and gather support from key bilateral and NGO partners, academic experts, professional associations, local NCD groups, others
- Involvement of representatives of district-level managers and clinicians and other target health workers, auxiliaries, and NCD expert patients in the review is important, to balance the perspective of central level experts.
- Plan the policy review and adaptation workshops (these may best be done sequentially) with enough time for the volume of material to be reviewed and adapted
- Provide materials well in advance of the workshop- both proposed new tools, existing national guidelines, training materials, relevant country data

To facilitate adaptation, it is important that there be resource persons with a thorough understanding of the technical basis (and cost and availability) of both the generic guidelines and suggested adaptations.

Once guideline decisions have been made, it makes sense to hire a local expert or consultant to go through the relevant training materials to suggest adaptations, then have

these reviewed by an expert group—rather than doing this in plenary or small group. This process may involve multiple expert groups e.g healthy diet counselling messages by nutrition group, clinical diabetes decisions by local NCD experts, etc.

It would then be important to incorporate the feedback and resend the tools out to all stakeholders.

9. Adapt and establish a patient and programme monitoring system

[to be updated when final minimum indicators available]

Standardize patient monitoring data and indicators

Standardized minimum data set for NCD programmes

A standardized minimum data set should be the foundation of any national NCD patient monitoring system. This should define any data collected from any system, whether paper-based or on the paper to electronic system continuum. Ideally, the national NCD programme has one, harmonized patient monitoring system that includes standardized paper-based tools with entry into one standardized electronic register or reports (at a designated administrative level). At the other end of the spectrum, in some countries there may be multiple, unharmonized patient monitoring tools and paper- or electronic-based systems depending on the facility, resource level, reporting requirements and external partner support.

It is up to the national programme to coordinate all entities providing NCD care in the country in order to standardize data collection and reporting procedures, just as standardized care and treatment protocols should also be followed. They may be private clinics, faith-based or donor-supported facilities. At the minimum, all facilities providing NCD care and treatment should collect the minimum data set and national indicators should be well-defined so that they are reported in a standardized fashion. Sites with greater resources may always collect more data. The use of standardized tools facilitates supervision, aggregation and transfer of patients between facilities.

Indicators from the patient monitoring system

The standardization of patient monitoring definitions and minimum indicators allows any system to collect and report on the same indicators to monitor and manage an NCD programme at any level.

The minimum essential indicators for cardiovascular risk management including hypertension and diabetes management are listed in the HEARTS monitoring module.

Adaptation of the NCD patient monitoring system for cardiovascular risk and diabetes case management- see the final *HEARTS monitoring module* once available

This module presents the minimum indicator list.

Key steps

While not providing a detailed methodology, the following are recommended actions to be taken (not necessarily in the order given) in adapting and operationalizing the generic NCD patient monitoring system. This would usually be done at national level.

Table 11d. Action steps in adapting and operationalizing an NCD patient monitoring system (adapted from WHO, 2017)

Action	Adapting and operationalizing an NCD patient monitoring system
MoH-lead technical work group	MoH forms/has a technical work group to lead the review/survey of existing NCD patient monitoring systems and the development of a harmonized national system
Stakeholder meeting	Gather key stakeholders to discuss the adaptation, development, revision or strengthening (as appropriate) of the national patient monitoring system. This includes actors not only from non-communicable or chronic disease programmes, but other programmes (e.g. HIV, TB, MNCH) necessary depending on how integrated or interlinked the intended system will be
Inventory current tools	Inventory current and potential patient monitoring tools and other information systems linked to NCD patient monitoring
Define indicators and minimum data set	Obtain consensus on what indicators to measure and the corresponding minimum data elements to collect for both patient care and programme management. Review and standardize definitions for each data element and indicator
Identify the system and tools for data collection	Identify an appropriate system and tools to collect these data for each type of facility
Determine paper-based and electronic systems	Determine when (what level) and how data will be collected on paper or via electronic methods (electronic reports, electronic register or EMR)(i.e. where the system will lie on the paper- to electronic-based continuum)
Adapt generic tools based on national guidelines	Adapt tools based on country resources and information needs (for example, data on when statin prophylaxis is started or stopped may be omitted from registers if this information is not required for drug supply management)
Stakeholder consensus for system	Obtain consensus on the patient monitoring tools from all key stakeholders
Identify supervision structure	Plan who will carry out, supervise and support patient monitoring at facility, district, regional and national levels
Develop training materials and conduct trainings	Develop (or adapt existing) training materials to prepare these staff at all levels on the use of patient monitoring tools, then train and retrain as necessary.
Plan for follow-up after training	Plan for systematic follow-up after training and supportive supervision, to ensure quality data collection and effective use of the data at facility and district levels
Human resource considerations	Decide and inventory current staff who will carry out patient monitoring activities at each level and part of the overall system, identify and fill any gaps as necessary and train each cadre accordingly (see Section 11.9)
Infrastructure considerations	Inventory infrastructure needs (e.g. room, table, chairs for patient registration or computers for EMR) and plan to obtain required items to ensure functioning NCD patient monitoring system.
Data quality and use	Include routine data quality assessments based on guidance recommendations
Coordination across programmes and partners	Ensure coordination between stakeholders from each programme included in the NCD patient monitoring system, and implementing partners

Frequency and timing of monitoring and reporting

While patients newly enrolled and in care and on treatment will be monitored more frequently during the first few months, routine drug pick-up or clinical appointments may take place less frequently thereafter (e.g. every three to six months or even yearly). For reporting, cohorts are organized by the year of enrolment, and the cohort analysis report is filled at baseline, six, 12 months and yearly thereafter. Likewise, the cross-sectional report is filled annually (more frequently as relevant). Community health workers (CHWs) may be monitoring patients more frequently in their community and may have their own tool to do so. CHWs will report to their designated facility depending on their activities (e.g. more frequently if dispensing meds, less frequently if only providing psychosocial, adherence support – though they may visit their patients with the same frequency).

Frequency of monitoring and reporting may shift depending on the clinical or programme needs of the facility team (or those at the district- or national-level).

Human resources and organization requirements for patient and program monitoring

Human resources

Patient monitoring is an activity that requires the participation of a wide range of staff with overlapping responsibilities and facilitated by the dependence on task shifting to lower level cadres and even lay providers (see below). The following table is a recommendation of the breakdown of different roles and responsibilities among potential staff. Note that in the case of electronic systems, EMR may replace “patient record” and electronic register may replace “register” though staff responsibilities may remain the same.

Table 9. Staff and their suggested roles and responsibilities for NCD patient monitoring

Staff	Roles and responsibilities for patient monitoring
Triage worker or Receptionist or Data clerk	• Maintain appointment book and signal missed appointments • Start or retrieve patient card • Record patient data in patient card (or register, depending on the NCD service provided)
Triage worker (auxiliary), trained Expert patient or Lay counsellor or Professional counsellor (these are facility-based lay providers)	These tasks may be divided: • Initial triage for emergency signs- if found, call for help from health worker • Fill demographic information in cards • Measure waist circumference, weight, height, calculate BMI, assess CVD risk % • Record patient data in patient card (or register depending on the NCD service provided) • Adherence counselling, treatment literacy and education, healthy lifestyle (record on card) • Adherence assessment and support • Patient tracking (lost to follow-up)

Staff	Roles and responsibilities for patient monitoring
Nurse or Clinical officer or Other clinician	• Record patient data in patient NCD card • If acute problem – provide acute care and record data on patient-held card, exercise book or 'patient passport' (if used) as well as note on encounter part of NCD card • Conduct patient reviews with clinical team (using longitudinal records) and discuss patient outcomes • Review routine NCD programme reports to track its progress • Review register to assess quality of NCD services • Review quality of NCD patient records and register with clinical or district supportive supervision team
Data clerk or Secretary or Other staff. May be a designated nurse if these are not available.	• Organize and manage patient records and register • Transcribe data from patient records to register • Enter patient data into electronic medical record, register or report (if used) • Link to DHIS2, other HMIS • Tally data and fill in routine reports • Review register to assess quality of NCD services and data • Review quality of NCD patient cards and register with clinical or district supportive supervision team and clinical mentor
Community health workers	• Initiate NCD testing/risk assessment and counselling in community • Monitor adherence and drug pick-up • Follow up and trace lost patients
External clinical mentors and supportive supervisors (e.g. from district team)	• Review quality of NCD patient cards and registers with clinical or district supportive supervision team • Provide supportive advice and recommendations to help improve clinical care and monitoring
Pharmacist, pharmacy technician/assistant	• Dispense drugs - fill out stock cards and ?dispensing register • Toxicity management • Adherence counselling and monitoring

Table 9... Organization structure for patient monitoring by level

Level	Structure
Central/National	• Central health management team • HMIS/M&E point person
Regional	• Regional health management team • HMIS/M&E point person
District	• District health management team • HMIS/M&E point person

Health centre or hospital outpatient	• Health facility in-charge
	• Clinical staff
	• Non-clinical staff
	  • Counsellors, Expert patients, Auxiliaries/triage worker
	  • Lab, pharmacy techs/assistants
	  • Data clerks
	  • Secretaries, receptionists
	• Patients

Community	• Community health workers • Treatment supporters • Patients and their families

Integration with existing systems

A successful NCD patient monitoring system is founded on the collaborative work and cooperation of various partners within the health sector.

NCD national programme and other national programmes

At the national level, there are also special demands and collaborations with WHO and others to produce certain internationally agreed indicators. The annual NCD progress reports are another source of estimated data on progress in reducing premature NCD mortality. For example, from the 2015 NCD progress report from Uganda, the probability of premature mortality (the probability of dying between ages 30 and 70 years from the four main NCDs) was 21%, while the total number of NCD deaths was 96,000, which comprised 27% of all deaths.

Case management programme monitoring at national/international level

In May 2015 WHO published a Technical Note (1) on how WHO will report in 2017 to the United Nations General Assembly on the progress achieved in the implementation of national commitments included in the 2011 UN Political Declaration and the 2014 UN Outcome Document on NCDs. The Technical Note included a set of ten progress monitoring indicators which are intended to show the progress achieved in countries in the implementation of the four time-bound commitments for 2015 and 2016 included in the 2014 Outcome Document. Of the ten progress indicators, most focus on population interventions to reduce use of tobacco, harmful alcohol use; two relate directly to case management:

 # 9 Member State has evidence-based national guidelines/protocols/standards for the management of major NCDs through a primary care approach, recognized/approved by government or competent authorities

 # 10 Member State has provision of drug therapy, including glycaemic control, and counselling for eligible persons at high risk to prevent heart attacks and strokes, with emphasis on the primary care level

Collaboration between other related national programmes, including in particular HIV, TB, MNCH (RCH), other communicable and chronic diseases, strategic information or HMIS will be important for the success of the NCD programme. Recommended activities include:

- Using NCD patient cards and registers at other programme sites; for example, if the HIV chronic care clinic will also provide diabetes, hypertension, high cardiovascular risk treatments to patients on ART, they might additionally start an NCD patient card for each patient with these NCD complications and enter into an interlinked electronic register
- Reconciling programme registers to avoid double-counting
- Integrating service delivery at the facility (e.g. a PLHIV can receive both HIV care/ART and diabetes care at the same place)
- Integrating NCD data into other programme records
- Integrating NCD data into the HMIS (including setting-specific DHIS2)
- Standardizing NCD indicators across programme areas

Other institutions

Collaboration between the NCD programme and institutions both in the country (e.g. UN organizations, community-based organizations (CBO), faith-based organizations (FBO), private businesses, teaching institutions) and outside (foundations, donors, universities) may hugely benefit patient care and monitoring by providing much-needed resources and filling in gaps in care and services (e.g. psychosocial support by CBOs). One way internal institutions may collaborate is through involvement in relevant (technical or otherwise) working groups to broaden the range of support that may be needed around improving the overall programme.

11. Health workforce and capacity building

Based on your decisions on which CVD/NCD case management services will be performed at different levels of the health systems (section ..), adapted clinical guidelines and national recording and reporting system:

Plan to augment the PHC health workforce to accommodate CVD/NCD case management:

- Review availability of PHC staff; current policy for PHC staffing at health centre and hospital outpatient
- Review current PHC / CVD service delivery model & team organization
  - Review functions, responsibilities and competencies by cadre for NCD case management at PHC and hospital level, team-based care
  - Decide whether changed are needed to support scale up of CVD/NCD case management
- Estimate the numbers required by cadre to strengthen CVD/NCD case management at PHC and hospital referral level (then district by district during implementation planning)
- Consider options to increase the numbers of health workers available to support NCD (and other) PHC services
- Consider options/set policy required to support task-shifting/sharing, addition of expert patient lay providers
- Explore approaches to introducing CVD/NCD guidelines and interventions into private for-profit and non-profit health facilities

Adapt in-service training curricula- choose and adapt in-service training curricula (and continuing education)

At primary health care level:

- Clinicians- doctors (if available), nurses, clinical officers
- auxiliaries/lay providers
- managers
- medicine and lab supply management and equipment maintenance within health facilities
- laboratory testing for NCDs
- use of recording and reporting tools

At hospital:

- clinical mentors
- doctors seeing patients in referral

Refresher training and continuing education

Consider low-cost innovations for in-service training

Promote effective clinical mentoring and supportive supervision at district level

Pre-service education-

- Work to include CVD risk/NCD case management in medical, nursing, pharmacy preservice education
- Provide adapted preservice education materials for faculty use

The human resources required to add or augment CVD/NCD case management at primary care level are often substantial, requiring the addition of clinical health workers and auxiliaries as well as task sharing or shifting, to produce functional clinical teams able to handle the increasing numbers of patients in chronic NCD care. This entails a substantial

need for training and mentoring for several cadres of health workers, with ongoing activities to maintain quality of care.

Managing human resources for NCD case management is a complex task that requires national level policy and planning for long-term sustainable impact.

The national level should review PHC staffing and determine if and how (which cadres) staffing needs to be expanded to accommodate cardiovascular risk management/NCD case management using existing MOH cadres and whether modifications in provider scope of responsibilities to accommodate NCD case management- task sharing/shifting is needed. This may entail both increasing the numbers of adding health workers in a cadre as well as augmenting the clinical teams with auxiliaries- nursing assistants (who may already be an MOH-approved and hired cadre), 'expert patient' lay providers or CHWs working in clinic. All this requires HR policy work.

Plan to augment the health workforce to accommodate CVD/NCD case management:

11.1 Review availability of PHC staff; current policy for PHC staffing at health centre and hospital outpatient

The chart below is an example of "basic" staffing for primary health care – adapt this to reflect the recommendations of your Ministry of Health. "Basic" staffing refers to staff required to provide primary care services not including the addition of NCD case management, and is based on the population served. Adapt this table to reflect your country policies and approach to service delivery.

Review the "basic" staffing for primary health centres (prior to additions for NCD case management)- adapt this table to reflect national staffing policies		
Small health centre (catchment population of 3,000-7,000 people)	**Clinical staff** • One clinical assistant • Two nurses; one nurse/midwife (N/M) and one emergency nurse • One nurse assistant	**Support staff** • One cleaner • One watchman
Large health centre (catchment population of 7,000-20,000)	**Clinical staff** • One clinical officer • One clinical assistant • Five nurses - one registered N/M, two EN/M, two EN • Two nurse assistants • One pharmacy technician/assistant • One laboratory technician/assistant	**Support staff** • Two cleaners • One watchman

11.2 Review current PHC / CVD service delivery model & team organization

- Review current PHC / CVD service delivery model & team organization (chapter 6)

- Review functions, responsibilities and competencies by cadre for NCD case management at PHC and hospital level, team-based care
- decide whether changed are needed to support scale up of CVD/NCD case management

Review job descriptions for each position currently assigned to health centres and outpatient clinics

Are health workers working together as a clinical team to deliver NCD case manaement?

Are clinical health workers doing work that could be shared with auxiliaries and other cadres (see section 10.5 on task-sharing)?

11.3 Estimate the numbers required by cadre to strengthen CVD/NCD case management per PHC facility and number of hospital referrals

This is then followed by district by district calculation of numbers during implementation planning.

Review the key clinical decisions which have substantial impact on the volume of patient visits to PHC on the volume of patient referrals from PHC to hospital - see section 11 in the *NCD district implementation manual*

Condition	Requires referral to district hospital	Initial follow-up interval	Once stable (targets met)	Example of estimated distribution amongst all active CVR patients
PCVD	Yes, for secondary prophylaxis treatment plan	3 months	6 months	..%
CVR >=30%	In generic HEARTS clinical guidelines	3 months	3 months	etc
CVR 20-30% with DM +/- HTN	No	3 months—isn't this monthly until controlled?	3 months	
CV risk 20-30% without DM or HTN	No	3 months	3-6 months	
CV risk 10-20%	No	3 months	6-9 months	
CV risk <10%	No	12 months	12 months	

11.4 Consider options to increase the numbers of health workers available to support NCD (and other) PHC services

Generally, recruitment and hiring are carried out by the district health office, working with the in-charge providers at health facilities, within a funded budget.

Can more funds be provided to expand human resources at PHC level?

Are trained health workers available to be hired, or have they been diverted to other programmes, private practice, etc?

"The degree of local capacity determines the kind of human-resource management strategies that will be feasible and desirable. Decentralization of human resource management is more likely to succeed in cases where lower-level authorities have the financial and managerial ability to set competitive compensation packages and salary levels that will attract local talent. In these cases, the flexibility advantages of allowing local governments to set hiring levels might outweigh the risk of increasing inter-regional inequalities. Where talent and skills are lacking at the local level, a unitary hiring system might be preferred to ensure that the necessary skills are present locally in all regions. In these cases where the center retains more control over human resources, caution should be paid to ensure that the management options of local stake-holders are not curtailed." --World Bank (http://www1.worldbank.org/publicsector/decentralization/admin.htm)

11.5 Consider options and set policy required to support task-shifting/sharing, addition of expert patient lay providers

"Task shifting" is the reassignment of clinical and non-clinical tasks from one level or type of health worker to another so that health services can be provided more efficiently or effectively. For example, when medical officers are in short supply, most NCD-related services at primary care level can be effectively shifted to non-physicians such as clinical officers and nurses, while maintaining quality. To free up their time, additional auxiliaries and 'expert patients' who are experienced managing their diabetes, hypertension or asthma/COPD can expand the clinical team in order to increase access. The diagram on the next page is an example of divisions of CVD/DM case management based on division of NCD clinic-based tasks between clinical (nurses and clinical officers) and non-clinical staff (auxiliaries, expert patient lay providers, CHWs working in clinic). Task shifting also can apply to laboratory functions, supply management, and pharmacy services.

"Task shifting" is not new; historically, many countries have created substitute cadres to take up the tasks of existing professionals, where there has been a shortage of professionals. Task-shifting initiatives have increased in recent years, particularly in countries with high HIV prevalence rates. It is likely you will experience it at your health centre with expansion of the clinical team. Decisions on task-shifting policy are usually made at national level. For facilities with nurse-led teams, prescriptions or standing orders may be required for some treatments.

11.5.1 Tasks to shift or share- for country adaptation

Each task in the table in Annex D is cross-referenced against the main categories of health worker cadres. This table addresses only cardiovascular disease and diabetes.

These cadres are:

- NCD specialist (for cardiovascular disease, a cardiologist; for asthma and COPD, a pulmonary expert; for diabetes, an endocrinologist; for renal problems, a nephrologist, for comprehensive eye exam, an ophthalmologist, for mental health/substance abuse problems, a psychiatrist or psychologist, etc.);
- MD/GP (medical doctor, general practitioner);
- NPC- non-physician clinician such as clinical officer;
- N (nurses); and
- CHW/auxiliary/expert patient lay provider/ peer educators; community health worker in community; auxiliary such as nurse assistant or health educator or trained expert patient or peer in the clinic or community).
- Lab technician/ lab assistant

These cadres need to be adapted to your national health system.

An **X** is used to indicate which cadres are able to execute that task in a manner that is both safe and effective, assuming that all health workers have standardized training and appropriate supervision specific to the performance of the individual task. People living with NCDs who are working as auxiliaries in clinic or CHWs in the community can add value in the delivery of specific services by virtue of their own knowledge and experience with their disease, provided that they undergo appropriate training and supervision.

The tasks have been assigned to the cadres as an illustration according to:

- The HIV 2008 taskshifting publication[144];
- Brief review of published literature on existing task shifting practices in NCD case management;
- Expert opinion gauging professional health worker confidence in shifting or sharing tasks from one cadre to another given standardized training and appropriate supervision.

The table in Annex D is intended as a guide that indicates the potential scope of practice for each health worker cadre for CVD/DM interventions. Please adapt it for your country based on available human resources, the challenge of scaling up NCD services for a very large number of patients, and the service delivery model that you are planning. There may be policy work required to increase the scope of work for certain cadres, and discussions and negotiations with professional associations (see below).

Key lessons from task shifting or task-sharing:

- Task shifting or task-sharing needs to be done with strengthening of referral (and back-referral) pathway (see section ….in *District Implementation Manual*).
- Successful task shifting or task-sharing requires:
    - Adequate health worker and auxiliary/lay provider education and training
    - organized clinical team structure, and
    - well-defined supervision after training

An example of the sequence of care for a clinical team delivering CVD/NCD care to a large volume of patients follows. The clinical team has been expanded by trained auxiliaries and expert patient lay providers.

There has also been some experience with additional task shifts for specific diabetes care enhanced by strengthening the referral pathway:

> **Eye care** In Malawi- Routine eye screening including fundoscopy is done through the establishment of eye clinics integrated in the NCD clinics at 21 hospitals in

Malawi. **Patient advocates** are associated to the clinics and a referral system to the Lions Eye Hospital in Blantyre is established. Plans are to develop screening services in the district including supplementary training of **ophthalmic clinical officers (OCOs)**, purchase of portable fundus cameras and establishment of mobile laser clinics to overcome patients' transport challenges and late presentation. Routine screening and treatment of SDR is not only about having laser equipment or trained ophthalmologists, such capacity must be anchored into the overall patient flows.

Foot care Originating in India and Tanzania, Step-by-Step' foot care, implemented in several countries in Africa, includes three levels of comprehensive foot care conducted by different health worker cadres:

- Basic level including regular feet examination and patient education, most often conducted at primary/secondary health care facilities by **nurses**
- Intermediary level including wound care, dressing and debridement and hence curative services to heal ulcers, most often conducted at secondary/tertiary care facilities by **nurses and medical officers**
- Advanced level including limb-saving surgeries and complicated ulcer treatment, most often conducted by **surgeons, physicians** at tertiary care level. [145]

In Malawi-a **nurse-led** foot care intervention clinic was established at QECH (tertiary care hospital) to carry out a twice yearly assessment of patients' feet for neuropathy, PAD, deformities and ulcers. As a result the amputation rate has been reduced from 20 to 5 cases per year. It was necessary to strengthen referral pathways whereby patients were not automatically referred to a surgeon, since this would often lead to too many amputations which could have been avoided and to develop a curriculum with an education program for health worker training.

In Kenya, many of the targeted professionals are nurses supported by orthopaedic assistants. Referral systems between nurses and surgeons must be in place. Vascular surgeons are rarely found at hospitals and patients may have to go to India or South Africa which is very expensive. Task transfer from the very few surgeons located at central hospitals to clinical officers and nurses is essential

11.5.2 Policy work to support task-shifting/task-sharing

HR policy: identify the tasks that could be performed by auxiliaries/expert patients/other lay providers

Lay providers can perform a range of tasks including helping with triage, taking patients' vital signs and pulling their charts, data keeping, treatment adherence counselling, treatment literacy and education, pill counting and stock management, tracking patients who are lost to follow-up, community outreach, home-based care and follow-up, managing support groups, counselling, basic laboratory testing, and more.

HR policy: how to support the recruitment and retention of lay providers

- Can they be paid?
- If payment is not possible, what other incentives such meals, gifts, waiving medical fees for their children, or inviting the providers to training and events.

- Paying for costs associated with the lay providers' work is also important. This can include paying their bus fares or buying/lending them a bicycle.
- NGOs and FBOs can be approached for help in hiring lay providers.

- **HR policy: what are the qualifications and/or training needed for the lay providers** Once you identify the tasks you wish the lay providers to perform, identify the training or qualifications needed to perform their roles. Contact your district health office or donors in your area to see what training is available for lay providers (also see 'recommended training' in this chapter).

- **HR policy: supervisory responsibility**

- **HR policy: For facilities with nurse-led teams, prescriptions or standing orders may be required for some treatments.**

11.5.3 Expanding the workforce through use of diabetes or hypertension expert patient, if needed

Recruiting lay providers can help increase the number of staff at PHC facilities. *Lay providers are non-professional workers who can serve as counsellors, triage officers, data clerks, community health workers, nursing, laboratory and pharmacy assistants, and more*. Depending on their training and experience, lay providers can work in non-clinical and clinical roles as paid staff or volunteers. See examples of how to include lay providers in the health centre team at the end of this section.

Expert patient lay providers- functioning both as auxiliaries and 'peer supporters'

Expert Patients (EPs) are patients with long-term health conditions who have gained valuable experience in controlling and managing their conditions and are living a meaningful and productive life.

Uganda adopted this concept in 2004, when there was urgent need to put about 60,000 HIV patients on ARVs through a comprehensive HIV care/ART approach. Since then experience has shown EPs with HIV/AIDS have been resourceful in training health workers (EPs are called Expert Patient-Trainers or EPTs when they assume a training role) and helping out in the busy ART clinics. A good number of these EPs are currently available in clinical settings and the community in Uganda. The very good ones have been trained in facilitation and communication skills and are being used to train health workers- first in chronic management of HIV patients, then more recently in enacting cases for the WHO IMAI training in emergency triage and managing severely ill patients (Quick Check+ training).

Based on their personal experiences and education at the health facility, EPs support other clients/patients to share ideas, different practices/experiences and support for adherence to treatment. Equipped with the right tools, EPs can therefore be effectively delegated with key tasks in both a clinical and community setting and can be utilized as a liaison between health workers and clients/patients. Health workers in Uganda have gradually task-shifted some areas of health education and counselling as well as minor clinical work such as taking temperature, weighing patients, and pill counting to the EPs. This releases health workers to concentrate and pay more attention to more complex clinical care and urgent issues.

This strategy has worked well with people living with HIV/AIDS and can likely work as well for patients with NCDs- examples of these chronic conditions include diabetes, hypertension, asthma, and sickle cell disease.

EPs working at the health facility continuously acquire better skills, knowledge and confidence in self-management and this enables them to live more fulfilled lives. This arrangement has increased collaboration and working relationships between health facilities and communities. It also facilitates information transfers from health facilities to communities and other clients. The end result for the EP and other clients is improved physical health and increased ability to live an independent life. This strategy allows clients/patients to participate in their own health care including advocacy for prevention and control of some of the chronic diseases in their communities. They can also be trained to help screen and link community members with cardiovascular risk or existing NCDs.

In an AMPATH review of retention in care, participants identified "peer support as a facilitator to care. In addition to developing a supportive connection with individuals with similar lived experiences, peer support can improve adherence to treatment, promote self-management coping skills and problem solving, reduce experiences of stigma and isolation, improve beliefs in treatment, self-efficacy [82] and feelings of hope . Peer support groups are common across many diseases and have been shown to have positive impacts on clinical and social outcomes. In diabetes management for example, peer support has resulted in decreases blood pressure while improving contact with the healthcare team and overall self-management….. Importantly, peers may be more approachable than healthcare providers."[146]

11.5.4 Examples of key task-shifting or task-sharing to make scale-up/decentralization CVD risk/DM management feasible.

Adapt this summary list for your country.

- CVD risk screening: from clinical health workers→ auxiliary staff, CHW, expert patients or peer educators
- Triage of patients arriving in chronic care clinic: from nurse → auxiliary staff, CHW, expert patients or peer educators
- Assessing, initiating treatment and management of hypertension and diabetes: from doctor/GP → nurses using a CVD-risk based and an algorithmic treatment approach and referring as appropriate.
- Laboratory referral can be done by different cadres following an algorithmic approach to screening and CVD-risk based case management.
- Decentralising laboratory services by making more POC testing available-shifting glucose testing from lab personnel→ trained auxiliary staff, CHW, expert patients or peer educators.
- Diabetes-specific management such as eye and foot screening can be done with task-shifting to specialty trained non-physician clinicians (funduscopic eye exam, orthopaedic assistants) or nurses (foot exam) with system improvement for patient flow and referral through patient advocates.
- Patient education and support by auxiliary staff, CHW, expert patients or peer educators
- Patient monitoring (patient card, registers, reports) can be done by different members of health team- nurses, auxiliary staff, trained expert patients, data clerks.

11.5.5 District team and health facility roles to support task-shifting and -sharing

Steps the in-charge or manager can take to help ensure successful implementation at health centre level.

- Make sure that auxiliaries or lay providers taking on new tasks are closely supervised, mentored and supported by experienced health centre staff. For example, if lay providers are performing screening for cardiovascular risk, the health centre nurse needs to establish regular meeting times with the lay provider so she/he can observe, supervise, and act as a mentor to that person. Their observations should be verified by a health worker.

- Identify the health centre provider's 'clinical back-up' at district hospital and make sure they have regular communications with this back-up staff. Health centre providers need district counterparts who will supervise and act as their mentors, and who will ensure that patients are being adequately referred to the district and returning to the health centre for services. For example, nurses handling hypertension, diabetes and elevated cardiovascular risk diagnosis, treatment and monitoring need to have regular communications with the district medical officer or head clinician. This will ensure that referrals are made correctly for patients with complications and that consultations take place on challenging cases. "Back-up" at district level is also needed for laboratory, pharmacy, and supply management staff.

- Establish a clinical "team-based approach" through regular clinical team meetings and good communications between staff. Conduct a weekly meeting of all staff at which you can openly discuss patient cases and issues that arise, and work together to solve problems. Encourage regular dialogue between staff about how to improve tasks to increase service efficiency and quality.

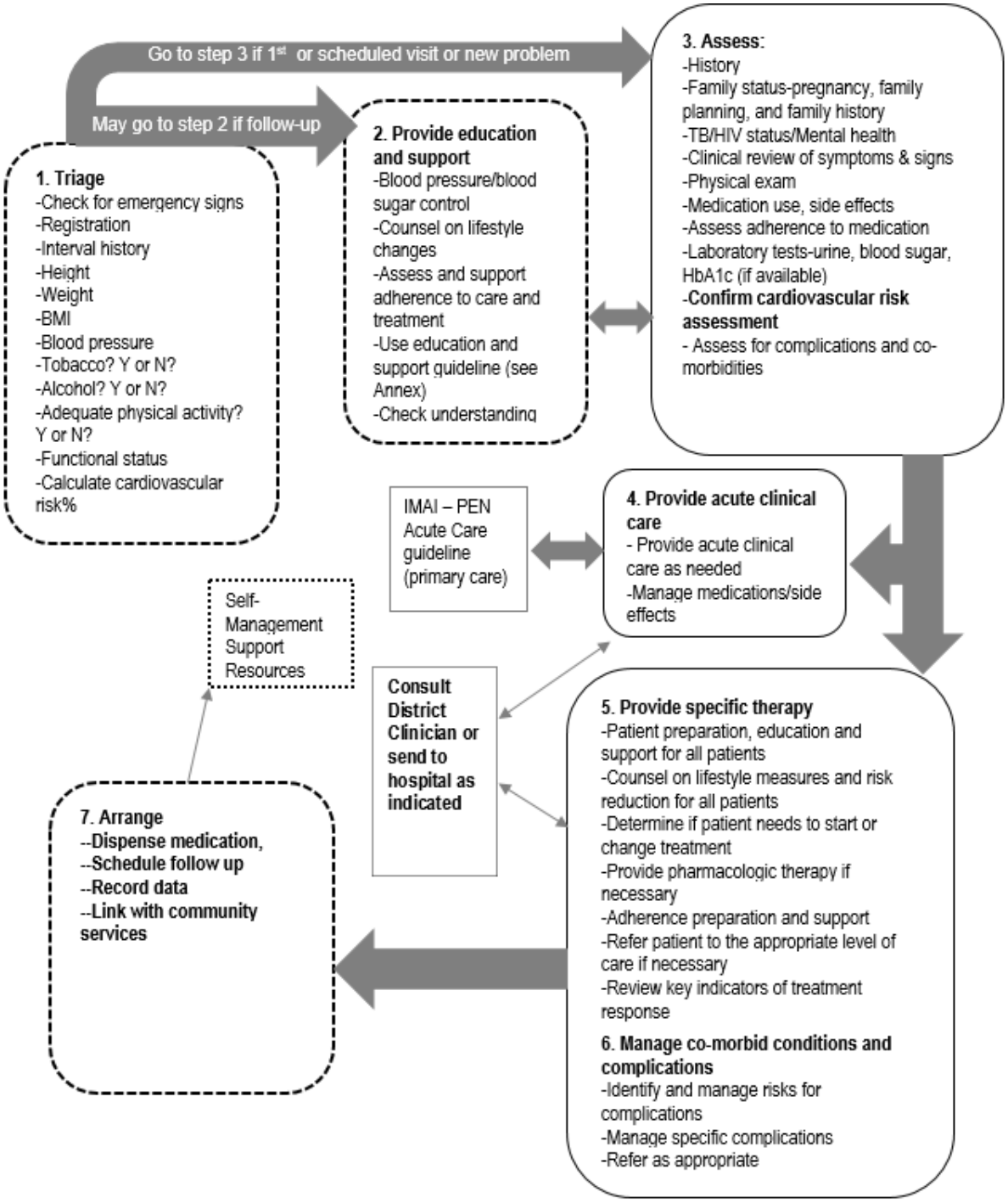
- Establish regular performance measurements to assure adherence to clinical and other standards (see *Quality Improvement* chapter and QI module).

- Implement strategies to motivate staff and to prevent 'burnout'. When staff are required to take on new tasks in an already heavy workload, they can suffer increased anxiety, stress, and burnout. Work together as a team to determine how you can keep each other motivated.

Task shifting can be a real asset at a health centre, but it takes teamwork, supervision and constant communication!

An example follow from a low-income adaptation of the HEARTS clinical guidelines for setting with human resource constraints where primary care clinical teams are led by nurses or clinical officers, working with auxiliaries. The sequence of care specifies roles for auxiliaries vs clinical health workers. Some visits do not require the patient to see a clinician.

Sequence of care[2]



Tasks that can be done by non-clinical staff

Tasks that can be done by clinical staff, such as nurses

[2] Example from IMAI-PEN Integrated NCD Care- Protocol 1

11.6 Explore approaches to introducing CVD/NCD guidelines and interventions into private for-profit and non-profit health facilities

11.7 Adapt in-service training materials

10.7.1 In-service training at primary health care level:

- Choice of training materials by cadre- this should reflect the choices of service delivery model and realities of the human resource situation at the primary care level- who are the cadres who need to be trained.
- Adapt the training materials- this adaptation work should follow adaptation of the clinical guidelines
    - Technical changes- summarize the clinical guideline adaptations and read through to make the comparable changes in the training materials. It is crucial that the training materials are consistent with the country-adapted clinical guidelines.
    - Changes in cadre titles, local names, illustrations, additions of common clinical presentations to drills and cases.

To provide quality NCD care, additional training is usually required. See the estimations, the recommendated training content for staff to provide NCD services in small and large health centres, and the descriptions of training needs and available courses in the NCD District Implementation Manual, section 11.3.

After adaptation of materials and initial training of trainers and production of master trainers, the main responsibility for a training programme is at district level. See the *NCD district implementation manual* for details on clinical training agendas and setting up a training programme and mentoring after training. Each health facility should keep track of the status and training of its staff (see the *Operations manual*) .

11.7.2 Training for CHWs working in the community-in development

11.7.3 Training for hospital-based doctors
Doctors seeing patients in referral
Clinical mentors
See NCD District Implementation Manual, section 11.3.

11.8 Refresher training and continuing education

In many countries, health and education ministries are collaborating to integrate many of the above areas of study into pre-service education. Staff who have already received the above training during medical, nursing, pharmacy, or other degree programmes can focus on taking refresher courses or more advanced training in the form of continuing education after joining the workforce.

11.9 Consider low-cost innovations for in-service training

Incorporate new, less resource-intensive approaches to training and supervision, such as self-directed learning, distance learning, clinical mentoring, and improved pre-service training, to reduce the financial burden on countries.

11.10 Promote effective clinical mentoring and supportive supervision

Setting up clinical mentoring and supportive supervision from the district hospital and/or district team if predominantly the responsibility of the district team- see section 11.4 in the *NCD district implementation manual*.

The doctor or other district clinician who leads the NCD clinical team at the district hospital will also benefit from mentoring from specialists in cardiology and diabetes (for HEARTS cardiovascular risk and diabetes management and for management of patients with rheumatic heart disease), in pulmonary (for asthma and COPD), etc. These might come from the regional referral hospital, from regional or national teaching hospitals, or from NGOs committed to improving cardiovascular, diabetes or pulmonary care (either national or international). The national programme can play an important role in arranging this higher level mentoring.

11.11 Pre-service education

It is important to rapidly introduce the country-adapted in-service NCD case management guidelines into preservice education leading to the graduation and certification of health workers in various disciplines, including doctors, nurses, clinical or health officers or similar cadres, pharmacists, health educators, and auxiliaries. Preservice education is a more cost-effective way to prepare members of the clinical team compared to in-service training.

Most service scale-up by priority public health programmes rely on in-service training. However, this is expensive, not efficient and often not sustainable by itself. Pre-service education has separate funding; students and faculty are already funded through the Ministry of Education. It may also be possible to leverage medical education partnerships which have funding. However, pre-service education is not always based on public health approach and there may be a gap between the Ministry of Health, with service responsibilities and operational guidelines, and the Ministry of Education.

Systematic pre-service approaches have been developed by WHO child health and IMAI based on the goal of a socially responsible curriculum which encourages education that is based on a public health perspective (see Annex E). Introducing pre-service faculty to the WHO PEN/HEARTS approach and providing the updated, adapted CVD/NCD in-service guidelines and training tools can help them focus on:

- the most common and serious health needs and problems among a population
- the “real life” responsibilities of different cadres of healthcare professionals
- the “real life” availability of diagnostic tools, drugs and equipment, particularly at peripheral level health facilities
- the use of evidence-based guidelines and procedures so that knowledge and skills for quality NCD case management are taught
- the use of teaching/learning methods that are competency-based and team-based

Goals are to assure student preparation that:

- Is adequate and of quality
- Competency- based
- Prepares the graduated student to work at health centre & district hospital level without further in-service training
- Priorities coordinated, multi-disciplinary team-based care
- Reflects the national resources for health (medicines, lab, equipment)
- Consistent with the national public health approaches to NCD case management

12. Develop a national strategic plan for HEARTS/integrated NCD case management

Strategic and implementation planning:

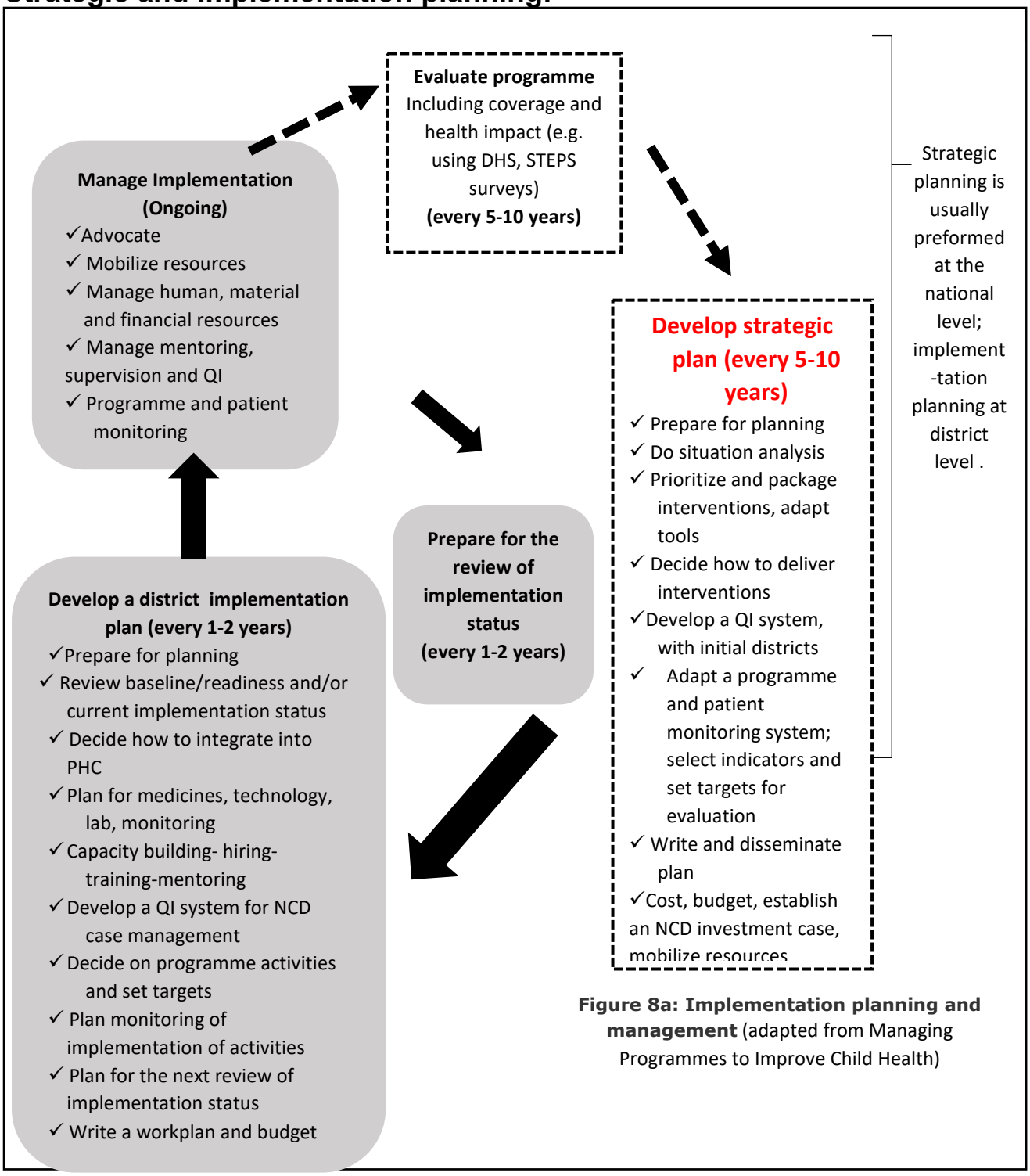


Figure 8a: Implementation planning and management (adapted from Managing Programmes to Improve Child Health)

Prepare for planning – form a planning team, involve stakeholders, and review the timing and resources needed.

Form a planning team

This team needs the necessary technical skills and should include people who understand the chosen interventions at the several levels of the district health system, as well as key stakeholders.

Additional technical skills required include:

- Epidemiology- quantitative and qualitative data collection and interpretation; understanding and if possible experienced in the STEPS surveys
- District programme management and planning
- Health facility management
- District health systems
- Patient monitoring systems
- Quality improvement approaches
- Budgeting, excel spreadsheet skills
- Writing and editing

One person may have several technical skills. The team should be small, calling in other help as needed, and have adequate time availability to do the work. It is helpful to have a specific administrative assistant assigned to the planning team.

Involve key stakeholders

The planning process is expected to be more effective if a wide range of stakeholders are involved in the planning process. Stakeholders can be organizations or individuals. Stakeholders should come to a common understanding of NCD key issues and priorities, to share goals and objectives as well as help support implementation.

Effective involvement of stakeholders can lead to broad ownership and support for the plan; adapted interventions and approach that responds to local needs and respects existing systems in the district; agreement on consistent guidelines and messages; assistance in identifying resources to implement the plan; and participate in supporting NCD program activities described in the plan.

Stakeholders can be involved in various ways, depending on who they are:

- within formal meetings, discussion meetings, focus groups, community meetings
- as key informants, meeting individually with one or more members of the planning team
- to collect and present data
- to review draft plans
- to participate in the core planning team responsible for developing the implementation plan.

Potential stakeholders should include:

- National NCD programme manager and staff
- Policy makers (e.g. politicians and decision makers) to ensure political commitment and consistency with government vision and national health policy & strategic plan.
- Health managers of other relevant programs- such as TB, HIV, maternal and reproductive health, health system strengthening. This is essential for cooperation, co-management and co-supervision of NCD services, which may occur within several clinical services.

- Health professionals (medical, nursing and paramedical) and other technical health workers, both from public and private sectors as key players for provision of NCD quality case management.
- Community representatives, including NCD 'expert patients,' are key stakeholders. They can help with needs assessment and also suggest how NCD case management services can be best provided and what barriers must be addressed for optimal access and coverage.
- Civil society and non-governmental organizations (NGOs) from health- related sectors.
    - Civil society / NGOs can play an important role in providing NCD case management services at community level, complementing NCD services provided by the public & private sectors.
    - NGOs and FBOs may be active in the district in supporting health provision at certain health centres or hospitals. These may be local or international.
- Academic/research institutions.
  Medical and nursing schools and research institutions have a role to play in NCD related research for better understanding of existing issues and adequate national/district adaptation of evidence – based interventions.
- Representatives of other sectors (e.g. finance, gender, education, transport, communication sectors etc). Their optimal contribution should be provided if effective universal coverage is to be achieved.
- WHO; (for children and mothers) UNICEF; other UN multilateral organizations which have been involved in NCD case management
- Bilateral development partners for their critical role in resource mobilization and technical support for an NCD case management agenda at global, national and district levels.

From 2010 WHO survey of national NCD programme stakeholders/collaborations:[147]

Nongovernmental organizations (NGOs), community-based organizations and civil society together form a stakeholder in the partnerships/collaborations in the majority of countries (82%). Collaborations with other, non-health government ministries are also reported as common (80% of countries), similarly with academia (72%) and UN agencies (68%). Private sector entities are the least common stakeholder (59%), although they are far more often stakeholders in upper-middle-income and high-income countries (70%) than in low-income countries (37%).

Collaborations most often address tobacco use (83% of countries), diabetes (81%), unhealthy diet (77%), cancer (77%), physical inactivity (75%), and hypertension (72%). Chronic respiratory diseases (54%) and abnormal blood lipids (46%) are the least common content areas of collaborations.

Your strategy should include activities which will then be planned in detail at district level to:

- **Increase availability of services**
    - Availability means that the health services are available for those who need them. Building new infrastructure (such as a community health facility), increasing the opening hours of a health facility, or increasing the number of health workers available to provide the service would increase the availability of services. Recruiting, training and supplying community health workers to screen for cardiovascular risk and help with patient follow-up at village level can improve the availability and access to services. However, increasing the availability of services does not guarantee that the target population will use them.

- **Increase access to services**
  - Access means that patients are able to reach the health services, when they are available.
  - Possible barriers to access include distance (too far away)' finances (unable to afford costs of transport, medicines or services); culture; time limitations of the patient; limited opening hours of the facilities
  - Plan activities that will remove or decrease the barriers. It is important that the health services are both available and accessible.
- **Increase demand for services**
  - Demand for services means that clients are motivated to use the health services. Activities
    that increase the community knowledge about cardiovascular risk and the availability of the
    health services and their benefits are likely to increase demand. Providing quality services
    including counselling is likely to increase community members' motivation to use services.
  - Reduction of fees for poor families, or insurance schemes, may also increase demand and
    use.
- **Improve quality of services**- see Chapter xx in the district management guide
  - Quality means that the health services are provided according to technical standards, and in
    a way that is appropriate and effective for the target population. Commodities are in place. Clinical care should be provided using the country-adapted standard guidelines and tools, with technically accurate messages, consistent with WHO WHO-PEN/HEARTS. Health workers should listen and be respectful of clients.
- **Increase the community knowledge of NCDs and their prevention and control.**

Most limited resource countries are faced with complex planning to improve NCD case management, facing both insufficient resources and potentially very large numbers of patients. Health facilities frequently lack key examination supplies, diagnostic tests, and medicines needed to provide essential NCD care, both at hospital and health centre level. For NCD services to be successful and sustainable, they need to be efficient and integrated within a primary care approach at health centre level, backed by a hospital clinical team able to supervise and mentor this care and provide referral care for patients with complications. Building on what already exists is important. A modular approach, to accommodate progressive implementation and various combinations of interventions by level of the district health system may also be important.

At the same time, the essential maternal and child health must continue as well multiple interventions to address the continuing high burden of communicable diseases. In some districts, a large number of HIV patients continue in chronic care on antiretroviral therapy. Whereas chronic HIV care/ART early implementation learned from NCD chronic care experience 2000-2003 as ART just became available in large supply in low resource countries, the experience managing ART in your district may help inform planning for NCD chronic care services.

In listing activities, categorize them by this or an adapted scheme:

Activity areas for implementing NCD case management interventions at district level

Major activity areas for delivering NCD case management at district level
1. Advocacy/resource mobilization
Advocacy on importance of NCD case management
Advocating for effective policies and appropriate norms and standards which match district needs
Preparing project proposals for potential donors
2. **Health workforce:** Training, ongoing learning, HR development
Conducting in-service training for health workers and auxiliaries/CHWs/expert patients as lay providers
Ensuring adequate staffing
Limiting staff turnover
Supporting on-going learning after training
3. Essential medicines, equipment and lab
Procurement and distribution of essential medicines
Procurement and distribution of essential equipment and supplies (BP machines, glucometers, lab reagents, cardiovascular risk wallcharts, adult weighing scales, etc.)
4. **Service organization:**
Health facility organization
Referral: Development of locally-supported referral pathways and schemes
Introduction of and adherence to standards for referral care
Development of hospital capacity (staff and equipment) to provide
emergency management of severely ill patients with DKA, myocardial infarction and heart failure
5. **Communication**/developing community support
Improvement in knowledge and awareness of NCDs and practices related to them- both prevention and care, through communication with individuals and groups, mass media, health workers and CHWs
Developing community supports (such as health volunteers, groups, essential infrastructure, supervision or oversight of activities)
6. **Mentoring, QI** (quality improvement), supervision, governance/coordination
Preparation of HEARTS/NCD clinical mentors
Development of integrated supervisory checklists
Conducting supervisory and mentoring visits to facility health teams
Supervision of CHWs, community volunteers
District level coordination
7.Monitoring/HIS:
- longitudinal patient monitoring system
- health facility and community assessments
- monitoring progress: regularly collecting data on activities conducted, resources used, results of activities
- analyzing data and identifying problems (so they can be solved)

8. **Planning and budgeting**
9. Other

Decide on how implementation of delivery strategies should be phased. If your NCD case management programme is new (as many will be):

- Plan a staggered introduction into your districts (consider starting with a demonstration or learning district)
- First phase may need to include country adaptation and production of materials- this will ideally be done at national level.
- In the demonstration district, get initial experience in few health facilities to get experience- then adjust- then further scale up in next implementation period. See the NCD District Implementation Manual for how to progressively implement in a district.

National role in setting targets:

Activity-related targets are expected changes related to improvements in availability, access, demand, or quality of services, or knowledge of NCD disease and risk factors in the community. These targets should be able to be met as the programme is implemented. For this reason activity-related targets are often short-term (e.g. 1–2 years) targets. Activity-related targets are based on the activities that are planned in a specific geographic area or the **results** that can be expected when planned activities are implemented.

A target is a quantified statement of *desired change* in a key indicator of programme implementation, such as population-based coverage with an intervention or an important activity-related indicator. A target specifies the expected level to be achieved over a given time period in a specified geographic area. The actual level of achievement after the given period of time will be compared to the target to determine whether or not the programme is being implemented effectivel

What makes a good target?

To be useful, targets need to be Specific, Measurable, Achievable, Relevant, and Time-bound (SMART). Criteria for reviewing targets:

- **S**pecific: This means clear and unambiguous. Targets should express what is expected, by what date, and at what level (e.g. 50%).
- **M**easurable: This means that it should be possible to collect data to measure achievement using available methods. Numbers and percentages are used to indicate how much change is expected.
- **A**chievable: This means that it should be possible to reach targets with available interventions and resources, in the amount of time available.
- **R**elevant: This means that they should be consistent with national objectives and priorities. They should also be appropriate for the scope of the activities planned in the geographic area.
- **T**ime-bound: This means that targets should specify a starting point and an end point. Activity-related targets are set for a relatively short period of time, such as for 1–years; coverage targets are usually set for 2–3 years; impact targets are set for 5–10 years. This encourages local planning of activities and setting of activity-related targets that are realistic and meaningful.

General Principles of target setting

- **Review indicators and select a few for which you will set targets.**
  - Activity-related targets can be set for completion of important activities, such as supervision or training, or for results of activities, such as improvements inavailability of services, access, demand, or quality of care, or knowledge of the population.

- **Set targets based on available data, tools and field experience.**
  Setting a target requires estimates. Make the following estimates as best you can:
  - An estimate of the current level of achievement for the indicator based on available data. It is important that you set a target based on a realistic starting point. Data may be available from routine reports of activities, or they may be available from survey, or an estimate from supervisory visits.
  - An estimate of how programme activities will change the current level of the indicator, based on how intensively and effectively the activities will be implemented. Consider the type of activities planned, the geographic scope of implementation, and the human, material and financial resources that will be mobilized.
  - The likelihood that the activities will lead to the desired results, that is, improved availability, access, demand, quality. This estimate is usually based on field experience, programme plans, and reports from staff.

Develop plan for year 1

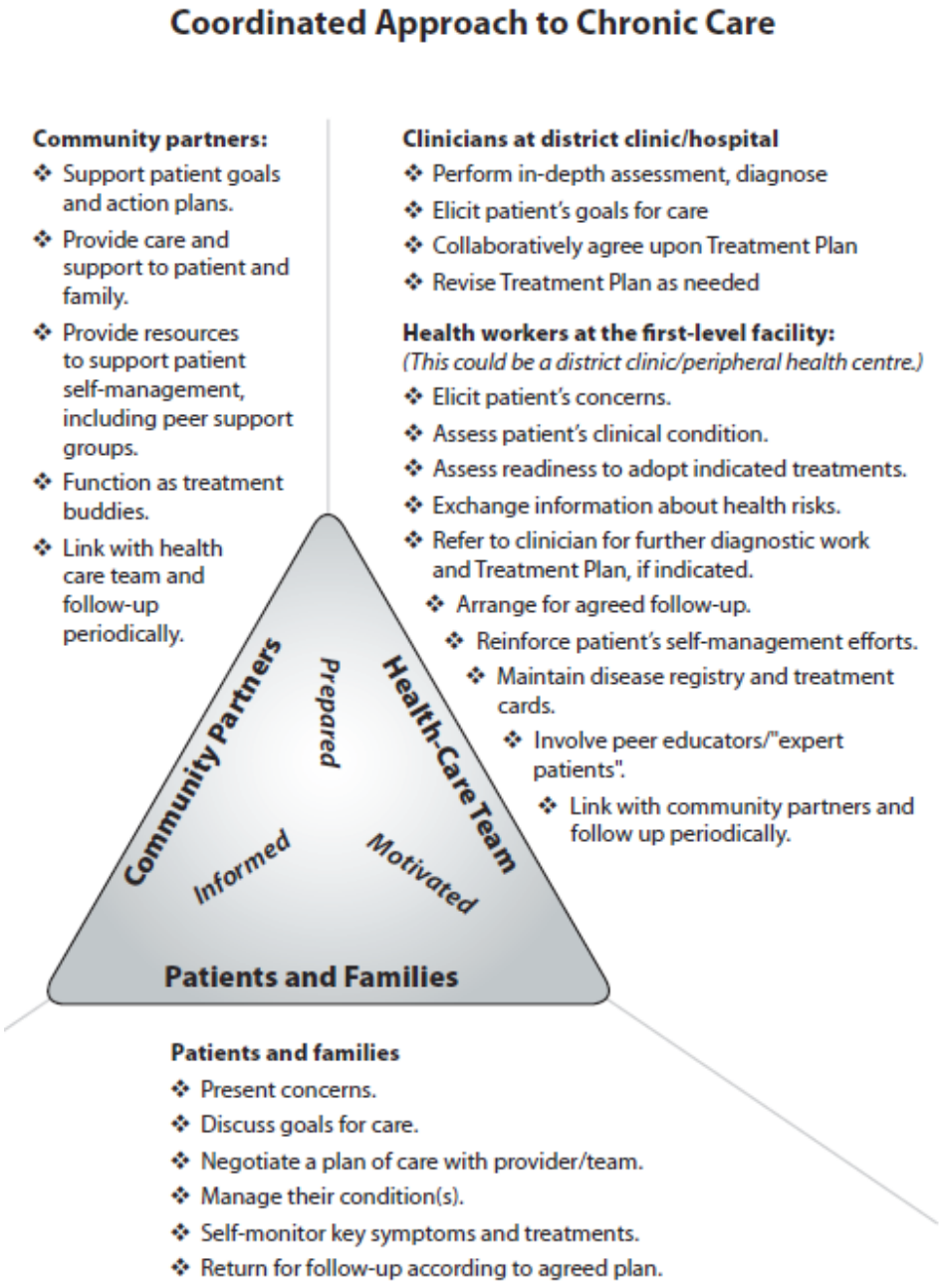
Decide on initial district for piloting/learning then scale up plan

For demonstration district:

Choice of district

What needs to be done to prepare for implementation in a demonstration site
• **Introductory meetings with high level stakeholders** • **Define demonstration site** • **Ministry of Health directive to proceed in demo site** • **Assign national & demo site focal points** • **Establish working group** • **Introduce to working group & demo site stakeholders** • **Adapt assessment tools & conduct baseline assessments** • **Define preparation priorities & establish work plan** • **Adapt clinical guidelines** • **Adapt health education and counselling tools** • **Phased implementation for service delivery**
• **Estimate costs of preparation & 1 year of implementation** • **Identify funding sources** • **Identify potential synergies with other programs & projects**

13. Linkages with the community[10]



Trained CHWs, especially those who are NCD expert patients, can play a key role in advocacy; screening, referral, adherence support and follow-up (see Chapter 6); as well as broadly informing the public about the importance of cardiovascular risk reduction by changes in lifestyle, as well as the benefits and implications of NCD case management interventions.

14. Medicines and technologies for NCD treatments

See PATH manual—I have not updated this section

A consistent supply of essential quality-assured NCD medicines at facility level is required to support scale of CVD/NCD case management.

Fortunately, most of the essential medicines needed to address most priority NCDs in limited-resource countries are generic, off-patent and relatively inexpensive, provided:

- Their import is not accompanied by import duties and taxes
- The national essential medicines list remains focused on the most cost-effective NCD medicines, based on WHO's Model List of Essential Medicines and global evidence-based clinical guidelines for the prevention and treatment of NCDs, to ensure financial accessibility. [Hogerzeil]
- Country-adapted national guidelines are based on WHO PEN, HEARTS and other global evidence-based clinical guidelines, with appropriate adaptations to limited resources and differences in country epidemiology of disease, promoting the use of a limited range of essential medicines and technologies for the highest priority and most cost-effective case management interventions.

Expanding access to priority NCD case management interventions requires acquiring a larger supply of these essential medicines integrated within a strong, national drug supply system. See the *HEARTS national/district essential medicines and technologies* manual for guidance on this.

For national NCD program managers:
Acquiring and making available a larger supply of these essential NCD medicines at national level requires sustained efforts and advocacy by national NCD managers and partners at central level. See NCD Alliance: Briefing paper: ACCESS TO ESSENTIAL MEDICINES AND TECHNOLOGIES FOR NCDS[148] and the upcoming *Toolkit to improve access to essential medicines and technology* (another tool of the HEARTS technical package) [currently in development]. Several recent publications provide advice at national level:

- **Maintain an appropriate national essential medicines list and country-adapted case management guidelines-** see above

- **Increase supply:**
  - More medicines can be acquired within existing budgets with efficient selection, procurement, supply and use of generic medicines.[149]
  - Low- and middle middle-income countries need to increase mobilisation of domestic resources to cater for the many patients with NCDs who do not have access to treatment.[149]
  - Ensure the government budget includes procurement of essential medicines and technologies for NCDs through the national public procurement system as a safety net for the most vulnerable populations and those not covered by health insurance.[148]
  - Where health insurance exists, ensure that essential medicines for NCDs, diagnostic and monitoring technologies are covered.
  - Implement pricing policies to promote affordable treatment through public and private systems, ensuring control of wholesale and retail mark-ups to guarantee the availability and affordability of treatment for the end-user. [148]
  - Leverage international procurement initiatives, such as the Asthma Drug Facility (ADF), when the expressed needs and finances are insufficient at national level to obtain the best prices and benefit from an international quality assurance system. [148]
  - There may be special support for the vaccines. The GAVI Alliance supports cervical cancer prevention in selected low- and middle-income countries by financing vaccines against human papillomavirus (HPV) types 16 and 18 for pre-sexually active girls.[150]

- **Avoid conflict of interest:**
  - In the selection process for updating the national essential medicines list.
  - In all aspects of promotion of access to essential NCD medicines. Ensure transparent and accountable processes in which potential and actual conflicts of interest are

explicitly identified and addressed Increase public support for civil society groups, reducing their dependence on commercial sources.[149]
    - By requiring all pharmaceutical companies to abide by the WHO ethical criteria for medicinal promotion/marketing. [50]
    - By requiring all pharmaceutical companies and other organisations to abide by interagency guidelines for drug donations.

- **Monitor safety and quality of the medicines**
    - Ensure that NCD drugs and diagnostics procured at a national level are WHO Prequalified and/or have been assessed for safety and efficacy by an internationally recognized drug safety monitoring board (e.g. US FDA, EMA)
    - If possible, ensure that local drug approval and regulatory agencies are engaging in routine surveillance of major adverse events and engaged in appropriate checks and inspections for counterfeit drugs; especially important for more expensive NCD treatments like insulin, IV anti-hypertensive medications, metered-dose-inhalers for asthma, etc.)

- **Monitor access:**
    - Monitor the proportion of the population unable to access essential NCD medicines. [149]
    - Work closely with NGOs in monitoring, pricing, availability and affordability of NCD medicines and identifying and promoting successful interventions to improve access.
    - As much as possible, when working with donation programs or other initiatives from private pharmaceutical companies, ensure that these medicines and supplies conform with national treatment guidelines, and that contingency plans/buffer stocks are made for when donations end or when supplies are in shortage

Collaboration between districts and national essential medicines programme

National Essential Medicines Programmes can support districts by:

- Advising on medicine recommendations for the treatment of Key NCDs–based on standard treatment guidelines.
- Advising when medicines currently being provided are inappropriate
- Determining the price of each material resource using MOH/national price lists or specific supplier price lists. Annex F contains a list of median international monthly and yearly costs for common NCD medicine—replace this with the actual procured cost in country or use the costing guide.
- Providing districts with updated essential medicine lists and in-house purchasing or ordering catalogues
    - Some medicines will be free/subsidized nationally and others require direct purchase; depending on the decentralization of budgeting and purchasing in the country, direct procurement may be done at the district level, based on aggregated facility-level data

In turn, districts can support national essential medicines programmes by:

- Providing accurate and timely estimates of total medicine needs based on local epidemiological data
- Monitoring whether medicines are getting to health facilities. If not, work with the essential medicines programme and local staff to find out why not and to solve problems.
- Monitoring appropriate use of medicines.
    - Use of standard case management guidelines and regular supervision with observation of practice will help to improve practices.

- Prioritize cost-effective interventions then implement carefully with documentation (operational research) to strengthen the evidence base in support of treatment strategies that are feasible and appropriate in your country.
- Critically assess existing guidelines, availability of NCD medicines, and how services are and can be delivered to suggest improvements, innovations and greater equity (are the poorest being reached?).

Essential medicines for NCD case management in:	
Primary care- health centre and hospital outpatient	**Hospital- requirements in addition to those in primary care**
Antihypertensives: ACE inhibitor- captopril, enalapril, or lisinopril Thiazide diuretic such as hydrochlorthiazide Spironolactone tablets Beta blocker such as atenolol Calcium channel blocker (long-acting) such as amlodipine Hydralazine injection* **Diabetes medicines:** Metformin cap/tab Insulin regular injection Sulfonylurea such as gliclazide tablet Glibenclamide cap/tab Dextrose 50% injection Dextrose infusion Normal saline infusion* **Management of ischemic heart disease, pre-referral treatment MI:** Glyceryl trinitrate sublingual tablet Isosorbide dinitrate tablet Aspirin* **Secondary prevention for history MI or stroke, primary prevention of high CV risk** Statin such as simvastatin tablet Aspirin cap/tab **Primary and secondary prevention rheumatic heart disease:** Benzathine benzylpenicillin powder for injection **Management heart failure (in addition to several above):** Furosemide cap/tab* **Asthma, COPD medicines:** Beclomethazone inhaler Prednisolone cap/tab Hydrocortisone injection Salbutamol inhaler Betamethasone inhaler Dexamethasone injection Penicillin Amoxicillin Aminophylline Other, relevant to several conditions **Vaccines to prevent cancers:** Hepatitis B vaccine HPV vaccine **Symptom management, palliative care medicines** Paracetamol Aspirin Ibuprofen Morphine	**Additional antihypertensives:** Nifedipine Methyldopa **Chronic respiratory disease at hospital:** Epinephrine Magnesium sulphate Oxygen Salbutamol liquid for nebulizer Epinephrine injection **Management of ischemic heart disease/MI:** Atenolol Thombolytic therapy (streptokinase) **Heart failure:** Furosemide IV **Management of DKA** IV fluids- normal saline Potassium IV Insulin IV, IM **Management of heart failure** Furosemide IV
Technology required to deliver treatments in:	

Primary care	Hospital- requirements in addition to those in primary care
Glucometer with test strips	Nebulizer for salbutamol Oxygen giving equipment IV giving equipment

*** For pre-referral treatment**

Assure a system of availability for all 3 components of NCD case management:

Screening, risk factor identification, early disease detection	NCD chronic care	Acute care for NCDs/ emergency management
• Reliable BP machines • Glucometers and test strips to measure blood sugar • Accurate weighing scales • Height measuring tape or rulers (for BMI calculations)	NCD essential medicines for chronic care	Emergency medicines in each health centre and hospital, which are available for true emergencies without delay from family purchase. • Trolley with medicines in emergency triage area • At health centres: medicines for pre-referral treatment Adequate oxygen supply and oxygen-giving equipment at hospital

15. Establish essential laboratory and other diagnostic capacity for NCD case management

Decentralizing diagnostic capacity to health centres using rapid point-of-care testing where possible is essential to scaling up NCD services at primary care level. Essential tests not available at health centre level should be made available if possible at district hospital level, rather than requiring transport to central or specialized laboratories. With geographically dispersed populations, relying on distant laboratories is often stymied by transport, procurement, and communication issues.

Every primary care facility should have the capacity to do fasting blood glucose (FBG) by glucometer on site. Assuring an adequate supply of test strips is crucial but an ongoing challenge in many health facilities. Whether to monitor glycaemic control with FBG or glycosylated haemoglobin (HbA1c) depends on availability and cost. Point of care HbA1c laboratory testing is now available; although more expensive than blood glucose monitoring, it is very useful clinically to monitor glycaemic control.[151] Other alternatives are to send yearly HbA1c samples to a district, regional or central laboratory or send the patient or sample to fee-for-service laboratory which may be available within the district or region. For screening in clinic or in the community (during mobile lab outreach or camps), a casual (random) blood glucose (RBG) by glucometer with strips will be necessary, using the higher threshold (>11.0 mmol/l (200 mg/dl).

NCD laboratory tests to be supported by health system level will vary depending on choice on NCD interventions and decisions on where care will be provided and policy decisions by the national programme, MOH and partners.

Table: NCD laboratory tests at the health centre and district hospital (in addition to tests for infectious diseases) for adolescents and adults

At the health centre **Essential laboratory tests**	**At the district hospital** **In addition to health centre laboratory tests**
• Haemoglobin or haematocrit • Urine test strips for protein, ketones • Blood sugar (glucose)- with glucometer/strips • Rapid pregnancy test • If possible, point of care HbA1c	• Full blood count with differential • Serum potassium and other electrolytes • Amylase • Serum creatinine and blood urea nitrogen (BUN) • Urine microalbuminuria test strips • Type and cross match for transfusion • Hepatitis B enzyme immunoassay (EIA) If possible: • HbA1c • Total cholesterol, lipid profile • Troponin test strips • Serum alanine aminotransferase (ALT) If monitoring patients on anticoagulation: • INR/PT, aPTT.*

*Point-of-care portable monitoring of anticoagulant status is feasible and has been shown to improve clinical care. Relying on central laboratory testing can result in suboptimal therapeutic monitoring of anticoagulation with potentially catastrophic outcomes such as embolic and haemorrhagic stroke.

Additional investigations or screening that require special equipment- adolescents, adults

At the health centre	At the district hospital (in addition to health centre equipment)
• Oxygen saturation by pulse oximetry (SpO_2) • Thermometer • Waist circumference: nonstretchable measurement tape • Body mass index (BMI) measurement: adult beam scale and height board, BMI tables • Blood pressure (BP) measurement: BP machine* with several cuff sizes • Auscultation and BP measurement: stethoscope • Respiratory rate: timer	• Ultrasound • ECG • Ophthalmoscopy: ophthalmoscope • Country-adapted WHO/ISH cardiovascular risk prediction charts • Snellen eye chart • Tuning fork • Speculum, light source, colposcope if available • 10-g monofilament • Spirometer • Peak flow meter-need disposable mouth pieces

*****For facilities with non-clinician health workers a validated BP measurement device with digital reading is preferable.

16. Quality improvement system for NCD case management

Quality improvement methods and implementation science should be integrated within programming, to facilitate shared learning among district teams—allowing local solutions to emerge and be generalized.

Note: This section provides guidance on the role of the national team in supporting the set up of a quality improvement system at district level. More guidance on Quality Improvement, directed at the district management team, can be found in the *district implementation manual.* For health facility staff, an NCD Quality Improvement Module is provided.

Quality investments are one of the few things that all health system stakeholders can usually agree on: improvements in quality lead to better patient outcomes, a better environment for staff and reduced costs for payers.

At national level, you can contribute to supporting quality improvement activities in the districts:

- Help district managers leverage existing quality improvement systems. In many districts, there may be existing quality improvement initiatives, often focused on HIV care or maternal and child health, that can serve as a platform for expanding efforts to improve quality for NCD case management.
- Liasing with the national quality improvement unit or similar entity or development partners that you routinely work with that are committed to quality improvement. Map the existing initiatives and see which can be linked with NCD case management.
- You will already have adapted the patient monitoring system—this can contribute to QI work by providing agreed important indicators of quality in process and outcomes (see Chapter ….and the HEARTS monitoring manual).

Funding can be challenging to secure for quality improvement, but many of the necessary activities may be currently facilitated within your budget. However, additional national or regional funding may be available to support these efforts. You may also reach out to local nonprofits or community-based organizations, which may be able to provide some funding or connect you to larger quality improvement initiatives.

If introductory work or training in QI methods are needed, you can help set this up.

Once more than one district is implementing activities, you can help network between then, facilitating communication by email updates and in-person meetings. You can also help incentivize strong quality work by recognition programmes and providing opportunities to present data.

A few key activities with a national role include:

Protocol and guideline development: Provide country-adapted tools.

Mentoring: The national team and national level experts….District managers are in an ideal position to mentor facilities, particularly facility managers. (see the District Implementation Manual section on mentoring in the Capacity Building chapter).

Data systems: Support appropriate data systems and dashboards.

17. Develop an NCD case management investment case and finding financing

Most countries have some funding available for NCD case management, but usually not enough to expand services to all who need them. Too often, the costs of NCD case management, both acute and chronic care, have to be borne by the patient and their family.

Out-of-pocket medical payments can lead to impoverishment in many countries, with households choosing from many coping strategies (borrowing from peers or relative, selling assets) to manage health-related expenses. Without other options, such as private health insurance, household medical expenditures can often be catastrophic, which is defined as expenditures exceeding a particular fraction of total household expenditures.[152]

Solutions need to be found for programming for the next few years and for the long term.

> Implementation of priority interventions does not need a new global fund. The two most important actions—full implementation of tobacco control and salt reduction—are affordable in all countries. To implement the other priority interventions, countries will need to find new resources, which for many would be well within their existing and growing health-care budgets, especially if they use existing resources more efficiently and develop innovative funding mechanisms such as health promotion foundations funded by additional alcohol and tobacco taxes.- Beaglehole et al[153]

Suggestions to explore:

Inclusion of key NCD case management in national universal health coverage (UHC) plans: Universal public finance typically targets a few selected interventions in the form of an essential health package. Consequently, many health services, including preventive and curative care for NCDs, require payment at the point of care. Although essential care packages have elements in common, such as basic maternal and child health services, no clear consensus has been reached regarding the additional interventions to be included.

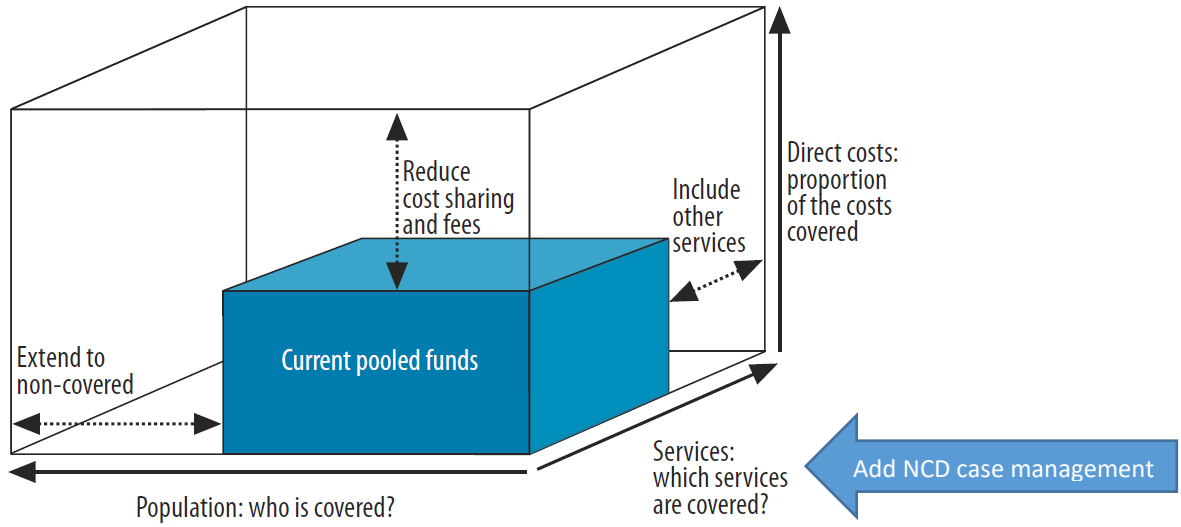
It is crucial and timely to push for the inclusion of key NCD case management interventions in the national universal health coverage package of essential services. This requires making an investment case for these interventions. It also is advisable in planning for UHC and inclusion in health insurance schemes to support the range of key NCD case management interventions as presented in WHO PEN, rather than planning for support for only one or several conditions such as hypertension alone or HEARTS CVD/Diabetes mellitus alone approach.

The concept of UHC encompasses three key dimensions; who has access, which services are provided and what proportion of the cost is covered. Traditionally, much focus has been on day-to-day functions of a health system, and the proportion of the population with access to affordable healthcare.

A key barrier to universal coverage is an overreliance on direct payments at the time people need care. These include over-the-counter payments for medicines and fees for consultations and procedures.[154]

> “In South Africa, where free primary health care is available in the public health care sector, all drugs are provided free of charge to patients. The same does not hold true in most other African countries, where patients with NCDs have to purchase their own drugs. On the other hand, ART is given free of charge because this is provided by international donors. This matter needs to be addressed, either through the provision of free medication, whether it be ART; drugs for hypertension, diabetes, or other NCDs; or a small copayment for all these conditions, should this be possible.”[155]

Fig. 1. **Three dimensions to consider when moving towards universal coverage**



.[156]

Inclusion of NCD case management interventions in health insurance schemes
NCD programmes should participate in promoting health insurance schemes, either prepayment and risk sharing through tax-based or obligatory health insurance (the most efficient way to increase population coverage from domestic sources) or voluntary schemes, such as community health insurance or microinsurance, where compulsory sources do not exist or provide only minimal coverage. Expansion of social protection schemes and pooling of inefficient out-of-pocket expenditures have enabled several low-income and middle-income countries to provide social insurance schemes that support NCDs.

Specifying contributions to NCD case management from certain taxes
Government financing through specific taxes can help increase health's share within total government spending and can potentially be used to increase NCD case management funding. Earmarked taxes such as tobacco and alcohol, sugary drinks, foods high in salt or trans fats relate directly to NCDs. NCD programmes should make the case that much of this should go to health and within that, to NCDs.

Internal advocacy for allocation within the general operating fund for health to NCD case management. NCD programmes can often take advantage of general operating funds for primary health care to support NCD case management by primary care staff. However, support for additional auxiliaries, nursing aids or trained expert patients may need to be found to expand the human resources available to cover a larger population for both screening and for the provision of NCD chronic care.

What have other countries done to fund NCDs?
For all countries, major sources of funding for NCDs were government revenues (84% of countries), international donors (56%), health insurance (39%), and earmarked taxes (20%); in low income countries, government revenues 63%, health insurance 7%, international donors 56%, earmarked taxes on alcohol, tobacco 7%. Although likely to be insufficient, the presence of existing funding streams implies a space where funding can be added and coordinated. There may be potential to increase the amount of funding from earmarked taxes. Tobacco taxes are widely applied across all world regions and national income groups, so providing the opportunity for earmarking.[157]

Apply for NCD case management support from donors. Many low-income countries will need additional international financing to address NCD case management. External funding from bilateral

donors or multilateral donors including foundations should be sought. This may initially entail support on a project basis—hopefully evolving into above longer term investments. Various high-income countries have committed to official development assistance (ODA) and improved aid effectiveness. Although NCDs have not been prioritized by many donors, making a strong investment case and promoting NCDs case management and demonstrating the effectiveness of evidence-based, prioritized intervention may sway donors and could help countries, both in terms of health and economic impact.

> "NCD control is a long-term investment. For HIV control significant funding came from abroad but for NCDs innovative financing is needed, not donor dependence. Donor funding can catalyse and promote scale-up." EADSG WDF 2016 meeting report

Breakthrough financing models are needed for NCD case management that unite resources from countries themselves, international donors and the private sector to accelerate implementation, as has been organized by the GFF for advancements in the health of women and children.

Encourage district-based and local health facility-based funding efforts, in addition to national (see Integrated NCD Implementation Manual).

Find NCD case management support within support for other programme

Continued advocacy for NCD care for PLHIV within GFATM and other HIV donors. Integrating NCD and HIV care for people on ART can be cost-effective by adding basic measures into existing infrastructures at minimal added expense, i.e., improving access to basic functioning equipment, introducing standardized treatment guidelines, and training health workers already providing chronic care for HIV/ART (see chapter… and HIV/NCD publications).

Contribute to efforts to improve the efficiency and quality of the national/district health systems, thereby releasing resources that could be used to cover more people, more services and/or more of the costs. Such interventions including switching to generic medicines, promoting rational use of medicines and diagnostics, avoiding inappropriate hospital admissions, emphasizing low-cost/high-impact interventions over high-cost/low-effect interventions (see WHO Best buys). [158] Primary health care, supported by family and self-care, can form the backbone of cost-effective ways of treating and caring for NCDs. Task shifting, low-cost diagnostics available at point-of-care or nearby, and an appropriate role for self and family management can contribute efficiencies.

Pay attention to improving NCD case management at private and NGO health facilities, not just government health facilities. Offering health services that are free in government facilities only goes part of the way to lowering financial barriers to access; in some countries, it is quite a small part.

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Specific opportunities for financing the supply of NCD medicines:

See the WHO/PATH national/district NCD medicines and equipment manual in the Hearts' Toolkit to improve access to essential medicines and technology. These include

- revolving funds for medicines (PAHO Strategic Fund, revolving pharmacies),
- NCD access schemes [expand or just cross reference PATH document]. The Global Task Force on Expanded Access to Cancer Care and Control helps with delivery of affordable cancer drugs, vaccines, and services through assistance with finance and procurement. The Asthma Drug Facility established and run by International Union Against Tuberculosis and Lung Disease has assisted low-income and middle-income countries to reduce by half the cost of quality-assured asthma inhalers through a quality assurance system based on WHO standards and a transparent tendering process[160]; however, it has been suspended due to lack of funding.
- Several countries have developed innovative financing models at the facility level to improve access to EMTs for people living with CVD and diabetes.

Annex A: Variables in SARA survey relevant for NCD case management readiness assessment

SARA survey relevant for NCD readiness assessment: SARA indicator number follows the variables; those in HEARTS facility assessment are in italics:

Equipment

- Adult scale
- Measuring tape
- BP cuff
- Peak flow meters
- Spacers for inhalers

Adolescent/adult vaccines (e.g. HPV, tetanus, flu) (plus section 1107 on auto-disposable syringes, sharps containers, etc)

- Availability at service site today: HPV (M413)
- Stock out HPV (M143_A)

Section D: NCD services- guidelines, prepared health worker (S22-24, S29)

- Cardiovascular disease: S23, T45, T46
- Chronic respiratory disease …….
- Cervical cancer diagnosis S29, T60, T61, D37, E44

Medicines and lab, categorized according to AT LEAST ONE VALID, AVAILABLE NON VALID, REPORTED AVAILABLE BUT NOT SEEN, NOT AVAILABLE TODAY

Lab relevant to NCD case management:

- Urine protein dipstick testing (D4)
- Urine glucose dipstick testing (D5)
- Urine ketone dipstick testing (D20)
- Glucometer (D2)
- Glucometer test strips (D2)
- Colorimeter or haemoglobinometer (D1)
- HemoCue (D1)
- Serum creatinine testing and specific assay kit(s) for renal function (D18)
- Other renal function testing (such as urea nitrogen) (D18)
- Serum electrolyte testing and specific assay kits (D24)

Other diagnostics:

- Ultrasound equipment (E35)
- ECG (E34)

Medicines:

- **Antihypertensives:**
- ACE inhibitor (M53)
- Thiazide (M54)
- Spironolactone tablets (M147)
- Beta blocker (M55)
- Calcium channel blocker (M56)
- Hydralazine injection (M106)
- Nifedipine cap/tab (M79)
- Methyldopa tablet (M107)
- **Diabetes medicines:**
- Metformin cap/tab (M50)
- Insulin regular injection (M51)
- Glucose 50% injection (M52)
- Glibenclamide cap/tab (M10)
- Gliclazide tablet or glipizide tablet (M115)
- **Primary and secondary prevention for high cardiovascular risk:**
- Simvastatin tablet or other statin e.g. atorvastatin, pravastatin, fluvastatin (M14)
- Aspirin cap/tab (M57) [need to check if low dose for prophylaxis)
- **Management of ischemic heart disease:**
- Glyceryl trinitrate sublingual tablet (M116)
- Isosorbide dinitrate tablet (M118)
- **Management heart failure (in addition to several above):**
- Furosemide cap/tab (M114)
- **Primary and secondary prevention rheumatic heart disease:**

Benzathine benzylpenicillin powder for injection (M77)
Asthma, COPD medicines:
Beclomethazone inhaler (M59)
Prednisone cap/tab (M60)
Hydrocortisone injection (M61)
Epinephrine injection (M62)
Salbutamol inhaler (M13)
Magnesium sulphate injectable (M24)
Betamethasone injection (M78)
Dexamethasone injection (M78)

This list does not include other medicines in SARA such as mental health medicines, anticonvulsants or analgesics or other palliative care medicines, as these are not specific to NCDs. Although the survey is highly relevant to assessing NCD case management readiness at the first-level health facility, you will need to dig deeper after the survey on quantities of medicines and specific formulations (see Chapter 9).

Annex B – from **WHO**: **Prevention of Cardiovascular Disease Guidelines for assessment and management of cardiovascular risk, Geneva, 2007**

TABLE 2

The percentage of the population, by age and sex, with a ten-year CVD risk of 30% or more, 14 WHO subregions

WHO SUBREGION	MEN Age group (years)				WOMEN Age group (years)			
	<50	50–59	60–69	70+	<50	50–59	60–69	70+
African Region: D	0.32%	1.98%	11.15%	13.30%	0.04%	1.10%	8.78%	24.45%
African Region: E	1.26%	1.87%	4.05%	3.84%	0.37%	1.34%	2.43%	3.93%
Region of the Americas: A	0.85%	8.40%	31.77%	54.23%	0.24%	3.13%	14.38%	31.59%
Region of the Americas: B	0.43%	5.42%	19.24%	23.25%	0.31%	4.23%	12.95%	25.28%
Region of the Americas: D	0.08%	2.25%	5.62%	12.36%	0.28%	1.62%	4.36%	18.65%
Eastern Mediterranean Region: B	0.13%	4.53%	25.32%	36.64%	0.09%	5.98%	24.08%	49.01%
Eastern Mediterranean Region: D	0.19%	4.65%	18.73%	38.46%	0.16%	2.60%	15.49%	39.91%
European Region: A	0.15%	2.77%	16.13%	37.83%	0.05%	0.32%	2.79%	20.69%
European Region: B	0.88%	8.94%	28.12%	41.93%	0.46%	1.92%	10.79%	22.77%
European Region: C	1.31%	13.70%	40.29%	58.69%	0.50%	3.16%	22.48%	51.89%
South-East Asia Region: B	0.37%	4.13%	10.23%	13.54%	0.22%	2.02%	9.32%	13.29%
South-East Asia Region: D	0.47%	5.12%	22.23%	31.39%	0.22%	3.31%	19.23%	29.75%
Western Pacific Region: A	0.35%	2.63%	12.32%	26.41%	0.05%	0.61%	2.20%	8.92%
Western Pacific Region: B	0.16%	3.78%	15.06%	21.63%	0.10%	1.99%	6.74%	15.28%

Annex C Checklist to facilitate rapid adaptation of HEARTS/NCD guidelines, training and communication tools

Key clinical guidelines and communication tools which need review for possible country adaptation.

Note that task-shifting and task-sharing decisions are covered in section 10.2 and Annex F

Key guideline/policy questions. If checked, <u>adaptation needed</u>. **Note that some adaptations are needed in every country (essential adaptations).**	**Country materials to review**	**Actions needed if adaptation required**
Core HEARTS medicines		
☐ First-line HTN medicines o Thiazide diuretic e.g. hydrochlorothiazide	Essential medicines list National clinical guidelines	Example of possible Ugandan adaptation: o Thiazide diuretic-bendroflumethiazide
First-line HTN medicines o ACE inhibitor e.g. enalapril	Essential medicines list National clinical guidelines	Example of possible Ugandan adaptation: o ACE inhibitor e.g. enalapril or captopril or angiotensin II receptor blocker (ARB, if ACEI not tolerated) e.g. losartan
First-line HTN medicines o Calcium channel blocker e.g. amlodipine	Essential medicines list National clinical guidelines	Example of possible Ugandan adaptation: o CCB e.g. nifedipine
First-line HTN medicines o Beta-blocker e.g. bisoprolol or atenolol	Essential medicines list National clinical guidelines	
First-line oral hypoglycaemic agents (OHA) o Metformin o Sulphonylurea e.g. gliclazide or glibenclamide	Essential medicines list National clinical guidelines	Example of possible Ugandan adaptation: First-line OHA: o Sulphonylurea eg. glibenclamide or glimepiride -Adapt clinical algorithms -Change patient card and register
Statin (lipid loweringtherapy) e.g. simvastatin atorvastatin	Essential medicines list National clinical guidelines	
Antiplatelet therapy e.g. low dose aspirin		
-Adapt clinical algorithm to determine if pre-referral treatment	Essential medicines list	-Adapt clinical algorithm to determine if pre-referral treatment

Condition—Pre-referral treatment: Severe hypertension—combination oral antihypertensive or IV hydralazine Chest pain/suspect acute MI—chew aspirin Stroke—check fingerstick glucose and treat, Hyperglycaemia or DKA—IV normal saline Acute congestive heart failure—give furosemide Hyperglycaemia or DKA—IV normal saline	National clinical guidelines	
Hypoglycaemia—give oral sweet drink or 50% glucose (dextrose) IV	National clinical guidelines	
CVD risk assessment ☑ Essential adaptation: Insert country-adapted chart- lab based (cholesterol and DM) and non-lab based	Task shifting decisions as part of national strategic planning	-Determine which settings to use lab-based or non-lab based country- specific charts - adapt clinical guidelines, training materials, district implementation manual, health facility operations manual
Laboratory guidance Insert value for diagnosis of diabetes in correct units-SI or US (mmol/l or mg/dl) Insert normal lab ranges for common laboratory testing for implementing WHO PEN-HEARTS -	National clinical guidelines	Example: Normal glucose range 4-7 mmol/l (70-126 mg/dl) Serum creatinine, men 70-120 µmol/l (0.8-1.4 mg/dl); women 50-90 µmol (0.56-1.0 mg/dl) Total cholesterol <5.2 mmol/l (<200 mg/dl)
Optimum targets for control Blood pressure BP general- <140/90 BP diabetics, CVD risk ≥30 or prior CVD or CKD- <130/80 Glycaemic control Fasting blood glucose <7 mmol/l (126 mg/dl) HbA1c (<7.0% but consider more stringent control <6.5% in certain patients) Other targets: Total cholesterol <5.0mmol/l (190 mg/dl) BMI 18.5-24.9	National clinical guidelines	Examples- Uganda clinical guidelines- BP target in diabetics 120/80

Physical activity- 150 minutes/week Tobacco use- smoking cessation		
Other clinical guidelines		
Referral for dilated, comprehensive eye exam-baseline and every 2 years If referral, treatment options-injection, laser surgery available?	Decisions as part of national strategic planning National clinical guidelines	
Cervical cancer screening and referral -Education in locally adapted language -VIA? Colposcopy? -Referral for treatment?	National strategic planning National clinical guidelines	
Early detection –breast cancer and referral -Education in locally adapted language -Mammography or ultrasound available? -Referral for treatment?	National strategic planning National clinical guidelines	
Are sputums sent for AFB or is the patient sent? Are the sputum collection instructions and **TB** suspect register the same as in TB programme? o If not, adapt to match.	National TB guidelines	
Screening for TB in certain risk groups	‘	
Are sputums sent for cough > 2 weeks (not cough > 3 weeks)?	“	
Response to negative or single positive AFB sputum- are these guidelines in Acute Care compatible with the national TB guidelines? o If not, adapt to match.	“	
HIV status- what documentation required in all clinics?	National HIV guidelines	
Rectal and IV diazepam in management convulsions?	Adult clinical guidelines	

○ If not, adapt to match guidelines.	IMCI adaptations (match rectal diazepam recommendations)	
Benzathine penicillin for suspected streptococcal sore throat in adolescents? In adults? ○ If not, adapt to match guidelines.	Essential medicines list National clinical guidelines	
Benzathine penicillin for secondary prophylaxis for RF/RHD	"	
Cross-reference to IMPAC- is this in adaptation or use? ○ If not,		
Management of hazardous and harmful alcohol use- size of problem; are brief interventions used in primary care settings? -Referral for dependence available?		
Assessing drinking ☑ Add examples of common drinks and their equivalency to define units in training materials		
Nicotine replacement therapy available for outpatient use for- Smoking cessation in high risk? If not, try to change policy or adapt.		
Pharmacologic treatment such as Bupropion, amitriptyline/nortriptyline available for outpatient use for- Depression? Neuropathy? Smoking cessation in high risk? ○ If not, try to change policy or adapt.		
Depression questions- are local adaptations needed?	Any validated depression questions?	
Are there other lab tests done at first-level facilities? ○ If yes, insert instructions for other standardized lab tests available (or slated for availability) at most first-level facilities.		
Wheezing management- at first level facility:		

Can metered-dose salbutamol inhalers be made available? Is salbutamol by nebulizer available?		
Homemade spacer for metered-dose inhaler (from cola bottle)		
Pain management		
Oral morphine- is it available for dispensing through first-level health facilities? ○ If not, adapt to match. This may require additions to specify who can prescribe and dispense and how to contact them.	National clinical guidelines EDL Controlled substance regulations and state of policy review	
Communication/patient/community education and treatment support		
☑ Adapted and pretested Patient Counselling Cards	Existing communication material	Adapted and pretested education and communication materials needed in all (use most effective phrases, replace line drawings, pretest for effectiveness)
☑ Adapted and pretested patient education flipchart	Existing communication material	Adapted and pretested education and communication materials needed in all (use most effective phrases, replace line drawings, pretest for effectiveness)
☑ Adapted patient-held card		
☑ **Identify myths and effective local explanations:**		
☑ **Front cover and inside cover**		Switch pastel to colors of flag or any other desired design. Add MOH endorsement and explanatory materials on inside front covers.

Annex D Tasks by cadre for risk-based CVD/DM case management

Example, for county adaptation. Expand to include other NCD case management interventions.

	NCD specialist	MD/ MO/ GP	NPC	Nurse	CHW/ Auxiliary/ EP	Lab tech
1. NCD Sensitization, Education and Counselling						
• Sensitization and education	x	x	x	x	x	
With individuals						
• With individual- standard	x	x	x	x	x	
• With individual- tailored to their status- progress	x	x	x	x	x	
Group education	x	x	x	x	x	
CARDIOVASCULAR/DIABETES						
2. Assessment- BP, diabetes, cardiovascular risk, anticoagulation						
Measure BP- stethoscope and cuff, including choice correct cuff size	x	x	x	x		
Measure BP- digital BP machine	x	x	x	x	x	x
POC: test glucose using glucometer with strips	x	x	x	x	x	x
POC: HbA1c with strips	x	x	x	x	x	x
Glucose or HbA1c measurement in lab						x
Cholesterol measurement						x
Serum creatinine, potassium						x
INR, aPTT						x
Draw and send blood for glucose, cholesterol, creatinine, potassium, or INR, aPTT (or HbA1c)	x	x	x	x	x	x
Urine dipstick for ketones, protein	x	x	x	x	x	x
Urine pregnancy test	x	x	x	x	x	x
Comprehensive eye exam with fundoscopy	x					
Cardiovascular risk in next 10 years- using chart	x	x	x	x	x	
High CVD risk based on asking about prior heart attack or stroke or end-stage renal disease	x	x	x	x	x	
High CVD risk based on diagnosis of heart attack, stroke, peripheral vascular disease, angina, TIA or chronic renal problem	x	x	x			
Calculate BMI	x	x	x	x	x	
Measure height and weight	x	x	x	x	x	
3. Chronic NCD care (in addition to skills/tasks above)						
Triage- check emergency signs, decide what patient needs to be seen by health worker	x	x	x	x	x	
Register, find medical record and return to file	x	x	x	x	x	
Fill out part of patient card with BP, lab results, etc	x	x	x	x	x	
Assess clinical signs and symptoms	x	x	x	x		
Assess pregnancy status	x	x	x	x	x	
Determine functional status	x	x	x	x	x	

Review TB status	x	x	x	x	x	x
Request lab tests	x	x	x	x		
Provide acute care for new problems	x	x	x	x		
Refer acutely ill patient to hospital after pre-referral treatment	x	x	x	x		
Routine referral to hospital clinician for treatment plan	x	x	x	x		
Interpret lab results	x	x	x	x		
Provide psychological support	x	x	x	x	x	
Partner with patients and support their self-management	x	x	x	x	x	
Work within a clinical team	x	x	x	x	x	x
Proactive follow-up	x	x	x	x	x	x
Use the 5 As: Assess, Advise, Agree, Assist, and Arrange.	X	x	x	x	x	
Assess and counsel on smoking or other tobacco use						
Pharmacologic treatment to assist smoking cessation for high risk CVD groups	x	x	x			
Assess harmful use of alcohol/dependence	x	x	x	x		
Counsel on alcohol reduction	x	x	x	x	x	X
Counsel on diet-heart healthy; specific diestary advice for hypertension and diabetes	x	x	x	x	x	X
Counsel on physical activity	x	x	x	x	x	x
Assess waist circumference, overweight/obese, counsel on weight reduction	x	x	x	x	x	x
Assess and counsel on adherence	x	x	x	x	x	x
4. Manage elevated CVD risk, hypertension, DM						
Evaluate and provide treatment plan for-elevated CVD risk, DM, HTN	x	x	x	x		
Decide approach and target based on cardiovascular risk %	x	x	x	x		
Non-pharmacological management-counselling on physical activity, diet	x	x	x	x	x	x
Decide who needs to be referred for further evaluation, treatment plan	x	x	x	x		
Initiate first-line hypertension	x	x	x	x		
Adjust dose	x	x	x	x		
Add second agent	x	x	x	x		
Recognize treatment failure and refer	x	x	x	x		
Arrange for follow-up visits	x	x	x	x		
Respond to new signs and symptoms and possible side-effects	x	x	x	x		
Supervise in the above tasks	x	x				
Manage chronic hypertension in pregnancy	x	x				

Initiate first-line diabetes type II	x	x	x	x		
Adjust dose	x	x	x	x		
Add second agent	x	x	x	x		
Recognize treatment failure and refer	x	x	x	x		
Manage diabetes in pregnancy						
Start insulin	x	x				
Start statin or ASA for high CVD risk	x	x	x	X		
Start statin and ASA for established CVD	x	x	x	x		
Start antihypertensive for established CVD and elevated BP (and refer)	x	x	x	x		
Treatment plan for established CVD, including antihypertensives (initial and follow-up as needed)	x	x				
Start statin for DM ≥ 40	x	x	X?			
6. Manage complications or co-morbidities						
Acute						
Manage severe hyperglycaemia or hypertension- recognize, pre-referral treatment	x	x	x	x		
Manage eclampsia/pre-eclampsia with severe hypertension- give hydralazine[161] pre-referral	x	x	x	x		
Manage severe hyperglycaemia or hypertension	x	x				
Manage MI, stroke, angina, or TIA- recognize, pre-referral treatment- pre-referral treatment	x	x	x	x		
Manage MI, stroke, angina, or TIA	x	x				
Manage severe leg pain with symptoms of claudication	x	x				
Manage acute cardiac failure- recognize, pre-referral furosemide	x	x	x	x		
Manage acute cardiac failure	x	x				
Manage severe foot infection	x	x				
Manage hypoglycaemia	x	x	x	x	x	
Non-acute complications/comorbid conditions						
Manage uncontrolled HTN, DM (treatment failure)	x	x				
Start statin for hyperlipidaemia	x	x	x?			
Manage peripheral neuropathy	x	x	x	x		
Manage proteinuria or suspected kidney problems	x	x				
Diagnosis and initial management of suspected heart failure	x	x				
Manage irregular pulse or cardiac murmur	x	x				
Manage diabetic foot ulcer	x	x	x	?		
Manage diabetic skin or GU problem (e.g. vaginal discharge)	x	x	x	x		
Manage deteriorating vision	x	x				

Annex E Strengthening the Pre-Service Education of Healthcare Professionals (summary by Rebecca Bailey WHO, 2010 for Child and Adolescent Health but relevant to NCD case management):

The keys to this approach at country level are:

- No need to immediately revise the written curriculum. Instead the process is started and written curricula are revised when the opportunity arises.
- The aim is to prepare students for work at peripheral health facilities by giving more emphasis to common serious conditions, and the skills needed to identify and manage those conditions using resources that are typically available at the peripheral level.
- Evidence-based.
- Need for generic materials for teaching, learning and student assessment that can be easily adapted and used (e.g. list of core competencies and learning outcomes; model handbooks; model textbook chapters; technical seminars; reference materials; visual aids such as slides, photos, videos, and computerized learning programmes; and suggested methods and materials for student assessment)
- Requires a national situation analysis to decide which subject areas and academic programmes (MBBS, BN, etc.) should be strengthened
- Need for understanding, support, and action from a wide range of organizations and institutions in addition to professors and administrators within teaching institutions
- Particularly for medical schools, there is a need for well- known and respected professors to advocate for and move the process forward.
- Need for action plans at national level and at teaching institutions that take into account important preparations such as training of teachers and clinical staff, preparing clinical practice sites, and preparing materials for teaching and student assessment.
- Critical to plan how students will be assessed in the new knowledge, skills and attitudes and what materials will be used
- Need for generic materials for teaching, learning and student assessment that can be easily adapted and used (e.g. list of core competencies and learning outcomes; model handbooks; model textbook chapters; technical seminars; reference materials; visual aids such as slides, photos, videos, and computerized learning programmes; and suggested methods and materials for student assessment)
- No need to make all changes to an academic programme at once. A teaching institution can start by introducing new teaching in the later years of the academic programme, and then work gradually backward to incorporate those principles and concepts into relevant theory and practice sessions in earlier years
- Strong need for coordination (or integration) of teaching both vertically (i.e. between different teaching departments and sub-units) and horizontally (i.e. over the years of the academic programme) to ensure that teaching in different years and units compliments, and does not contradict, one another.
- The approach compliments in-service training in many ways, particularly in forming a pool of institutions and trainers who can help to implement in-service training.

Annex F Examples of international median cost of NCD medicines without tariffs, taxed or mark-ups

Product	Units per month	Median Unit Cost	Monthly cost ($)	Yearly cost (US$)
Antihypertensives:				
ACE inhibitor- long-acting (e.g. enalapril 10mg tab)	60	$ 0.02680	$1.61	
Thiazide diuretic (e.g. hydrochlorthiazide 25 mg)	30	$ 0.00430	$0.13	$1.55
Spironolactone tablets (25 mg tab)	60	$ 0.04320	$2.59	
Beta Blocker (Atenolol 50 mg tab)	30	$ 0.01030	$0.31	$3.71
Calcium channel blocker (long-acting, e.g. amlodipine 10 mg tab)	30	$ 0.07650	$2.30	
Hydralazine injection* (20 mg ampoule (INJ))	per dose	$ 4.67170		
Diabetes medicines:				
Metformin HCL 500 mg tab	60	$ 0.01690	$1.01	$12.17
Insulin, Isophane NPH 100IU/ml 10ml	1	$ 8.83400	$8.83	$106.01
Sulfonylurea - gliclazide 80 mg tab	60	$ 0.05910	$3.55	$42.55
Glibenclamide 5 mg tab	30	$ 0.00680	$0.20	$2.45
Dextrose 50% injection (per ml)-25-50 ml	per 50 ml dose	$ 0.900		
Normal saline infusion* (sodium chloride in water (normal saline) 0.9% solution (IV) (per ml))- 1000ml	per 1000 ml dose	$ 1.0000		
Management of ischemic heart disease, pre-referral treatment MI:				
Glyceryl trinitrate (nitroglycerin) 0.5 mg tab	30	$ 0.0946	$2.84	$34.06
Isosorbide dinitrate (10 mg) tab (PO)	60	$ 0.0724	$4.34	$52.13
Aspirin (acetylsaliclic acid) 300 mg tab	30	$ 0.0020	$0.06	$0.72
Secondary prevention for history MI or stroke, primary prevention of high CV risk				
Statin (simvastatin 20 mg tablet)	30	$ 0.0531	$1.59	$19.12
Aspirin (acetylsaliclic acid) 100 mg tab	30	$ 0.0020	$0.06	$0.72
Primary and secondary prevention rheumatic heart disease:				
Benzathine benzylpenicillin powder for injection (3 G, PEN. G) 5M IU powder (INJ)	1	$ 0.2223	$0.22	$2.67
Management heart failure (in addition to several above):				
Furosemide (40 mg cap/tab*)	30	$ 0.0067	$0.20	$2.41
Asthma, COPD medicines:				
Beclometasone inhaler (100 mcg/dose inhaler (INH)) (per dose 0.8 mg)	1	$ 0.0453	$0.05	$0.54
Prednisolone cap/tab (5 mg tab-cap (PO))	15	$ 0.0117	$0.18	$2.11

Hydrocortisone injection (sodium succinate) 100 mg vial (INJ)	per dose	$ 0.5332		
Salbutamol inhaler (100 mcg/dose inhaler) (INH)	1	$ 0.0105	$0.01	$0.13
Dexamethasone injection (4 mg/ml ampoule) (INJ)	per 4 mg dose	$ 0.6644		
Epinephrine injection (adrenaline) 1 mg/ml ampoule (INJ)	per dose	$ 0.3339		
Magnesium sulphate (50% vial) (INJ)	1	$ 0.1323	$0.13	$1.59
Amoxicillin (250 mg tab-cap) (PO)	60	$ 0.0184	$1.10	$13.25
Symptom management, palliative care medicines				
Paracetamol (100 mg tab-cap)	30	$ 0.0020	$0.06	$0.72
Aspirin (acetylsaliclic acid) 300 mg tab	30	$ 0.0020	$0.06	$0.72
Ibuprofen (200 mg tab cap (PO)	30	$ 0.0069	$0.21	$2.48
Morphine sulfate (IC) 10 mg/ml ampoule (INJ)	per dose	$ 0.6089		
*prices are median unit supplier costs from: MSH (Management Sciences for Health). 2015. International Drug Price Indicator Guide, 2014 Edition. (Updated annually.) Medford, Mass.: MSH.				

Abbreviations/ abbreviations

ACE	angiotensin-converting enzyme
ALT	alanine aminotransferase
AN	autonomic neuropathy
ANC	antenatal care
Aptt	activated partial thromboplastin time
ARF	acute rheumatic fever
ART	aspartate aminotransferase
BB	beta blocker
BMI	body mass index
BP	blood pressure
BUN	blood urea nitrogen
Cap	capsule
CBO	community-based organization
CCB	calcium-channel blocker
CDOP	chronic disease outreach program
CHF	congestive heart failure
CHW	community health workers
CKD	chronic kidney disease
COPD	chronic obstructive pulmonary disease
CSF	cerebrospinal fluid
CV	cardiovascular
CVD	cardiovascular disease
CVR	cardiovascular risks
DCM	district clinician manual
DEAD	the facility has been notified patient has died
DHIS2	district health information system 2
DKA	diabetic ketoacidosis
DM	diabetes mellitus
DoB	date of birth
EC	elevated creatinine
ECG	electrocardiogram
EIA	enzyme immunoassay
EMR	electronic medical record
EP	expert patients

EPT	expert patients who assume a training role
ERD	end-stage renal disease
FBG	fasting blood glucose
FBO	faith-based organization
FBS	fasting blood sugar (=FBG)
FCTC	framework convention for tobacco control
GAVI	Global Alliance for Vaccines
HbA1c	glycosylated haemoglobin
HCR	high cardiovascular risk
HEARTS	global hearts initiative working together to beat CVDs ****
HIV	human immunodeficiency virus
HMIS	health management information system
HPV	human papillomavirus
HR	heart rate
HTN	hypertension
IARC	International Agency for Research on Cancer
IMAI	Integrated Management of Adolescent and Adult Illness
IMNCI	Integrated Management of Newborn and Childhood Illness
IMPAC	Integrated Management of Pregnancy and Childbirth
INR	international normalized ratio (to express prothrombin time)***
IV	intravenous
LFT	liver function test
LMIC	low and middle income countries
LTF	lost to follow-up
mhGAP	WHO Mental Health Gap Action Programme
MI	myocardial infarction
MISS	the patient missed an appointment or drug pick up
mmol	millimoles
MN	motor neuropathy
MNCH	maternal, newborn, and child health
MOH	Ministry of Health
NCCP	national cancer control plan
NCD	noncommunicable diseases
NGO	nongovernment organization
NMH	WHO noncommunicable diseases and mental health cluster
NPMO	non-pharmacological management only
NPR	non-proliferative retinopathy
OP	overt proteinuria
OPD	outpatient department
PA	persistent albuminuria
PCNC	primary health care nurses
PDCA	Plan-Do-Check-Act
PEN	WHO Package of Essential Noncommunicable Disease ***
PHC	primary health care
PM	****
PN	peripheral sensory neuropathy
PPV	positive predictive value
PR	proliferative retinopathy
PVD	***
PCVD	prior cardiovascular disease (MI or stroke, not RHD or congenital)
QI	quality improvement
QoC	quality of care
RBF	results based financing ****
RBG	random blood glucose
RF	rheumatic fever
RHD	rheumatic heart disease
SARA	services available and readiness assessment- a WHO survey
SBG	*****
SHAKE	*****
SpO2	oxygen saturation
STEPS	WHO Stepwise approach to surveillance
Tab	tablet
TB	tuberculosis
TI	transfer in
TIA	transient ischemic attack
TO	transfer out
UNICEF	United Nations Children's Fund
VIA	visual inspection with acetic acid
VN	***
WHO	World Health Organization

References and resources

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