



Addressing severe chronic NCDs across Africa: measuring demand for the Package of Essential Non-communicable Disease Interventions-Plus (PEN-Plus)

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Abstract

Severe chronic non-communicable diseases (NCDs) pose important challenges for health systems across Africa. This study explores the current availability of and demand for decentralization of services for four high-priority conditions: insulin-dependent diabetes, heart failure, sickle cell disease, and chronic pain. Ministry of Health NCD Programme Managers from across Africa ($N = 47$) were invited to participate in an online survey. Respondents were asked to report the status of clinical care across the health system. A care package including diagnostics and treatment was described for each condition. Respondents were asked whether the described services are currently available at primary, secondary and tertiary levels, and whether making the service generally available at that level is expected to be a priority in the coming 5 years. Thirty-seven (79%) countries responded. Countries reported widespread gaps in service availability at all levels. We found that just under half (49%) of respondents report that services for insulin-dependent diabetes are generally available at the secondary level (district hospital); 32% report the same for heart failure, 27% for chronic pain and 14% for sickle cell disease. Reported gaps are smaller at tertiary level (referral hospital) and larger at primary care level (health centres). Respondents report ambitious plans to introduce and decentralize these services in the coming 5 years. Respondents from 32 countries (86%) hope to make all services available at tertiary hospitals, and 21 countries (57%) expect to make all services available at secondary facilities. These priorities align with the Package of Essential NCD Interventions-Plus. Efforts will require strengthened infrastructure and supply chains, capacity building for staff and new monitoring and evaluation systems for efficient implementation. Many countries will need targeted financial assistance in order to realize these goals. Nearly all (36/37) respondents request technical assistance to organize services for severe chronic NCDs.

Keywords: Access, cardiovascular disease, decentralization, health care planning, non-communicable disease, palliative care, policy, priorities

Introduction

Non-communicable diseases (NCDs) are a major cause of morbidity and mortality in Africa. Between 1990 and 2017, the age-standardized burden of NCDs, measured in terms of disability-adjusted life years (DALYs), has grown to nearly equal the burden of disease from communicable, maternal, neonatal and nutritional diseases combined across the region (Gouda *et al.*, 2019). NCDs include a large and diverse group of conditions. The recent Lancet Commission on Reframing NCDs and Injuries (NCDIs) has highlighted the heterogeneity of NCDs affecting the world's poorest billion (Bukhman *et al.*, 2020). Notably, this burden includes severe chronic conditions, such as type 1 diabetes, rheumatic heart disease and sickle cell disease that affect relatively young populations.

Relative to communicable, maternal and child health programs, investments in the prevention and control of NCDs has been severely limited (Nugent, 2016). The results of this are evident across the African region, where existing data suggest that coverage of NCD care remains low, with many services restricted to tertiary facilities (Gupta *et al.*, 2020; Moucheraud, 2018). As a result, severe NCDIs of the poor are far more lethal than the same conditions in high-income populations, with some conditions resulting in an additional 20 years of healthy life per person lost (Bukhman *et al.*, 2020; Johansson *et al.*, 2020).

Advocates have argued that decentralization of ambulatory services for severe NCDs to secondary care facilities (e.g. district hospitals) offers an important opportunity to reinforce the World Health Organization's (WHO's) Package of

Key messages

- There has been increasing global recognition of the need to ensure access to care for severe non-communicable diseases (NCDs). Calls for action have been especially pronounced across large parts of the Africa region, where weak health systems and endemic disease collide. This work explores the availability of and demand for decentralization of four high-priority NCD service packages among well-placed central authorities from 37 countries across Africa.
- Countries report widespread gaps in service availability at all levels. Just under half (49%) of respondents report that services for insulin-dependent diabetes are generally available at the secondary level; 32% report the same for heart failure, 27% for chronic pain and just 14% for sickle cell disease. Reported gaps are smaller at tertiary facilities and larger at primary care facilities.
- Respondents report ambitious plans to introduce and decentralize these services in the coming 5 years. Serious efforts to offer services at the periphery of the health system will require efficient and cost-effective solutions.

Essential NCD (PEN) services for primary care (Bukhman *et al.*, 2011; Eberly *et al.*, 2019; Gupta and Bukhman, 2015). In 2019, the WHO Regional Office for Africa (WHO/AFRO) convened a consultation to discuss a regional ‘Package of Essential NCD Interventions-Plus (PEN-Plus)’ strategy. PEN-Plus is designed to complement standardized PEN protocols by offering individualized care for high-severity, low-frequency conditions at lower-level facilities—particularly first-level hospitals. The specific services included in the PEN-Plus package can be adapted to reflect local needs, but generally includes medical management for insulin-dependent diabetes, heart failure, liver failure, kidney failure and sickle cell disease. This is achieved with the creation of integrated care teams that can leverage common characteristics across conditions to allow the efficient provision of high-quality care (Bukhman *et al.*, 2011). Workflow optimization and task-shifting to mid-level providers offer opportunities for additional efficiencies (Bukhman *et al.*, 2011; Gupta and Bukhman, 2015). The proposed strategy aims to accelerate decentralization of integrated outpatient services for severe chronic NCDs locally (World Health Organization Regional Office for Africa, 2020).

In this study, we evaluated the current and anticipated decentralization of outpatient services for four severe chronic NCDs in 37 countries from across western, eastern, central and southern Africa. Services were selected to reflect priorities of the PEN-Plus strategy. These include conditions of epidemiological importance in the region, including type 1 and type 2 insulin-dependent diabetes, heart failure (including heart failure from advanced rheumatic heart disease, cardiomyopathies, congenital heart disease and hypertensive heart disease) and sickle cell disease. Given the critical importance of palliative care for a range of conditions, we further include morphine for chronic pain relief in the list of interventions assessed. See Box 1 for additional information on the conditions considered in this work.

Table 1. Disease areas and tracer items investigated by this study

Disease area	Tracer items
Insulin-dependent diabetes	– Diagnosis – Insulin management – HbA1c monitoring
Heart failure	– Ultrasound diagnosis and monitoring – Diuretic/ACE-inhibitor management – Beta-blocker management – Warfarin management – INR testing
Sickle cell disease	– Newborn screening – Testing for hemoglobin S – Initiation of hydroxyurea – Monitoring of hydroxyurea
Morphine for chronic pain	– Long-term morphine

Respondents were asked to consider all tracer items in a given service package while completing surveys.

Methods

We conducted a structured, cross-sectional online survey lasting approximately 30 min. Respondents were Ministry of Health NCD Programme Managers or their respective delegates. Representatives from all 47 countries were identified and invited to participate. Designated respondents were contacted by email with a link to the online survey.

The survey asked about the availability of specific clinical services at the primary, secondary and tertiary levels of the health system. For services not currently available at a given level, respondents were asked to indicate whether making the services available is likely to be a priority in the next 5 years. The survey asked about a total of 13 acute and chronic conditions, reflecting a broad cross-section of health system demands. We extracted information for chronic conditions highlighted above; namely, type 1 and insulin-dependent type 2 diabetes, heart failure, sickle cell disease and morphine for chronic pain. Details of the service packages were developed by clinicians on the research team. The questionnaire asked about the ‘general availability’ of each service package, which was defined as availability at 50% of facilities or more at a given level of the health sector. In referring to ‘general availability’, the survey was designed to mimic the NCD Country Capacity Survey, a biennial survey led by the WHO that is well-known to most NCD technical leads (World Health Organization, 2018). See Table 1 for details on each of the four service packages considered in this analysis. For each condition, respondents were asked to separately consider the availability of a complete list of tracer indicators at the primary care level (often referred to as health centres), the secondary care level (often referred to as first-level hospitals, in many countries referring to district hospitals) and tertiary care level (often referred to as referral hospitals, generally including a combination of provincial and central hospitals).

The survey was developed in three languages—English, French and Portuguese—and was implemented in two rounds. Round 1 was launched in advance of a regional consultation on WHO PEN and PEN-Plus, which was organized by WHO/AFRO and attended by NCD technical focal points from 17 member states, as well as regional partners. In the weeks prior to the workshop, designated attendees were

invited to participate in the online survey via email. Initial results were analyzed and presented to attendees. The survey was revised for length and clarity based on feedback gathered at the meeting. Round 2 was launched in the Spring of 2020. An English version of the revised survey can be found in the Supplementary materials. French and Portuguese versions are available upon request.

For both Round 1 and Round 2, countries were invited via email to participate using the online survey platform Qualtrics. Respondents were able to complete the survey at the time and place of their choosing (Qualtrics, 2005). Following analysis, all countries were provided with a country profile summarizing the information that had been provided and explaining how it would be interpreted and used. Respondents were invited to update the information if errors were identified. Respondents could opt to complete the survey in English, French or Portuguese. Country profiles were developed in the same language as the one selected for the survey.

For analytic purposes, countries were divided into sub-regional and linguistic groups reflecting the structure of the WHO/AFRO. Countries were also categorized according to the World Bank income classification (World Bank, 2020). All analysis was conducted using Stata SE, Version 15 (Statacorp, 2017).

Ethical approval was received from the Harvard University Longwood Medical Area IRB (IRB19-0696). Respondents provided written informed consent prior to initiating the survey.

Results

Representatives from 37 out of the 47 invited countries responded to the survey, resulting in an overall response rate of 79% (See Table A1). The response rate was highest in West Africa (95%) and lowest in Central Africa (44%). French-speaking countries responded at a lower rate (74%) than either English (83%) or Portuguese-speaking (80%) countries. Most countries in the region were classified as either low-income countries or lower-middle-income countries by the World Bank in the year 2020. Among these two groups, 81% and 79% of countries responded, respectively.

Figure 1 provides an overview of current service availability at each of the three levels of the health sector. While 70% of respondents report that policies are in place to support decentralization of chronic care of NCDs down to the secondary care facilities, respondents reported limited care availability even at the tertiary level. Care for insulin-dependent diabetes was reported to be the most readily available service across all three levels of the health system. Care for sickle cell disease was the least available. According to respondents, care for insulin-dependent diabetes was generally available at tertiary facilities in 68% of countries—this is nearly twice the availability reported for care for sickle cell disease (32%). Care for all conditions was less available at lower levels of the health system. Services for insulin-dependent diabetes were reportedly available at secondary care facilities in 49% of countries and at primary care facilities in just under one-quarter (24%) of countries. Additional details on the current reported availability of services can be found in Table 2.

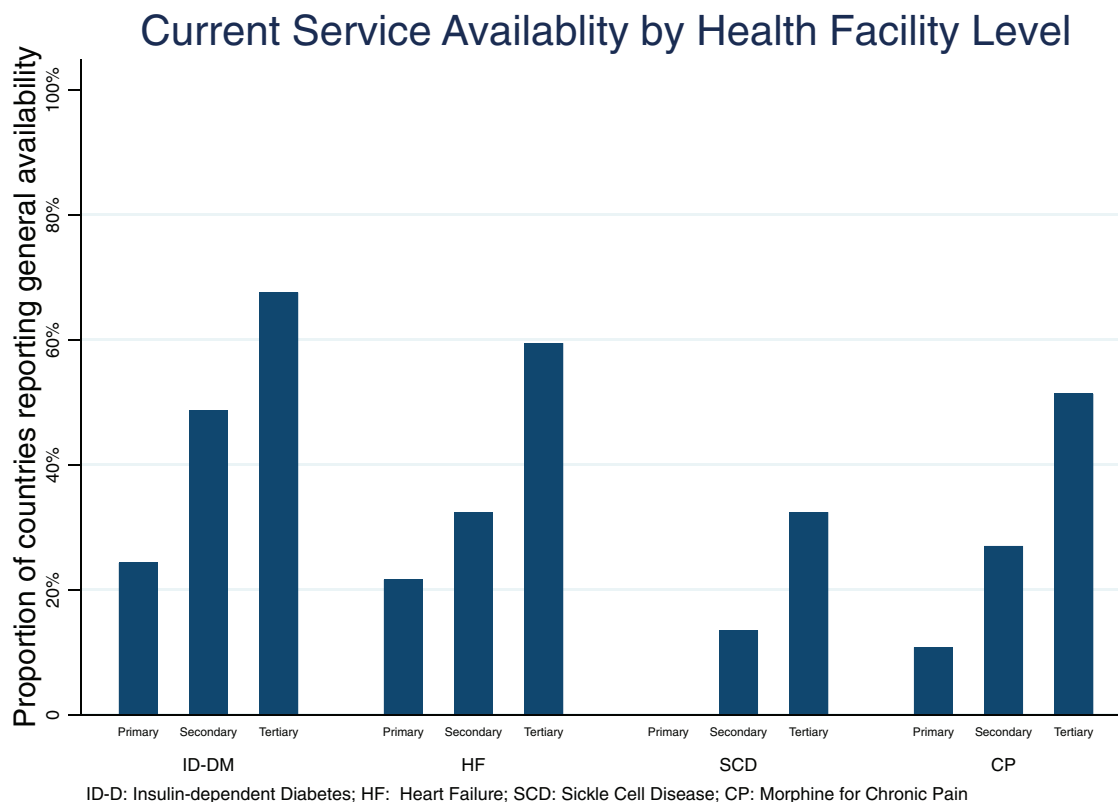


Figure 1. Current availability of care packages for severe NCDs by facility type. We show the per cent of countries reporting that a given package is 'generally available' at the primary, secondary and tertiary care level. General availability is defined as availability at 50% of facilities or more, at a given facility type. Country income groups are as defined for the year 2020 by the World Bank.

Table 2. Current and target availability of severe NCD service packages by 2025

	Current availability		Target availability, 2025	
	N	%	N	%
Insulin-dependent diabetes				
Tertiary care facilities	25	68%	36	97%
Secondary care facilities	18	49%	35	95%
Primary care facilities	9	24%	32	87%
Heart failure				
Tertiary care facilities	22	60%	36	97%
Secondary care facilities	12	32%	30	81%
Primary care facilities	8	22%	22	60%
Sickle cell disease				
Tertiary care facilities	12	32%	32	87%
Secondary care facilities	5	14%	24	65%
Primary care facilities	0	0%	19	51%
Morphine for chronic pain				
Tertiary care facilities	19	51%	35	95%
Secondary care facilities	10	27%	31	84%
Primary care facilities	4	11%	25	68%

We show the number and percent of countries reporting that a given service package is generally available at the primary-, secondary- and tertiary level (left) and the number and percent of countries aiming to make services available by 2025 (right).

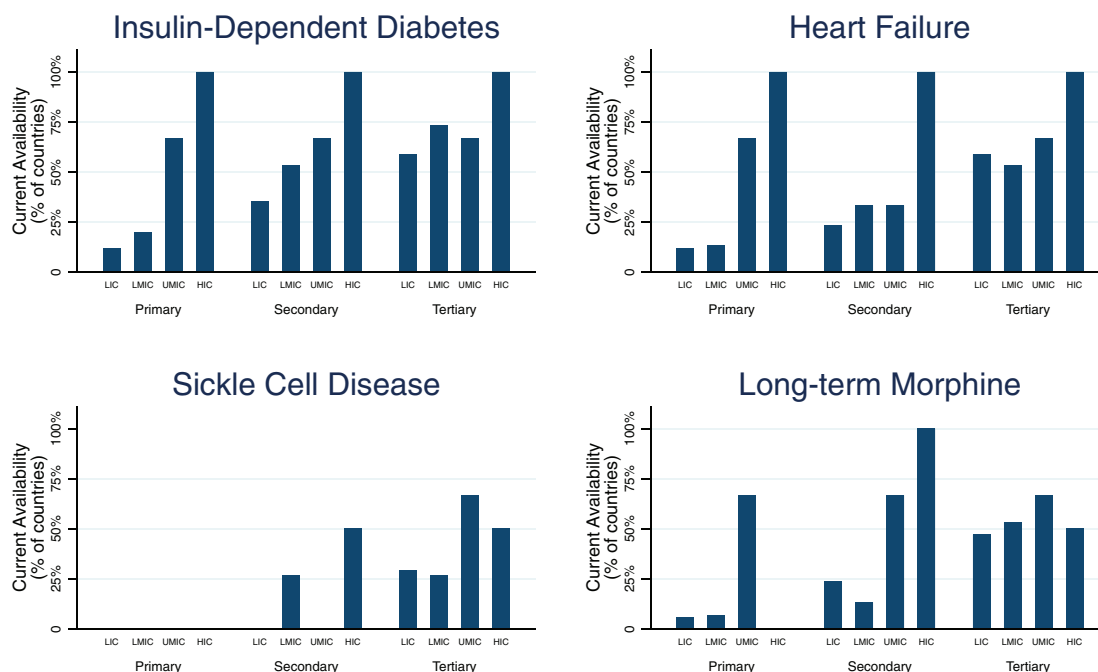
Across all of four care packages, respondents from South and East Africa were two-to-three times as likely to report that services are currently available relative to their peers

in Central or West Africa. Services were also reported to be generally more available in higher-income countries (Figure 2, Table A2). For example, 59% of respondents from low-income countries reported care for type 1 and insulin-dependent type 2 diabetes is generally available at the tertiary care level. This compares with 70% respondents from countries categorized as lower-middle-income or above.

Respondents were also asked to report target coverage of the selected services by 2025. Most (86%) said that they seek to make all services available at least at tertiary care facilities, while 57% of respondents will aim to make all four service packages available at secondary care facilities. Respondents were least likely to report that care for sickle cell disease would be introduced or expanded (Table 2). Five of 37 countries (13%) anticipate that the basic service package for sickle cell care will not be available at any level of the national health system by 2025. This is largely driven by differences in South and East Africa, where sickle cell disease prevalence is lower, and countries are less likely to report plans to introduce or decentralize these services. With the exception of sickle cell disease, higher income countries report more ambitious plans for decentralization than do lower income countries (Table A3).

Table 3 provides additional information on plans for scale-up, with countries grouped according to the current lowest reported level of service availability. For countries reporting that a given service is generally available only at tertiary level, the current lowest level of care is the tertiary care facilities. For countries for whom care is available at both

Current Service Availability, by Country Income Group



LIC: Low income, N = 17; LMIC: Lower-middle income, N = 15; UMIC: Upper-middle income, N = 3; HIC: High income, N=2

Figure 2. Current availability of service packages for severe NCDs by country income group. We show the per cent of countries reporting that a given package is generally available at the primary, secondary and tertiary care level by income group. General availability is defined as availability at 50% of facilities or more, at a given facility type. Country income groups are as defined for the year 2020 by the World Bank.

Table 3. Severe NCD service package scale up plans for 2025, by current lowest health system level of care availability

Current lowest level of care	# of countries	Decentralization: target availability in 2025 at each facility level, by lowest level of care in 2020							
		No plans to make available		Tertiary care facilities		Secondary care facilities		Primary care facilities	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Insulin-dependent diabetes									
Not currently available	12	1	8%	11	92%	10	83%	9	75%
Tertiary care facilities	7	–	–	7	100%	7	100%	6	86%
Secondary care facilities	9	–	–	–	–	9	100%	8	89%
Primary care facilities	9	–	–	–	–	–	–	9	100%
Heart failure									
Not currently available	15	1	7%	14	93%	9	60%	7	47%
Tertiary care facilities	9	–	–	9	100%	8	89%	5	56%
Secondary care facilities	5	–	–	–	–	5	100%	2	40%
Primary care facilities	7	–	–	–	–	–	–	7	100%
Tertiary and primary facilities ^a	1	–	–	1	100%	1	100%	1	100%
Sickle cell disease									
Not currently available	24	5	21%	19	79%	15	63%	12	50%
Tertiary care facilities	8	–	–	8	100%	4	50%	3	38%
Secondary care facilities	4	–	–	–	–	4	100%	3	75%
Secondary facilities only ^b	1	–	–	1	100%	1	100%	1	100%
Morphine for chronic pain									
Not currently available	17	2	12%	15	88%	12	71%	9	53%
Tertiary care facilities	10	–	–	10	100%	9	90%	7	70%
Secondary care facilities	5	–	–	–	–	5	100%	4	80%
Primary care facilities	4	–	–	–	–	–	–	4	100%
Secondary facilities only ^b	1	–	–	1	100%	1	100%	1	100%

For each service package, we group countries by the current lowest level of care (left). Within each group, we indicate the proportion of countries aiming to make services generally available at tertiary-, secondary- and primary care facilities by 2025 (right).

^aOne country indicates that care for heart failure is available at health centers and referral hospitals, but not first level hospitals.

^bOne country indicates that care for sickle cell disease and palliative care are both available at district hospitals but not referral hospital.

tertiary and secondary levels, the current lowest level of care is the secondary care facilities, and so on. A large majority of countries expect to decentralize services by at least one level—frequently by several levels—in the coming 5 years. For example, 12 countries report that the service package for insulin-dependent diabetes is not currently available at any level. Of these, 11 (92%) expect that care will be generally available at tertiary facilities by 2025, 10 (83%) expect that care will be generally available at secondary facilities and 9 (75%) report that the service package will be generally available at primary facilities. All but one country (36/37) reported that they would like support to develop and implement integrated strategies for severe NCDs at secondary facilities.

Discussion

NCDs are a major cause of morbidity and mortality in Africa. Existing research highlights the difficulties that many countries face in responding to this challenge. In many countries, health systems have evolved to manage acute and episodic care, leaving them ill-equipped to provide effective and longitudinal care required for this heterogeneous group of chronic conditions (Sixty-ninth World Health Assembly, 2016). Physical and financial barriers compound these issues, resulting in significant avoidable morbidity and mortality (Bukhman *et al.*, 2020; Ezzati *et al.*, 2018).

This is the largest study to date regarding the levels of service coverage for severe chronic NCDs in the African region. The study provides a broad understanding of the current

availability and anticipated service delivery goals for four sets of interventions from the perspectives of ministries of health. These interventions include care for insulin-dependent diabetes, heart failure, sickle cell anaemia and oral morphine for chronic pain. We identify significant gaps in service availability, including at the tertiary level, with availability declining as we look towards the periphery. Of the care packages examined here, the availability of services is highest for insulin-dependent diabetes and lowest for sickle cell disease. Just under half (49%) of respondents report that services for insulin-dependent diabetes are generally available at the secondary level; 32% report the same for heart failure, 27% for chronic pain, and just 14% for sickle cell disease.

There are limited data available regarding current coverage for NCDs, particularly the more severe NCDs that are the focus of this study. Our findings are consistent with prior surveys of health facilities that assess systems readiness to provide NCD care (Carlson *et al.*, 2017; Moucheraud, 2018; Spiegel *et al.*, 2017). For example, the largest recent analysis using Service Provision Assessments (SPA) in six countries in Africa found low overall availability of the medicine and equipment for severe NCD services, including heart failure and diabetes (Gupta *et al.*, 2020).

While current care availability is low, respondents from 70% of the countries included in our study note an existing policy aimed at decentralizing care for severe NCDs to the secondary level. When asked about the four specific service packages included in this study, ambitious plans emerge. Most respondents expect to expand access to services by at least one level—often multiple levels—in the coming 5 years.

Respondents from 21 countries (57%) expect to make all of the included services generally available at secondary facilities by 2025. By bringing services closer to patients' homes, efforts to decentralize services could significantly decrease geographic barriers to care, resulting in improved clinical outcomes (Siddharthan *et al.*, 2015).

Aligning these ambitious policy goals with on-the-ground readiness will require significant effort. Serious efforts to offer services at the periphery of the health system will require efficient and cost-effective solutions. In addition to investments in infrastructure and equipment, clinical staff need to be trained to diagnose, assess and treat patients. Supply chains need to be developed to ensure the reliable availability of medicines, and both patient records and monitoring systems may need to be updated to track new conditions. Case detection and referral systems across all three levels of care will require strengthening to ensure a continuum of care. Many countries will need targeted financial assistance to realize these goals, and nearly all (36/37) respondents request technical assistance to organize services for severe chronic NCDs.

The PEN-Plus model has been developed in response to this challenge. At the centre of PEN-Plus is an integrated approach to care delivery. While each of the service packages examined in this study is unique, the underlying systems and clinical skills needed to deliver them share several important features. For each, clinicians must have the skills and the tools needed to read, interpret and respond to evolving health needs. Together with the relatively low patient load of the individual conditions, these complementarities present opportunities to combine workflows to gain efficiencies. In this way, integrating services into bundled care packages reduces the per-patient cost of introducing new services by sharing investments in infrastructure and capacity building across multiple conditions. Further, experience elsewhere has illustrated that, with targeted training, much of the care for these conditions can be effectively managed by mid-level providers (Eberly *et al.*, 2018). Task shifting this care from more specialized providers reduces pressure on already strained human resources and offers a lower-cost path to care delivery.

This study has several limitations. First, while the response rate was high overall, the relatively low response rate in the central African sub-region (44% compared to an overall response rate of 79%) limits our ability to draw conclusions from this area. Reports on the current availability of services were not validated by in-person or facility-based observation. While our findings are consistent with studies that do so, this work does not offer a detailed review of service readiness at sampled facilities, such as is provided by SPA or service availability and readiness assessments (SARA) data. Rather, this study relies on the knowledge and perceptions of uniquely well-placed technical officers and their designees. The methodology allows us to rapidly assess a broader cross-section of countries in the region than would be feasible with a bottom-up approach to the question.

Finally, it is to be noted that data was collected prior to the COVID-19 pandemic. In many ways, the increased mortality due to COVID-19 experienced by this population has raised the profile of NCDs (Clark *et al.*, 2020; The Lancet, 2020). The pandemic has upended global, national, and local health systems alike. While the long-term impact on sectoral priorities is not yet known, highlighting areas with the largest gaps and strongest political will can help to align efforts with the complex realities of a co-ordinated response.

Conclusion

There has been increasing global recognition of the need to ensure access to care for severe NCDs. Calls for action have been especially pronounced across large parts of the African region, where weak health systems and endemic disease collide. However, there is little information on how policymakers across the continent perceive the situation. Here, we explore the availability of and demand for decentralization of four NCD service packages among well-placed central authorities.

Although most countries have a policy in place for decentralized care, services for the four selected conditions remain concentrated at tertiary facilities in countries across all regions of Africa. Survey responses indicate a very significant workload ahead, as NCD Programme Managers describe ambitious plans to expand service availability over the coming 5 years. Such an expansion of care requires efficient implementation frameworks—such as those offered by PEN-Plus strategies—and re-doubled support from both domestic and global policy advocates.

Supplementary data

Supplementary data are available at *Health Policy and Planning* online.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

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Conflict of interest statement. The authors declare that they have no conflicts of interest.

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Appendix

Table A1. Survey response rate, by country income group, language and WHO sub-region

	Response rate N (%)	Total N
Country Income Group, 2020		
Low-income	17 (81.0%)	21
Lower-middle income	15 (78.9%)	19
Upper-middle income	3 (60.0%)	5
High-income	2 (100%)	2
Lingua franca		
English	19 (82.6%)	23
French	14 (73.7%)	19
Portuguese	4 (80.0%)	5
Sub-region		
West Africa	17 (94.4%)	18
South and East Africa	16 (80.0%)	20
Central Africa	4 (44.4%)	9
Total	37 (78.7%)	47

The 47 countries invited to participate in the survey are shown according to the World Bank country income group (2020), lingua franca used by the WHO and region as defined by the WHO country Focus and Cooperation office.

Table A2. Reported current availability of care for severe NCDs across the African region by facility and country income group

	Insulin-dependent diabetes	Heart failure	Sickle cell disease	Morphine for chronic pain
Tertiary care level				
Low income	59%	59%	29%	47%
Lower middle income	73%	53%	27%	53%
Upper middle income	67%	67%	67%	67%
High income	100%	100%	50%	50%
Total	68%	60%	32%	51%
Secondary care level				
Low income	35%	24%	0%	24%
Lower middle income	53%	33%	27%	13%
Upper middle income	67%	33%	0%	67%
High income	100%	100%	50%	100%
Total	49%	32%	14%	27%
Primary care level				
Low income	12%	12%	0%	6%
Lower middle income	20%	13%	0%	7%
Upper middle income	67%	67%	0%	67%
High income	100%	100%	0%	0%
Total	24%	22%	0%	11%
Overall				
Low income	35%	31%	10%	26%
Lower middle income	49%	33%	18%	24%
Upper middle income	67%	56%	22%	67%
High income	100%	100%	33%	50%
Total	47%	38%	15%	30%

Services that are currently reported to be 'generally available,' defined as available at 50% of facilities or more, at the primary, secondary and tertiary level. Country income groups are as defined for the year 2020 by the World Bank.

Table A3. Reported target availability of care for severe NCDs by 2025 across the African region by facility and country income group

	Insulin-dependent diabetes	Heart failure	Sickle cell disease	Morphine for chronic pain
Tertiary care level				
Low income	94%	94%	82%	88%
Lower middle income	100%	100%	93%	100%
Upper middle income	100%	100%	67%	100%
High-income	100%	100%	100%	100%
Total	97%	97%	87%	95%
Secondary care level				
Low income	88%	77%	59%	71%
Lower middle income	100%	87%	80%	100%
Upper middle income	100%	67%	0%	67%
High income	100%	100%	100%	100%
Total	95%	81%	65%	84%
Primary care level				
Low income	77%	59%	47%	59%
Lower middle income	93%	53%	60%	73%
Upper middle income	100%	67%	0%	67%
High income	100%	100%	100%	100%
Total	87%	60%	51%	68%
Overall				
Low income	86%	77%	63%	73%
Lower middle income	98%	80%	78%	91%
Upper middle income	100%	78%	22%	78%
High income	100%	100%	100%	100%
Total	93%	79%	68%	82%

Reported priorities to make services 'generally available,' defined as available at 50% of facilities or more, at the primary, secondary and tertiary level, by 2025. Country income groups are as defined for the year 2020 by the World Bank.

Box 1. Epidemiologic and clinical context

The chronic and severe NCDs included in this study are of particular concern for rural and impoverished populations in the region (Bukhman *et al.*, 2020). Each of the conditions under consideration—type 1 and insulin-dependent type 2 diabetes, heart failure, sickle cell disease and morphine for chronic pain—is associated with significant morbidity and mortality across Africa, causes high rates of re-hospitalization, and is associated with a reduced quality of life for patients (Dokainish *et al.*, 2017; Patterson *et al.*, 2019; Piel *et al.*, 2017). Heart failure affects individuals at a younger age in Sub-Saharan Africa, and is diagnosed, on average, up to two decades earlier than it is in other regions (Damasceno *et al.*, 2012). Life expectancy after diagnosis of type 1 diabetes has been estimated to be as little as 1 year in many countries, and between 50 and 90% of children born with sickle cell disease are thought to die, undiagnosed, before age five (Beran and Yudkin, 2006; Williams, 2016).

The local epidemiology of these conditions differs from that found in higher income settings in important ways. For example, a recent systematic review found that, while there are no known population-based or incidence studies of the disease, heart failure accounts for a significant proportion (9.4–42.5%) of inpatient admissions in Sub-Saharan Africa (Agbor *et al.*, 2018). Hypertensive heart disease is the leading cause of heart failure in the region, followed by cardiomyopathies and rheumatic heart disease (Callender *et al.*, 2014; Damasceno *et al.*, 2012; Kwan *et al.*, 2016). Ischemic heart disease—the dominant aetiology elsewhere—remains rare. In contrast, prevalence data would suggest that type 1 diabetes often has a later onset and lower incidence in Africa relative to other regions (Atun *et al.*, 2017). However, given that Africa has the highest diabetes-related mortality in the world, these phenomena may be reflective of poor data rather than the actual underlying epidemiology (Patterson *et al.*, 2019). More is known about the prevalence of sickle cell disease. The condition is geographically concentrated in the region, with approximately three in four sickle cell-affected babies—up to 300 000—globally born in the region each year (Piel *et al.*, 2017).

These conditions require timely diagnosis and individualized treatment regimens (Bukhman *et al.*, 2011). Guidelines on ambulatory care for type 1 and insulin-dependent type 2 diabetes in low-resource settings includes education, monitoring of glycaemic control and nutrition, insulin therapy, and management of hypo- and hyperglycemia (Codner *et al.*, 2018). Pharmacologic treatment for heart failure most frequently includes diuretics, angiotensin converting enzyme (ACE) inhibitors, and beta blockers (Agbor *et al.*, 2018). Hydroxyurea is the primary long-term therapy for individuals with sickle cell disease. Treatment has been shown to reduce the number vaso-occlusive events, reducing both morbidity and mortality associated with sickle cell disease (McGann and Ware, 2011). Existing evidence points to widespread gaps in all of these services across the region, with care frequently limited to large, urban centres (Agbor *et al.*, 2018; Atun *et al.*, 2017; McGann *et al.*, 2017). The heavy toll of these and other conditions speak to the need for chronic pain management and palliative care efforts in the region (Rhee *et al.*, 2018). However, access to morphine, like the therapeutics discussed above, remains rare across the region (Knaul *et al.*, 2018).