

REPUBLIC OF KENYA



MINISTRY OF HEALTH



The Kenya Non-Communicable Diseases & Injuries Poverty Commission Report

July 2018

THE KENYA
NCDI
POVERTY
Commission

*Reframing **Noncommunicable Diseases**
and **Injuries** for the Poorest Billion*





FOREWORD

The Kenya Non-Communicable Diseases and Injury (NCDI) Poverty Commission was established in December 2016 with a mandate of developing a local investment case for pro-poor policies and integrated health service delivery platforms to achieve substantial reductions in premature death, suffering, and poverty due to NCDs and injuries. Kenya joined ten other countries at the invitation of the global Lancet Commission on Reframing NCDs and Injuries of the Poorest Billion to form national commissions that would make broader generalizations regarding the burden of NCDIs among the poor and the investment opportunity that they represent.

Kenya has made commitments both internationally and locally to halt and reverse the burden of NCDs. To achieve this, it is necessary to have appropriate data that explain the distribution of the burden. Equally important, is the need to continuously advocate for proven cost effective interventions among other strategies. These two areas were among the key objectives of the commission. Additionally, financing of NCDIs has been limited and the commission sought to establish the gaps in resources and estimate the cost of interventions to facilitate the attainment of the Sustainable Development Goals (SDGs).

The Ministry of Health is grateful to Partners in Health and the Program in Global NCDs and Social Change at Harvard Medical School for the financial and technical assistance offered to carry out the task of the commission. We are equally grateful to all the national commissioners who participated in this assignment and a big thank you to the able co-chairs - Dr. Joseph Kibachio and Dr. Mary Nyamongo who were able to lead the team effectively. I am also grateful to Dr. Gladwell Gathecha for coordinating the activities in-country.

The recommendations made in this report should be addressed by both state and non-state actors, and health and non-health actors. I thereby call on all NCDI stakeholders to work together to ensure the burden of NCDI is reduced nationally and specifically among the poorest population.

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ACRONYMS & ABBREVIATIONS

ACEi	Angiotensin-converting-enzyme (ACE) inhibitor
AMPATH	Academic Model Providing Access to Healthcare
APHRC	Africa Population Health Research Center
ARB	Angiotensin Receptor Blockers
BMI	Body Mass Index
CDC HDSS	Centers for Disease Control and Prevention Health and Demographic Surveillance System
COPD	Chronic Obstructive Pulmonary Disease
CT Scan	Computerized Tomography Scan
CVD	Cardiovascular Disease
CVRD	Cardiovascular and Respiratory Disorders
DALYs	Disability-Adjusted Life Years
DCP3	Disease Control Priorities 3
DNCD	Division of Non-Communicable Diseases
EEG	Electroencephalogram
GBD	Global Burden of Disease
GoK	Government of Kenya
HIV	Human Immunodeficiency Virus
HPV	Human Papillomavirus
HSSP	Health Sector Strategic Plan
KDHS	Kenya Demographic and Health Survey
KEMRI	Kenya Medical Research Institute
KEPH	Kenya Essential Package for Health
KMoH	Kenya Ministry of Health
KSh	Kenyan Shilling
MPI	Multidimensional Poverty Index
MRI	Magnetic Resonance Imaging
MTRH	Moi Teaching and Referral Hospital
NCDs	Non-Communicable Diseases
NCDIs	Non-Communicable Diseases and Injuries
NEML	National Essential Medicines List
NHA	National Health Accounts
OPHDI	Oxford Poverty and Human Development Initiative
PIH	Partners In Health
PPP	Purchasing Power Parity
SARA	Service Availability and Readiness Assessment
STEPS	STEPwise Approach to Surveillance
TB	Tuberculosis
USD	United States Dollar
WHO	World Health Organization
YLD	Years Lived with Disability
YLL	Years of Life Lost



EXECUTIVE SUMMARY

In December 2016, the Non-Communicable Diseases and Injuries (NCDI) Poverty Commission was established by the Kenyan Ministry of Health (MoH) to assess the causes and impacts of NCDIs particularly on the poorest populations of Kenya and provide recommendations on how NCDIs can be best addressed for its population. This commission, comprised of 24 experts in this field, used existing literature and data sources over the course of one year to generate the findings presented in this report. The commission conducted its work with support and collaboration from the global *Lancet* Commission on Reframing Non-Communicable Diseases and Injuries for the Poorest Billion.

Overall, the commission reports that NCDIs are responsible for a large share of morbidity and mortality in Kenya, resulting in 37% of the overall burden of disease and 35% of all deaths. Contrary to popular belief, NCDIs occur at younger ages and affect those in the productive years of life, with over half of the NCD disease burden and almost three-quarters of injuries occurring before the age of 40. NCDI conditions are very diverse, and although global targets in NCDs largely focus on four major diseases (cardiovascular disease, type 2 diabetes, asthma, and cancers), 67% of NCDs in Kenya are due to other NCD conditions.

The poor suffer disproportionately from NCDIs. Data from Health and Demographic Surveillance Sites in Kenya demonstrate an equal, if not higher, proportion of deaths due to NCDIs in the poorest as compared to wealthiest quintiles. Crude death rates among the poor were more than double for NCDs and triple for injuries than those among the wealthier populations. Most of the NCDI disease burden cannot be attributed to individual lifestyle choices. In modeling of risk factors for NCDIs, less than one-quarter of the risk factor profile can be attributed to individual behaviors, such as tobacco or alcohol, or metabolic risk factors, such as obesity or blood pressure. Review of existing literature suggests that the prevalence of particular risk factors, such as alcohol, obesity, and hypertension, may be lowest in the poorest wealth quintiles.

The commission found that services for basic NCDIs are lacking, particularly in poorer regions and in the public sector. Despite strong inclusion of NCDIs in the Kenya Essential Package for Health (KEPH), availability of key medications and readiness of NCD services remains limited and inversely related to the poverty level of regions. Availability of services is better in urban and private sector settings as compared to rural or public sector settings. Referral hospital level NCDI services remain sparse compared to the population of the country and concentrated in urban areas. Coverage of basic NCDIs, such as diagnosis and treatment of hypertension and diabetes or cancer screening, is low, and is inversely related to wealth.



NCDIs also have a significant economic impact on households. Household surveys demonstrate NCDs cause a greater decrease in household income (28.6%) and a higher rate of catastrophic expenditures than communicable diseases. Catastrophic expenditures for NCDs are greatest for the poor and rural households. Households affected by NCDs are 30% more likely to be impoverished than households with communicable diseases. Despite comprising a large burden of disease in Kenya, currently NCD spending comprises only 6.5% of total health expenditures.

Based on the overall burden of disease, equity profile of disease conditions, severity and disability of illness, and age profile of those effected, this commission selected 14 NCDI disease conditions on which to increase health sector interventions. These conditions build on the existing Kenya NCD Strategic Plan, and include asthma, chronic obstructive pulmonary disease (COPD), hypertensive heart disease and stroke, rheumatic heart disease, diabetes (type 1 and 2), cervical cancer, non-Hodgkin lymphoma, breast cancer, major depressive disorders, epilepsy, sickle cell disease, cirrhosis, motor vehicle road injuries, and interpersonal violence/assault. This commission then proposed 34 potential interventions to be introduced or intensified within the health sector to target these priority NCDI conditions. These interventions were selected on the criteria of potential health impact, cost-effectiveness, financial risk protection, and priority to the “worst-off”, including those that could avert more severe or premature complications. With implementation of these interventions, it is estimated that over 9000 premature deaths can be averted annually by the year 2030. These interventions, including outpatient, inpatient, surgical, mental health, rehabilitation, and palliative care services, along with facility- and central-level indirect costs, would cost roughly 17% of total health expenditure, or \$11.97 per capita annually.

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1. Background, History and Policy Context

1.1 HISTORY, ORGANIZATION AND GOVERNANCE OF NCDIS IN KENYA

Kenya has had a rich and robust response to developing health systems response to the collective area of conditions known as non-communicable diseases (NCDs). The response to NCDs has been housed within the Ministry of Health (MoH), Division of NCDs (DNCD). This Division was established in 2001, and currently has 17 technical staff, who oversee the areas of cancer, cardiovascular diseases, diabetes and other metabolic diseases, violence and injury prevention, risk factor reduction, and wellness and aging. This Division is responsible for formulating and strengthening legislation, policies and plans, reducing modifiable risk factors, strengthening health systems for the NCDI response, sensitizing and building capacity for county governments, promoting operational research and surveillance, developing local and international partnerships, drive advocacy and communication, and building capacity and providing technical assistance for NCDIs. The DNCD is comprised of five functional units, including the NCD Control Unit, Cancer Control Programme, Tobacco Control and Substance Abuse Unit, Violence and Injury Prevention Unit, and Health and Ageing Unit.

Kenya has made major strides in the legislation of key intersectoral interventions to reduce and prevent several major NCDs. The Tobacco Control Act 2007, Alcoholic Drinks Control Act 2010, Occupational Health and Safety Act 2007, Cancer Prevention and Control Act 2012, Traffic Amendment Act 2012, amongst others, have developed the foundation to enable a healthy environment and reduce key risk factors for several major NCDIs. The NCD Division has gone on to develop key policies, clinical guidelines, and training materials in many areas of NCDs, including the National Diabetes Control Strategy (2010), National Cancer Control Strategy (2017), Tobacco Control Action Plan (2010), Violence and Injury Prevention and Control Action Plan (2017), National Palliative Care Guidelines (2013), and National Nutrition Action Plan 2012-2017.

Health services in Kenya have continually been improving and focused on the burden of NCDs. In addition to major policy objectives to “provide essential health care” and “minimize risk factor exposure” for health conditions in Kenya, the Health Sector Strategic Plan¹ included specific policy objectives to “halt and reverse the rising burden of non-communicable conditions” and “reduce the burden of violence and injuries.”¹ The HSSP states that “NCDs represent a significant (and increasing) burden of ill health and death in the country, the most important being cardiovascular disease, cancers, respiratory and digestive diseases, diabetes, and psychiatric conditions... which represent 50-70% of all hospital admissions and up to half of all inpatient mortality”.¹ The HSSP adds that “Injuries and violence also feature among the top 10 causes of morbidity and



mortality in the country, increasing incrementally over the years (especially in young and unemployed people).”¹ The HSSP sets the framework and targets for equitable access to health services, recognizing that economic constraints including a high level of poverty and low allocation of public resources to the health sector restricts access to services and renews the government’s commitment to allocate 15% of public expenditures to health, target services for at risk and marginalized populations, increase geographic access, and reduce the burden of pre-payment for health services.¹

The HSSP outlines the Essential Package for Health Services for NCDIs at all levels of the health system, from awareness, education, occupational safety and NCD case detection at the community level to disease screening, risk factor modification, and management of NCDs at the primary care level to referral and management of complex cardiac diseases, specialized cancer care, and management of acute severe illness at the county and referral levels.¹

The focus of the prevention and control of NCDs has been on four major diseases and four risk factors leading to those diseases, as encouraged by the World Health Organization (WHO) in the Global Action Plan for the Prevention and Control of Noncommunicable diseases in 2013.² The major emphasis on tobacco control, alcohol control, physical activity, and healthy diet as well as hypertension, diabetes, asthma, and cancer (primarily lung cancer) was put forward as a global agenda to consolidate focus on behavioral and lifestyle-associated risk factors and disease conditions.² Although it represents a major step towards control of several NCDs in the global population, this framework represents NCDs that are primarily behaviorally mediated amongst ageing and urbanizing populations. Recent groups have suggested that a large proportion of the global DALYs due to NCDIs may be due to risk factors and conditions other than those represented in this framework.³ This differential burden of NCDs and risk factors may be particularly pronounced in younger populations and those living in extreme poverty, as is present in a large proportion of the Kenyan population.³

The Kenyan National Strategy for the Prevention and Control of NCDs 2015-2020⁴ reinforces a global monitoring framework for NCDs focused on key risk factors and the prevention and treatment of cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers, but also encourages interventions and service provision for additional conditions, such as palliative care, mental disorders, and violence and injuries. The Strategic Plan goes further to name additional conditions that will leverage the Strategic Plan to create detailed guidelines and policies, including cognitive impairment, renal disorders, hepatic disorders, endocrine disorders, neurological conditions including epilepsy, autism, Alzheimer’s and Parkinson’s diseases, hematological conditions including hemoglobinopathies (eg, thalassemia and sickle cell anemia), gastroenterological, musculoskeletal, skin disorders, oral diseases, disabilities including visual and hearing impairment and genetic disorders.⁴



1.2 BACKGROUND AND AIMS OF THE KENYA NCDI POVERTY COMMISSION

The Kenya NCDI Poverty Commission was established by the Office of the Director of Medical Services of the KMoH in collaboration with the global *Lancet* Commission on Reframing Non-Communicable Diseases and Injuries for the Poorest Billion, which provided ongoing technical support. The intent of this commission is to use existing data sources to best summarize the impact of NCDIs on the health of Kenyans, establish the relationship of poverty with NCDIs in Kenya, develop a proposed package of health sector interventions to raise the visibility and understanding of this problem among policy makers and civil society in Kenya, and inform future planning and resource allocation. Specifically, the aims of this Commission were to:

- Establish the burden of disease of NCDs and injuries in Kenya, particularly in relation to socioeconomic risk factors;
- Understand and document the current availability and coverage of health sector services for NCDIs in Kenya;
- Prioritize among NCDI conditions that require intervention in Kenya, emphasizing those causing the largest burden of morbidity and mortality for the Kenyan population, with a particular focus on those that affect the worst off or cause severe disability and those that are inequitably addressed for those living in poverty;
- Propose a package of cost-effective interventions to address priority NCDIs in Kenya;
- Estimate the cost and potential impact of these interventions and forecast the potential fiscal space in Kenya for financing these interventions; and
- Highlight the voices of those impacted by NCDIs particularly affecting populations living in poverty.

In order to achieve these aims, the KMoH nominated a group of experts within Kenya to participate in this Commission. These experts included leaders from the KMoH, county health authorities (i.e., Nyeri), medical schools and teaching hospitals (Maseno University, University of Nairobi), WHO, World Bank, International Institute for Legislative Affairs, civil society (Kenya Hospice and Palliative Care), partner non-governmental organizations (African Institute for Health and Development, AMPATH), and research institutions (Africa Population Health Research Centre, International Development Research Center, Kenya Medical Research Institute (KEMRI)). [see appendix for full list of commissioners]. Commissioners participated in four subcommittee working groups, which included 1) Burden of Disease, 2) Health Sector Interventions, 3) Health Financing, and 4) History, Governance, and Patient Advocacy. The Commission convened a series of four consultative meetings over a one-year period, with financial and techni-



cal support from Partners In Health (PIH), Harvard Medical School Department of Global Health and Social Medicine, and the Lancet Commission on Reframing NCDs & Injuries for the Poorest Billion (technical and advisory support from Dr. Neil Gupta, Dr. Gene Bukhman, Mr. Matt Coates, and Ms. Mamka Anyona).

1.3 METHODOLOGY OF THE NCDI POVERTY COMMISSION

The Commission first established and accessed available data sources related to the specific aims of the commission (listed above). A thorough literature review was conducted, consisting of all studies published from 2006-2016 (extended to January 31st 2017). The search terms corresponded to level 2 NCDI categories combined with the word Kenya. Studies were included if they met any of the following criteria: (1) contained data on prevalence, risk or mortality from NCDIs preferably stratified by socioeconomic strata or by geographic location; (2) reported distributions of types of NCDI cases among admissions and deaths at health facilities; and (3) reported on interventions or service delivery models for NCDIs. The results of this search are summarized in Table 1.

The Global Burden of Disease (GBD)⁶ database was then used to estimate of prevalence, disability-adjusted life years (DALYs), and percent of total deaths for specific NCDs, injuries and risk factors⁶. These were compared with the values for communicable, maternal, neonatal and nutritional diseases. The burden distribution was further analyzed by sex, age and time. The Kenya Demographic and Health Survey (KDHS)⁷ data were used to gather nationally-representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition.⁷ This survey also contained data on tobacco use, alcohol use and adult nutritional status among men and women aged 15-49 years disaggregated by wealth quintile.⁷ The Kenya STEPS Survey Report (2015)⁸ was then reviewed with a focus on obtaining data on behavioral and metabolic risk factors for NCDs.⁸ Data from the STEPs Survey was secondarily analyzed to obtain wealth quintile disaggregation for survey questions pertaining to diagnosis and treatment for hypertension and diabetes.

Baseline availability of services was estimated using the Kenya Service Availability and Readiness Assessment⁹. Availability of services was analyzed by disease condition, level of the health system, urbanicity, and county. Both reported availability of services and readiness by the observed availability of designated tracer items were analyzed. Separately, the population in each county living with at least four deprivations from an adapted Multidimensional Poverty Index (MPI)¹⁰, an index of socioeconomic indicators constructed from the Kenya DHS 2014¹¹ including schooling, school attendance, electricity, sanitation, water, flooring, cooking fuel, and household assets¹⁰. The association of the percentage of facilities with service/medication availability or readiness with proportion of households living in poverty per the MPI across counties was tested using Pearson's correlation coefficient and the p-value of the slope from a simple least



squares regression. These data were reviewed and validated by commissioners to establish baseline availability of services. Availability of referral level services was provided by experts' report from the members of the commission.

The commission then undertook a process to prioritize among NCDIs conditions for the Kenya health sector based on principles of priority setting recently recommended by global bodies¹². The commission chose to analyze and rank NCDI conditions based on the estimated burden of disease of each condition in Kenya as measured by DALYs.⁶ The severity of each condition was measured using the average years of life lost (YLL) per death, and the disability of each condition was measured using the years of life with disability (YLDs) per incident case. Finally, the impact in Kenya compared to high-income countries was estimated for each condition by comparing the rate of DALYs per 100,000 population.⁶ A total of 190 NCDI conditions from the GBD database were analyzed along these metrics, and a summary score was provided to each condition according to the average of the ranking quartiles on each metric. The 50 conditions with the highest summary score were then reviewed by the commission sub-committee. These commissioners then chose 20 of these conditions that were believed to contribute significantly to adverse health and economic consequences in Kenya, could be feasibly and effectively controlled in Kenya, and were complementary to ongoing strategy and efforts by the Government of Kenya (GoK).

Information regarding evidence-based and cost-effective health sector interventions for NCDIs was obtained from the Disease Control Priorities group (Seattle, USA), which has collected and compiled available literature and data on health sector interventions.^{13, 14} The unit cost for each intervention was provided on average across low-income countries. These costs were then adjusted for the cost of health sector expenditure in Kenya for tradeable costs. Indirect costs to the health system were included in a 50% adjustment. These interventions were reviewed by the Commission for 1) alignment with stated NCDI priority conditions, and 2) feasibility and desirability in the Kenya context. Each intervention was assigned a baseline coverage in Kenya, estimated from existing data sources (where available, including Service Provision Assessment, STEPS⁸, and DHS surveys⁷) as well as expert experience from the commissioners. The Commission then assigned target coverage for each intervention by the year 2030. The total cost of implementing these interventions and premature deaths averted was then calculated.¹⁵



2. Burden of disease of NCDIs for the poor in Kenya

2.1 RESULTS OF LITERATURE REVIEW

Overall, 2,429 articles were found over the search period (2006-2017) using the identified search terms (Table 1). Of these, 104 (4.3%) contained relevant data on the prevalence or frequency of disease conditions or outcomes, and 40 (1.6%) contained socioeconomic data of the study population. The category of “Diabetes, blood, urogenital, endocrine” had the largest number of total studies (564 [23.2%]), followed by neurological disorders (349 [14.4%]), injuries [282 (11.6%)], cancers [277 (11.4%)], and digestive diseases (250 [10.3%]). Cardiovascular diseases had less overall studies found [160 (6.5%)] but the largest proportion of relevant studies [50 (31.3%)] and studies with socioeconomic data [15 (9.4%)].

Literature Search: Kenya NCDIs (2006-16) More data needed on SES status

NCD category	Articles the met search criteria (N)	Relevant studies (N,%)*	Had data on socioeconomic status (N,%)**
Chronic respiratory conditions	21 (0.9)	0 (0.0)	0 (0.0)
Cirrhosis and other liver conditions	10 (0.4)	0 (0.0)	0 (0.0)
Cardiovascular diseases	160 (6.5)	50 (31.3)	15 (9.4)
Diabetes, blood, urogenital, endocrine	564 (23.2)	5 (0.9)	4 (0.7)
Digestive diseases	250 (10.3)	11 (4.4)	1 (0.4)
Injuries	282 (11.6)	8 (2.8)	4 (1.4)
Mental health and substance abuse	209 (8.6)	12 (5.7)	10 (4.8)
Musculoskeletal disorders	193 (7.9)	1 (0.5)	0 (0.0)
Neoplasms	277 (11.4)	3 (1.1)	2 (0.7)
Neurological disorders	349 (14.4)	7 (0.3)	4 (0.9)
Other NCDs	114 (4.7)	7 (6.1)	0 (0.0)
Total	2429	104 (4.3)	40 (1.6)

Table 1 – Results of literature search on NCDIs in Kenya 2006-16

* Studies relevant if contain relevant prevalence/mortality data or report on distribution of types of cases or diagnosis among admissions/deaths in a hospital or clinic, or reports on an intervention/ treatment

** Studies classified as having data on SES indicators if they report prevalence, incidence, diagnosis/case, or mortality data by one of the following indicators: education, income, wealth/assets/living conditions, occupation, specific, geographic location, or other indicators (payment status of patients, fertility), or multidimensional poverty indicators



2.2 OVERALL EPIDEMIOLOGY: GLOBAL BURDEN OF DISEASE ESTIMATES

Overall, NCDIs accounted for 37% of the disease burden in DALYs in Kenya (Figure 1). More than half (53%) of NCD DALYs and 72% of injury DALYs occur before the age of 40 (Figure 2).

37% of total DALYs in Kenya are due to NCDs

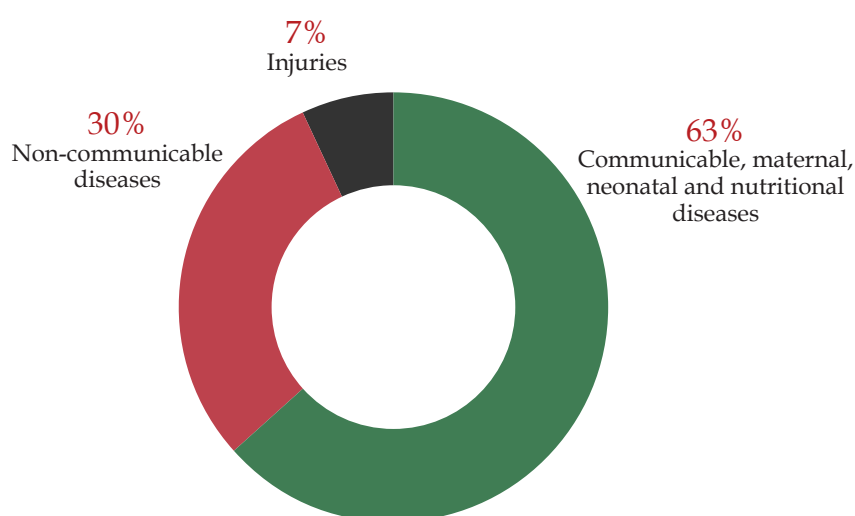


Figure 1 Proportion of disability-adjusted life years (DALYs) in Kenya due to major disease groups (GBD 2016).



53% of NCD DALYs and 72% of injury DALYs in Kenya occurred before age 40

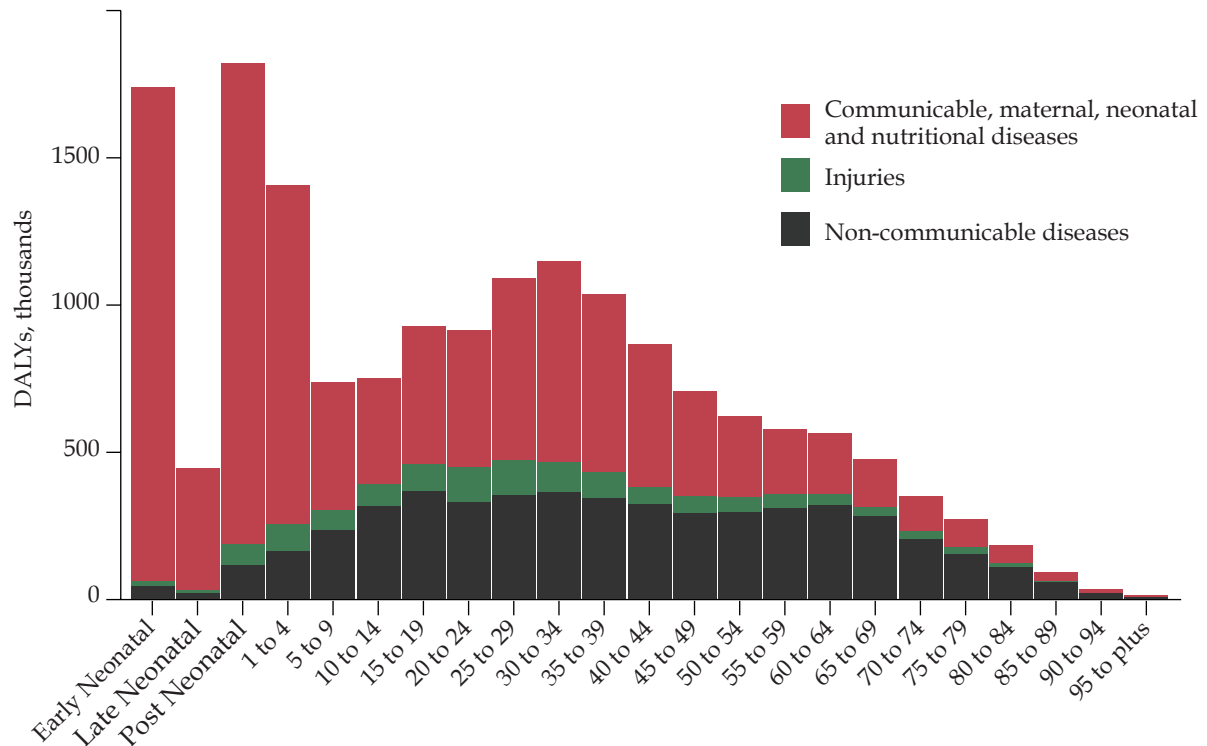


Figure 2 - Disability-adjusted life years due to major disease groups, by age (GBD 2016).

Of all DALYs from NCDs, 67% were related to conditions other than cardiovascular disease, diabetes, neoplasms, and chronic respiratory diseases. This is notably higher than in high-income countries, where only 53% of NCD DALYs are due to conditions other than these four disease areas (Figure 3). NCD disease categories with the highest proportion of DALYs occurring under the age of 40 included mental health disorders (74%), neurological disorders (70%), and chronic respiratory diseases (50%).



Less DALYs due to 4x4 conditions in Kenya compared to wealthier nations

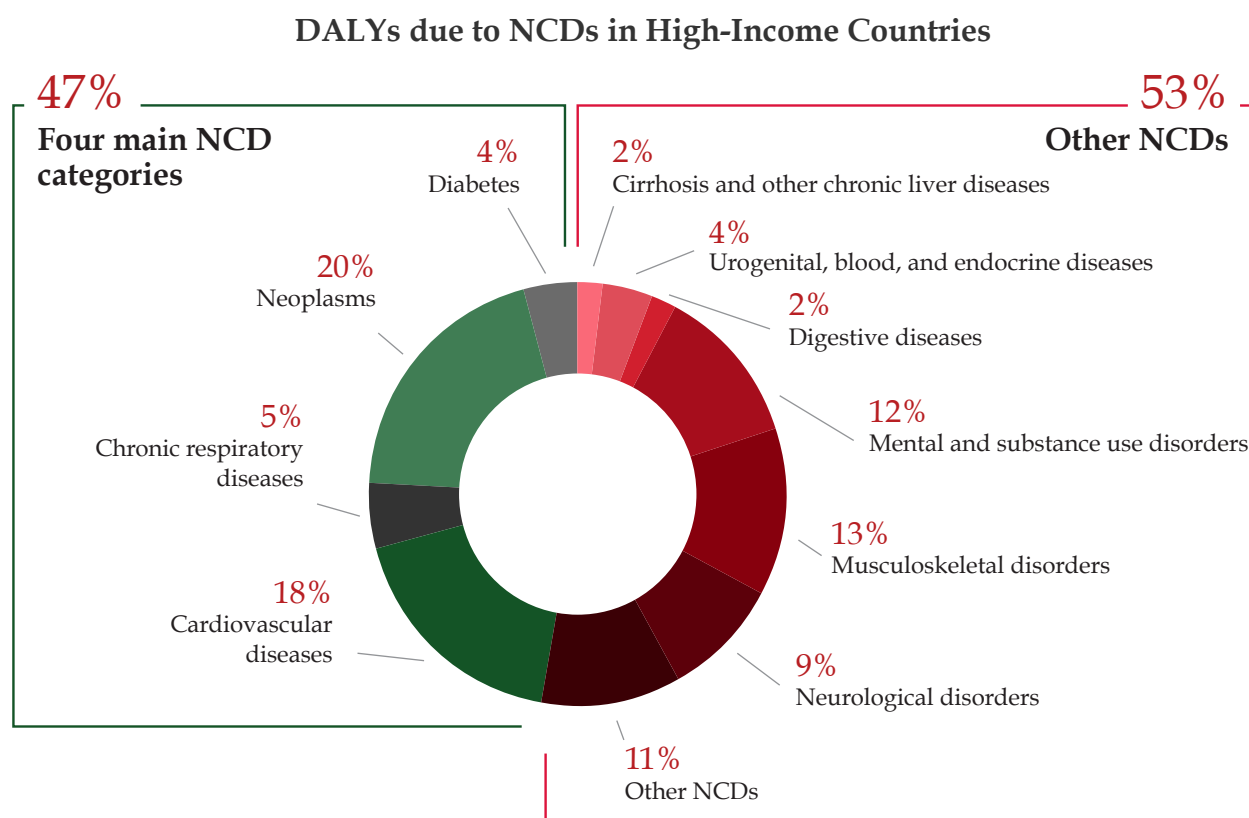
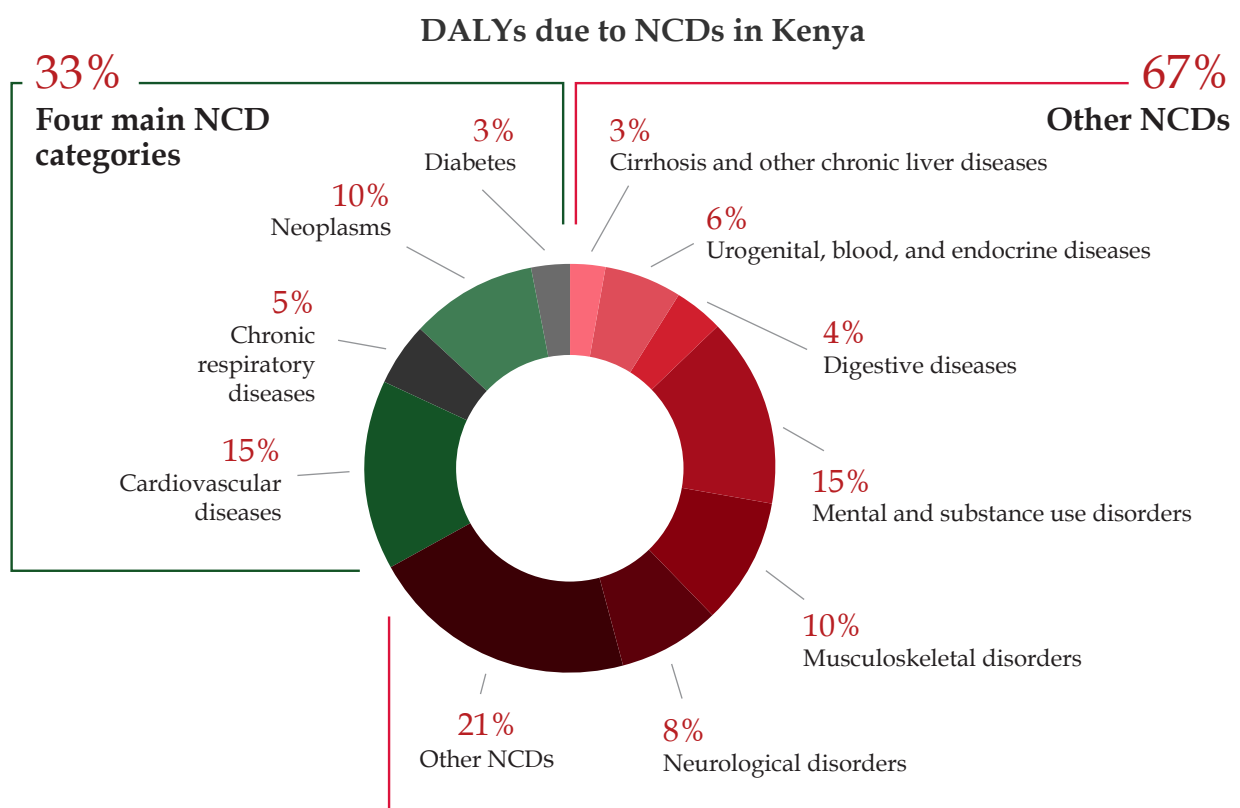


Figure 3 – Proportion of disability-adjusted life years in Kenya compared to high-income countries (World Bank High Income) (GBD 2016).



In terms of mortality, NCDs were responsible for 35% of all deaths in Kenya, and 22% of these occurred before the age of 40. YLLs per death for each cause of death were higher in Kenya than high-income countries with notable absolute differences for conditions as diverse as congenital heart anomalies, sickle cell disorders, epilepsy, motor vehicle road injuries, non-Hodgkin lymphoma, appendicitis, breast cancers, asthma, rheumatic heart disease, cervical cancer, ischemic heart disease, diabetes, stroke and COPD (Figure 4).

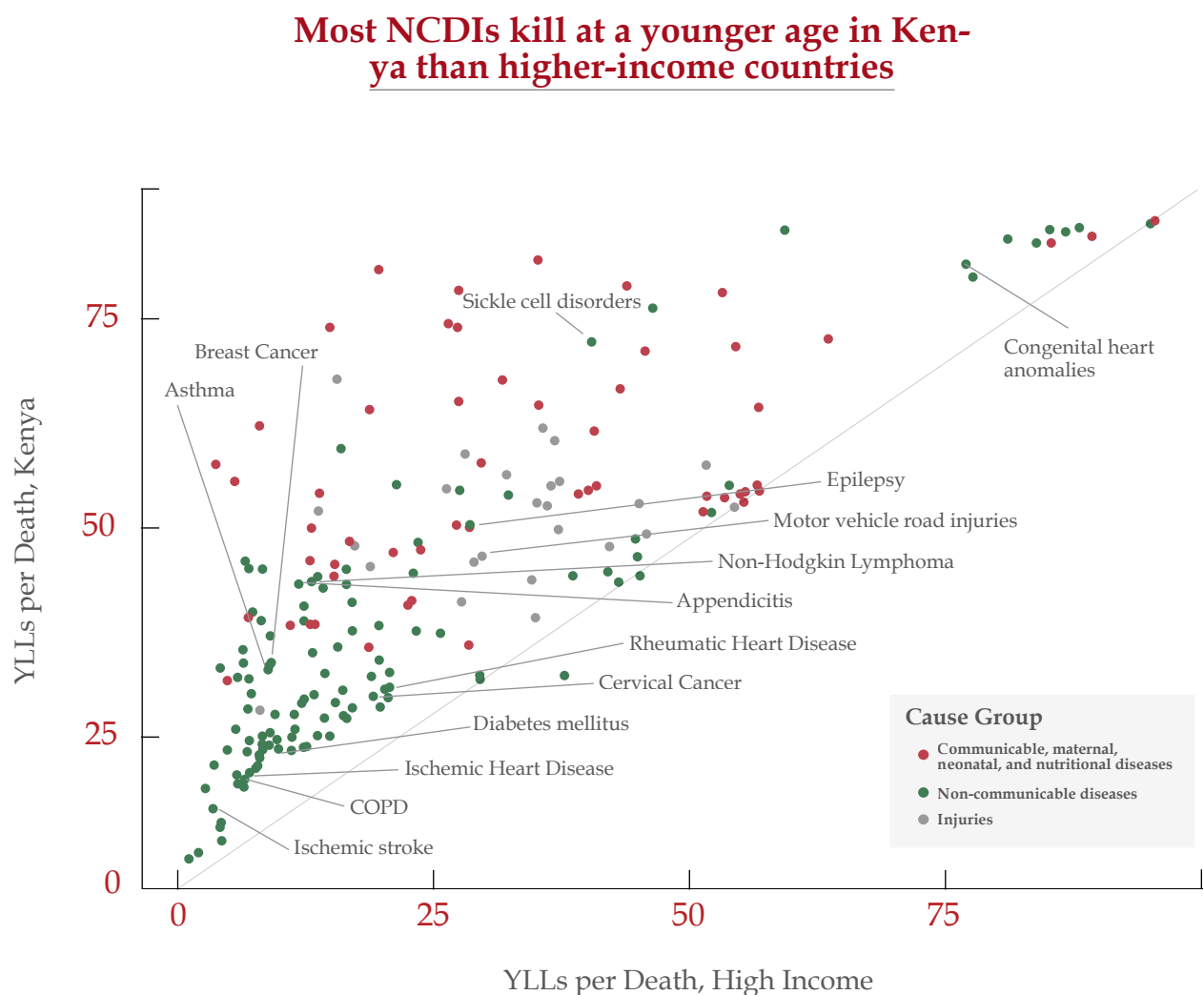


Figure 4 Years of life lost in Kenya for individual conditions compared to high-income countries (Institute of Health Metrics and Evaluation high sociodemographic index countries) (GBD 2016)



2.3 BURDEN OF NCDIS IN RELATION TO POVERTY: HEALTH & DEMOGRAPHIC SURVEILLANCE

Data from Health and Demographic Surveillance Sites (HDSS)¹¹ in Kenya provides valuable information on cause of death and overall death rates due to NCDIs, as well as comparative distribution of NCDIs by socioeconomic status. In the Siaya HDSS cohort, which is a primarily rural catchment area located in the western region of the country near Kisumu town, from 2003-2016, 36.1% of deaths were attributed to NCDs and 4.6% attributed to injuries by verbal autopsy methods.¹¹ Individuals in the lowest wealth quintile had a comparable proportion of deaths due to NCDIs (39.0%) as compared to the highest wealth quintile (41.6%) (Figure 5a).⁷ The leading causes of NCD deaths among the poorest quintile were cancers (32.1%), cardiovascular disease (26.3%), and abdominal causes (16.2%) (Figure 5b).

HDSS demonstrates burden of NCDs comparable for lowest and highest SES quintiles

Causes of death by socioeconomic status in the HDSS

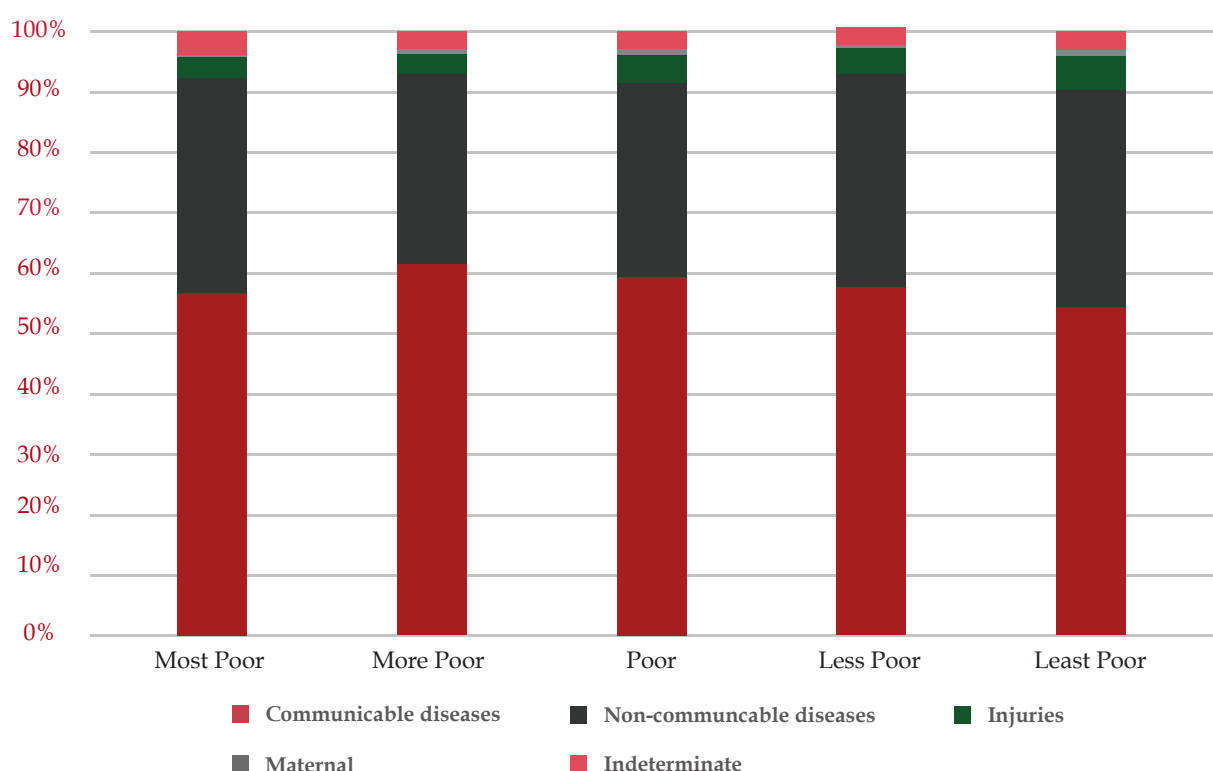


Figure 5a - . Proportion of cause of death by wealth quintile in Siaya Health Demographic Surveillance Site 2003-2016 (courtesy of Frank Odhiambo)



HDSS shows cancers, CVDs are also prominent NCDs in poorest SES quintile

Causes of NCD deaths among poorest adults

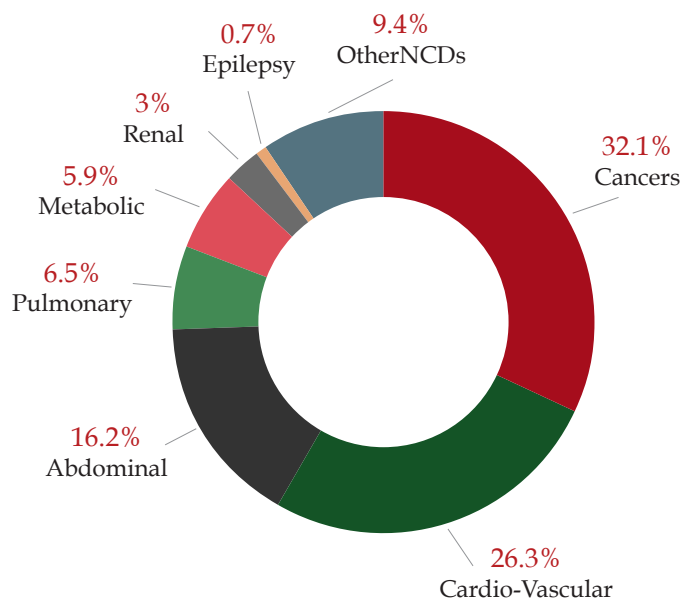


Figure 5b – Proportion of cause of death among adults in the poorest quintile in Siaya Health Demographic Surveillance Site 2003-2016 (courtesy of Frank Odhiambo)

Data from an urban HDSS cohort in Nairobi from 2010-2015 demonstrates overall a lower proportion of deaths due to NCDs (14%) but a much higher proportion of deaths due to injuries (19%).¹¹ The proportion of deaths due to NCDs remained relatively constant across wealth quintiles (range: 12.1-15.2%), but the proportion of deaths due to injuries was highest in the poorest quintile (22.8%) as compared to the wealthiest quintile (16.9%) (Figure 6a). The specific disease conditions leading to NCD-related deaths differed slightly among wealth quintiles, with the poorest quintile having a relatively higher proportion of deaths due to neoplasms and the wealthiest quintile with a relatively higher proportion of cardiovascular and neurologic/mental health related deaths (Figure 6b). Overall, crude death rates due to both NCDs and injuries demonstrated a clear socio-economic trend, with increasing death rates associated with increasing level of poverty (Figure 7). The crude death rate from NCDs in the lowest wealth quintile (138.5 per 100,000 person-years) was double that within the highest wealth quintile (60.8), and the crude death rate from injuries (231.2) was over triple that within the highest wealth quintile (73.0).



Causes of death by wealth quintile in Nairobi HDSS site

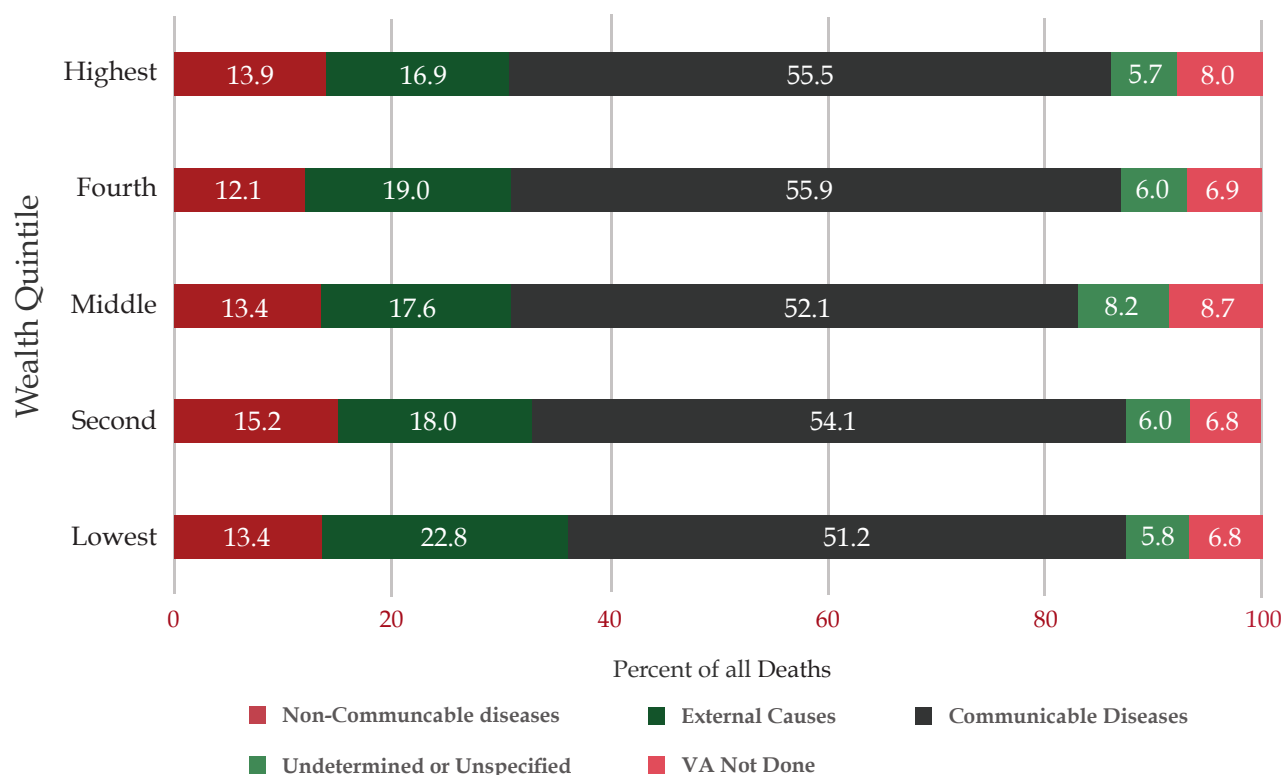


Figure 6a - Proportion of cause of death by wealth quintile in Nairobi Health Demographic Surveillance Site 2010-2015 (courtesy of APHRC)

Causes of NCD-related death among all residents, by wealth quintile

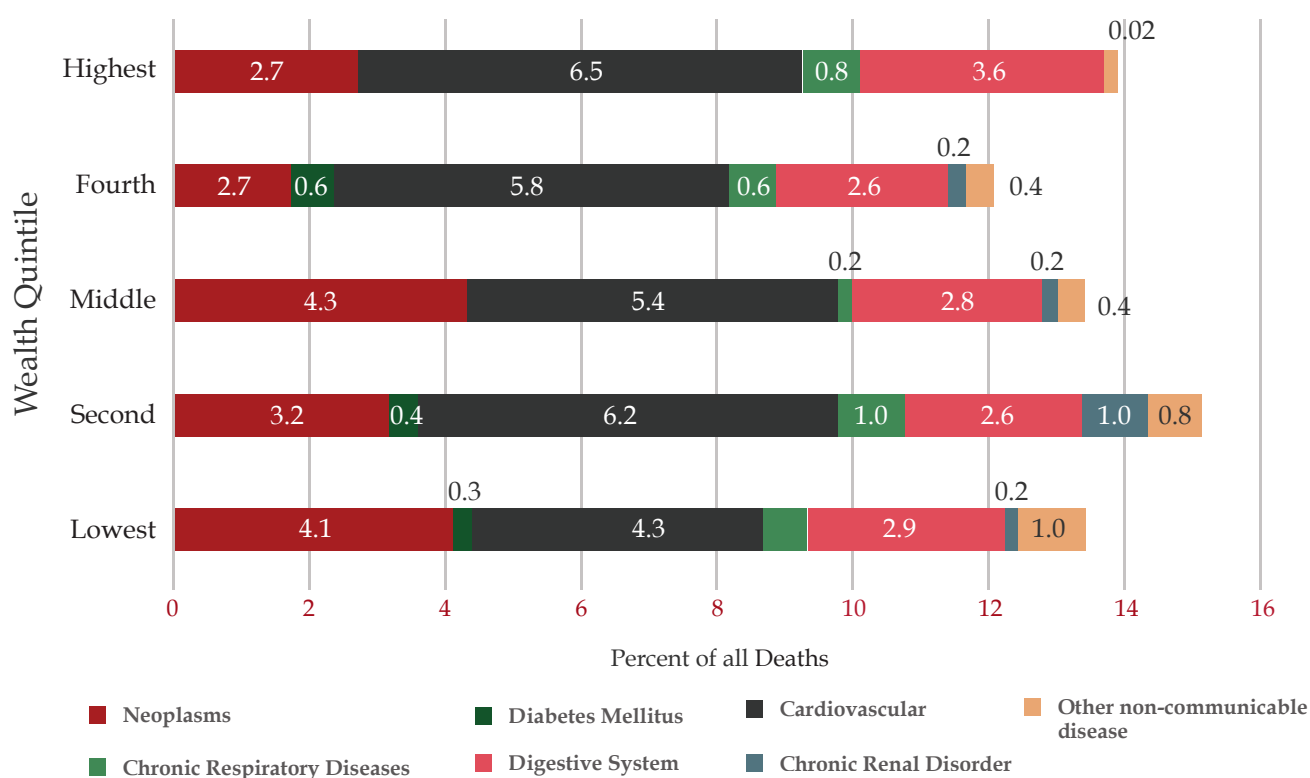


Figure 6b - NCD-related causes of death as proportion of all deaths by wealth quintile in Nairobi Health Demographic Surveillance Site 2010-2015 (courtesy of APHRC)



Crude death rates due to NCDs and injuries by wealth quintile in Nairobi HDSS, 2010-2015

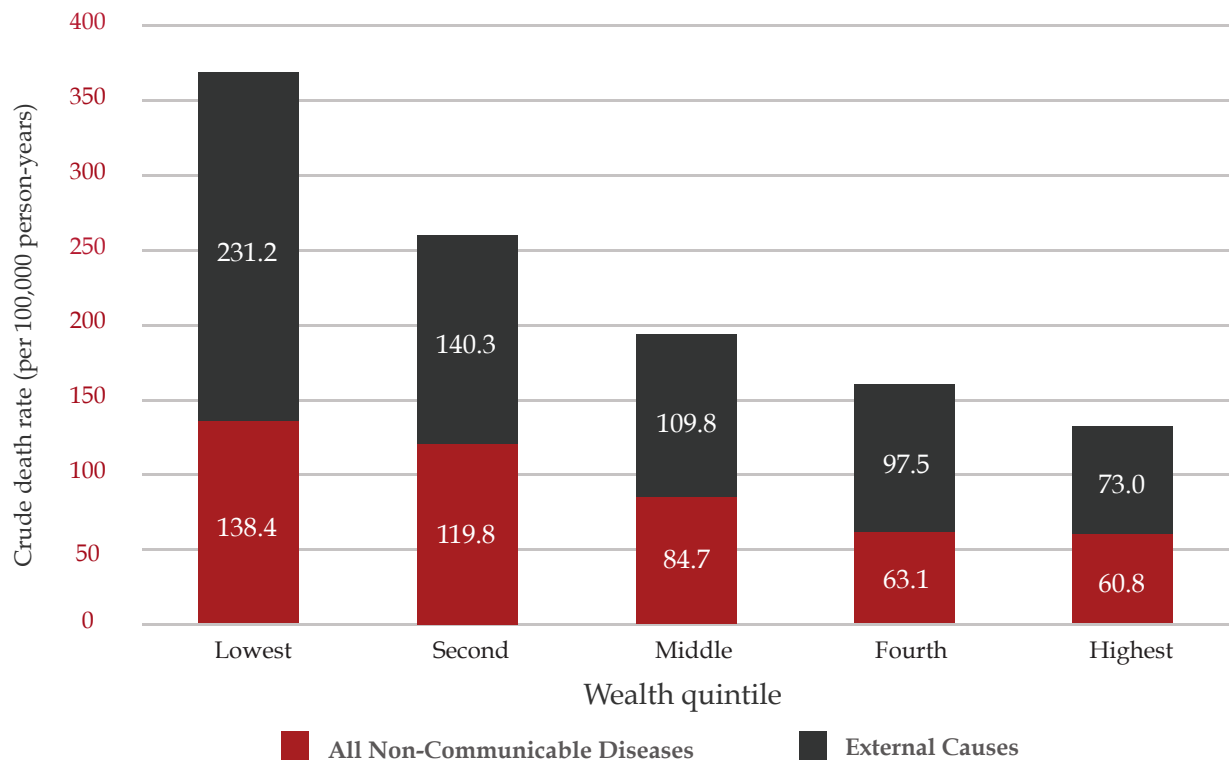


Figure 7 – Crude death rates due to NCDs and injuries by wealth quintile in Nairobi Health Demographic Surveillance Site 2010-2015 (courtesy of APHRC)

2.4 NCDI RISK FACTORS

In risk factor modeling, behavioral and metabolic risk factors, including tobacco, alcohol and drug use, dietary risks, low physical activity, high blood glucose, high cholesterol, elevated blood pressure, and high body mass index, etc., accounted for only 21% of DALYs from NCDI conditions in Kenya (Figure 8a).⁶ In this model, 73% of all NCDI DALYs were not able to be attributed to the examined risk factors. In the 2016 GBD, if accounting within NCDs alone, 23% of DALYs were attributed to behavioral and metabolic risk factors, and the four traditional behavioral risk factors (tobacco use, unhealthy diet, physical inactivity, and alcohol) accounted for approximately 13% of all NCD DALYs. In the categories of digestive diseases, neurologic diseases, musculoskeletal diseases, and other NCDs, virtually none of the risk factor profile could be attributed to behavioral or metabolic causes (Figure 8b).



73% of NCDI risk factor NOT attributable to behavioral or metabolic risks

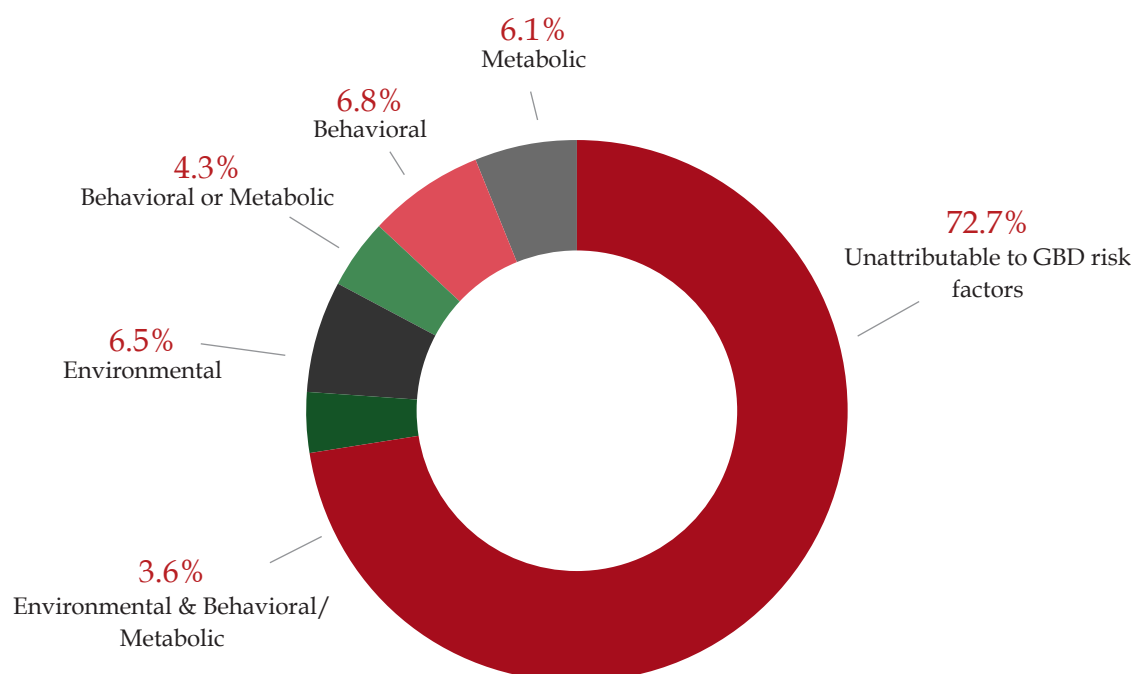


Figure 8a - Proportion of disability-adjusted life years in Kenya due to risk factor groups (GBD 2016)



Most categories with no behavioral risk factors; CVD, cirrhosis, diabetes have <50%

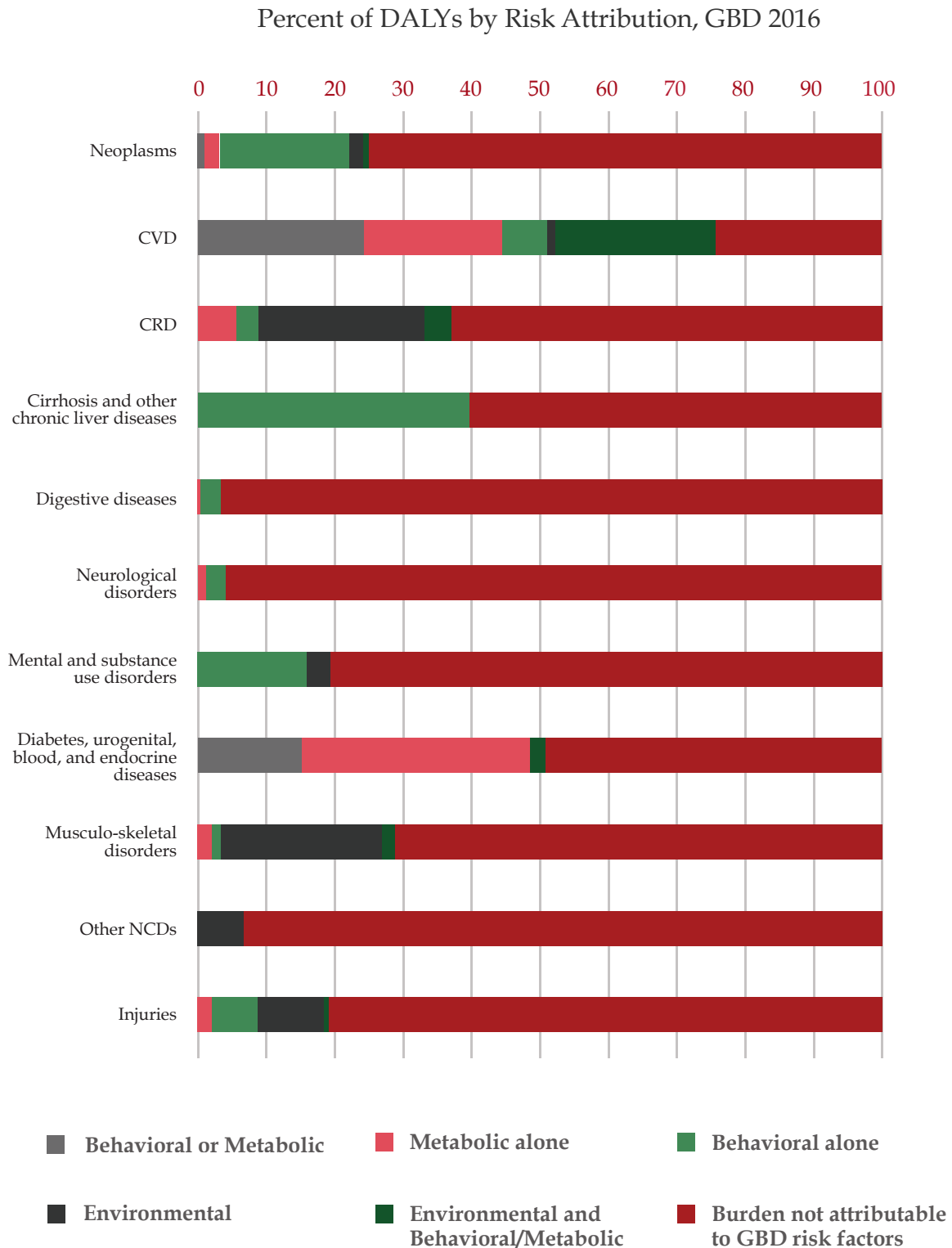


Figure 8b – Proportion of disability-adjusted life years in Kenya due to risk factor groups in each NCDI disease category (GBD 2016)



For injuries and mental and substance use disorders, only 10-15% of the risk factor profile was attributed to behavioral causes. Although, the categories of neoplasms and cirrhosis had a higher proportion of attributable risk to behavioral risk factors (20% and 53%, respectively), which likely represents the relationship of smoking with lung cancer and alcohol use with cirrhosis, it is notable that the vast majority of neoplasms and almost half of cases of cirrhosis were caused by other risk factors, such as chronic infections (human papilloma virus, Epstein Barr virus, hepatitis B and C) or genetic predispositions. Chronic respiratory diseases had the largest component of risk factors attributable to the environment, presumably through air pollution and indoor cooking. Although the categories of both cardiovascular disease and diabetes had the highest proportion of metabolic risk, metabolic risk alone remained less than half of the risk factor profile for each of these categories, which suggests a large component of non-metabolic related disease conditions, such as rheumatic heart disease, cardiomyopathies, and type 1 diabetes, within these categories.

There is evidence that some NCDIs had varying prevalence and risk factors among socioeconomic groups. Data from the STEPS survey showed that tobacco use is higher among the poorest quintile (18%) as compared to the least poor quintile (10%) (Table 2).⁸ The KDHS (2014)¹¹ reported similar findings with tobacco consumption highest among men in the poorest wealth quintile (22.9%) as compared to the richest quintile (12.9%). Tobacco consumption was similarly higher among Kenyans with no formal education (20.1%) as compared to those with higher than secondary education (8.8%). Alcohol consumption, however,

Behavioral and metabolic risk factors may differ by wealth quintile

Risk factor	Lowest Quintile	Middle Quintile	Highest Quintile
Smoking (% current tobacco)	18.2	13.4	10.0
Alcohol (% heavy episodic)	11.4	10.9	17.5
Obesity (% BMI > 30)	2.4	9.4	14.8
Raised Blood Pressure (% prevalence)	19.5	29.8	21.7
Elevated Blood Glucose (% prevalence)	1.4	2.2	2.1

Table 2 – Prevalence of NCD risk factors by wealth quintile (sources: STEPS 2015 & Demographic Health Survey 2014)



was highest among the richest quintile as compared to the poorest, both for regular and heavy episodic consumption (17.5% and 36.8%, respectively, compared to 11.4% and 25.2%, respectively).⁸ The KDHS similarly reported alcohol consumption among men in the highest quintile significantly higher than that of those in the lowest quintile (36.8% vs. 25.2%).¹¹ There was also a significantly higher proportion of “unrecorded alcohol” use among the poorest wealth quintile (56.2%) as compared to the highest wealth quintile (5.1%). According to the STEPS data, there is a significant direct relationship of income with obesity, ranging from 14.8% prevalence among the highest income group to 2.4% among the poorest quintile.⁸ The poorest quintiles similarly displayed significantly less physical inactivity and less high salt consumption than the wealthier quintiles (49.0% vs. 61.1% and 2.5% vs. 5.4%, respectively).⁸

2.5 DIABETES

The STEPS survey noted a higher prevalence of elevated blood sugar among participants residing in urban areas (2.4%) and within the wealthiest income quintile (2.1%) as compared to those from rural areas (1.6%) and among the poorest income quintile (1.4%).⁸ However, higher overall rates of diabetes have been noted in the primary literature. Population-based surveys in poor urban settings in Nairobi reported a higher age-adjusted prevalence of diabetes of 4.4-5.3%¹⁸ compared to the 2.4% urban prevalence reported in the national STEPS survey.^{16, 8} Higher rates of diabetes have been also reported in Nakuru among urban (10%) as compared to rural (5%) populations.¹⁷ A study investigating socioeconomic status as a predictor for diabetes, hypertension and visual impairment in Nakuru found significant relationships between socioeconomic status (as defined by education level and material possession accumulation) and diabetes and hypertension, both in rural and urban Nakuru.¹⁸ Diabetic retinopathy, a visually impairing sequelae of diabetes, was found to have a prevalence of 3.3% and is also worse amongst poorer populations.^{18, 19}

2.6 HYPERTENSION AND CARDIOVASCULAR DISEASE

The overall prevalence of elevated blood pressure was found by the 2015 STEP survey to be 23.8%, slightly higher in rural than urban areas (25.3% vs. 21.5%, respectively).⁸ Previous studies have demonstrated a broad range of the burden of hypertension. Higher prevalence of hypertension was noted in a study in Nakuru, which reported raised blood pressure of 57% and 47% amongst its urban and rural dwelling study participants, respectively¹⁷. The Webuye HDSS study, carried out in a predominantly rural part of the country, reported significantly lower prevalence of raised blood pressure, with a prevalence of 4.9%.¹¹ In the STEPS survey, the second and third highest wealth quintiles had the highest prevalence of elevated blood pressure, 24.4% and 29.8% respectively.⁸ This is similar to previous reports in urban slums, where those in the second and third wealth quintiles had notably higher prevalence of raised blood pressure (40.9%



and 20% respectively) compared to the bottom and top quintiles (8.4% and 5.2%, respectively).²⁰ Additionally, those with only primary school education had a higher prevalence than both those without primary school and those with secondary education and higher. Still others have reported an increased risk of hypertension amongst the highest quintile in urban slums, with an adjusted odds ratio of 1.6.²¹ Local literature was lacking in terms of other etiologies of cardiovascular disease, with no primary studies found on the literature search. More remotely, an echocardiographic screening survey of 1115 schoolchildren resulted in a prevalence rate of rheumatic heart disease of 27/1000 and congenital heart disease of 1.8/1000.²²

2.7 NEOPLASMS

Data from Globocan (2012) estimates highest incident cancers as cervical (40.1 per 100,000, age-standardized rate), breast (38.3), prostate (31.6), esophageal (17.6), Kaposi sarcoma (11.8), stomach (9.5), colorectal (8.6), lip/oral (5.5), and liver (5.4).²³ From 2004-2008, the population-based cancer registry in Nairobi reported the highest prevalent cancers among men as prostate (15%), esophagus (9%), stomach (6%) liver (6%), and Kaposi sarcoma (6%), and among women the leading cancers were breast (22%), cervical (21%), non-Hodgkin lymphoma (4%), liver (4%), and colon (4%).²⁴ More recent data from the population-based cancer registry in Eldoret (2009-2011) reported among men a much lower proportion of prostate cancer (6.8%) and relatively higher proportion of esophageal cancer (16.5%), skin (9.2%), and non-Hodgkin lymphoma; amongst women, there was a lower proportion of breast cancer (13.6%) and also a higher proportion of esophageal (9.2%), skin (7.3%), and non-Hodgkin lymphoma.²⁵ The relative dominance of cervical cancer in females (17.4%) and lower proportion of breast cancer among females in the Eldoret registry may reflect the less urbanized population and lower access to referral level health care services than the Nairobi population. Prevalence of lip/oral and nasopharyngeal cancers are higher than in surrounding East African countries. The GBD (2015) reports the malignancies with the highest rate of DALYs per 100,000 individuals in Kenya as cervical (322 DALYs/100,000 population), stomach (104), breast (81), brain and nervous system (65), colorectal (65), esophageal (58), acute lymphoid leukemia (52), and non-Hodgkin lymphoma (49).⁶ There is limited data from Kenya in regards to risk factors for specific cancers, generally focused on HPV and HIV infection for cervical cancer.²⁶ In a case-control analysis of 159 individuals at the Moi Teaching and Referral Hospital (MTRH), low socioeconomic, smoking, snuff use, alcohol, tooth loss, cooking with charcoal and firewood, hot beverage, and use of mursik were independently associated with esophageal cancer.²⁷ The need for palliative care for malignancies as well as other NCDs in Kenya has not been well quantified.



2.8 CHRONIC RESPIRATORY DISEASE

Asthma and COPD are increasingly being recognized and diagnosed in Kenya, though systematic data regarding these conditions is sparse. According to the World Health Survey 2002-2003, the prevalence of asthma among Kenyan adults was 2.9-6.2%, depending on mode of diagnosis.²⁸ In a large cross-sectional study of school children in 2001, the prevalence of asthma was 12.6%, with a higher prevalence in Nairobi compared to Uasin Gishu.²⁹ A similar study reported prevalence of wheezing symptoms among 13-14 year-old children in Nairobi of 18.0% as compared to smaller, less urbanized towns such as Eldoret (13.8%).³⁰ These rates were comparable to other African cities in South Africa, Nigeria and Ethiopia.

2.9 MENTAL HEALTH DISORDERS & EPILEPSY

Mental health disorders are a commonly unrecognized burden of NCDs in Kenya, comprising 4.6% of all DALYs (GBD, 2016). A population-based household survey in Nyanza Province reported a rate of common mental disorders of 10.8%, comprised of mixed anxiety/depression (6.1%), panic disorder (2.6%), generalized anxiety disorder (1.6%), and depressive episodes (0.7%).³² One or more psychotic symptoms were reported in 13.9% of the population, with a significantly higher prevalence in women (17.8%) than men (10.6%).³³ Wealth was significantly inversely associated with prevalence of common mental disorders, with the lowest asset group 2.5 times more likely to suffer from common mental disorders than the highest asset group.³⁴ In this group, the rates of past suicidal ideation and attempted suicide were 7.9% and 1.9%, respectively, and suicidal ideation was higher in lowest asset group (9.4%) compared to the highest asset group (6.3%).³⁵ School-based surveys amongst youth 10-12 years have reported a prevalence of common mental disorders of 37.7%, including somatic complaints (29.6%), affective disorders (14.1%) and conduct disorder (12.5%).³⁶ Among patients presenting to an outpatient clinic in an urban slum area of Nairobi, 56.3% presented with one or more common mental disorders, including mood disorders (39.0%), anxiety disorders (31.3%), somatoform disorders (13.0%), alcohol and substance-related disorders (6%).³⁷ A cross-sectional survey of patients in diverse inpatient and outpatient clinical settings also reported a prevalence of mild-moderate depression of 42%.³⁸

Cross-sectional studies within a rural population of Kenya (Kilifi HDSS)⁷ reported an incidence of convulsive epilepsy 37.6/100,000 persons per year (95% confidence interval (CI) 32.7-43.3) (N=151,408).³⁹ The treatment gap among this population of individuals living with epilepsy was 64%, and distance from the health facility and inability to pay for antiepileptic medications were significantly associated with non-care seeking behavior.⁴⁰



2.10 OTHER NCDS

There are an estimated 60,000 prevalence cases of sickle cell disease in Kenya, though no primary studies regarding the population prevalence was found in the literature review⁶. Several studies from Kilifi District Hospital have described adequate follow-up and utilization of services by children enrolled in a clinic for sickle cell disease.³¹ Although no local literature characterizing liver cirrhosis was found in the literature search, there are an estimated 12,000 cases in Kenya due to alcohol, hepatitis, and other etiologies.⁶

2.11 INJURIES

Injuries, including interpersonal violence, burns, falls, drownings, and road traffic crashes are a relatively common occurrence among the Kenyan population. The leading causes of injury in Kenya include assault (42%), road traffic crashes (28%), unspecified soft tissue injury (11%), cut-wounds and dog-bites, falls, burns and poisoning (each <10%).⁸ Verbal autopsy of a large rural population reported 4% of deaths from 2003-2008 were attributed to trauma, with the highest proportion in young males (Odhiambo 2013).⁴¹ The 2015 STEPS reported that 3.9% of adults have experienced a serious injury from interpersonal violence in the last 12 months, higher in men (5.2%) than women (2.7%), and those in the poorer quintiles and less education have higher prevalence of violent injuries.⁸ Overall, 44% of Kenyan adults have experienced physical violence over their lifetime, and 14% of women and 6% of men have experienced sexual violence.¹¹ These rates are higher among lower wealth quintiles as compared to the higher wealth quintile, and are relatively equal between urban and rural areas. There is considerable evidence from the literature that women with lower levels of education and from lower socioeconomic status are at greater risk for experiencing intimate partner violence.^{42, 43} About one-fifth (19.7%) of Kenyan adults reported an unintentional injury in the past 12 months, including cuts (60.0%), falls (39.8%), burns (20.0%), road traffic crashes (3.2%), animal bites (2.4%), and poisonings (1.0%).¹¹ The prevalence of falls and animal bites appear to be higher among the lower quintiles and rural populations, while road traffic crashes and poisonings are higher among urban populations.¹¹ Burns were slightly more prevalent among the urban population and a survey of patients at Kenyatta National Hospital report that people in poor and lower-middle socioeconomic strata had higher risk for kerosene burns.^{11, 44}



3. Standards and Service Availability for NCDIs in Kenya

3.1 ESSENTIAL PACKAGE OF HEALTH AND ESSENTIAL MEDICINES LIST FOR NCDIS

The revised KEPH plan in the HSSP describes the specific services to be provided by the various tiers of the health system for the separate age cohorts in the Kenyan population (**Tables 3a and 3b**).¹ At the community level, the KEPH provides public information on NCDs prevention, screening and early treatment, community detection and diagnosis for NCDs, education on referral/evacuation of persons with NCDs, hypertension and obesity screening, and home-based management for NCDs. Workplace health and safety as well as food quality and safety interventions are also specified at the community level. At the primary care level, KEPH includes routine blood pressure and body mass index (BMI) measurement and outpatient management of most NCDI-related conditions, including pharyngitis, asthma, ischemic heart disease, stroke, peripheral vascular diseases, rheumatic heart disease, congenital heart disease, hepatitis, rheumatoid arthritis, fractures, neurologic conditions, mental disorders, disabilities, diabetes, thyroid disorders, leukemia, lymphomas, birth defects, malnutrition, minor injuries, cancers. At the county level, KEPH specifies services for routine blood sugar testing, cervical cancer screening, fecal occult blood testing, breast cancer screening, lung function testing, lipid profiling, prostate examination, and physical/occupational/psychosocial therapy for persons with disabilities as well as specialty clinics and inpatient management of the above NCDI-related conditions. NCDI service delivery related diagnostics at the county level include liver and renal function tests, cholesterol tests, tumor markers, histopathology, ultrasound, x-ray, endoscopy, and laparoscopy. At the national referral level, the KEPH specifies advanced services including radiotherapy, chemotherapy, interventional radiology, dialysis, organ transplants (kidney, liver, bone marrow), bypass surgeries, reconstructive surgery and diagnostics including CT scan, MRI, radio-isotope scanning, angiography, and EEG. Surgical services are categorized as outpatient operations at the primary care level, emergency or general operations at the county level, and specialized operations at the national referral level. Palliative care services, including pain management, counseling and psychosocial support are designated at the county level, as are rehabilitation services.¹



KEPH Service Package for reversing the rising burden of NCDs, by level of care

Service area	Interventions	Minimum Tier	Cohort
Health Promotion and education for NCD's	Public information on NCD's prevention, screening and early treatment	1	All
	Community detection and diagnosis for NCD's	1	All
	Education on Referral/evacuation of persons with NCD's	1	All
Institutional Screening for NCD's	Routine Blood Sugar testing	3	3,4
	Routine Blood Pressure measurement at OPD	2	3,4
	Routine Body Mass Index (weight and height) measurement for all outpatients	2	3,4
	Cervical cancer screening	3	3,4
	Fecal Occult Blood testing for bowel cancers	3	3,4,5
	Breast cancer screening	3	3,4,5
	Lung Function Testing	3	3,4,5
	Lipid profiling	3	3,4,5
	Annual prostate examination for all men over 50 years	3	4,5
Community screening for NCD's	Routine Blood Pressure measurement in the community	1	3,4,5
	Adult Mid Upper Arm Circumference measurement	1	3,4,5
Rehabilitation	Home based care clients with NCD's	1	All
	Physio therapy for persons with physical disabilities	3	All
	Occupational therapy for persons with disabilities	3	All
	Psychosocial therapy for persons with disabilities	3	All
	Provision of rehabilitative appliances	3	All
Workplace health and safety	Workplace wellness programs	1	All
	Inspection and certification	1	All
	Safety education	1	All
Food quality and safety	Food demonstrations (at community and facilities)	1	All
	Food quality testing	1	All
	Consumer Education on food quality and safety	1	All

Table 3a. Kenya Essential Package for reversing the rising burden of non-communicable conditions, by level of care (Health Sector Strategic and Investment Plan 2013-17)



KEPH Service Package for managing the rising burden of violence and injuries, by level of care

Service area	Interventions	Minimum Tier	Cohort
Health Promotion and education	Awareness creation on violence and injuries (including Sexual and Gender Based Violence)	1	All
	Public education on prevention of violence and injuries	1	All
Pre-Hospital Care	Basic First Aid	1	All
	Evacuation Services for Injuries	1	All
OPD/Accident and Emergency	Basic Emergency Trauma Care	2	All
	Advanced Emergency Trauma care	3	All
Management for Injuries	Basic imaging for violence and injuries	2	All
	Advanced imaging for Violence and Injuries (CT Scan, MRI)	3	All
	Basic Lab services for violence and injuries (Blood transfusions, vaginal swabs, HIV serology)	2	All
	Advanced Lab services for violence and injuries (DB+NA testing)	3	All
Rehabilitation	Physiotherapy following recovery from violence and injuries	3	All
	Occupational Therapy following recovery from violence and injuries	3	All
	Psychosocial therapy for violence and injuries	3	All
	Rehabilitative appliances following violence and injuries	3	All

Table 3b. Kenya Essential Package for managing the rising burden of violence and injuries, by level of care (Health Sector Strategic and Investment Plan 2013-17)

The Kenya National Essential Medicines List (NEML) details the medications to be available at the various levels of public health sector facilities.⁴⁵ The list was revised in 2016 by the National Medicines and Therapeutics Committee, updating the previous list developed in 2010 by convening national and local experts and incorporating normative guidance from the WHO. The current list contains 452 unique drugs for 620 total presentations, which was a net increase of 206



medications from the 2010 version. Of these medications, there are a prominent number for NCDI conditions, including in the areas of cardiovascular disease (27), diabetes (7), respiratory conditions (6), chemotherapeutics (43), mental health disorders (28), epilepsy (8), anesthetics and other surgical needs (17), and palliative care (19). A comparative analysis using the previous NEML showed that among 10 African countries, Kenya had an approximately average number of total medications and was missing 30% of the medications from the WHO Essential Medicines List, less than the average of 42% of the 10 countries.⁴⁶

3.2 OVERALL AVAILABILITY OF NCDI SERVICES

The most recent nationally representative comprehensive health facility survey conducted in Kenya was the SARAM in 2013.⁹ This survey measured the reported service provision and observed availability of key personnel, guidelines, equipment, diagnostics and medications for several NCDI conditions, including cardiovascular disease, diabetes, and chronic respiratory diseases. Overall 34% of facilities surveyed were considered ready for NCD services as measured by the presence of standard precautions, basic amenities, basic equipment, and essential medicines. The level of readiness was 51% of the hospitals, 51% at the health centers, 36% at dispensaries, and 21% at medical clinics. A greater proportion of public facilities (42%) were considered ready as compared to private not-for-profit (34%) and private for-profit (22%) facilities. Overall, all facilities on average had available 37.1% of components of this readiness package, and only 4.9% of facilities had all components available.⁹

3.3 AVAILABILITY AND DISTRIBUTION OF SPECIFIC NCDI SERVICES AND COMMODITIES

Among medications on the national essential medicines list, there was low availability of metformin (18%), insulin (13%), injectable glucose (47%), enalapril (22%), furosemide (31%), atenolol (19%), amlodipine (12%), beclomethasone (11%), prednisolone (31%), hydrochlorothiazide (21%), aspirin (55%), injectable epinephrine (18%), and morphine (7%).⁴⁵ The majority of these medications were more available in urban than rural settings (Figure 9a) and in private than public settings (Figure 9b). Only aspirin, injectable glucose, and injectable epinephrine had higher availability in rural and public settings as compared to urban and private settings.



Most NCD medications less available in rural areas

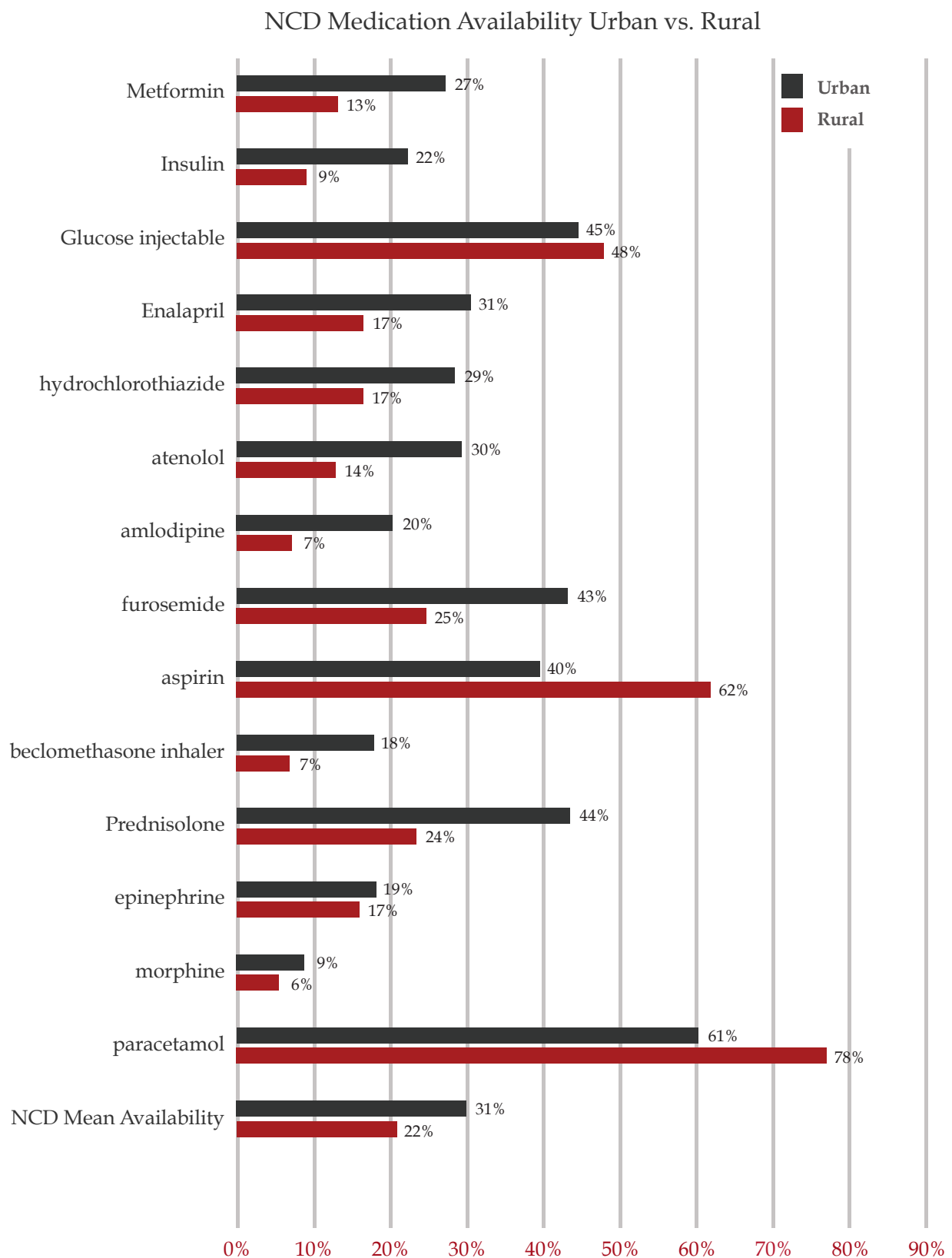


Figure 9a – NCD medication availability in all facilities, urban vs. rural (Service Availability and Readiness Assessment, 2013)



Most NCD medications less available in public facilities

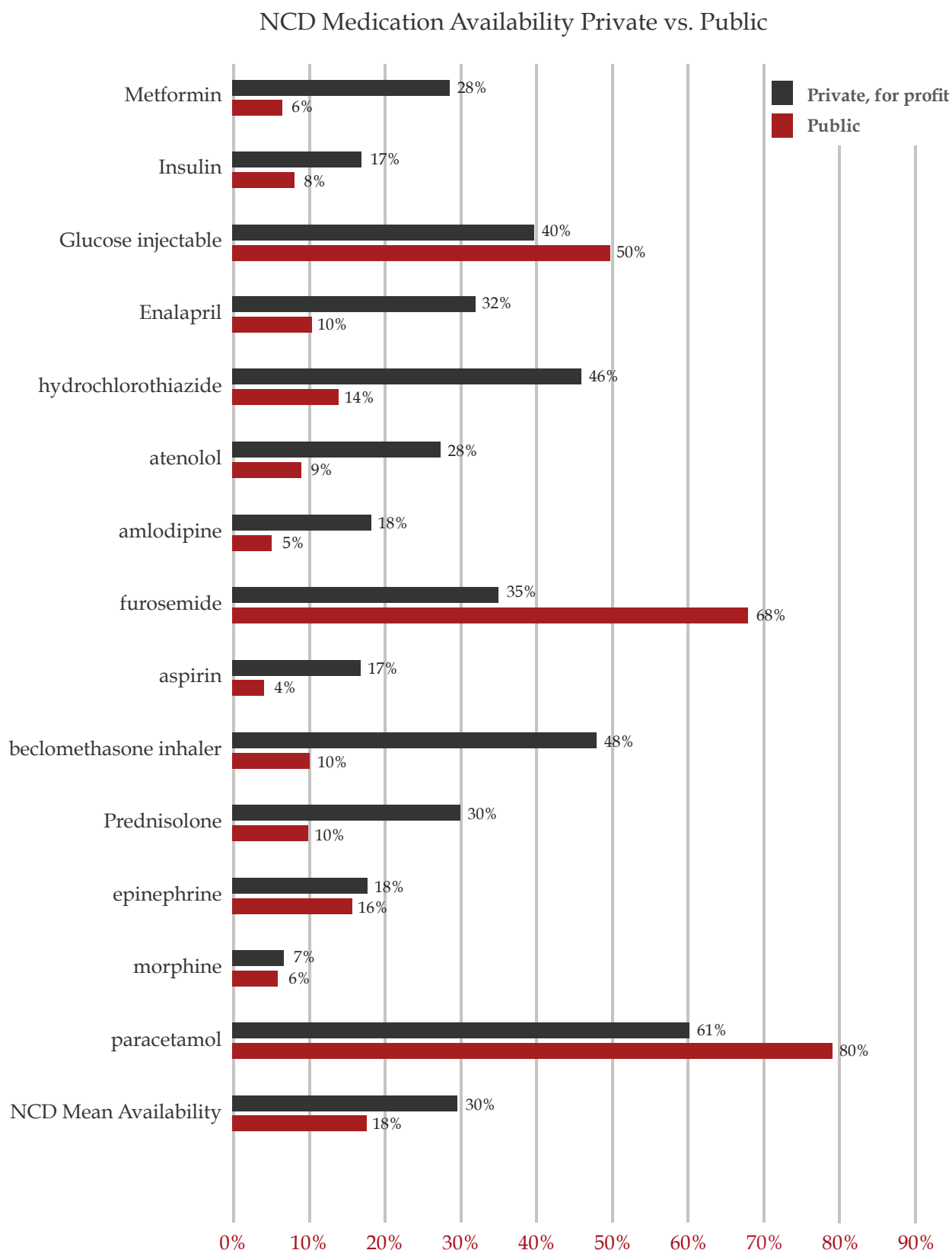


Figure 9b – NCD medication availability in all facilities, public vs. private (Service Availability and Readiness Assessment, 2013)



Compared to other disease areas, essential NCD medications were less available at both hospitals (32%) and primary care facilities (25%) than medications for malaria (65% and 55%, respectively), tuberculosis (TB) (55% and 51%, respectively), and HIV (35% and 47%, respectively) (Figure 10).⁴⁵

Less availability of NCD medications compared to HIV, TB & Malaria

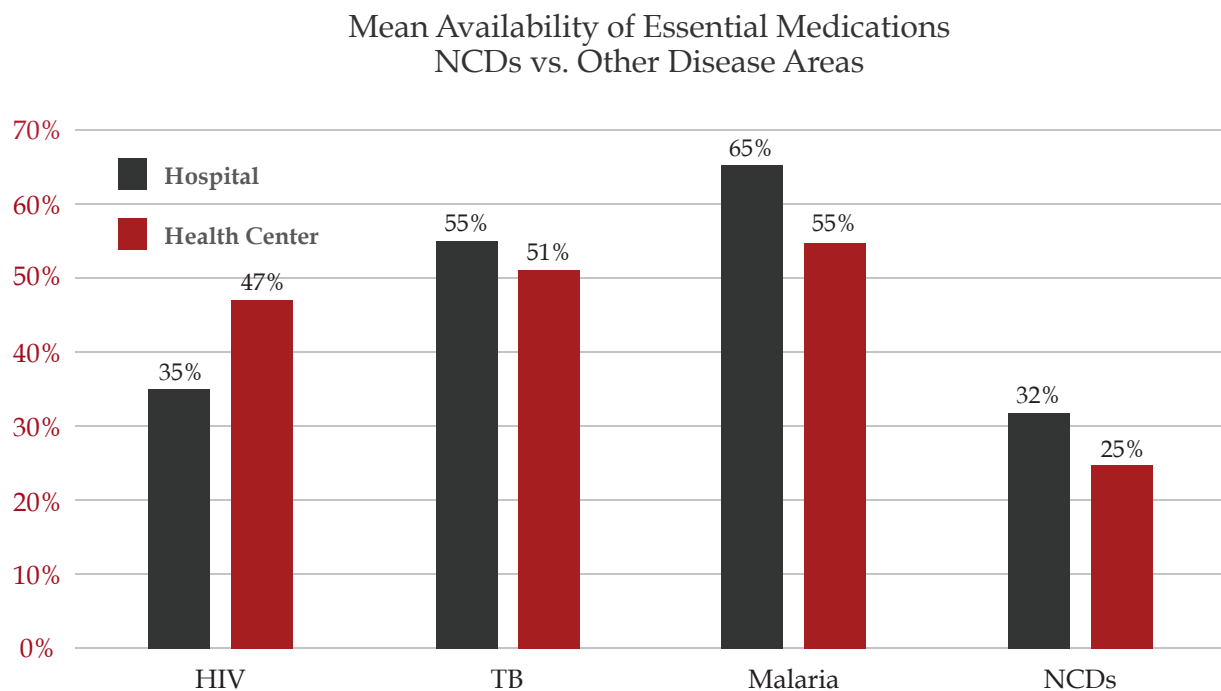


Figure 10 – Mean availability of essential medications for NCDs compared to HIV, TB, and malaria (Service Availability and Readiness Assessment, 2013)

3.4 RELATIONSHIP OF AVAILABILITY AND READINESS WITH REGIONAL POVERTY

Using the multidimensional poverty index to assess poverty on a range of health, education, and household asset indicators, a poverty threshold was established to represent the poorest billion individuals globally, or those deprived of at least 5 of 8 indicators as reported by household surveys.¹⁰ Using this index, 39.5% of Kenyans would be considered as living in the poorest billion people globally. In addition to lower availability of key NCDI medications in rural facilities compared to urban facilities, the availability of most NCDI medications were inversely proportional to the proportion of the population living in the poorest billion in each county. This relationship displayed a significant correlation for metformin, hydrochlorothiazide, enalapril, furosemide, atenolol, amlodipine, beclomethasone, and prednisolone. Only the availability of aspirin and insulin were not correlated with poverty level in the counties. Overall, counties with



a higher proportion of the population living in the poorest billion had a lower mean number of tracer NCD medications available as compared to counties with a lower proportion of population living in the poorest billion ($p < 0.01$) (Figure 11).

Less availability of NCD medications in counties with greater % poverty

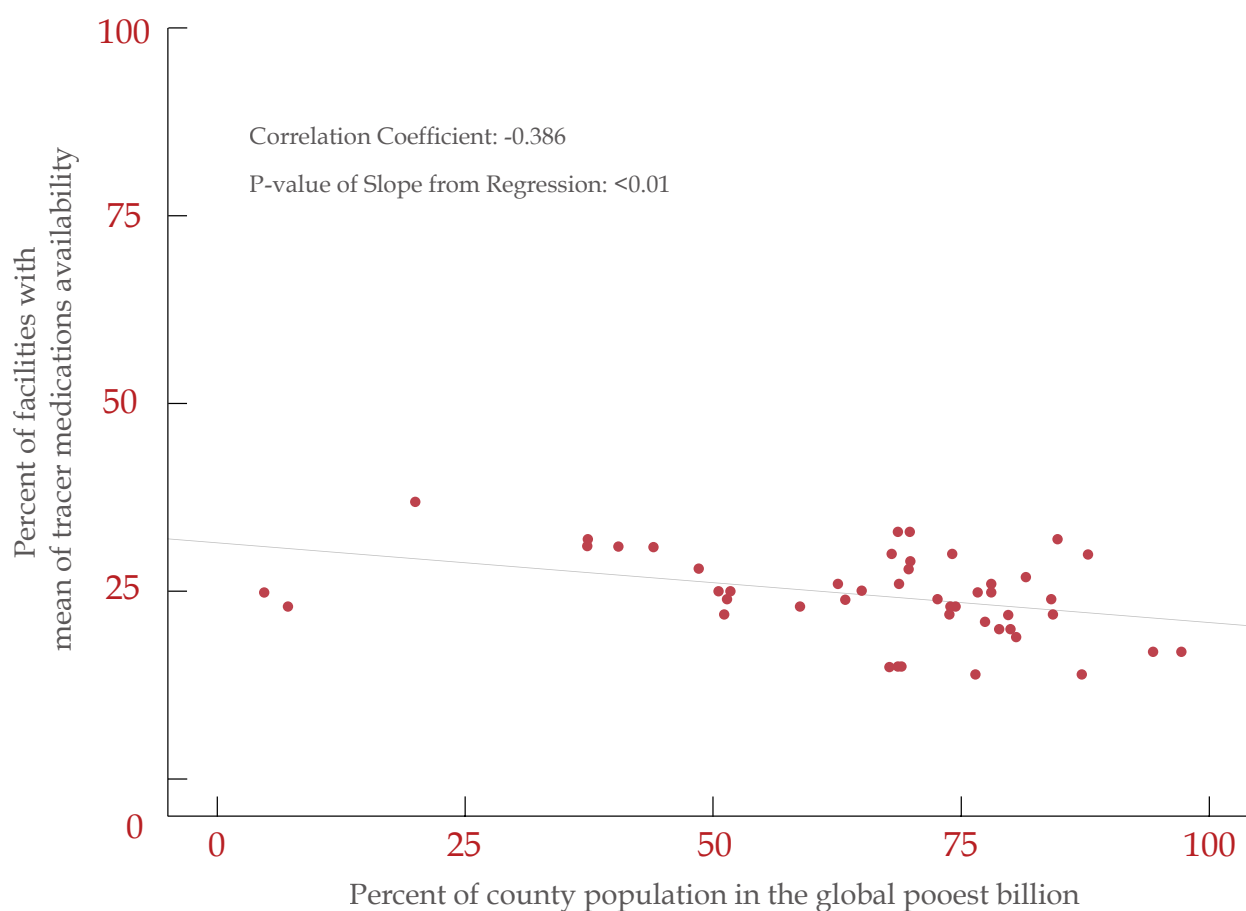


Figure 11 – Percent of facilities in each county with the mean number of tracer medications available for NCDs by the percent of the county's population living in the global poorest billion (Sources: Service Availability and Readiness Assessment 2013 and Oxford Poverty & Human Development Initiative)

3.5 ACCESS AND COVERAGE OF BASIC NCDI SERVICES

The Universal Health Coverage monitoring framework suggests key indicators for NCDs should include population coverage of hypertension and diabetes.⁵ Globally, coverage for these services has lagged behind other key UHC indicators (e.g., skilled birth attendance, vaccination coverage, antiretroviral treatment coverage).⁴⁷ The STEPs survey reported that 55.8% of respondents had



never had their blood pressure measured in the past and 87.8% had never had their blood sugar measured in the past.⁸ In secondary analysis, access to screening for both hypertension and diabetes was associated with wealth quintile, with progressively higher proportions never previously screened with increasing poverty level (Figure 12). This relationship was also seen when comparing urban and rural populations, with a higher proportion of individuals never previously screened in rural areas for both hypertension (60.7% vs. 48.1%) and diabetes (89.6% vs. 84.8%). Of those patients found to have hypertension, access to treatment was associated with wealth quintile, with poorer populations less likely to be on treatment (Figure 12). Patients were more likely to be on treatment for hypertension if from urban areas (24.8%) than from rural areas (20.3%). For patients with elevated blood sugar, 40.1% of patients were currently taking medications, though the smaller number (n=72) limited the possibility of socio-economic disaggregation. In a random sample of adults living in two urban Nairobi slums, less than 5% of those with diabetes had achieved blood sugar control.

Access to hypertension and diabetes diagnosis and treatment by wealth quintile

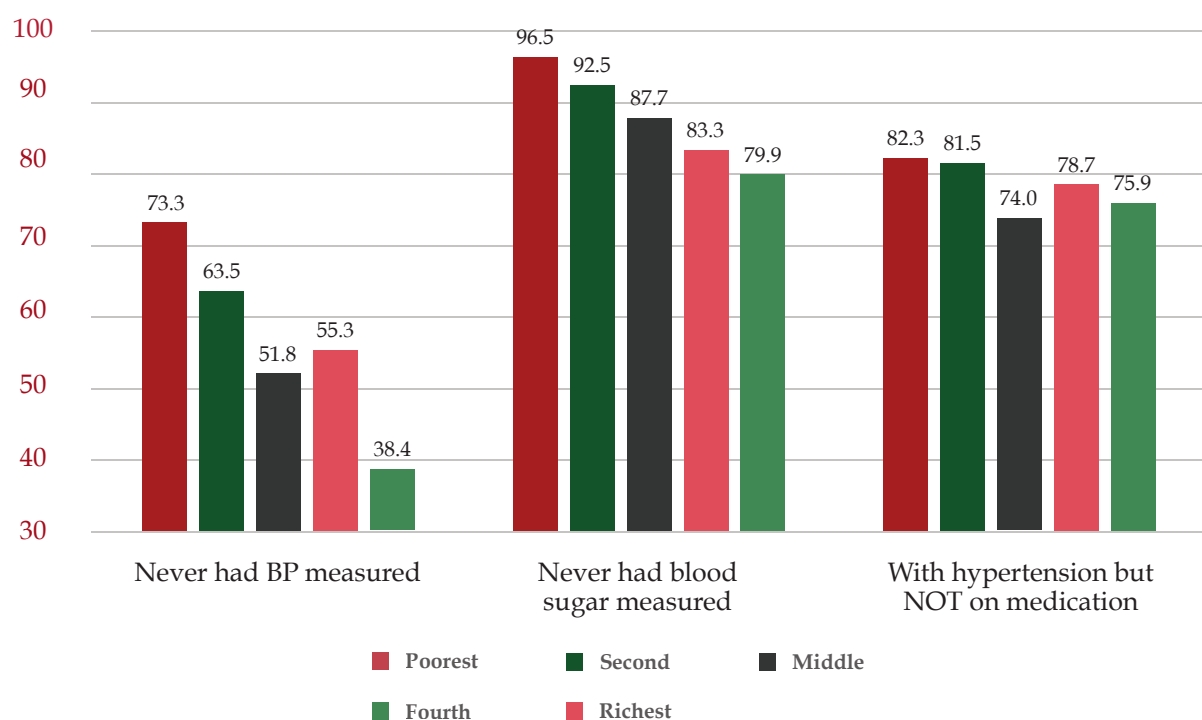


Figure 12 – Access to diagnosis for hypertension and diabetes and treatment for hypertension, by wealth quintile (STEPS 2013)



In terms of coverage of other NCDI services, screening for cancers also demonstrates a clear differential among socioeconomic classes. Per the Kenya DHS, cancer screening was dramatically higher in the wealthiest quintile as compared to the poorest quintile for breast cancer (22.7% vs. 4.4%, respectively), cervical cancer (22.9% vs. 4.4%), and prostate cancer (3.9% vs. 1.5%).¹¹ Screening for each of these cancers was higher in urban than rural areas. This gap likely reflects differences in awareness, service availability, and care seeking for cancer prevention in these populations.

3.6 AVAILABILITY AND DISTRIBUTION OF SPECIALTY NCDI SERVICES

Among services listed in the KEPH for the referral level, there are limited services compared to the population of the country. Expert opinion provided by the commission indicates that currently there are a limited number of referral level services in the public sector. There are currently six cardiac surgery centers. In terms of cancer services, there are twelve centers with capacity for chemotherapy, and six radiotherapy centers, though only one in the public sector. Through the “Changing Diabetes in Children” project, there are eight “hubs” providing care for type 1 diabetes in the public sector, with 16 “spokes”. Dialysis is more readily available, with approximately 294 centers around Kenya. Computed tomography (CT) is available at 17 public facilities, and magnetic resonance imaging (MRI) at 20 public facilities. Histopathology services are available at most major hospitals.²⁴ Eleven county hospitals have integrated palliative care services and serve as training and mentorship sites for county hospitals.⁴⁸ Density of these services per 100,000 population, as well as the number of specialty physicians for NCDIs, are listed in Table 4. The distribution of referral NCDI services and specialty physicians throughout the country has not been quantified, though such resources are believed to be largely concentrated in urban areas.



Limited NCDI specialty services and personnel in public sector

Referral Service	Number (Density per 100,000 pop)
Cardiac surgery centers	6 (0.01)
Echocardiography centers	
Chemotherapy centers	12 (0.03)
Radiotherapy centers	6 (0.01)
T1D treatment centers	16 (0.03)
Dialysis units – numbers	294 (0.6)
Kidney transplant centers	
CT centers	17 (0.04)
MRI centers	20 (0.04)
Newborn screening sites	
Specialty Physicians	
Physicians	1803 (5)
Internists	296 (0.6)
Pediatrician	300 (0.7)
Cardiologists	
Endocrinologists	
Oncologists	14 (0.03)
Nephrologists	30 (0.07)
Gastroenterologists	
Pulmonologists	
Pathologists	78 (0.2)
Psychiatrists	71 (0.2)
Obstetrician/Gynecologist	400 (0.9)
General surgeons	1082 (2.4)
Orthopedic surgeons	120 (0.3)
Neurosurgeons	17 (0.04)
Plastic surgeons	

Table 4 – Availability of NCDI referral services and specialty physicians in Kenya, number and density per 100,000 population (NCDI Poverty Commission, 2017).



4. Household impact of NCDs and current NCDI financing

4.1 ECONOMIC IMPACT OF NCDs ON HOUSEHOLDS

The economic impact of NCDs on households is not only due to the household spending on NCDs but also to loss of productivity. Data from the Kenya Household Health Expenditure and Utilization Survey of 2007 showed that although general health conditions reduce household income by 13.6%, NCDs reduce household income by 28.6%.⁴⁹ Furthermore, NCDs were associated with a 23.2% reduction in household income relative to households affected by communicable diseases. Overall, for households experiencing NCDs, 29.9% of those in the lowest quintile experienced catastrophic expenditures (defined as >30% of total household income), compared to 9.2% in the highest income quintile.⁵⁰ The rate of catastrophic expenditure was higher for rural (20.8%) as compared to urban (13.6%) households. Mwai et al. (2016b) report that the odds of incurring catastrophic expenditure for households were over 50% higher for those affected by NCDs as compared to households affected by communicable diseases.⁵¹ Furthermore, the odds of becoming impoverished due to out-of-pocket expenditures for a household were over 30% higher for those affected by NCDs as compared to households affected by communicable diseases.

4.2 CURRENT HEALTH FINANCING FOR NCDs IN KENYA

In 2015, the current health expenditure per capita in Kenya was \$70.1 USD (\$157.2 in \$PPP), which represented 5.2% of gross domestic product.⁵² Of the current health expenditure, 33.1% was from general government health expenditure, which represented 6.3% of general government expenditure overall. About half (48.2%) of current expenditure was from domestic private health expenditure, the majority of which (70.8% or \$23.4USD per capital) was out-of-pocket.

According to the Kenya National Health Account (NHA) 2015/16, total health expenditure in Kenya was \$3,047,270,653 USD.^{51, 53} Expenditure on NCDs in 2015/16 was \$198,568,740 USD, or 6.5% of total health expenditure, an increase from 6.1% in 2013. Of this expenditure on NCDs, 45% of revenue for financing schemes was from the government, 31% from employers, 20% from households, and 5% from international sources. Two-fifths (40%) of the expenditures for NCDs occurred in government health facilities and 34% in private health facilities. About half (48%) of NCD expenditures were for outpatient curative care services, 29% for inpatient curative care, and 9% for preventive care.



5. Proposed expansion pathways for NCDI control

5.1 PRIORITY NCDI CONDITIONS FOR EXPANSION

The objective of the Kenya NCDI Poverty Commission was to recommend a package of cost-effective health sector interventions that could be implemented in Kenya to address NCDIs with an emphasis on conditions affecting the poor. In the analysis of the commission as described in the methodology section, a group of 14 priority conditions were selected based on the overall health impact of each condition (“burden of disease”), the severity of the condition in terms of premature mortality (“severity”), the extent of disability caused by the condition on each individual affected (“disability”), the inequity of health outcomes from the condition as compared to other regions of the world (“equity”) and national diseases/conditions priorities. Data for each condition were provided by the review of literature and available disease burden estimates.⁶ The selected conditions are listed in Table 5.

Selected priority NCDI conditions for expansion of services and interventions

Disease Category	Prioritized Disease/condition
Respiratory	Asthma
	Chronic obstructive pulmonary disease
Cardiovascular – behavioral & metabolic etiologies	Hypertension, Hypertensive heart disease, Ischemic heart disease, hemorrhagic stroke, ischemic stroke
Cardiovascular - other etiologies	Rheumatic heart disease
Endocrine	Diabetes mellitus (type 1 and 2)
Cancers	Cervical cancer
	Burkitt lymphoma (non-Hodgkin lymphoma)
	Breast cancer
Mental Health	Major depressive disorder
Neurologic	Epilepsy
Congenital	Sickle cell disorders
Liver	“Cirrhosis” - etiologies include hepatitis B, hepatitis C, alcohol, other causes
Surgical & Injuries	Motor vehicle road injuries
	Assault

Table 5 – Selected priority NCDI conditions for expansion of services and interventions



These conditions represent a diverse set of NCDs that currently have an enormous impact on the health of Kenyans, and in many cases affect those living in rural or impoverished regions (as described in Section 2), with limited diagnostic and management services available (as described in Section 3).

5.2 SELECTED HEALTH SECTOR INTERVENTIONS FOR EXPANSION OF NCDI SERVICES

Addressing the prioritized NCDI conditions in Kenya will involve the design, implementation, integration, and scale of a complex set of health sector interventions, some of which already exist within the health care system, and others that have yet to be introduced. A package of cost-effective interventions to achieve UHC, including NCDs and injuries, in low-income countries has recently been recommended by the Disease Control and Priorities 3 (DCP3) group.¹³ This guidance is based on the best evidence available globally as interpreted by health economists and public health experts within this group, which had the goal of defining a package of interventions to achieve UHC. The package recommended for UHC contains 68 interventions targeting NCD and injury conditions. These interventions were costed for low-income countries using the best evidence available, and adjustment for the price of health care personnel at a country level. Each intervention was additionally assigned an ordinal ranking for its properties of cost-effectiveness, financial risk protection, and equity based on the literature and expert opinion by the DCP3 group. The ranking ranges are slightly different for cost-effectiveness (0-4), financial risk protection (0-6), and equity (0-3), with 0 representing minimal and higher numbers representing more optimal values in each respective metric. The interventions were also assigned a target level of the health system: population, community, health center, first-level hospital, and referral/specialty hospital.

These interventions were evaluated and judged by the commission on the following criteria: alignment with the prioritized disease conditions, feasibility in Kenyan context, cost-effectiveness, provision of financial risk protection (or protection against catastrophic expenditures), and provision of some priority to the “worst-off” (i.e., children, individuals suffering from severe disease, those living in poverty, etc.). After evaluation according to these above criteria, 34 interventions were selected. These 34 interventions are listed in Table 6, organized by NCDI conditions. The baseline coverage for each intervention, as estimated by the commissioners using available data sources and expert opinion, are listed for each condition, as well as the desired target coverage by the year 2030. The total cost of each intervention was determined by multiplying the direct unit cost of each intervention adjusted for Kenya by the estimated population in need of each intervention in Kenya. Direct costs included personnel, equipment, testing services, diagnostics, drugs and other consumables. A 50% indirect cost was added to the total direct cost to account for indirect costs at the facility level, including items such as laboratory, buildings, rent, maintenance, and utilities.



An additional 17% indirect cost was added for non-facility based costs, such as financing, supply chain, and health information systems. The incremental cost for each intervention was then determined by multiplying the total cost by the coverage increment.

The total annual cost the incremental increase in coverage represented by this package is estimated to be \$520,146,154 USD, or approximately KSh 54.7 billion. Although this package of interventions would represent a 2.6-fold increase in the current expenditure on NCD services as detailed in the national health accounts 2015/16 (see section 4.2), it would represent only 17.1% of total health expenditure. Overall, this package of interventions, which includes outpatient, inpatient, surgical, mental health, rehabilitation, and palliative care services would represent an incremental investment of \$11.97 per capita annually. Although several preventative interventions delivered by the health system are included in this package, it is important to note that this package does not explicitly include intersectoral interventions.

These interventions, if implemented to target coverage, are projected to avert 9,322 premature deaths per year by the year 2030. This estimate is based on current NCDI mortality rates adjusted for the estimated population in 2030 with the estimated effect size for a similar package of interventions proposed by the DCP3 group.^{6, 13, 14} This figure represents an approximate 10% reduction in expected premature deaths in the year 2030 (according to 2015 death rates). However, although this figure provides a reasonable estimate of averted deaths, given the greater number of interventions selected by the Kenya NCDI Poverty Commission, this figure is likely underestimated. Furthermore, this analysis does not include averted morbidity, which would be considerably greater than averted mortality, and provide substantial benefit to many more individuals, particularly given the emphasis on interventions for severe conditions affecting those at younger ages.



Cost-effectiveness, financial risk protection and equity scores for selected health sector interventions for expanded NCDI services in Kenya

Condition	Intervention	Cost Effectiveness rating	Financial Risk Protection Rating	Equity Rating	Total cost	Baseline coverage 2018	Target Coverage 2030	Incremental Cost	Health System Level
Cirrhosis	Screening and brief intervention for alcohol use disorder	3	2	1					
Respiratory	Low-dose inhaled corticosteroids and bronchodilators for asthma and for selected patients with COPD	1	3	1	262,690,039	0.16	0.5	89,314,613	Health Center
Respiratory	Management of acute exacerbations of asthma and COPD using systemic steroids, inhaled beta-agonists, and, if indicated, oral antibiotics and oxygen therapy	1	4	1	165,654,576	0.16	0.5	56,322,556	First-Level Hospital
Respiratory	Mass media for awareness on handwashing and household air pollution health effects	0	1	1	1,768,986	0.1	0.8	1,238,290	Population
Respiratory	Tobacco cessation counseling, and use of nicotine replacement therapy in certain circumstances	4	2	1	46,322,061	0.07	0.6	24,550,692	Health Center
Respiratory	Mass media messages concerning use of tobacco and alcohol	4	1	1	1,768,986	0.61	0.8	336,107	Population
Breast cancer	Treat early stage breast cancer with appropriate multimodal approaches, including generic chemotherapy, with curative intent, for cases that are referred from health centers and first-level hospitals following detection using clinical examination	4	4	1	1,496,070	0.1	0.8	1,047,249	Referral Hospital
Cervical Cancer	Opportunistic screening for cervical cancer using visual inspection or HPV DNA testing and treatment of precancerous lesions with cryotherapy	3	3	1	8,295,680	0.14	0.6	3,816,013	Health Center
Cervical Cancer	School-based HPV vaccination for girls	3	3	1	10,835,837	0.02	0.8	8,451,953	Community
Cervical Cancer	Early detection and treatment of early-stage cervical cancer	0	4	1	380,650	0.6	0.8	114,195	First-Level Hospital
Cancer-Lymphoma/leukemia	Treatment of early-stage childhood cancers (such as Burkitt and Hodgkin lymphoma, acute lymphoblastic leukemia, retinoblastoma, and Wilms tumor) with curative intent in pediatric cancer units or hospitals	3	5	1	205,957	0.1	0.5	82,383	Referral Hospital
Cardiovascular	Long term management of ischemic heart disease, stroke, and peripheral vascular disease with aspirin, beta blockers, ACEi, and statins (as indicated) to reduce risk of further events	2	2	1	109,888,784	0.8	1.0	32,966,635	Health Center
Cardiovascular	Mass media messages concerning healthy eating or physical activity	4	1	1	1,768,986	0.23	0.8	1,008,322	Population
Cardiovascular	Opportunistic screening for hypertension for all adults and initiation of treatment among individuals with severe hypertension and/or multiple risk factors	1	1	1	20,334,580	0.442	0.8	7,279,780	Health Center
Cardiovascular	Screening and management of hypertensive disorders in pregnancy	1	3	3	452,107	0.6	0.8	180,843	Health Center
Cardiovascular	Provision of aspirin for all cases of suspected acute myocardial infarction	4	2	1	4,330	0.1	0.5	1,732	Health Center



Condition	Intervention	Cost Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Total cost	Baseline coverage 2018	Target Coverage 2030	Incremental Cost	Health System Level
Cardiovascular	Use of community health workers to screen for CVD using non-lab-based tools for overall CVD risk, improving adherence, and referral to primary health centers for continued medical management	n/a	n/a	n/a	3,750,922	0.05	0.6	2,063,007	Community
Cardiovascular & RHD	Medical management of acute heart failure	4	5	3	107,579,215	0.1	0.5	43,031,686	First-Level Hospital
Cardiovascular & RHD	Medical management of heart failure with diuretics, beta-blockers, ACEi, and mineralocorticoid antagonists	4	4	3	52,681,296	0.25	0.5	13,170,324	Health Center
Rheumatic Heart Disease	Treatment of acute pharyngitis in children to prevent rheumatic fever	4	2	1	3,510,122	0.37	0.6	807,328	Health Center
Rheumatic Heart Disease	Secondary prophylaxis with penicillin for rheumatic fever or established rheumatic heart disease	0	1	1	3,510,122	0.37	0.6	807,328	Health Center
Diabetes	Screening and management of diabetes among at-risk adults, including glycemic control, management of blood pressure and lipids, and consistent foot care	4	2	1	147,470,455	0.3	0.8	73,735,228	Health Center
Diabetes	Screening and management of diabetes in pregnancy (gestational diabetes or preexisting Type II diabetes)	1	3	3	31,785,834	0.02	0.3	8,900,034	Health Center
Chronic Kidney Disease	Screening and management of albumin-uric kidney disease with ACEi or ARBs, including targeted screening among people with diabetes	2	2	1	19,701,995	0.25	0.5	4,925,499	Health Center
Sickle Cell	In settings where sickle cell disease is a public health concern, universal newborn screening followed by standard prophylaxis against bacterial infections and malaria	4	2	3	17,950,478	0.01	0.4	7,000,686	First-level Hospital
Epilepsy	Management of epilepsy, including acute stabilization and long-term management with generic anti-epileptics	4	4	3	3,443,559	0.25	0.5	860,890	Health Center
Mental Health	Management of depression and anxiety disorders with psychological and generic antidepressant therapy	3	4	1	81,676,987	0.15	0.3	12,251,548	Health Center
Mental Health	Management of schizophrenia using generic anti-psychotic medications and psychosocial treatment	2	4	2	14,188,315	0.15	0.3	2,128,247	Health Center
Injuries & Cross-cutting	Basic outpatient surgical services*				37,049,652	0.25	0.5	9,262,413	Health Center
Injuries & Cross-cutting	Basic first-level hospital surgical services*				365,621,563	0.54	0.8	95,061,606	First-level Hospital
Injuries & Cross-cutting	Expanded first-level hospital surgical services*				4,874,954	0.25	0.5	1,218,739	First-level Hospital
Injuries & Cross-cutting	Specialized surgical services*				8,774,918	0.25	0.5	2,193,729	Referral Hospital
Injuries & Cross-cutting	Basic rehabilitation services*				19,402,318	0.14	0.3	3,104,371	Health Center
Injuries & Cross-cutting	Palliative care and pain control services*				44,524,581	0.1	0.3	12,912,129	Health Center
				Total Cost	1,601,415,783			520,146,154	

* Costing based on service implementation across entire population.

Table 6 – Cost-effectiveness, financial risk protection and equity scores for selected health sector interventions for expanded NCDI services in Kenya. Baseline and target coverage estimates as well as incremental cost of introduction and scale up are shown.



5.3 DELIVERY PLATFORMS AND INTEGRATION OF SERVICES

At the population and community level, prioritized interventions based on cost-effectiveness, financial risk protection, equity, and alignment with prioritized NCDI conditions would include mass media messaging on awareness of handwashing and household air pollution, tobacco and alcohol, and health eating or physical activity (Figure 13). The commission also chose education of diabetes for self-management and tobacco cessation counseling and nicotine replacement therapy as key interventions for introduction and scale up. Additional selected interventions include school-based HPV vaccination for girls and the use of community health workers to screen for cardiovascular risk factors, refer patients for medical management, and improve adherence to cardiovascular interventions.

The majority of interventions selected for introduction or scale up would be applied at the primary care or health center level. These interventions include outpatient medical management and chronic follow up of asthma/COPD, cardiovascular disease, chronic heart failure, diabetes, epilepsy, depression/anxiety, and schizophrenia. Health center level interventions to scale would also include screening for hypertension in all adults and diabetes in high-risk adults as well as screening and management of hypertension and diabetes in pregnancy. Primary and secondary prevention of rheumatic heart disease was emphasized at primary health centers. Additionally, opportunistic screening for cervical cancer using visual inspection (acetone or Lugol's iodine) or HPV DNA testing and cryotherapy for small precancerous lesions was included at this level. At the county hospital level, the commission prioritized strengthening and scaling up inpatient management of acute exacerbations of asthma/COPD and heart failure as well as the treatment of early stage cervical cancer within existing services. Additionally, the introduction and scale up of medical management for sickle cell disorder was chosen to be included. Multimodal breast cancer treatment and treatment for childhood cancers (i.e., leukemias and lymphomas) were prioritized at the referral hospital level. Included in the priority interventions are cross-cutting packages to improve basic and county-level surgical and laboratory services, rehabilitation, and palliative care services. Challenges to introduction and scale-up of these interventions may include infrastructure, staffing, training, guidelines, medications, equipment, diagnostics, and referral networks. However, most of these interventions exist at some baseline level in public health sector facilities, though availability and readiness may vary dramatically, as described in Section 3 of this report. Additionally, these interventions utilize common delivery platforms, for example mass media communication channels, community health workers, laboratory equipment platforms, or integrated health worker training packages. Although specific medications and laboratory reagents may require scale-up, the supply chain for procurement, storage, and distribution of these commodities already exist.

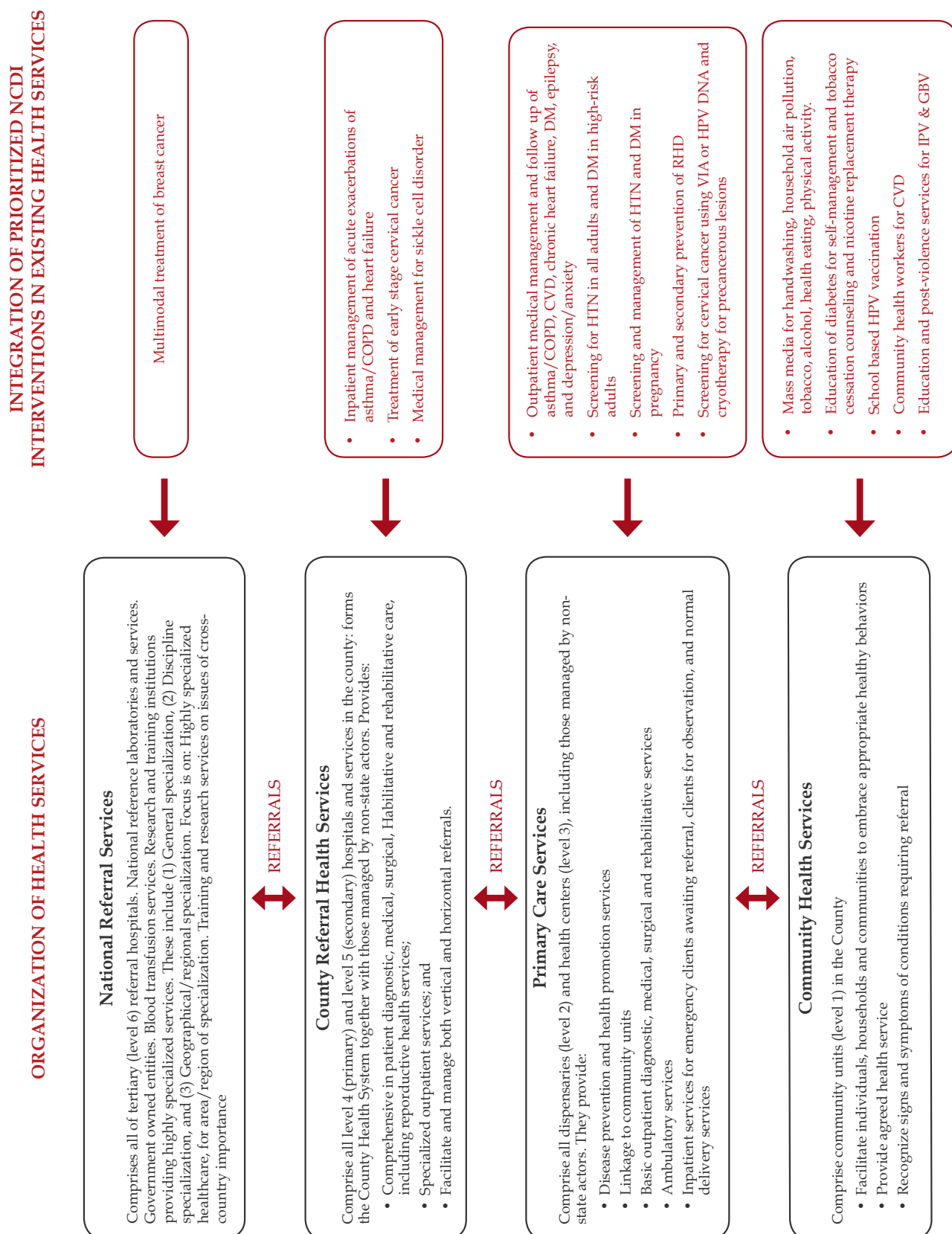


Figure 13 – Integration of prioritized NCDI interventions into levels of the health system and existing services.



Leveraging existing infrastructure and personnel for other chronic diseases, such as antiretroviral therapy for HIV/AIDS, may facilitate integration of other chronic disease services for chronic NCDs and mental health conditions. Utilizing and strengthening existing antenatal care or family planning services could improve screening and management of hypertension and diabetes, as well as cancer screening, among women of reproductive age, and current childhood services (such as IMCI or outpatient departments) could be strengthened to include cancer and sickle cell disease screening. Surgical units with access to anesthesia and blood transfusion at first-level hospitals routinely providing emergency caesarian sections could be foundational for expanded surgical services for trauma and burns.

Specific research and planning for integration of expanded NCDI services, including decentralization of referral services and capacity building for task-shifting/sharing of key responsibilities, in the health sector is required and is currently underway by a joint team of governmental and non-governmental partners.

5.4 INTERSECTORAL INTERVENTIONS

Health system interventions alone are not sufficient to prevent the risk and impact of NCDIs as well as provide care for NCDs on the Kenyan community. Although not specifically addressed in the analysis in this report, it is important to mention the importance of intersectoral interventions on NCDIs and the progress and key challenges to policy instruments in Kenya that could mitigate various risk factors for health conditions leading to NCDIs. A recent study conducted by the APHRC analyzed in depth the status and success of NCD prevention policies in Kenya.⁵⁴ This study found 36 national NCD policy documents in the areas of harmful use of alcohol (13), tobacco control (5), physical activity (7), diet and nutrition (8), and national NCD strategies (3). The study team found several factors limiting the complete implementation of such policies. For example, in the area of tobacco control, there persist challenges due to industry interests, single-stick sales, and increasing numbers of women and youth consumers. Homebrewed alcohol presents a serious challenge to alcohol related policies and prevention, and policies in the area of diet and physical activity lack clear mandates or priority. Overall, though policies, implementation plans, monitoring and evaluation frameworks, and financing frameworks are often in place, lack of funding, low prioritization, and lack of clear mandates have hampered successful implementation. The need for greater awareness of NCDIs, robust multisectoral engagement, and balance of health and economic impacts of risk factor mitigation are required to further strengthen large scale NCDI prevention.



6 Key Findings and Recommendations

6.1 KEY FINDINGS

- **NCDIs are a major threat in Kenya.** Overall, NCDIs comprise a large share of the burden of disease in Kenya, including 37% of all disability-adjusted life years and 35% of deaths.
- **NCDIs occur at young ages.** Contrary to popular belief, NCDIs occur at young ages and affect those in the productive years of life. 53% of all DALYs associated with NCDs and 72% of all injuries occur before the age of 40.
- **The burden of NCDI conditions is very diverse.** Although global targets in NCDs largely focus on four major diseases (cardiovascular disease, type 2 diabetes, chronic respiratory diseases, and cancers), 67% of all NCD DALYs in Kenya are due to other NCD conditions, which is significantly greater than that seen in high income countries.
- **The poor suffer disproportionately from NCDIs.** HDSS data from Kenya demonstrate a higher burden of morbidity and mortality from NCDIs within the poorest quintiles as compared to wealthiest quintiles. HDSS data from both rural and urban cohorts demonstrate an equal, if not higher, proportion of deaths due to NCDIs in the poorest as compared to wealthiest quintiles. Furthermore, crude death rates among the poor were more than double for NCDs and triple for injuries than that among the wealthier populations. .
- **Most of the NCDI disease burden cannot be attributed to individual lifestyle choices.** In modeling of risk factors for NCDIs, less than one-quarter of the risk factor profile can be attributed to individual behaviors, such as tobacco or alcohol, or metabolic risk factors, such as obesity or blood pressure. Review of existing literature suggests that the prevalence of particular risk factors, such as alcohol, obesity, and hypertension, may be lowest in the poorest wealth quintile.
- **Basic services for NCDIs are lacking, particularly in poorer regions and in the public sector.** Despite strong inclusion of NCDIs in the Essential Package for Health, availability of key medications and readiness of NCD services remains limited and inversely related to the poverty level of regions. Availability of services are superior in urban and private sector settings as compared to rural or public sector settings. Referral level NCDI services remain sparse compared to the population of the country and concentrated in urban areas. Coverage of basic NCDIs, such as diagnosis and treatment of hypertension and diabetes or cancer screening, is low, and is inversely related to wealth.



- **NCDIs have a significant economic burden on households.** Household surveys demonstrate NCDs cause a greater decrease in household income (28.6%) and a higher rate of catastrophic expenditures than communicable diseases. Catastrophic expenditures for NCDs are greatest for the poor and rural households. Households affected by NCDs are 30% more likely to be impoverished than households with communicable diseases.
- **Domestic financing for NCDIs is limited and not commensurate to the burden.** Despite comprising a large burden of disease in Kenya, currently NCD spending comprises only 6.5% of total health expenditures.

6.2 RECOMMENDATIONS

- **The NCDI focus needs to be broadened.** In order to adequately address NCDIs in Kenya and reduce stigma associated with these diseases, we must broaden our attention beyond the traditional behavioral risk factors towards a more comprehensive approach. After review of data of the overall burden of disease, equity profile of disease conditions, severity and disability of illness, and age profile of those effected, this commission selected 14 NCDI disease conditions across the life span on which to increase health sector interventions. These conditions build on the existing Kenya NCD Strategic Plan, and include asthma, chronic obstructive pulmonary disease, hypertensive heart disease and stroke, rheumatic heart disease, diabetes (type 1 and 2), cervical cancer, non-Hodgkin lymphoma, breast cancer, major depressive disorder, epilepsy, sickle cell disease, cirrhosis, motor vehicle road injuries, and interpersonal violence/assault.
- **There are evidence-based health sector interventions that can address NCDIs.** Of an evidence-based package of interventions recommended for Universal Health Care, this commission selected 34 potential interventions to be introduced or intensified within the health sector to target these priority NCDI conditions. These interventions were selected on the criteria of potential health impact, cost-effectiveness, financial risk protection, and priority to the “worst-off”, including those that could avert more severe or premature complications. These interventions require local adaptation and integration into existing health services, which require development and strengthening of human resource capacity, supply chains, and referral pathways.
- **We can avert premature mortality from NCDIs.** With implementation of these interventions at a realistic level of coverage, we expect that over 9000 premature deaths can be averted annually by the year 2030.
- **We can prevent impoverishment from NCDIs.** By expanding social insurance coverage, establishing and strengthening social safety nets, and focusing on more equitable access to both preventive and curative health services



through coherent policies, many households can be spared impoverishment and contribute to economic growth in Kenya. Further analysis is needed to model the impact of these interventions for households affected by NCDIs.

- **More investment for NCDIs is needed.** These interventions would cost roughly 17% of total health expenditure, or \$11.97 per capita annually. Although this represents an almost three-fold increase in current NCD expenditure, these interventions include not only inpatient and outpatient services for NCDs, but also comprehensive mental health, surgical, palliative care, rehabilitation services, as well as community and population-based prevention efforts. There is a need to expand fiscal space for such investments via increases in direct funding through capitation, insurance revenues, and innovative financing mechanisms and partnerships. There can also be increased efficiencies in the health system through integration of existing platforms and resources. Further research and advocacy is needed to better define the potential sources and plans for investments in NCDI prevention and management. These investments would have economic externalities as whilst they protect individuals from ill health and premature mortality, they improve their social developmental capacity and wellbeing that is vital for national building.



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