Tanzania Non-communicable Diseases and Injuries Poverty Commission: Findings and Recommendations

August 2020

THE TANZANIA NCDI POVERTY Commission

Reframing Noncommunicable Diseases and Injuries for the Poorest Billion

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ACRONYMS & ABBREVIATIONS

ACEI	Angiotensin Converting Enzyme inhibitors
ALL	Acute Lymphoblastic Leukemia
AML	Acute Myeloid Leukemia
BMC	Bugando Medical Centre
CHS	Catastrophic Health Spending
COPD	Chronic Obstructive Lung Disease
CVD	Cardiovascular Diseases
DALYS	Disability Adjusted Life Years
DCP 3	Disease Control Priority 3
DHS	Demographic and Health Survey
DSS	Demographic Surveillance Site
ECG	Echocardiography
FNA	Fine Needle aspiration
GBD	Global Burden of Disease
HIV	Human Immunodeficiency Virus
HR HPV	High Risk Human Papilloma Virus
KCMC	Kilimanjaro Christian Medical Centre
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
NCDI	Non- Communicable Diseases and Injuries
NEHCIP	National Essential Health Care Interventions Package
NGO	Non-Governmental Organisation
NIMR	National Institute for Medical Research
ORCI	Ocean Road Cancer Institute
PEP	Post Exposure Prophylaxis
PIH	Partners in Health
RHD	Rheumatic Heart Disease
RTA	Road Traffic Accident
SCD	Sickle Cell Disease
SES	Socio Economic Status
SPA	Service Provision Assessment
THE	Total Health Expenditure
UHC	Universal Health Coverage
USD	United States Dollars
WHO	World Health Organisation
YLD	Years Lived with Disability
YLL	Years of Life Lost

ACKNOWLEDGEMENTS

The development of this report would not have been possible without the joint support of individuals and organisations who contributed tirelessly into the development of this report. Special thanks go to the Tanzanian Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), NCD Synergies / Partners in Health, Department of Global Health and Social Medicine at Harvard Medical School, the Lancet Commission on Reframing Non-communicable Diseases and Injuries for the Poorest Billion, National Institute for Medical Research, National Bureau of Statistics, and other NCDI stakeholders, individuals and organizations. We particularly thank members of the Tanzania NCDI Poverty Commission for their time and dedication to this project.

EXECUTIVE SUMMARY

Non-communicable diseases and Injuries (NCDIs) are increasing globally and disproportionately affect the poor, especially those in low- and middle-income countries. Despite the increased burden of NCDIs, investment in interventions to halt the burden is still low despite increased awareness of the problem at the global level.

The Tanzania NCDI Poverty Commission was established in collaboration with the Lancet Commission on Reframing Non-Communicable Diseases and Injuries for the Poorest Billion with the objective of raising awareness of NCDIs in Tanzania and their relationship with poverty. This also includes an assessment of readiness of the health system to respond to NCDIs in order to further propose cost-effective interventions for priority NCDI conditions. This report presents a summary of the burden of NCDIs in Tanzania from a review of published literature and analysis of global burden of disease data and analysis of data from the Service Provision Assessment and NCD National Surveys. The report also includes a set of proposed priority NCDIs interventions and the proposed estimates of the investment required for implementation.

The findings of this report confirm that NCDIs cause significant burden of disease in Tanzania, accounting for 41% of all DALYs, including disability and premature mortality, and that the burden of NCDIs has doubled in the past 25 years. While it has been described that 80% of the global NCDI burden is attributed to lifestyle factors, namely poor diet, lack of physical activity, smoking and alcohol consumption, this report showed that 79% of the NCDIs DALYs cannot be explained by the traditional behavioural and metabolic risk factors. Further analysis is needed to unpack the risk factors underlying the increase in the burden of NCDIs, including lack of treatment of conditions leading to chronic diseases and the linkage between infectious diseases and NCDs, which tend to be more pronounced in low-income settings. Furthermore, over 60% of NCDI DALYs in Tanzania are from conditions other than Cardiovascular Diseases (CVD), Cancer, Diabetes and Chronic Respiratory Diseases (COPD). One of the objectives of the review was to disaggregate data by poverty and socio-economic indices. For example, evidence from the literature review showed that some NCDI conditions, such as stroke and diabetes, are more prevalent in urban areas, while other conditions, such as anaemia, cervical cancer, and esophageal cancer are more prevalent in rural areas. There is a need to describe the burden of NCDIs disaggregated by socio economic indices to best target the interventions to the right populations. More studies are needed to fill the gap in the knowledge of NCDI risk factors especially in poor populations.

Although included in the essential services package, the availability of NCDIs services were limited overall and there was high variability between rural and urban areas, with lower availability and readiness in rural areas. There were also barriers to accessing treatment for certain conditions, such as hypertension and diabetes, which was more pronounced in rural and lower socioeconomic groups. Positive findings were noted, however, where specific interventions were implemented, such as the National Diabetes Programme. Access to care was also impacted by lack of resources.

Using a priority setting process supported by local data and expertise, this commission identified an expanded set of 48 NCDI conditions for attention and priority to appropriately capture the full burden of NCDIs affecting Tanzanians. In addition to common conditions such as hypertensive and ischemic heart disease, type II diabetes, and chronic respiratory disease, we encourage inclusion of additional conditions with a high burden of disease that particularly affect the young and the poor, such as rheumatic and congenital heart diseases, sickle cell disease and hematologic malignancies, severe chronic respiratory diseases, type 1 diabetes, women's malignancies, severe mental health conditions, and injuries. This commission also selected 53 previously described evidence-based cost-effective health sector interventions to fill the gap for NCDI services to achieve UHC. This set of interventions includes services for NCDs, mental health, injuries, palliative care, rehabilitative care and represents medical, surgical, psychosocial, and community-based approaches that would require integration at multiple levels of the health care system. Existing capacities need to be upgraded, including guidelines, human resources, and training. Overall, the combined annual incremental cost of this comprehensive set of NCD, mental health, and surgical interventions is estimated to be USD $702.9 million, or approximately $12.26 per capita annually, which represents 35.6% of total current health expenditure or 1.32% of GDP.

There is a need to describe the burden of NCDIs disaggregated by socio economic indices to best target interventions. More studies are needed to fill this knowledge gap, and systematic inclusion of socioeconomic indicators in disease registries, health facility reporting, and household surveys such as the Tanzania Demographic and Health Survey. A detailed analysis of possible financing mechanisms, as well as a formal fiscal space analysis, would greatly facilitate target setting and feasibility assessment of inclusion of key NCDI interventions in essential health package and national health insurance to help achieve universal health coverage. Participation is needed from all sectors, particularly from patients and civil society, policy-makers, academia, and clinicians. Advocacy and discussion with these stakeholders may result in greater awareness and high-level commitments to combat an expanded group of NCDIs in Tanzania.

This report has highlighted the increased burden of NCDIs and that the poor and those in rural areas are also affected. The agenda for NCDIs needs to recognise the local burden of disease and include additional conditions that are causing significant burden locally and affect the young, such as epilepsy, sickle cell disease, rheumatic and hypertensive heart diseases, violence, etc, while also affirming to the global recommendations. Services for NCDIs require dramatic strengthening, especially interventions that respond to the needs of the poor. Finally, there is a need to identify sustainable funding for NCDIs and other chronic conditions as the current out-of-pocket expenditures and free treatment policy will not be feasible in the long run and can exacerbate the cycle of poverty as the burden of NCDIs continue to rise.

1. Background

Global policies for Non-communicable Diseases (NCDs) have not yet benefitted the world's poorest people. Despite two United Nations High-Level meetings on NCDs in 2011 and 2018, and their inclusion under target 3.4 of the Sustainable Development Goals, development assistance for NCDs has stalled, and there has been little evidence of progress on domestic investment to address NCDs and injuries (NCDIs) in the poorest. In Tanzania, there have been strong initiatives to address and combat NCDIs. In 2008, the Tanzanian Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) established the NCD Division, whose function is to coordinate the design, implementation and monitoring of policies to address NCDIs. In 2009, the MoHCDGEC also launched the National Noncommunicable Disease Strategy, an 8-year plan for risk factor reduction and health system strengthening. Building on this initiative, in 2016, the MOHCDGEC further developed the Strategic and Action Plan for the Prevention and Control of Non Communicable Diseases in Tanzania (2016-2020), which provided a more updated and detailed approach to addressing NCDIs in Tanzania.

In September 2015, the Lancet launched the Commission on Reframing NCDs and Injuries for the Poorest Billion (Lancet NCDI Poverty Commission).[1] This Commission hypothesized that for the populations living in the most extreme poverty, the endemic burden of NCDIs is much less dominated by preventable lifestyle risk factors and their associated diseases (e.g. coronary artery disease and type 2 diabetes) than it is in other populations. Given this epidemiology, the response to NCDIs among the poorest must be framed in terms of policies that address material poverty and integrated health service delivery strategies. These strategies should complement the existing WHO-supported agenda focused on prevention of emerging behavioural risk factors and their associated diseases.

In 2016, the MOHCDGEC established the Tanzania NCDI Poverty Commission to explore the epidemiology, response, and potential actions for NCDIs affecting the poorest populations in Tanzania. The objectives of this Commission were to:

- Establish the burden of disease of NCDIs in Tanzania, particularly in relation to socioeconomic risk factors
- Understand and document the availability and coverage of health sector services for NCDIs in Tanzania
- Prioritize NCDI conditions that require intervention in Tanzania, emphasizing those causing highest morbidity and mortality, 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 Tanzania

- Estimate the cost and potential impact of these interventions
- Highlight the voices of those impacted by NCDIs particularly those living in poverty

This report summarizes existing and available data regarding the NCDI disease burden and coverage of NCDI interventions in relation to socioeconomic risk factors in Tanzania and proposes potential cost-effective health sector interventions for an expanded set of NCDI priorities. It is the hope of this Commission that these findings can inform dialogue among relevant stakeholders and provide next steps to be undertaken to address NCDIs in Tanzania.

2. Review of literature on the burden of NCDIs in Tanzania

The aim of this review was to evaluate the scope of literature on NCDIs in Tanzania to achieve the following goals:

i. Identify available data sources on NCDIs in Tanzania, including published studies, population surveys and health facility surveys

ii. Quantify the burden of NCDIs and their associated risk factors by socioeconomic factors in Tanzania using existing data sources

iii. Assess the availability and coverage of NCDI services by socioeconomic factors in Tanzania using existing data sources

iv. Assemble relevant experts and stakeholders to review and discuss findings in relation to policy and health system interventions

v. Detail next steps to be undertaken by this Commission to better inform strengthened and expanded NCDI interventions in Tanzania

2.1 DATA SOURCES

Several data sources were used for assessing the burden of disease in Tanzania. One of these was a detailed analysis of the Global Burden of Disease (GBD) study's findings on the burden disease due to NCDIs in Tanzania.[2] This was conducted through the GBD online visualization tool and the datasets linked to it. The second source was a systematic review of published studies on NCDIs in Tanzania. This involved searching PubMed for studies in humans that had been published between January 1st 2006 and July 31st 2016. Search terms included level 2 NCDI categories as defined by GBD Study combined with the word "Tanzania". Studies were classified as relevant for further review if they contained data on prevalence, risk or mortality from NCDIs, preferably stratified by socioeconomic and poverty or by geographic location; reported distributions of

types of NCDI cases among admissions and deaths at health facilities; or if they had details on interventions for NCDIs. For studies that used data from national surveys, we further referred to published literature on the original surveys to abstract relevant data. For example, national estimates for hypertension and diabetes were abstracted from STEPS survey reports.[3] The third source of data involved a secondary analysis of several surveys that previously collected data on NCDIs in Tanzania. These included the WHO supported Stepwise Approach to Surveillance on NCDs, the Tanzania Service Provision Assessment Survey and the Service Availability and Readiness Assessment Survey.

2.2 OVERALL SCOPE OF BURDEN OF DISEASE DUE TO NCDIS IN TANZANIA

Figures 1 shows a comparison of the top causes of burden of disease in Tanzania between 1990 and 2017. There was a reduction in rankings for many communicable, maternal, neonatal and nutritional conditionals. During the same period, there has been was increase in rankings for almost all NCDIs. Currently, NCDIs are more prevalent than communicable diseases at almost all ages, and more than 67% of all prevalent NCDIs occur before age 40 (Figure 2).

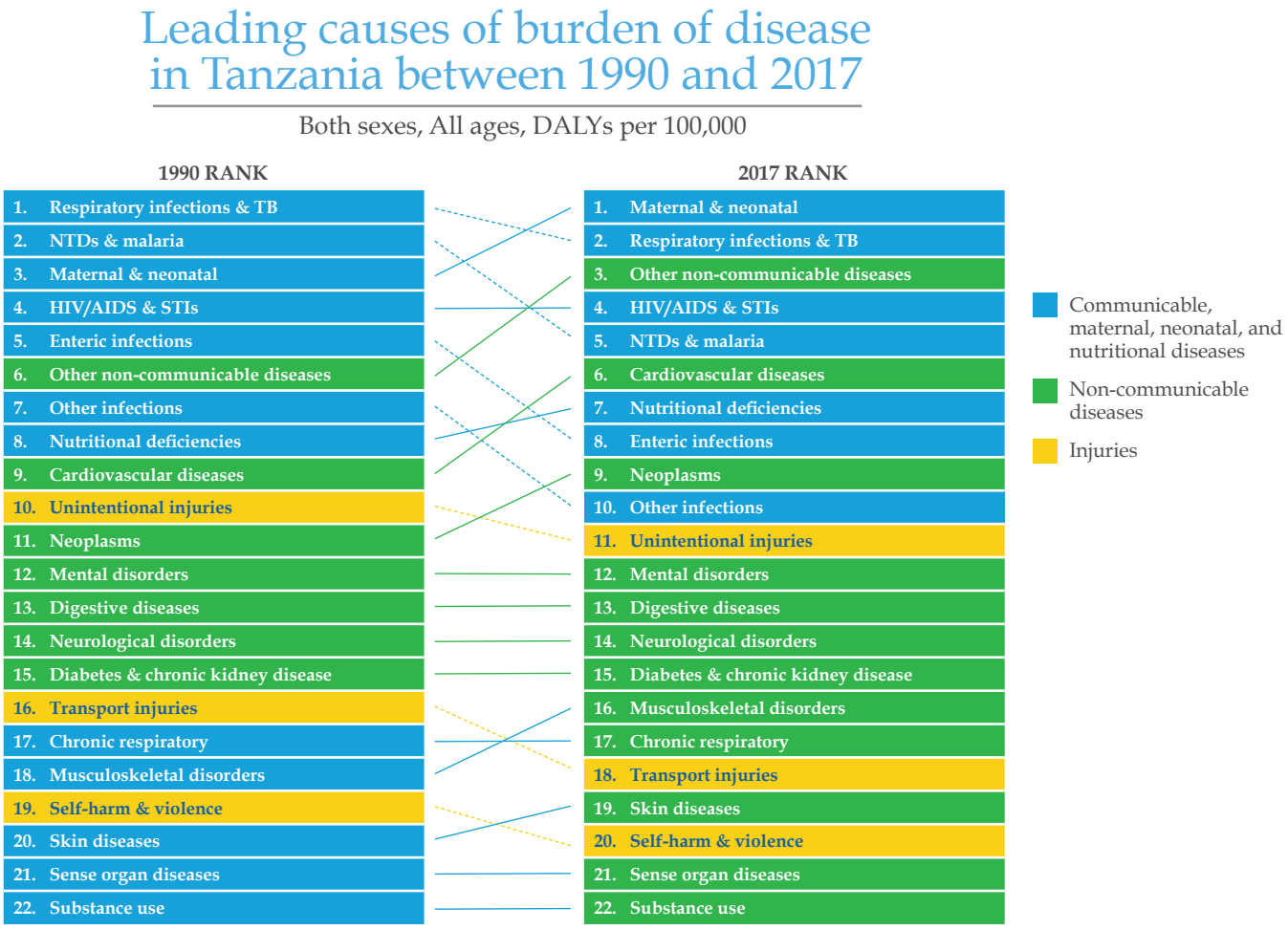

Figure 1: Leading causes of burden of disease in Tanzania between 1990 and 2017, GBD study

Less than 40% of the burden of disease caused by NCDIs in Tanzania is due to cardiovascular diseases, chronic respiratory conditions, cancer and diabetes – the four NCDIs identified by the World Health Organization as top targets for prevention and control (Figures 3). A large proportion (79%) of NCDI DALYs are not attributable to behavioral or metabolic risk factors measured in GBD models. This may support the hypothesis that there are other underlying socio economic and cultural risk factors that are underpinned by poverty (Figures 4).

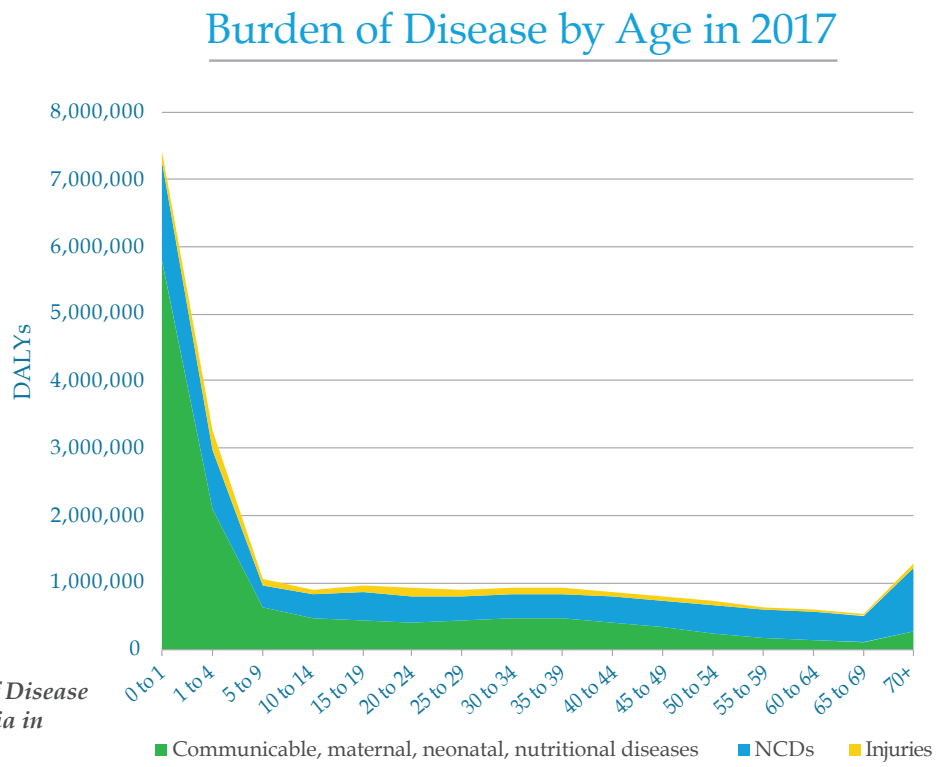

Figure 2: Burden of Disease by Age for Tanzania in 2017, GBD Study

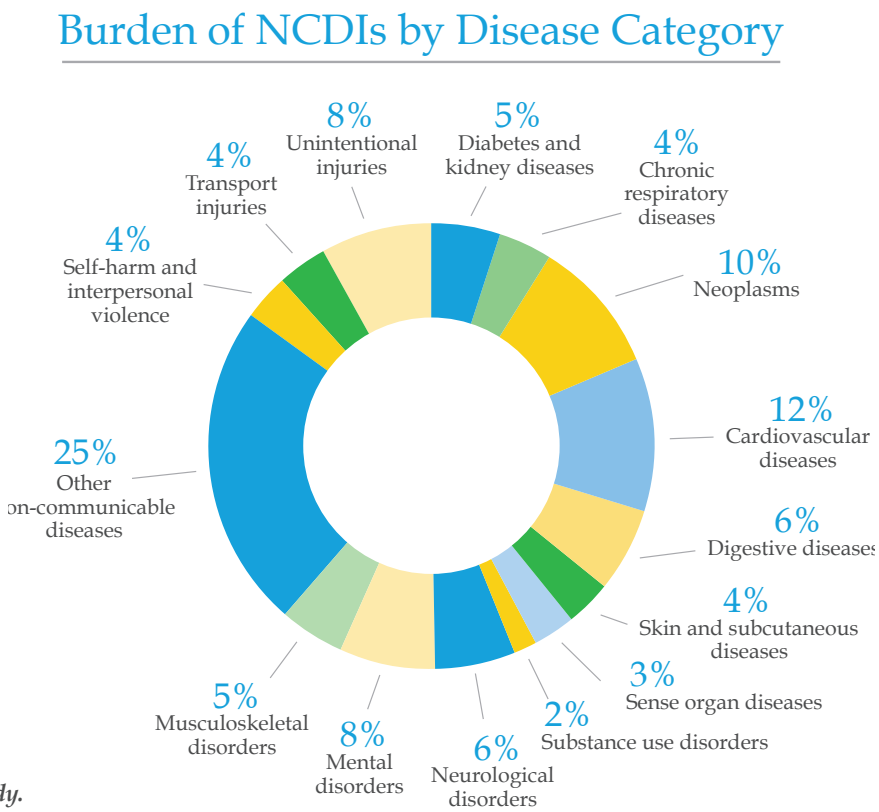

Figure 3: Burden of NCDIs by disease category for Tanzania in 2017, GBD Study.

As seen in Figure 4, cardiovascular diseases have the greatest variability in risk factors. This may reflect both ischemic risk factors such as hypertension, obesity, and smoking, as well as environmental, infectious, or social risk factors for non-ischemic cardiomyopathies, including rheumatic heart disease, post-partum, and other cardo myopathies. "Cirrhosis and other liver diseases" have a considerable portion of behavioural risk factors, presumably alcohol use. Neoplasms and mental and substance abuse both also have some risk attributed to behavioural factors, though minimally so. Diabetes, as expected, has a considerable proportion of risk associated with metabolic and behavioural factors. Both "chronic respiratory diseases" and "musculoskeletal diseases" demonstrate a significant portion of environmental risk, presumably from indoor cooking and overall air quality in the former and occupational exposures in the latter. Overall, however, aside from cardiovascular diseases, all other categories demonstrate approximately half or more of disease that is not attributable to behavioural or metabolic risk factors modelled within the GBD study.

NCDI Risk Factor Attribution by Disease Categoryin 2017

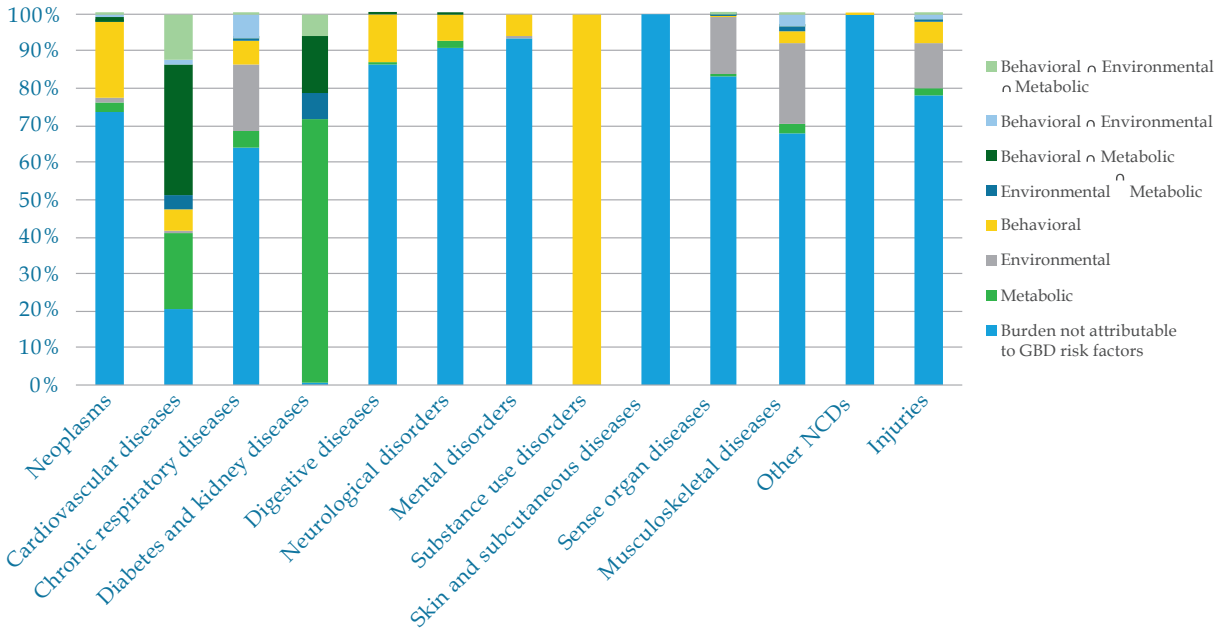

Figure 4: NCDI risk factor attribution by disease category in Tanzania in 2017, GBD Study

2.3 SCOPE OF PREVIOUS STUDIES ON NCDIS IN TANZANIA

The literature search yielded 1,161 published studies on NCDIs in Tanzania from 2006-2016. Twenty percent (N=345) were selected as relevant based on predefined criteria. One-hundred and fifty-five of these had details on links between socio-economic factors and NCDIs (Figure 5). There were no studies on cirrhosis and chronic liver disease or on musculoskeletal disorders with details on how socio-

economic factors in Tanzania affect these conditions. Categories that have the largest proportions of relevant studies included injuries, neoplasms, cardiovascular diseases and mental health conditions, all with 30% of studies categorized as relevant. Most of the literature on NCDIs in Tanzania is from studies that were conducted in urban settings and regional or referral hospitals.

Published Literature on NCDs in Tanzania

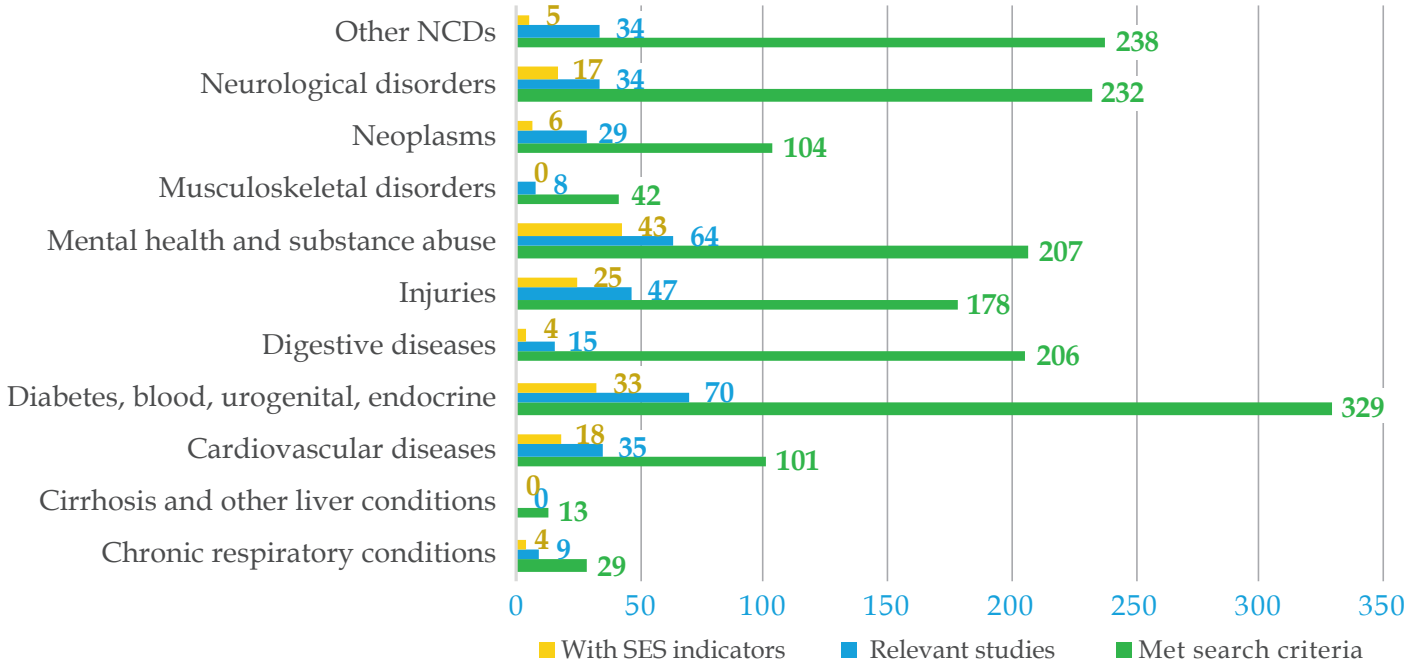

Figure 5: Identified Published literature on NCDs in Tanzania based on search criteria

2.3.1 CARDIOVASCULAR DISEASES

A large proportion of literature on NCDIs in Tanzania is on hypertension. The national prevalence of hypertension among adults aged 25-64 is 26% with no difference by sex.[3] No studies have assessed regional differences but one study found similar proportions of individuals with hypertension in urban and rural areas of Mwanza.4 People living in rural areas were however more likely to be unaware of their hypertension and therefore less likely to be on treatment. Over 90% of hypertensive people in Tanzanian are not on blood pressure medication and individuals that are diagnosed with hypertension often do not seek the required health care.[3,4] A study in Mwanza region found that only a third of patients that are diagnosed with hypertension seek care during the next 12 months.[4] Lack of symptoms and the cost of treatment were listed as the most common reasons for not seeking care.

Hypertension-related diseases are the leading cause of deaths (after HIV) at Bugando Medical Centre, and the leading cause of deaths due to NCDs (34%).[5] The hospital mortality rate for these conditions at this referral hospital was 19.5 per 100 admissions and the leading causes of deaths were hypertensive stroke (37 per 100 admissions), hypertensive renal disease (29 per 100 admissions), hypertensive heart failure (17 per 100 admissions) and hypertensive emergencies (9 per 100 admissions).

There have been more studies on stoke than on ischemic heart disease in Tanzania. This is in part due to The Tanzania Stroke Incidence Project, one of the few population-based cohorts on stroke in sub-Saharan Africa.[6] This study documents incident stroke cases in the rural demographic surveillance site (DSS) in Hai district and an urban DSS in Dar es Salaam. Between 2003 and 2006, the age adjusted incidence of stroke was 109 per 100,000 in Hai and 315 per 100,000 in Dar es Salaam. These estimates are comparable to annual figures from the GBD Study.2 There has also been a gradual increase in the mean age and proportion individuals admitted with stroke that are women.[6] Over 80% of cases of stroke that present at health facilities are due ischemia[7] and a large proportion of these die within 3 to 7 years.[8] By WHO estimates, Tanzania had the 6th highest number of Ischemic Heart Disease deaths in sub-Saharan Africa with 191,000 deaths in 2008.[9]

The commonest causes of heart failure in patients seen at Muhimbili National Hospital, Dar es Salaam are hypertension (45%), cardiomyopathy (28%), rheumatic heart disease(12%), and ischemic heart disease (9%).[10] Individuals diagnosed with heart failure in Tanzania are on average younger than those from high income settings and hypertension is gradually becoming a more important risk factor for heart failure than rheumatic heart disease (RHD). There are no published studies on the burden of RHD and other cardiomyopathies in Tanzania. According to the GBD there were 1,140 per 100,000 cases of RHD in Tanzania in 2016, with a large majority aged between 5 and 40 years.

2.3.2 DIABETES MELLITUS

According to the 2012 Tanzania STEPS survey, the prevalence of diabetes in adults aged 25 to 64 years was 8% in males and 10% in females.[3] Over 90% of people in this survey had never been assessed for diabetes and over 90% people found to be diabetic were newly diagnosed. The prevalence of diabetes in urban settings of Kilimanjaro is double that of rural areas (10% vs. 5%)[11]. Adherence to antidiabetic therapy is generally low as shown by a study in Dar-es-Salaam that reported adherence rates of 60% at one week and 71% at three months.[12] The most common reasons for the poor adherence were high medication costs (57%), disappearance of symptoms (18%) and medication side effects (12%).

About half of diabetics in Tanzania were estimated to have complications such as diabetic retinopathy[13] and diabetic foot.[14] The proportions of reported complications do not differ by sex, education and locality (rural and urban).[13] In one study, a third of patients attending a diabetic clinic in Dar es Salaam had diabetic foot and 10% had undergone major amputation.[14] Some studies have also looked at the cost of managing diabetes and its complications, and found that annual costs for complications like haemodialysis and diabetic foot ulcers are too expensive for both patients and the government.[15] For example, the cost of treating diabetic foot ulcers at referral hospitals ranges from $102 for uncomplicated ulcers to $3000 for complicated ones.

2.3.3 ANEMIA, SICKLE CELL DISEASES AND GOITRE

Forty-five percent of women aged 15 to 59 years and 58% of children aged 6 to 59 months in the 2015 Demographic and Health Survey (DHS) were anaemic.[16] Children with mothers that had at least secondary education are less likely to be anaemic than those with no education (prevalence: 54% vs. 66%). Children from households of the lowest wealth quintile are more likely to be anemic than those from the highest quintile (prevalence: 50% vs. 64%). Although a large proportion of this is due to infectious and nutritional causes, the resulting chronic anaemic states can have an impact on other NCDs.

In 2012, 6 per 1000 live births in Tanzania had Sickle Cell Disease (SCD) resulting in 11,877 new cases of SCD per year.[17] Annual mortality rate of SCD in Tanzania was 1.9 per 100 person-years between 2004 and 2009.[18] An estimated 10,313 children aged 5 years or younger with SCD are estimated to die every year, thereby contributing 7% of overall deaths of children aged 5 years or below.[17] These figures are much higher than those reported by the GBD Study, which estimated mortality rate at 4.2 per 100,000 in 2007 and 1,717 deaths for that year. The prevalence of goitre in children aged 6 to 9 years living in goitre-endemic districts reduced from 61% in 1980 to 12% in 2004.[19] In 2007, 83% of households iodine deficient in Tanzania mainland and 64% of household in Zanzibar were using iodized salt.[20]

2.3.4 DIGESTIVE DISEASES

Only a few studies have been published on digestive diseases in Tanzania. One of these was conducted at Bugando Referral Hospital and found that obstructed hernias were the commonest cause (33%) of dynamic bowel obstruction.[21] Other causes included obstructive bands (19%), volvulus (17%), malignancies (12%), and intestinal tuberculosis (9%). A second study from the same hospital reported gastric cancer as the commonest malignant cause of gastric outlet obstruction and

peptic ulcer disease as the commonest benign cause.[22] Congenital pyloric stenosis is the commonest (13%) cause of gastric outlet obstruction in children.[23] The majority (91%) of patients that presented with obstruction in this study underwent surgery while the rest were managed conservatively. In another study at Kilimanjaro Christian Medical Center the commonest causes of upper GI bleeding were esophageal varices (42%), duodenal ulcers (15%), hemorrhagic gastritis (8%), gastric ulcers (5%) and Mallory Weiss tears (2%). Conservative medical therapy was carried out in 52% of the cases, whereas endoscopic therapy and surgical intervention was used in 47% and 2% of cases respectively. Mortality rates in the above three studies in patients that presented with digestive diseases ranged from 14% to 19%.

2.3.5 MENTAL HEALTH

The GBD Study estimates that over 7 million Tanzanians currently have mental and substance abuse disorders. There are no nationally representative studies that used primary data to verify this figure but multiple studies exist from different parts of the country. Alcohol use and abuse is one of the most frequently studied area in this category.[24–28] The prevalence of alcohol use and abuse is higher in men,[27] with regional differences in the alcohol consumption. For example, alcohol use is more common in Kilimanjaro than in Mwanza. These patterns are mostly due to social and cultural differences as opposed to economic drivers. The age of onset of alcohol intake is below 18 years for most people who take alcohol[28] and several studies have linked alcohol intake to risky sexual behavior.[24,26] Fewer studies have been published on abuse of other substances but there is evidence of concerning rates of injection drug use and other illicit drugs in urban settings.[25,29,30] It was estimated that 50,000 Tanzanians were using opiates in 2011.[31]

Over 1.5 million people are estimated to be have depressive disorders in Tanzania, the majority being women.[2] This is consistent with findings from primary data that found a low prevalence (3%) of depression and anxiety in Dar-es-Salaam.[32] There are however higher rates of these conditions reported in HIV positive individuals.[33] Intimate partner violence by men has also been shown to be a contributing factor to depression in Tanzanian women.[34] There were no published studies comparing rates of mental health by socio-economic status.

2.3.6 NEUROLOGICAL DISEASES

Fourteen million Tanzanians are estimated to have some form of neurological disorder, the majority of whom are age 40 years or younger[2]. There have been several studies on neurological conditions in elderly individuals from Hai dis-

trict[40–42]. The prevalence of neurological conditions in this population is 15%, a large proportion of which are tension and migraine headaches. Of individuals identified with neurologic diseases, only 65% accessed medical treatment.[42] Only 14% of patients had been diagnosed prior to the survey and 10% had received treatment for their conditions. Patients are more likely to seek treatment for conditions with high levels of disability.

There is a low prevalence of neurological diseases that are commonly associated with aging.[35] In 2009, the age-adjusted prevalence of Alzheimer's Disease and vascular dementia was 3.0% and 2.6% in 2009.[35] Likewise, another study found a low prevalence of Parkinson's disease in adults aged 50 years or older, with only 3 of 1,269 individuals being diagnosed with the disease.[36]

The estimated prevalence of epilepsy from population-based surveys is between 1 to 2.7 per 1000 with a preponderance in women.[37,38] About half of individuals with epilepsy are reported to have active disease and approximately 70% of epilepsy patients do not access required treatment.[38]

Th prevalence of tension-type headaches in Tanzania has been estimated to be 20% with regional differences.[39] The prevalence of tension headaches in Mbulu district is 7% with higher rates reported in women and aged 41 to 50 and men aged 60 years or older.[39] In 2003, the prevalence of migraine headaches in Manyara region was 28% with an annual attack rate of 18 episodes.[40]

Several studies have looked at eyesight and related conditions. One assessed 400 children aged 6 to 17 years old in Kibaha and found poor vision in 9.5% of them.[41] Females in this study were more likely to have poor vision than males and congenital anomalies were the most common cause of poor vision. The prevalence of bilateral blindness in a population-based study in individuals aged 50 years or older from Kilimanjaro was reported to be 2.4%, with most of this due to cataracts.[42] The estimated prevalence of blindness in children in the same region is 17 per 100,000. A study in 256 randomly selected diabetic patients in Zanzibar found that 65% of them had diabetic retinopathy and that 20% had visual impairment.[43] Only 10% of patients in this study had undergone an eye check-up in the past year.

2.3.7 RESPIRATORY DISEASES

The few studies that have been carried out in this category are on asthma and chronic respiratory disorders that are as a result of occupational hazards. A study conducted in secondary school children (n=610) in rural (Bagamoyo) and urban (Ilala) areas reported a prevalence of asthma was 12.1% in Bagamoyo and 23% in Ilala.[44] Another cross-sectional study in Manyara among children aged 9-10 years found a prevalence of 24% with severe symptoms in 5% of them in last one year.[45] Several studies have reported severe chronic respiratory symptoms among workers in coffee, sisal, cement and coal factories.[46–48]

2.3.8 NEOPLASMS

The Tanzanian Ministry of Health estimates that 40,000 new cases of cancer occur each year.[49] Cervical cancer is most frequent cancer in Tanzania.[50] More than 7,300 women were diagnosed with cervical cancer in Tanzania in 2016 and over 4200 died from the disease that year.[50] A cross-sectional study in apparently healthy women aged 25-59 years in Dar es Salaam (N=10,374) found that 4.8% had stage 1 to stage 3 cervical cancer.[51] The prevalence of high risk human papilloma virus (HR HPV) in Tanzania is 20% and ranges from 15% in women with normal cytology to 94% in women with high grade cervical cancer.[52] The prevalence of HR HPV is also significantly higher in women from rural areas and in HIV positive women. A large proportion of women that are diagnosed with cervical cancer in Tanzania present in advanced stages when curative care can no longer be considered.[53] Factors associated with late presentation relate to poor access and utilization of health care services.[53–55] It is also estimated that only 10% of cervical cancer cases are seen at tertiary centers that can provide required care, 80% of who present with late stage cancer.

The age-standardized prevalence of breast cancer in Tanzania 19.4 per 100,000 women and breast cancer represents 14% of new cancer cases.[56] There were an estimated 1,500 deaths due to breast cancer in Tanzania in 2016.[2] Most women diagnosed with breast cancer present at advanced stages.[57–59] The mean age at breast cancer diagnosis is 52 years, the majority being postmenopausal multiparous women.[59] There is high awareness of breast cancer in Dar es Salaam with 98% of women in one survey reporting knowledge of the disease.[60] However only 50% of them were knowledgeable on common symptoms of breast cancer. Also, although half of them were aware of self-breast exams, 40% of them did not practice it. The commonest histological type of breast cancer seen is invasive ductal carcinoma and almost half of the cases are both estrogen and progesterone receptor negative.[58] The most optimal choice of management in women diagnosed with breast cancer is usually mastectomy with adjuvant chemotherapy and hormonal therapy.[57] Five-year survival rates are estimated to be only 21%, with 17% of women experiencing local tumor recurrences.[57]

A study in 184 patients that presented with gastric outlet obstruction at Bugando Medical Center found that cancer was the most common malignant cause implicated.[22] The majority of (92%) of patients diagnosed with gastric cancer at this hospital present at advanced stages and the male to female ratio is 3:1.[61] Almost all patients are treated surgically with chemotherapy reported in less than a quarter of them. Postoperative complications occur in over a third of the surgical cases and five-year survival rate in this study was only 7%. Another common gastro-intestinal cancer in Tanzania is esophageal cancer, which is more prevalent in rural than urban areas and in males with a sex ratio of 2:1.[62] Esophageal cancer has also been reported to be more prevalent in the central and eastern parts of Tanzania.[63]

There was a 6-fold increase in documented cases of colorectal cancer at two hospitals in Dar es Salaam in the period between 2005 and 2015.[64] There are no sex-differences in the prevalence of colorectal cancer and 60% of diagnosed patients are between the ages of 40 and 69 years. A cross-sectional study in 322 patients diagnosed with colorectal cancer in Mwanza found that almost all (98%) were surgically managed.[65] Post-operative complications, cancer recurrence and morality were reported in 26%, 19% and 11% respectively.[65]

Commonly diagnosed pediatric cancers in Tanzania include leukemia and Burkitt's Lymphoma.[66,67] A chart review of 106 cases of leukemia diagnosed at Ocean Road Cancer Institute between 2008 and 2010 revealed that 77% were due to acute lymphoblastic leukemia (ALL) and 24% due to acute myeloid leukemia (AML).[66] The majority (84%) of ALL cases and 35% of AML cases achieved complete remission after chemotherapy leading to a 2-year event-free survival of 33% for ALL but none (0%) for AML. This is in comparison to only one survival in 20 children that were diagnosed with leukemia at this center in 2005. A survey in 6 hospitals from Mwanza and Mara estimated a 1.4:1 male to female ratio for Burkitt lymphoma.[67] Its incidence is estimated to have peaked in 2001 and thereafter gradually declined. Tumors occur at a younger mean ag in boys as compared to girls (6.8 vs. 7.6 years) and boys are more likely to have facial tumors (50% vs. 36%)

2.3.9 OTHER NCDS

Dental disorders, skin disorders and congenital diseases in this category. A study conducted in rural Kilimanjaro (n=1,435) found that 75% of participants had dental fluorosis and 4% had juvenile skeletal fluorosis.[68] Factors associated with these conditions included low body mass index, drinking well water, not being weaned off bananas and the use of fluoride salts in cooking during childhood. The prevalence of dental carries in children aged 3 to 5 years in Moshi was reported to be 30%.[69] Similarly, 20% of children examined in a school based survey were found to have carries, with a higher prevalence in children from rural areas. Another study assessed access to dental care in two refugee camps in Kigoma and found that extractions accounted for 96% of procedures performed.

Two studies on skin disorders were relevant for further review. One population based study conducted in Dar es Salaam reported the prevalence of any skin disorder of 57%.[70] A large proportion of these (30%) are infectious dermatoses with superficial fungal infections, with tinea capitis being the most common (20%). The majority of the affected children (67%) did not seek any medical assistance. The second study documented skin disorders in 55% of children, with tinea versicolor as the leading cause (26%). Other common conditions included pyoderma and dermatophytoses, scabies and eczematous lesions.[71]

A hospital based study from Mwanza (n=455) reported a prevalence of congenital anomalies of 29%, with most anomalies in the central nervous system (CNS), musculoskeletal system and digestive tract.[72] Maternal factors that were significantly associated with congenital anomalies included the lack of peri-conception use of folic acid, a maternal age of above 35 years and an inadequate attendance to antenatal clinic.

2.3.10 INJURIES

Injuries have been studied more extensively in Tanzania when compared to other NCD categories. Although none of these are national studies, existing literature on injuries is from different geographical regions including both urban and rural settings. Road traffic accidents (RTAs) are a common cause of fatal and non-fatal injuries in Tanzania.[73-75] The GBD study estimates that there were over 460,000 people involved in RTA and over 57,000 deaths were due to RTAs 2016. A large proportion of these involve young males that ride motorcycles in with no helmets.[73] Alcohol intoxication has been identified as a common cause of severe cases of injuries due to RTAs.[74] The median duration of admission for RTA patients ranges from 12 to 33 days, depending on the severity of the injuries with longer duration observed in patients with lower limb injuries. A study in Bugando Referral Hospital reported an RTA mortality rate of 16%,[75] while another found that though motorcycle accidents are more common, their mortality rate is lower than that for motor vehicles.[76]

Other common causes of injuries include burns, animal bites and intentional injuries.[77-80] A community-based study in Dar es Salaam found that burns represent 16% of reported injuries in children.[78] Annual exposure to rabies in two rural districts in northwestern Tanzania has been estimated to be between 6 and 141 per 100,000, with a higher risk in pastoralists and households that have dogs[79]. Post-exposure prophylaxis in this study reduced the mortality rate by 27%. Some of the barriers to PEP include long-travel distances and drug stock-outs.[80]

Intentional causes are also common causes of injuries.[21,81] One study reported observed suicide rates in a hospital-based surveillance study to be low.[81] Instead almost all (97%) of intentional injuries are due to interpersonal violence, with most of this in young males. Gunshot wounds account for 12% of all intentional injuries and poverty, employment and alcohol-use are common factors reported in cases of intentional injuries.

3. NCDI conditions and risk factors by socioeconomic status

There is limited data from primary studies that describes the influence of socio-economic factors on NCDIs. Therefore, we explored additional large survey data on NCDIs and NCDI risk factors disaggregated by socioeconomic status.

3.1 HYPERTENSION

According to the STEPs survey,[3] the majority (74%) of survey participants found to have raised blood pressure were never previously diagnosed (Figures 6-7). Less than a third of those who had been previously diagnosed were accessing treatment. There was no association between income and odds of having raised blood pressure but individuals with tertiary education level were associated with higher odds of having hypertension (Table 1). Being employed was also associated with higher odds of raised blood pressure.

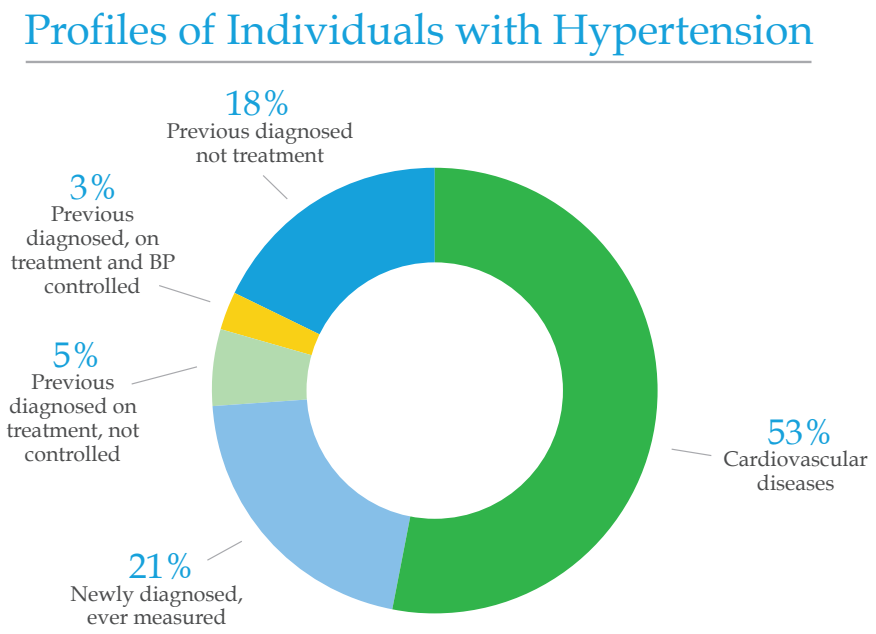

Figure 6: Profiles of individuals with hypertension in Tanzania

3.2 DIABETES

Socioeconomic gradients were observed in individuals with raised blood sugar. Seventy-seven percent of individuals with raised blood glucose were previously not diagnosed, and only half of those that had been previously diagnosed were accessing treatment (Figure 8-9). Individuals of lower wealth quintile, less education, and those from a rural setting were all less likely to have prior blood glucose assessment.

Profiles of Hypertensive Individuals in Tanzania by Wealth Quintile, Setting and Education Level

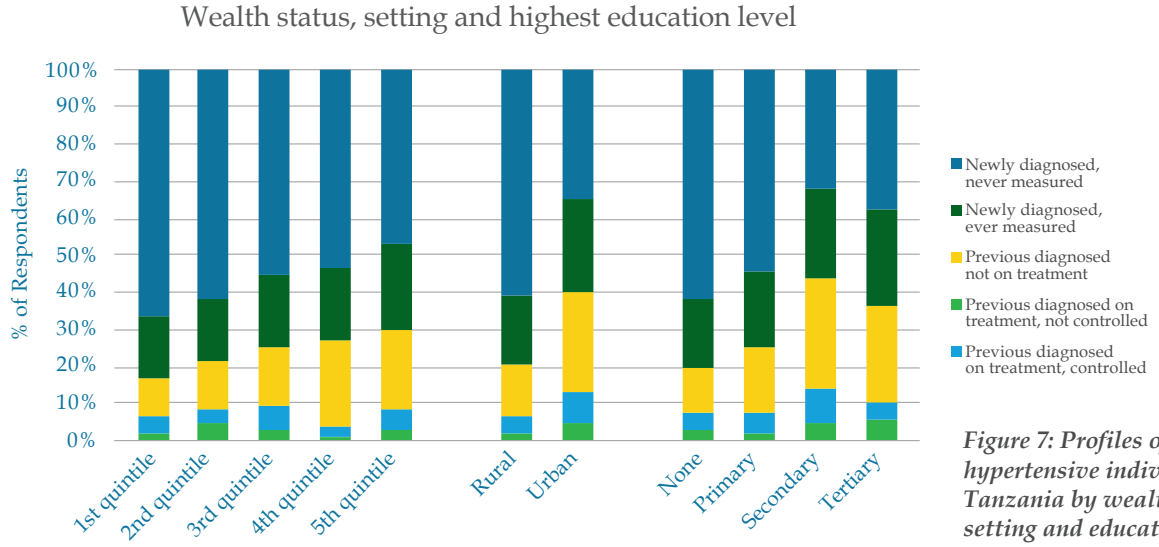

Figure 7: Profiles of hypertensive individuals in Tanzania by wealth quintile, setting and education level

Estimated Risk for Non-ideal Cardiometabolic Risk Factor Levels in Tanzania by Socioeconomic Factors

Characteristic	Raised Blood Pressure [a] AOR (95% C.I.)	Raised Blood Glucose [b] AOR (95% C.I.)	Overweight or Obese [c] AOR (95% C.I.)
WEALTH STATUS			
1st quintile	Ref	Ref	Ref
2nd quintile	1.04 (0.65-1.64)	0.93 (0.50-1.74)	0.77 (0.38-1.59)
3rd quintile	1.20 (0.76-1.89)	0.78 (0.40-1.52)	1.21 (0.56-2.58)
4th quintile	1.07 (0.60-1.92)	0.76 (0.41-1.43)	1.36 (0.62-3.02)
5th quintile	0.94 (0.65-1.35)	1.18 (0.63-2.18)	1.45 (0.73-2.88)
EDUCATION			
None	Ref	Ref	Ref
Primary	1.13 (0.86-1.47)	0.70 (0.47-1.06)	1.18 (1.27-2.52)
Secondary	1.14 (0.77-1.67)	0.84 (0.50-1.44)	3.01 (2.00-4.80)
Tertiary	2.34 (1.31-4.15)	0.80 (0.41-1.56)	4.70 (2.63-8.39)
SETTING			
Rural	Ref	Ref	Ref
Urban	1.07 (0.87-1.31)	1.20 (0.91-1.56)	2.20 (1.76-2.75)
SEX			
Male	Ref	Ref	Ref
Female	1.07 (0.85-1.34)	1.09 (0.83-1.45)	4.06 (2.88-5.72)
EMPLOYED			
No	Ref	Ref	Ref
Yes	1.25 (1.00-1.58)	0.85 (0.56-1.28)	1.42 (1.07-1.87)
MARITAL STATUS			
Single [e]	Ref	Ref	Ref
Married or cohabiting	1.13 (0.90-1.42)	0.98 (0.64-1.50)	1.77 (1.37-2.29)

Adjusted Odds Ratio (AOR), Confidence Interval (CI)

[a] *Raised blood pressure defined as systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥ 90 mmHg or currently on treatment for hypertension*

[b] *Raised blood glucose defined as a fasting blood glucose of >= 7.0 mmol/L*

[d] *Overweight defined as Body mass index ≥ 25 kg/m2; Obesity defined as BMI ≥ 30 kg/m2*

[e] *Includes widowed and separated*

Table 1: Estimated risk for non-ideal cardiometabolic risk factor levels in Tanzania by socioeconomic factors

3.3 SMOKING AND ALCOHOL CONSUMPTION

There are no marked differences by income, education level and setting (rural or urban) in alcohol consumption.[3] Results from DHS survey also showed that about 1% and 14% of women and men, respectively, were current tobacco smokers and nearly all smokers were daily smokers.[16] The proportion of women that smoke was unchanged between 2004 and 2010. On the contrary, the percentage of men who smoke has been declined from 22% in 2004, 21% in 2010, and 14% in 2015. Older men are more likely to be smokers than younger ones – 33% of men aged 45-49 years were smokers as compared to only 1% aged 15-19 years. There is an inverse pattern between the prevalence of smoking among men with increasing education and wealth. The prevalence of smoking any tobacco was 23% among men without any formal education as compared to 7% in those with at least secondary education. The prevalence of smoking any tobacco was 18% and 11% among men with lowest and high wealth quintile, respectively. Smoking rates are similar in urban areas and rural areas.

3.4 OVERWEIGHT AND OBESITY

In 2012, 26% of Tanzania's aged 25 to 64 were overweight and 9% were obese. The two conditions were more prevalent in women than in men (37% and 15% vs. 15% and 2%). Urban residence, higher education attainment and being employed were all associated with increased risk for overweight and obesity (Tables 1). Those with tertiary education were almost 5 times more likely to be overweight or obese than those with no formal education, while those in urban settings are twice as likely than individuals in rural areas.

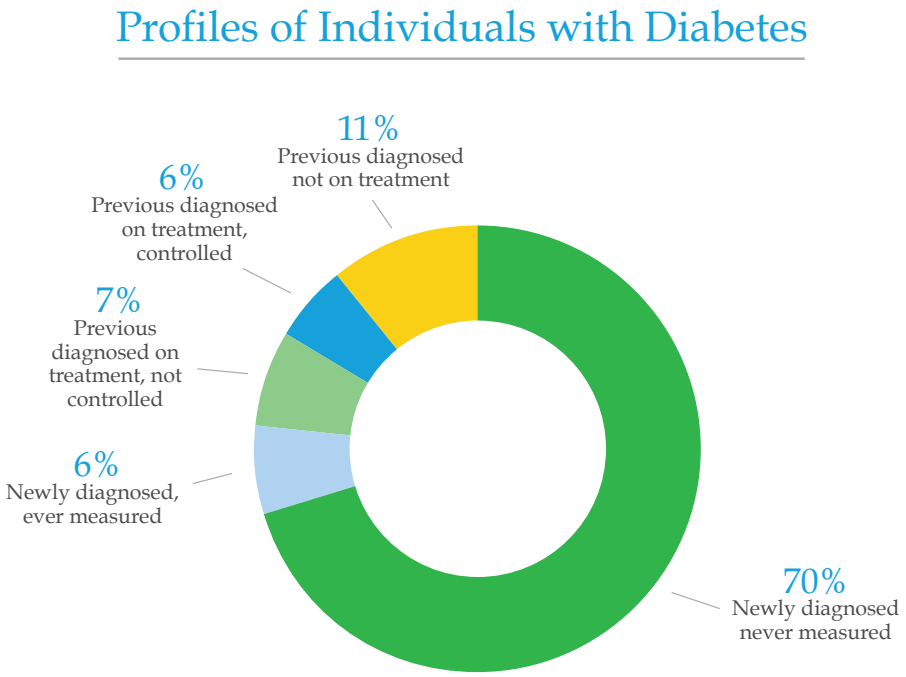

Figure 8: Profiles of individuals with diabetes in Tanzania

Profiles of Individuals with Diabetes in Tanzania by Wealth Quintile, Setting and Education Level

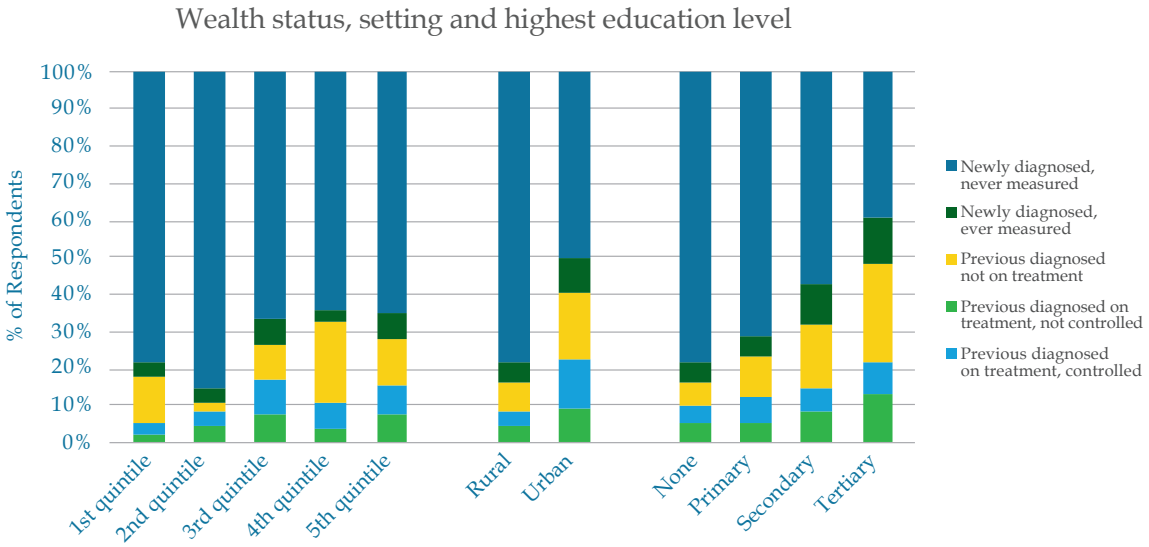

Figure 9: Profiles of individuals with diabetes in Tanzania by wealth quintile, setting and education level

4. Review of policies and health financing for NCDIs in Tanzania

The 2015-2020 Health Sector Strategic Plan highlighted the increasing proportions of individuals with NCDs in Tanzania and laid out several strategies for addressing them, including community-based prevention, health promotion activities, and early treatment and rehabilitation.[82] MoHCDGEC plans to implement these strategies by integrating NCD care with existing services for other conditions Tanzania and has had two Strategic Plans specific for addressing NCDs.[83,84] The first plan covered the period between 2008 and 2018, and it focused on increasing public awareness of NCDs and associated risk factors, promoting preventative activities for NCDs, strengthening the capacity of health workers to diagnose and manage NCDs, and strengthening community-based programs to address NCDs.[83] Building on the successes of the initial plan, MoHCDGEC launched a second 5-year strategic plan in 2016 whose overall target was to reduce NCD-related mortality by 25% by 2025.[84] This would be achieved by increasing advocacy for NCD prevention and control, strengthening leadership, governance and multisectoral collaboration in addressing NCDs, reorienting the health system to address NCDs through promotive, preventative, curative and rehabilitative services, and strengthening national capacity for NCD surveillance, evidence-based planning and monitoring and evaluation. This plan also laid out targets indicators and indicators that would be used to assess progress. The government has also developed several disease-specific policies and control programs, such as the National Eye Care Strategic Plan (2011-2016), Mental Health Act (2008),

Tobacco Products Regulations Act (2014), Occupational Health and Safety Policy (2009), and Cancer Control Strategy (2013-2022).

The 2013 Standard Treatment Guidelines & National Essential Medicines List provides detailed guidance for health providers on the diagnosis and management of common NCDIs in line with international standards.[85] The medicines list was also developed to be consistent with the WHO recommendations under existing conditions in Tanzania, so as to simplify the drug supply mechanisms throughout the country. However, although these guidelines specify NCDI drugs that are expected at different tiers of the health system, some commonly used NCDI drugs for NCDIs are not expected to be provided at low-level health units. For example, oral hypoglycaemics can only be provided at Council or higher level hospitals. In 2018, MOHCDGEC launched updated standard treatment guidelines which improved access to NCD medications at lower levels of care.

A review that was commissioned by MoHCDGEC found that a minimum health benefits package that contains funding for common in and outpatient services, as well as drugs on the essential drug list (including some for NCDIs), would cost 34 dollars per capita.[86]

Government contribution as percent of total health expenditure (THE) was 64% in 2016. In the same year, 7.80% of THE was on NCDs, and 0.64% on injuries. Expenditure on NCDs in Tanzania increased from 45 million US dollars (USD) in 2012 to 154 million USD in 2016, translating to an increase in per capita expenditure on NCDs from 2.73% to 8.74% (Figure 10).[87] Domestic funding on NCD services in this 4-year period increased by over 300% (34 million USD to 144 million USD). Almost half (47%) of health care spending on NCDs is used to compensate employees. Total health expenditure on injuries has remained relatively constant from 2012 (14 million USD) to 2016 (13 million USD) (Figure 11).

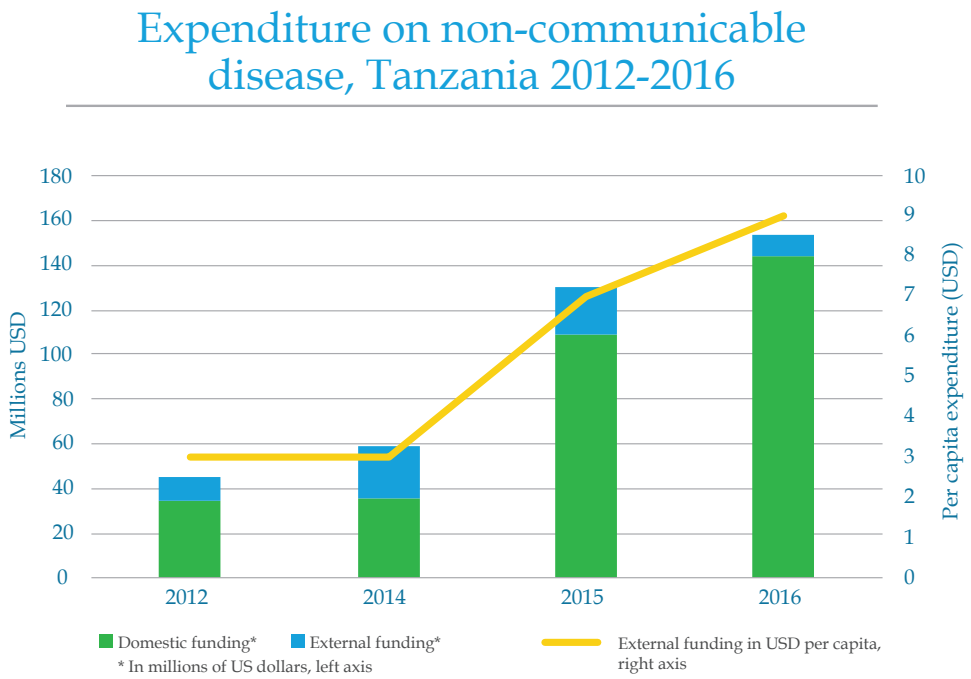

Figure 10: Expenditure on NCDs in Tanzania, 2012 to 2016

Expenditure on Injuries, Tanzania 2012-2016

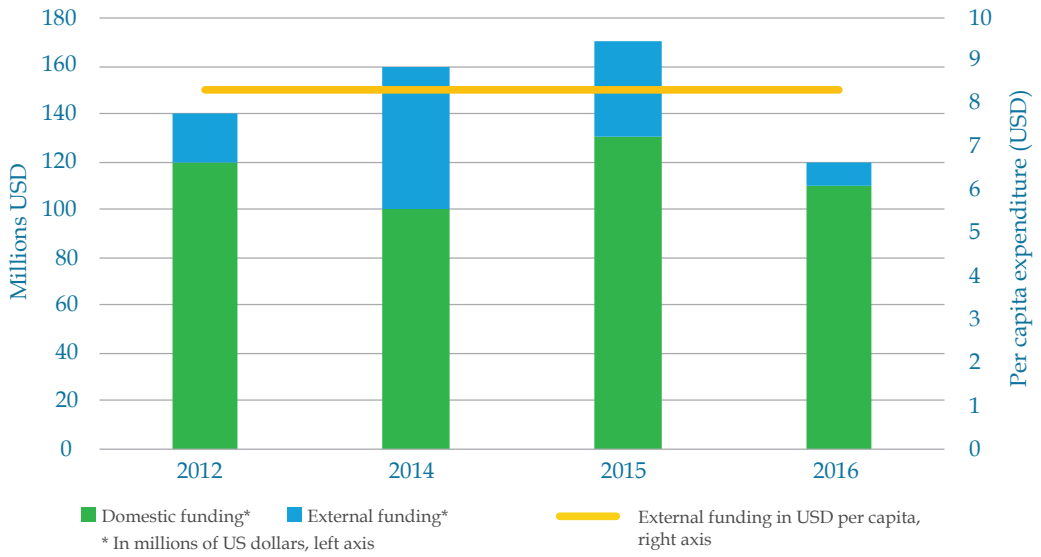

Figure 11: Expenditure on injuries in Tanzania, 2012 to 2016

5. NCDI Service availability

The Ministry of Health has developed a National Essential Health Care Interventions Package (NEHCIP 2013) that includes expected standards for delivery of non-communicable disease and injuries (NCDIs) services by different types of health facilities. By these standards, dispensaries are expected to provide long-term care for mild to moderate hypertension and diabetes including routine monitoring of blood pressure and blood glucose. Dispensaries are expected to offer clinical dia¬¬gnosis, early detection and referral for neoplasms, as well as palliative care for patients with terminal cancer. With regards to injuries, these facilities are expected to provide first aid, pain relief and antibiotic cover for injuries and, refer those who need blood transfusion. For mental conditions, dispensaries should offer early detection and long-term follow up of psychoses, epilepsy and mental retardation. Health workers at these facilities are expected to refer complicated NCDIs to higher level health facilities.

In addition to services provided by dispensaries, health centers are expected to treat cardiac and diabetic emergencies, have in-patient services for minor injuries including intravenous fluids and gastric lavage, and to offer brief admission to patients with psychoses and psychological disorders. Referral hospitals are expected to provide a tertiary level specialised and super-specialised care for NCDIs such as dialysis, kidney transplants, cardiac surgeries and implants, orthopaedic implants and neurosurgeries. By 2014, no standards were yet set for clinics; another level of health facilities that is included in this review.

According to the 2014 Service Provision Assessment (SPA) survey for Tanzania, there was low availability of most NCDI services. Only 26% of surveyed facilities had the ability to provide services for diagnosing and managing diabetes, 16% for hypertension, 4% for asthma and 9% for basic surgical services. Health facilities in rural settings generally had lower availability of NCDI services when compared to those in urban areas (Figure 12). Although service availability was generally better in higher level health facilities, the overall availability of these services at the hospital level was still lower than expected for all NCDI areas measured, including diabetes (26%), hypertension (16%), asthma (4%), and surgical services (9%). Clinics were more likely to have non-surgical NCDI services than dispensaries and for some conditions, they were also better than health centers (Figure 13). However, most of the clinics that surveyed were private-for-profit or run by non-governmental organizations. Government owned (public) health facilitates generally had lower availability of health services than privately owned or those managed by faith-based facilities and non-governmental organizations (Figure 14).

5.1 DIABETES SERVICES

By national standards, dispensaries were expected to have services to screen for blood glucose, treat mild diabetes with oral hypoglycemic drugs and to keep resources for following up patients in long-term care. Health centers should provide the same care and also be able to treat diabetic emergencies, while hospitals are expected to be to provide care for all types of diabetic conditions. However, according to the 2014 SPA survey, with the exception of some districts bordering Lake Tanganyika, most districts had at least one district or regional level hospital that had services for providing long-term diabetic care (Figure 15). The bulk of this care was in hospitals, where 58% had the ability to provide long-term care and monitoring of diabetes (Figure 13). This proportion is much higher than the 7% observed for health centers and 2% for dispensaries. Diabetes care is more likely to be available in urban settings than in rural areas (31% vs. 21%, Figure 12).

Similar trends were observed for ability to manage diabetes emergencies where 75% of hospitals could provide services for managing diabetic ketoacidosis as compared to only 11% of health centers and 2% of dispensaries. Less than 20% of health centers and dispensaries had the ability to manage hypoglycemia. These low numbers are mostly due to lack of drugs needed for long-term care of diabetes. For example, 78% of health centers had functioning glucometers and test strips for monitoring blood glucose, but only 5% had the necessary drugs for managing diabetes. Only 10% of health centers had insulin, 22% had Glibenclamide, and 27% had metformin. Health facilities generally had intravenous fluids for managing diabetes emergencies - almost all (92%) health centers and

79% of dispensaries had either ringers lactate or normal saline. Drugs for diabetes were more available in faith-based and NGO-funded organizations. For example, 61% of faith-based organizations had metformin as compared to 54% in private- for- profit hospitals and only 18% in public hospitals.

Despite these numbers, diabetes service provision is generally better in Tanzania when compared to other conditions in this analysis (Figures 16-18). In addition, Tanzania has a fair geographical distribution of health units that can diagnose and treat diabetes (Figure 15). This may be due to the presence of several interventions supported by the World Diabetes Foundation and other partners including the National Diabetes Program[89] as well as strong advocacy by the Tanzania Diabetes Association which collaborates with the Ministry of Health to implement interventions throughout the country.[90]

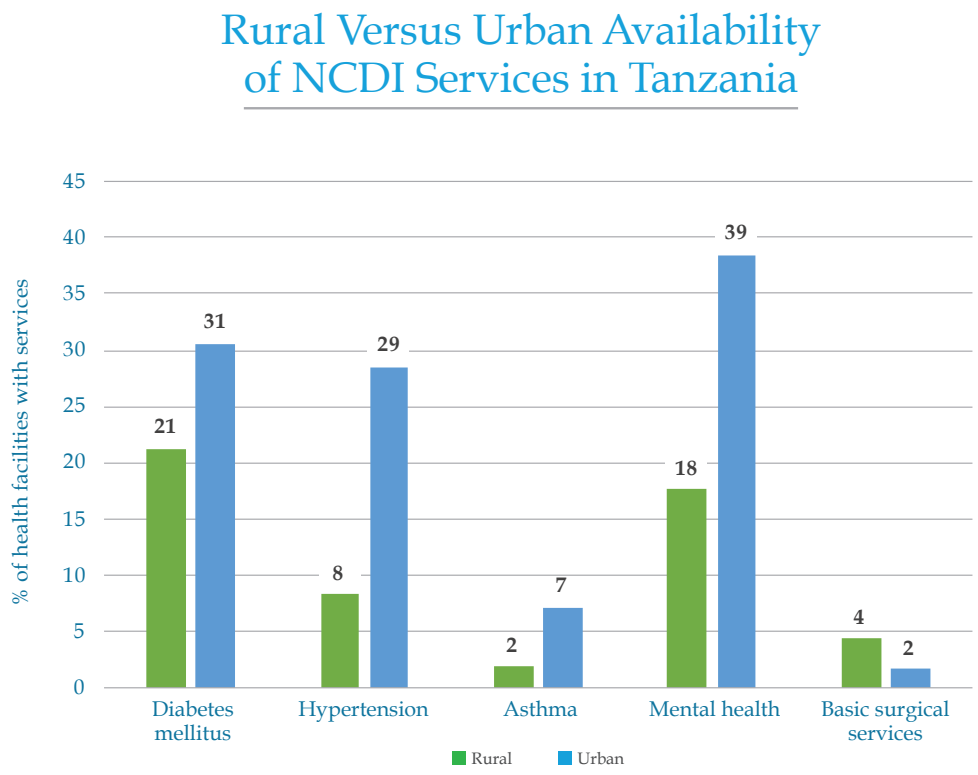

Figure 12: Rural versus Urban availability of NCDI services in Tanzania

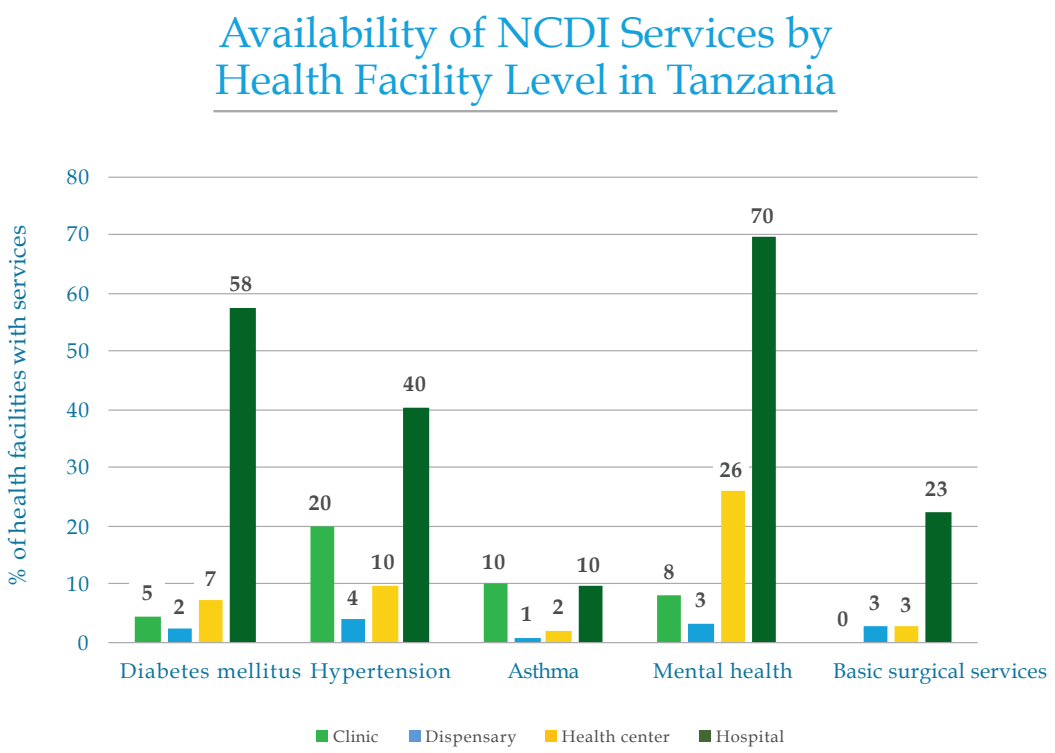

Figure 13: Availability of NCDI services by health facility level in Tanzania

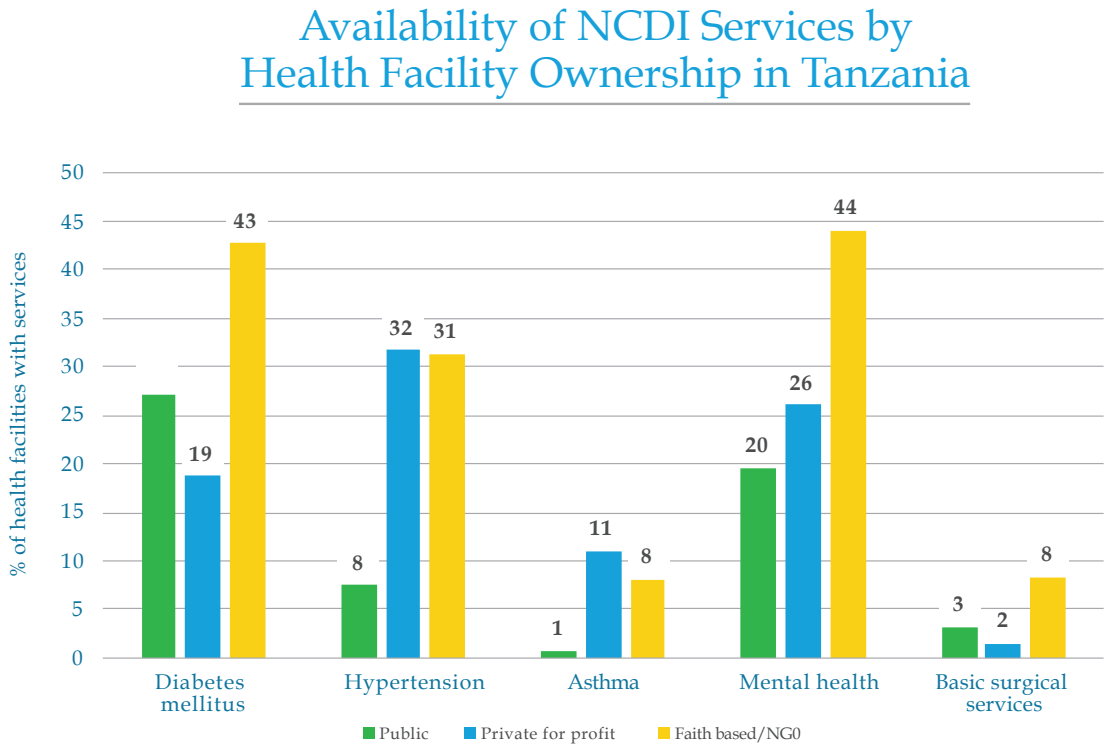

Figure 14: Availability of NCDI services by health facility ownership in Tanzania

Availability of Diabetes Mellitus Services at District and Region Level Hospitals in Tanzania

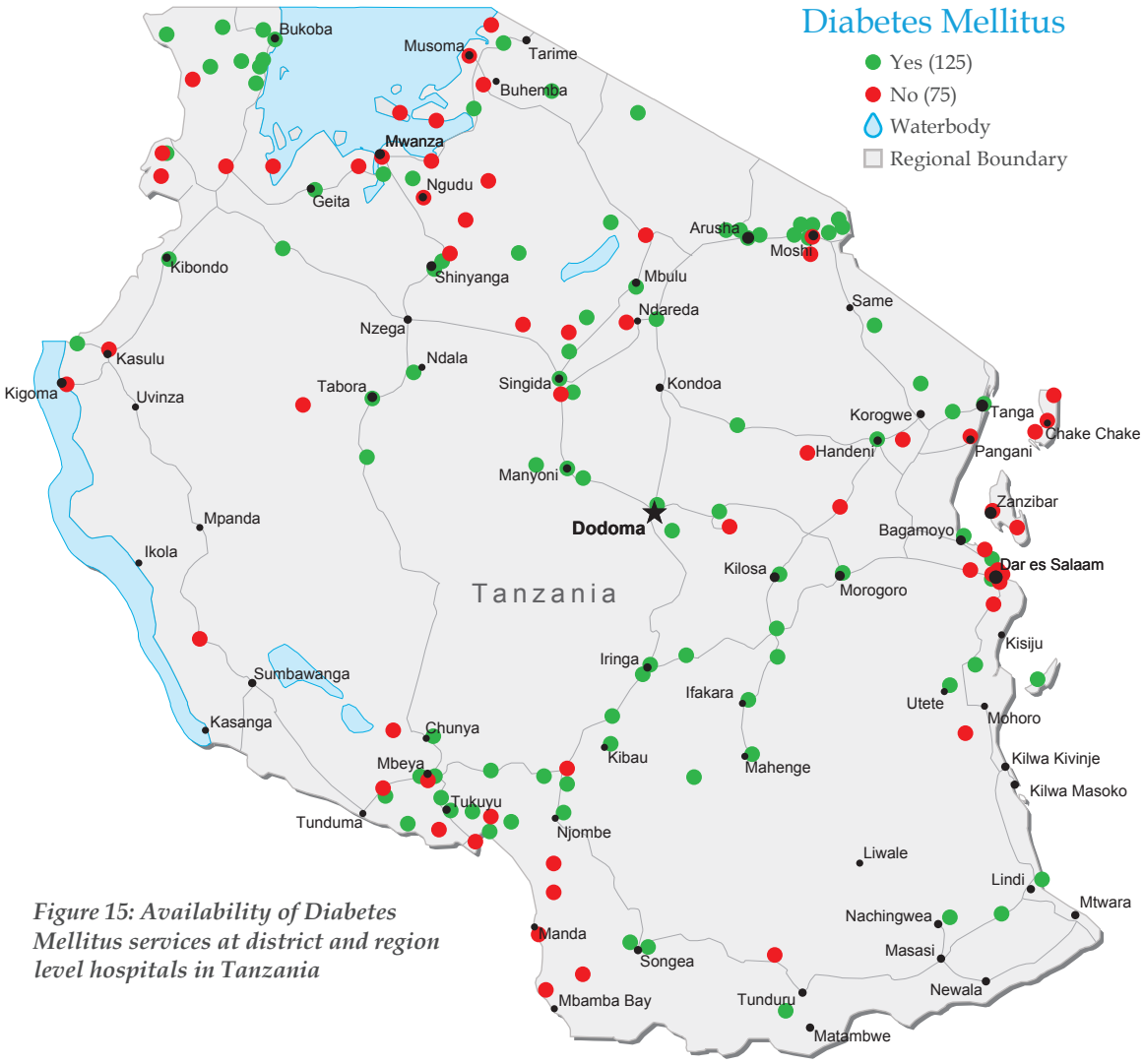

Figure 15: Availability of Diabetes Mellitus services at district and region level hospitals in Tanzania

5.2 CARDIOVASCULAR SERVICES

According to the national standards, dispensaries were expected to provide routine blood pressure checks and treat mild to moderate hypertension. In addition to services provided at dispensaries, health centers were expected to manage cardiac emergencies and refer complicated cases to hospitals. Eighty-seven percent of surveyed health facilities had functioning equipment for measuring blood pressure. This high percentage was observed in both urban and rural settings, and at all levels of health facilities, regardless of who managed the hospital (public, private or faith-based/NGO). On the contrary, only 13% of health facilities had two of the three first-line drugs (beta-blockers, ACE inhibitors and thiazide diuretic) for managing hypertension. Forty percent of hos-

pitals had at least two of the drugs compared to 9% of health centers, 2% of dispensaries and 10% of clinics. Drug availability was better in urban than in rural settings (25% versus 9%) and in private and faith-based/NGO facilities than public facilities (25%, 27% and 9% respectively). Most health facilities therefore had the ability to diagnose and monitor hypertension (87%), but only 16% could offer treatment. Forty-eight percent of hospitals were able to diagnose and treat hypertension compared to only 9% of health centers, 3% dispensaries and 10% at clinics. According to the SPA survey, there was a fair geographical distribution of district and regional level hospitals that could diagnose and manage hypertension (Figure 16). However several districts including Katavi, Songwe and Rukwa did not have any hospitals to provide this care. In other districts like Lindi, Kigoma and Mbeya the available care was in areas that might be too far for some patients to access.

With respect to services for managing congestive heart failure, 14% of health facilities did not have scales for measuring body weight. This included 60% of hospitals and 35% of health centers. In addition, 7% of scales reported and observed at health facilities were non-functional. Overall, there was a low availability (26%) of equipment required for monitoring heart failure (blood pressure apparatus, stethoscope and weight scale). In addition, only 27% of health facilities had drugs required for managing congestive heart failure. Of the facilities surveyed, only 29% of had services for managing congestive heart failure, the majority being hospitals (59%) and health centers (28%). Nationwide, the geographic distribution of hospitals with services for heart failure were largely similar to that for hypertension (Figure 17).

One of the consequences of the low availability of CVD services are catastrophic health expenditures in patients with some CVD conditions. A study in patients hospitalized with these conditions in Mwanza, Dar es Salaam and Zanzibar found catastrophic health spending (CHS) in all income groups.[92] Those from rural areas were also twice as likely to have CHS than urban residing patients.[92] Furthermore, 75% of patients in this study reported a decrease in income due to CVD-related hospitalization.

Specialized cardiac services are available at some regional and all tertiary hospitals, including access to investigations such as ECG or echocardiography. Open heart surgery is available at Jakaya Kikwete Medical Centre in Muhimbili hospital, Bugando Medical Center and Aga Kham hospital. The centers also provide services for rheumatic heart disease, congenital heart conditions, and ischaemic heart disease, though services are limited by staffing shortages and funding.

Availability of Hypertension Services at District and Region Level Hospitals in Tanzania

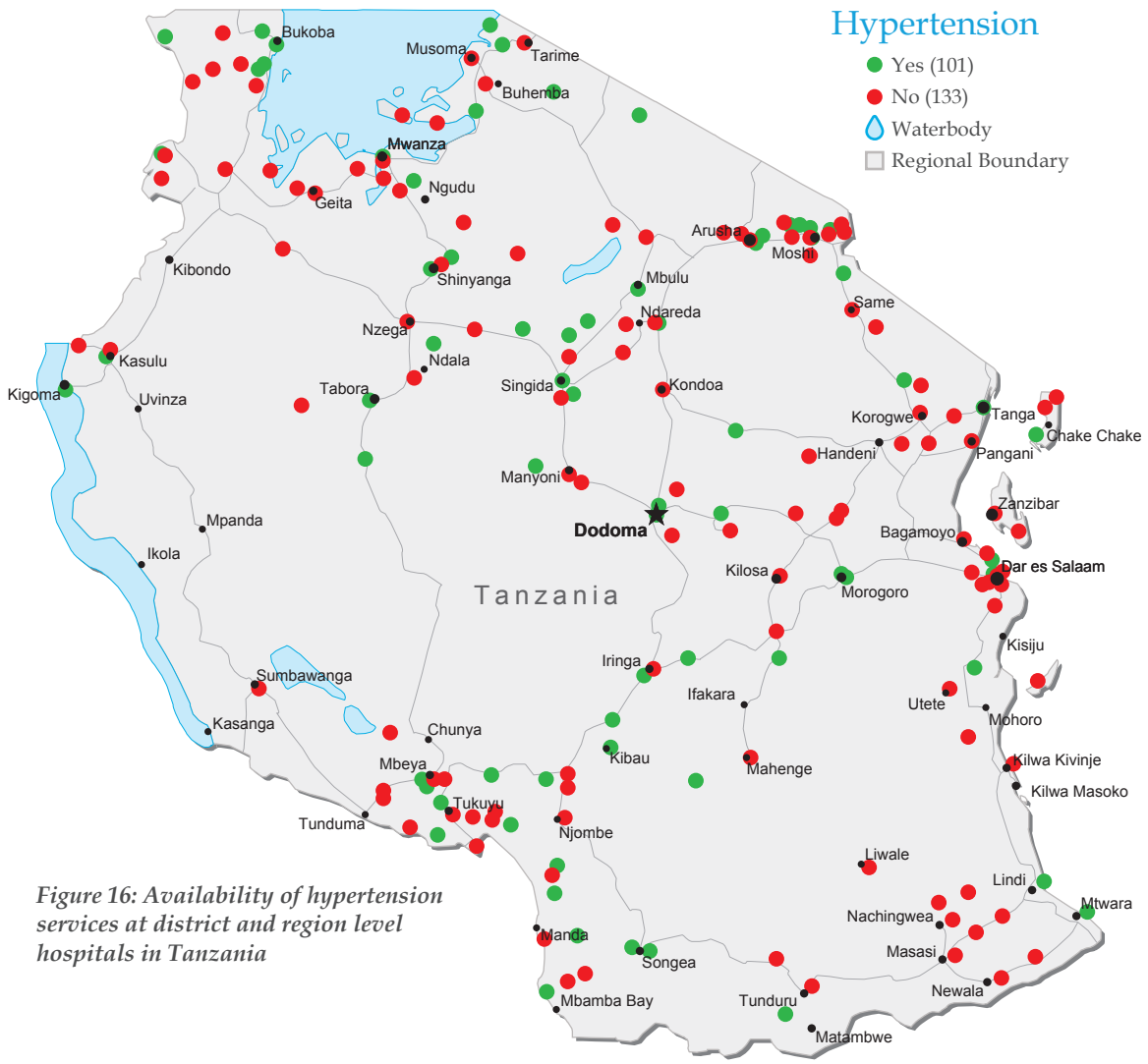

Figure 16: Availability of hypertension services at district and region level hospitals in Tanzania

Availability of Heart Failure Services at District and Region Level Hospitals in Tanzania

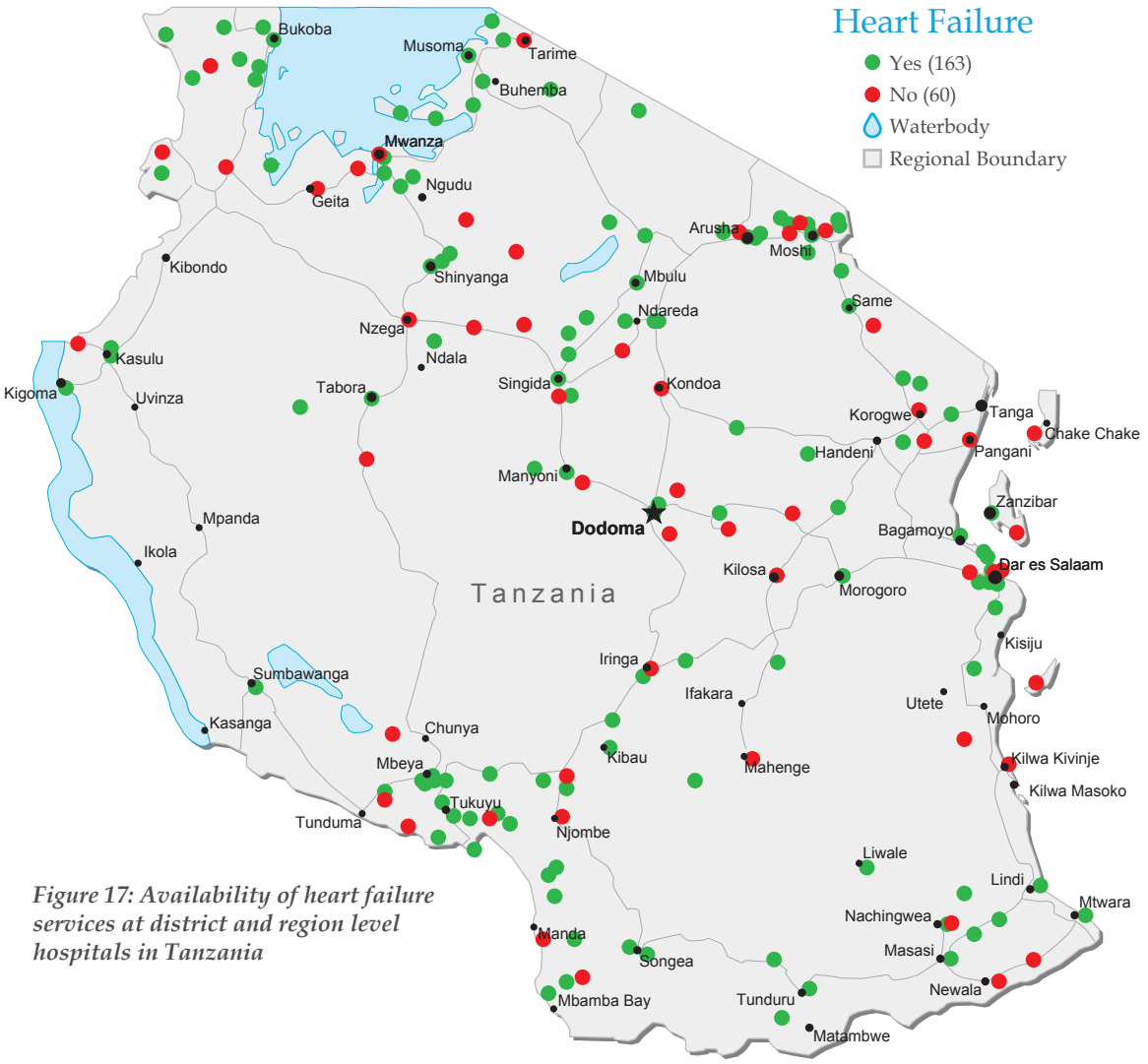

Figure 17: Availability of heart failure services at district and region level hospitals in Tanzania

5.3 CHRONIC RESPIRATORY DISEASE SERVICES

There are no set standards for management of chronic respiratory disease services at different health facility levels. The SPA survey showed that there was low availability of drugs required for managing asthma (Figures 12-14). Of all facilities surveyed, 24% had salbutamol, 4% had beclomethasone inhalers and 48% had prednisolone. Only 3% of the facilities had all the three drugs. There was a low proportion of facilities that had both drugs and equipment for diagnosis and managing asthma (4%). The low availability of asthma services is also evident in

geographical distribution of district and regional hospitals that can provide this care (Figure 16). The low figures were seen in both urban and rural areas, across all levels of health facilities irrespective of whether they were public, for-profit or managed by non-governmental organizations. This is mostly due to the low prioritization of these conditions as compared to infectious diseases and other NCDIs.

Availability of Asthma Services at District and Region Level Hospitals in Tanzania

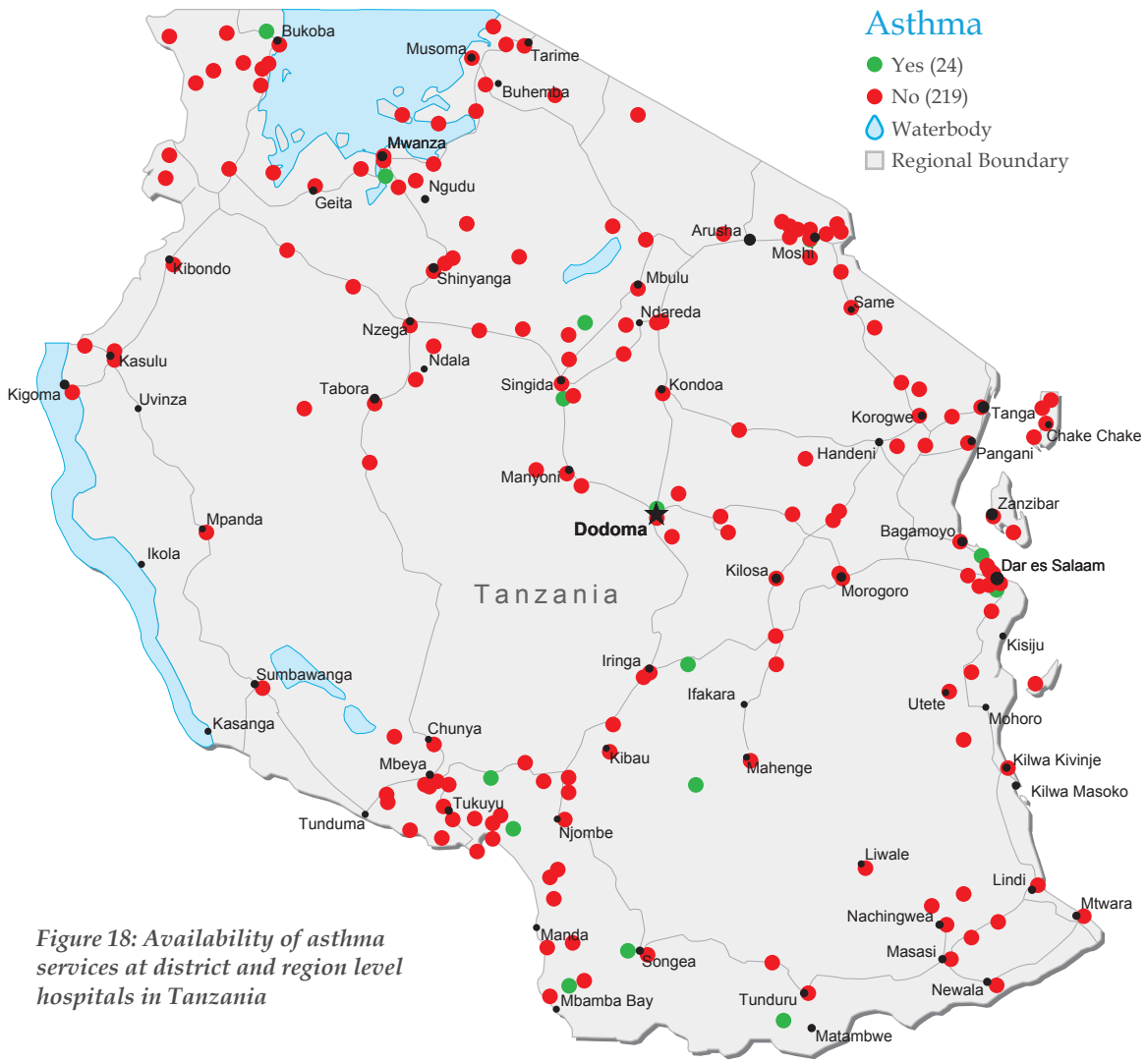

Figure 18: Availability of asthma services at district and region level hospitals in Tanzania

5.4 TRAUMA AND INJURY-RELATED SERVICES

National guidelines require dispensaries to provide first-aid services, and to offer pain relief and antibiotics for injuries. Health centers should provide the same care with the additional capacity to admit patients that need more critical care, such as burn victims. Hospitals should offer more intensive services, including surgery. According to the 2012 SARA survey, availability of surgical services was variable at the health center level, including 78% for acute burn management, 80% for wound debridement and 20% for closed fracture management. Similar figures were seen at the hospital level at 80%, 34% and 81% respectively. This pattern was also observed for items required for providing surgical services. A third of hospitals had oxygen for use in surgical procedures, 78% had needle holders, 94% had sutures, 35% had retractors, 63% had scalpels and 62% had scissors. Overall, very few rural and urban health facilities could provide services for common injuries (4% and 2% respectively). There were also no major differences in observed patterns by ownership status (public, private- for profit or faith-based/NGO). Regarding training, only 8% percent of facilities had providers with previous training in basic surgical skills. 30% of hospitals had providers with basic surgical skills as compared to only 10% at health centers. There were no major differences in availability of skilled providers between urban and rural facilities (10% versus 7%).

In 2017 MOHCDGEC in collaboration with Safe Surgery 2020 launched the National Surgical Obstetrics and Anaesthesia Plan to improve surgical services in the country.[88] The goal of this plan was to strengthen the surgical health system in Tanzania by improving service delivery, infrastructure, human resource, information and technology management, as well as finance and governance.

5.5 MENTAL HEALTH & EPILEPSY SERVICES

The 2007 National Health Policy contained a strategy for improving mental health services in Tanzania.[89] This strategy set several goals including increased training of health workers that can manage mental health conditions, establishing psychiatric rehabilitation facilities in each region and increasing the number of mental health care beds at each district hospital to at least 20. Some progress has been observed in these indicators. For example, the number of health facilities that can provide mental health services increased from 9 in 2007 to 124 in 2011.[90]

However, in 2014, only 25% of all health facilities in Tanzania had first line drugs for managing chronic depression and acute psychosis. As observed for other NCDIs, service availability for mental health was higher in urban than rural areas (39% vs. 18%), in hospitals compared to health centers (70% vs. 26%) and in faith-based/NGO facilities than in public facilities (44% vs. 20%).

5.6 CANCER SERVICES

In 2013, MOHCDGEC designed a ten-year national cancer control strategy. This included a detailed roadmap for developing and implementing a comprehensive response to the increasing burden of cancer in Tanzania.[49] As a result, several cancer registries are now available for tracking cancer trends in Tanzania. These include a hospital-based cancer registry at the National Cancer Institute – Ocean Road Cancer Institute (ORCI), a pathology-based cancer registry at Muhimbili National Hospital, and a population-based cancer registry in Kilimanjaro.

An assessment of breast cancer services recently published by Susan G. Komen in collaboration with the MoHCDGEC.[56] found that services for early detection of breast cancer are available in regional referral hospitals where staff perform clinical breast exams in symptomatic patients. Some referral hospitals are also able to perform fine needle aspiration (FNA) biopsies which are then sent to centers with pathology labs. These hospitals offer surgery for women diagnosed with breast cancer; however, there is limited capacity. Some zonal hospitals including Bugando Medical Center (BMC) in Mwanza and Kilimanjaro Christian Medical Centre (KCMC) are more equipped to diagnose and manage breast cancer cases. The bulk of breast cancer services are provided by specialized units in Dar es Salaam, at ORCI, Muhimbili National Hospital and Aga Khan Hospital. Mammograms and FNA biopsies are available at ORCI, and treatment options at this center include surgery, chemotherapy and radiotherapy. Muhimbili National Hospital provides mammography and partners with ORCI for treatment options. Aga Khan Hospital, a private facility provides comprehensive breast cancer diagnosis and management services including all those listed above. In addition, the Aga Khan Hospital hosts free camps for breast cancer diagnosis.

Given the high grade of most cervical cancer cases diagnosed, treatment options are mainly palliative. The Ministry of health therefore plans to implement a comprehensive prevention strategy by updating the Tanzania's current immunization schedule to include two doses of Human Papillomavirus vaccine in school-going girls[91]. This vaccination program will first target 14 year-old girls in 2018 and 2019, followed by 9 to 14 year olds in 2020, and finally 9 year olds in subsequent years.

6. Priority Setting for NCDIs in Tanzania

6.1 EXPANDING PRIORITY NCDI CONDITIONS

This review has demonstrated a complex and diverse burden of NCDIs in Tanzania, which has been partially addressed through global and national policies and programs. However, significant gaps remain. The Tanzania NCDI Poverty Commission therefore aimed to use existing data and local expertise to generate an expanded list of priority NCDIs for consideration in national programs and policy frameworks. Four globally recognized metrics were used in this priority setting exercise – burden of disease, severity, disability, and equity.[92] For burden of disease, the commission analyzed and ranked the number of disability-adjusted life-years (DALYs) for each condition.[2] Severity of each condition was measured as the average years of life lost (YLLs) per death, while disability was quantified as the number of years of life lived with disability (YLDs). Finally, to identify conditions with the largest equity gaps in terms of health outcomes, the commission compared the rate of DALYs per 100,000 population for each condition in Tanzania to that of high-income countries. The commission ranked 190 NCDI conditions from the GBD 2017 study along these metrics. A composite score was then calculated for each condition as a weighted average of the quartile ranks for each conditionof the four metrics. The 50 conditions with the highest composite score were presented to commissioners for expert review. From this list, the commissioners selected 34 conditions that (1) contribute substantially to adverse health outcomes and economic consequences, (2) have feasible and effective health sector interventions, and (3) are consistent with policy and strategies established by the Government of Tanzania.[84,85] The commissioners selected an additional 14 conditions from outside the top 50 conditions that they believed also to meet the above criteria and important to include in the prioritized NCDI conditions or were paired with evidence-based interventions that were prioritized for the health system. The 48 selected conditions are displayed in Table 2.

Disease Category	Prioritized Conditions
Respiratory	Asthma, chronic obstructive pulmonary disease
Cardiovascular – behavioral & metabolic etiologies	Hypertensive heart disease, hemorrhagic stroke, ischemic stroke, ischemic heart disease*
Endocrine	Diabetes mellitus
Cardiovascular - other etiologies	Rheumatic heart disease, endocarditis
Cancers	Female - Cervical cancer, ovarian cancer, breast cancer*
	Other - Prostate cancer, colorectal cancer*, esophageal cancer*
	Hematologic - Non-Hodgkin lymphoma, Hodgkin lymphoma, childhood leukemias*
Mental Health	Alcohol use disorders, major depressive disorders*, anxiety disorders*, bipolar disorders*, dementia*
Neurologic & Musculoskeletal	Epilepsy, rheumatoid arthritis*, osteoarthritis*
Congenital	Sickle cell disorders, congenital heart abnormalities, neural tube defects, digestive congenital disor-ders
Liver	Cirrhosis and other chronic liver diseases due to hepatitis B, Cirrhosis due to alcohol use
Kidney	Chronic kidney disease due to glomerulonephritis
Oral	Oral health
Sensory Organs	Vision, Hearing
Injuries – Accidental	Poisonings, drowning, burns, falls, venomous animal contact, non-venomous animal contact
Injuries – Non-accidental	Physical violence by sharp object, firearm, or other means; self-harm by other means
Injuries – Road traffic	Motor vehicle road injuries, pedestrian road injuries
Other surgical conditions	Paralytic ileus and intestinal obstruction, appendicitis

Table 2: NCDI conditions prioritized by the Tanzania NCDI Poverty Commission, by disease category

**Conditions that were added by expert review or alignment with prioritized health-sector interventions*

6.2 INTERVENTIONS FOR EXPANDED NCDI HEALTH SECTOR CAPACITY

The Tanzania NCDI Poverty Commission sought to recommend a package cost-effective interventions in the health sector that could be implemented to address NCDIs prioritized by the commissioners. Evidence based-information on cost-effective interventions in the health sector for the selected NCDI conditions was obtained from the third edition of Disease Control and Priorities group (DCP3).[93] The DCP3 has recently recommended an evidence-based package of health-sector interventions for Essential Universal Health Coverage (EUHC) in low-middle and low-income countries. This recommended package includes 65 interventions targeted for NCDIs. The DCP3 group provided expert committee rankings for three key intervention metrics based on available global data. These metrics were cost-effectiveness, financial risk protection and prioritization for the worst off (equity).[92] Interventions for cost-effectiveness and equity were ranked from 0 to 4, and those for financial risk protection from 0 through 6, with 0 representing the lowest value in each metric. The DCP3 group also provided an average direct unit cost for implementation per beneficiary in low-income countries. DCP3 additionally identified a sub-set of these conditions as a "high-priority package" (HPP), which are interventions that would be recommended as highest priority in resource-constrained settings. The commission estimated the

total number of individuals in Tanzania requiring each intervention annually based on disease prevalence and incidence estimated from GBD 2017. The total cost to reach all beneficiaries annually was calculated for each intervention.

Based on the disease burden addressed and the cost, cost-effectiveness, financial risk protection, and equity-generating properties described above, the commission selected 53 interventions for consideration for introduction and/or scale-up in Tanzania. These prioritized interventions are comprehensive, including interventions for NCDs, mental health, injuries, palliative care, rehabilitative care. The interventions represent medical, surgical, psychosocial, and community-based approaches at multiple levels of the health care system, from population level interventions to specialized referral hospitals. Multi-sectoral interventions and policy-based initiatives were not included in this analysis.

The commission assigned a baseline coverage level, according to available literature and from expert knowledge from commissioners. The commissioners also assigned a target coverage level to be achieved for each intervention by the year 2030. Based on prior programmatic scale-up experience, a 30% absolute coverage increase was determined to be a reasonable incremental coverage increase by 2030. The total cost of implementing the selected interventions was estimated by multiplying the direct unit cost (adjusted for Tanzania health sector costs) by the estimated Tanzanian population in need. Direct costs included those for personnel, equipment, laboratory and diagnostic services, drugs and other consumables. A 50% indirect cost, was added to the direct cost to account for facility level expenses, such as, rent, maintenance and utilities. An additional 17% indirect cost was also added for non-facility-level costs like those for supply chain and health information systems. The incremental cost for each intervention was then estimated by multiplying the total of the above costs by the coverage increment.

Selected interventions for addressing prioritized NCDI conditions and their costs are presented in Table 3. These interventions included some that already exist within Tanzania's health care system, and others that are yet to be introduced. Using the most recent National Health Account figures for 2016 for a total health expenditure (THE) of USD $1.97 billion (USD $35.5 per capita) and a gross domestic product of USD $53.3 billion, the incremental annual investment for the prioritized NCD interventions is USD $459 million, which would represent 23.3% of current THE (0.86% of GDP) or approximately USD $8.01 per capita annually.[94] The total for prioritized mental health interventions is USD $70.5 million, which would represent 3.6% of THE (0.13% of GDP) or an additional USD $1.23 per capita annually. The total for prioritized surgical interventions is USD $172.7 million, which represents another 8.8% of THE (0.32% of GDP) or USD $3.01 per capita annually. Overall, combining the incremental cost of NCD, mental health, and surgical interventions is USD $702.9 million, representing 35.6% of THE and 1.32% of GDP, or approximately $12.26 per capita annually. The subset of interventions designated in the "high-priority package" by DCP would cost USD $378.9 million annually ($6.61 per capita), which would represent 19.2% of THE (0.71% of GDP).

Condition	Intervention	Cost-Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline Coverage (%)	Target Coverage (%)	Incremental Cost (USD)	Health System Level
Respiratory	Low-dose inhaled corticosteroids and bronchodilators for asthma and for selected patients with COPD	1	3	1	20	50	102,475,475	Health Center
	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	20	50	54,209,169	District Hospital
	Self-management for obstructive lung disease to promote early recognition and treatment of exacerbations	0	0	0	20	50	11,336,155	–
	Tobacco cessation counselling, and use of nicotine replacement therapy in certain circumstances	4	2	1	30	60	13,608,491	Health Center
Breast Cancer	Treat early stage breast cancer with appropriate multimodal approaches, including generic chemotherapy, with curative intent, for cases that are referred from Health Center and District hospitals following detection using clinical examination	4	4	1	20	50	211,275	Regional, Zonal, and National Referral Hospitals
Cervical Cancer	Opportunistic screening for cervical cancer using visual inspection or HPV DNA testing and treatment of precancerous lesions with cryotherapy	3	3	1	11	41	2,306,327	Health Center
	School-based HPV vaccination for girls	3	3	1	50	80	3,105,559	Community
	Treatment of early-stage cervical cancer	0	4	1	20	50	91,885	District Hospital
Colorectal Cancer	Treat early stage colorectal cancer with appropriate multimodal approaches, including generic chemotherapy, with curative intent, for cases that are referred from Health Center and District hospitals	3	5	1	20	50	184,888	Regional, Zonal, and National Referral Hospitals
Childhood Cancers	Treat selected early-stage childhood cancers with curative intent in pediatric cancer units/hospitals	2	5	2	20	50	460,829	Regional, Zonal, and National Referral Hospitals
Palliative Care	Palliative care and pain control services	0	4	1	10	40	36,123,872	Health Center
Palliative Care	Combination therapy for persons with multiple risk factors to prevent CVD (primary prevention)	2	2	1	20	50	13,427,487	Health Center
	Long term management of IHD, stroke, and PVD with aspirin, beta blockers, ACEi, and statins (as indicated), for secondary prevention	2	2	1	10	40	27,853,193	Health Center
	Management for acute critical limb ischemia with unfractionated heparin and revascularization if available, with amputation as a last resort	0	0	0	10	30	7,553,090	Regional, Zonal, and National Referral Hospitals

Condition	Intervention	Cost-Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline Coverage (%)	Target Coverage (%)	Incremental Cost (USD)	Health System Level
Cardiovascular Diseases	Mass media messages concerning healthy eating or physical activity	4	1	1	20	50	242,915	Population
	Screening and management of hypertensive disorders in pregnancy	1	3	3	30	60	133,569	Health Center
	Use of aspirin in case of suspected myocardial infarction	4	2	1	20	50	1,188	Health Center
	Use of community health workers to screen for CVRD using non-lab-based tools for overall CVD risk, improving adherence, and referral to primary health Centers for continued medical management	0	0	0	20	50	956,235	Community
	Use of percutaneous coronary intervention for acute myocardial infarction where resources permit	3	4	1	20	50	9,598,364	Regional, Zonal, and National Referral Hospitals
	Use of unfractionated heparin, aspirin, and generic thrombolytics in acute coronary events	2	4	1	20	50	17,182,038	District Hospitals
	Medical management of acute heart failure	4	5	3	20	50	36,969,392	District Hospital
	Medical management of chronic heart failure with diuretics, beta-blockers, ace-inhibitors, and mineral-ocorticoid antagonists	4	4	3	30	60	18,103,760	Health Center
Rheumatic Heart Disease	Secondary prophylaxis with penicillin for rheumatic fever or established RHD	0	1	1	5	50	516,479	Health Center
	Treatment of acute pharyngitis in children to prevent rheumatic fever	4	2	1	20	35	1,032,958	Health Center
Diabetes Mellitus	Diabetes self-management education	0	0	0	10	40	2,246,367	—
	Diabetic retinopathy screening via telemedicine, followed by treatment using laser photocoagulation	3	2	1	20	50	3,314,436	Regional, Zonal, and National Referral Hospitals
	Prevention of long-term complications of diabetes through blood pressure, lipid, and glucose management as well as consistent foot care	4	2	1	20	50	36,563,569	Health Center
	Screening for diabetes in all high-risk adults	4	2	1	10	40	3,364,237	Health Center
	Screening for diabetes in pregnant women	1	3	3	30	60	9,566,644	Health Center
Chronic Kidney Disease	Treatment of hypertension in kidney disease, with use of ACEIs or ARBs in albuminuric kidney disease	2	2	1	20	50	6,245,635	Health Center
Cirrhosis; Alcohol and Tobacco Use Disorders	Screening and brief intervention for alcohol use disorders	3	2	1	20	50	1,169,382	Health Center
	Mass media messages concerning use of tobacco and alcohol	4	1	1	20	50	242,915	Population

Condition	Intervention	Cost-Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline Coverage (%)	Target Coverage (%)	Incremental Cost (USD)	Health System Level
Sickle Cell Disease	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	0	30	3,437,615	District Hospital
Congenital Disorders	Provide iron and folic acid supplementation to pregnant women, as well as food/caloric supplementation to pregnant women in food insecure households	3	3	3	21	51	14,310,547	Health Center
Oral Health	Oral health promotion in schools	0	1	1	20	50	1,729,564	Community
Vision	Vision pre-screening by teachers; vision tests and provision of ready-made glasses on-site by eye specialists	2	2	1	20	50	2,075,477	Community
Hearing	Targeted screening for congenital hearing loss in high-risk children using otoacoustic emissions testing	1	3	3	20	50	131,639	Health Center
Rheumatoid Arthritis	Combination therapy, including low-dose corticosteroids and generic disease-modifying antirheumatic drugs (including methotrexate), for individuals with moderate to severe rheumatoid arthritis	0	0	0	20	50	3,050,000	District Hospital
Dementia	Interventions to support caregivers of patients with dementia	0	3	1	20	50	485,629	Health Center
Epilepsy	Management of epilepsy using generic anti-epileptics	4	4	3	25	55	2,722,376	Health Center
Substance Abuse	Provision of harm reduction services such as safe injection equipment and opioid substitution therapy to people who inject drugs	4	5	2	5	35	233,055	Health Center
Assault and Violence	Education campaigns for the prevention of gender-based violence	0	0	0	20	50	5,704,030	Population
	Post gender-based violence care including, counselling, provision of emergency contraception, and rape-response referral (medical and judicial)	0	0	0	20	50	4,748,264	Health Center
NCD subtotal incremental cost							**459,026,046**	

Condition	Intervention	Cost-Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline Coverage (%)	Target Coverage (%)	Incremental Cost (USD)	Health System Level
Depression and Anxiety	Management of depression and anxiety disorders with psychological and generic antidepressant therapy	3	4	1	10	40	16,976,695	Health Center
	Mass media messages concerning sexual and reproductive health; and mental health for adolescents	4	2	1	20	50	30,586,636	Population
Bipolar Disorder	Management of bipolar disorder using generic mood-stabilizing medications and psychosocial treatment	2	4	2	20	50	20,210,078	Health Center
Psychotic Disorders	Management of schizophrenia using generic anti-psychotic medications and psychosocial treatment	2	4	2	20	50	2,737,092	Health Center
NCD subtotal incremental cost							**70,510,501**	

Condition	Intervention	Cost-Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline Coverage (%)	Target Coverage (%)	Incremental Cost (USD)	Health System Level
Surgical Services	Elective surgical repair of common orthopaedic injuries (e.g., meniscal and ligamentous tears) in individuals with severe functional limitation	0	0	0	20	50	7,648,800	Regional, Zonal, and National Referral Hospitals
	Basic first-level hospital surgical services	0	0	0	20	50	98,879,210	District Hospital
	Basic outpatient surgical services	0	0	0	20	50	10,019,760	Health Center
	Basic outpatient surgical services	0	0	0	20	50	52,471,901	District Hospital
	Expanded first-level hospital surgical services*	0	0	0	15	45	1,318,389	Regional, Zonal, and National Referral Hospitals
	Specialized surgical services*	0	0	0	15	45	2,373,101	Regional, Zonal, and National Referral Hospitals
Surgical subtotal incremental cost							**172,711,161**	
Grand incremental cost							**702,247,708**	

High yield priority interventions for achieving universal health coverage.

6.3 INTEGRATION AND DELIVERY OF EXPANDED NCDI SERVICES

The health sector interventions prioritized by this commission would require integration at different levels of the Tanzania health system (Figure 19). At the community level, where very few NCD interventions are currently being offered, we propose adding preventative messages on behaviors associated with health promotion and disease prevention such as healthy eating and physical activity, as well as tobacco and alcohol use cessation. We also propose school-based HPV vaccination and considering the use of teachers to screening and provision of ready-made glasses. Community and school-based NCD interventions will also require prior sensitization and should be carried out in a culturally appropriate manner using the local language (Swahili). The use of schools to delivery some interventions will require multisectoral planning with the Ministry of Education as well as putting into place mechanisms of referring children that require further follow up to appropriate levels of care.

The 2014 Service Provision Assessment (SPA) survey for Tanzania found low availability of most NCDI services at health centers – only 7% could offer services for diabetes, 10% for hypertension, 2% for asthma, 26% for mental health and 3% for basic surgical services.[16] We propose that health centers offer a more extensive list of NCDI interventions, including the following: Screening and intervention of alcohol use disorders and tobacco use, treatment of asthma and COPD, screening for cervical cancer and treatment of precancerous lesions, palliative care and pain control services, primary and secondary prevention on CVD, medical management of chronic heart failure, screening and management of hypertensive disorders in pregnancy and diabetes in pregnant women, secondary prophylaxis of rheumatic fever or established RHD and treatment of acute pharyngitis to prevent rheumatic fever, screening for diabetes and prevention of long-term complications of diabetes, treatment of hypertension in kidney disease, screening for congenital hearing loss in high-risk children, management of epilepsy , post gender-based violence care including, counselling, provision of emergency contraception, and rape-response referral, provision of harm reduction services such as safe injection equipment and opioid substitution therapy to people who inject drugs, management of depression and anxiety disorders, management of bipolar disorder. Integration of these interventions with existing services will require didactic and in-service training of clinical staff on detection, diagnosis and management of NCDIs. The expanded list of services offered at health centers will necessitate procuring essential equipment and drugs through the existing supply chain mechanisms, and the use of current out and in-patient infrastructure, with renovations where needed.

Recent national surveys found moderately high availability of NCDI services at hospitals in Tanzania – service availability at hospitals was 23% for basic surgical services, 40% for hypertension, 10% for asthma and 58% for diabetes mellitus

and 70% for mental health disorders.[16] We propose the expansion of interventions that are available at district hospitals to improve access to services of severe NCDs. We specifically propose the following interventions at this level: medical management of acute exacerbations of asthma and COPD, treatment of early-stage cervical cancer, medical management of acute heart failure, basic first-level hospital surgical services and medical management of moderate to severe rheumatoid arthritis. Once again existing staff and infrastructure can be used to deliver these services. Nurses and medical assistants can be trained to deliver these interventions, with oversight and ongoing mentorship by physicians and the necessary pharmaceutical and equipment should be procured through existing supply chain mechanisms. These interventions should be implemented in line with existing disease-specific control plans. For example, the ORCI has an ongoing training program for cancer prevention and control that can be implemented in all district hospitals.

The final and top level of the health system, zonal, regional and referral hospitals, is reserved for patients with the highest illness severity. To date, ORCI is the only specialized center for cancer treatment. We propose that all referral and specialized hospitals provide multimodal treatment of early stage breast cancer that includes surgery, radiation, chemotherapy, and hormonal therapy. In addition, these hospitals should also provide, services for diabetic retinopathy via telemedicine, medical management of critical limb ischemia, and specialized surgical services. In line with the MOHCDGEC plan, improved access to these interventions, will reduce the cost that the Tanzanian government incurs on treating patients who are referred abroad due to lack of infrastructure and expertise in the country.[82]

Referral And Specialized Hospitals

- Treat early stage breast cancer, colorectal and childhood cancers using appropriate multimodal approaches and with curative intent
- Management for acute critical limb ischemia with unfractionated heparin and revascularization if available, with amputation as a last resort
- Use of percutaneous coronary intervention for acute myocardial infarction where resources permit
- Diabetic retinopathy screening via telemedicine, followed by treatment using laser photocoagulation
- Elective surgical repair of common orthopedic injuries (e.g., meniscal and ligamentous tears) in individuals with severe functional limitation
- Expanded first-level hospital surgical services
- Specialized surgical services

District Hospital Level

- Management of acute asthma and COPD using systemic steroids, inhaled beta-agonists, oral antibiotics and oxygen therapy
- Treatment of early-stage cervical cancer
- Use of unfractionated heparin, aspirin, and generic thrombolytics in acute coronary events
- Medical management of acute heart failure
- Where sickle cell disease is a concern, universal newborn screening and standard prophylaxis against bacterial infections and malaria
- Combination therapy for moderate to severe rheumatoid arthritis including low-dose corticosteroids and generic disease-modifying drugs
- Basic first-level hospital surgical services
- Basic rehabilitation services

Health Center Level

- Screening and intervention of alcohol use disorders and tobacco use
- Low-dose corticosteroids and bronchodilators for asthma and for patients with COPD
- Opportunistic screening for cervical cancer using visual inspection or HPV DNA testing and treatment of precancerous lesions
- Palliative care and pain control services
- Combination therapy for person at high risk for cardiovascular diseases (primary prevention)
- Long term management of IHD, stroke and PVD with aspirin, beta blockers, ACEIs and statins (secondary prevention)
- Use of aspirin in case of suspected myocardial infarction
- Medical management of chronic heart failure with diuretics, beta-blockers, ace-inhibitors, and mineralocorticoid antagonists
- Screening and management of hypertensive disorders in pregnancy and diabetes in pregnant women
- Secondary prophylaxis of rheumatic fever or established RHD and treatment of acute pharyngitis to prevent rheumatic fever
- Screening for diabetes in all high-risk adults and prevention of long-term complications of diabetes
- Treatment of hypertension in kidney disease, with use of ACEIs or ARBs in albuminuric kidney disease
- Iron and folic acid supplementation to pregnant women, and food supplementation to women in food insecure households
- Targeted screening for congenital hearing loss in high-risk children using otoacoustic emissions testing
- Interventions to support caregivers of patients with dementia
- Management of epilepsy using generic anti-epileptics
- Post gender-based violence care including, counseling, provision of emergency contraception, and rape-response referral
- Provision of harm reduction services such as safe injection equipment and opioid substitution therapy to people who inject drugs
- Management of depression and anxiety disorders with psychological and generic antidepressant therapy
- Management of bipolar disorder using generic mood-stabilizing medications and psychosocial treatment
- Management of schizophrenia using generic anti-psychotic medications and psychosocial treatment
- Basic outpatient surgical services

Population/ Community Level

- Mass media messages gender based violence, healthy eating, physical activity, tobacco use and alcohol use
- School-based HPV vaccination for girls
- Vision prescreening by teachers; vision tests and provision of ready-made glasses on-site by eye specialists
- Use of community health workers to screen for cardiovascular diseases, improve adherence and referral to primary health centers

Figure 19: Proposed integration of selected NCDI interventions into Tanzania health system levels

6.4 AFFORDABILITY AND FISCAL SPACE FOR THE PROPOSED INTERVENTIONS

This commission prioritized an expanded set of interventions for NCDIs in Tanzania in accordance with best estimates of the national NCDI disease burden and best available evidence on health sector interventions. Though the total cost of these interventions is a substantial proportion of the overall total health expenditure, this commission believes that this level of expenditure is commensurate with the enormous burden of morbidity and mortality caused by NCDs, injuries, mental health conditions, and chronic pain and disability. Further research is required to estimate the potential return on such investment, which we believe would be well justified in terms of human and economic benefits.

In order to generate and mobilize funds for financing these interventions, this commission supports several strategies previously proposed by the MOHCDGEC. These include regulatory mechanisms for fair pricing of pharmaceuticals in the public and private sector, efficient procedures to access funds generated by health facilities through insurance, and timely and adequate disbursement of funds for procurement of commodities and supplies.[82] We also support specific proposals to increase fiscal space, which include earmarked taxation mechanisms on unhealthy behaviours such as tobacco and alcohol, surcharges on automobile registrations or insurance, levies on airline taxes or international departures, or proportions of value added taxes. Efficiency generation can be enhanced through better integration of services in the health system. Efforts should be made to maintain and align donor funding towards the national strategic plan for addressing NCDIs in Tanzania. This will help optimize cross-sectional efforts and funding. Finally, the commission highly supports the government's current commitment, investment, and efforts towards achieving Universal Health Coverage, which would serve as a foundation for high-priority cost-effective interventions to address NCDIs in Tanzania. We highly encourage greater partnerships to consider additional financing sources and strategies to achieve this ambitious and worthwhile goal for the health and prosperity of all Tanzanians.

7. Key Findings

- **NCDIs are an important problem in Tanzania.** NCDIs currently comprising 41% of all death and disability in Tanzania and have almost doubled over the past 25 years.
- **NCDIs affect young populations in Tanzania.** Although deaths from NCDIs may occur later in life, over two-thirds of the health burden of NCDIs occurs before age 40.
- **NCDIs are diverse in Tanzania.** Over 60% of the NCDI DALYs are from conditions other than CVD, cancer, diabetes, and chronic respiratory diseases. Prominent NCDIs in Tanzania also include rheumatic and congenital heart diseases, hematologic malignancies, severe chronic respiratory diseases, type 1 diabetes, women's malignancies, severe mental health conditions, and injuries. Some NCDI conditions, such as stroke and type II diabetes are more prevalent in urban areas, while other conditions, such as anaemia, cervical cancer, and esophageal cancer are more prevalent in rural areas.
- **Risk factors for NCDIs are complex and may differ by socioeconomics.** 79% of NCDI DALYs in Tanzania are not attributed to traditional behavioral or metabolic risk factors. Traditional risk factors for NCDIs are present in poorer populations, but may differ according to risk factor. For example, there is a much lower prevalence of obesity among adults in the lowest quintiles.
- **NCDI services are limited.** Although included in essential service packages, the availability of services for NCDIs are limited and variable. Even at the hospital level, less than half of all hospitals provide major NCDI services, and the readiness for key diseases is even lower. Availability is lowest in rural, public facilities.
- **Access to NCDI services may be worse for poorer populations.** There are barriers in access to treatment for common diseases such as hypertension and diabetes faced by people in lower quintiles of wealth and in rural areas. Individuals in lower quintiles were less likely to have been screened, diagnosed, or treated for common conditions such as hypertension and diabetes.
- **Financing for NCDIs is limited.** Only 7.8% of Tanzania's total health expenditure is on NCDs and 0.64% on injuries. Expenditure on NCDs increased from 45 million USD in 2012 to 154 million USD in 2016 (2.73% to 8.74% per capita), expenditure on injuries has remained relatively constant in the same period (~14 million USD).

8. Recommendations and Next Steps

- **We must broaden the NCDI agenda in Tanzania.** This commission recommends an expanded set of 48 NCDI conditions for attention and priority to appropriately capture the full burden of NCDIs affecting Tanzanians. In addition to common conditions such as hypertensive and ischemic heart disease, type II diabetes, and chronic respiratory disease, we encourage inclusion of additional conditions with a high burden of disease that particularly affect the young and the poor, such as rheumatic and congenital heart diseases, hematologic malignancies, severe chronic respiratory diseases, type 1 diabetes, women's malignancies, severe mental health conditions, and injuries.

- **Evidence-based interventions for NCDIs are needed to achieve UHC.** This commission recommends 53 previously described evidence-based cost-effective health sector interventions to fill the gap for NCDI services to achieve UHC. This set of interventions includes services for NCDs, mental health, injuries, palliative care, rehabilitative care and represents medical, surgical, psychosocial, and community-based approaches that would require integration at multiple levels of the health care system. Existing capacities need to be upgraded, including guidelines, human resources, and training.

- **More investment in NCDIs are needed.** Overall, the combined annual incremental cost of this comprehensive set of NCD, mental health, and surgical interventions is estimated to be USD $702.9 million, or approximately $12.26 per capita annually, which represents 35.6% of total current health expenditure or 1.32% of GDP. A detailed analysis of possible financing mechanisms, as well as a formal fiscal space analysis, would greatly facilitate target setting and feasibility assessment of inclusion of key NCDI interventions in essential health package and national health insurance to help achieve universal health coverage. Return-on-investment case studies for NCDI interventions are also needed.

- **More data is needed on NCDIs in Tanzania.** There is a need to describe the burden of NCDIs disaggregated by socio economic indices to best target interventions. More studies are needed to fill this knowledge gap, and systematic inclusion of socioeconomic indicators in disease registries, health facility reporting, and household surveys could further provide this information.

- **Greater stakeholder engagement is required.** Participation is needed from all sectors, particularly from patients and civil society, policy-makers, academia, and clinicians. Advocacy and discussion with these stakeholders may result in greater awareness and high-level commitments to combat an expanded group of NCDIs in Tanzania.

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