Ministry of Health

The Zambia Non-Communicable Diseases and Injuries Poverty Commission Report

Reframing Non-Communicable Diseases & Injuries in Zambia

April 2022

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FOREWORD

Non-communicable diseases and Injuries (NCDIs) are a major public health concern with significant social and economic implications in terms of health care-needs, loss of productivity and premature deaths. NCDIs comprise, but are not limited to, cardiovascular diseases, cancers, diabetes mellitus, heart diseases, stroke, chronic respiratory diseases, and injuries.

Zambia is currently undergoing an epidemiological transition in its disease burden from infectious to non-communicable conditions, resulting in a duo burden of disease. NCDIs are fast replacing infectious diseases and undernutrition as leading causes of disability and premature death in developing countries. Although the burden is universal, low- and middle-income countries (LMICs) are hit the hardest, with over three-quarters of all deaths occurring in these countries. In Zambia, majority of patients with NCDs present to hospitals when their disease has already advanced posing a challenge to effective treatment and resulting in poor health outcomes. NCDIs are thus a serious set-back to our attainment of social, health and economic targets if no appropriate interventions are put in place.

The call to action is reinforced by persistent gaps and shortcomings in the response, ranging from lack of prioritization of NCDIs, inadequate resources, a lack of preventative action, vulnerable and ill-equipped health systems to respond to the growing burden, and an absence of the voice of people living with NCDs in the response. However, the Zambian government has enhanced its financing model by introducing the National Health Insurance Scheme that mandates all in formal and informal employment to make monthly contributions to the Management Authority thus providing insurance cover to a wider group of citizens.

This report provides the requisite information on NCDIs in Zambia and is targeted at informing policy and complimenting other guidance and efforts for national response to the burden of NCDIs. The report is further intended to guide the prioritization of NCDIs interventions, implementation, resources allocation and reporting.

Professor Lackson Kasonka

Permanent Secretary-Technical Services
Zambia Ministry of Health

ACKNOWLEDGEMENTS

In putting this report together, we had to take the help and guidance of many people who deserve our greatest gratitude. We would like to start by acknowledging the Ministry of Health for providing the technical guidance throughout this process and to the Centre for Infectious Disease Research in Zambia for co-chairing the commission and providing the support that was needed . We would also like to show our gratitude to our colleagues at Partners in Health; Dr Neil Gupta and Dr Emily Wroe for helping us to put the document together through numerous consultations.

Our final gratitude go out to all those who have directly and indirectly helped us to write this report.

Dr Alex Mukupa
Director Clinical Care and Diagnostic Services
Ministry of Health

ZAMBIA NCDI COMMISIONERS

In loving memory of our dearly departed NCDI commissioners, Dr. Peter Songolo and Mr. David Chanda, who contributed immensely to this report and for their dedication to fighting NCDs in Zambia.

CO-CHAIRS

Prof. Lackson Kasonka, Permanent Secretary, Technical Services, Ministry of Health-Co-Chair
Dr. Sharon Kapambwe, Assistant Director, Cancer, Ministry of Health - Co-Chair

MEMBERS

Dr. Daniel Makawa, Assistant Director, Clinical Care and Diagnostic Services, Ministry of Health
Dr. Aggrey Mweemba, National Coordinator- Nephrology, Ministry of Health/University of Teaching of Hospital
Dr. Siwo Chioni, Acting National Coordinator, Mental Health, Ministry of Health/UTH
Mr. Patrick Banda, Assistant Director, Planning and Budgeting, Ministry of Health
Dr. Citonje Susan Musadabwe, Head Clinical Care, Cancer Diseases Hospital
Dr. Abel Kabalo, Director, Health Promotion, Environment and Social Determinants, Ministry of Health
Prof. Peter Mwaba, Dean, Lusaka Apex Medical University
Prof. Roma Chilengi, Chief Scientific Officer, Centre for Infectious Diseases Research Zambia
Prof. Samuel Bosomprah, Biostatistician, Centre for Infectious Diseases Research Zambia
Ms. Jane Matambo, Cervical Cancer Prevention Advisor, Centre for Infectious Diseases Research Zambia
Prof. John Musuku, Founder, Rheumatic Heart Disease Association, Zambia
Prof. Fastone Goma, Chairman, Zambia NCD Alliance
Dr. Ernest Muyunda, Deputy Country Director, PATH
Dr. Peter Songolo, National Professional Officer, Disease Prevention and Control, WHO **(Posthumous)**
Dr. Muhumpu Kafwamfwa- Dean, School of Medicine, Cavendish University
Ms. Udie Soko- Executive Director- Zambian Cancer Society
Dr. Manoj Mathews: National Coordinator- Paediatric, Ministry of Health
Dr. Godfrey Nyanda- National Coordinator Emergency and Mobile Services, Ministry of Health
Dr. Kevin Zimba- Consultant Paediatrician, University Teaching Hospital
Mr. David Chanda - Acting Chief Cancer Control Officer, Ministry of Health (Posthomous)
Dr. Wilbroad Mutale- University of Zambia, School of Public Health/Visiting Scientist, Centre for Infectious Disease Research in Zambia

COORDINATOR

Ms. Mukobe L. Chisunka - Project Manager-Research, Centre for Infectious Disease Research in Zambia

ACRONYMS

AIDS	Acquired Immuno-deficiency Syndrome
ART	Anti Retro Viral Therapy
BID	Brought In Dead
CDH	Cancer Diseases Hospital
DHS	Demographic and Health Survey
DALY	Disability Adjusted Life Years
DCP3	Disease Control Priorities
ENT	Ear, Nose and Throat
GBV	Gender Based Violence
GBD	Global Burden of Disease
HIC	High Income Countries
HIV	Human Immune-deficiency Virus
HPV	Human Papillomavirus
JICA	Japan International Cooperation Agency
KS	Kaposi's Sarcoma
MoH	Ministry of Health
NCCSP	National Cancer Control Strategic Plan
NHRA	National Health Research Authority
NCD	Non-Communicable Diseases
NCDI	Non-Communicable Diseases and Injuries
OPD	Outpatient Department
STI	Sexually Transmitted Infections
SCD	Sickle Cell Disease
UHC	Universal Health Coverage
UTH	University Teaching Hospital
VSU	Victim Support Unit
VIA	Visual Inspection with Acetic acid
WHO	World Health Organization
YLL	Years of Life Lost
YLD	Years Lost to Disability
ZDHS	Zambia Demographic and Health Survey
ZNCR	Zambia National Cancer Registry

PART 1: BACKGROUND AND OBJECTIVES

Global Lancet NCDI Poverty Commission

The Global Lancet Commission on Reframing NCDs and Injuries for the Poorest Billion ("The Lancet NCDI Poverty Commission") was launched in 2015. Driven by an equity agenda, the global Commission is "based on the principle of complementarity" and "aims to rethink global policies, to mend a great disparity in health, and to broaden the current noncommunicable disease agenda in the interest of equity". [1]

This global Lancet Commission had four main objectives:

1. Assess the nature of the NCDI burden amongst the poorest billion people in the world.
2. Work with a group of countries to develop actionable pro-poor pathways for expansion of NCDI interventions.
3. Assure that sustainable financing is not a bottleneck to NCDI prevention and treatment among the world's poorest; and
4. Expand the NCD movement and the global health agenda to urgently address NCDIs among the poorest billion.

The Lancet Commission invited national partners and stakeholders to establish similar commissions at the national level, particularly in countries with significant populations living in extreme poverty. These national commissions were tasked to advise on the findings of the Lancet Commission and provide platforms for potential implementation of global recommendations. Through the Harvard Medical School Program on NCDs and Social Change and Partners In Health NCD Synergies Project, the Lancet Commission provided financial and technical support to the establishment and execution of the national commissions.

Zambia National NCDI Commission

In order to achieve these global goals and encourage national capacity and voice, the Lancet NCDI Poverty Commission, Brigham & Women's Hospital in Boston, USA, and Partners In Health (PIH) are working with select countries to undertake a series of national-level analyses to complement the global Commission. Through these national NCDI and Poverty commissions' findings, the global Lancet NCDI Poverty Commission is better positioned to make broader generalizations regarding the burden of NCDIs among the poor and the investment opportunity that they represent.

The global Lancet NCDI Poverty Commission provides technical and research support for the National NCDI Commissions, including a standardized methodological approach for conducting the analyses. National NCDI Commissions collect, analyze, and report information to demonstrate the national burden of NCDIs, particularly as they relate to poverty, current health system readiness, and potential expansion of health system interventions in the selected country.

Expected deliverables of the Zambia NCDI Poverty Commission:

- Assemble baseline data regarding disease burden and intervention coverage in relation to household poverty and individual disease severity
- Assemble baseline data on local costs, financing, and governance
- Document innovative local policies and service delivery models
- Review possible NCDI interventions (policies and service delivery strategies) with their associated costs and impact on health and poverty
- Undertake a priority-setting exercise for expanded health investments

Findings of the Zambia NCDI Poverty Commission are contained in this report submitted to the government.

Process and Organization of the Zambia NCDI Poverty Commission

The National Commission for Zambia is titled the Zambia NCDI Poverty Commission. The Ministry of Health, Permanent Secretary Technical Services, was the substantive Chair of the Commission supported by the Co-Chair, Deputy Director Cancer Control. The Chairperson was endorsed by the Ministry of Health as a representative of national aims and strategy.

The Chairperson further nominated a committee of 23 members, representing a multi-sectoral group of public and private sector health authorities, clinical specialists, technical advisors, researchers/academics, and advocates for NCDIs in 2018. The committee had expertise in economics, social protection, poverty measurement, and key policy areas as well as health service delivery platforms.

The operations of the Zambia NCDI Poverty Commission got adversely affected by the COVID-19 Pandemic as most of the members were repurposed to the National Covid Response.

The Permanent Secretary designated the Co-Chair as Committee Coordinator who dedicated a part of her time to manage and organize the commission timeline and deliverables. Select members of the Zambia NCDI Poverty Commission participated in two global Commission meetings in Maputo and Dubai, and the committee held four meetings at national level with all committee members.

PART 2: BURDEN OF NCDIs IN ZAMBIA

Literature Review

A ten-year literature review revealed what the published literature has covered in Zambia pertaining to NCDIs. The review examined the types of studies, the disease area, and the population focus. Any studies that focused on NCDI conditions, using Zambia data, and published between 2009 and 2019 were identified and included. The search terms used the Level 2 disease categories from the Global Burden of Disease and Zambia.

A total of 484 articles were identified, 402 published on NCDs and 82 on injuries. A fifth of the published studies focused on cancer, and over half focused on one of three areas: cancers, digestive diseases, and mental health and substance abuse. Other NCDs accounted for 13% of the

publications and neurological diseases for 6%. Overall, the span of literature covered much of the burden of NCDIs in Zambia. However, there were gaps such as only 1% focused on chronic respiratory disease (3 publications total), and a total of only 14 publications were identified for diabetes and kidney disease. There were also less than neighboring countries. For example, Malawi and Tanzania's literature searches identified 873 and 983 publications, respectively.

THE GENERAL BURDEN OF NCDIS IN ZAMBIA

Global Burden of Disease Initiative

The Global Burden of Disease (GBD), started in the 1990s, is a systematic effort to quantify the comparative magnitude of the loss of health due to different conditions across geographic regions and points in time. GBD does not collect primary data; it compiles estimates into a centralized database from a multitude of other studies and data sources to model the burden of disease. The GBD results are reported every few years using standardized metrics.

The Global Burden of Disease initiative was the primary source the Commission used to describe the burden of disease in Zambia, heretofore called 'GBD'. GBD in 2017 used 307 dataset records for Zambia to contribute to the model and the results. Examples within this include the STEPwise non-communicable disease risk factors surveys 2017, Demographic and Health Surveys 2018, Living Conditions Survey 2015, as well as a wide variety of research findings.

The Commission analysis of the GBD showed that the relative burden of NCDIs in Zambia has increased over time. The burden of disease in Zambia, as everywhere else, is quantified by Disability Adjusted Life Years (DALYs), which is a composite metric representing deaths and disability from a given disease. In 1990, NCDIs accounted for 25% of DALYS, and in 2017 this proportion rose to be 37% (Figure 1).[2]

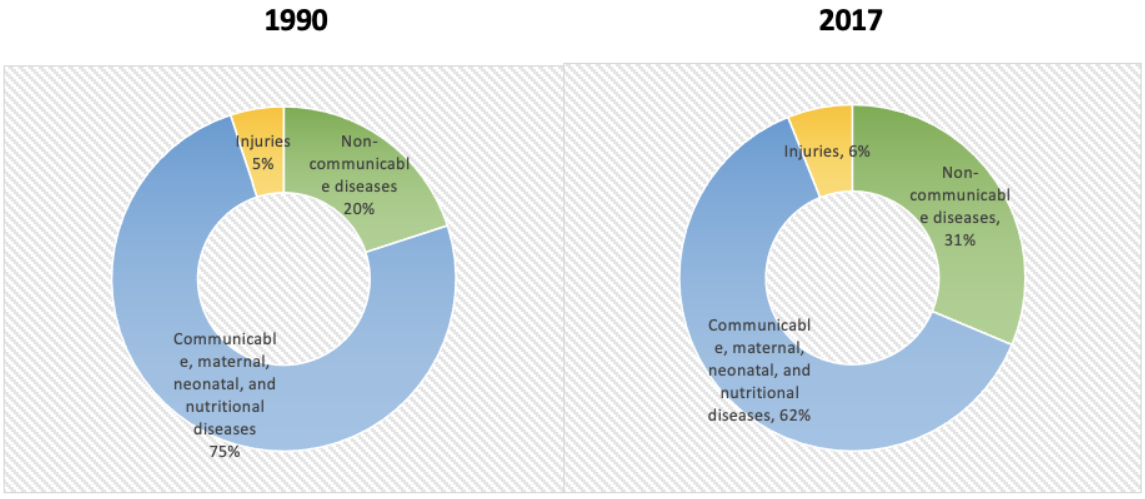

Figure 1: All-age deaths in Malawi by major disease causes, 2017 (Source: GBD, 2017)

NCDIs also causes a large number of deaths in Zambia. NCDs are said to be responsible for 29 percent of all deaths in Zambia, of these 62 percent are premature (among those under 70).

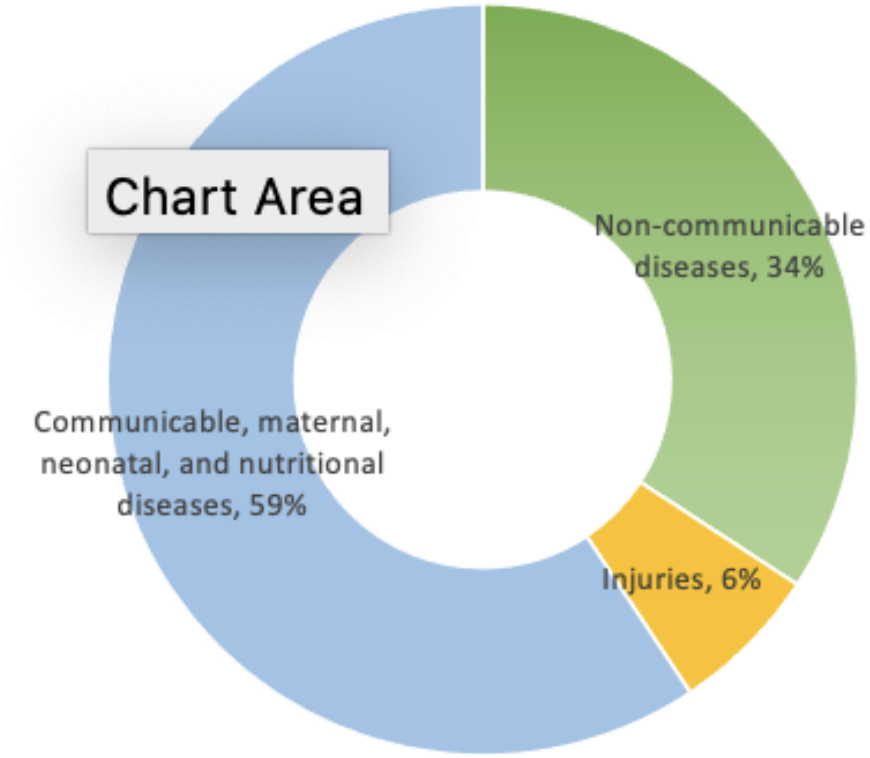

Figure 2: All-age deaths in Zambia by major disease causes

In addition to the 4x4 conditions or 'the big 4' (cardiovascular disease, chronic respiratory disease, diabetes, and cancer), the range of conditions contributing to this NCDI burden in Zambia is quite broad. These 4 conditions, while critically important, account for just 37% of the deaths and disability from NCDIs in Zambia (Figure 3). They do, however, account for a large proportion of deaths alone in Zambia. Within the nearly two-thirds of DALYS due to NCDI conditions outside of the 4x4 agenda, the large categories include digestive diseases, mental and neurological disorders, and a large category of 'other', representing the wide range of NCDI conditions affecting the population in Zambia (Figure 3).

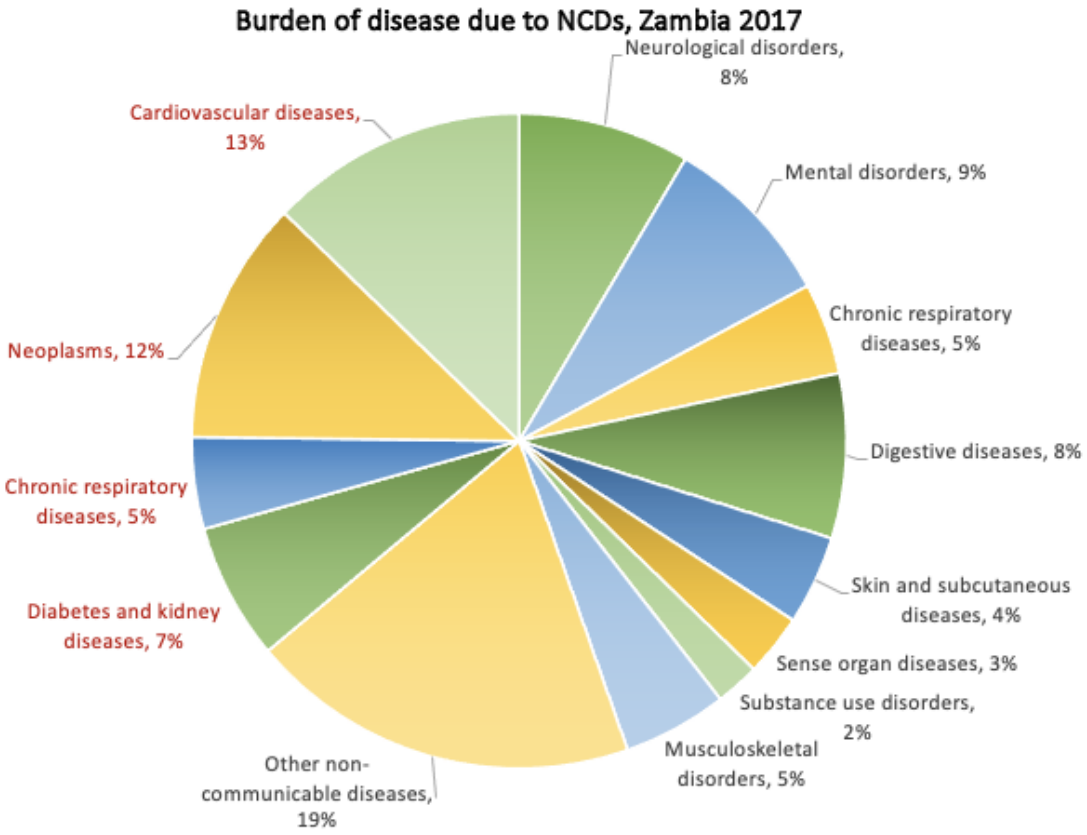

Figure 3: NCD DALY burden in Zambia in 2017: percentage by 4x4 NCD categories versus other NCD categories (Source: GBD, 2017)

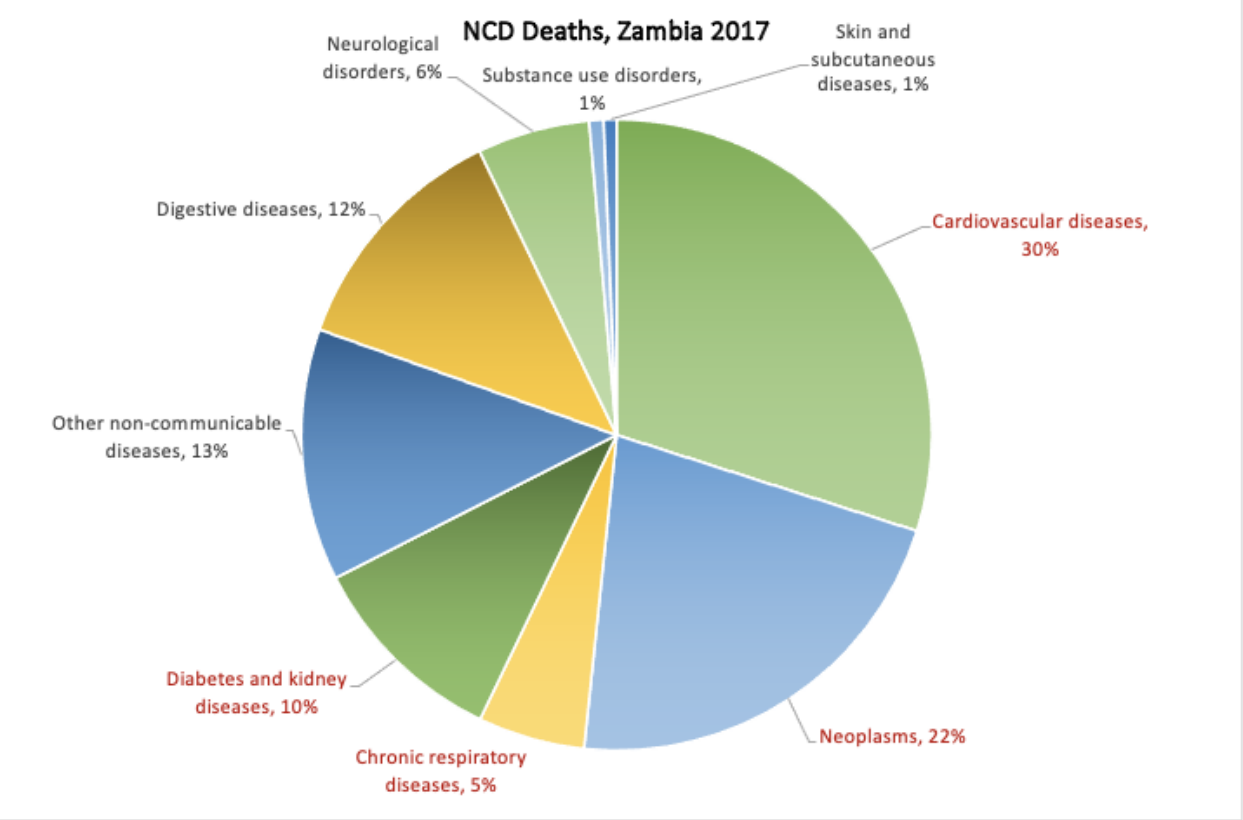

Figure 4: NCD deaths in Zambia in 2017

Burden of NCDIs in Zambia – The Young

The NCDI burden strongly impacts young Zambians, including the workforce in the country. More than half of NCD DALYs and more than three-quarters of injury DALYs occur before the age of 40 years (Figure 5). This represents a significant amount of death and disability in Zambian children and young adults.

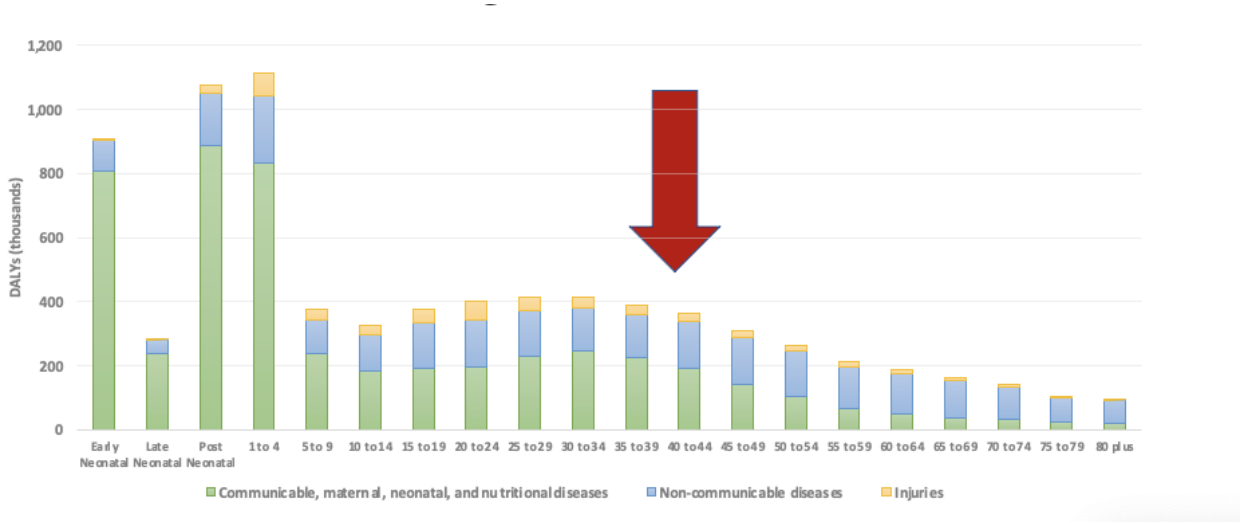

Figure 5: DALYs in Zambia, by age and condition type, 2017 (Source: GBD 2017)

Examining age underscores the importance of considering both death and disability. While the larger proportion of illness and suffering from NCDIs occurs in young Zambians, deaths are more prevalent in the older age groups, where 75% of deaths from NCDs and 41% of deaths from injuries occur after the age of 40 (Figure 6).

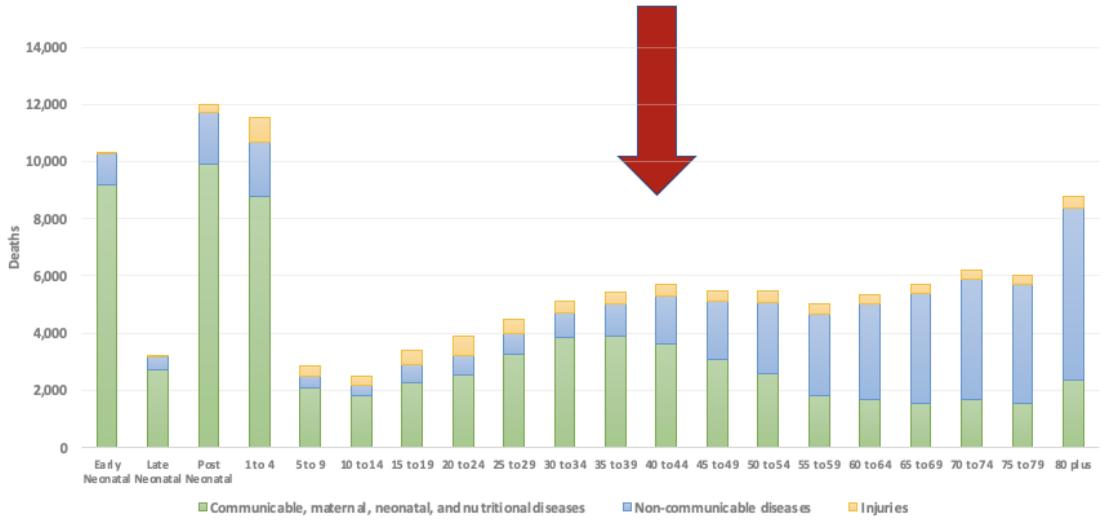

Figure 6: Deaths in Zambia, by age and condition type, 2017 (Source: GBD 2017)

Burden of NCDIs in Zambia – compared to HICs

Almost all NCDI conditions cause more death and suffering in Zambia than when compared to high-income countries (HIC). Someone born in Zambia who gets an NCD condition will not live as long as someone born in a HIC with the same condition. In Figure 7, conditions above the line of equality indicate that more years of life are lost for each person dying of that condition in Zambia than someone dying of that condition in a HIC. For example, someone with epilepsy in Zambia loses almost 60 potential healthy years of life – more than 20 years in excess of someone with epilepsy in a rich setting.

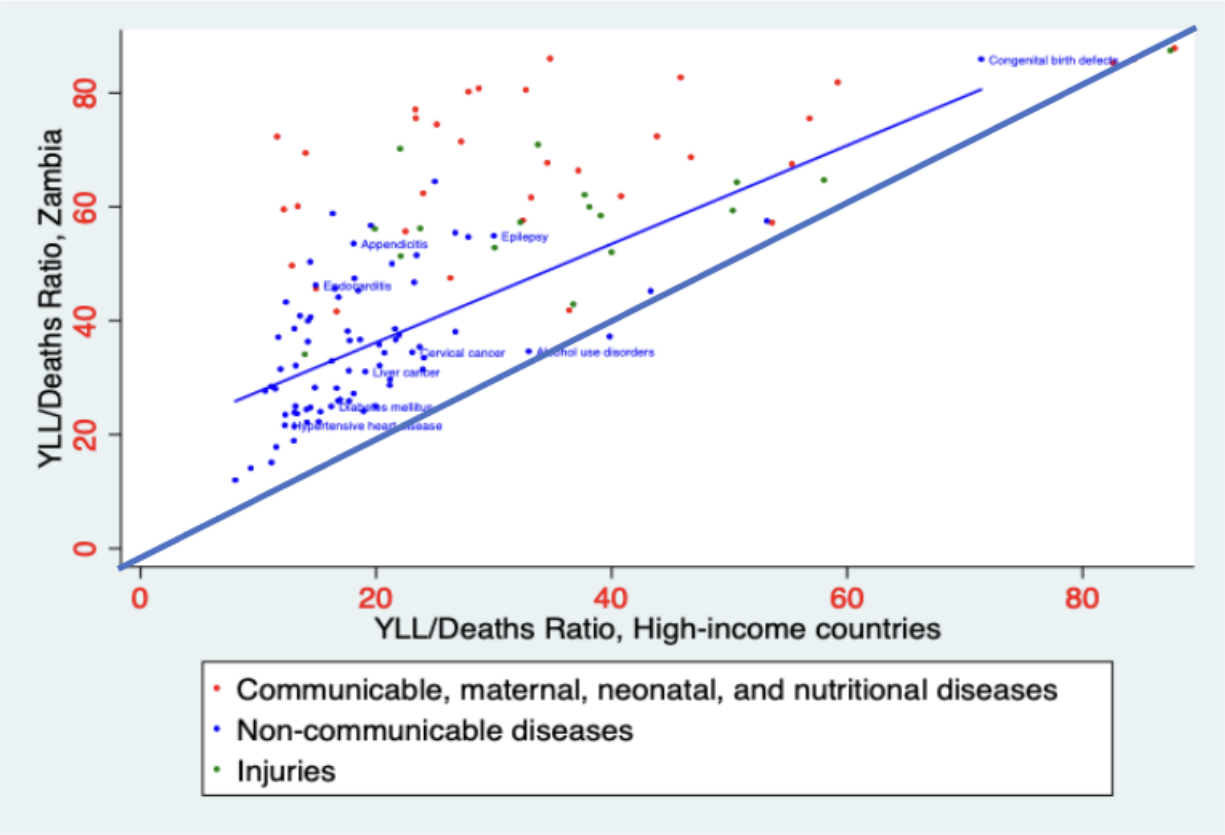

Figure 7: Comparison of Years of Life Lost (YLL) in Zambia vs. High-Income Countries, by Condition Type and Disease Category, 2017 (Source: GBD, 2017)

Burden of NCDIs in Zambia – Risk Factors

In addition to examining burden of disease from conditions, GBD also reports on risk factors, estimating what proportion of the burden of disease for a condition or group of conditions is derived from a specific set of risk factors. Risks are classified as environmental, behavioral, metabolic, or a combination thereof (Table 1).

Environmental risk factors	Behavioral risk factors	Metabolic risk factors
Unsafe water, sanitation and handwashing	Child and maternal malnutrition	High systolic blood pressure
Air pollution	Tobacco	High fasting plasma glucose
Occupational risks	Alcohol use	High LDL cholesterol
Other environmental risks	Drug use	High body-mass index
	Dietary risks	Low bone mineral density
	Intimate partner violence	Impaired kidney function
	Childhood maltreatment	
	Unsafe sex	
	Low physical activity	

Table 1: Risk factors for burden of NCDIs in Zambia

Globally, the dominant 4x4 narrative of NCD risk factors has attributed NCDIs to behavioural and metabolic risks, including high body mass index (BMI), diet, smoking, alcohol, drug use, low physical activity, high blood glucose, high cholesterol, and elevated blood pressure. While these are important considerations in Zambia, they far from explain the factors to which the majority of NCDs are attributed. As shown in Figure 8, half (50%) of the overall NCD burden is not attributable to select metabolic and behavioral risk factors, meaning that the remaining majority of the attribution is due to environmental risk factors and factors unattributable to the GBD 2017's selected behavioural and metabolic factors.

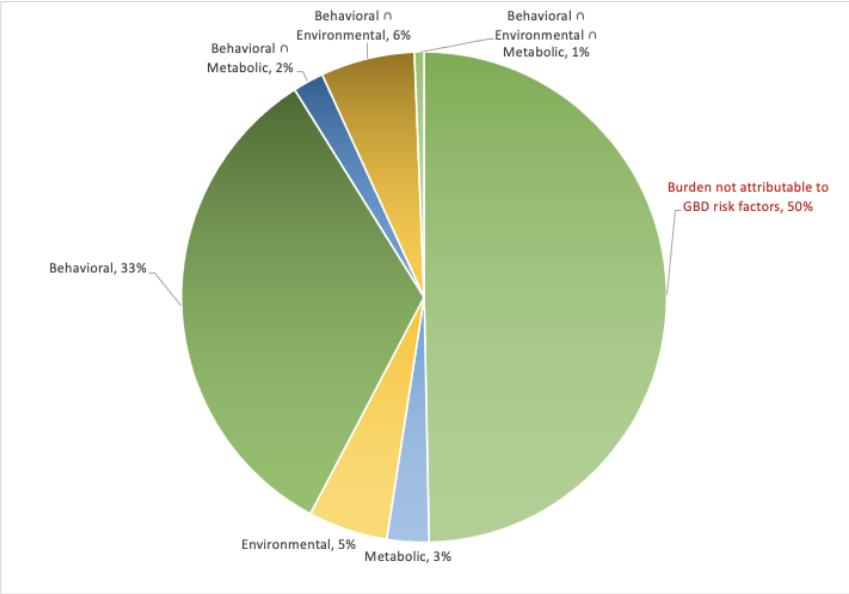

Figure 8: Percent of NCD DALYs Attributed to Selected GBD Risk Factors, 2017 (Source: GBD, 2017)

These proportions of disease that can be attributed to known and measured risk factors differ across NCDI conditions (Figure 9). For example, the majority of diabetes and cardiovascular DALYs can be attributed to these sets of risk factors (but not all), while a very small minority of mental and neurologic disorders are attributable to known risks. A practical example here would include epilepsy. We know that risks for epilepsy include birth asphyxia, childhood cerebral infections (e.g. malaria, meningitis), and head injury, but these are not traditionally included in risk factor frameworks and analyses for NCDs. Many of the risks not accounted for in GBD may be associated with impoverishment as well as infections.

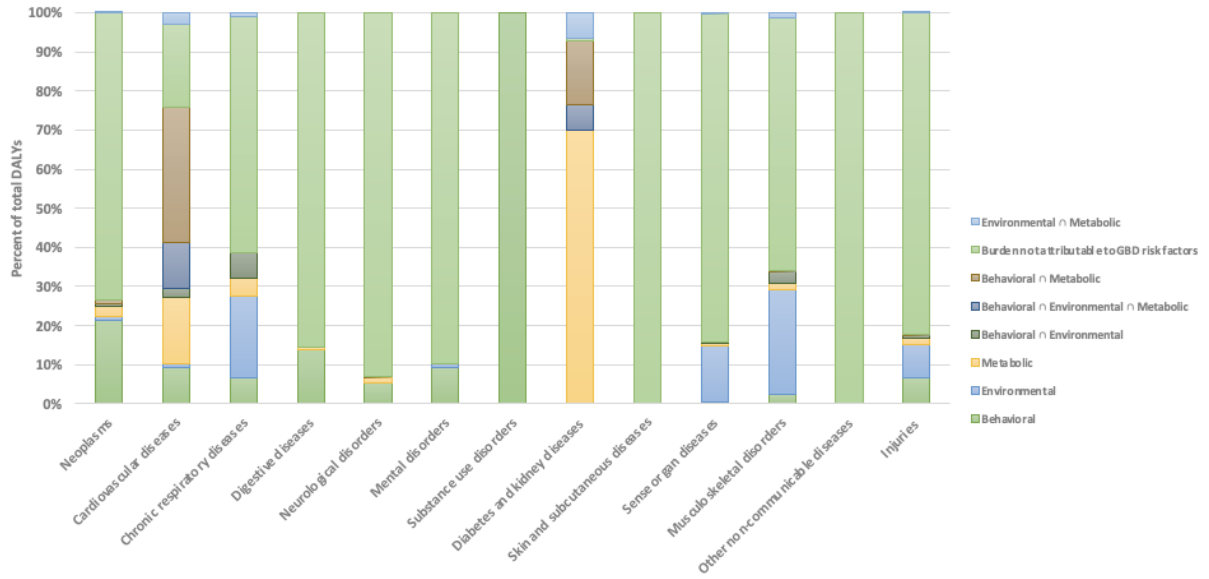

Figure 9 Percent of Total Zambia NCDI DALY Risk Factor Attribution, by Cause, 2017 (Source: GBD, 2017)

Disease category	Condition	Risk factors related to poverty
Hematology and oncology	Cervical cancer, gastric cancer, lymphomas, Kaposi Sarcoma, hepatocellular carcinoma	HPV, *H. Pylori*, EBV, HIV, Hepatitis B
	Breast cancer	Idiopathic, treatment gaps
	Hyperreactive malarial splenomegaly, hemoglobinopathies	Malaria
Psychiatric	Depression, psychosis, somatoform disorders	War, untreated chronic diseases, undernutrition
	Schizophrenia, bipolar disorder,	Idiopathic, treatment gaps
Neurological	Epilepsy	Meningitis, malaria
	Stroke	Rheumatic mitral stenosis, endocarditis, malaria, HIV
Cardiovascular	Cardiomyopathies	HIV, other viruses, pregnancy
	Hypertension	Idiopathic treatment gap
	Congenital heart disease	Maternal rubella, micronutrient deficiency, treatment gap

Table 2 NCDis attributable to known and measured risk factors

Burden of NCDIs in Zambia – GBD conclusions

Analysis of GBD for NCDI conditions concludes that NCDIs account for a significant proportion of deaths and disability in Zambia. The big four conditions remain critically important and account for a majority of deaths, but they account for a minority of DALYs and the NCDI burden is a much broader range of conditions. In addition, NCDIs are significantly impacting the young in Zambia.

Regarding risk factors, half of the NCDI burden cannot be attributed to known and measured risk factors, suggesting a much broader agenda for risk prevention as well.

NCD burden and poverty in Zambia – the Living Conditions Survey

The Living Conditions Survey was conducted in 2015 in over 12,000 households in 10 provinces in Zambia. More than half reporting were below the national poverty line, 41% classified as extremely poor. Among those surveyed, 14.2% had an illness or injury within the two weeks preceding the survey, with a rural and poor predominance (17.9% rural vs 9.1% urban; 16.3% extremely poor vs 11.8% non-poor).

Among those reporting illness in the preceding two weeks, NCDs reported represented a range of conditions. When NCDs were reported as the main type of illness, toothaches or infections in the mouth were most common for NCD conditions, followed by diabetes, hypertension, and asthma. Some of the NCDs did not show much difference in reporting between rural and urban, whereas hypertension and diabetes had a large urban predominance. This could reflect burden of disease or access to screening services, or both.

In examining wealth across self-reported NCDI conditions, the survey classified as extremely poor, moderately poor, or non-poor. Asthma was reported by a higher proportion of extremely poor than those in other groups, with a few conditions most common in the moderately poor such as anemia and paralysis. Hypertension and toothaches were more reported in the non-poor category.

Burden of specific NCDI conditions

The burden of NCDIs in Zambia is increasing. The most common NCDs in the country include chronic respiratory diseases, CVDs, diabetes mellitus (Type II), cancers, epilepsy, mental illnesses, oral diseases, eye diseases, trauma (mostly due to road traffic accidents and burns), and sickle cell anaemia. In 2016, it was estimated that NCDs caused 29% of all deaths in the country, and the risk of dying prematurely (between the ages of 30 and 70) from one of the NCDs was 18%.[3]

Cardio-Vascular Diseases

The national burden of cardiovascular disease (CVD) and non-communicable diseases (NCD) risk factors and Zambia's premature deaths attributable to CVD (30–70 years old) is at 10%.[4] In 2017, the age-standardized total CVD death rate was 10.3%, which is lower than the global rate of 31.8%.[5] The percentage of Disability Adjusted Life Years (DALYs) resulting from CVD was 4.18%. The prevalence of rheumatic heart disease (RHD) was 0.98%, while the total RHD mortality rate was 0.14% of all deaths.[5]

Tobacco and alcohol

The prevalence of tobacco use in adult men 15 years and older was 26.5% in 2015, which, in 2017, was found to be 24% in 18–69-year-old respondents in the WHO STEPwise approach to surveillance (STEPS).[6,7] In 2015, only 4.6% of adult women used tobacco, while of those who participated in STEPS, 7.8% was using tobacco.[6,7] The premature CVD mortality rate attributable to tobacco is 4% of the total mortality rate[8] and the three-year (2016–18) average recorded alcohol consumption per capita (≥ 15 years old) was 3.9 litres.[6]

Raised blood pressure and cholesterol

In 2015, the percentage of men and women 25 years and older with raised blood pressure (BP) levels (systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg) was 27.6% and 26.5%, respectively.[4] STEPS data, conversely, revealed 19.1% of Zambians had raised BP or were on medication in 2017.[7] The percentage of DALYs lost because of hypertension was 2.32%, whereas the mortality rate caused by hypertensive heart disease was 0.93% in 2017.[5]

Overweight and obesity

The prevalence of overweight [body mass index (BMI) ≥ 25 to < 30 kg/m^2] and obesity (BMI ≥ 30 kg/m^2) in adults 25 years and older was 27.8% and 8.1%, respectively in 2016.[6] On the other hand, of the STEPS respondents, 13.2% of men and 20.2% of women were overweight, while far more women (12.3%) than men (3%) were found to be obese.[7]

Diabetes

The percentage of the defined population with a fasting glucose level ≥ 7.0 mmol/l or on medication for raised blood glucose (age-standardized) in 2014 was 6.5% for men and 6.7% for women.[6] In 2019, the prevalence of age-adjusted (adults 20–79 years) diabetes was 4.5%, which is lower than the global estimate of 9.3% but higher than that of Africa's 3.9%.[9]

Mental Health

Mental Disorders remain largely unknown although that of acute psychotic disorders and schizophrenia have been reported as 3.61% and 1.8% per 10 000 population served by the hospitals' catchment area respectively.[10] The highest numbers of admissions at mental health facilities are due to Alcohol & substance use disorders which are at 42%.[7] The percentage of men who drink alcohol is significantly higher (32%) than that of women (15.3%).[7] Harmful use of Alcohol has long lasting devastating effects on families, work, relationships, and health. It is apparent that problems related to mental health are numerous, but there is no systematic mechanism for documenting and reporting them.

The second highest number of admissions to mental institutions is Depression which is at 30%. Several studies have revealed a link between HIV and Mental Health. Besa found that amongst the HIV positive population in Zambia, 82% were found to have a psychiatric disorder[11] with the HIV population scoring higher for depression than the general population.[11] The HIV positive

populations were also found to drink more alcohol than the general population. The scope of intervention drugs provided in the essential medicines list is grossly inadequate and does not cover key drugs for mental illness.

Oral Health

According to the Ministry of Health Zambia, though most of the oral diseases are preventable, over 80% of Zambians are affected by oral health problems, which include dental caries, periodontal disease, malocclusion, facial injuries, halitosis (bad breath), can Crum oris, and oral tumors. The scourge of HIV & AIDS has also compounded the deleterious impact of oral diseases in the Zambian population. Oral diseases are common in Zambia, and there has been an insufficient focus on preventive strategies. According to the STEPS survey, 75% of Zambians have never visited a dentist and less than 10% visited a dentist in the past 12 months.

Sickle Cell Disease (SCD)

The SCD trait is estimated at 18% of the Zambian population. The University Teaching Hospital, Lusaka, with the largest population of SCD patients, has on its records over 6, 000 patients currently registered with them. The majority of these are children below the age of fifteen years. SCD patients accounted for 12% of the total all- cause admissions at the UTH- Children's Hospital in 2017 and yet SCD was 4th of the top five causes of mortality among children admitted to the Hospital in 2017 and among the top 10 causes of seeking medical attention. In 1972 Barclay described the distribution of the sickle cell trait in Zambia showing the highest incidences of the trait to be in the northern regions of Zambia. It was further observed that the incidence was higher in the rural populations than in the urban populations. The disease has since been reported in all districts of Zambia.

Assault and violence including gender-based violence

Gender Based Violence (GBV) continues to be a huge problem in Zambia. The 2007 Zambia Demographic Health Survey (ZDHS) indicates that one in five women has reported having experienced sexual violence at some point in her life, and 46.8% of women have experienced physical violence at some point since 15 years of age. According to the data collected by the Zambia Police Victims Support Unit (VSU), GBV cases have steadily increased between 2008 and 2011 with 6,716, 8,467, and 11,914 cases recorded in 2008, 2010 and 2011 respectively.

In its efforts to address the rising incidences of GBV, the Government enacted the Anti-Gender Based Violence (GBV) Act No. 1 of 2011. However, low levels of reporting (amongst women and men) and high rates of withdrawal of reported cases have negatively contributed to the fight against gender-based violence. There is a wide preference for settling such matters outside the Courts of Law to preserve family respect. Since most cases of GBV are perpetrated by men who may be the breadwinners, the victims prefer to withdraw the cases rather than risk the economic security that they associate with marriage or long-term partnerships.

Adolescent health

About 32% of adolescents aged 15-17 and 60% of those aged 18-19 are sexually active in Zambia, and therefore face risks from HIV and other sexually transmitted infections (STIs), especially as only 40% of them report regular condom use. They also experience mental health issues, trauma and physical and sexual violence. Non communicable diseases, particularly those related to poor nutrition and physical inactivity, are also an emerging area of concern. In addition, there are significant gender differences related to risk and vulnerability among adolescents in Zambia: almost one in five adolescent girls are already married compared to only 1 in 100 adolescent boys aged 15-19; and one out of every four girls aged 17 and six out of every 10 girls aged 19 have already started childbearing. On the other hand, adolescent boys seem more predisposed to alcohol and substance use and abuse compared to girls.

Based on the situation analysis the priorities in the Adolescent Health strategy included sexual and reproductive health; HIV and AIDS, other STIs; gender-based violence; non communicable diseases - particularly nutrition related and mental health issues; alcohol and substance abuse; and health issues affecting adolescents with special needs.

The latest Zambian Global Youth Tobacco Survey (GYTS) of 13–15-year-olds from the 10 provinces of Zambia shows tobacco use prevalence of 35.6% (boys 37.9% and 34.0% girls), of whom 27.9% smoke and 14.5% use smokeless tobacco. This is an exponential increase from the data of 2011. Tobacco control must therefore be accelerated in this age group.

Unhealthy eating especially fast foods

The STEPS 2017 survey showed a high rate of national salt consumption estimating it at 9.5g per day (10.5g for men; 8.5g for women). The fact that more than three-quarters (78.3%) of adults thought they were consuming the correct amount of salt might suggest a lack of knowledge as a potential driver. However, the majority (62.2%) of the population are aware of the health risks of overconsumption. Further reported misconceptions highlighted a greater need for education around salt. Saturated fat intake is also a concern around unhealthy diets in Zambia. A global survey showed Zambia has the greatest increase in mean saturated fat intake worldwide – measured as % of energy intake – over the period 1990-2010, rising from 2.3 to 7.1%.

Injuries, including road traffic accidents in Zambia

Road crashes are the third leading cause of death after malaria and HIV/AIDS, accounting for over 2,000 deaths per year, with many thousands being injured each year.

Brought in Dead

Zambia has some patients that die from home or on the way to the hospital. These are categorized as Brought in Dead. The country has no national register that records the numbers and what conditions caused the death and autopsies are not routinely done. This forms a major limitation. The table below depicts a sample from the University Teaching Hospital study.[12]

Top 10 Causes of deaths among the brought in dead adult cases in the University Teaching Hospital during research period by SmartVA and Death Notification Form.

SmartVA (N=1366)					Death Notification Form (N=1366)			
Rank	**Cause of Death**	**No.**	**%**		**Rank**	**Cause of Death**	**No**	**%**
	Undetermined	344	25.2			Undetermined	526	38.5
1	HIV/AIDS	278	20.4		1	TB	239	17.5
2	Stroke	134	9.8		2	Other CVDs	148	10.8
3	TB	87	6.4		3	Malaria	75	5.5
4	Suicide	68	5.0		4	Stroke	59	4.3
5	DM	67	4.9		5	Other Cancers	45	3.3
6	Other CVDs	57	4.2		6	Suicide	33	2.4
7	Pneumonia	52	3.8		7	Diarrhea/Dysentery	31	2.3
8	Epilepsy	38	2.8		8	Other NCDs	28	2.0
9	IHD/AMI	26	1.9		9	DM	25	1.8
10	Asthma	25	1.8		10	RTA	25	1.8

Table 3 Causes of deaths among adult BIDs in UTH during SmartVA and death notification form

Tuberculosis, DM diabetes mellitus, CVDs cardiovascular diseases, AMI acute myocardial infarction, IHD ischemic heart disease, NCDs non-communicable diseases, RTA road traffic accident NCDs rank highly and prominently on the BiDs which need interventions.

Road Trauma

Zambia has one of the highest mortality rates from road trauma in the world. The World Health Organisation (WHO) estimates that more than 3,500 people die annually in Zambia from road trauma representing 24.7 deaths per 100,000 population. The official Zambian reports indicate less than 2000 deaths per year, signaling potential underreporting. The overall authority in reporting estimates of road trauma in Zambia is the police. The health care system also collects road trauma data but tends to collect data only on severe cases and deaths.

Substance abuse and alcoholism

According to the Zambia Stepwise Survey for NCDs risk factors (2017), 21.7% of the respondents were current drinkers of alcohol with a significant gender difference (32.0% for men compared to

11.8% for women). In men, the largest proportion of drinkers (37.8%) was among the 30 to 44 years while in women (15.3%) it was among the 60 to 69 years' age group. The percentage of current drinkers was significantly higher among women in urban areas (15.7%) than in rural areas (7.8%).

Sexual intercourse when one or both partners are under the influence of alcohol is more likely to be unplanned and couples are less likely to use condoms. According to the 2014 DHS, 6% of young women and 4% of young men reported that they or their partners were drunk when they had sexual intercourse at some point during the period preceding the survey.

In addition, the Zambia Global School Health Survey (2004) was conducted among students in grades 7-10, in 47 schools, in 9 provinces. The survey indicated that 42.6% of the 2,257 students who participated had taken alcohol on one or more occasions during the previous 30 days. Children, as young as 13, had indulged in drinking alcohol and grade 7's abused alcohol more than students in grades 8 and 9. Consumption was higher among females (45.5%) than among males (38.9%) and in the age group of 16, females (49.9%) drank more alcohol one or more times than males (35.9%).

Cervical cancer

Cervical cancer is the most common cancer in Zambia accounting for 22.9% of cancer cases diagnosed annually and 40.2% of all female cancers diagnosed.[13] Early-stage disease is also curable with 5-year survival rates of close to 100%. Unfortunately, the incidence and mortality rates in Zambia are one of the highest in the world with an age standardized incidence rate of 65.5per 100,000 and an age standardized mortality rate of 44.6 per 100,000.[13] The WHO has embarked on a strategic program to accelerate the elimination of cervical cancer by 2030. Zambia has the largest cervical cancernational screening program linked to the HIV program in the sub-Saharan Africa. The triage test with HPV is currently being rolled out. HPV vaccination was introduced into the Zambian Expanded Program of Immunisation for 14 year old in 2019. Currently the country has one cancer treatment center; the Cancer Diseases Hospital, with advanced plans to decentralize treatment centers to 2 additional provinces.

Prostate cancer

Prostate Cancer is the most common urologic malignancy among men in Zambia which accounts for 11.2% of all cancer cases and 25.9% of all cancers among men.[13] It has an age standardized incidence rate of 45.6 per 100,000 and the age adjusted Death Rate is 29.58 per 100,000 of population.[14] Prostate cancer is the most common cancer seen amongst men at Cancer Diseases Hospital with incidence and mortality rates of 21.9 and 18.2 per 100,000 men respectively[14], representing 5% of all cancers seen. The average age of prostate cancer diagnosis at CDH is 71 years of age.

According to the WHO (2018)[15] prostate cancer deaths in Zambia reached 599 or 0.54% of total deaths. The need to expand access to prostate cancer services in Zambia cannot be over-emphasized.

Breast cancer

Breast cancer is the third most common cancer after cervical and prostate cancer accounting for 11.2% of all cancer cases.[13] Majority of breast cancer cases are diagnosed at late-stage disease (Stages III and IV), at which survival rate is poor and treatment options are limited and costly. In the early stages of the disease, treatment modalities such as; appropriate surgical intervention with or without radiotherapy are less costly, more effective, and less toxic and are therefore offered even in low- and middle-income countries where resources are limited. The Ministry of Health has published National Breast cancer guidelines and established early diagnosis clinics in some primary health facilities in 2018 which are being implemented, achieving higher early detection rates, more effective treatment, and reduced mortality. Between March 2018 and April 2019, 1,790 symptomatic women who presented to these clinics where 176 (10%) had clinical and/or ultrasound indications for histologic evaluation and 64% of these women had pathologic findings compatible with primary breast cancer and those with advanced disease referred.[16]

Kaposi 's sarcoma

KS is among the five commonly diagnosed cancers in Zambian men and women in 2012 and is the forth most common cancer in Zambia with a ASR of 12.1 per 100,000 and ASR 6.1. The high prevalence of KS in Zambia is because of the high prevalence of HIV. The two key interventions for the reduction of KS morbidity are; reducing HIV infection rate and improving ART coverage across the country. The incidence and mortality rates have evidently reduced since the advent of highly active antiretroviral therapy.

Childhood cancers

Data from the Zambia National Cancer Registry (ZNCR) shows that Paediatrics cancers comprise 6% of all cancer cases diagnosed in Zambia. **Retinoblastoma** is the most common cancer in children in Zambia and worldwide. Despite the disease being fatal, some medical personnel are not able to detect retinoblastoma, which has become a leading cause of mortality among children under the age of five. Therefore, there is urgent need to expand access to and make available retinoblastoma services in Zambia. Retinoblastoma has been reported to be the second and third commonest tumor in children in Zambia in two retrospective reviews conducted in 1980-1992 and 2008-2010 respectively (ZNCR). Despite retinoblastoma being highly curable in developed countries, a higher mortality is seen in developing countries where most of the affected children live.

PART 3: ORGANIZATION AND AVAILABILITY OF NCDI SERVICES IN ZAMBIA

NCDI Service Availability

Zambia's 2015 Service Availability and Readiness Report (SARA) sampled 234 of 1842 health facilities. Overall, the report showed a high degree of readiness for basic amenities such as sanitation, consultation rooms, communication, and emergency transport. The most common missing item was power source. Overall, lower levels of the health system (health posts) were less prepared for providing services than higher levels (hospitals).

Regarding equipment relevant to NCDs, using blood pressure cuffs as a tracer item, they were available at 99% of hospitals, 94% of health centres, and 89% of health posts. They were available at 97% of urban facilities and 91% of rural.

Regarding diagnostic capacity, the SARA 2015 report in Zambia reports on diagnostic capacity for HIV, malaria, syphilis, pregnancy, and anemia, but does not include any tracer items specific to NCDs such as glucometers.

However, the SARA report does include availability of tracer medications for NCDs by region, facility type, and urban vs rural. All facilities reported at least one medication being available, though there was a very wide range across the medications. For example, aspirin was available in 93 of the 231 facilities surveyed, but insulin was only available at 19 facilities. Salbutamol was present in 49% of facilities, atenolol in 47%, amitriptyline in 25%, glibenclamide in 43%. A very small minority of facilities reported availability of neurologic and mental health medications.

Regarding NCD services overall, most hospitals self-reported readiness to diagnose and/or treat common NCDs within the 4x4 agenda, including 98% for diabetes, 90% for cardiovascular disease, and 95% for chronic respiratory disease. However, health centers self-reported less preparedness for these conditions (62%, 77%, 78%, respectively). Private facilities were more equipped for diagnosing and treating NCDs, and many facilities were lacking in basic tracer items. Beyond those 3 disease categories, cervical cancer was investigated, but analysis for the much broader burden of NCDs (e.g. rheumatic heart disease, sickle cell disease, type 1 diabetes) was not possible.

Ultimately, for diabetes, only 28% of facilities having insulin, 29% metformin, and 13% with at least 1 staff trained in diabetes. For cardiovascular disease, only 19% had oxygen, 27% had ACE-inhibitors, 22% hydrochlorothiazide, and 12% had at least 1 staff trained. For chronic respiratory disease, 49% had salbutamol in halers, 13% beclomethasone inhalers, and 17% with at least 1 staff member trained.

Another study which looked at health facility readiness to manage NCDs in three districts of Zambia showed wide heterogeneity between facilities in respect of readiness to manage NCDs. Only 6 (including the three 1st level hospitals) out of the 46 facilities were deemed ready to manage

NCDs. Only the first level hospitals scored a mean index higher than the 70% cut off; With regard to medications needed to manage NCDs, urban and rural health facilities were comparably equipped. However, there was evidence that calcium channel blockers (p = 0.013) and insulin (p = 0.022) were more likely to be available in urban and semi-urban health facilities compared to rural facilities.[17]

Health Expenditures on NCDIs in Zambia

National Health Accounts (NHA) is a process for monitoring how health investments flow through a system and what is spent on health in a country, including public, private, and out-of-pocket spending. The Commission reviewed spending by looking at Zambia's NHA from 2013-2016.

The precise amount of health spending to achieve UHC is not known, but is likely around $79 per capita in low-income countries.[18] In addition, the type of funding is important as the more out-of-pocket spending would confer more impoverishment from health spending. Oftentimes NCDs are subject to more out-of-pocket spending than other conditions. In Zambia, per the National Health Accounts 2013-2016, total health expenditure was $59 per capita, and 12% of the spending was out-of-pocket. From 2013 to 2016, NCDs made up a minority of investment in health, representing just 8 to 10% of health expenditures, compared to infectious diseases which was 58-68%.[19] The data also showed 62% DALYS due to infection and RMNCH, which attracted 69% spending whereas there was 37% DALYS due to NCDIs, which attracted only 13% spending (Figure 9). The Commission was not able to ascertain what proportion of the NCD spending was out-of-pocket.

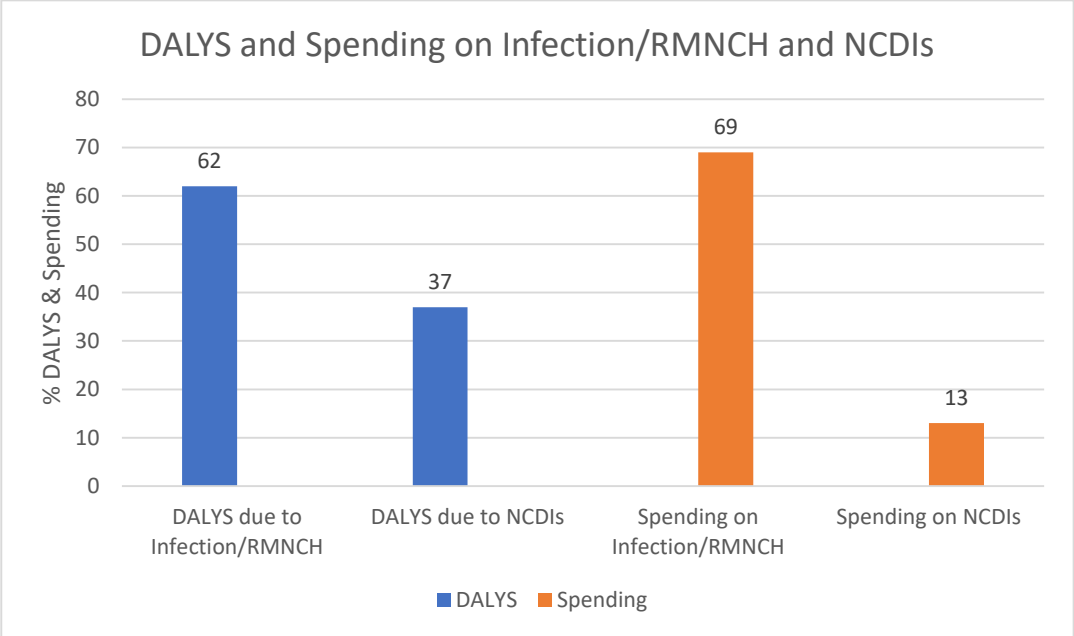

Figure 10: DALYS and Spending on Infection/RMNCH and NCDIs

There are few external funding sources to support NCDs in Zambia as of 2016. In examining sources of funding, in 2016, external sources of funding exceeded government spending for infectious diseases, a common scenario in sub-Saharan Africa given Global Fund and other investments into HIV, TB, and malaria. By contrast, all of the spending for NCDIs was attributed to domestic government expenditure.

PART 4: PRIORITY SETTING FOR NCDIs AND INTERVENTIONS-METHODS

The Zambia NCDI Poverty Commission used robust methodology in setting priority disease conditions. The priority setting and intervention was conducted in five phases, namely: 1) Collect Key Indicators of NCDI Burden; 2) Construct Composite Index; 3) Select Priority List of Conditions; 4) Intervention prioritization and 5) Costing of interventions.

Data Collection for NCDI

The commissioners used the Zambia national data from the GBD 2017 NCDI. The GBD 2017 database included YLL (Years of Life Lost), YLD (Years Lost due to Disability), DALYs, and DALY rate ratio calculated for each NCDI cause (or disease condition). The conditions were grouped into disease categories. The indicators are defined as follows:

- YLL (Years of Life Lost) =N*L (where N=number of deaths; L=Standard Life Expectancy at the age at which death occurs). YLL is a measure of premature death within a group of people. YLLs are calculated by starting with the highest achievable life expectancy in a given year for a given age group, then subtracting the age at which a person in that age group dies. For example, if achievable life expectancy in a given year for men is 81 years, a man who dies of lung cancer at age 65 will have 16 years of life lost. Life expectancy is the number of years that the average member of a group can expect to live.

- YLD (Years Lost due to Disability) =I*L*W=P*W (where I=number of incident cases; L=average duration of the case, W=Disability weight, i.e., 0=perfect health to 1=death; P=number of prevalent cases). YLD measures the amount of time people lose to diseases and injuries that degrade health but do not cause death. It is calculated by multiplying a disability's severity by the time it lasts. This means that a short-term, severe health problem and a long-term, relatively mild health problem could both result in the same number of YLDs. For example, someone who needs two months to recover from a car accident but then regains their full health and someone who experiences relatively mild but lifelong back pain could end up losing the same number of years of their lives to disability.

- DALYs for a disease=YLL+YLD. It is the sum of YLLs and YLDs, so DALYs consider both premature death and health-related suffering to portray the total years of healthy life

lost from all causes. Ranking the causes of DALYs in a population shows the health problems that cause the most suffering in a society.

- DALY rate ratio compared to World Bank high-income countries (HICs) for each cause. It is a measure of poverty or equity.

Construct Composite Index

The composite index is the first step in trimming down the list of NDCI causes towards selecting priority disease conditions. First, the YLL, YLD, DALYs, and DALY rate ratio were normalized by ranking each from 1 to n where "1" represents the highest value of each indicator and "n" represents the lowest. Quartiles of ranks were created with quartile 4 representing highest priority. Using expert knowledge, the commissioners assigned weight to the indicators as follows: YLL = 3, YLD = 3, DALY = 2 and DALY rate ratio = 1. Where 1 = somewhat important, 2 = important, and 3 = very important. The composite index was calculated as the weighted average of the normalized indicators (i.e. [3*TLL + 3*YLD + 2*DALY + 1*DALY rate ratio]/9).

Select Priority List of Conditions

The conditions with composite index above 2.5 were presented to the commissioners for selecting the priority conditions. The commissioners used Delphi method to select the priority conditions. The commissioners were divided into three groups. Each group was given the list of disease conditions with composite index above 2.5. For clarity, they were also provided with the entire list of 211 GBD conditions in case they were searching for conditions they couldn't find on the prioritized list. In the first round of list reduction, for each disease condition, the commissioners indicated whether the condition should be included as a priority or not with 1=included and 0 = not included. The inclusion indicator was summed such that 3 represents "all three groups agreed to include the condition", 2, "two groups agreed to include the condition", 1, "only one group agreed to include the condition"; and 0, "none of the groups agreed to include the condition". Conditions with the sum of inclusion indicator less than 1 (no group voted to include) were excluded. In addition, the groups had the option to propose additional conditions not found with composite score >2.5; through this method, 13 additional conditions were put forward. At this point, 111 conditions remained. In the second round of prioritization, the commissioners were reconstituted into two groups and the process was repeated with the 111 conditions – conditions with the sum of inclusion indicator equal to 2 (i.e., both groups agreed to include) were kept, i.e. where both groups voted to include. These two rounds of the Delphi method yielded a total of 79 disease conditions, which were further reviewed to exclude conditions without interventions. Some conditions were also merged. This process yielded a further reduction to 54 as the final list of priority disease conditions.

Intervention Prioritization

The final list of priority disease conditions was used to determine a set of priority interventions. The first exercise focused on the Disease Control & Priorities (DCP3), a rigorously reviewed set of cost-effective interventions for Low and Middle Income Countries that are graded on cost-effectiveness, equity, and financial risk protection. The Commission reviewed all DCP3 NCD interventions that were relevant to the prioritized conditions and used a couple stages to come up with the final list of priority NCD interventions for Zambia.

The initial stage involved extracting the DCP3 interventions relevant to the prioritized conditions in Zambia. In this manner, from the list of 190 NCDs priorities from DCP3, a set of 65 NCDI interventions were selected by the Zambian NCDI commission to be considered. The 65 DCP3 interventions were then reviewed in two groups, based on the alignment with national strategic goals and chosen priority conditions. From the 65 suggested interventions for NCDIs in the UHC package for Zambia adapted from the DCP3, each of the interventions were assessed with the following questions: Is the interventions targeting one of the prioritized conditions? Is it feasible in our context? Does it rank highly on the three priority categories (cost-effectiveness, financial risk protection, equity)? From the above questions, the commission decided to include or exclude each of the interventions from the 65 suggested interventions. Groups scored if each intervention was feasible and desirable in Zambia, and if it should be prioritized. The two groups agreed on all but 2 interventions, which were resolved with group discussion and debate. Discussions of additional interventions, not on the DCP3 list, were also tracked.

The next stage involved reviewing the selected priority interventions for Zambia. From the consolidated and improved list of priority conditions by commission, a review was done after a series of deliberations. One of the key issues that was considered in addition to the above-named criteria of cost effectiveness, equity, feasibility, and financial risk protection was benchmarking of interventions aligned with national strategic goals and those currently been implemented in Zambia with the chosen priority conditions. For this reason, various key strategic documents were reviewed that included but not limited to the National Health Strategic Plan 2017-2021, The Seventh National Development Plan 2017-2021, the Non-Communicable Diseases Strategic Plan, National Cancer Control Strategic Plan among other key strategic documents both published and unpublished. These were matched with the available Universal Health Care interventions for Low-income Countries by Disease Control & Priorities from the DCP3.

Costing of interventions

The DCP3 data for the unit costs was adjusted for Zambia using the appropriate adjusting factor provided by DCP3. The unit cost was then multiplied by the Zambian selected burden of disease (# people in need of the specific intervention) from GBD estimates.

Based on the final list of interventions, the baseline estimate and target coverage of the interventions was done based on the literature review of both peer and policy documents that were available. Some interventions had already estimated baseline and coverage, some had baseline only while others had neither the baseline nor the target interventions. In the cases of missing

baseline and target interventions or any of the two, expert opinion was used. This approach was decided upon by the commission as a better approach than using the default setting of 20 percent and target of 50 percent as certain intervention baseline coverages were above the default setting numbers as set out in the DCP3.

The baseline coverage ranged from 1 percent for selected interventions that had the lowest coverage to about 70% for the interventions that seemed to be doing very well whereas the target setting ranged from 15% for selected interventions that were doing very badly to about 85% for the interventions that were doing very well. Out of the selected 65 interventions that were selected for Zambia, only 3 had a target of 100%.

The final stage, therefore, involved calculating the total cost of interventions per year based on the increased coverage (from baseline to target) for each intervention, the unit cost, and the population in need. In addition, a calculation of the percentage of total health expenditures from the selected interventions represented was modelled against the impact of these interventions for health outcomes and economic outcomes to determine the fiscal space needed to finance the selected package of interventions.

To determine the cost of priority interventions for the NCDI and Poverty, six distinct steps from the DCP3 tool were utilized. This involved a team decision through group work, on which of the interventions received the highest score in terms of cost-effectiveness with a scale ranging from 0 to 4, financial risk protection with a scale ranging from 0 to 6, and equity scale ranging from 0 to 3 in the first round of selections. Furthermore, the selection of priority intervention was subjected into a second round of selection to determine the final list of priority interventions that formed the final list of costed interventions which involved the feasibility and desirability of implementing the intervention and finally classifying the intervention into those that should be prioritized for implementation and be part of the NCDI and Poverty list of priority interventions.

PART 5: PRIORITY SETTING FOR NCDIs AND INTERVENTIONS - FINDINGS

Priority Disease Conditions

A total of 74 NCDIs were selected as priority disease conditions for Zambia (Table 4). Of these, 5 conditions were added by the commission as important within the Zambian context. These were depression, HIV induced mood disorders, HIV induced psychosis, Kaposi's sarcoma, post-traumatic stress disorders. In addition to the four traditional NCDs (i.e., cardiovascular, respiratory, diabetes, and cancer), many of these conditions cause significant burden in Zambian population, especially among the young and poor, such as rheumatic and congenital heart disease, type 1 diabetes, and mental health conditions. The 74 conditions were further reduced to 54, which excluded conditions without interventions, and some were merged.

Disease categories	Prioritised NCDIs in Zambia
Cancer	Breast cancer, cervical cancer, esophageal cancer, Hodgkin lymphoma, liver cancer due to other causes, nasopharynx cancer, non-Hodgkin lymphoma, other leukemia, other pharynx cancer, and peptic ulcer disease.
Cardiovascular	Endocarditis, hypertensive heart disease, ischemic heart disease, ischemic stroke, rheumatic heart disease, other cardiomyopathy.
Congenital	Congenital heart anomalies, congenital musculoskeletal and limb anomalies, down syndrome, neural tube defects, orofacial clefts, other congenital birth defects.
Dermatological /musculoskeletal	Low back pain, other musculoskeletal disorders, rheumatoid arthritis.
Endocrine	Diabetes mellitus type 1, diabetes mellitus type 2.
ENT & eye & diseases and disorder of the mouth	Cataract, glaucoma.
Food drug interactions and other adverse events	Adverse effects of medical treatment, other drug use disorders, poisoning by other means.
Gastrointestinal	Inflammatory bowel disease.
Genital urinary	Acute glomerulonephritis, benign prostatic hyperplasia, chronic kidney disease due to glomerulonephritis, endometriosis, female infertility, male infertility, prostate cancer, uterine fibroids.
Hematological	Sickle cell disorders.
Liver	Cirrhosis and other chronic liver diseases due to other causes, liver cancer due to Hepatitis B.
Mental health	Alcohol use disorders, anxiety disorders, bipolar disorder, liver cancer due to alcohol use, self-harm by other specified means.
Neurologic	Alzheimer's disease and other dementias, brain and central nervous system cancer, epilepsy, other neurological disorders, subarachnoid hemorrhage.
Respiratory	Asthma, chronic obstructive pulmonary disease, pulmonary aspiration and foreign body in airway.

Surgical & Injuries	Appendicitis, cyclist road injuries, fire heat and hot substance, inguinal femoral and abdominal hernia, intracerebral hemorrhage, motor vehicle road injuries, other exposure to mechanical forces, other transport injuries, paralytic ileus and intestinal obstruction, pedestrian road injuries, physical violence by other means, venomous animal contact.
Added by Zambia NCDI Commission	Depression, HIV induced mood disorders, HIV induced psychosis, kaposis sacorma, post-traumatic stress disorders.

Table 4:Prioritised disease conditions

Interventions for the priority conditions

Condition	DCP3 Intervention name	Level of Health System
Adolescent	Adolescent-friendly health services: provision of condoms to prevent STIs, provision of reversible contraception, treatment of injury in general and abuse in particular, screening and treatment for STIs	Community
Alcoholic cirrhosis	Screening and brief intervention for alcohol use disorders	Health center
Assault/Violence	Education campaigns for the prevention of gender-based violence	
Assault/Violence	Parent training, including nurse home visitation for child maltreatment, for high-risk families	Community
Assault/Violence	Post gender-based violence care including, counseling, provision of emergency contraception, and rape-response referral (medical and judicial)	Community and first level hospital
Asthma/COPD	Low-dose inhaled corticosteroids and bronchodilators for asthma and for selected patients with COPD	Health Center
Asthma/COPD	Management of acute exacerbations of asthma and COPD using systemic steroids, inhaled beta-agonists, and, if indicated, oral antibiotics and oxygen therapy	First-level Hospital
Asthma/COPD	Management of acute ventilatory failure secondary to acute exacerbations of asthma and COPD; in COPD use of bilevel positive airway pressure preferred	Referral and Specialty Hospitals
Asthma/COPD	Mass media for awareness on handwashing and household air pollution health effects	Population

Asthma/COPD	Self-management for obstructive lung disease to promote early recognition and treatment of exacerbations	First level hospital
Asthma/COPD; CV/ischemia	Tobacco cessation counseling, and use of nicotine replacement therapy in certain circumstances	Health Center
Asthma/COPD; CV/ischemia; Alcoholic cirrhosis	Mass media messages concerning use of tobacco and alcohol	Population
Cancer - Breast	Treat early-stage breast cancer with appropriate multimodal approaches, including generic chemotherapy, with curative intent, for cases that are referred from health centers and first-level hospitals following detection using clinical examination	Referral and Specialty Hospitals
Cancer - Cervical	Opportunistic screening for cervical cancer using visual inspection or HPV DNA testing and treatment of precancerous lesions with cryotherapy	Health Center
Cancer - Cervical	School-based HPV vaccination for girls	Community
Cancer - Cervical	Treatment of early-stage cervical cancer	First-level Hospital
Cancer - Leukemia	Treat selected early-stage childhood cancers with curative intent in pediatric cancer units/hospitals	Referral and Specialty Hospitals
Cancer; Palliative Care	Palliative care and pain control services*	Health Center
Chronic Kidney Disease	Treatment of hypertension in kidney disease, with use of ACEi or ARBs in albuminuria kidney disease	Health Center
Congenital	Provide iron and folic acid supplementation to pregnant women, as well as food/caloric supplementation to pregnant women in food insecure households	Health Center
Congenital	Universal newborn screening for congenital endocrine or metabolic disorders (e.g., congenital hypothyroidism, phenylketonuria) that have high incidence rates and for which long-term treatment is feasible in limited resource settings*	First-level Hospital
CV/ischemia	Combination therapy for persons with multiple risk factors to prevent CVD (primary prevention)	Health Center
CV/ischemia	Long term management of IHD, stroke, and PVD with aspirin, beta blockers, ACEi, and statins (as indicated), for secondary prevention	Health Center
CV/ischemia	Management for acute critical limb ischemia with unfractionated heparin and revascularization if available, with amputation as a last resort	Referral and Specialty Hospitals
CV/ischemia	Mass media messages concerning healthy eating or physical activity	Population

CV/ischemia	Opportunistic screening for hypertension for all adults, with treatment decisions guided by absolute CVD risk	Health Center
CV/ischemia	Screening and management of hypertensive disorders in pregnancy	Health center
CV/ischemia	Use of aspirin in case of suspected myocardial infarction	Health Center
CV/ischemia	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	Community
CV/ischemia	Use of percutaneous coronary intervention for acute myocardial infarction where resources permit	Referral and Specialty Hospitals
CV/ischemia	Use of unfractionated heparin, aspirin, and generic thrombolytics in acute coronary events	First-level Hospitals
CV/ischemia; RHD	Medical management of acute heart failure	First-level Hospital
CV/ischemia; RHD	Medical management of chronic heart failure with diuretics, beta-blockers, ace-inhibitors, and mineralocorticoid antagonists	Health Center
Dementia	Interventions to support caregivers of patients with dementia	Health Center
Depression	Management of depression and anxiety disorders with psychological and generic antidepressant therapy	Health Center
Depression	Mass media messages concerning sexual and reproductive health; and mental health for adolescents	Population
Diabetes	Diabetes self-management education	Community
Diabetes	Diabetic retinopathy screening via telemedicine, followed by treatment using laser photocoagulation	Referral and Specialty Hospitals
Diabetes	Prevention of long-term complications of diabetes through blood pressure, lipid, and glucose management as well as consistent foot care	Health Center
Diabetes	Screening for diabetes in all high-risk adults	Health center
Diabetes	Screening for diabetes in pregnant women	Health center
Epilepsy	Management of epilepsy using generic anti-epileptics	Health Center
Injuries	Elective surgical repair of common orthopedic injuries (e.g., meniscal and ligamentous tears) in individuals with severe functional limitation	Referral and Specialty Hospitals
Injuries; Surgery	Basic first-level hospital surgical services*	First-level Hospital
Injuries; Surgery	Basic outpatient surgical services*	Health center
Injuries; Surgery	Basic rehabilitation services*	First-level Hospital

Injuries; Surgery	Expanded first-level hospital surgical services*	Referral and Specialty Hospitals
Injuries; Surgery	Specialized surgical services*	Referral and Specialty Hospitals
Mental Health	Management of bipolar disorder using generic mood-stabilizing medications and psychosocial treatment	Health Center
Mental Health	Management of schizophrenia using generic anti-psychotic medications and psychosocial treatment	Health Center
Mental Health	Psychological treatment for mood, anxiety, ADHD and disruptive behavior disorders	Health Center
RHD	Secondary prophylaxis with penicillin for rheumatic fever or established RHD	Health center
RHD	Treatment of acute pharyngitis in children to prevent rheumatic fever	Health Center
Rheumatoid Arthritis	Combination therapy, including low-dose corticosteroids and generic disease-modifying ant rheumatic drugs (including methotrexate), for individuals with moderate to severe rheumatoid arthritis	First-level Hospital
Sickle Cell	In settings where sickle cell disease is a public health concern, universal newborn screening followed by standard prophylaxis against bacterial infections and malaria*	First-level Hospital
Substance Abuse	Provision of harm reduction services such as safe injection equipment and opioid substitution therapy to people who inject drugs	Health Center

Table 5: Health Sector Interventions Recommended by the Zambia NCDI Poverty Commission

Cost of Interventions - Overall Costs of Interventions

During the implementation of the NCDI Poverty report, the total cost of incremental cost of all interventions to reach the target coverage, including overall correction factor of overhead, infrastructure, and other indirect costs has been estimated at just over $ 393 million USD. This translates into a per capita cost of $22.64 USD during the 5 years and is equivalent to 32.8% of the total health expenditure, or an annual incremental cost of 2% of Zambia's GDP.

PART 6: KEY FINDINGS & RECOMMENDATIONS

Key Finding: NCDIs and the behavioral risk factors associated with them are increasing in Zambia, causing significant contribution to mortality and morbidity. NCDIs cost the Zambian economy an estimated 6% of its GDP every year. More than 90% of that economic burden stems

from economic productivity losses. While the NCDs are prevalent in all the socio-economic strata, some conditions such as asthma are disproportionately more prevalent in the poorest. They are also prevalent in all age groups; children, adolescents, adults and the elderly.

Recommendation: Need to invest in all recommended intervention packages – investing in all recommended intervention packages would help reduce premature mortality and thereby save more lives and help avert many more cases of NCDIs over a period of time providing Zambians with more healthy life years and a healthier population.

Key Finding: There is wide heterogeneity between facilities in respect of readiness to manage NCDs. A large number of facilities were deemed to not be ready to manage NCDs. None of the health centres scored a mean index higher than the 70% cut off. Medications needed to manage NCDs were more likely to be available in urban and semi-urban health facilities compared to rural facilities.

Recommendation: Need to adjust health systems approach towards NCDI services- the current system seems to have entirely been designed for prevention and care for infectious diseases. To meet NCD needs, the health system will require significant adjustments to allow for community outreach, early diagnosis and care at the primary care level. Prevention is better (and cheaper) than cure.

Key Finding: There was paucity of information on NCDs in Zambia with rather poor sources of information, made worse in the last 3 years by the COVID-19 pandemic. Some of the data used in the report is from 2015, as no other surveys have been done since then. Therefore, there was lack of triangulation.

Recommendation: Better evidence is needed to inform policy- as a matter of urgency, Zambia needs; well-designed studies to better document the burden of NCDI's, feasible approaches to improve care for chronic conditions such as hypertension and diabetes, understanding of behaviours towards risk factors in order to understand the rampant increase in substance abuse and related issues.

Key Finding: There is limited information available on health promotion initiatives in the Country. The disease prevention and health promotion agenda requires a multi-sectoral approach that would be based on documented best practices.

Recommendation: Promote awareness and reporting- There is need to institutionalize health promotions activities at all levels of care. This will require intentional and deliberate actions to provide information and related health promotion services to the public. This requires multisectoral approach i.e. need to design NCD curricula to include within the Ministry of Education to reach all levels of education and it must be examinable. Ministry for Education must also make conditions to ensure every school has facilities for physical education and production units. Promotion of healthy traditional food at facilities. Ministry of Local Government to make walkways for physical activities.

Key Finding: NCDIs agenda is primarily hosted by the Ministry of Health and yet the multi-sectoral response required demands a strong central coordination at the highest level of

government. There is also need for strong civil society engagement for advocacy and to hold government accountable to the people in terms of funding and priority setting.

Recommendation: Advocacy, Policy, and Governance- Given the broad burden of NCD disease affecting everyone across the country, a strong central coordination is urgently required to manage the Multi-sectoral approaches with a focus on line ministries, Cooperating Partners, civil society organizations and the private sector.

Key Finding: There are several stakeholders that are not represented on the Zambian NCDI Poverty Commission.

Recommendation: Expand the current Zambian NCDI Poverty Commission- appropriate funding and mechanisms are needed to adjust the scope and capacity of the Commission to include other key sector experts such as those from Food and Nutrition Commission, Ministry of Education, Road Traffic and Transport Agency etc.

Key Finding: National NCDs information is poorly collected due to multiple unintegrated data sources and poorly designed data collection tools.

Recommendation: Integration of systems- there is a great and urgent need to integrate NCD data sources and streamline data collection tools to reflect current trends in NCDs reporting from the community through to tertiary health care institutions.

Key Finding: Generally, there is limited funding for NCDIs and no specific funding earmarked for NCDs.

Recommendation: Funding and Resource Mobilisation. Government and Cooperating Partners need to commit more resources towards NCDI prevention and care.

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ANNEX 1: T**imeline and Milestones for Zambia National NCDI Poverty Commissions**

milestones	Proposed Timeline (24 months)													
	1	2	3	4	5	6	…..	50	51	52	53	54	55	56
Agree upon **National NCDI Poverty Commission** Terms of Reference	*													
Onboarding of **National NCDI Poverty Commission** Researcher and Research Assistant	*													
National NCDI Poverty Commission *Steering Committee Meeting #1*: Commission introduction and annual plan preparation			*											
Policy review						*								
Data Sources review						*								
Literature Search and review						*								
Health Services review					*	*								
Secondary analysis of GBD and survey data					*	*								
National NCDI Poverty Commission *Steering Committee Meeting #2*: Baseline situation														
Priority setting of NCDI conditions					*	*								
Priority setting of cost-effective interventions								*						
National NCDI Poverty Commission *Steering Committee Meeting #3*: Prioritization								*						
Manuscript preparation														
National NCDI Poverty Commission *Steering Committee Meeting #4*: Finalize Final Report and Dissemination Plan Review										*	*	*	*	
Dissemination of National NCDI Poverty Commission Final Report														*