

IFMSA Policy Document

Non-Communicable Diseases

Proposed by Team of Officials

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Policy Statement

Introduction:

The noncommunicable diseases (NCDs) are a group of non-transmissible chronic illnesses that are the leading cause of mortality and morbidity worldwide. Rising rates of NCDs in high-income, as well as low and middle income countries, are the cause of significant public health concern as they contribute to downstream lasting social, financial, mental, and physical consequences, which even have more detrimental impact on disadvantaged populations. Addressing the rising burden of NCDs requires an increasingly holistic response that addresses the upstream determinants of health, whilst mobilising socially accountable initiatives that account for the disproportionate disease burden for disadvantaged, marginalised and under-served populations and communities worldwide. Numerous political, commercial and health systems-related barriers still exist on the road to curbing AND. However, in order to get more adequate prevention, management and treatment of NCDs, it is necessary that meaningful actions are implemented to address the complex aetiology and trajectory of NCDs.

IFMSA position:

The International Federation of Medical Students' Associations (IFMSA) affirms the urgent need for multisectoral and holistic approaches to combat the rising burden of NCDs worldwide. Socially accountable research, integrated intervention programs and comprehensive policy-making from both international and national stakeholders are necessary to achieve the targets in the Sustainable Development Goals Agenda 2030. IFMSA affirms that existing global inequities in the prevention, management and treatment of NCDs are unjust, unfair and preventable, and require the mobilisation of national and international resources to support all populations including but not limited to those that are disproportionately affected by, and more vulnerable to the NCD burden. Importantly, IFMSA recognizes the paramount influence of youth in the NCD movement, and advocates for their involvement as key stakeholders in the global NCD agenda.

Call to Action:

IFMSA calls upon:

National and State Governments to:

- Implement a multisectoral, comprehensive, sustainable and evidence-based strategy to address the rising burden of NCDs in their respective countries;
 - a. Address the social, biological, environmental, commercial and structural determinants of NCDs by implementing a Health in All Policies approach
 - a. Establish effective national strategies following the United Nations High Commissioner for Refugees (UNHCR) program cycle to ensure continuity in NCD care and service provision during health emergencies, pandemics and humanitarian crises
 - b. Establish and continue international action on NCDs as a global public health concern through research collaboration and policy development
 - c. Ensure proper funding of NCDs-related research to ensure continuous generation of an evidence-based to inform policy-making and program design processes
- Address the unequal distribution of NCDs within populations, and the disproportionate burden on groups from lower socioeconomic groups, culturally and linguistically diverse (CALD) populations, Indigenous populations, and refugee and migrant populations;
 - a. Design and implement culturally safe health policies and programs to address the higher prevalence and severity of NCDs among all populations
 - a. Recognize the importance of local communities in health program design and primary health care (PHC) service delivery through the involvement of community health workers (CHWs), community control, ongoing collaboration with, and capacity building for the CHWs and community leaders.

- Work toward the achievement of universal health coverage (UHC) as a means of providing equitable, affordable and available PHC for NCDs, including adequate availability of NCD-related care and drugs
- Legislate healthy public policies that mitigate the impact of social, environmental and behavioural risk factors on NCD development and complication;
 - a. Fund population-based primordial prevention campaigns encouraging healthy lifestyles and communities to prevent onset and complications of NCDs
 - a. Implement taxation on the selling of tobacco, e-cigarettes, alcohol, and sugar
 - b. Implement restrictions and bans on the advertisement of harmful products not limited to alcohol, tobacco and junk foods.
 - c. Fund and promote research to identify effective interventions and tools that assist the attenuation of risk factors

Private sector companies to:

- Implement consistent, transparent and accurate packaging and labelling of products for their nutritional content and value
- Recognize and collaborate with governments to mitigate the influence on the health of the commercial determinants of health;
 - a. Minimise advertisement that appeals to younger audiences
- Ensure independent, scientifically-unbiased processes in the evaluation of food safety and nutrition standards

International Organizations and National Government Organizations (NGOs) to:

- Continue targeted advocacy and outreach to push NCDs as an issue of global emergency, ensuring that inequities are addressed and prioritised in global and national health policy and development agendas.
- Maintain and establish connections with different country governments, civil society organisations, NGO partners, international organisations, private enterprises and academia, as appropriate, in the development and implementation of plans for NCD prevention and management.

Universities and other medical education providers to:

- Equip students with sufficient ability and confidence to tackle NCDs at both a clinical and population level through the teaching of brief behaviour change counselling, health promotion and preventative medicine in the context of the social determinants of health
- Encourage and provide NCD-related research opportunities for students
- Introduce a multi-sectoral lens to NCDs within the medical curricula

Healthcare facilities and healthcare professionals to

- Provide empathetic, patient-centred counselling and care in relation to NCD prevention and management, accounting for unique socioeconomic, cultural and environmental determinants that patients may be exposed to
- Provide leadership and guidance on NCD-related public health matters to encourage healthier lifestyle choices, communities, and populations.

IFMSA NMOs and medical students to:

- Maintain momentum for NCD advocacy through creating meaningful activities, workshops and seminars to increase student and community-level awareness
- Establishing global NCD initiatives with different NMOs, involving students with NCD lived experience, CALD and Indigenous students
- Continue the active participation of NMOs and students as voices in high-level stakeholder meetings, discussions and decision-making surrounding NCDs

Position Paper

1. Background information

Noncommunicable diseases (NCDs) constitute a group of non-transmissible chronic illnesses that include conditions such as heart disease, stroke, cancer, chronic respiratory diseases, and diabetes, and are the leading cause of death and disability worldwide [1]. The aetiology of NCDs is multifactorial and is often the result of a combination of genetic, environmental and lifestyle-related factors. NCDs account for 74% of all deaths globally, most of which are recorded in low and middle income countries (LMICs) [1, 2]. In 2014 the initial '4x4' approach was developed, focusing on the main NCDs: cardiovascular diseases (CVD), cancer, diabetes, and chronic respiratory diseases, alongside the four modifiable risk factors - tobacco, alcohol, diet and physical inactivity [3]. In 2018, the third UN High-Level Meeting on NCDs moved to adopt a '5x5' approach where mental health was formally recognized alongside air pollution as a core component of the NCD approach [4]. Sustainable development and improved population health rely on health systems that are capacitated to address the root causes of ill health, and ultimately, the range of determinants that increase vulnerability to NCDs necessitates an integrated and multi sectoral approach to health policy.

2. Discussion

2.1 5 Main Noncommunicable Diseases (NCDs):

2.1.1 Cardiovascular diseases

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels including, but not limited to, coronary heart disease, congenital heart disease, rheumatic heart disease, peripheral artery disease, and cerebrovascular disease [5, 6]. Behavioural risk factors such as unhealthy diet, physical inactivity, tobacco use, and harmful alcohol consumption can increase the risk of heart disease and stroke. While not directly leading to heart disease, these behaviours contribute to intermediate risk factors, such as high blood pressure, high blood sugar, high blood lipid levels, and excess weight, which increase the risk of heart attack, stroke, heart failure, and other CVDs. These intermediate risk factors can be detected in primary care settings [5].

2.1.2 Chronic Respiratory Diseases

Chronic respiratory diseases (CRDs) are one of the most common NCDs worldwide, due to the increasing prevalence of noxious environmental, occupational, and behavioural factors [7, 8]. CRDs group a range of respiratory conditions that affect the lower and/or upper respiratory tract. and include, but are not limited to, chronic obstructive pulmonary disease (COPD), asthma, restrictive pulmonary diseases, and pulmonary hypertension. [9] Despite their prevalence, chronic respiratory diseases such as chronic obstructive pulmonary diseases have received proportionately less public attention than other diseases such as CVD, cancer, and diabetes [10]. Worldwide, the most common CRD is asthma, being the most common chronic disease among children. COPD is another highly prevalent CRD, and is known to disproportionately affect populations in LMICs, with 90% of COPD from these areas [11].

2.1.3 Cancer:

Cancer is the second leading cause of death worldwide and is the result of abnormal cell growth and spread (metastasis). Metastasis is a major cause of cancer deaths. Most common types of cancers include lung, prostate, colorectal, breast, thyroid and liver cancer [12].

Some cancer cases are preventable, and governments can work on a population level to support an environment that minimises exposure to known cancer risk factors by identifying causal risk factors and mitigating their exposure, in addition to working on supporting cancer survivors through providing ongoing care that is well coordinated, focuses on prevention, provides surveillance whilst minimising and managing the long term impacts of treatment and other comorbidities. [13, 14].

2.1.4 Diabetes:

Diabetes is a chronic metabolic disease that occurs either when the pancreas does not produce enough insulin or when the body is unable to use the insulin it produces, leading to elevated blood glucose (hyperglycaemia) [15, 16]. Hyperglycaemia subsequently can lead to damage of nerves, eyes, kidneys and the heart [16]. With that it is a major cause of blindness, renal failure, heart attack, stroke and lower limb amputation. The prevalence of diabetes is rising rapidly particularly in LMICs, and in 2019, was the direct cause of 1.5 million deaths worldwide [15]. Furthermore, Diabetes causes 460.000 kidney disease deaths with diabetes causing the majority of new cases and patients with Chronic Kidney Disease (CKD) in all regions.[17].

2.1.5 Mental Disorders:

In 2019, 1 in every 8 people (970 million) globally lived with a mental disorder [19]. Mental Disorders refer to clinically significant conditions which involve disturbances in thinking, emotions or behaviour [18]. These may include: anxiety, depressive, trauma and stressor related disorders (such as PTSD), eating, neurodevelopmental, schizophrenia and other psychotic disorders [19]. During the course of the COVID-19 pandemic, the number of people with anxiety and depressive disorders increased, by up to 26-28% [20]. Prevention and treatment options exist for mental disorders, however most people suffering are not able to access effective and appropriate care. Furthermore, stigma and discrimination are also barriers to individuals seeking mental health care[19].

2.2 NCD Risk factors:

2.2.1 Physical inactivity:

Physical inactivity is the fourth largest risk factor for NCD aetiology, behind only tobacco use, hypertension, and high blood sugar levels. In 2010, it was responsible for more than 3 million deaths that could have been avoided, and is becoming a bigger challenge especially for nations that have observed a reduction in mortality from famine, epidemics, as well as a reduction of mortality in infants and children[21, 22].

Physical activity is strongly linked to the prevention of many of the main NCDs that cause early death and disability, both directly and indirectly. Although physical inactivity is a global public health issue, neither universal acceptance nor explicit policy action have been addressed in the majority of countries [21]. Only a small portion of research on physical activity has been concentrated in LMIC nations, despite the fact that more than 80% of the world's population and more than 80% of the burden of noncommunicable diseases are found in LMICs. Considering the current situation, developing evidence-based policies to address physical activity and NCDs, especially in LMICs should be a top priority in the coming years [22].

2.2.2 Unhealthy diets

Unhealthy diets and nutrition are an important NCD risk factor, leading to elevated blood pressure, cholesterol, and insulin resistance [23].

High salt intake has been shown to result in elevated blood pressure, increasing the risk of renal, and cardiac disease, as well as strokes. According to the World Health Organization (WHO), a population's daily salt intake should be less than 5 grams. By the time a child is five years old, they often consume more than six grams of salt per day, with many nations averaging between nine and twelve grams per day. Reducing dietary salt intake is therefore an important dietary intervention for those with normal and elevated blood pressure [24]. We can create resources to support policy development by working closely with nations by [21]:

- Addressing industry engagement and product reformulation;
- Advocacy and communication;
- Surveillance of salt intake, sources of salt in the diet, and knowledge and opinions on salt and health;
- Salt fortification with iodine; and
- National-level health economic studies on salt reduction

The incidence and prevalence of obesity and other chronic diet-related disorders are directly attributed to the high levels of added sugars, salt, and fat found in processed foods [25]. Consuming too much sugar is linked to overweight and obesity, as well as high blood pressure, which are risk factors for a range of NCDs including CVD and some cancers [26].

A major contributor to CVDs, which is considered to be responsible for 540,000 annual fatalities and has no proven health advantages, is trans fats [27, 28]. Consuming trans fats is associated with a 28% rise in the risk of coronary heart disease and a 34% rise in overall mortality risk. Contrary to other dietary fats, trans fats raise "bad" cholesterol, causing it to build up in the arteries while decreasing "good" cholesterol, which helps the body remove additional cholesterol. Every 1% increase in the amount of daily energy derived from trans fats results in a 12% increase in the mortality rate from coronary heart disease. A higher risk of developing various NCDs and their risk factors, such as ovarian cancer, diabetes, and obesity, has also been associated with the consumption of trans fats [27]. Numerous studies show that the recommended daily amounts of nutrient-rich food groups, such as fruits, vegetables, legumes, and whole grains, are not followed by people in Europe and the US, and the typical diet is mostly unhealthy fats and carbohydrates based [29, 30]. This is especially true of younger children and may constitute a risk for the development of NCDs in later life [31].

2.2.3 Tobacco consumption

Smoking is the primary global cause of preventable disease, disability, and death. Additionally, it has been linked to a number of illnesses, including CVD, multiple types of cancer, and respiratory diseases. Smokers are exposed to more than 7,000 chemicals through inhalation, and the effects of this exposure can have a variety of negative effects on one's physical health [32]. The most popular method of tobacco usage worldwide is cigarette smoking. Waterpipe tobacco, other smokeless tobacco items, cigars, cigarillos, roll-your-own tobacco, pipe tobacco, bidis, and kreteks are examples of further tobacco products [33].

Numerous studies have found that tobacco use contributes to over two-thirds of the variation in mortality risk among social classes in men aged 35 to 69. In addition, due to cigarette use, lower-income groups experience nearly twice as many cancer-related cases as those in higher income groups do [34]. Among socioeconomic and racial groups, there are significant differences in the frequency of tobacco-related cancer occurrences and death, as well as in the accessibility and effectiveness of cancer treatment. Even though smoking is declining in popularity over time, inequality has only slightly increased as a result

of smoking. This is due to the high prevalence of smoking in the lowest socioeconomic levels and its severe detrimental effects on the health of these populations [35].

Further, the chemical mixture within tobacco damages tissue and changes the cellular environment when it is breathed through smoke, which encourages cellular proliferation and the growth of cancer cells [36]. Smoking is to blame for at least 30% of all cancer deaths and 80% of lung cancer fatalities. Smoking has also been connected to a higher risk of up to 18 different cancers, including leukaemia, head and neck cancers, oesophageal cancer, bladder, pancreas, kidney, liver, stomach, cervix, ovarian, and uterine cancers [37].

In addition, tobacco smoking has been shown to be a modifiable risk factor for many chronic illnesses, such as diabetes, and CVDs [32]. Current and former smokers had 5.5 times the risk of developing chronic lung disease, 2.8 times the risk of heart disease, 1.7 times the risk of diabetes, 1.3 times the risk of developing hypertension, 1.2 times the risk of developing hypercholesterolemia, and 1.4 times the risk of developing cancer compared to non-smokers [38]. The majority of cases of chronic obstructive pulmonary disease (COPD) are caused by tobacco use, with smoking being responsible for 85 to 90% of cases. Adult smokers have a two times greater risk of stroke than non-smokers [39].

2.2.4 Alcohol consumption:

Regular alcohol consumption results in death and impairment relatively early in life [40]. Drinking too much alcohol frequently or in excess can seriously harm the heart and lead to linked cardiovascular problems such as cardiomyopathy, cardiac arrhythmia, high blood pressure, and stroke, which are all NCD risk factors [41]. It has almost universally been noted that chronic heavy alcohol consumption has been associated with adverse cardiovascular outcomes. Further, alcoholic beverages are classified as carcinogenic by the International Agency for Research on Cancer because they raise the risk of certain malignancies. For instance, there are unmistakable links between drinking alcohol and a higher chance of developing some cancers, such as cancer of mouth, throat, larynx, and oesophagus as well as liver, breast, and colorectal cancer [41-43]. Finally, being a psychoactive substance, alcohol consumption is also a risk for mental disorders due to interference with the structures and functions of the central nervous system. Uncontrolled alcohol usage increases the likelihood of developing an alcohol dependence when it comes to neuropsychiatric disorders [44]. Additionally, alcohol use has been linked to a number of mental illnesses such as depression and anxiety [45] - and can exacerbate mental disorder trajectory in most circumstances.

2.2.5 Air Pollution:

70% of air pollution-related deaths result from NCDs, however, air pollution continues to be an under-recognized source of noncommunicable disease. In 2015, air pollution was to blame for 19% of all cardiovascular deaths globally, 24% of deaths from ischemic heart disease, 21% of deaths from stroke, and 23% of deaths from lung cancer [46]. Although it is commonly recognised that air pollution is hazardous for the lungs and airways, it can also harm the rest of the body's organ systems. Air pollution is thought to be a contributing factor in the deaths of 500,000 people from lung cancer and 1.6 million people from COPD. Other cancers, like bladder cancer and paediatric leukaemia, have been related to air pollution. Exposure to air pollution impacts lung growth in childhood, and poor lung development in children creates a trajectory for lung impairment and respiratory disease in adults. Prevalence, morbidity, and mortality of diabetes have also been linked to air pollution in studies. Likewise, autoimmunity, allergic sensitization, and allergic rhinitis are all linked to pollution's impact on the immune system [47].

Altogether, air pollution is a serious risk factor that continues to endanger both public health and the environment. More people are likely to die as a result of air pollution if the causes and drivers of it are not eliminated. Research has shown that the number of Disability Adjusted Life Years (DALYs) related to ambient air pollution is rising globally over time. In order to lessen the burden of NCDs linked to air pollution at the global, regional, and national levels, air pollution prevention and control measures are urgently needed [48].

2.3 The determinants of NCDs:

The social determinants of health (SDoH), referring to the conditions, forces and systems that influence the trajectory of an individual's life, account for approximately half of all variations in health outcomes [49]. In essence, they are the 'causes of the causes' of ill-health, and remain a leading cause for the pattern of distribution of disability, mortality and morbidity from NCDs [50, 51]. The SDoH that influence risk, course and management of NCDs encompass both non-modifiable (foetal origins, genetic) as well as modifiable determinants (behavioural, structural, and environmental) factors [52].

2.3.1 Biological determinants:

NCDs are often associated with lifestyle and environmental factors, such as tobacco use, unhealthy diet, physical inactivity, and air pollution. However, genetic factors can also play a role in the development of NCDs, as some individuals may have a higher inherited risk of developing certain NCDs due to heritability of risk factors [53, 54]. Obesity and being overweight, dyslipidaemias, hyperinsulinemia, and hypertension are all biological factors that have been correlated to the development of NCDs [54, 55], whilst certain types of cancer, CVD, diabetes, and chronic lung dysfunction, have a high heritability [56]. In addition, more recent research has been supportive of the Foetal Origins of Adult Disease (FOAD) hypothesis, which suggests that events during early development have a profound impact on one's risk for the development of future adult-age diseases, such as Type 2 Diabetes Mellitus (T2DM), CVD, and hypertension, through epigenetic mechanisms [54, 57, 58]. A 2013 literature review on the role of epigenetic foetal programming (FOAD) on the development of adult T2DM found that many maternal factors during pregnancy, such as hyperglycaemia, malnutrition, obesity, stress, diet and smoking increased susceptibility to diabetes in later life for the developing foetus [59]. The chronic negative health effects on children were noted particularly in unfavourable maternal socioeconomic environments [59, 60].

2.3.2 Structural determinants:

The distribution of NCDs can be exacerbated and delineated to a large extent by the embedded socio-economic, socio-cultural, and political systems of a country. NCDs disproportionately affect disadvantaged populations in LMICs due to structural social and economic inequities [61].

It has been almost universally established that those who have a lower socioeconomic status, in poverty and in marginalised communities have a higher risk of dying from NCDs compared to more advantaged communities [62]. Risk factors for NCDs such as smoking rates, blood pressure, alcohol consumption, and poor fruit/vegetable consumption, are higher in groups with lower socioeconomic status [62, 63]. Research on the social determinants of chronic disease has widely illuminated the role of social disadvantage in the expression of poorer health behaviours such as smoking, and that these same communities have greater exposure to sociocultural contexts that promote this behaviour [64, 65]. Other upstream determinants such as low income, greater psychosocial stress, and unemployment have also been regarded as factors that prevent the cessation of health behaviours such as alcohol and tobacco use [64, 65]. Numerous other examples exist regarding the extant influence of social factors as a

determinant of NCD outcomes, as exemplified in studies of patients with end stage renal disease, breast cancer, childhood obesity, and CVDs [66-69].

A 2017 cross-sectional survey examining NCDs across 20 European countries observed an existing social gradient in health, with a predictable correlation between lower socioeconomic status and greater risk of disease [70]. This was similarly reflected in a 2015 umbrella review of systematic reviews, reinforcing the extensive link between socioeconomic differential and the incidence and prevalence of NCDs. For instance, there is evidence that CVD complication rates in LMICs are increasing and exceed levels in high income countries (HICs) - as well, mortality from the aforementioned is higher in LMICs than HICs. Similar findings were common among other NCDs such as T2DM, cancers and COPD [61]. Furthermore, studies have shown that lower socioeconomic status (SES) increases the risk of mortality and other adverse outcomes from NCDs [71]. This is especially true of CVD, whereby a relatively consistent body of research has been seen to support an inverse-graded relationship between SES and CVD. There has been consistent support for the detrimental impact of the accumulation of negative SES conditions across the life course on CVD risk - wherein cumulative psychosocial and physiological experiences and environments during early and later life accumulate to increase the risk of disease [71, 72].

Social coherence and neighbourhood disadvantage has also been shown to be a determinant of several chronic health conditions such as high blood pressure, chronic respiratory conditions, and risk factors including drug use and a decreased ability to obtain appropriate health care [73, 74]. The quality of housing, water, air, as well as fear, crime, lack of personal safety, environmental pollution, visible alcohol and drug use, lack of amenities and concentrated poverty, have been shown to function as multiple social mechanisms that are ultimately harmful to physical and mental health [75]. NCDs have additionally been correlated with lower levels of education and formal schooling [76, 77]. In the United States and Japan, a lower educational level was associated with a higher incidence of diabetes and stroke as well as heart disease [1, 52, 76].

Finally, Primary health care (PHC) services are the cornerstone in the prevention and management of chronic diseases [78]. However, social disadvantage negatively affects an individual's access to equitable and quality PHC, with lack of access to preventive and primary health care services a key factor in the development of disease and complications from chronic diseases, particularly in LMICs as well as low SES communities [78, 79]. For instance, for rural and regional Australian Aboriginal communities, access to reliable, affordable, and sustainable PHC services remains a barrier to effective coordination of care [80], contributing to the ongoing health gap between Indigenous and non-Indigenous Australians - with two-thirds attributable to chronic disease [81, 82].

2.3.3 Commercial:

The commercial determinants of health are collective strategies and approaches employed by the private sector to promote products and behavioural choices detrimental to health [83]. Globalisation in the 21st century, rapid urbanisation and the mechanisation of the rural economy, have led to increased activity of transnational food, drink and tobacco corporations which have seen the increase of behavioural patterns associated with increased risk of NCDs. The change in population health profiles to increased NCDs has been due to factors such as increased unhealthy diets, lower physical activity, and tobacco and alcohol use [78]. The selling of tobacco, alcohol, foods high in fat, salt and sugar has continued to soar in demand, and concomitantly, NCDs. In the European Union, unhealthy diets are the biggest risk factor for DALYs loss, predominantly through T2DM, cancer and CVDs. However, these commercial determinants

are especially pertinent to LMICs. Over the last decade, MSCI Consumer Staples Index (including tobacco, food and drinks that are associated with NCDs) has grown by 200% [83].

Modern marketing strategies enhance the desirability and acceptability of products damaging to healthy lifestyles, and transnational companies are able to actively lobby to impede healthy public policy and legislation. A recent report from Cancer Research UK found that a potential ban on junk food advertisements from all programmes shown before 9 pm would more than halve children's exposure to it, and thus have a role in reducing childhood obesity. Yet, due to the extensive global supply chains and transnational influence of large for-profit corporations, they are often able to exert considerable influence over political decision-making, especially over pro-health policies such as plain packaging, and taxation [84]. This was exemplified in successful opposition to government attempts to legislate sugar-sweetened beverage taxation in Brazil, and South Africa [85, 86].

The rise of NCDs can be partially attributed to the rise of a global economic system that prioritises wealth over health. Broad facilitators such as globalisation and international influence of trade, corporate systems, capitalist ideologies, associated social and economic power, and their harmful products contribute significantly to worsened global health outcomes in relation to NCDs [87].

2.3.4 Environmental:

Extensive reviews on the association between contributory environmental factors and NCD development have shown a role played by air pollution, heavy metals, and endocrine-disrupting chemicals in the environment [88]. NCD risks often stem from unsustainable environmental systems, particularly those related to agriculture and urbanisation practices [89]. Underlying mechanisms of metabolic and immune function disturbances have been found to include direct genotoxicity, endocrine disturbances and increased oxidative stress on the body [88]. Agricultural changes can directly influence greenhouse gas emissions, deforestation, land and soil degradation, and pollution. For instance, tobacco farming has contributed to the displacement of food crops in LMICs which has contributed to changes in dietary behaviour [89]. Likewise, there have been studies showing associations of ambient air pollution exposure with increased mortality from cardiopulmonary disease, lung cancer, and indoor exposures to allergens in the dust with adverse asthma outcomes in children and young adults [90]. Obesity, metabolic syndrome, and diabetes have been linked in complex ways to diverse persistent organic pollutants - which interfere with thyroid function and fat metabolism [91, 92].

Air pollution poses another significant environmental risk to health - with outdoor fine particulate matter exposure being the fifth leading risk factor for death in the world, accounting for 4.2 million deaths and 103 million DALYs [93]. Particulate matter and accumulation of 'soot' pollution in the lungs may lead to chronic inflammation, fibrosis and scarring as well as lung cancer and COPD [93]. Deaths from air pollution are predominantly in middle-income countries due to rapid industrial development than from higher income countries [94]. In the UK, research has found that a higher area deprivation index with increased exposure to environmental pollutants has contributed to inequalities in NCDs [95].

Moreover, the role of green infrastructure has emerged as an area of research to show correlations between green spaces and increased health benefits which may prove to be of importance with regard to the development of NCDs. Green infrastructure has shown benefits in the alleviation of mental disorders, increased physical activity as well as reduced air pollution - targeting various risk factors to the development of NCDs [96, 97].

Ultimately, the collective and interacting role of upstream structural, commercial, and environmental determinants present an array of factors that can be tackled by more effective governance and policy-making with respect to economic, social, environmental and health policies. Socioeconomic policies, such as those related to income inequality, access to effective and comprehensive PHC, employment and social welfare, have powerful impacts on the health and well-being of populations, with research supporting the link between poverty, adversity, and economic insecurity to higher rates of chronic disease [52]. While the non-modifiable genetic determinants are still contributing factors in the development of NCDs, epigenetic correlative factors such as the FOAD are preventable. Enhancing maternal environments through more supportive socioeconomic and psychosocial contexts, as well as encouraging healthy behaviours during periods of developmental plasticity and preconception are promising strategies to attenuate the potential long-lasting epigenetic influence on NCDs across the life course [98]. Further, environmental determinants of NCDs such as air pollution, and environmental toxins should also be accounted for when taking a multisectoral approach to health policy when tackling NCDs. Widely applicable strategies clinically such as better nutrition, increased exercising and sweating to enhance excretion, to counter toxic effects of environmental pollutants may have potential benefits - however, wider scale environmental policy addressing its contribution to chronic disease will likely have benefits to the population health and productivity in the longer-term [88]. Overall, the determinants of chronic disease are complex and multifaceted, and thus, addressing them holistically requires a comprehensive, integrated approach involving a range of stakeholders, including but not limited to governments, community organisations and multinational corporations.

2.4 The consequences of NCDs:

NCDs are usually chronic disorders that require life-long or long-term medications and treatment. Even then, most NCDs result in several health complications, and other consequences. NCD Consequences are broadly discussed under health complications, economic burden, and social effects. The incidence of these consequences and their severity, as well as the burden on the healthcare system, stresses the fact that sustained, focused and intersectional interventions for NCDs are necessary and should be a priority within healthcare frameworks [1, 99].

2.4.1 Health Complications

Health complications of NCDs are manifold and usually depend on the type, severity, and onset of NCDs, as well as other environmental, genetic, and constitutional factors. They also depend on the time of diagnosis, the type of healthcare and treatment being administered, adherence to the treatment and regular monitoring. Most health complications of NCDs are irreversible, but their onset can be delayed, and severity reduced if interventions are made on time. Some complications are entirely avoidable as well. Coordinated efforts for awareness, regular monitoring and follow-up, and adherence to treatment should be made across all sectors, with a specific focus on low- and middle-income countries, rural areas, and areas where healthcare access is not adequate. This can be achieved by disseminating NCD healthcare provisions across primary healthcare services. Complications can also lead to permanent disabilities such as blindness (diabetic retinopathy), and other fatal occurrences (usually in CVDs or neurological conditions like epilepsy) [100]. The reason that these complications should be mitigated and focused upon is that their incidence can be significantly reduced, and the quality of life of the patient can be improved if efforts are put in and treatment is provided on time.

2.4.2 Socioeconomic Burden

NCDs commonly result in financial burdens, both to the patient and the healthcare infrastructure. Most NCDs require long-term treatments with expensive drugs, as well as regular monitoring with diagnostic tests and examinations. In out-of-pocket healthcare settings, this can result in major economic burdens

for the patient and their families; and in other healthcare models, NCDs can form a large burden on healthcare infrastructures like the government [101]. Further, complications of NCDs like kidney failure requiring dialysis, or surgeries can exacerbate this burden. Additionally, several NCDs can render the patient unable to normally carry out their work and can affect their productivity and earnings, thus impacting their family's financial security in the long term. This situation can create cycles of poverty [102]. This is usually seen in NCDs like CRDs, advanced cardiovascular diseases and more. With the rise in NCDs in all countries including low- and middle-income countries, the economic effects on the country as a whole cannot be ignored [101, 102].

NCDs that primarily affect normal working and productivity can also have social and societal repercussions. This is especially true of cancers which commonly have staggering mental health effects, and social fallouts as well. People may be treated as burdens or have consequent mental health issues in conjunction with NCDs. NCDs have a host of consequences, across various domains. Physical complications are especially concerning, due to their characteristics such as some being irreversible, and some being avoidable if efforts are made. They can result in life-long dependencies on healthcare systems like dialysis; or may even be fatal. Hence, it is imperative that these consequences are addressed while developing healthcare frameworks for NCDs [103].

2.5 NCDs in Health and Humanitarian Emergencies:

The incidence of NCDs has been increasing globally due to several different factors in different populations, and as a result, the effect of Humanitarian crises on patients with NCDs is also exacerbated. The United Nations estimates that around 235 million people need humanitarian assistance and protection in 2021. Hence, the number of people living with NCDs in crisis situations is on the rise; NCDs are currently the leading cause of mortality worldwide. Due to various phenomena like climate change, political issues, wars, etc., the frequency of such crises emerging has increased, and people with NCDs are particularly vulnerable to health systems being compromised [104].

Most NCDs require continuous regular monitoring, treatment and testing, and long-term or life-long drug therapies. Displacement of medical services and provisions during humanitarian crises hence has a significant impact on patients of NCDs. Access to essential care may be hindered by insecurity, population displacement, damaged health systems, interrupted supply chains and services, and irregular food supplies during such emergencies [105]. This could lead to many consequences, such as exacerbation of the disease, irreversible disabilities (eg. Diabetic Retinopathy), life-threatening and fatal complications (especially in cardiovascular diseases), and more. Loss of regular monitoring can lead to the disease progressing out of control. Loss of, or, affected health care services can prove almost immediately fatal for people requiring treatments like regular dialysis (such as Diabetic Nephropathy or CKD). Further, NCDs leave people especially vulnerable to the health effects of humanitarian crises, like physical injuries, disturbed climate, stress, etc. NCDs like Cancer and Mental Illnesses can be exacerbated due to physical and mental stresses in crisis situations. Against the backdrop of this, it is essential to have systems in place that support patients of NCDs in humanitarian emergencies [106].

In the past, most provisions for healthcare systems in humanitarian crises have largely focused on physical injuries and communicable diseases, vaccines, etc. Recently, light has been shed on NCDs within humanitarian emergencies. The WHO has approved recommendations for NCD patients in humanitarian emergencies at the World Health Assembly in 2022. It has been agreed upon that people living with NCDs require special and specific attention in humanitarian emergencies. This can be achieved through a multi-sectoral all-hazards approach that encompasses preparedness, response and recovery [104].

The disruptions of essential NCD healthcare services can be due to several reasons: lack of drugs, accessibility of equipment and testing, and lack of trained personnel, amongst others. Several measures and models have been proposed to alleviate these issues. These include the distribution of NCD Kits, dissemination of healthcare provisions across a country to more remote centres instead of just tertiary care or apex hospitals, and preparation and procurement of essential NCD medicines. Newer methods like digital health can be incorporated, as well as quicker, cheaper methods of testing (like Gluco-metre strips) to manage the situation [107].

Several models have been put forward, which are being followed in various capacities within different humanitarian aid organisations. They depend mainly on the type of humanitarian crisis and tend to focus on NCDs with immediate or major consequences (cardiovascular diseases, asthma, diabetes) [105].

UNHCR (The United Nations Refugee Agency) has prepared a comprehensive operational guide for tackling NCDs in humanitarian crisis situations. The framework includes steps to be taken in the Acute (0-6 months) and Ongoing phases (6> months), including [106]:

- Needs Assessment & Planning (with Resource Mobilisation)
- Implementation via Coordination and Partnerships (with national authorities, International and national NGOs, civil society, development actors and donors)
- Service Delivery
- Supplies
- Human Resources
- Monitoring and Evaluation

Transition to national health services and advocacy and research are also included in the later stages. Key components of NCD management as identified by UNHCR include[106]:

Triage and Life-saving care, follow-up care, and community engagement, with components like therapeutic patient education (patient self-management) and robust referral systems being of high importance in humanitarian crisis situations. The Humanitarian program cycle has also been put forward keeping NCDs in mind as a useful tool to gauge such situations. Adoption of these guidelines by tailoring them to specific individual needs can aid in the effective, streamlined management of NCDs in such situations [108].

Further models focus on a tier-based response system, including an early focus on immediate emergencies with high mortality (kidney failures, epilepsy); followed by more long-term measures (for diseases like diabetes, and cancers). This is largely supported by the identification of cases and susceptible populations, readily having backups for drugs and medicines, and sustaining availability of trained personnel via different methods. Facilities must be present to manage life-threatening complications of NCDs and ensure a supply of medicines for those dependent on them [106, 108].

The COVID-19 pandemic is also an important crisis situation and has in turn resulted in several humanitarian events in many countries. The pandemic has had grave effects on the global economy, workforce and healthcare. It has burdened healthcare systems in countries, leading to a lack of coverage and resources for NCDs. COVID-19 also affects people with NCDs more severely and can result in more complications. Hence, it is important that during major health crises like pandemics, NCDs are not ignored, and efforts are made to maintain effective, required care [109-111].

It is vital in the current state of healthcare efforts that NCDs are focused upon in humanitarian crises. People should not be faced with making difficult choices between accessing regular, life-sustaining healthcare and their own safety.

2.6 Global Governance of NCDs:

In May 2010, The United Nations passed a resolution on the reduction and prevention of NCDs unanimously. The resolution called for a UN Summit dedicated to NCDs. In 2021, the first High-Level UN Summit on Noncommunicable Diseases was held, and the UN Political Declaration on the prevention and control of noncommunicable diseases was passed at the end of the Summit [112]. The UN 2030 Agenda for Sustainable Development includes a goal of reducing deaths due to NCDs by one-third by 2030 [99]. In 2013, the WHO passed the WHO Global NCD Action Plan 2013-2020, which calls for governments around the world to fulfil the six objectives related to NCD reduction [113]. In 2013, the United Nations established the UN Interagency Task Force on the Prevention and Control of Noncommunicable Diseases (NCDs), which allows different UN systems to cooperate with each other and offer support to countries in order to reduce NCDs. Its strategic priorities were [114]:

- supporting countries to deliver multisectoral action on the NCDs
- mobilising resources to help countries develop national action plans
- harmonising actions and forging partnerships
- being an exemplar for UN reform to achieve the 2030 Sustainable Development Agenda.

When evaluating the results, since the development of the Task Force, 30 countries have requested and received support, 5 global joint programmes were financed and in operation, a fund was launched specifically for resources including technical assistance, an increase in countries that utilise functional multi-sectoral coordination mechanisms for NCD reduction, and an increase in the number of partnerships [114]. Non-government organisations (NGOs) also have a large role to play in the management and advocacy surrounding NCDs, especially in LMICs, especially in reference to strengthening health financing as well as access to medical products relevant to NCDs [115].

2.7 NCDs and Health Systems:

2.7.1 Health information systems

NCDs place enormous burdens on individuals and health systems. While there has been significant global progress to guide the development of national NCD monitoring programs, many countries still struggle to adequately establish critical information systems to prioritise NCD control approaches. It is widely known that early detection increases the survival rate and ensures a favourable prognosis for most NCDs, however, about 80% of NCDs are detected at an advanced stage when little can be achieved in treatment [116].

Since 2014, the United Nations have recognised the critical importance of effective monitoring and surveillance systems in combating NCDs, in order to inform public health interventions. In spite of this, there has been little about the enormous challenges faced by member states in collecting the relevant data to support NCD control efforts [117-120]. Overall, there has been a systematic failure to invest, lead, and catalyse essential health information system developments to reliably monitor progress with NCD programs and policies [117, 118, 121]. The implication is that countries will not be able to effectively inform and evaluate their intervention strategies for some of the most pressing global public health threats, including tobacco, obesity, high blood pressure, and other key determinants of increased NCD.

Well-functioning health information systems are essential for more effectively tackling health challenges related to NCDs, and ensuring accountability and the necessary health intelligence to inform strategies to improve population health [116]. In 2013, the World Health Assembly adopted the 'Comprehensive Global Monitoring Framework' with comprehensive indicators and targets for the prevention and control of NCDs. Despite the conceptual basis for this framework, due to inadequate monitoring and surveillance systems, many countries continue to struggle to establish programs or have reliable information to evaluate progress and lack thereof, in regard to NCD control [116, 122]. Of concern are LMICs which struggle with the absence of strong health surveillance and information systems despite increasing levels of NCDs [117-120].

2.7.2 Health delivery services and role of primary health care

The International Alma Ata Conference on Primary Health Care health, held in 1978, culminated in a unanimous decision that Primary Health Care (PHC) is a means to achieve health equity [123]. In the context of NCDs, PHC is an important cornerstone of care. NCDs require sustained person-centred and community-based care, due to the long-term nature of disease as well as the need for proactive monitoring and disease management [124]. Given its direct link to communities and households, PHC is well-positioned to achieve such care [125].

As recommended by the World Health Organization's (WHO) "best buys", effective and feasible implementation of NCD prevention and control strategies in low- and middle-income countries (LMICs), require strengthening and orientating the health system through people-centred PHC [126]. Globally, nations are confronted with the challenge of providing affordable health services to populations with increasing levels of noncommunicable and chronic diseases [127]. Combined with factors such as rising levels of obesity and related noncommunicable disease, the demand for health services is requiring nations to consider new models of affordable health care.

NCDs, such as heart disease and stroke, often do not have symptoms until they have progressed significantly [99]. Screening for risk factors can identify people at high risk and potentially prevent the disease from worsening. PHC settings, which are often the first point of contact for people seeking medical care, are well-suited for detecting high-risk individuals and implementing a total-risk approach, which can be carried out by non-specialist health workers [128]. In practice, PHC usually translates to healthcare, prevention and all necessary services being made available to people close to them, without the dependency on apex institutes. It does not centre around particular diseases or ailments but rather serves as a constitutional cohesive approach to health that is easily accessible [129].

This approach is feasible, affordable, and equitable for addressing noncommunicable diseases and can help to reduce the burden on secondary and tertiary level care. Given the level of disease burden, all staff, not just doctors, need to be part of the solution and encouraged to innovate and deliver better and more affordable health care, particularly preventative PHC services [127]. Further, emphasising to health services the importance of more comprehensive healthy lifestyle approaches, including awareness about NCD risk factors, can help mitigate the sharp rise in NCD prevalence. This being integrated into PHC setups can have a synergistic effect [130].

In effect, the issue of NCDs can strongly benefit from being integrated into PHC efforts of every country. This could include cost-effective, evidence-based, and affordable solutions, including community participation. Integrated, functional and mutually supported referral systems are also integral to PHC. PHC also includes inter-sectoral collaboration, which could include targeting other areas of communities and industries which contribute to NCD risk factors [131].

2.7.3 Health financing

The financial burden resulting from rapidly rising NCDs on the individual and household levels, and the healthcare delivery system in LMICs is well-documented. With projected increases in the number of people living with chronic diseases, increased demand for and utilisation of NCD-related health care services is a certainty. To understand these resource requirements, it is incumbent for costs to be estimated that are associated with the diagnosis, treatment and management of NCDs in resource-constrained LMICs [132]. The chronic nature of NCDs and the costs associated with long-term care can result in catastrophic health expenditure for the patient and their household pushing them deeper into poverty and entrenching inequality in society [102, 133].

Research findings highlighted that the four most prevalent NCDs, along with mental health, would pose accumulative global economic losses of 47 trillion USD by 2030, approximately 75% of global gross domestic product (GDP) in 2010 (US\$ 63 trillion). This is anticipated to have disproportionate impacts on LMICs, where health systems are fragile, safety nets are lacking and current efforts to cope with multiple concurrent health issues are ongoing. Over 2 billion people living in LMICs are hindered from an efficient, equitable and adequately funded healthcare system, in addition to the lack of universal health coverage (UHC) and financial risk protection schemes. Compared to HICs, the household financial burden of healthcare in LMICs is much higher where more than 150 million people suffer from catastrophic expenditures every year and unexpected out-of-pocket expenditures for costly services [133].

2.7.4 Health Workforce

Health systems can only function with health workers; improving health service coverage and health outcomes depends on a fit-for-purpose and fit-to-practise health workforce. (9)

Efforts to scale up essential interventions to achieve the health-related targets of the Sustainable Development Goals (SDGs) and universal health coverage are likely to be thwarted by insufficient availability of health workers in low- and middle-income countries. (9), The new World Health Organization (WHO) Global Strategy on Human Resources for Health: Workforce 2030 (the Global Strategy) examines the contemporary evidence and provides policy options and recommendations for transformative actions to effectively tackle the most significant health workforce challenges in the decades to come. (9)

Community health workers (CHWs) are often trained to fill the provider gaps in health systems and health care delivery, especially in LMICs, due to the shortage of human resources [134]. CHWs are usually members of the local community and from the same race and ethnicity as patient groups [135]. Evidence suggests varied roles and relevance of CHWs in the management of NCDs. These roles include patient education and care, provision of social support, and acting as a liaison with the healthcare system [134]. Evidence shows that engaging community health workers (CHWs) in community-based health care programs can relieve the health professional shortage and improve the population's health in a cost-saving manner [136, 137].

Furthermore, there is an importance in CHWs and the local workforce in delivering community-centred and culturally safe PHC and services to under-served populations. For instance, Indigenous Health Workers (IHWs) are important members of multidisciplinary PHC teams in Aboriginal and Torres Strait Islander communities in Australia due to their knowledge of the unique community, culture, and care needs. CHWs are often in the best position to build strong community connections, and also understand the unique needs of individuals within the community alongside, and thus are well-positioned to take part in prevention and health promotion initiatives [136].

2.7.5 Health Governance and Leadership

The health system is made up of various stakeholders including individuals, communities, civil organisations, and national and global institutions who all need to work together under the guidance and leadership of an institution responsible for setting policies, visions and for providing resources for the implementation of these policies. There is also a need for continuous synthesis of relevant evidence to drive the making of these policies, so as to identify better health programs and strategies, as well as effective monitoring systems. The establishment of a global structure that harnesses the engagement of the communities, and the energy of civil society organisations and that creates a global movement to influence the policy agenda at the country level leading to laws and reforms is crucial in combating the rising prevalence of NCDs [138].

2.7.6 Access to essential medicines and technologies

Innovations drive development and progression in all spheres of life, and it has a crucial role to play in the fight against NCDs. The development of effective, accessible, and sustainable technologies to aid in the prevention, reduction, and monitoring of NCDs is very important in combating NCDs. While many of the current technological models are not sustainable in low and middle-income countries due to monetary incapacities and/or lack of necessary human resources for its sustainability, there is a need to develop a system that brings together technological enthusiasts, motivated leaders and societies, informed policymakers, financial institutions, and investors in order to develop globally sustainable technological solutions through collaborations [139].

In many countries, there is no access to medicines for NCDs due to unavailability when needed or due to financial constraints as many of these medicines are unaffordable. There is a need for adequate resource allocation for these medicines while focusing on equity as well as giving priority to reimbursement for noncommunicable diseases medicines in benefits packages, ensuring efficient procurement and distribution of these medicines, and making sure the price of these medicines is regulated. Also, there is a need for these processes to be evidence-based, transparent and grounded on national values and priorities [140].

2.7.7 People-centred approach and inclusion of people with lived experiences

Patient journey mapping, also known as healthcare process mapping, is a technique used by healthcare leaders to view the management of particular conditions from the perspective of the patients, as a sequence of related events or activities between patients and healthcare systems that shape the patient experience [141].

The NCDs Alliance's initiative, the "Global Charter on Meaningful Involvement of People Living with NCDs," is founded on the idea that everyone affected by NCDs, including care partners (also known as carers or caregivers), should be meaningfully involved in all life-affecting decisions. The Global Charter mobilises all players, including governments, foreign partners, the commercial sector, and civil society organisations, with the goal of having individuals living with NCDs meaningfully involved in organisational activities [142].

Additionally, through route mapping, healthcare delivery teams can gain important and distinctive insights from patient views and value-added inclusion [143]. Most patient journeys, as seen from the perspective of a hospital or healthcare system, consist of six consecutive stages, including the: Trigger event/awareness, Help, Care, Treatment, Behavioral/Lifestyle Change, and Ongoing care/Proactive Health. The mapping process reveals all facets of the patient-health system connection. The chance to restructure patient pathways to enhance clinical efficiency by focusing on activities most appreciated by

patients is provided by this exercise, which aids in identifying any gaps in the patient care experience [141]. However, the majority of NCD patient journeys start long before the "trigger" or point of access to the health system. The start of a disease can be avoided or delayed by adopting healthy habits and being "informed" of NCD risk factors. It is crucial to understand that NCDs do not occur in isolated cases; many individuals experience multimorbidity, with each morbidity triggering a different journey. Patients living with NCDs (PLWNCDS) have first-hand knowledge of how the disease affects their quality of life and physical function. They have direct, extensive experience living with the disease. As such, having a patient-centred approach with active decision-making from the patient as a proactive rather than passive individual is key in the management of NCDs [141, 144].

In order to reach the highest possible level of quality and quantity of life for individuals and communities, a patient-centred, all-encompassing health system that integrates rather than divides all prevalent NCDs, regardless of their aetiology or trajectory across time, must be created [144, 145].

2.7.8 Universal Health Coverage and NCDs

The principle of Universal Health Coverage (UHC) is for all people to have access to the full range of quality health services they need, when and where they need them, without descending into financial hardship. This covers the entire gamut of health services, from health promotion to prevention, treatment, rehabilitation, and palliative care as well. UHC is also an important element of the Sustainable Development Goals; target 3.8 states "achieve UHC, including financial risk protection, access to quality essential health care services and access to safe, effective, quality, and affordable essential medicines and vaccines for all."

UHC is one of the main focuses of future health policies and programmes, but every country and healthcare system faces issues with its fulfilment. Usually stemming from a lack of resources, finances, frameworks and coordination, several countries are struggling to work towards UHC. NCDs should be one of the key priorities within any UHC framework that is to be implemented. With the rise in the prevalence of NCDs and as we achieve control over infectious diseases, NCDs are at the forefront of healthcare. Control and focus on NCDs are essential to achieving UHC due to several other reasons as well: NCDs leave the population vulnerable to other infectious diseases, complications and consequences which increases the burden on healthcare systems. Hence, any and all frameworks and strategies for UHC should include NCDs as a major focus area and ensure that effective and reliable care for NCDs is made available [146-148].

Healthcare for NCDs can no longer be restricted to treating them, but the UHC approach must essentially include prevention. One of the main elements here is a coordinated approach that primarily focuses on NCD risk factors, awareness and early diagnosis and institution of treatment. WHO advocates for action at several levels, including regulating the sales of products that increase the risk of NCDs (tobacco, sugary drinks, or foods containing trans-fat and high levels of sodium), promoting healthy lifestyles and educating the public about NCDs and their risks [149].

Presently, there are several drawbacks to the UHC models which may work for infectious diseases mainly but fall short for NCDs. These include a dominant focus on episodic primary health care, and disparity in the distribution of health services [150, 151]. Models and frameworks should be curated in such a way that they are able to tackle NCDs, act on prevention strategies, and are able to provide diagnosis and treatment to all NCD patients regardless of their geographical, social or financial background [150, 152]. Several NCDs require high-cost treatments, a lifelong supply of drugs, surgeries and expensive diagnostic procedures, further complicating the economic problems of achieving UHC [150, 152].

Hence, a multi-pronged approach led primarily by governments and lawmakers is essential to achieve UHC with a focus on NCDs. This can include financial frameworks that ensure a continuous supply of trained healthcare for NCDs, diagnostics, drugs and treatment; and above all, prevention [153]. Priority and inclusivity of comprehensive, accessible, and cost-effective NCD interventions are much needed in every country, with a strong commitment from governments and other stakeholders.

2.8 NCDs advocacy:

2.8.1 Multisectoral collaboration and health in all policies

Multisectoral action refers to the engagement with one or more government and stakeholder sectors outside health in order to attain better health outcomes and target the main determinants [154]. Given the wide range of determinants that are critical in the development, management and prevention of NCDs, it is difficult for the health sector to prevent and manage NCDs effectively without multisectoral collaboration [155]. The Global NCD Action Plan (2013-2020) recommends that member states establish a high-level national multisectoral agency or commission to facilitate engagement and policy coordination across all policy areas that could affect the prevention and control of NCDs. This would ensure that NCD-related efforts are integrated into a wide range of policy decisions [156], as well as that different NCD-related efforts are complementary rather than conflicting with each other. For instance, the recommendations of the Australian National Preventive Health Strategy (NPHS) align with the importance of multisectoral action in addressing NCDs. The NPHS calls for an independent, expert-led mechanism to advise the federal government on prevention priorities, with a focus on equity and evidence-based assessments and cross-sectoral collaboration [157].

Despite the importance of addressing the social determinants of health, such as education, employment, poverty reduction, living conditions, and environmental factors, in improving overall health outcomes, these efforts have not yet been widely implemented in many parts of the world [51]. The WHO has encouraged countries to adopt multisectoral action plans to address NCDs, however, progress has been slow, with only 41% of countries having such plans in place and of these, only 34% have operationalised this [158]. Many of these plans are limited to the creation of high-level steering committees with representation from different ministries, which often do not function effectively [154]. Literature has shown that NCD committees are still dominated by those in the health sector and have not yet expanded to include other key stakeholders whose engagement is equally crucial [159]. Evidence from Africa suggests that the main barriers to multisectoral action include a lack of awareness among different sectors about their potential contribution and roles, weak political will, coordination challenges, and insufficient resources [160].

Political commitment and strong leadership are crucial for the effective implementation of multi-sectoral coordination. However, this commitment is often only demonstrated through the signing of global goals rather than through the allocation of necessary resources, such as financial and human resources. This lack of resource allocation has been a major obstacle for NCD programs [154]. For example, in 2016-2017, the WHO - a technical lead agency for NCDs - allocated less than 5% of its biennial budget to NCDs, and this percentage decreased further in 2018-2019 [158]. Literature has recognized the importance of multisectoral approaches to achieving key SDGs [161], and has recommended the establishment of institutional-wide mechanisms for ongoing monitoring and evaluation to replace multiple 'siloed' multi-sectoral committees in parallel - which contrarily becomes a chaotic task of management [51, 154].

The need for multisectoral approaches was highlighted in the Health in All Policies approach (HiAP), adopted at the UN High-Level Meeting in 2011 [162]. In its essence, HiAP aims to bring together multiple sectors and disciplines in order to implement policies that account for not only health but its determinants - through an intersectoral collaborative approach [162]. At its base, the HiAP and any fundamental argument for integrated action rest on the WHO's Commission on Social Determinants of Health, which has compiled evidence supporting the integration of efforts to address the root causes of health disparities, as social determinants significantly impact the distribution of disability and mortality from noncommunicable diseases [50].

2.8.2 NCDs within the medical curricula

It is important that the critical nature of NCD prevention and health promotion be taught in medical school as part of the core curricula. The traditional and most orthodox approach to medical education has put a great focus on biomedical causes and treatment for the disease, with narrow contextual understanding [163]. Traditional curricula often lack focus on links between living conditions, social determinants, and disease, and there is limited emphasis on disease prevention [164]. The rapid demographic and epidemiological shifts in LMICs require a well-trained workforce that is capable of responding to the challenges surrounding the management, prevention, and treatment of NCDs which are rapidly rising in these regions. A more transformative medical curriculum needs to be adopted that accounts for the convergence between social context, health, and medicine, coupled with population-level determinants such as socioeconomic context and political systems.

Integrated teaching styles that address the needs of under-served communities are required in medical education, especially in the case of NCDs which are rapidly rising and of high prevalence among these communities. This need particularly zooms in on the concept of social accountability in medical education, which refers to education that adjusts to the needs of all patients and healthcare systems, including under-served and vulnerable groups which are most often left behind in policy and decision-making processes at a national and global level [163, 164]. This implies the responsibility to contribute to the development of medicine and society through fostering competence in research and addressing determinants of health inequities globally [165]. In many LMICs, due to the historically high number of communicable diseases in the past, teaching and training in undergraduate public health education were more focused on communicable diseases. Research in these regions has demonstrated an insufficient level of education on the prevention and control of NCDs - with focuses often on medical models compared to public health approaches [166]. For instance, a study investigating the teaching of NCD risk factors across medical colleges in India found that curricula efforts are directed mostly upon highly clinical aspects of NCDs such as hypertension, diabetes, mental illness and cancer. There was little too inadequate focus on practical health promotion and counselling skills as well as long-term health implications of smoking, diet, physical activity and alcohol use [167].

Additionally, equipping medical students with the skills required to clinically address the risk factors for NCDs is of critical importance, especially with the rise of NCDs involving lifestyle behaviours. One such patient-centred approach that has been shown to be effective is motivational interviewing (MI), which should be actively taught in medical schools and specialty colleges [168]. For instance, A California Academic Chronic Care Collaborative piloted and implemented a curriculum teaching internal medicine residents to use chronic care model components and MI skills to better prepare and equip patients to self-manage and care for their chronic conditions and was too great a success [169].

2.8.3 NCDs Research

The Global Strategy for the Prevention and Control of Noncommunicable Diseases (NCDs), along with its Action Plan, was adopted by the World Health Assembly in 2008. This strategy and action plan provide guidance on how to prevent and control NCDs and establish effective programs to do so. One of the objectives of the action plan is to coordinate research efforts on NCDs in order to improve the evidence base for cost-effective prevention and control measures [170]. Although there are efficient interventions for the prevention and management of noncommunicable diseases, their application is insufficient globally. In order to scale up and maximise the impact of existing therapies, research that combines social and biomedical sciences are necessary [156]. As mentioned in the sections above, there are numerous research gaps that exist within the NCD domain, most evident across LMIC and other under-served populations [171, 172]. As noted by the HiAP, multisectoral responses to NCDs are likely to be more effective in the long term, and thus buy-in from all important stakeholders to fund and encourage research linked to the prevention and control of NCDs must be prioritised. Not only research but as well as its translation into practice is highly important [156, 162].

The WHO's priority research agenda for the prevention and control of noncommunicable illnesses, which was designed through a participatory and consultative method, currently serves as the basis for future funding in NCD research. The research agenda prioritises [170]:

- Understanding and influencing the multisectoral, macroeconomic, and social determinants of noncommunicable diseases and risk factors
- Translation and health systems research for global application of proven cost-effective strategies
- Research to make costly but effective interventions accessible and be used appropriately in preventing and treating noncommunicable disease

2.8.4 Challenges facing NCD advocacy

The presence of multimorbidity of disease, research gaps, as well as commercial interests remain major challenges to the success in NCD advocacy efforts. Firstly, one of the major challenges facing chronic disease advocacy is the limited research support in LMICs, which poses difficulty in context-specific advocacy surrounding NCDs [173]. Further research is needed to explore the triad of socioeconomic status, lifestyle, and the development of health conditions in LMICs, as most current studies are drawn from HICs and thus are not generalisable across contexts [174]. Other high-priority populations include children as well as under-served and disadvantaged populations with often the highest incidence of multiple behaviour-impacted diseases such as NCDs [175]. For instance, whilst the trend of lower SES being associated with higher rates of chronic disease mortality and morbidity, has largely been corroborated by studies from Western high-income countries [171, 172]. However, recent literature has reinforced the need to further explore data from LMICs - especially noted in sub-Saharan African studies which confirm negative social gradients - higher SES with more NCDs compared with lower SES. These findings support the need for more evidence-based and context-specific policies targeted at specific socioeconomic and demographic groups [171]. The WHO Global Action Plan for the Prevention and Control of NCDs 2013-2030 and the related Global Monitoring Framework have an emphasis on the need to systematically collect data for socioeconomic differentials in all population measures of NCDs [156], and thus the suggestion of unique epidemiological risk factors supports the need for more targeted advocacy, resting fundamentally on the availability of research.

Furthermore, the presence of multimorbidity and the double burden of disease poses a challenge to the prioritisation and management of NCDs. Many LMICs that are rapidly globalising and industrialising are

undergoing challenges associated with developing higher rates of NCDs whilst concomitantly high levels of communicable diseases such as HIV, TB and malaria [78]. Literature has supported the intimate link between T2DM and COPD to TB, however, there are many research gaps regarding effective approaches to minimising the morbidity and mortality from these interactions - not limited to the effect of TB on glycaemic control, as well as appropriate ways to screen for COPD with concomitant TB infection [78, 176, 177]. Similar interactions have been noted across literature for other infectious diseases such as malaria and HIV [178, 179]. One relevant tool designed to address the increasing need for chronic disease care in LMICs is the WHO Innovative Care for Chronic Conditions (ICCC) Framework [180]. However, the ICCC is limited in that multimorbidity, and the double disease burden is not explicitly incorporated [78]. Likewise, disease surveillance and reporting programs of LMICs have been identified as a significant concern due to a lack of health information and difficulty thus in evaluating the health of the population to develop effective prevention, control and treatment strategies [181]. The presence of infectious diseases as a simultaneous public health concern alongside NCDs impacts their prevention, treatment and management and may also be a confounding factor and challenge to effective disease surveillance and thus advocacy [79].

Finally, the commercial interests of powerful transnational companies pose a challenge to NCD advocacy and action. Efforts to prevent NCDs often go against the business interests of powerful economic operators, and thus pose themselves as one of the biggest challenges facing health promotion [182]. As aforementioned, the commercial determinants of health have a great impact on shaping consumer behaviour and exacerbate the impact of biomedical risk factors on NCDs, not limited to hyperglycemia and metabolic syndrome. The advancement of strategies to mitigate the harmful influences of commercial organisations will be necessary in light of their rising influence on global public health. [183].

In conclusion, increasing medical and social research and monitoring efforts may pose an effective strategy to ensure populations globally are equipped to cope with NCDs in the future [173], however, gaps in this area pose ongoing challenges to context-specific NCD advocacy. There is a necessity to research the relationships between socioeconomic status, lifestyle and the development of NCDs in LMICs in order to better inform strategies surrounding disease surveillance and reporting [79], as well as devise more context-specific strategies to target NCDs [174]. Additionally, the presence of multimorbidity and the double burden of both communicable and NCDs in LMICs poses challenges to prioritising and managing NCDs, as well as making it difficult to evaluate the health of the population to develop effective prevention, control, and treatment strategies [78]. Lastly, it is essential to better understand the role of public health in understanding the commercial determinants of health, and thus attenuate their expanding influence on NCD risk factors and determinants [183].

2.8.5 Role of Youth

NCDs, among other contemporary issues such as climate change and mental health, are major issues affecting our generation, and yet there are limited contemporaneous approaches that involve the youth in NCD advocacy and leadership [184]. This is crucial as the youth can be considered major stakeholders in the sphere of NCD advocacy. In 2019, approximately half of the DALYs among adolescents was due to NCDs [112]. NCDs share key behavioural risk factors such as alcohol, physical inactivity, unhealthy diets and tobacco use, which are all modifiable behaviours established during adolescence or young adulthood [185]. The WHO estimates that 70% of premature deaths in adults worldwide are the result of behaviours learnt during adolescence or early adulthood [186]. Therefore, shifting the NCD disease trajectory requires interventions and programs that support positive health behaviours in the youth population.

Literature has suggested the importance of engaging with adolescents as research partners in NCD-related health promotion [184, 187, 188]. Health behaviours acquired in childhood and adolescence such as healthy dietary practices, active lifestyles and avoidance of alcohol and tobacco, are more likely to be carried to adulthood [189]. Likewise, the development of negative health behaviours early into childhood and adolescence are more likely to be retained into adulthood, with a greater risk of abuse and dependency, as well as greater difficulty initiating behaviour change [190]. For instance, in Africa, more than one-third of the population are youth between the ages of 10 and 24 - and if the NCD trajectory is to be addressed, then health promotion and disease prevention should be more targeted towards youth groups. In Africa, the population projected to be affected by NCDs is likely to increase multi-fold by 2050, when the middle-aged population - where the NCD burden is the greatest - has increased three-fold [191].

In the 21st century, young people contribute to global and public health as researchers, practitioners, patients, activists and community organisers [187] - thus, policies addressing NCDs are also of utmost importance to the youth [188]. The 2011 WHO Prioritised Research Agenda for Prevention and Control of NCDs was established as a guide to implementing and funding research on NCDs and their unique determinants. However, there was neglect of the role of adolescents and young people in the agenda [188]. This is likewise reflected in the state of adolescent health research, with only 2.2% of total developmental assistance for health being spent on youth health [192]. Of this, there is limited known research on NCDs and their impact on youth populations as well as their role in NCD prevention. This is notable in LMICs, where the population of youth is particularly high, and thus, hampers the ability to generate evidence-based policies that are effective in the long-term across the life-course trajectory [188].

Youth organisations such as the International Federation of Medical Students' Associations (IFMSA) have participated and debated in several different aspects of NCDs, such as through the *Budva Youth Declaration: A Call to Action on NCDs* [193]. Other organisations, such as the Young Professionals Chronic Disease Network (YP-CDN), NCD Child, NCD-free and YP Uganda, have also achieved notable success in advocacy such as delivering sustainable meals and improving access to essential NCD drugs worldwide [194, 195]. Ultimately, the youth community has the potential to be leaders in NCD advocacy and are uniquely positioned to do so as the shifting disease burden is projected to fall upon increasingly younger populations. Supporting the youth in leadership, learning and development of capabilities with evidence-based programs and policies will attenuate the impact of NCD risk in the long term as well as its downstream impact on communities and societies as a whole [195, 196].

2.9 NCDs and vulnerabilities

2.9.1 Introduction to factors increasing vulnerability to NCDs:

Beyond the discussion on biological determinants and behavioural factors that increase an individual's vulnerability to NCDs, there are other predisposing factors that increase susceptibility to developing NCDs. These are often community and population-related and are intimately linked to their interactions with the social determinants. These include communities living in rural and remote areas, Indigenous populations, as well as CALD populations [82, 197-199].

2.9.2 Rural settings

Rural, regional, and remote populations experience levels of social disadvantage that create a gradient in healthcare inequity in comparison to urban counterparts [200, 201]. Rural populations are less able to access health services due to geographical remoteness, a circumstance exacerbated by reduced economic productivity, lower affordability of public infrastructure and transport, and a lower SES. As a

consequence, there is a lower level of health services usage and access for rural populations, less access and exposure to screening and primary prevention, leading to preventable disease development as well as poorer follow-up for chronic conditions [202, 203]. Literature has highlighted that chronic diseases, and their complications are higher in rural and remote living areas [204-206]. Many NCD-related behavioural risk factors such as alcohol, smoking, high blood pressure and poor diets are also of higher prevalence in rural areas - for instance, in Australia, rates of smoking for people aged 14 and over, increases by 10% going from urban to very remote areas [207].

The concept of 'continuity of care' describes the collaboration between multiple healthcare professionals to provide high-quality care and is particularly important to account for the more complex needs for patients with chronic diseases [208]. Challenges associated with continuity of care and management of NCD also pose a problem in rural areas. Research on diabetes management in rural US has shown that HbA1c targets are less likely to be reached, as well as poorer renal and ophthalmic screening in comparison to urban counterparts [209]. The prevalence of COPD and hospitalisation rates were also higher in rural areas in both Australian and American studies [210, 211]. Similarly, in rural Canada, patients with CKD were less likely to be managed with appropriate medication and more likely to die or be hospitalised prematurely compared to urban patients [212]. Limited availability of suitably skilled healthcare professionals, and limited access to appropriate information technology and travel, all impact on the continuity of care in rural and remote areas in relation to NCDs [204].

2.9.3 Indigenous populations

Indigenous populations experience a greater vulnerability to NCDs in comparison to the general population due to various interacting social and cultural determinants [213, 214]. In HICs such as the US, Canada and Australia, Indigenous peoples suffer from significant social and economic disadvantage [214, 215], as well as institutional racism [216]. These subsequently create greater risk factors for the development of NCDs as well as difficulties in follow-up and management.

Literature has noted that the higher mortality across the disease spectrum amongst Indigenous peoples arises predominantly from chronic diseases. In Australia, US, Canada and New Zealand, circulatory conditions, respiratory disease, endocrine and cancers account for the majority of the excess mortality in Indigenous peoples [217]. In Australia, chronic diseases contribute 80% to the mortality gap between Aboriginal and Torres Strait Islander peoples and non-Indigenous Australians [218, 219]. They are three times more likely to require hospital admissions for conditions which could have been manageable in primary care settings [220]. Many Australian Aboriginal communities residing in remote regions experience high levels of poverty secondary to high unemployment rates and high welfare dependency, lower educational outcomes, domestic overcrowding, and poorer quality of food - leading to poorer health, correlated to higher rates of chronic diseases [218]. The simultaneous presence of high rates of infectious diseases, especially in childhood, also increases the risk and severity of chronic diseases such as diabetes and cardiovascular disease [221].

In this landscape, the SDoH are particularly important given the sociopolitical history of invasion, colonisation and racialized practices within the Western culture of medicine [219]. While the effects of poverty and economic marginalisation are important determinants of NCDs in the case of Indigenous health, these SDoH have been described in the literature as both direct and indirect consequences of colonisation [222]. One of the persistent consequences of colonisation has been structural racism. Structural or institutional racism describes systematic racial discrimination that is entrenched into society (whether intentionally or unintentionally), reinforced through systems of housing, education, employment, healthcare, justice and media. Historical dispossession, transgenerational trauma, and

discrimination within mainstream health services continue to affect access and quality of care [223, 224]. In healthcare, the presence of institutional racism against Indigenous population groups reinforces discriminatory beliefs and values, making it a barrier to equity of resource distribution. Literature has highlighted that a focus on institutional racism offers promising approaches to improving population health in the long term [225, 226]. Likewise, micro-aggressive person-mediated racism in the clinical interface often undermines patient-centred care, and can be a strong determinant of adverse chronic disease management. Research on the state of American-Indian healthcare has found a positive correlation between micro-aggressive experiences in the clinical setting and worse management and outcomes for T2DM [226].

Beyond addressing the effect of socioeconomic disadvantage on health outcomes, being sensitive to the cultural beliefs and values of Indigenous peoples is equally important [227, 228]. Improving the health status of Indigenous populations requires a culturally safe approach, with the involvement of, and leadership by, Indigenous communities and researchers who possess the relevant cultural and contextual knowledge [229]. Research and development of culturally appropriate models for chronic disease care have found more success in services that take into account principles of self-determination and community-control and the involvement of Indigenous Health Workers [230]. Literature has found that enablers of successful programs to address NCD burden include joint cultural and clinical leadership between Indigenous communities and Western clinicians, alongside enduring relationships on service delivery, organisational and health systems levels [231, 232].

2.9.4 Culturally and Linguistically Diverse (CALD), refugee and migrant populations

CALD, refugee and migrant populations face unique challenges in accessing quality primary healthcare, and experience a disproportionate burden of NCDs compared to other groups in society [156]. In migrant populations, the WHO has found a positive correlation between the duration of life in the new country and increased risk of NCDs in host countries that fall in the WHO European Region [233]. A longitudinal research study in Australia found that immigrants in Australia, twenty years on from their initial migration, although initially healthier than those born in Australia, were equally likely to report a chronic disease comparatively [234]. Literature has also supported that the risk for T2DM is higher in all migrants, and members of the migrant population appear to develop T2DM at an earlier age than host populations [235].

There are numerous unique factors active during the migration process that may increase the individual's exposure and susceptibility to NCD risk factors. Firstly, there may be limited access to healthcare due to legal status and poor living conditions which may affect disease development risk and continuity of treatment [236]. In light of SDG 3.4, which aims to reduce one-third of all premature mortality from NCDs by 2030, efforts need to be centred around addressing NCD-related vulnerabilities in the migrant population, measured to have reached 244 million people globally. [236]. Although current research supports the trend that migration from LMICs to HICs may increase the risk of NCDs due to changes in lifestyle and behaviours, there is still a great need for further research to study the relationship between migration and NCDs to inform evidence-based programming. More research is necessary to determine the differential risk of NCDs among specific migrant groups in order to assist disease prevention, health promotion and clinical management efforts more effectively in these populations [235].

2.9.5 Sex and gender

Targeted health promotion and disease prevention require a holistic understanding of risk factors and vulnerabilities. However, little has been explored in the differential risk of NCDs amongst the sexes. A 2017 cross-sectional study across multiple age groups in China found that the odds of stroke and

chronic lung disease were higher in men, whilst the odds of heart disease, diabetes and arthritis were higher in women [237]. A similar 2020 study demonstrated that in the Chinese population, the risk of chronic cardiometabolic disease in women was significantly higher than in men at the same BMI level (when in excess of 25) [238]. Studies have shown that gender and sex uniquely impact health, however, as a whole, there is a lack of research examining differential risk factors and underlying causes in the context of NCDs and sex and gender identity [239]. Regardless, due to high levels of social prejudice and stigma, gender-diverse individuals are often exposed to multiple behavioural risk factors for NCDs such as smoking and alcoholism due to psychosocial stress (minority stress) from factors such as social exclusion and discrimination [240-242]. NCD risk and prevalence in gender-diverse populations constitute an important healthcare gap to address, and mitigating the challenges faced by this population will be essential in health promotion among this population with this particular vulnerability [243].

2.9.6 Vulnerabilities exacerbated by NCDs

Various vulnerabilities are exacerbated by NCDs, including the bi-directional interaction between NCDs and poverty, biological vulnerabilities to other diseases, as well as mental disorders risk and severity. Chronic diseases can have significant economic impacts on those living in poverty, often exacerbating their financial struggles. The illness of parents and caregivers due to chronic illness may contribute to an increased poverty risk for their children and extended families [244]. For individuals affected by chronic illnesses, there may be a lessened ability to perform their activities of daily living, work, and a loss of their independence. This burden may affect their family and caregivers, decrease household income and increase expenditure for healthcare-associated costs and out-of-pocket expenses for medication - thus, pushing households into vicious cycles of poverty [102].

In addition, the presence of NCDs may also affect an individual's biomedical vulnerability to other morbidities, such as infectious disease risk and other chronic conditions. One such example is prevalent in contexts of poverty present among several populations. For example, among poor populations within Aboriginal and Torres Strait Islander, and Māori communities is the double burden of infectious disease, which predisposes to unacceptably high rates of acute rheumatic fever and consequently, chronic rheumatic heart disease [245]. Associated cardiac sequelae include various other chronic cardiac conditions such as heart failure, stroke, and transient ischemic attack [245]. Evidence has been emerging that chronic diseases are also risk factors in the susceptibility to infections. For instance, patients with T2DM have a greater risk of urinary tract, skin, and lung infections [246]. There is a convergence between chronic and infectious diseases and thus health systems require holistic approaches to policy that account for this double burden in the context of risk assessment, health promotion and disease prevention. This is especially important in the context of high background rates of infections in LMICs [79, 102], and calls for a holistic response to illness whereby activities in the infectious and chronic disease sphere of public health are combined [247].

Finally, NCDs have a role in exacerbating mental disorders as well as being a risk factor for the development of mental disorders. Literature has long supported the link between mental and physical health [248, 249]. Although mental illness increases the vulnerability to physical disease, individuals with chronic physical health conditions also experience depression and anxiety, and at a two-fold higher rate than the general population. The co-existence of mental and physical illnesses can lead to increased severity of and worsened health outcomes [248, 250]. Patients with chronic conditions suffer from chronic pain and physical dysfunction, as well as associated lower quality of life and loss of independence, which can lead to a loss of self-worth and increased risk of depression [250]. The estimated prevalence of depression in patients with chronic illness has been found to be as high as 25%

[251], with chronic cardiovascular disease and T2DM having consistently been linked to a higher incidence of depression [252]. There is increasing recognition of the link between mental health and physical well-being, and it is becoming clear that providing effective treatment for chronic disease requires a more comprehensive approach that integrates mental health.

2.9.7 NCDs and Behavioural Change:

The behavioural risk factors for NCDs need to be effectively addressed in the clinical interface if NCD prevalence is to be reduced. Behaviour change for effective self-management can improve health outcomes and the quality of life of people affected by NCDs [253]. Interventions that address risk factors and support behaviour change can improve health and well-being and reduce the cost of healthcare for ageing populations with chronic conditions [253]. A 2012 US study found that patterns of behaviour change following diagnoses of new chronic conditions indicated that for the vast majority of individuals, healthier lifestyle behaviours were not adopted. Of changes observed, smoking cessation for those with heart disease was the most common observed change, while little alteration was observed in terms of alcohol consumption [254]. One strategic objective is to empower healthcare providers to help patients improve their lifestyles and take responsibility for managing their own health, with the goal of preventing NCDs and improving the quality of care for chronic conditions. To target the importance of lifestyle interventions, brief behaviour change counselling (BBCC) that is integrated into routine health care has been shown to be effective in helping patients modify risk behaviours for noncommunicable disease (NCD), improve self-management of chronic conditions, as well as produce clinically meaningful improvements in biological outcome [255]. An acceptability study in Malawi found a high rate of acceptance of BBCC among stakeholders in NCD clinics, developed and guidance from existing BBCC and MI models including the 5 A's of counselling (Ask, Advise, Assess, Assist and Arrange) [256, 257].

One type of BBCC is MI, which is a different approach to traditional medical consultation, where a paternalistic relationship style may not be effective for treating patients with chronic conditions or risk factors related to lifestyle [258]. In MI, the patient is the primary caregiver and is empowered and equipped with the necessary skills to make decisions about how to manage their health in the long term. The provider's role is to guide the patient and offer support, rather than try to enforce the desired change. Motivation for change is increased when the provider helps the patient understand and resolve their ambivalence about change and build their self-efficacy, whilst respecting their autonomy. This approach can reduce resistance to change and increase intrinsic motivation for change [259, 260]. A recent meta-analysis found that MI has a more successful outcome compared to other interventions, and has a positive impact on various NCD factors such as death rate, blood pressure, cholesterol levels, weight, excessive alcohol consumption, smoking, patient confidence, and engagement in long-term care [261].

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