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Chapter

The Global Burden and Perspectives on Non-Communicable Diseases (NCDs) and the Prevention, Data Availability and Systems Approach of NCDs in Low-resource Countries

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Abstract

The burden of non-communicable diseases (NCDs) is growing swiftly in low-resourced countries resulting in deleterious health resembling the NCDs burden in high-resourced countries. Despite the availability of information on the escalating adverse economic and health effects of NCDs globally, specific strategies designed to address the growing burden of NCDs in low-resourced countries remain substandard. Research engines like EBSCOhost, Science Citation Index, CINAHL database, PsycINFO, Cochrane Database of Systematic Reviews, published and unpublished abstracts and a hand search of reference lists and table of contents of relevant journals and books were searched from January 2011 to June 2019. In total, 84 studies met the inclusion criteria. Most studies confirm that low-resourced countries compared with high-resourced countries battle to implement NCDs prevention strategies; fail to record data on the risk factors of NCDs; medical records and surveillance data are unavailable. Due to a lack of knowledge and skill, low-resourced countries show no urgency to implement a systems approach for NCDs management. The findings confirm disparities between high-resourced and low-resourced countries regarding NCDs prevention, availability of quality data, and strategies to prevent and manage NCDs through a systems approach that can assist healthcare institutions in reducing the damaging effect of NCDs globally.

Keywords: changing environment, health information, low resourced countries, modernisation, NCDs data, system approach

1. Introduction

As with many high-resourced countries, low-resourced countries have not been spared the global challenges caused by non-communicable diseases (NCDs), such as cardiovascular diseases, coronary heart disease, hypertension, diabetes mellitus,

and obesity [1, 2]. For countries with minimal health budgets, every effort needs to be made to reduce patients' reliance on costly medical solutions to health problems, including NCDs, for which drugs are often the first line of treatment to reduce the associated morbidity and premature mortality [3]. Prevention efforts within the healthcare system need to take a broader public health approach to motivate people to address their unhealthy lifestyles that result in the development of NCDs. To achieve this, however, Ministries of Health in low-resourced countries needs factual, timely, and reliable NCDs data that can build a comprehensive information system to provide evidence-based decision-making and to develop appropriate prevention strategies for the specific population affected by NCDs [4, 5].

All healthcare organisations, including governmental and non-governmental institutions, have their strategies to prevent and control diseases and to maintain the health of their community effectively and efficiently. Likewise, healthcare organisations have a strategy for disease prevention and control to maintain the health of the community. Most healthcare systems rely on accurate, timely, correct, and factual data to make political and administrative decisions [4–6]. Moreover, healthcare systems should have a balanced approach in preventing both infectious communicable disease and NCDs, which require factual data at the mega, macro, meso, and micro level of healthcare.

This chapter aims to create a better understanding of the growing global burden and perspectives on NCDs. It also aims to reflect on the prevention of NCDs, the global status and availability of NCDs data, and effective strategies to prevent the growing burden of NCDs in low-resourced countries.

1.1 The global burden of non-communicable disease

Non-communicable diseases (NCDs) are the leading public health challenges globally in the twenty-first century, resulting in ill health, economic loss, life loss, diminished quality of life, and poor social development equally in both high-resourced and low-resourced countries [7, 8]. According to the World Health Organisation Global Status Report (GSR) on non-communicable disease, from 38 million deaths due to NCDs each year, more than 40% were premature and were preventable [9]. Based on the projection of the WHO, by 2025 NCDs will account for over 70% of all deaths globally, with 85% of these occurring in developing countries [10]. Evidences show that if proper prevention approaches are not designed and applied, an estimated 41 million people in low-resourced countries will die from NCDs by 2025, mainly due to cardiovascular diseases (CVDs) (48%), cancers (21%), chronic respiratory diseases (12%), and diabetes (3%) [11].

Globally, more than 9 million deaths occurred due to NCDs in people under the age of 60, with most being preventable. Untimely losses from NCDs range from 22% amongst men and 35% amongst women in low-resourced countries to 8% amongst men and 10% amongst women in high-resourced countries [10]. According to current research, more than 80% of heart diseases, stroke, hypertension and type 2 diabetes, and over a third of cancers can be prevented by eradicating the common risk factors, mainly tobacco use, unhealthy diets, physical inactivity, and the harmful use of alcohol [12]. The effective prevention and management of common NCDs risk factors require the establishment of a strategic framework which can tackle health problems associated with the growing burden of morbidity and mortality of these diseases [13]. According to evidence by the WHO, globally, NCDs deaths will increase by 17% over the next 10 years, with the most considerable increase being in low-resourced countries such as Africa (27%) and the Eastern Mediterranean region (25%) [7, 8]. Current research indicates that cancer, diabetes, high blood pressure, cardiovascular diseases, and kidney diseases are no longer the

illness of high-resourced countries, but also, non-communicable disease hampers the people and the economies of the deprived populations even more than communicable diseases, representing a public health emergency in slow motion [14, 15].

As illustrated in **Figure 1**, common NCDs account for most of the avoidable morbidity and preventable mortality, these being cardiovascular disease, coronary heart disease, high blood pressure, diabetes, and obesity. The percentage of mortality associated with the major NCDs across three regions of the world, such as high-resourced countries, low-resourced countries, and Africa varies. In high-income countries, the percentage of mortality related with NCDs such as cardiovascular disease, coronary heart disease, high blood pressure, diabetes, and obesity decreases, whilst in low-resourced countries and Africa, it continues to raise. For instance, the percentage of mortality due to cardiovascular disease is 38% in high-resourced countries [16] and 42% in low-resourced countries, from which 20% is the share of Africa [17–19].

In low-resourced countries, the largest percentage of mortality (70%) is due to coronary heart disease with Africa's share 10% [19]. In high-resourced countries, coronary heart disease accounts for 20% of mortality. The share of high blood pressure is 46% in Africa, exceeding the total percentage of deaths in low-resourced countries (40%) [20]. In high-resourced countries, high blood pressure accounts for a relatively lower 35% of mortality [21].

The percentage of mortality as a result of diabetes is 8, 12, and 14% in high-resourced, low-resourced countries, and Africa, respectively [22, 23]. The percentage of deaths due to obesity is 29.5% in high-resourced countries and 37.5% in low-resourced countries with the share of Africa 33% [24–27].

1.2 The global perspective on NCDs

In 2011, the United Nations High-Level Meeting presented and promised a unique opportunity for international communities to take action against the rising

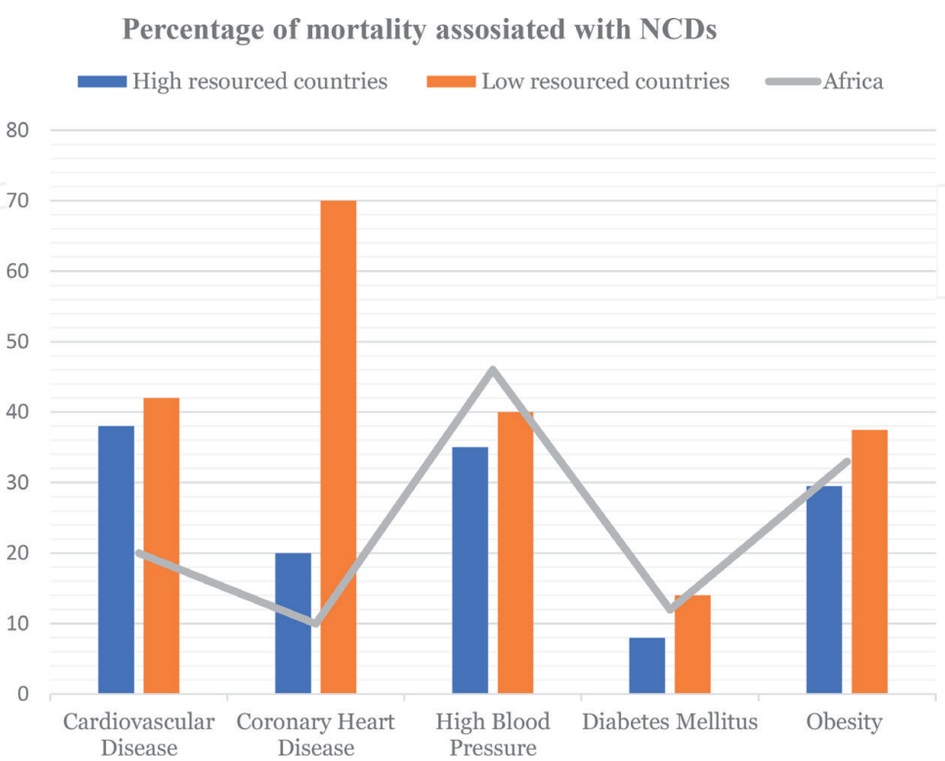


Figure 1.
Percentage of mortality associated with NCDs in Africa, high-resourced and low-resourced countries.

epidemic of NCDs. The WHO asserts that the world has reached a decisive point in the history of NCDs and has an unprecedented opportunity to alter its course. In an attempt to alter the damaging progression of NCDs, the WHO Member States agreed on a time-bound set on the following nine voluntary global targets to be attained by 2025 [9, 28]:

1. A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases.

2. At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context.

3. A 10% relative decrease in pervasiveness of deficient physical action.

4. A 30% relative decrease in mean populace admission of salt/sodium.

5. A 30% relative decrease in the pervasiveness of current tobacco use in people matured 15+ years.

6. A 25% relative decrease in the pervasiveness of raised circulatory strain, or regulation of predominance of raised pulse, as indicated by national conditions.

7. Stop the rise in diabetes and fat.

8. At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes.

9. An 80% accessibility of the moderate fundamental innovations and essential drugs, including generics, required to treat major NCDs in both open and private offices.

Furthermore, the world health assembly set a target of a 25% reduction in overall mortality from four major NCDs, including cancer, diabetes, cardiovascular-, and chronic respiratory disease by 2025 [28]. The 25 × 25 strategy is today included in the World Health Organisations Global Action Plan 2013–2020. Amongst the nine voluntary national strategies, two are intended to reduce deaths due to the four illnesses mentioned earlier and to stop the increase in obesity and diabetes. The remaining national strategies focus specifically on incorporating decreased alcohol intake, promoting physical exercise, reducing nutritional salt and smoking, enhancing hypertension control, and improving the treatment of those at risk from the main NCDs. Countries need to make progress on all these targets to attain the overarching target of a 25% reduction of premature mortality from the four major NCDs by 2025 [29–32].

The action plan advocates a comprehensive vision, recognising the social, economic, and political determinants of diseases and the wide-ranging developmental healthcare scheme [29]. Conversely, it is uncertain, in low-resourced countries at a much lower economic level, how these declarations of commitment will be interpreted and implemented [33–35]. The prioritising of infectious communicable disease, a frail healthcare system, and poorly designed NCDs prevention policies prevent low-resourced countries not to implement these declarations of commitment [1, 4].

Moreover, to improve the prevention and control of NCDs, the United Nations High-Level Meeting presented four additional time-bound commitments in 2014

which incorporates: "*1) by 2015, consider setting national NCD targets for 2025, 2) by 2015, consider developing national multisector policies and plans to achieve the national targets by 2025; 3) by 2016, reduce risk factors for NCDs, building on guidance set out in the WHO Global NCD Action Plan, and 4) by 2016, strengthen health systems to address NCDs through people-centred primary health care and universal health coverage, building on guidance set out in WHO Global NCD Action Plan*" [28]. Despite the formulation of these four additional time-bound commitments by United Nations High-Level meeting, progress made by the majority of low-resourced countries is plodding and incomparable with that of high-resourced countries [1, 36].

The WHO argues that the global epidemic of NCDs can be reversed through modest investments in interventions that are so low in cost that countries' income levels need not be a significant barrier to successfully implement the nine voluntary global targets and the 25 × 25 strategy. However, what is needed, more importantly, is high levels of commitment, proper planning, community mobilisation, and an intensive focus on a small range of critical actions. The above will ensure quick gains to reduce the significant behavioural risk factors, namely tobacco use, harmful use of alcohol, an unhealthy diet, and physical inactivity, as well as biological risk factors, such as blood glucose [29, 37].

If the current trends continue, the probability of dying prematurely from the four main NCDs is projected to increase in Sub-Saharan Africa but will show a relative decrease in areas such as Europe, the western Pacific, Americas, eastern Mediterranean, and Southeast Asia [37]. It is believed that if the risk factor targets set by the WHO are achieved, the 25 × 25 target will be surpassed in Europe amongst both men and women. In the western Pacific, the target will be achieved in women and almost achieved in men, whist the Americas, Eastern Mediterranean, and Southeast Asia will approach the target with the rising trend in Africa be reversed. In most regions, a more striving 50% tobacco reduction instead of the agreed 30% by 2016 will contribute the most to reducing premature NCD mortality amongst men, followed by addressing raised blood pressure [29, 38]. For women, the highest contributing risk factor towards the premature NCD mortality target will be raised blood pressure in every region except Europe and the Americas, where the ambitious but not approved tobacco reduction would have the most substantial benefit [33, 35].

2. Factors influencing the quality of NCDs prevention

Different factors predict healthcare systems' capacity to prevent NCDs and its related risk factors. These predictors are determinants of NCDs prevention including the level of physical exercise, dietary choice, organised infrastructure, urbanisation and related policy, cultural norms, and accessibility of health information.

2.1 Level of physical exercise

Worldwide industrial expansion and an increased service sector have resulted in less work-related physical exercise, whilst at the same time, modern technology has also made it increasingly convenient to remain sedentary. Many people lead a life with little or no physical exercise, and their leisure time is often spent on sedentary activities such as live online chats, playing computer games, and watching television, with 60% of the world's population being estimated to lead a sedentary life [39, 40].

Research indicates that low-resourced countries are experiencing rapid nutritional transitions, lifestyle changes, and epidemiological transition

following modernisation, westernisation, and increased reliance on technology. As a result, more time is available to pursue leisure activities, which leads to lifestyle diseases such as cardiovascular disease, diabetics, hypertension, overweight, and obesity [40, 41].

Naturally, the human body is designed for movement; however, planned strenuous physical exercise is not a part of the normal lifestyle. Furthermore, an individual cannot expect his/her body to function optimally and to remain healthy for extended periods if it is abused or is not used as intended [40]. In **Figure 2**, the diseases associated with a lack of physical exercise that contributes to a rise in NCDs are illustrated.

Research shows that physical inactivity is the most critical public health problem in the twenty-first century. For many years, scientists and health and fitness professionals have advocated regular physical exercise as the best defence against the development of many diseases, disorders, and illnesses [40]. Due to the recognised health benefits, it has, and the importance of maintaining a good quality of life, regular physical exercise received recognition in the first U.S. surgeon general's report on physical exercise and health. In this report, physical exercise was identified as a national health objective and recognised physical inactivity as a nationwide severe health problem; it provided clear-cut scientific evidence linking physical activity to numerous health benefits and presented demographic data describing physical exercise patterns and trends in the U.S. population. It also made physical exercise recommendations for improved health [42, 43].

2.2 Dietary choice

Consumption of high levels of trans fats, saturated fats, processed and refined foods, sugar, salt, and sugary drinks is associated with an increased risk of CVD and diabetes, whilst adequate consumption of fruit and vegetables is associated with a reduced risk of coronary heart disease and stroke. Unhealthy diets tend to follow a socio-economic gradient. Higher quality diets are associated with persons of greater affluence, whilst energy-dense nutrient-poor diets are associated with persons of more limited economic

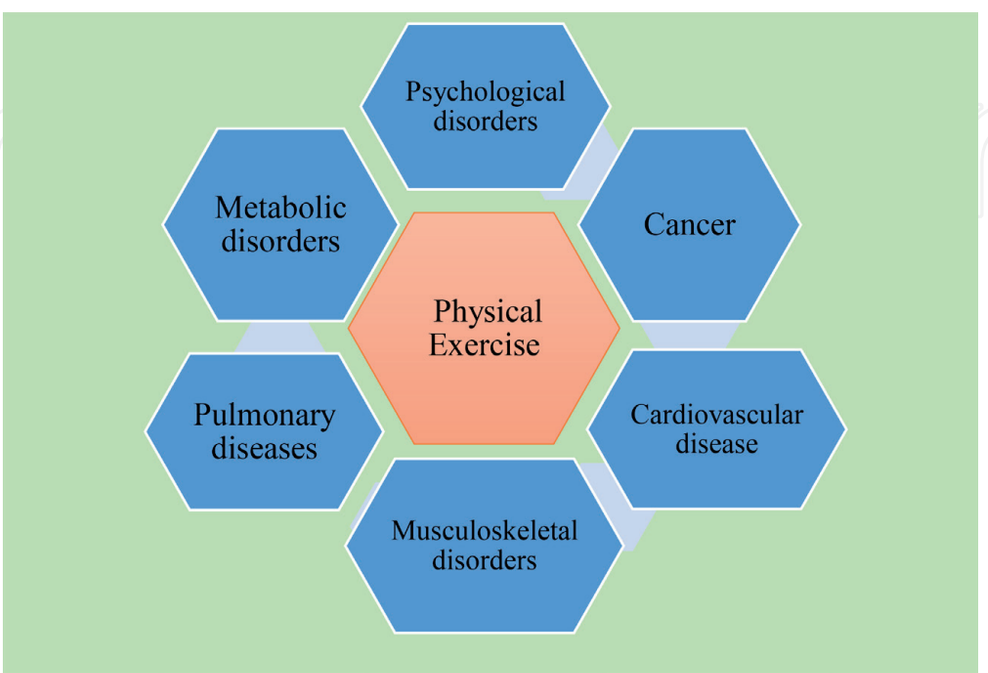


Figure 2.
NCDs associated with lack of physical exercise.

means [44, 45]. Education and gender also impact diet, with unhealthy eating habits associated with lower levels of education. Moreover, low fruit intake represented a 50% greater share of the disease burden amongst men than women [46, 47].

In low-resourced countries, the wrong perceptions about body image contribute to consume unhealthy dietary sources such as high level of trans fats, saturated fats, raw beef, goat meats, and fast foods [47]. In some Asian and the majority of African countries, having a big, fat stomach is considered as being charismatic, powerful, healthy, and perceived as a sign of wealthy [1, 48]. Following this perception, a more significant number (52%) of the public consumes high-fatty food substances which spontaneously results in acquiring NCDs [1, 49, 50]. **Figures 3a–c** depicts examples of red meats, such as raw beef meat called "Kurt Siga", red raw ground beef with spices and yoghurt called "Kitfo", and partially roasted meat respectively of which high levels of consumption and frequent consumption increased risk of NCDs due to high fat levels [1, 50]. This dietary practice is very customary amongst the diverse Ethiopian communities. Such unhealthy dietary practices are practised mainly amongst wealthy community groups and



Figure 3.
(a) Raw fatty beef meat. (b) Raw grinded beef meat with spices and yoghurt. (c) Partially roasted beef meat for consumption.

high government officials [50]. Practising these dietary choices frequently result in overweight, obesity, high blood pressure, kidney disease, and premature ageing [51, 52]. Additionally, food cooking oil known as "Hayat" and "Palm oil" which is in use amongst the majority of the Ethiopian is full of high cholesterol, and this can easily harm the health of the users [1].

Another unhealthy dietary practice frequently practised amongst low-resourced populations, particularly in East Africa such as Ethiopia, Eritrean, Djibouti, Somalia, Kenya, Tanzania, and Sudan and Arab countries such as Saudi Arabia, United Arab Emirates, Yemen, Bahrain, Kuwait, and Oman, is "Khat chewing". Khat is a leafy plant with natural amphetamine content and chewed by 20 million people each day in Arabian peninsula and East African region mainly in Ethiopia (**Figure 4**) [53]. Khat chewing has incredible stimulation effects on chewers nervous system and predominantly addictive. The practice of Khat chewing is frequent amongst university students, shop keepers, drivers, and majority of the Muslim community, teachers, and some government officials [54]. Evidence shows that Khat chewing is associated with escalated degrees of cardiovascular complications, stroke, myocardial infections, cardiomyopathy, gastritis, poor oral hygiene, neurosis, poor academic performance, periodontal disease, and decreased quality of life [55, 56].



Figure 4.
Chewable leaves of Chat plant.

Khat dependence is associated with wasting of longer working hours and family time. Evidence in Yemen and Saudi Arabia shows that lousy mood, psychosomatic dependence, sleeplessness, and physical indicators were observed amongst Khat chewers, and they spend an aggregate of 6 hours a day and 5.7 days a week for Khat use [57, 58]. Similarly, Khat chewing is associated with diminished antioxidants of saliva Khat chewers [59]. Moreover, Khat chewing is associated with the development of type 2 diabetes. Evidence in Saudi Arabia indicates that Khat chewing increases the likelihoods of developing type 2 diabetic disease four times than non-chewers [60]. Evidence in East African countries such as Ethiopia, Kenya, Eretria, Somalia, Sudan, Rwanda, and Uganda indicates that Khat chewing is associated with the development of high blood pressure, type 2 diabetes, heart failure, mental health problems, group segregation, family cessation, and abandonment of public accountabilities [61, 62].

2.3 Organised infrastructure

Within the healthcare framework, the availability of interrelated material and infrastructure are other determinants of healthcare. For NCDs, neighbourhood environments broadly define the conditions in which people live and have a

significant influence on the risk of NCDs [40, 63]. A randomised control study in which mothers and families were given the opportunity to move from a neighbourhood with a high level of poverty to one with a lower level found that moving to a better-off neighbourhood was associated with a reduction in NCDs. Multiple mechanisms have been proposed whereby the neighbourhood environment affects the risk of NCDs, including interrelated material mechanisms [64]. These material mechanisms include the nature of the built environment, such as proximity to food outlets selling processed foods, as well as psychosocial mechanisms, such as conforming to social norms of behaviour. Also, children living in unfavourable social conditions, unsafe surroundings, poor housing, and no access to sidewalks, parks, and recreation centres were 20–60% more likely to be overweight or obese compared with children not facing such conditions [2, 39, 64].

2.4 Urbanisation and urban development policy

Urbanisation is associated with an increased prevalence of NCD risk behaviours, which are increasing at a rapid rate. More than half of the global population lived in cities in 2010, a proportion expected to reach 60% in 2030 and 70% in 2050. In countries where rural-to-urban migration is commonplace, urban life may be less conducive to physical exercise than life in rural areas. As countries develop, the sprawling nature of urban expansion and increased disposable income encourages mechanised transport and discourages walking and cycling. The nature of work available in urban areas may require less energy expenditure than subsistence farming in rural areas [63, 64].

A study of physical activity concerning hypertension, obesity, and diabetes found that it was lower amongst rural than urban dwellers. The prevalence of obesity, diabetes, and hypertension was higher amongst the urban population, and physical inactivity amongst urban groups was associated with a higher BMI, blood pressure, and fasting blood glucose levels. NCD prevention and control may require that cities adopt models of urbanisation that address the health impacts and inequities associated with city living [65–67].

2.5 Cultural norms

Evidence indicated that beliefs and norms amongst some social groups might include preferences for foods high in animal fat, which is socially acceptable or perceived as a sign of good health but result in overweight, obesity, hypertension, and health problems. Ethnographic studies found that amongst blacks in South Africa, Arabs in Niger, groups in rural Jamaica, Puerto Ricans in Philadelphia, and members of a Fijian village, a big body size and fatness reflect wealth and prosperity, beauty, marriageability, attractiveness, fertility, and "closeness to God", as is the case of Habesha in Ethiopia [1, 48, 68]. In contrast, much of the industrial West associate fatness with ugliness, undesirability, and lack of self-control, whilst associating slimness with health, beauty, intelligence, wealth, self-discipline, and "goodness". There is some evidence that the Western slim-body ideal is becoming globalised, with thinness now being desired in many places where fatness was previously preferred. Moreover, the beliefs amongst those who idealise fatness may change when the associated health risks are explained [69].

2.6 Accessibility of health information

Health information is a tool that provides data to the healthcare system, which can be used to enhance, promote, improve, and create awareness about the health of

a community. It is evidenced that health information systems are an essential tool for collecting data about the health conditions and indicators of a country to help with decision-making. It is documented that reliable health data that is collected, analysed, and interpreted can assist policymakers, health organisations, the healthcare system, and healthcare providers in formulating appropriate disease preventive strategies. It has also been demonstrated that health data can be made available to the public through various health information channels, such as healthcare providers, counselling, teaching, and advice; mass media, such as radio television, internet, social media; and telecommunication, such as mobile short message service (SMS) [4, 70].

Despite the wide-ranging health benefits of health information, the attention given to addressing NCDs-related risk factors, morbidity, mortality, the health burden, and preventive mechanisms using the various sources of health information is inadequate in low-resourced countries. Similarly, the attention devoted to the accessibility of health information coverage is deficient in the healthcare system of developing countries [4].

3. The global status and availability of NCDs data

The incidence of non-communicable diseases (NCDs) is increasing and resulted in the death of 38 million people in 2012, of which 28 million occurred in low- and middle-income countries, causing an estimated US$ 7 trillion economic loss [7, 9]. A significant number of NCDs, such as cardiovascular disease, diabetes, hypertension, and obesity, can be avoided by addressing the major behavioural and metabolic risk factors associated with such conditions. Their prevention and treatment require reliable, accurate, and timeous information on their symptoms and associated risk factors. The use of credible data has, therefore, become essential to identify current and potential NCDs morbidity, mortality, and related risk factors [4].

The availability of NCDs data at local, regional, and national levels is helpful for decision-makers to prioritise the prevention of NCDs and strengthen distribution and budget allocation in the healthcare system. It is demonstrated that strengthening the health system is a possible way to resist the growing burden of NCDs and ensure enhanced health results. An effective health system is built on a well-functioning information system that collects accurate, reliable, timeous, and relevant health data for optimal healthcare delivery and decision-making. The lack of data in the healthcare system is a hindrance to planning, allocating resources, and implementing appropriate NCDs intervention strategies [4, 71]. The effective prevention of NCDs is based on having consistent morbidity, mortality, and related risk factors data to plan, design, and implement evidence-based decision-making and its preventive strategies at regional and national levels. NCDs surveillance data can be best collected by establishing and implementing data collection standardised protocols in the healthcare system. Such standardised protocols are data collection forms used to obtain morbidity, mortality, and risk factor-related data [4, 72]. A study by Melkamu and Grace [4] indicated that collecting NCDs data alone is not enough to ensure effective prevention and intervention; what is needed is a well-organised healthcare system that periodically evaluates the data quality and is timeous and accurate on mortality, morbidity, and related NCDs risk factors to ensure effective decision-making. Whilst progress has been made to lead the development of national NCDs monitoring programmes, most low-resourced countries are still struggling to adequately establish robust information systems to help with their intervention, treatment, and related NCDs risk factors [4].

Health information systems store information that is obtained from patient records, surveys, health plans, and other data sources. Most first world and

high-resourced countries, such as North America, Australia and Europe, have established standards and processes in their healthcare sector to obtain ongoing information on morbidity, mortality, NCDs risk factors, as well as determinants of their care services [73]. Middle-income countries, such as South Africa, and low-resourced countries, such as Ghana, Mozambique, Rwanda, Tanzania, and Zambia, conducted studies to investigate the capacity of their national health information systems, which resulted in them developing robust disease surveillance systems to understand the disease profiles of their population. The availability of health information in the healthcare system enabled these countries to exchange health-related data between healthcare providers, organisations, and health service consuming communities.

According to Diamantidis and Becker [74], the availability of NCDs-related public health data in the healthcare system enables timeous and appropriate healthcare decisions to be made, quick information retrieval, fast information sharing, improved data storage, improved information screening and reporting, all of which enhances the quality of healthcare. Furthermore, having NCDs mortality, morbidity, and risk factor data about a population can help policymakers and healthcare providers to establish relevant preventive strategies in their national healthcare system. In a healthcare system with accessible, accurate, reliable, timeous, and cleaned health information, it is possible to predict the future burden of NCDs in that country [4, 75]. Globally, various countries have established healthcare strategic plans in order to address the burden of NCDs by explicitly focusing on the four major lifestyle risk factors, these being an unhealthy diet, physical inactivity, tobacco use, and excessive alcohol consumption [76].

Low-resourced countries have made a concerted effort to improve the health status of its citizens, particularly regarding preventing and treating infectious communicable diseases, such as HIV/AIDS and tuberculosis [77]. However, little attention is devoted to preventing and treating NCDs in these countries, which resulted in an increased burden of such conditions on individuals, communities, and the healthcare system [4]. Despite the growing evidence of NCDs in this population, the operating healthcare system predominantly focuses on preventing and treating infectious communicable disease, with little evidence-based research that evaluates the availability of their morbidity, mortality, and associated risk factors data [78]. In low-resourced countries, the healthcare system must aim to establish the status of NCDs-related data, the presence of mechanisms to periodically evaluate NCDs data quality, reliability and timeliness, and the availability of standardised protocols for NCDs-related data collection.

Healthcare that has accurate data that serves as information for decision-making is imperative within the hastened speed of information-oriented universal environment. In the changing world, the desire of the community to obtain up-to-date health-related information has become crucial in both high-resourced and low-resourced countries. The accessibility of appropriate health-related information is associated with the availability of factual, accurate, timeous, and reliable data associated with NCDs [4].

4. Strategies to prevent the growing burden of NCDs

4.1 The system approach

The system approach (SA) was primarily established by Urie Bronfenbrenner in Russia as a human developmental approach in the 1970s. This approach explicates how diverse systems of the community impact the development of an individual. The approach involves the word "system" which refers to the relations of organisms within their setting. Moreover, from the sociological point of view, the system

describes the way humans and the public interact with their natural and artificial atmosphere [79]. The term "approach" incorporates the way people are in constant relation with each other and the setting in which they live [80]. However, these chains could either have an encouraging or discouraging effect on an individual. The system approach is applied in social work as a meta-paradigm which is regularly referred to as "a person in the neighbourhoods". This meta-paradigm explains the way a person and different multifaceted settings interact and impact each other [81, 82]. The primary emphasis of the SA is that people are part of and continuously interact with other organisms in the setting. The system approach has been applied in healthcare to establish intercessions targeted at shifting the intrapersonal, interpersonal, organisational, community, and health policies levels [82].

The system approach has four stages or levels of impact known as M4, namely a micro-system, meso-system, macro-system, and mega-system [83]. The micro-system is the stage where the individual belongs, and it includes the impact relating to the person, which can come from the individuals' family, peer groups, and the neighbourhood collectively stated as social agents. Social agents interrelate directly with an individual and affect a persons' health behaviour either positively or negatively. For example, using networked communication such as sneezes, it will be easier for individuals to inform their families and friends about risk factors associated with NCDs and possible prevention mechanisms through verbal expression. Sneezes are imperative in NCDs prevention, and healthcare leading organisations need to ascertain who they are and give them incentives and motivations to blowout the conversation of the mouse. The meso-system is the level where the social representatives will be operating, and it is interrelated to the micro-system where the family experiences are associated to the peers' experiences and the peers' experiences to the neighbourhood experiences—for example, by using schmoozed messages such as hive, a community who has a common culture, religion, custom, rules, beliefs, and traditions can increase the spread information related to NCDs and its associated risk factors, so that awareness can be easily created [83, 84]. The macro-system is the stage where organisations are involved and demonstrate an individual's activities within it. An organisation can affect an individual's life by encouragement or discouragement and vice-versa. For example, by using diversified mediums and amplifiers such as posters, images, slogans or phrases, school mini-media, television and radio broadcasts, short message services (SMS), webpages, and the internet as a means of transmitting information related to NCDs can increase the strength of information as it gets passed across a broad audience. The mega-system level illustrates the state that reflects the culture in which individuals live. Also, the mega-system level incorporates advancement, industrialisation, urbanisation, socio-economic status, poverty, religion, and ethnicity. For example, by applying velocity and smoothness through high government officials involvement, NCDs-related messages can swiftly and efficiently reach a higher number of the public who can be reminded to abstain from behavioural practices that lead to NCDs. Likewise, working with multi sectors such as governmental and non-governmental organisations, developmental partners, religious institutions, and urban planners to increase access and availability to parks, public open spaces, and recreational facilities can lead to effective transfer of information related to NCDs to a large number of the community and its prevention [82–84].

4.2 The view of the systems approach

The system approach, as illustrated in **Figure 5,** is constructed on a supposition that when an individual, community, healthcare organisations, and the

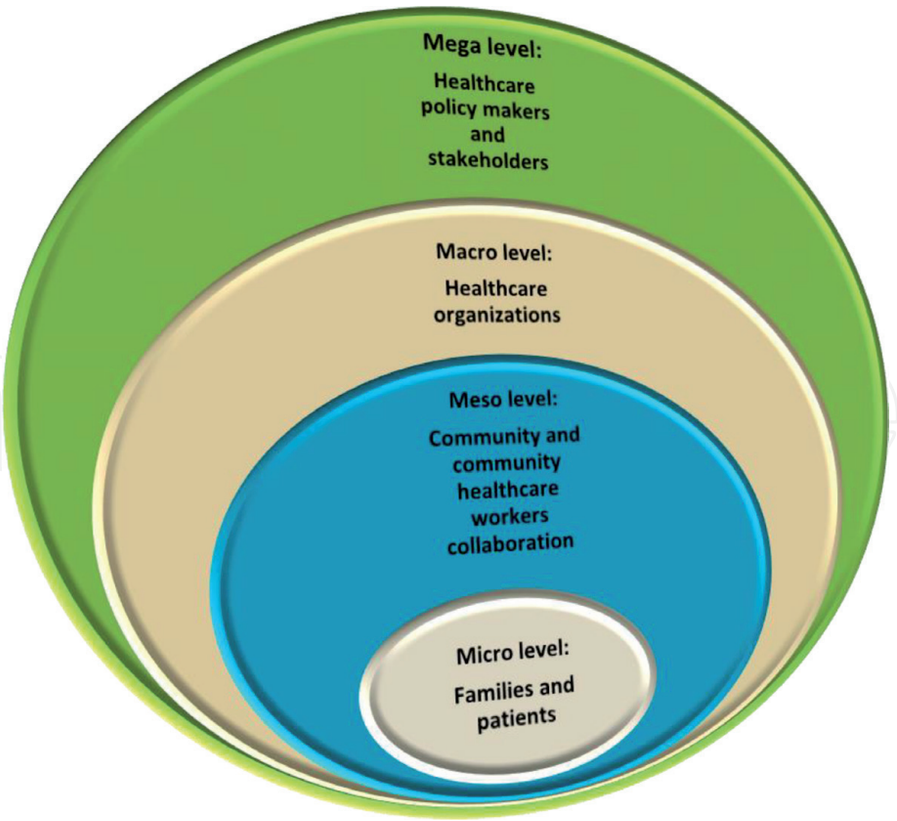


Figure 5.
Systems approach for NCDs prevention.

leading government authority are linked and operating together in a setting of a supportive system, the efficiency of preventing and controlling NCDs also increases.

4.2.1 Mega level

The mega-system level help to review and understand the existing NCDs prevention strategy, the practice of health information, the availability and status of data related to NCDs morbidity, mortality, and risk factors for decision-making at a national level. This level of the ecological system theory focuses on the status and availability of data related to NCDs at national level, so that plenty of information can be utilised in the healthcare system for effective decision-making for the prevention of NCDs. Availability of quality and timeous NCDs data and evaluating its status periodically help policymakers to redesign and strengthen the existing healthcare system to revert the growing burden of NCDs at national and international level [1, 4].

4.2.2 Macro level

The macro-level of the system approach explores and recognises strategies used by healthcare organisations such as health facilities, clinics, and hospital to prevent NCDs. The system approach at the macro level emphasises health professionals' perceptions of NCDs risk factors and how healthcare professionals use appropriate preventative strategies to prevent NCDs risk factors at the various healthcare organisations. Exploring the perceptions of healthcare professionals can help to understand the magnitude of the disease burden and help healthcare organisations to establish and implement local specific NCDs prevention strategies [1, 4].

4.2.3 Meso level

At the meso level, the community, community health counsellors, and stakeholders operate together to contribute to the prevention of NCDs. The emphasise of the meso level of the system approach is on creating awareness by community healthcare workers and community representatives on NCDs and related risk factors for the public in collaboration with the media. Telecommunication work together with the community to offer awareness on NCDs risk factors; promote a healthy diet and physical exercise benefits that is required within the community [1, 4, 40].

4.2.4 Micro level

The micro-healthcare system level is where NCDs prevention is managed and addressed at home and individual level. At this level, the family and the patients take full responsibility for their illness and self-manage their illness and diseases at home by using the advice they acquire from various sources of information and healthcare workers. At this level, NCDs-related education and preventative mechanisms can be thought at family level by family representatives, and home visiting healthcare professionals can help families and individual patients to practise self-management at their homes. At the micro level, NCDs-related data of the family in addition to detecting the challenges to self-management at this level, solutions to overcome the problem can be recorded [1, 4, 40].

5. Conclusion

The global burden of NCDs is increasing with devastating health consequences mounting swiftly in low- and middle-income countries (LMIC). The response and strategies used to prevent NCDs are inadequate in low-resourced countries due to the unavailability of timeous quality data at various stages of healthcare institutions. Data associated with the prevalence, morbidity, mortality, and risk factors of NCDs are required for evidence-based decision-making to ensure effective management of NCDs. Moreover, multi-sectoral response is required in low-resourced countries to urgently implement a systems approach at micro, meso, macro, and mega-level to prevent and control NCDs and its associated risk factors.

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Conflict of interest

The authors declare no conflict of interest.

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