

**RESPONSIVENESS OF THE DEMOCRATIC REPUBLIC OF  
CONGO HEALTH SYSTEM TO THE EMERGING  
NON-COMMUNICABLE DISEASES**

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# **Responsiveness of the Democratic Republic of Congo health system to the emerging non-communicable diseases**

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by:

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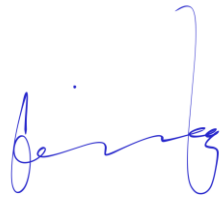
Democratic Republic of Congo

Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements.

The thesis '**Responsiveness of the Democratic Republic of Congo health system to the emerging non-communicable diseases**' is my own work.

Signature:



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## List of abbreviations

COPD	: Chronic Obstructive Pulmonary Diseases
CSO	: Civil Society Organization
CVD	: Cardiovascular diseases
DRC	: Democratic Republic of Congo
ECG	: Electrocardiogram
GDP	: Gross Domestic Product
HIS	: Health Information System
HPV	: Human Papilloma Virus
HR	: Human Resources
ICT	: Information Communication Technology
IDF	: International Diabetes Federation
IFHA	: International Federation for Heart Associations
IHD	: Ischemic Heart Disease
LMIC	: Low and Middle-income Countries
MoH	: Ministry of Health
NCDs	: Non-communicable diseases
NGO	: Non-government organization
UN	: United Nations
USD	: United States Dollar
VU	: Vrije Universiteit
WHO	: World Health Organization

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## Glossary

1. Health system: all the activities whose primary purpose is to promote, restore and/or maintain health (1).
2. Non-Communicable diseases (NCDs): diseases or conditions that are not transmissible from person to person (2,3). There is a long list of NCDs but four main diseases are cardiovascular diseases, diabetes, cancers and chronic obstructive pulmonary diseases (2,4). This study will focus on these 4 NCDs.
3. Cardiovascular diseases (CVD): group of disorders of the heart and blood vessels. They include coronary heart disease (or ischemic heart disease), cerebrovascular disease (or stroke), peripheral arterial disease (like hypertension), rheumatic heart disease, congenital heart diseases and deep vein thrombosis and pulmonary embolism (5).
4. Chronic Obstructive Pulmonary Diseases (COPD): a group of chronic diseases of the airways and lung that cause limitations in lung airflow. The most common COPD are emphysema, asthma, chronic bronchitis, occupational lung disease and pulmonary hypertension (6).

## **Abstract**

### **Background**

The DRC has started to face the burden of non-communicable diseases (NCDs), which are now emerging in low-income countries. Of the total deaths in the country, NCDs account for an estimated 23%. The analysis of preparedness and responsiveness of the health system to address this problem is needed in order to identify potential gaps and provide recommendations.

### **Methodology**

A literature review of peer reviewed articles and gray literature on NCDs and health systems in DRC and neighboring countries was conducted. Five interviews with key informants in Ituri province were carried out to have a better understanding of the situation. The WHO health system model was used for analysis.

### **Result**

Findings show that there is low capacity of the health system in DRC to respond to NCDs, especially weak leadership, no NCDs program and no policy. Poor funding, low availability of medicines and human resources is reflected in poor quality of service delivery, which leads to poor outcome. Some countries in the region are making progress compared to DRC.

### **Conclusion**

The study indicates the need for good leadership and governance to be able to develop a multispectral integrated strategy for NCDs prevention and control. Integration of NCDs in primary health care will improve the responsiveness for patients. DRC can learn from examples and interventions put in place in the neighboring countries and improve its response to NCDs.

**Key words:** non-communicable diseases, health system, service delivery, financing, information system, and leadership, access to medicine, human resources, DRC,

**Word count: 13123**

By Upio Nzeni Mike , Democratic Republic of Congo



## Introduction

Non-communicable diseases (NCDs), which represent a major health problem for developed countries, are now emerging and becoming a burden for low-and middle-income countries (LMIC) because of the epidemiologic transition characterized by a shift in communicable diseases and nutritional deficiencies to chronic diseases (7). World wide, about 70% of all deaths are due to NCDs, almost three quarters of them occur in LMIC. Of these deaths, 15 million are premature (30-69 years) and almost 80% of them in LMIC (2). NCDs are projected to become the leading cause of death by 2030. This will impose a significant burden to the continent, which is also projected to see its population double within the next generation (4,8).

Although NCDs are often chronic diseases with slow progression, they may result in more rapid and sudden death<sup>3</sup> (3). There is a long list of NCDs but cardiovascular diseases, diabetes, cancers and chronic obstructive pulmonary diseases are the main NCDs that are responsible for 82% of NCDs deaths. They cause 70% of all deaths worldwide and 80% of premature deaths (2,4).

Before coming to do the master course, I was working as a clinician in a district hospital in the Northeast of the Democratic Republic of Congo (DRC). A couple of years ago, I was also a District officer in the same area. During my time in clinic and supervising activities, I have seen a lot of patients with NCDs in my practice, and the cases are becoming more frequent, especially for the 4 main NCDs. I also realized that we were not sometimes able to deal with these cases. The majority of our interventions in the health district are focused more on infectious diseases and sexual reproductive health; leaving people with NCDs without access to health care.

Considering that NCDs are not only a local or regional problem but also a global health problem, and the fact that management and prevention of NCDs is now on the agenda of the World Health Organization (WHO) and all countries, it is therefore necessary to evaluate interventions of the DRC for their control. In 2011, the General Assembly of the United Nations adopted a resolution with a political declaration on prevention and control of NCDs, signed by all state members. This study aim to analyze the responsiveness of DRC health system to the emerging NCDs, and study will allow to make recommendations to different stakeholders and actors to improve prevention and control NCDs.

The study is divided in to 5 chapters: 1) Back ground; 2) Problem statement, justification, objectives, and methodology; 3) Results; 4) Discussion; 5) Conclusion and recommendations.



## Chapter 1: Background

The DRC is situated in Central Africa surrounded by 9 countries (figure 1) and has near 80 million inhabitants (9). About 57.5% of the populations live in rural areas, but urban population growth is 4% per year. There is an important rural to urban immigration because of political instability and for economic reasons (10). Life expectancy has risen from 48.6 years in 2000 to 58 years in 2015 for men and from 51.5 years to 62 years for women (11,12). The literacy rate is 52% for women and 80 % for men (13).

Figure 1. Map of DRC



RICH CLABAUGH/STAFF

Political instability led the country to a long period of conflicts and wars in the past two decades. This situation has a negative impact on health in general and health system in particular. The country has high maternal mortality rate (693/100000 live births), high infant and under-five mortality rates (75/1000 and 98/1000 live births respectively). There is also low measles immunization coverage (71.6%) (11).

There is weak governance in the country, poor transport infrastructure, and the country is among the poorest in the world with a GDP of 369USD per capita. An estimated 80% of the population lives below the poverty line (14). Despite this poverty, the population is growing fast; the fertility rate, which was 6.3 children per woman in 2007, is now 6.6 (11).

The health system of DRC has 3 levels: The central level which is represented by the ministry of health, the intermediary level constituted of the regional level and the peripheral level with 516 health districts. Each district has one referral hospital and several Health Centers, and is supposed to cover 100000 populations in rural settings, 150000 inhabitants in urban areas. There are 10 public tertiary hospitals in the country, but also some private (15,16).

Service delivery in the DRC has 3 levels of care: primary level formed by health centers where a basic package of services is performed essentially by nurses and community health workers. The secondary level is constituted of general referral hospitals. Hospitals provide the Complementary Package of activities to the population by doctors, nurses, midwives, etc. The tertiary level is constituted of regional hospitals and university hospitals where specialized health services are offered. They are mainly situated in urban areas of the country (17).

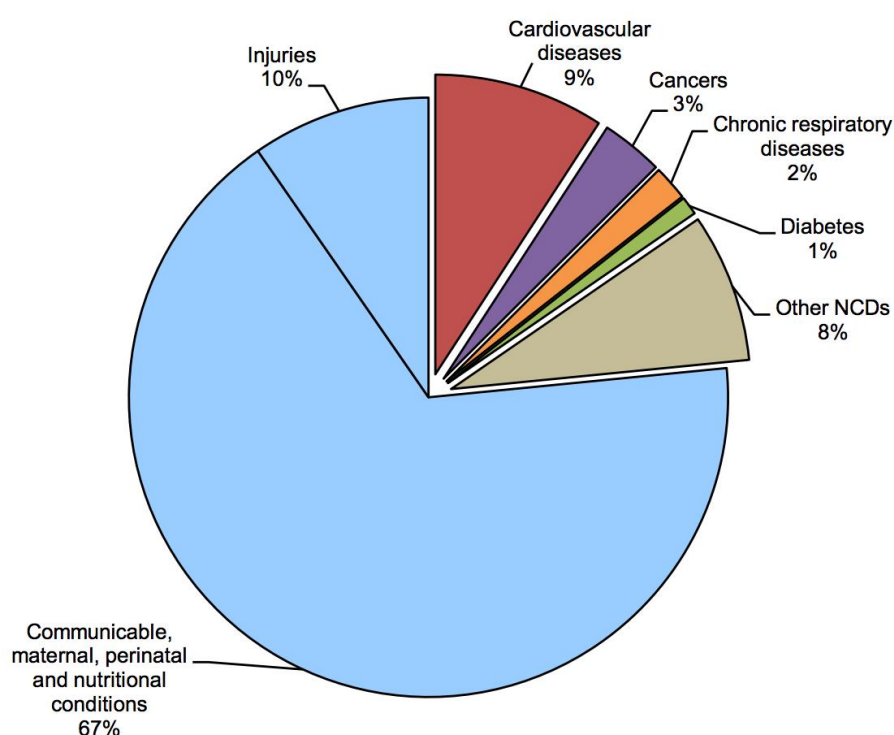
Many other private health facilities complement the public system to offer health services. Private non-profit sector represents 40% of service delivery in the country, and it is owned by faith based organizations and other non-government organizations (NGO). They offer preventive and curative services to the population, especially in rural areas where the public service does not exist. Private non-profit facilities are well regulated and integrated in the national and public system, which is not the case for private for profit. Traditional medicine plays also a role in the health system of the DRC, especially in rural areas as first point of contact, where access to modern medicine is difficult. There is a national program within the ministry of health to regulate this sector (17).

## Chapter 2: Problem statement, justification, objectives and methodology

### 2.1. Problem statement

The DRC has started to face the burden of NCDs. The number of cases and death is continuing to rise over time. Of the total deaths in the country, NCDs are estimated to account for 23% (figure 2). The probability of dying between age 30 and 70 years from the 4 main NCDs is 24% (18).

Figure 2. Proportionate mortality in DRC in 2014 (all ages, both sexes)



Source: WHO, NCD country profile DRC 2014

#### A. Cardiovascular diseases

Cardiovascular diseases (CVD) are the number one cause of death globally; they account for about 17.7 million deaths each year, representing 31% of all deaths. Studies done in Africa have shown that CVD are now the second most common causes of death after infectious diseases, and a major cause of chronic illness and disability. Projections show that between 1990 and 2020, the burden of CVD will double in African countries; the mortality from Coronary artery diseases is expected to increase by 120% in women and 137% in men (19).

As shown in the figure above, CVD represent 9% of all total deaths in DRC and 39% of mortality due to NCDs (20). Buyauli et al found that hypertension is present in 30.9% of adults (21). A similar study showed that hypertension was present in 41.4% in urban areas and 38.1% in rural (22). Hypertension is highly associated with stroke. In a study done in Kinshasa, 62% of stroke cases were due to hypertension, and the mortality was 38% (23).

Rheumatic heart disease is common among children in DRC and these children are not recognized early and treated. The prevalence in Kinshasa is 14.03/1000 school children; more in slum schools 22.2/1000 than in urban schools 4/1000. Those children are prone to develop major heart complications if they are not treated early (24).

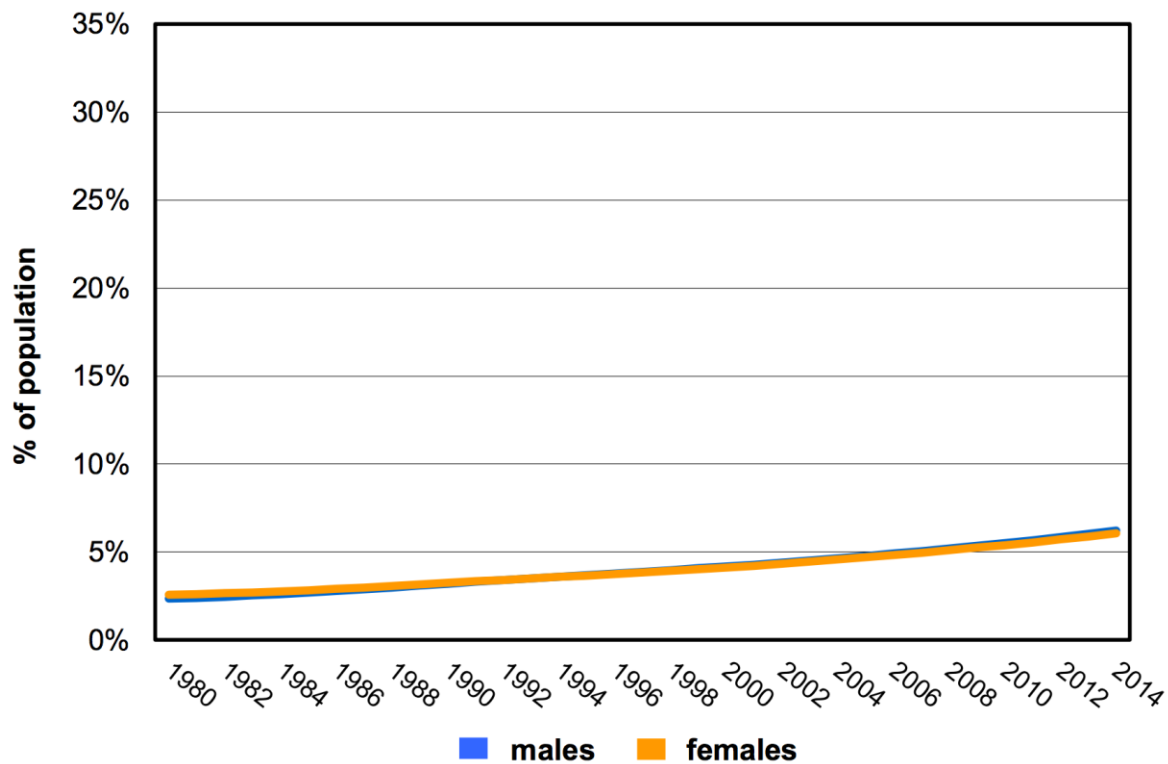
The mortality rate for ischemic heart disease (IHD) in DRC is 166/100000 for male, 132/100000 for female. Although IHD in DRC is relatively unknown, its prevalence and mortality is rising due to hypertension, diabetes, obesity, physical inactivity, increased tobacco and dyslipidemia (25). According to a study done at the University hospital in Kinshasa, 32.5% of all cardiovascular emergencies at the intensive care unit was due to stroke, followed by acute pulmonary edema and pulmonary embolism; the in-hospital mortality was 38.3%. Hypertension represented the principal risk factor for these emergencies (40.18%) and diabetes 11.21% (26).

## **B. Diabetes**

Diabetes represents about 4% of all deaths due to NCDs worldwide, and is projected to be the 7<sup>th</sup> leading cause of death in 2030 (4,27,28). In 2015, an estimated of 1.6 million deaths worldwide were directly caused by diabetes. The number of people with diabetes has risen from 108 millions in 1980 to 422 millions in 2014, and the global prevalence has risen from 4.7% in 1980 to 8.5% in 2014. The prevalence is also rapidly increasing in LMIC (29).

As shown in figure 3, the prevalence of diabetes in DRC is increasing over time. In 2015, there were approximately 1.7 million cases of diabetes. The prevalence of diabetes in adults aged 20 to 79 years is 5.3%. The prevalence increases with age and reaches 10% from 45 years(18). In 2015, the number of deaths due to diabetes in adults was about 32,417. Diabetes represents 1% of the total mortality in DRC (figure 2), but is responsible of many complications including blindness, amputations and metabolic problems (20,30,31).

Figure 3. Trends in age-standardized prevalence of diabetes in DRC



Source: WHO, Diabetes country profile DRC 2016

### C. Cancer

Cancers are the second after CVD in terms of burden of NCDs world wide; they represent 27% of all deaths attributable to NCDs (4). Due to ageing and growth of the population worldwide, it is expected that the burden of cancer is going to be higher, particularly for developing countries where about 82% of the population live (32). According to WHO, the main cancers in the DRC are respectively prostate cancer, liver cancer, stomach cancer and colorectal cancer for men; cervix cancer, breast cancer, liver cancer and colorectal cancer for women. The trend for all these cancers is increasing over the years (33).

Cervical cancer is the leading cancer in incidence and mortality in women; there were 6024 new cases diagnosed in 2012, and 27.8% of cancer deaths were due to cervical cancer (33). The incidence rate of breast cancer is 23.5/100 000 and a mortality rate of 14.2/100 000 (32). The incidence of lung cancer per 100 000 population is 2 in men and 0.8 in women in Central Africa where DRC is located. Mortality due to lung cancer was 1.8/100 000 in men and 0.5/100 000 in women (34). In 2012, there were 2215 new cases of lung cancer in men and 1444 in women. Liver cancer represented 14.9% of all deaths due to cancer in men and 8.1% in women (33).

## **D. Chronic obstructive respiratory diseases (COPD)**

COPD are responsible for 2% of mortality in the DRC (18). In 2008, mortality rate due to chronic respiratory diseases per 100 000 population was 127 for men and 74 for women (35). The mortality for asthma was 16.5/100 000 for men and 13.3/100 000 for women. For emphysema, the mortality rate was 80.1/100 000 for men and 4.4/100 000 for women. The trend for these diseases also is increasing (36).

## **E. Main risk factors**

In 2011, tobacco-smoking rate was 10% (16% for male and 5% for female). Alcohol consumption among adults aged 15 years and more is 3.6%. (5.8% for male and 1.5% for female). The prevalence of raised blood pressure among adults aged 18 years and more is 31.6% for male, 27.4% for female (33). Raised fasting blood glucose prevalence was 6.1% among adults aged 18 years and more. Prevalence of raised total cholesterol among adults aged 25 years and more was 17.6%. Insufficient physical activity among adults aged 18 years was 26%, and obesity was 6% for males, 7.1% for females (33).

Based on the facts above on the emerging NCDs in the DRC and its consequences on the health of the population and the whole country, the main question to be answered by this study is at which extent is the DRC health system ready to deal with the increasing morbidity and mortality of the main four communicable diseases? Is the health system in DRC sufficiently prepared to produce expected outcomes regarding NCDs? Which lessons learned from neighboring countries can be applied to the DRC context to improve NCDs control?

## **2.2. Justification**

The burden of NCDs is growing in Sub-Saharan Africa in general and in DRC particularly. A rationale for public health intervention is needed both for prevention and treatment with integrated approach. For many years, efforts have been put to control communicable diseases such as malaria, TB and HIV. NCDs face constraints across all main components of health systems. Problems faced by these diseases include the reliance on external financing; insufficient facilities and infrastructures across all service delivery, poor laboratory and diagnostic systems; shortage and imbalanced distribution of trained health workers, a weak information system (8).



Controlling NCDs is a key public health issue in Africa, and an effective response is difficult in many countries facing double or triple burden of disease, with low national income level and weak health systems. These efforts have to be supported by national governments, public and private employers and businesses, civil society and international community (8).

Intervention for NCDs prevention and control include reducing population level of risk, reducing individual susceptibility to NCDs and managing NCDs in the community. Management of NCDs includes detection, screening and treatment as well as palliative care. These interventions are essential to achieve the global target of a 25% relative reduction of premature mortality from NCDs (37). A comprehensive, integrated approach to NCDs can be summarized in 7 points: policy approach, population-level prevention, clinical services for individual-level prevention, therapy-treatment, care and palliative care; addressing information and research gaps; and cooperation between public, private sector (8,38).

In 2011, the United Nations (UN) adopted a resolution on prevention and control of NCDs, signed by all state members. An Inter-Agency Task force was put in place to monitor the progress and implementation of the measures (39). Under point 45 of the Political Declaration of the High-Level Meeting, countries have decided to strengthen their national policies and health systems to respond to the NCDs (39). Therefore, the analysis of the health system in relation to the prevention and control of NCDs will give insight on what exists right now or what has already been put in place, and what is planned for the management and control of these diseases. Based on this analysis, comparison will be made with the expected strategies in order to identify potential gaps to be addressed and make recommendations for improvement.

### **2.3. Objectives of the study**

The overall objective of the study is to analyze preparedness and the responsiveness of the health system of the DRC to address the emerging NCDs in the country in order to make recommendations for prevention and control.

Specific objectives are:

1. To analyze the response to NCDs of the health system in the Democratic Republic of Congo, differentiated by health system building blocks;
2. To explore the response to NCDs in neighboring countries, identifying potential lessons that could be useful for DRC;

3. To make recommendation to policy makers and health service providers on NCDs prevention and control.

## **2.4. Methodology**

The analysis of preparedness and the responsiveness of the health system of the DRC to address the emerging NCDs is based on a literature review of peer reviewed articles and gray literature. To capture actual service delivery at clinic level, few interviews with providers was undertaken to supplement findings in the literature.

### **2.4.1. Methods of search**

Methods used per objective were as follows:

#### *Objective 1*

Three methods were combined.

A literature review of published scientific articles on the topic of NCDs in the DRC. Articles were searched on PubMed database (using MeSH terms) and VU library. Key words were combined using Boolean operators (AND, OR or NOT) to generate articles (table 1).

A review of gray literature was conducted to access documents relevant for the study (reports, textbooks, conference papers, policies, strategies, plans, laws etc.). Google, Google scholar and different websites (mainly WHO, Ministry of health) were explored. The full list of websites is in the annex 5.

Realizing that many things are not written up for day-to-day practice, a limited set of key informants were consulted to get an exploratory view through interviews on what happens in day-to-day practice. Semi-structured questionnaire was used (annex1). For this reality check, I only concentrated on one particular region, i.e. Ituri in the Northeast to get a deep understanding of the problem. The respondents were one District Medical Officer (DMO) and four directors of hospitals: one public, two faith based (catholic and protestant) and one private for-profit, to have perspectives from different types of providers.

Interviews were held on Skype and Whatsapp, in French for approximately 35 minutes each. The purpose of the study was explained to interviewees, after which they all gave verbal consent. Participants were told that the researcher will try to

maintain confidentiality, in that their names and institutions would be omitted from the thesis. Care was also taken that the interview would not interfere with their work.

### *Objective 2*

To explore the response for NCDs in the neighboring countries, literature review was used, focused on articles published in Uganda, Tanzania, Rwanda, Burundi, Zambia, Angola and Republic of Congo. PubMed, VU library and the same combination strategy of key words were used to generate articles. Similarly, Google, Google scholar and different websites were explored to find other documents.

#### **2.4.2. Inclusion criteria**

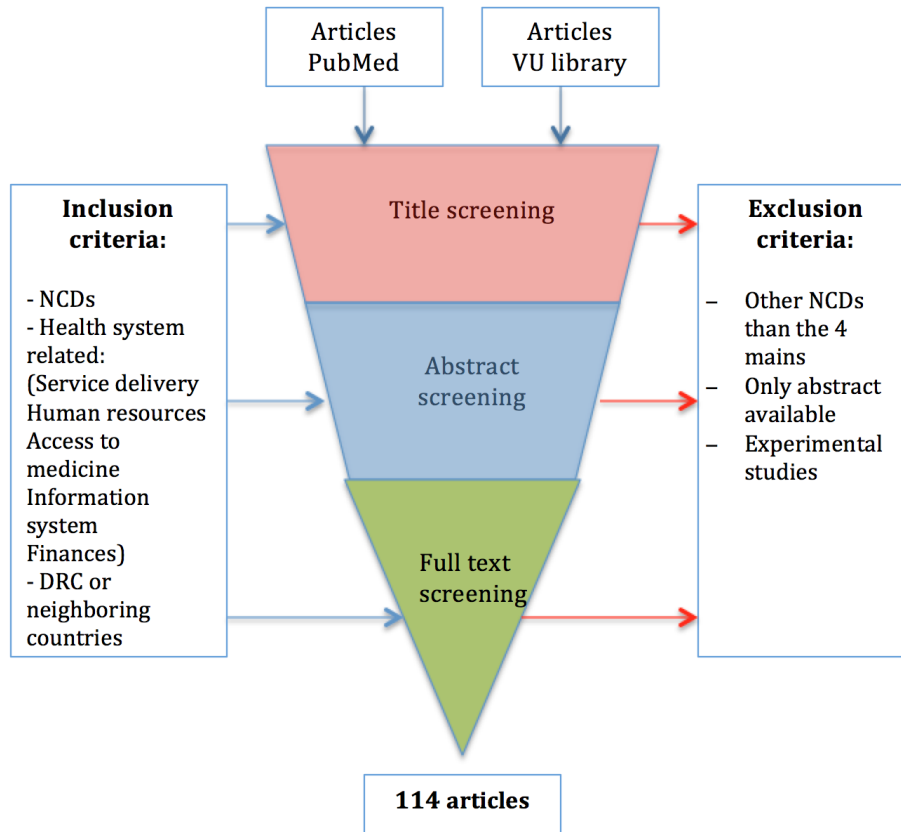
Articles included in the study were all articles done on the field on NCDs in DRC and neighboring countries. All studies done on the health system components were also included in the search. Only articles written in English and French within the last 10 years were included because NCDs have mostly been on agenda in the last 10 years. Articles with only abstract available were excluded. Same criteria were used for documents and websites searches except the time limit was not applied as some documents like policies and law might still be relevant.

The choice of neighboring countries is to some extent arbitrary. However, as they are in the same region as DRC and face almost the same realities in terms of socio-economic status, they might allow a good comparison and help to make recommendations.

#### **2.4.3. Selection process**

As shown on figure 4, there were 3 levels of articles screening from Pubmed and VU library: title screening, abstract screening and full text screening. From the articles selected at the end of the process, information were extracted and included for analysis. In the each step, inclusion and exclusion were applied.

Figure 4. Flow chart of the selection criteria



#### 2.4.4. Conceptual Framework

WHO health system framework (figure 5) was used and the six building blocks were analyzed in relation to the four NCDs. This framework also allows a definition of desirable attributes and what a health system should have to do; identifies priorities and provides a means of identifying gaps (40).

Figure 5. The WHO Health System framework

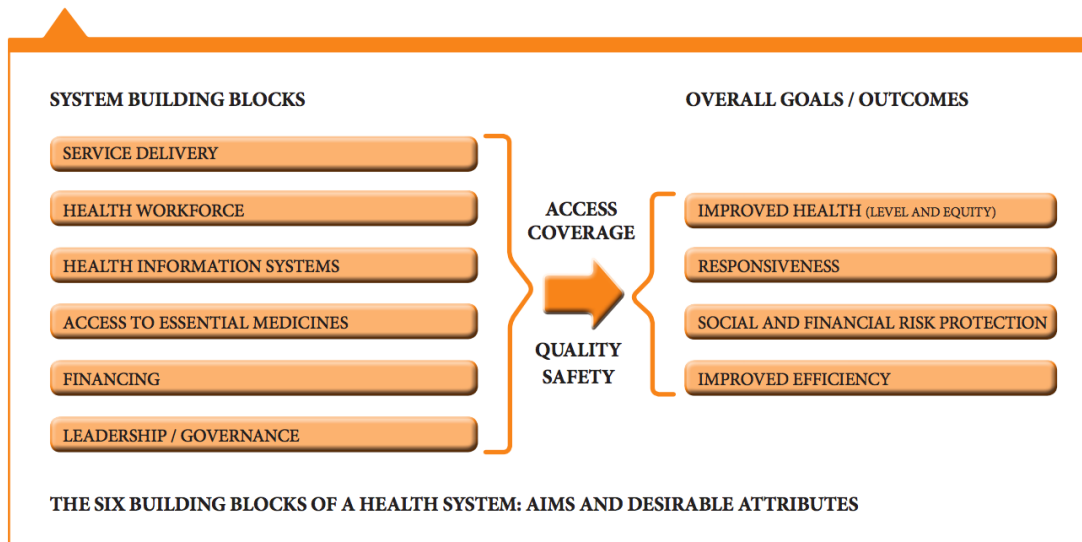


Table 1. Table of key words and search strategy

Conditions or diseases	AND/OR	Risk factors	AND	Health system	Or	Intervention	AND	Country
<ul style="list-style-type: none"> <li>• Non-communicable diseases</li> <li>• Cancer</li> <li>• Breast cancer</li> <li>• Lung cancer</li> <li>• Cervical cancer</li> <li>• Prostate cancer</li> <li>• Liver cancer</li> <li>• Gastric cancer</li> <li>• Colon cancer</li> <li>• Cardiovascular diseases</li> <li>• Hypertension</li> <li>• Stroke</li> <li>• Ischemic heart disease</li> <li>• Diabetes</li> <li>• Chronic respiratory diseases</li> <li>• COPD</li> <li>• Asthma</li> </ul>		<ul style="list-style-type: none"> <li>Smoking</li> <li>Tobacco use</li> <li>Alcohol use</li> <li>HPV infection</li> <li>Obesity</li> <li>Overweight</li> <li>Physical inactivity</li> </ul>		<ul style="list-style-type: none"> <li>• Service delivery</li> <li>• Financing</li> <li>• Cost of care</li> <li>• Medicine</li> <li>• Pharmaceutical products</li> <li>• Human resources</li> <li>• Physicians</li> <li>• Nurses</li> <li>• Information system</li> <li>• Leadership</li> <li>• Governance</li> <li>• Access to medicine</li> </ul>		<ul style="list-style-type: none"> <li>• Diagnostic</li> <li>• Treatment</li> <li>• Prevention</li> <li>• Radiotherapy</li> <li>• Management</li> <li>• Chemotherapy</li> <li>• Screening</li> <li>• Testing</li> <li>• Vaccination</li> <li>• Visual inspection with acetic acid</li> <li>• Laws</li> <li>• Regulations</li> <li>• Policy</li> <li>• Plan</li> </ul>		<ul style="list-style-type: none"> <li>• Democratic Republic of Congo</li> <li>• Rwanda</li> <li>• Uganda</li> <li>• Burundi</li> <li>• Tanzania</li> <li>• Zambia</li> <li>• Angola</li> <li>• Congo</li> <li>• Sub-Saharan Africa</li> </ul>

## Chapter 3: Results and Findings

This chapter presents the findings from the literature review, desk reviews and interviews.

In order to get information and data for our findings, 114 articles were used (DRC 36, Tanzania 17, Zambia 14, Uganda 12, Rwanda 11, Angola 8, Burundi 6, Congo 5 and 5 for some countries combined) (see annex 4). Most of the articles (70.18%) were diseases oriented; only few were health system oriented. On the 80 disease oriented articles, 34 were on hypertension and diabetes, 27 on cancer (12 cervical and 8 breast), only 4 on COPD. For health system articles, 6 articles were for leadership, 7 on HIS, 7 on HR, 6 on access to medicine and 6 on financing. Most of the studies in DRC were done in urban areas.

Twenty-two websites were consulted and 69 documents found. The list of these websites and documents are in the annexes 2 and 3.

### 3.1. Findings from DRC

In this section, findings from the literature and interviews are incorporated and presented for analysis by building block.

#### 3.1.1. Service delivery

- *Cancer*

Many studies have found that the knowledge, attitude and practice on cancer were low in DRC. Catherine Ali Risasi et al. found that 81.9% of women have heard about cervical cancer; only 16.8% have ever heard of screening, and only 8.6% had already had a Pap smear test (41). Due to lack of knowledge and awareness on cancer, 81% of women present with a late-stage breast cancer (42).

There is lack of medical infrastructure for cancer treatment; samples for pathology have to be fixed and sent to other countries (43,44). The percentage of patients in with confirmed diagnosis by pathology is only 10.5% (45). Where chemotherapy is available, it is generally prescribed and administered by non-oncology trained health workers (46). Due to poor access to health care, patients with cancer use traditional

medicine for treatment (47). A study found that 11.4% of women with cervical cancer used herbs for vaginal care to treat cervical cancer (48).

According to the DMO interviewed, there is no prevention or awareness activities on cancer in the community. Only one faith based hospital declared to have a visualization technique of cervix with acetic acid as the facility has a gynecologist, but this is done only for clinical reasons and not for screening.

- *Diabetes*

For the large majority of the population, education on diabetes is not available (49). A study done in the East found that knowledge of the general population about hypertension and diabetes was low (50). Various studies also have shown that most of the diabetic patients don't know their status. In a study in Kinshasa, only 27% of patients knew their status (51). Another study in Bunia found that 54% of patients with both hypertension and diabetes did not know that they had diabetes (52).

An assessment of diabetes care in Kinshasa found that delivery of health care services was poor due to limited skills of health care providers on following guidelines, and little knowledge on the therapeutic goals (53). It was reported in 2010 that one-sixth of people with diabetes needing insulin die within 5 years of diagnosis (54).

It is estimated that 48.8% of diabetes patients in DRC are uncontrolled, and resulting in long-term complications (55). A study found that only 22.2% of patients reached the target of HbA1C, and 13.9% developed foot lesions (56). In Lubumbashi, 13% of diabetic patients developed diabetic retinopathy and 0,27% blindness (30). Another study found that 48% of hospitalized diabetic patients developed complications, the main reasons being non-proper therapeutic regiment, non-observance of treatment and little knowledge about the disease and its complications (31). The majority of diabetic patients rely on traditional medicine for their health care needs because conventional drugs are often unaffordable (57,58).

According to the DMO, guidelines for treatment of diseases in health centers are not detailed. Glucose test is not available in most of the health centers. In hospitals all directors confirmed that glucose test is available, but not the HbA1c. Special clinics are also not organized for chronic patients.

- *Cardiovascular diseases*

The package of activities in the primary health care does not contain a section on prevention of CVD, except for screening for hypertension and diabetes (59). In the East of the country it was found that only 57% of hypertensive patients were aware of the condition (22). Another study in the central part of the country revealed that 29.4% of patients with hypertension did not know of their status (60).

A study done in Kinshasa found that only 50% of facilities were in possession of guidelines for the treatment of hypertension. No guidelines were found for the management of other CVD. Knowledge of nurses on CDV was limited: 57.8% were able to mention at least one CVD, only 49% of nurses were able to mention the cut-off value for hypertension, 3.9% knew the cut-off for diabetes. The most used antihypertensive drugs were Aldomet, Furosemide and Esidrex (61).

There is poor blood pressure control at the primary care level (62). The referral health care facilities register more patients with hypertension-related complications including stroke and kidney diseases (60,63). A study done in Kinshasa has found that 94.2% of hypertensive patients with stroke were not taking their hypertensive medication before the onset of the stroke (64).

There is a high rate of non-adherence to the treatment for hypertensive patients in DRC according to different studies. The prevalence of non-adherence to antihypertensive and blood pressure control are 54.2% and 15.6% respectively (62). In another study in Bandundu, lack of support from family members, long waiting time for receiving medication, poor knowledge of medication and the disease were the reasons for non-compliance to the medication (65). In South-Kivu province, only 30.5% of hypertensive patients were treated, with control achieved for 13.6% (22). Due to dissatisfaction about the conventional health system, 26% of patients use alternative medicine (42.5% herbal and 35.6% prayer). Ineffectiveness, long waiting times, high cost of conventional treatment, misinterpretation that hypertension is curable were the main reasons (66).

Interview with directors of hospital confirmed the lack of equipment for CVD. Electrocardiogram was present only in one mission hospital. Aldomet and furosemide were the most available medicine for hypertension. Captopril was available only in 2 hospitals. All interviewees confirmed that there were no



cardiologists in the region. Patients are referred to Uganda for specialized care, but this is not possible for the poor.

A doctor said *“I have lost a 17 year old girl who came with mitral stenosis, which needed surgery. They could not afford to travel and be treated in Uganda, so she died. This was a very sad situation that shows how our health system cannot help people”*.

- COPD

Search in prevention of COPD in DRC did not find many articles. There is a lack of infrastructure and equipment to diagnose and treat patients with COPD in DRC (67). A study done in Kinshasa has found that only 7% of asthmatic patients were taking their medication everyday; 51% had not taken any medication for over a year (68). The guideline for treatments in the health centers contains the diagnostic of COPD but does not give a clear indication of the education for the patients. The treatment consists of administration of antibiotics and no health education is given to the patient (69).

All 4 doctors confirmed that salbutamol for asthma treatment was available in their facilities in tablet. The spray was only available in the private hospital.

The analysis from the findings on service delivery show that the level of knowledge of the population and patients on NCDs is low, and there is lack of screening for NCDs. These findings show poor awareness and prevention measures for NCDs in the country. It is known that NCD prevention is one of the key components of a comprehensive integrated approach for NCD control. It includes raising awareness, detection and screening to reduce the level of risk and susceptibility of people to NCDs (2,70,71,72,73).

Low skill of health personnel, lack of guidelines in health facilities, lack of infrastructure, equipment and medicine show poor capacity and quality of facilities to deliver effective care for NCDs, which will be a consequence of the outcome of patients and explain a high rate of complications, low rate of blood pressure and diabetes control, and contribute to the increased mortality due to NCDs. The role of clinical medicine for NCDs is to improve detection, treatment and prevention of complications (74). These are not the case for DRC. Aldomet and furosemide are the most used antihypertensive drugs while they are not recommended as first line for hypertension (75). In the guideline of asthma treatment, antibiotics are given as first line for treatment while they are only restricted for some severe cases of asthma (76). This shows a poor prescription practice for NCDs in health facilities.

### 3.1.2. Health workforce

- *Production*

Education sector for health in the DRC is characterized by an unregulated production of human resources (HR). Between 1998 and 2009, the number of schools for training of nurses and other health professionals increased from 255 to 470; the number of colleges for training of nurses has increased from 53 to 108 and the number of medical schools from 3 to 39 (77,78). Only 14% of secondary schools and 48% of nursing colleges and medical schools meet the accreditation criteria to function (79).

The training of human resources for health is not linked to deployment in the country. Only Faith based organizations train and produce HR for health according to their needs (77). Training program has not been revised since 1967 (80).

From the interview, two hospitals declared that nurses and doctors have been trained by the diabetes program to take care of the disease, but the program never proceeded to follow up and never sent equipment and medicine as promised.

- *Recruitment and deployment*

The absence of planning and monitoring system in the teaching institutions, and lack of link between training and health needs makes the recruitment of health professionals difficult (80). There is mal-distribution of HR, most qualified health workers being concentrated in urban areas. According to WHO, 68% of physicians are concentrated in urban areas while 64% nurses are in rural areas (81). Lack of financial and non-financial incentives in rural areas, less career opportunities and poor living and working conditions prevent qualified health workers from serving in rural areas (80,82).

- *Retention*

There is no reliable source about the number of health workers in DRC. Data on HR for NCDs were not found except for cancer with 15 pathologists, 21 histopathology technicians, 4 cytopathology technicians, and 4 oncologists (83). There is a chronic understaffing of rural and primary health facilities (83). The ratio per 10000 habitants is 1 for physicians and 10 for nurses. Between 2010 and 2013, the Medical Association reported that 470 doctors have migrated abroad. Poor payment and poor living and working conditions are the main reason for migration of qualified health workers, especially specialists (80). According to a study, only 32% of nurses receive a salary from the government (84).

Findings from the HR show that there is poor quality of teaching and therefore poor human resources for health in the country. There is lack of human resources and an uneven deployment and distribution across the country, especially between rural and urban areas. A responsive health system should have a mix of available, competent, responsive and productive health force, which is equitably distributed to help achieve the best health outcome in regard to NCDs. The ability to meet the health goal depends largely on the knowledge, skills and motivation of HR (85). All these essential components are poor in DRC. There is shortage of HR to deliver an effective care for NCDs in the country. Studies have shown a link between the number of HR for health and population health outcome (86,87). Including teaching and training modules on NCDs into medical curriculum is necessary for prevention and control (88). But in DRC, it is shown that the medical program has not changed since 1967. These findings show that HR are not prepared to deliver effective a quality health care to cover the entire population.

### **3.1.3. Health information system (HIS)**

Hospitals, health centers and community health workers collect data manually, transcribe on a form and transmit monthly to the health district office (17).

NCDs data on the form for health centers are only new cases and deaths of diabetes and hypertension. There is no categorization according to sex and age. None of the medicine for NCDs is reported on the list of medicine to be monitored and reported in the monthly information system.

The form for hospitals contains information on new cases and deaths of diabetes, hypertension, stroke, infarction and cancers. The other CVD are not specified, except number of deaths due to heart failure. There is no information on COPD, except number of deaths due to asthma. There is information on number of people counseled and treated to prevent heart attack and stroke, number of hypertensive and diabetic patients treated, number of cancer cases confirmed and treated by chemotherapy and morphine. On the list of medicines available to be reported monthly, only aspirin, adrenaline, hydralazine, atropine, insulin and morphine are directly linked to NCDs.

From the interview, all medical doctors declared that they collect data manually and transmit to the district office. None of them has received feedback in the past 6 months. The DMO said that they compile these data and convert that to an electronic version to be sent to the higher level.

A good HIS is the one that allow quality, relevant and timely data generation, compilation, analysis, synthesis and communication to support health-related decision-making (40,89). In DRC, there is poor generation of data from health facilities, there is a poor capacity to analyze and use the information, and there is also no feedback and no availability of data for good communication. In addition, health facility data are the only source of health information, which will not give an over all picture of the situation of NCDs. A good HIS has to collect data from individual level, population level and public health surveillance to provide improved evidence for LMIC (85,90,91).

### **3.1.4. Access to essential medicines**

The national pharmaceutical policy was elaborated in 1987 and revised in 2008 (92). The National List of Essential Medicine (NLEM) was also elaborated in 1987 and revised the last time in 2010, and contains a list of drugs for the main NCDs, but these medicines are not always available in the health facilities (15,92,93,94).

The circulation of low quality medicine, especially counterfeit drugs, characterizes the pharmaceutical sector in DRC. This is due to poor quality insurance system, and non-effective implementation of laws and regulations on medicines (95).

There is poor availability of medicine in health facilities. On 35-selected medicines, the availability of medicine was 55.6% in public, 65.4% in private for profit and 48.5% in church facilities. Among these 35 medicines monitored, 8 were for NCDs, except cancer (96). In another study, the availability of nifedipine (for hypertension) was 13% in public facilities, 9.1% in church facilities. Atenolol was available at 2.8% in public sector and 9.6% in private. Metformin (for diabetes) was present in 2.9% of public facilities, 7.7% in private. According to the World Diabetes Federation, insulin is less than 25% of the time accessible in DRC (97).

The use of traditional medicine is important in the DRC. Traditional healers target mainly diseases and conditions that are not been treated effectively in the modern medicine like diabetes, hypertension, cancer, sexual disorders, and psychiatric disorders (95).

*A doctor said "medicine and salary are the major challenges in our hospital. Most of the time we run out of medicine and have to sent patients with prescriptions to buy medicine outside..."*

A well functioning health system ensures equitable access to essential medical products and technologies of assured quality, safety, efficacy and cost effectiveness (40). In the DRC, the findings show that all these qualities are not ensured, there is no availability of medicine for NCDs, there is poor quality and safety because of low control system, and patients with NCDs cannot access medicines for NCDs. In addition, there is a need of national policies or regulations, a good procurement supply, storage and distribution system; and a support for rational use and to ensure adherence through guidelines (85).

### **3.1.5. Financing**

In 2014, DRC spent 1,462,093,561 USD on health representing 7.8% of the GDP. Forty-two percent of the funds came from households (out-of-pocket payment) and 40% from external sources. Of this fund, only 3% were allocated to NCDs while 60% were spent on infectious diseases, 13% on reproductive health and 4% on nutritional deficiencies (98). There is low public health budget in the country, and no national health insurance system (99). Poor funding for NCDs was also confirmed by the UN agencies joint mission in 2015 (100). According to Rajan, the minimum operating budget necessary to run a health district in the DRC was 17.91\$/inhabitant/year, which is 3 times more than what is currently allocated (101). Lack of financial support makes effective diagnosis and therapy impossible in DRC (55).

Congolese health districts are funded by a wide variety of donors, leading to varying services and utilization rates across districts (101). To improve access to health care and equity of care, funders are helping to subsidize some local health care providers through performance-based financing (102).

According to MSF, 30-60% of people requiring health care were prevented due to financial barrier (103). In 2008, 50-70% of diabetic patients were not able to obtain insulin because its cost was excessive. Households with diabetic patients spent 59% of their income on treatment (104).

All the interviewees confirmed that patients have to pay user fees to get service in the hospital, even in the public facility. In health centers, people pay an equivalent of 0.5\$ for consultation. In the hospital, the fees vary from 3\$ to 5\$. The price of a blood glucose test varies from 3 to 5\$. A bottle of 100 units of insulin costs between 6 and 8\$. A doctor said *“in the region, diabetes is called “diable-bête”, meaning “devil beast” because once you have, it leads to death because of the cost of treatment”*.

A good health system raises sufficient funds to ensure that people can use health services needed regardless their ability to pay, and protect them from catastrophic expenditure (40). Without enough necessary funds, there would be no health worker, no medicine, no equipment and no health promotion or prevention measures to control NCDs (85). Findings from DRC show that there is not enough funds raised and allocated for health, the majority of people have to pay out-of-pocket to have access to health services, but the poor cannot access services because of lack of money. In addition, there is no health insurance in the country to protect people financially when they need health care. According to WHO, without health insurance coverage, countries are unlikely to provide universal access to essential NCDs interventions (2).

### **3.1.6. Leadership and governance**

- *Strategic policy and framework*

In the ministry of health, there are 52 Programs that are designed to address different health problems. Four are designated to fight the main NCDs (105). There is also a national program for the control of drug use and the use of other toxic substances. There is no specific program that deals with NCDs in general (106). There is no policy or strategic plan for NCDs (20). The strategic plan for health development 2016-2020 has 2 targets for NCDs: to reduce by one third premature deaths due to NCDs and the reinforcement of prevention of substance abuse, especially tobacco and alcohol (17).

- *Laws and regulations*

The DRC has launched some decrees on taxation, marketing, advertising and use of tobacco and alcohol in the Country. The legal minimum age for sale and consumption of alcoholic beverages and tobacco is 18 years (107). Despite these laws, still 11.5% boys and 3.7% girls under legal age smoke cigarettes in DRC (108)(109). Public places with smoke-free legislation are health facilities, educational facilities, universities, and public transport. There is no legislation in government places, indoor offices, workplaces, restaurants, café and bars. Even for the smoke-free spaces, the compliance is low (90% for health facilities, 20% in schools, 0% in universities and 10% in public transport (110). According to the study done by Tumwine on implementation of the framework convention on tobacco control, DRC is among the countries where modest progress has been achieved (111).

The country has a law on taxation of alcoholic beverages and tobacco products. For alcoholic beverages, according to the alcohol content, taxation varies from 18% to 30% of the retail price (112). There is law on taxation for cigarettes (47.76% of retail price) but no specific taxation on smoked tobacco other than cigarette or smokeless tobacco (110).

- *Coalition building*

The International Diabetes federation has indicated that the government is not taking action to engage the local members and NGOs in policy making, and has not enacted laws or charters to protect the right of people with diabetes (113).

A strong leadership by head of states and governments is needed to meet the national commitment to the UN political declaration on NCDs (114). It is important to have comprehensive and inclusive health policies, strategies and plans, good legislative framework in the health sector to achieve universal health coverage (115). In DRC, the absence of NCDs department and policy demonstrated lack of good leadership and governance in the MoH. To have an effective prevention and control of NCDs, an integrated care strategy, which combines all the 4 NCDs together is needed (116). In DRC, there is no integration of the 4 NCDs; the MoH has different programs for each of them separately.

Legal and regulatory reforms and interventions lie at the heart of a successful national response to NCDs. They play a major role in the control of risk factors (117). In DRC findings show that law and regulations are not complete, and are not implemented successfully.

The collaboration with other sectors, including civil society, academia and private sector is important to enhance the NCDs prevention and control (2)(118). In DRC, findings show that there is no collaboration and coalition on NCDs.

### **3.2. Findings from neighboring countries**

Many studies in the neighboring countries have found similar problems and challenges like in DRC regarding NCDs prevention and control. This chapter presents the problems and challenges faces by these countries and also the best practices in some countries that can be used for improvement.

### 3.2.1. Service delivery

In most of the countries findings have shown that there is poor prevention and awareness for NCDs.

In Uganda, 80% of women with cervical cancer come at the late stage of the disease (119), the same in Rwanda (120). In Tanzania, only 35.6% of patients were aware of their diabetes status (121), 22.6% of women had obtained cervical cancer screening (122). Only 5.8% of patients with breast cancer come at the early stage for treatment (123). Approximately 54% of patients with hypertension in the north reported that they have ever been told that they had hypertension or diabetes (124).

In Burundi, cytology is not available, visual inspection using acetic acid is not implemented nationwide, and palpation of breast as routine for detection of breast cancer is not done (125).

In Zambia, knowledge of the population about COPD, especially asthma is poor, and there is misconception about it (126). Oelke found that 56% of participants had ever had their blood pressure checked by a health professional (127).

In Angola, only 21.6% of hypertensive patients were aware of their status (128), only 47.1% of women had heard about self-examination of breast (129). Knowledge on breast cancer was insufficient among university students (130). About 77.8% of women present to the health facility at the late stage of the disease (131).

In Congo Brazzaville, only 39.4% of patients had their blood pressure taken for screening in Brazzaville (132). Patients with cancer arrive very late at the health facility; health facilities being responsible for 40.8% (25.5% doctors) and patients for 24.4% (133).

In regard to treatment, there is also poor capacity of health services in most of countries to treat NCDs. There is lack of equipment and infrastructure for NCDs treatment.

In Uganda, equipment and services for cancer was inadequate in primary and secondary facilities (134). There is only one government laboratory for pathology to and colposcopy examinations (119).

In Rwanda, there is lack of radiotherapy, patients have to be sent to Uganda (135).

In Tanzania, basic diagnostic equipment for hypertension was observed in 63 to 75% of health facilities. The overall diagnostic equipment was available in 70.8% of facilities (136).

In Burundi, there is no specialized center for treatment of cancer (137). Radiotherapy is not available in the country (138).



Zambia has only one referral hospital that treat people with cancer. It is the only one center that offers radiotherapy (139).

Most of health facilities don't have guidelines or standard for NCDs. In Uganda, Katende et al have found that many health facilities lacked guidelines (140). In Tanzania, only 13% of health facilities had guidelines for diabetes and hypertension (136). In Zambia, standard treatment guideline for NCDs are available in most of the facilities, but only few health workers had received specialty training in management of these diseases (141).

There is low level of knowledge of health professionals on NCDs and their risk factors. In Uganda, 72% health workers demonstrated fair knowledge of hypertension management, and 52% for diabetes (140). In Tanzania, 59% of health workers showed a fair knowledge for hypertension and 56% for diabetes (136). Only half of nurses had adequate knowledge regarding cervical cancer (142). In Burundi, only 22% of health workers had good practice of testing the vision in a year for diabetic patients (143).

There is poor outcome and low effectiveness of treatment for NCDs.

In Uganda, a study showed that only 23% of hypertensive patients were receiving adequate treatment (144).

In Tanzania, none of the district hospitals offer complex care like chemotherapy or radiotherapy, and palliative care is offered almost exclusively by one hospital in the north (145). Hypertensive patients prefer self-medication because public health facilities were said to often run short of drugs, to have long waiting times and sometimes to be unfriendly places because of the negative attitudes of health professionals (124). Only 68% of children with type I diabetes had good adherence to insulin, 48% for blood glucose control (146); 36% of children with diabetes reported missing more than 6 doses of insulin a month (147). A study found that 15.2% of patients with chronic diseases use traditional healers (148).

In Burundi, about 62.8% of diabetes are discovered at the stage of complications (149). In Zambia, only 10% of hypertensive patients who were on treatment had their blood pressure controlled (150). Only 38% of diabetic patients had a good glycemic control, 73.7% were not following treatment (151). Another study has found that 61.3% of diabetic patients had a poor glycemic control status (152).

In Angola, less than 10% of cancer patients had access to radiotherapy (131). The costs of cancer treatment being high, patients do not start treatment or do not adhere

to it after starting (153). In Congo Brazzaville, Ikama et al have found that only 34.7% of hypertensive patients had their blood pressure under control (154).

Some countries have made good progress in prevention and treatment of NCDs in the region.

Uganda is among the few countries to introduce HPV vaccine at national level (119,155). Cervical cancer screening guidelines are based on a “see and treat” algorithm (156). There has been an effort of integrating communicable diseases (HIV) and NCDs screening campaign. The pilot study had a good success by diagnosing about 65% of new hypertensive patients and 23% of new diabetic patients (157). Studies have been done to support this integrations and to learn from HIV success in LMIC (158). There is a better knowledge on cancer compared to DRC; a study found that 88.2% of women had heard about cervical cancer, 62.4% knew at least one preventive measure, 82.6% at least one sign of the disease (159).

The Uganda Cancer institute offers specialized services in area of cancer treatment, prevention and research (160). The Center receives also patients from DRC, Rwanda, South Sudan, Burundi and Western Kenya (119).

In Rwanda, the program of NCDs prevention and control is integrated in all levels of care and MoH management. Rwanda is also tackling some preventive issues relevant to NCDs including improvement of household cooking stoves and treatment for streptococcal pharyngitis, because of the high prevalence of rheumatic heart disease (161). Rwanda is the first low-income country to roll out the HPV vaccine nationwide with 93.2% of coverage in eligible girls in the first year (162). The country has also initiated nationwide screening and treatment programs. The MoH has the ambition to eradicate cervical cancer by 2020 (163).

The Butaro Hospital provides a free treatment for cancer patients in Rwanda. It includes a full spectrum of care: screening, diagnosis, chemotherapy, surgery, patient follow-up, palliative care, a pathology lab, social support, and community health worker accompaniment. There is good cancer treatment even in rural health facilities in Rwanda (164). Evidence-based guidelines, protocols or standards for NCDs are available and fully implemented in health facilities (165).

In Tanzania, private facilities, through their NCDs programs, involved primary schools and communities around health facilities in healthy lifestyle teachings including healthy eating and physical activities (166). There have been some pilot projects and interventions to introduce HPV vaccination in Tanzania with an acceptability of 93% (167). There have been efforts to establish a good palliative care

for patients in the community to overcome the burden of NCDs and chronic diseases (168). Initiatives have been implemented to improve management of diabetic foot by training health professionals in 15 centers across Tanzania, and the program has been a success (169).

In 2015, Burundi started a pilot program of introduction of HPV vaccination to prevent cervical cancer (125). There is a project to build a Burundi heart center in Bujumbura to treat CVD (170).

Zambia has made an effort to implement the “screen-and-treat” strategy by the visual inspection of cervix with acetic acid. The program has been a success in detecting and treating early cases of the disease (171). Most women acknowledged the supportive attitude of the staff as a motivating factor. In general, the experience of women about the program was positive (172). Knowledge about cervical cancer is higher than in DRC: 74.7% of women have heard about cervical cancer; 42.2% knew the cause and 73.3% believed that it is preventable and treatable. Ninety-six percent would like to be vaccinated against HPV if it was available (173). To improve asthma awareness in the community and the care for the disease, the World Asthma day is used to inform the population about the disease every year (141). Community home-based care has been integrated in the primary health care, and was used for HIV patients, now it has been used other chronic NCDs (174).

In Angola, there are 4 hospitals for cancer treatment in the country, 3 being private (175). The government is exploring the feasibility of training health workers to provide palliative care for patients with chronic diseases in all levels (153).

### **3.2.2. Health workforce**

In all the neighboring countries, like in DRC, there is a shortage of health workers. The ratio physician per 10000 populations is 1 in Uganda, 0.5 in Rwanda, 1.4 in Tanzania, 0.28 in Burundi, 1.7 in Angola and 0.23 in Congo. For nurses, the ratio per 10000 populations is 3 in Uganda, 1.8 in Rwanda, 1.9 in Burundi, 16.6 in Angola and 1.91 in Congo (135,176,177,178,179,180). There is a deficit of human resources in all these countries (181).

There is also an uneven distribution of HR between rural and urban areas and between facilities. In Zambia, there is concentration of technicians and skilled health workers in secondary and tertiary health facilities (182). In Angola, about 70% of

doctors are concentrated in the capital city. There is also shortage of nurses in primary health care while there is excess in urban cities and high level care facilities (179). In Congo, about 66% of doctors, 42% of paramedical are in the capital city. There is weak capacity on HR management, lack of reliable information system on HRH, and there is no coordination between teaching institutions to train health professionals according to the health need of the population (180).

Training of health professionals is a challenge for most of the countries.

In Tanzania, only 25% of health workers had training on hypertension and diabetes in the past 12 months in the hospital; none of the personnel in health centers and dispensaries received such training. None of the hospitals received supervision on hypertension and diabetes. In the health centers, only 21% were experienced for hypertension and 10% for diabetes (136). There is still a need for adjustment in the training institutions to deal with the emerging NCDs (183).

In Zambia, Maree et al found a lack of formal oncology nursing education and training; only a small number of nurses had a formal oncology education in South Africa (184). Burundi has only one medical school in the country (185).

All the countries face problem of remuneration. In Tanzania, the median monthly income for health workers was an equivalent of 350USD. It was shown that 39% of respondents did not know their job description, 63.5% declared have attended at least one workshop during the past 12 months (186). In Angola, Mendes et al found that nursing workforce face problems of excessive workload and low-salaries, which lead to unsatisfactory work environment and discouraged HR (187).

Despite the problems, some countries are making progress in improving HR to deal with NCDs and other diseases.

In Uganda, there is collaboration between Makerere University and Yale University (United States) to provide clinical care and medical education at Mulago hospital in Kampala for NCDs. In 2011, they conceived the idea of a center that would focus on NCDs integration primarily through community health workers training and health service delivery. They based this idea on the successful story in addressing HIV and other infectious diseases in the country. They included the need of task shifting to address the shortage of HR in addressing NCDs. Palliative Care Nurse Leadership Fellowship Program is a two years training program that aims to develop nurse leaders by supporting and mentoring them in implementation of clinical best practices and participation in local and national palliative care-related projects. The

program has been successful, and has been implemented in other countries where health resources are constrained and care needs are great (176).

In Rwanda, there is a clear plan and strategy to train health professionals according to the need of the country. Rwanda has a good program for training doctors and public health professionals to deal with health problems (188). There is a task shifting system for NCDs; the government has planned to train 1-2 specialist physicians per specialty in referral centers; 2-3 NCDs-nurses in district hospitals; 2-3 integrated chronic care nurses at the health centers, and 2 community health workers for chronic care in the community (189).

In Tanzania, there is an ongoing initiative for human resources for health that aims to achieve 100% balanced distribution of skilled health workers at primary level health care by 2017/2018 (177). Pilot studies in the country have shown good result in the training of health workers on NCDs-prevention, control and treatment in Tanzania (190).

### **3.2.3. Information system**

There are some common problems in data collection in the countries.

In Uganda, there are limited technical staff at the district level, staff redeployment, interruption of electricity and poor access to internet (191). The health facility form don't provide all information for NCDs (192).

In Tanzania, according to Perk et al, the reporting system for NCDs is weak; the information system in the health facilities and in the population is limited to measure NCDs-related variables (136).

In Burundi, the national information system provides little reliable recent data on NCDs. There is weak HR and research capacity to generate and use information (193). There is lack of infrastructure, technology and HR to manage the system.

In Zambia, many facilities are running both manual and electronic collection of data, which added more workload (194).

In Angola, there is a poor quality of data and a limited use of data to improve services. The country has a population-based survey data, but there is a limited access to data and information. Routine data are usually missing and inaccurate (195).

In Congo, there is still a vertical system where projects and programs have their own system of collecting data (196).

Some countries are doing an effort to improve the health information system in relation to NCDs.

In 2011, Uganda adopted the electronic health information system, which brought significant improvement in completeness and timeliness (191).

In Rwanda, Karara et al found that the information system in 6 hospitals contained enough and comprehensive data to enable a detailed monitoring of universal health coverage (197). The health information system is well organized and provides a clear and accurate data on NCDs and their risk factors (161). The country has a population-based cancer registry (198).

In Tanzania, the MoH is planning to establish projects that will help collect data on NCDs variables in the community. Variables for NCDs risk factors have been introduced in the Tanzania demographic health survey tool (199).

Burundi has developed a Manual of Standards and Procedures of Health Information, but the indicators for NCDs contain only data for hypertension and diabetes (200).

A study done in Burundi, Rwanda and DRC on the introduction of information system for chronic diseases has shown a good result in term of quality of data (201). Congo has a population-based cancer registry that provides accurate and reliable data on cancer in the country (202).

#### **3.2.4. Access to Medicine**

Most of the neighboring countries also face the problem of availability, accessibility and quality of medicines.

In Uganda, only 56% of patients with NCDs declared having the medication; 22% only reported obtaining all recommended medicine free-of charge and the overall access of medicines to treat NCDs was 16% (203). A study found that none of the facilities assessed met the WHO standards for essential tools and medicines to implement effective NCDs interventions (134).

In Rwanda, 20% of hypertensive medicine purchased on the market were of substandard content and 70% were of insufficient stability (204).

In Tanzania, only 25% had medications for hypertension in health centers, 75% in hospitals. Metformin is available only in 20% of health centers and dispensaries. About 30% of health facilities reported having often stock-out of NCDs medicines (136). Yohana found that the availability of medicines at the Cancer Institute was

50%; 70% of patients did not get the prescribed anticancer medicines at the hospital. Some patients are required to get medicine from private pharmacies where (205).

In Burundi, chemotherapy and morphine are not generally available in public primary health facilities at the district level. Metformin, sulfonylurea, HBA1C fundus eye are not available (206).

In Zambia, Lily et al found that only 18% of hypertensive patients had hypertensive medicine prescribed (150). Oelke found that under stocked medication was the first reason to explain lack of adherence to treatment among patients with hypertension (127).

In Angola Insulin, metformin, sulphonyl urea, urine trips and HBA1c are generally not available in public primary health facilities. There is insufficient financial input in the pharmaceutical area, which makes drugs scarce constantly in the health facilities (207).

There are countries where progresses are made in term of medicine for NCDs. In Rwanda, insulin, metformin, sulfonylurea, blood glucose, urine trips for glucose and ketone measurements are generally available in the primary care facilities (165). According to WHO, Tanzania is making a considerable progress in access to quality essential medicines and health products. The government has included some medicines to treat major NCDs in the NLEM, but availability and cost remain a challenge (208).

### **3.2.5. Financing**

Apart from Uganda where funding for NCDs was specified, no clear proportion of money for NCDs was found for other countries.

In 2014, the NCDs program in Uganda was allocated 0.01% of the total MOH budget, representing about 27000USD per year. Most of the money (92%) to cover the NCDs program comes from the World Diabetes Federation, which brings the total funding of NCDs program to 270000USD per year (209).

In Rwanda, the plan for NCDs is publicly financed and sponsored to ensure accessible and affordable lifelong treatment and managed care for NCDs. The MoH has worked to pass legislation prohibiting smoking in public paces and introducing tax on cigarettes and alcohol that helps to subsidize social health insurances to cover NCDs treatment costs (161). Rwanda is among the 6 countries in Africa to achieve the Abuja declaration by providing more than 15% of the government budget to the

health (210). With its national social health insurance, the country is moving towards universal health coverage (211).

In Tanzania, the government is trying to make national health insurance mandatory, with the poorest paying lower fees. Patients holding the national health insurance card or a council card reserved for rural areas, usually cover 50% of the cost. The current policy is to provide free services and medicines for the poorest, children under 5 and pregnant women (208).

In Burundi, 46% of the funding for health comes from external sources, 28 % out-of pockets. Decision-making remains very centralized at the national level, especially for budget allocation (212).

In Zambia, there is an increased budget for health sector but the NCDs sector remains underfunded (213).

In Angola, the government expenditure on health as percentage of total government expenditure in 2013 was 7.7. Out-of-pocket expenditure as part of total health expenditure was 24.4%. There is only 1.7% of health funding coming from external sources (179). More than 50% of public health expenditures goes to referral and central facilities; primary health care is poorly developed and access to health care in rural areas is estimated to 30 to 40% (207).

In Congo, the general government expenditure on health as percentage of total government expenditure was 8.7% in 2013. Out-of pocket expenditure on health as percentage of total health expenditure was 21.7 (214).

### **3.2.6. Leadership and governance**

- *Strategic policy framework and oversight*

In term of coordination of the NCDs program, only Uganda, Rwanda, Tanzania and Zambia have a NCDs department or unit within the Ministry of health (215,216,217). Uganda does not have a policy but a five years strategic plan for NCDs (218).

The NCDs policy in Rwanda was elaborated in 2015 and has clear objectives to prevent and control NCDs. It contains a governance framework with organization and management, partnership and roles of stakeholders, interventions at all levels of the health system (219). There is a National health Research Agenda 2014-2018 that focus also on NCDs (220). The program of NCDs prevention and control is integrated in primary, secondary and tertiary care levels, and the MoH Management (189).



The success of the Rwanda health program is the result of good political will, cross-sectorial collaboration planning, good partnership and robust monitoring and evaluation system (163). Rwanda has achieved progress in health and has become a pioneer in tackling cancer and NCDs that most LMIC are only beginning to take on (221). This success has been attributed to innovative policy making and the alignment of vertical donor funding with horizontal government-driven priorities (222,223).

Tanzanian leadership has a high political commitment for NCDs; there are policies and strategies for prevention and control of these diseases. The country is one of the few in sub-Saharan Africa to respond to the NCDs initiatives 2 decades ago (217). There is a running national NCDs strategy 2008-2018 with clear objectives (224). The country also has a 10 years National cancer control strategy 2013-2022 (225).

In Burundi, there is a National Strategic Integrated Program to fight NCDs, but the 3 strategies on the document are only for tobacco control (226).

In Zambia, no actual policy for NCDs was found; there is a NCDs strategic plan 2013-2016, which was going to be updated in 2017 (227). There are operational policies to reduce physical inactivity, harmful use of alcohol and tobacco, and unhealthy diet. There is no operational multisectoral strategy or action plan that integrates several NCDs and shared risk factors (228).

In Angola, the search did not find much information related to NCDs leadership and governance. Documents on NCDs in general were not available (229).

In Congo, there is policy and plan for NCDs and plan for reduction of burden of tobacco use. There is also action plan to reduce over weight and obesity, and harmful use of alcohol. There is no action plan to reduce physical inactivity in the country (230).

- *Laws and regulations*

In Uganda, the tobacco control act emphasizes prohibition of smoking in public places, work places and means of public transportation, within 50 meters of any public places or any other place that provides services primarily to children. It also has a comprehensive ban on all tobacco advertising, promotion and sponsorship, which was not the case until 2014. It contains a chapter on enforcement of the law and regulations on tobacco (231).

In Rwanda, the new comprehensive Act on tobacco control aims to prevent tobacco use, inform and educate the public on the consequences of tobacco use, prevent

exposure to tobacco smoke, eliminate illicit trade in tobacco products and motivate smokers to quit (232). Owners of premises are requested to create a designated smoking area. The Center for Tobacco Control in Africa ranked Rwanda second after Kenya in the East African Community in implementation of tobacco control law in the line with the WHO framework and recommendations (233).

Tanzania has a law on tobacco and alcohol control, but the ban of tobacco use is only for 2 places on 8 as recommended by WHO. There is ban of tobacco advertisement and promotion on National TV, radio, print media, but not on other forms of direct or indirect advertisement (234).

In Burundi, there is no law on tobacco control, and on the 8 free smoke places recommended. There is also no ban on tobacco advertising, promotion and sponsorship on media in the country (111).

In Congo Brazzaville, there is interdiction on advertising, promotion and sponsorship of tobacco on national television, radio and medias (230).

- *Building coalition and accountability*

In Uganda, there is an NCDs alliance and a partnership between faculty at Makerere University College of Health Science in Uganda, Yale school of Medicine in the US, the Mulago Hospital and the Uganda Ministry of Health Program for control and prevention of NCDs (235). The Uganda Cancer Institute also has an alliance with Hutchinson center Cancer for studies and research on Cancer (236).

In the Parliament, there is a forum on NCDs founded in 2011 with the objective to implement resolutions of the UN meetings on NCDs, advocate for policy formulations by government in support of the NCDs alliance, to lobby for resources to support bodies and agencies, and to create awareness of NCDs in parliament and different constituencies in the country (237).

With the help of the Danish International Development Assistance, civil societies are equipped to build groups concerned with NCDs to raise the political priority on NCD, build public awareness, and provide support for education, treatment and patient concerns (238). The Uganda cancer society also coordinate civil society efforts for a systematic contribution towards effective cancer control (239).

In Rwanda, health leaders are globally extending the overall health system successes to realm of NCDs. There is a strong synergies partnership in the country between the MoH and health partners (240). The National NCDs policy contains a governance framework with organization and management, partnership and roles of stakeholders, interventions at all levels of the health system including college of

medicine and health sciences, private sectors and civil society, implementing and non-implementing partners (219).

In Tanzania, the ministry of health and social welfare collaborates with Tanzania Diabetes Association to address diabetes and other NCDs by training health workers to implement prevention, awareness and health promotion activities across communities. Community outreach activities will be based on lessons learned from HIV/AIDS strategy that has proven successful (241). The Cancer Institute, the Ministry of health and Social Welfare and Nutrition experts have formed a joint national strategic cancer control task force to educate the public on effective way to combat NCDs. The involvement of the community in effective disease control interventions for various diseases is very well known (242).

In Zambia, there are many civil society organizations (CSO) working on some NCDs specific diseases and risk factors. The MoH finances most of those CSO, and few receive support from development partners. The NCDs Alliance in Zambia is planning to strengthen the capacity of the Zambian Civil Society Health Partnership, which is supposed to coordinate activities of all CSO working in the NCDs program (227).

In Congo and Angola, no coalition was found for NCDs. According to Siddharthan et al, civil societies have played a major role in galvanizing consensus regarding NCDs management in East Africa, but Burundi did not follow the rest of the countries (243).

## Chapter 4: Discussion

This chapter discusses the results and findings from the DRC and neighboring countries in relation to response to NCDs.

Findings show that in the DRC and most of the neighboring countries, health systems are not able to deliver effective, safe and quality care for NCDs.

There is a poor prevention and awareness strategy to address NCDs.

The reasons for poor prevention and awareness in DRC might be due to poor leadership on NCDs in the MoH as there is no department and policy or strategic plan for NCDs in the country. The absence of policy and strategic plan leads to the fact that there is no priority and objectives to achieve and to focus on. In the context of DRC, political instability and 2 decades of war might also justify the lack of NCDs awareness. Maternal, child health and some infectious diseases are still a major problem in the country; therefore constitute priority for the government. The fact that NCDs are not effectively integrated in primary health care in the DRC might also explain poor awareness and inability of health facilities to deliver good care for patients.

Some neighboring countries like Uganda, Tanzania, Rwanda and Zambia are making progress in NCDs prevention. Uganda and Zambia are integrating communicable diseases and NCDs screening campaign. This might be due to experience of the success of HIV awareness and prevention. Using the model of HIV might increase prevention and control of HIV. In Uganda, cancer awareness and prevention success might also be explained by multiple partnerships and alliances the MOH has made with teaching institutions, cancer institute and civil society organizations. These coalitions will increase the visibility and accessibility of the population to information in regard to NCDs. The parliament forum on NCDs in Uganda is a powerful tool for raising awareness and accountability for NCDs in the community.

The success of Rwanda in term of NCDs prevention and control, especially cancer, might be linked with the strong leadership and political will in health. There is also a strong synergy and partnership between all stake holders. Political stability in the country might be a factor of success and allows focusing on main priorities of the country. NCDs are integrated in all levels of the health care delivery in Rwanda; this might explain the success of the program, as it is close to the population, therefore increases accessibility and responsiveness.

In DRC, there is not enough qualified HR for NCDs control. Lack of funds and planning in term of training and recruitment might explain this situation. Lack of leadership for implementation of law and regulation on the teaching institutions are factors for low quality HR in the country. Because of poor career development and poor remuneration, poor working and living condition, aggravated by the on going political instability and insecurity in the country qualified HR migrate, leading to understaffed health facilities.

The uneven distribution of health professionals between rural and urban can be explained by the economic prospects and security in urban areas in the context of DRC. Poor infrastructures and living conditions might also prevent health workers from working in rural areas. Lack of policy and strategy for deployment and retention of HR and poor remuneration is also one reason for low number of HR in rural areas compared to urban areas.

Uganda, Rwanda and Tanzania are making progress in developing HR for NCDs. In Uganda and Rwanda, there is a task shifting for NCDs services between different levels of care. This is to help compensate the lack of specialists to treat NCDs. Community health workers are trained to take part in NCDs control and prevention. This might be due to the lessons learned from how community health workers played a role in HIV fight and other infectious diseases.

In Rwanda particularly, there is a clear strategy to train health professionals according to the health need. There is also a plan of training and deploying health workers on NCDs in all levels of health care. This might be due to the strong leadership and commitment of the MoH, but also a clear policy and monitoring system. This requires a good supervision and monitoring system to ensure the effectiveness, which is not yet the case for the DRC.

The Ugandan Palliative Care Nurse fellowship is a good program to train nurses in community to provide palliative care. Due to the fact that chronic diseases are responsible of long-term complications it is therefore necessary to train community workers and nurses to provide palliative cares. This intervention is feasible in the DRC where people don't have access to health care and have complications that require long-term palliative care.

The HIS is weak in DRC due to lack of infrastructures and human resources able to generate, analyze and use the information for decision making. Once again, lack of leadership and political will to plan, and the financial status of the country might be the reason for this situation. Lack of political stability might explain the slow speed

in the improvement of infrastructures for electronic system. Uganda, Zambia, Rwanda and Tanzania have already introduced electronic data collection in health facilities, but all these countries have been politically stable for long time therefore able to develop both HR capacities and infrastructures. Even in Zambia where electronic system is introduced, it was reported that some facilities still run the 2 systems in parallel to prevent problems due to technical issues. The pilot study done in Rwanda, Burundi and Congo on the introduction of electronic information system for NCDs has shown a success but the study was done in urban areas while many health facilities are situated in rural area where access to electricity and internet is challenging.

There is poor availability of medicines in the health facilities, which can explain poor control of NCDs, the high incidence of NCDs-related complications and high mortality rate due to NCDs as shown in many studies in the findings. Poor health funding, weak control system and geographical inaccessibility in the country might explain this situation.

In Rwanda and Tanzania, efforts are made to make medicine available in the country. Most of NCDs medicines are found to be available in health facilities demonstrating a strong political will and MoH determination to deal with NCDs. Road infrastructure in the country might also explain the availability of medicines in these countries.

DRC doesn't raise and allocate sufficient funds for health. The reason for this is because the country is among the poorest in the world and does not have enough resources to fund health. The political instability and insecurity in the country might lead to more money going to security and defense instead of health and other sectors.

Rwanda is the only country in the region that allocate more money for health, and this can be explained by the political will to improve health and the alignment of partners and donors to the priority of the country. Rwandan Government is raising funds from taxes on tobacco to finance health, and there is a national health insurance. High political will and involvement in health also explains the fact that Rwanda adheres to the Abuja declaration.

Most of the studies found were disease oriented and few only on health system topics. There is also lack of published literature on human resources and finance on NCDs in most of the countries, highlighting the interest of researchers on prevention and treatment.

The majority of studies were on diabetes, hypertension and cancer. Only few studies were on COPD and other cardiovascular diseases. This might be due to the fact that more attention is put to the mentioned diseases and priorities are given on them. Many studies were found in Uganda and Tanzania, probably because the research is more developed in these countries and people publish more in these countries.

### **Limitations of the study**

This study was based on literatures review on the health system in response to the NCDs. Some data on service delivery would need a primary data collection to assess the real situation in the health facilities, as there were not enough studies to support the evidences.

Five interviews were not enough to get in-depth understanding of the situation. The interviews were done in one particular region, which is not representative of the whole country.

Desk review documents were also used to analyze the situation, which leads to the question of credibility of the information, as they are not scientifically proven.

It was difficult to find some information on some NCDs like COPD in all the countries. Studies published in DRC were done in some parts of the country, but considering the size of the country and the different realities in different parts, they might not be generalized to the entire population.

## Chapter 5: Conclusion and recommendations

### 5.1. Conclusion

Non-communicable diseases are becoming a burden for LMIC in general and particularly in the DRC. Health systems have to respond to these conditions in order to prevent complications and mortality. The aim of this study was to analyze the preparedness and responsiveness of the health system of the DRC to address the emerging NCDs in the country. The result has shown that there are some measures and interventions put in place by the health system to control NCDs and their risk factors, but comparing to some neighboring countries, the DRC is not yet prepared enough to respond to the crisis of NCDs for various reasons.

There are many areas of weaknesses to the response, almost in all the 6 dimensions of the health system. There is lack of a strong leadership and governance to coordinate and to put in place an NCDs policy and program or strategies; a poor service delivery for NCDs both for prevention, treatment and palliative care; a weak information system to generate information to guide decision making; and a lack of resources to produce a good outcome for patients (human, finances, medicine and medical products).

Despite the fact that neighboring countries are also facing challenges for NCDs prevention and control, there are lessons that can be learned by the DRC to improve its response to NCDs. In term of service delivery, it is possible to integrate NCDs prevention and management in primary health care and create an awareness and prevention campaigns in communities. A palliative service is also possible by training nurses and community health workers like in Zambia and Uganda.

Task shifting and training enough health professional at different levels of care to be able to deliver effective care for patients with NCDs can improve the control of these diseases in primary health care, taking into account success interventions for HIV/AIDS programs. Like for infectious diseases, a selection of essential medicine and medical equipment for NCDs is important and can be possible to implement in the country.

Due to the poor technology development and lack of HR for ICT, introducing electronic HIS might not be feasible but the improvement of existing HIS and integration of information and indicators on NCDs on the HIS can be achieved at all levels of the health care system.



Raising and allocating sufficient funds for health is necessary to achieve the NCDs prevention and control. Despite a low GDP, it is possible to raise funds both internally and externally to finance NCDs. Strategies like tax on tobacco and alcohol, realignment of donors to the priority of the country and social health insurance are possible to implement in the country for NCDs financing.

Good leadership to address NCDs is needed in the country, because all other building blocks depend entirely on a successful leadership, which is linked to the political will and commitment. A clear NCDs department that deal with all the diseases is necessary to create a coalition on NCDs and develop strategies for prevention and control.

## **5.2. Recommendations**

In the light of the result of this study, in order to improve the response of DRC health system to NCDs, it is recommended:

### **To the government and the MoH**

#### *In the short term*

- To create a NCDs department in the MoH and put in place a multisectoral structure by involving all stake holders including civil society.
- To develop Policy and strategic plan on NCDs that will clarify the objectives to achieve.
- To integrate the NCDs in prevention and control in primary health care by setting up a task shifting from physicians to nurses and community workers, and make available guidelines for NCDs.
- To standardize the health information system tool by incorporating indicators for NCD risk factors and disintegrated data by age, sex and diseases.

#### *In midterm*

- To raise and allocate enough funds for chronic diseases by allocating at least 15% of the total budget to health, increasing taxes on tobacco, alcohol, sugar and other products, and allocate that fund to health.
- To create community and social health insurance in the country.

**For researchers**

- To conduct researches on health system related topics on NCDs such as HR, financing and HIS;
- To conduct researches on COPD and other CVDs, and not only on hypertension, diabetes and cancer.
- To conduct studies on NCDs in different regions of DRC because, due to its dimension, realities might differ.

## References

1. World Health Organization. Health Systems Strengthening Glossary [Internet]. WHO. [cited 2017 Aug 10]. Available from: [http://www.who.int/healthsystems/hss\\_glossary/en/index5.html](http://www.who.int/healthsystems/hss_glossary/en/index5.html)
2. World Health Organization. Non-communicable diseases [Internet]. WHO. [cited 2017 Jul 12]. Available from: <http://www.who.int/mediacentre/factsheets/fs355/en/>
3. Cambridge English Dictionary. Non-communicable definition [Internet]. [cited 2017 Jul 12]. Available from: <http://dictionary.cambridge.org/us/dictionary/english/non-communicable>
4. Mendis S. Global status report on non-communicable diseases 2014. World health organization; 2014.
5. World Health Organization. Cardiovascular diseases (CVDs) [Internet]. WHO. [cited 2017 Aug 10]. Available from: <http://www.who.int/mediacentre/factsheets/fs317/en/>
6. World Health Organization. Chronic obstructive pulmonary disease (COPD) [Internet]. WHO. [cited 2017 Aug 10]. Available from: <http://www.who.int/respiratory/copd/en/>
7. Gaziano TA, Bitton A, Anand S, Abrahams-Gessel S, Murphy A. Growing Epidemic of Coronary Heart Disease in Low- and Middle-Income Countries. *Curr Probl Cardiol*. 2010 Feb 1;35(2):72–115.
8. Marquez PV, Farrington JL. The challenge of non-communicable diseases and road traffic injuries in sub-Saharan Africa: an overview. 2013;
9. Banque Mondiale. République Démocratique du Congo [Internet]. [cited 2017 Jul 12]. Available from: <http://www.banquemondiale.org/fr/country/drc>
10. UNdata. Democratic Republic of the Congo, Country Profile [Internet]. [cited 2017 Jul 12]. Available from: <http://data.un.org/CountryProfile.aspx?crName=democratic%20republic%20of%20the%20congo>
11. Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité, Ministère de la Santé Publique (MSP), ICF International. République Démocratique du Congo, Enquête Démographique et de Santé (EDS-RDC) 2013-2014. Rockville, Maryland, USA; 2014.
12. Organisation Mondiale de la Santé. Profil sanitaire de la République démocratique du Congo, statistiques, action de l’OMS dans le pays, informations et reportages. République démocratique du Congo [Internet]. WHO. [cited 2017 Jul 12]. Available from: <http://www.who.int/countries/cod/fr/>
13. Huebler F, Lu W. Adult and Youth Literacy 1995-2015. 2012;
14. Jones GA, Rodgers D. The World Bank’s World Development Report 2011 on conflict, security and development: A critique through five vignettes. *J Int Dev*. 2011 Oct 1;23(7):980–95.
15. Ministère de la Santé Publique (MSP) République Démocratique du Congo. Plan National de Développement Sanitaire PNDS 2011-2015 [Internet]. Kinshasa; 2010 [cited 2017 Jul 12]. Available from:

- [http://www.nationalplanningcycles.org/sites/default/files/country\\_docs/Democratic%20Republic%20of%20Congo/pnds\\_2011-2015.pdf](http://www.nationalplanningcycles.org/sites/default/files/country_docs/Democratic%20Republic%20of%20Congo/pnds_2011-2015.pdf)
16. Ministère du Plan et Révolution de la Modernité, Institut National de la Statistique. Annuaire statistique 2014, République Démocratique du Congo [Internet]. Kinshasa; 2015 Juillet [cited 2017 Jul 12]. Available from: [http://www.ins-rdc.org/sites/default/files/Montage%20AnnuStat%20FINAL%202%20From%20VEROUILLE%20\\_0\\_0.pdf](http://www.ins-rdc.org/sites/default/files/Montage%20AnnuStat%20FINAL%202%20From%20VEROUILLE%20_0_0.pdf)
  17. Ministère de la Santé Publique (MSP) RDC. Plan National de Développement Sanitaire 2016-2020 : vers la couverture sanitaire universelle [Internet]. Kinshasa; 2016 Mar [cited 2017 Jul 12]. Available from: [http://www.nationalplanningcycles.org/sites/default/files/planning\\_cycle\\_repository/democratic\\_republic\\_of\\_congo/pnds\\_2016-2020\\_version\\_finale\\_29\\_avril\\_2016.pdf](http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/democratic_republic_of_congo/pnds_2016-2020_version_finale_29_avril_2016.pdf)
  18. World Health Organization. Non-communicable Diseases Country Profiles 2014, Democratic Republic of the Congo [Internet]. Geneva; 2014 [cited 2017 Jul 12]. Available from: [http://apps.who.int/iris/bitstream/10665/128038/1/9789241507509\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/128038/1/9789241507509_eng.pdf)
  19. Yach D, Hawkes C, Gould CL, Hofman KJ. The Global Burden of Chronic Diseases: Overcoming Impediments to Prevention and Control. *JAMA*. 2004 Jun 2;291(21):2616–22.
  20. World health Organization. Diabetes, Country profile 2016. Democratic Republic of Congo [Internet]. Geneva; 2016 [cited 2017 Jul 13]. Available from: [http://www.who.int/diabetes/country-profiles/cod\\_en.pdf?ua=1](http://www.who.int/diabetes/country-profiles/cod_en.pdf?ua=1)
  21. Bayauli PM, M'Buyamba-Kayamba J-RJ, Lemogoum D, Thijs L, Dramaix M, Fagard R, et al. Cardiovascular risk factors among the inhabitants of an urban Congolese community: results of the VITARAA Study. *IJC Metab Endocr*. 2014 Sep 1;4:33–8.
  22. Katchunga PB, M'Buyamba-Kayamba J-R, Masumbuko BE, Lemogoum D, Kashongwe ZM, Degaute J-P, et al. Hypertension artérielle chez l'adulte Congolais du Sud Kivu : résultats de l'étude Vitaraa. *Presse Médicale*. 2011 Jun 1;40(6):e315–23.
  23. Tshikwela ML, Londa FB, Tongo SY. Stroke subtypes and factors associated with ischemic stroke in Kinshasa, Central Africa. *Afr Health Sci*. 2015 Jan 1;15(1):68–73.
  24. Longo-Mbenza B, Bayekula M, Ngiyulu R, Kintoki VE, Bikangi NF, Seghers KV, et al. Survey of rheumatic heart disease in school children of Kinshasa town. *Int J Cardiol*. 1998 Feb 28;63(3):287–94.
  25. Onen CL. Epidemiology of ischaemic heart disease in sub-Saharan Africa : review article. *Cardiovasc J Afr*. 2013 Mar 1;24(2):34–42.
  26. Mboliasa I, Lepira B, Makulo R, Kintoki F, Lubenga Y, Mpembele M, et al. Profil épidémiologique et clinique des urgences cardiovasculaires admises aux soins intensifs de médecine interne des Cliniques Universitaires de Kinshasa. *Ann Afr Médecine*. 2015 Mar 31;8 No2: Mars 2015.
  27. Mathers CD, Loncar D. Projections of Global Mortality and Burden of Disease from 2002 to 2030. *PLOS Med*. 2006 Nov 28;3(11):e442.
  28. World Health Organization. Diabetes [Internet]. WHO. [cited 2017 Jul 13]. Available from: <http://www.who.int/mediacentre/factsheets/fs312/en/>

29. World Health Organization. Fact sheets Diabetes [Internet]. WHO. [cited 2017 Aug 12]. Available from: <http://www.who.int/mediacentre/factsheets/fs312/en/>
30. Kaimbo WKD, Snyers B. La rétinopathie diabétique à Lubumbashi. *Bull Soc Belge Ophtalmol.* 2012;319:51–9.
31. Kakoma PK, Kadiebwe DM, Kayembe AM, Makonga PK, Bugeme M, Mukuku O. Acidocétose diabétique chez l’adulte à l’Hôpital Sendwe de Lubumbashi: à propos de 51 cas. *Pan African Medical Journal.* 2014;17(1).
32. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. *CA Cancer J Clin.* 2015 Mar 1;65(2):87–108.
33. World Health Organization. Cancer Country Profiles 2014, Democratic republic of Congo [Internet]. Geneva; 2014 [cited 2017 Jul 13]. Available from: [http://www.who.int/cancer/country-profiles/cod\\_en.pdf?ua=1](http://www.who.int/cancer/country-profiles/cod_en.pdf?ua=1)
34. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer.* 2015 Mar 1;136(5):E359–86.
35. Knoema. WHO Statistical Information System, 2012 [Internet]. Knoema. [cited 2017 Jul 13]. Available from: <https://knoema.com//WHOSIS2012/who-statistical-information-system-2012>
36. Global Disease Burden. Global Disease Burden: Demographic Statistics [Internet]. [cited 2017 Jul 13]. Available from: <http://global-disease-burden.healthgrove.com/>
37. World Health Organization. Management of non-communicable diseases [Internet]. WHO. [cited 2017 Aug 4]. Available from: <http://www.who.int/ncds/management/en/>
38. Beaglehole R, Bonita R, Alleyne G, Horton R, Li L, Lincoln P, et al. UN High-Level Meeting on Non-Communicable Diseases: addressing four questions. *The Lancet.* 2011 Jul 30;378(9789):449–55.
39. UN General Assembly. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases; September 16, 2011. 2012;
40. World Health Organization. The WHO Health Systems Framework [Internet]. WPRO. [cited 2017 Jul 26]. Available from: [http://www.wpro.who.int/health\\_services/health\\_systems\\_framework/en/](http://www.wpro.who.int/health_services/health_systems_framework/en/)
41. Ali-Risasi C, Mulumba P, Verdonck K, Broeck DV, Praet M. Knowledge, attitude and practice about cancer of the uterine cervix among women living in Kinshasa, the Democratic Republic of Congo. *BMC Womens Health.* 2014;14(1):30.
42. Islami F, Lortet-Tieulent J, Okello C, Adoubi I, Mbalawa CG, Ward EM, et al. Tumor size and stage of breast cancer in Côte d’Ivoire and Republic of Congo – Results from population-based cancer registries. *The Breast.* 2015 Dec 1;24(6):713–7.
43. World Health Organization. Global Atlas of medical devices [Internet]. 2017 [cited 2017 Jul 13]. Available from: [http://www.who.int/medical\\_devices/publications/global\\_atlas\\_meddev2017/en/](http://www.who.int/medical_devices/publications/global_atlas_meddev2017/en/)

44. Luyeye Mvila G, Batalansi D, Praet M, Marchal G, Laenen A, Christiaens M-R, et al. Prognostic features of breast cancer differ between women in the Democratic Republic of Congo and Belgium. *The Breast*. 2015 Oct 1;24(5):642–8.
45. Nelson AM, Milner DA, Rebbeck TR, Iliyasu Y. Oncologic Care and Pathology Resources in Africa: Survey and Recommendations. *J Clin Oncol*. 2016 Jan 1;34(1):20–6.
46. Challinor JM, Galassi AL, Al-Ruzzieh MA, Bigirimana JB, Buswell L, So WKW, et al. Nursing's Potential to Address the Growing Cancer Burden in Low- and Middle-Income Countries. *J Glob Oncol*. 2016 Jun 1;2(3):154–63.
47. Ngbolua K, Kabena N, Lukoki L, Mpiana P, Ngombe K, Fatiany P, et al. Phytochemical Screening of some medicinal plants traditionally used by African Women in Kinshasa city (DR Congo) for their intimate hygiene and Evaluation of the pH of derived recipes. *J Mod Drug Discov Drug Deliv Res*. 2014;V1I3.
48. Ali-Risasi C, Verdonck K, Padalko E, Broeck DV, Praet M. Prevalence and risk factors for cancer of the uterine cervix among women living in Kinshasa, the Democratic Republic of the Congo: a cross-sectional study. *Infect Agent Cancer*. 2015;10(1):20.
49. Mottini G, D'Avola D, Dimbelolo J, Lumu R, Gallizioli E, Nisita J, et al. A hospital survey of the clinical features of diabetes in Congo. *Diabetes Nutr Metab*. 2003;16(4):236–42.
50. Katchunga P, Malanda B, Mweze M, Dupont B, M'Buyamba-Kabangu J, Kashongwe Z, et al. Knowledge of the general population about hypertension and diabetes mellitus in South Kivu, Democratic Republic of Congo. *Rev Epidemiol Sante Publique*. 2012;60(2):141–7.
51. Limbole EB, Magne J, Lacroix P. Stroke characterization in Sun Saharan Africa: Congolese population. *Int J Cardiol*. 2017 Aug 1;240:392–7.
52. Houser N, Baiden P, Fuller-Thomson E. Diabetes and Hypertension in Congolese Church Personnel: An Emerging Epidemic? *J Community Health*. 2017 Jun 1;42(3):453–60.
53. Kapongo RY, Lulebo AM, Mafuta EM, Mutombo PB, Dimbelolo JCM, Bieleli IE. Assessment of health service delivery capacities, health providers' knowledge and practices related to type 2 diabetes care in Kinshasa primary healthcare network facilities, Democratic Republic of the Congo. *BMC Health Serv Res*. 2015;15(1):9.
54. Muyer MT, Buntinx F, Mapatano MA, De Clerck M, Truyers C, Muls E. Mortality of young patients with diabetes in Kinshasa, DR Congo. *Diabet Med*. 2010 Apr 1;27(4):405–11.
55. Longo-Mbenza B, Kasiam Lasi On'kin JB, Nge Okwe A, Kangola Kabangu N. The metabolic syndrome in a Congolese population and its implications for metabolic syndrome definitions. *Diabetes Metab Syndr Clin Res Rev*. 2011 Jan 1;5(1):17–24.
56. Van Olmen J, Marie KG, Christian D, Clovis KJ, Emery B, Maurits VP, et al. Content, participants and outcomes of three diabetes care programmes in three low and middle income countries. *Prim Care Diabetes*. 2015 Jun 1;9(3):196–202.
57. Ngbolua KN, Rakotoarimanana H, Rafatro H, Ratsimamanga US, Mudogo V, Mpiana PT, et al. Comparative antimalarial and cytotoxic activities of two *Vernonia* species: *V. amygdalina* from the Democratic Republic of Congo and *V. cinerea* subsp *vialis* endemic to Madagascar. *Int J Biol Chem Sci [Internet]*. 2011 Jan 1 [cited 2017 Jul 13];5(1). Available from: <https://www.ajol.info/index.php/ijbcs/article/view/68111>

58. Katemo M, Mpiana PT, Mbala BM, Mihigo SO, Ngbolua KN, Tshibangu DST, et al. Ethnopharmacological survey of plants used against diabetes in Kisangani city (DR Congo). *J Ethnopharmacol.* 2012 Oct 31;144(1):39–43.
59. Ministère de la Santé Publique (MSP). Normes des Zones de santé en RDC. Deuxieme édition 2010 [Internet]. Kinshasa; 2010 [cited 2017 Jul 13]. Available from: <http://www.minisanterdc.cd/Articles/Reformesanitaire/RECUEIL%20DES%20NORMES%20SANITAIRES.pdf>
60. M'Buyamba-Kabangu J-R, Biswika RT, Thijs L, Tshimanga GM, Ngalula FM, Disashi T, et al. In-Hospital Mortality Among Black Patients Admitted for Hypertension-Related Disorders in Mbuji Mayi, Congo. *Am J Hypertens.* 2009 Jun 1;22(6):643–8.
61. Lulebo AM, Mapatano MA, Kayembe PK, Mafuta EM, Mutombo PB, Coppieters Y. Assessment of hypertension management in primary health care settings in Kinshasa, Democratic Republic of Congo. *BMC Health Serv Res.* 2015;15(1):573.
62. Lulebo AM, Mutombo PB, Mapatano MA, Mafuta EM, Kayembe PK, Ntumba LT, et al. Predictors of non-adherence to antihypertensive medication in Kinshasa, Democratic Republic of Congo: a cross-sectional study. *BMC Res Notes.* 2015;8(1):526.
63. Sumaili EK, Krzesinski J-M, Cohen EP, Nseka NM. Épidémiologie de la maladie rénale chronique en République démocratique du Congo : une revue synthétique des études de Kinshasa, la capitale. *Néphrologie Thérapeutique.* 2010 Jul 1;6(4):232–9.
64. Longo-Mbenza B, Ngimbi RM, Ngoma DV, Fuele SM, Buassa-bu-Tsumbu B. Facteurs de risque d'accident vasculaire cérébral chez les diabétiques hypertendus noirs congolais de type 2. *Ann Cardiol Angéiologie.* 2008 Feb 1;57(1):37–43.
65. Lubaki J-PF, Mabuza L, Malette N, Ndimande JV, Maduna P. Reasons for non-compliance among patients with hypertension at Vanga Hospital, Bandundu Province, Democratic Republic of Congo : a qualitative study : original research. *Afr J Prim Health Care Fam Med.* 2009 Jan 1;1(1):1–5.
66. Lulebo AM, Mapatano MA, Mutombo PB, Mafuta EM, Samba G, Coppieters Y. Prevalence and determinants of use of complementary and alternative medicine by hypertensive patients attending primary health care facilities in Kinshasa, Democratic Republic of the Congo: a cross-sectional study. *BMC Complement Altern Med.* 2017;17(1):205.
67. Muzembo NJ, Nkakudulu BH, Frans A. Respiratory rehabilitation in patients with bronchial asthma and chronic obstructive pulmonary disease (COPD) in Kinshasa. *Rev Pneumol Clin.* 2001;57(3):209–18.
68. Obel KB, Ntumba KJM, Kalambayi KP, Zalagile AP, Kinkodi kaba D, Munogolo KZ. Prevalence and determinants of asthma in adults in Kinshasa. *PLOS ONE.* 2017 May 2;12(5):e0176875.
69. Ministère de la Santé Publique (MSP), Projet d'appui a la rehabilitation du secteur de la santé. Ordigramme de soins [Internet]. Kinshasa; 2008 [cited 2017 Jul 13]. Available from: [https://www.africa-onweb.com/media/PDF/CONGO\\_secteur-sante.pdf](https://www.africa-onweb.com/media/PDF/CONGO_secteur-sante.pdf)
70. Ranjani H, Mohan V. Prevention and Control of Noncommunicable Diseases Role of Family Physicians in Improving Compliance to Lifestyle Modification. *Asian J Diabetol.* 2009;11(2):9–14.

71. World Health Organization. Best buys' and other recommended interventions for the prevention and control of non-communicable diseases [Internet]. 2017 [cited 2017 Aug 5]. Available from: [http://www.who.int/ncds/management/WHO\\_Appendix\\_BestBuys.pdf](http://www.who.int/ncds/management/WHO_Appendix_BestBuys.pdf)
72. Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, et al. Priority actions for the non-communicable disease crisis. *The Lancet*. 2011 Apr 23;377(9775):1438–47.
73. Zühlke LJ, Engel ME. The Importance of Awareness and Education in Prevention and Control of RHD. *Glob Heart*. 2013 Sep 1;8(3):235–9.
74. Hunter DJ, Reddy KS. Non-communicable Diseases. *N Engl J Med*. 2013 Oct 3;369(14):1336–43.
75. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014 Feb 5;311(5):507–20.
76. Chung KF, Wenzel SE, Brozek JL, Bush A, Castro M, Sterk PJ, et al. International ERS/ATS guidelines on definition, evaluation and treatment of severe asthma. *Eur Respir J*. 2013 Jan 1;erj02020-2013.
77. Ministère de la Santé Publique (MSP). Etat des Lieux du Secteur de la santé en RDC 2009 [Internet]. Kinshasa; 2015 Dec [cited 2017 Jul 13]. Available from: <http://espkinshasa.net/etat-des-lieux-du-secteur-de-la-sante-en-rdc-1998/>
78. Ministère de la Santé Publique (MSP). Rapport de l'Etat des lieux des ITM et IEM de la RDC [Internet]. 2009 [cited 2017 Jul 13]. Available from: <http://www.nyankunde.org/istm/RAPPORT%20DE%20L%27ISTM%202009-2010.pdf>
79. Fujita N, Zwi AB, Nagai M, Akashi H. A Comprehensive Framework for Human Resources for Health System Development in Fragile and Post-Conflict States. *PLOS Med*. 2011 Dec 20;8(12):e1001146.
80. Ministère de la Santé Publique RDC. Plan national de développement de Ressources Humaines pour la Santé en RDC 2011-2015 [Internet]. Kinshasa; 2011 [cited 2017 Jul 13]. Available from: <http://www.minisante-rhs.cd/index.php/plan-national-de-drhs>
81. World Health Organization. Median availability of selected generic medicines - Data by country Uganda [Internet]. WHO. [cited 2017 Jul 13]. Available from: <http://apps.who.int/gho/data/node.main.488?lang=en>
82. Roome E, Raven J, Martineau T. Human resource management in post-conflict health systems: review of research and knowledge gaps. *Confl Health*. 2014;8(1):18.
83. Bertone MP, Lurton G, Mutombo PB. Investigating the remuneration of health workers in the DR Congo: implications for the health workforce and the health system in a fragile setting. *Health Policy Plan*. 2016 Nov 1;31(9):1143–51.
84. Maini R, Hotchkiss DR, Borghi J. A cross-sectional study of the income sources of primary care health workers in the Democratic Republic of Congo. *Hum Resour Health*. 2017;15(1):17.
85. World Health Organization. Monitoring the building blocs of health systems:a handbook of indicators and their measurement strategies [Internet]. Geneva; 2010 [cited 2017 Aug 7].



Available from:

[http://www.who.int/healthinfo/systems/WHO\\_MBHSS\\_2010\\_full\\_web.pdf?ua=1](http://www.who.int/healthinfo/systems/WHO_MBHSS_2010_full_web.pdf?ua=1)

86. Speybroeck N, Kinfu Y, Dal Poz MR, Evans DB. Reassessing the relationship between human resources for health, intervention coverage and health outcomes. *Backgr Pap Prep World Health Rep.* 2006;2006.
87. Kruk ME, Prescott MR, de Pinho H, Galea S. Are doctors and nurses associated with coverage of essential health services in developing countries? A cross-sectional study. *Hum Resour Health.* 2009 Mar 31;7:27.
88. Talwar K, Grover A, Thakur J. Role of Medical Education in Preventing and Control of Noncommunicable Diseases in India? *Indian J Community Med Off Publ Indian Assoc Prev Soc Med.* 2011 Dec;36(Suppl1):S63–6.
89. World Health Organization. Monitoring and surveillance of NCDs [Internet]. WHO. [cited 2017 Aug 5]. Available from: <http://www.who.int/entity/ncds/surveillance/introduction/en/index.html>
90. Kroll M, Phalkey RK, Kraas F. Challenges to the surveillance of non-communicable diseases – a review of selected approaches. *BMC Public Health [Internet].* 2015 Dec 16;15. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4682212/>
91. Gouda HN, Richards NC, Beaglehole R, Bonita R, Lopez AD. Health information priorities for more effective implementation and monitoring of non-communicable disease programs in low-and middle-income countries: lessons from the Pacific. *BMC medicine.* 2015 Sep 21;13(1):233.
92. Ministère de la Santé Publique (MSP). Rapport narratif Profil pharmaceutique de la RDC 2011 [Internet]. Kinshasa; 2011 [cited 2017 Jul 13]. Available from: <http://www.asrames.org/wp-content/uploads/2016/07/RAPPORT-NARRATIF-PROFIL-PHARMACEUTIQUE-DE-LA-REPUBLIQUE-DEMOCRATIQUE-DU-CONGO-2011.pdf>
93. Ministère de la Santé Publique (MSP) RDC. Liste nationale des médicaments essentiels. Révision Mars 2010 [Internet]. Kinshasa; 2010 [cited 2017 Jul 13]. Available from: <http://apps.who.int/medicinedocs/documents/s18817fr/s18817fr.pdf>
94. MSF USA. Empty Shelves, Come Back Tomorrow: ARV Stock Outs Undermine Efforts to Fight HIV [Internet]. 2015 Nov [cited 2017 Jul 13]. Available from: <http://www.doctorswithoutborders.org/article/empty-shelves-come-back-tomorrow-arv-stock-outs-undermine-efforts-fight-hiv>
95. Kohler JC, Pavignani E, Michael M, Ovtcharenko N, Murru M, Hill PS. An examination of pharmaceutical systems in severely disrupted countries. *BMC Int Health Hum Rights.* 2012;12(1):34.
96. Ministère de la Santé Publique (MSP), Programme National d'Approvisionnement en Médicaments Essentiels (PNAM). Enquête sur les prix des médicaments en République Démocratique du Congo [Internet]. Kinshasa; 2017 Juillet [cited 2017 Jul 13]. Available from: <http://haiweb.org/wp-content/uploads/2015/07/DRC-Report-Pricing-Surveys.pdf>
97. Azevedo M, Alla S. Diabetes in Sub-Saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia. *Int J Diabetes Dev Ctries.* 2008;28(4):101–8.

98. Ministère de la Santé Publique (MSP) RDC. Rapport sur les comptes de la santé – République Démocratique du Congo 2014 [Internet]. [cited 2017 Aug 11]. Available from: <http://www.document.minisanterdc.cd/index.php/direction/157-rapport-sur-les-comptes-de-la-sante-republique-democratique-du-congo-2014>
99. World Health Organization. The world health report –Health system financing: the path to Universal health coverage [Internet]. Geneva; 2010 [cited 2017 Jul 13]. Available from: [http://apps.who.int/iris/bitstream/10665/44371/1/9789241564021\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44371/1/9789241564021_eng.pdf)
100. UNAIDS, UNICEF, UNFPA, WHO. NCD Joint programming mission DRC, 13-17 July 2015 [Internet]. 2017 Apr [cited 2017 Aug 12]. Available from: <http://www.who.int/ncds/un-task-force/country-missions/progressreport-2017-drc.pdf?ua=1>
101. Rajan D, Kalambay H, Mossoko M, Kwete D, Bulakali J, Lokonga J-P, et al. Health service planning contributes to policy dialogue around strengthening district health systems: an example from DR Congo 2008-2013. *BMC Health Serv Res.* 2014;14(1):522.
102. Soeters R, Peerenboom PB, Mushagalusa P, Kimanuka C. Performance-Based Financing Experiment Improved Health Care In The Democratic Republic Of Congo. *Health Aff (Millwood).* 2011 Aug 1;30(8):1518–27.
103. Ponsar F, Tayler-Smith K, Philips M, Gerard S, Van Herp M, Reid T, et al. No cash, no care: how user fees endanger health—lessons learnt regarding financial barriers to healthcare services in Burundi, Sierra Leone, Democratic Republic of Congo, Chad, Haiti and Mali. *Int Health.* 2011 Jun 1;3(2):91–100.
104. Volman B, Laing R, Reed T, Ewen MM. Direct costs and availability of diabetes medicines in low-income and middle-income countries. *WHO Health Action Int Geneva Amst.* 2008;
105. Ministère de la Santé Publique (MSP) RDC. Programmes spécialisés [Internet]. [cited 2017 Jul 30]. Available from: <http://www.minisanterdc.cd/new/index.php/sample-sites>
106. Ministère de la Santé Publique (MSP) RDC. Programmes [Internet]. [cited 2017 Jul 14]. Available from: <http://www.minisanterdc.cd/new/index.php/sample-sites>
107. Gouvernement RDC. Arrêté ministériel n° 008/CAB/MIN.INFO.PRES & COM.NAT./2007 du 09 juillet 2007 modifiant et complétant l'Arrêté ministériel n° 04/MCP/009/2002 du 15 octobre 2002 fixant les critères d'appréciation de la publicité sur le tabac et boissons alcoolisées [Internet]. Kinshasa; 2007 Juillet [cited 2017 Jul 14]. Available from: <http://www.leganet.cd/Legislation/Droit%20economique/Reglementationproduits/AM.008.09.07.2007.htm>
108. American Cancer Society, World Lung Foundation. The Tobacco Atlas, Democratic Republic of the Congo [Internet]. [cited 2017 Jul 14]. Available from: <http://www.tobaccoatlas.org/country-data/democratic-republic-congo/>
109. Institute for Health Metrics and Evaluation. Democratic Republic of the Congo - Kinshasa Global Youth Tobacco Survey 2008 [Internet]. [cited 2017 Jul 14]. Available from: <http://ghdx.healthdata.org/record/democratic-republic-congo-kinshasa-global-youth-tobacco-survey-2008>
110. World Health Organization. WHO Report on the Global Tobacco Epidemic, 2015 Country profile Democratic Republic of the Congo [Internet]. Geneva; 2015 [cited 2017 Jul 14].

Available from:

[http://www.who.int/tobacco/surveillance/policy/country\\_profile/cod.pdf?ua=1](http://www.who.int/tobacco/surveillance/policy/country_profile/cod.pdf?ua=1).

111. Tumwine J. Implementation of the Framework Convention on Tobacco Control in Africa: Current Status of Legislation. *Int J Environ Res Public Health*. 2011 Nov 17;8(11):4312–31.
112. Gouvernement RDC. Loi n° 08/002 du 16 mai 2008 modifiant et complétant l'Ordonnance-loi n° 68/010 du 06 janvier 1968 relative aux droits d'accises et de consommation et au régime des boissons alcooliques [Internet]. [cited 2017 Jul 14]. Available from: <http://www.leganet.cd/Legislation/Dfiscal/Accisices/Loi.16.05.2008.htm>
113. International Diabetes Federation. Members: DRC [Internet]. [cited 2017 Jul 14]. Available from: <https://www.idf.org/our-network/regions-members/africa/members/6-democratic.html>
114. Bonita R, Magnusson R, Bovet P, Zhao D, Malta DC, Geneau R, et al. Country actions to meet UN commitments on non-communicable diseases: a stepwise approach. *The Lancet*. 2013 Feb 16;381(9866):575–84.
115. World Health Organization. Health System Governance for Universal Health Coverage. Action Plan [Internet]. Geneva; 2014 [cited 2017 Aug 8]. Available from: [http://www.who.int/universal\\_health\\_coverage/plan\\_action-hsgov\\_uhc.pdf](http://www.who.int/universal_health_coverage/plan_action-hsgov_uhc.pdf)
116. Bousquet J, Anto JM, Sterk PJ, Adcock IM, Chung KF, Roca J, et al. Systems medicine and integrated care to combat chronic non-communicable diseases. *Genome Med*. 2011 Jul 6;3:43.
117. Magnusson RS, Patterson D. The role of law and governance reform in the global response to non-communicable diseases. *Glob Health*. 2014 Jun 5;10:44.
118. Moodie R, Stuckler D, Monteiro C, Sheron N, Neal B, Thamarangsi T, et al. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *The Lancet*. 2013 Feb 23;381(9867):670–9.
119. Nakisige C, Schwartz M, Ndira AO. Cervical cancer screening and treatment in Uganda. *Gynecol Oncol Rep*. 2017 May 1;20:37–40.
120. Partners in Health. Faster, Better Care for Breast Cancer in Rwanda [Internet]. [cited 2017 Jul 24]. Available from: <http://www.pih.org/blog/faster-better-care-for-breast-cancer-in-Rwanda>
121. Stanifer JW, Cleland CR, Makuka GJ, Egger JR, Maro V, Maro H, et al. Prevalence, Risk Factors, and Complications of Diabetes in the Kilimanjaro Region: A Population-Based Study from Tanzania. *PLOS ONE*. 2016 Oct 6;11(10):e0164428.
122. Lyimo FS, Beran TN. Demographic, knowledge, attitudinal, and accessibility factors associated with uptake of cervical cancer screening among women in a rural district of Tanzania: three public policy implications. *BMC Public Health*. 2012;12(1):22.
123. Rambau P, Masalu N, Jackson K, Chalya P, Serra P, Bravaccini S. Triple negative breast cancer in a poor resource setting in North-Western Tanzania: a preliminary study of 52 patients. *BMC Res Notes*. 2014;7(1):399.
124. Nnko S, Bukenya D, Kavishe BB, Biraro S, Peck R, Kapiga S, et al. Chronic Diseases in North-West Tanzania and Southern Uganda. Public Perceptions of Terminologies, Aetiologies, Symptoms and Preferred Management. *PLOS ONE*. 2015 Nov 10;10(11):e0142194.

125. World Health Organization. Cancer Country Profile, Burundi 2014 [Internet]. [cited 2017 Jul 24]. Available from: [http://www.who.int/cancer/country-profiles/bdi\\_en.pdf](http://www.who.int/cancer/country-profiles/bdi_en.pdf)
126. Marsden EJ, Somwe SW, Chabala C, Soriano JB, Vallès CP, Anchochea J. Knowledge and perceptions of asthma in Zambia: a cross-sectional survey. *BMC Pulm Med*. 2016;16(1):33.
127. Oelke ND, Rush KL, Goma FM, Barker J, Marck P, Pedersen C. Understanding Perceptions and Practices for Zambian Adults in Western Province at Risk for Hypertension: An Exploratory Descriptive Study. *Glob J Health Sci*. 2016 Feb;8(2):248–59.
128. Pires JE, Sebastião YV, Langa AJ, Nery SV. Hypertension in Northern Angola: prevalence, associated factors, awareness, treatment and control. *BMC Public Health*. 2013;13(1):90.
129. Tavares H dos P, Tavares SBMP, Natanel FA, Capingana DP. Knowledge and Attitude of Patients, and Practice of the Arrest of Breast Cancer in Outpatient Consultations in Mastology at the General Hospital of Huambo, Angola. *Clin Med Insights Womens Health*. 2015 Aug 25;8:7–12.
130. Sambanje MN, Mafuvadze B. Breast cancer knowledge and awareness among university students in Angola. *Pan Afr Med J*;11(1).
131. Lopes LV, Miguel F, Freitas H, Tavares A, Pangui S, Castro C, et al. Stage at presentation of breast cancer in Luanda, Angola-a retrospective study. *BMC Health Serv Res*. 2015;15(1):471.
132. Ikama SM, Nsitou BM, Makani J, Ellenga-Mbolla B, Ondze-Kafata LI, Mongo-Ngamami SF, et al. Pratique de la mesure ambulatoire de la pression artérielle à Brazzaville (Congo): données préliminaires. *Pan Afr Med J*. 2015 Apr 14;20.
133. Gombé MC, Diouf D, Nkoua MJ, Minga B, Makouanzi NS, Nsondé MJ. Arrival of patients at advanced stage: tempting to identify responsibility. *Bull Cancer (Paris)*. 2013;100(2):167–72.
134. Rogers H. Assessment of the capacity of Ugandan health facilities, personnel, and resources to prevent and control non-communicable diseases [Internet] [M.P.H.]. [United States -- Connecticut]: Yale University; 2014.
135. Kamanzi J-B, Adeduntan R, Antoni D, Musafiri S, Noël G. Implementing radiotherapy in Africa: Focus on the needs in Rwanda. *Cancer/Radiothérapie*. 2016 May 1;20(3):231–5.
136. Peck R, Mghamba J, Vanobberghen F, Kavishe B, Rugarabamu V, Smeeth L, et al. Preparedness of Tanzanian health facilities for outpatient primary care of hypertension and diabetes: a cross-sectional survey. *Lancet Glob Health*. 2014 May;2(5):e285–92.
137. Ntagirabiri R, Karayuba R, Ndayisaba G, Niyonkuru S, Marebo S, Maregwa G. Cancer de l'estomac à Bujumbura : bilan de 22 ans au centre hospitalo-universitaire de Kamenge. *J Afr Hépatogastroentérologie*. 2016 Oct 1;10(3):121–4.
138. World Health Organization. Maladies non transmissibles et états de santé connexes, Burundi [Internet]. [cited 2017 Jul 24]. Available from: [http://www.aho.afro.who.int/profiles\\_information/index.php/Burundi:Non-communicable\\_diseases\\_and\\_conditions/fr](http://www.aho.afro.who.int/profiles_information/index.php/Burundi:Non-communicable_diseases_and_conditions/fr)
139. Maliti BK. Management of retinoblastoma in Zambia. *Asia-Pacific Journal of Oncology Nursing*. 2017 Jul 1;4(3):184.

140. Katende D, Mutungi G, Baisley K, Biraro S, Ikoona E, Peck R, et al. Readiness of Ugandan health services for the management of outpatients with chronic diseases. *Trop Med Int Health*. 2015 Oct 1;20(10):1385–95.
141. Wa Somwe S, Jumbe-Marsden E, Mateyo K, Senkwe MN, Sotomayor-Ruiz M, Musuku J, et al. Improving paediatric asthma care in Zambia. *Bull World Health Organ*. 2015 Oct;93(10):732–6.
142. Urasa M, Darj E. Knowledge of cervical cancer and screening practices of nurses at a regional hospital in Tanzania. *African health sciences*. 2011;11(1).
143. Niyonsavye L. Knowledge, Attitudes And Practices On Diabetic Retinopathy [Internet]. 2015 [cited 2017 Jul 24].
144. Kalyesubula R, Kayongo A, Semitala FC, Muhanguzi A, Katantazi N, Ayers D, et al. Trends and level of control of hypertension among adults attending an ambulatory HIV clinic in Kampala, Uganda: a retrospective study. *BMJ Glob Health*. 2016 Nov 1;1(3):e000055.
145. The foundation for cancer care in Tanzania. Meeting the challenge of cancer care in Northern Tanzania. A program for comprehensive and sustainable care [Internet]. [cited 2017 Jul 24]. Available from: <http://tanzaniacancercare.org/wp-content/uploads/2015/07/FCCT-White-Paper.pdf>
146. Noorani M, Ramaiya K, Manji K. Glycaemic control in type 1 diabetes mellitus among children and adolescents in a resource limited setting in Dar es Salaam-Tanzania. *BMC Endocr Disord*. 2016;16(1):29.
147. Mukama LJ, Moran A, Nyindo M, Philemon R, Msuya L. Improved glyceemic control and acute complications among children with type 1 diabetes mellitus in Moshi, Tanzania. *Pediatr Diabetes*. 2013 May 1;14(3):211–6.
148. Stanifer JW, Turner EL, Egger JR, Thielman N, Karia F, Maro V, et al. Knowledge, Attitudes, and Practices Associated with Chronic Kidney Disease in Northern Tanzania: A Community-Based Study. *PLOS ONE*. 2016 Jun 9;11(6):e0156336.
149. Nsabiyumva F, Ndikubagenzi J, Baransaka E, Harindavyi H. Aspects épidémiologiques et cliniques de 3620 diabétiques suivis au Centre de Lutte Contre le Diabète au Burundi Etude rétrospective sur six ans. *Médecine Afr Noire*. 2011;58(7):345–9.
150. Yan LD, Chi BH, Sindano N, Bosomprah S, Stringer JS, Chilengi R. Prevalence of hypertension and its treatment among adults presenting to primary health clinics in rural Zambia: analysis of an observational database. *BMC Public Health*. 2015;15(1):933.
151. Musenge EM, Michelo C, Mudenda B, Manankov A. Glycaemic Control and Associated Self-Management Behaviours in Diabetic Outpatients: A Hospital Based Observation Study in Lusaka, Zambia. *Journal of diabetes research*. 2015 Dec 21;2016.
152. Musenge EM, Manankov A, Mudenda B, Michelo C. Glycaemic control in diabetic patients in Zambia. *The Pan African medical journal*. 2014;19.
153. Miguel F, Conceição AV, Lopes LV, Bernardo D, Monteiro F, Bessa F, et al. Establishing of cancer units in low or middle income african countries: angolan experience - a preliminary report. *Pan Afr Med J [Internet]*. 2014 Nov 17;19. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4393956/>

154. Ikama MS, Nsitou BM, Makani J, Nkalla-Lambi M, Passi-Louamba C. Hypertension artérielle et niveau de contrôle à Brazzaville (Congo) : place du Holter tensionnel. *Ann Cardiol Angéiologie*. 2015 Apr 1;64(2):76–80.
155. Hogerzeil HV, Liberman J, Wirtz VJ, Kishore SP, Selvaraj S, Kiddell-Monroe R, et al. Promotion of access to essential medicines for non-communicable diseases: practical implications of the UN political declaration. *The Lancet*. 2013 Feb 23;381(9867):680–9.
156. Ministry of Health Uganda. Strategic Plan for Cervical Cancer Prevention and Control in Uganda 2010–2014 [Internet]. [cited 2017 Jul 24]. Available from: [http://www.rho.org/files/PATH\\_Uganda\\_cxca\\_strat\\_plan\\_2010-2014.pdf](http://www.rho.org/files/PATH_Uganda_cxca_strat_plan_2010-2014.pdf)
157. Chamie G, Kwarisiima D, Clark TD, Kabami J, Jain V, Geng E, et al. Leveraging Rapid Community-Based HIV Testing Campaigns for Non-Communicable Diseases in Rural Uganda. *PLOS ONE*. 2012 Aug 20;7(8):e43400.
158. Narayan KMV, Ali MK, del Rio C, Koplan JP, Curran J. Global Noncommunicable Diseases – Lessons from the HIV–AIDS Experience. *N Engl J Med*. 2011 Sep 8;365(10):876–8.
159. Mukama T, Ndejjo R, Musabyimana A, Halage AA, Musoke D. Women’s knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda. *BMC Womens Health*. 2017;17(1):9.
160. Ministry of Health Uganda. Uganda Cancer Institute [Internet]. 2017 [cited 2017 Jul 24]. Available from: <http://www.health.go.ug/projects/uganda-cancer-institute>
161. Alleyne G, Binagwaho A, Haines A, Jahan S, Nugent R, Rojhani A, et al. Embedding non-communicable diseases in the post-2015 development agenda. *The Lancet*. 2013 Feb 16;381(9866):566–74.
162. Binagwaho A, Wagner CM, Gatera M, Karema C, Nutt CT, Ngabo F. Achieving high coverage in Rwanda’s national human papillomavirus vaccination programme. *Bull World Health Organ*. 2012 Aug;90(8):623–8.
163. Binagwaho A, Ngabo F, Wagner CM, Mugeni C, Gatera M, Nutt CT, et al. Integration of comprehensive women’s health programmes into health systems: cervical cancer prevention, care and control in Rwanda. *Bull World Health Organ*. 2013;91(9):697–703.
164. Pace LE, Mpunga T, Hategekimana V, Dusengimana J-MV, Habineza H, Bigirimana JB, et al. Delays in Breast Cancer Presentation and Diagnosis at Two Rural Cancer Referral Centers in Rwanda. *The Oncologist*. 2015 Jul 1;20(7):780–8.
165. World Health Organization. Diabetes country profile, Rwanda [Internet]. [cited 2017 Jul 24]. Available from: [http://www.who.int/diabetes/country-profiles/rwa\\_en.pdf?ua=1](http://www.who.int/diabetes/country-profiles/rwa_en.pdf?ua=1)
166. Association of Private Health Facilities in Tanzania. Non-communicable disease Programme, 2011 [Internet]. [cited 2017 Jul 24]. Available from: [http://www.aphfta.org/index.php?option=com\\_content&view=article&id=115&Itemid=154](http://www.aphfta.org/index.php?option=com_content&view=article&id=115&Itemid=154)
167. Cunningham MS, Skrastins E, Fitzpatrick R, Jindal P, Oneko O, Yeates K, et al. Cervical cancer screening and HPV vaccine acceptability among rural and urban women in Kilimanjaro Region, Tanzania. *BMJ Open*. 2015 Mar 1;5(3):e005828.

168. Frank M, Bwemero J, Kalunga D, Sangu W, Semeni S, Hamisi M, et al. OA60 Public health and palliative care mix; a ccpmedicine approach to reverse the overgrowing burden of non-communicable diseases in tanzania. *BMJ Support Palliat Care*. 2015 Apr 1;5(Suppl 1):A19–A19.
169. Abbas ZG, Lutale JK, Bakker K, Baker N, Archibald LK. The “Step by Step” Diabetic Foot Project in Tanzania: a model for improving patient outcomes in less-developed countries. *Int Wound J*. 2011 Apr 1;8(2):169–75.
170. Backhaus J, Yacoub L, Kambaris A, Wright G, Yacoub MH. The Burundi Heart Centre: From concept to design. *Global Cardiology Science and Practice*. 2015 Jul 4:22.
171. Parham GP, Mwanahamuntu MH, Kapambwe S, Muwonge R, Bateman AC, Blevins M, et al. Population-Level Scale-Up of Cervical Cancer Prevention Services in a Low-Resource Setting: Development, Implementation, and Evaluation of the Cervical Cancer Prevention Program in Zambia. *PLOS ONE*. 2015 Apr 17;10(4):e0122169.
172. White HL, Mulambia C, Sinkala M, Mwanahamuntu MH, Parham GP, Kapambwe S, et al. Motivations and experiences of women who accessed “see and treat” cervical cancer prevention services in Zambia. *J Psychosom Obstet Gynecol*. 2012 Jun 1;33(2):91–8.
173. Liu FW, Vwalika B, Hacker MR, Allen S, Awtrey CS. Cervical cancer and HPV vaccination: Knowledge and attitudes of adult women in Lusaka, Zambia. *Journal of vaccines & vaccination*. 2012 Jun 12;3(138).
174. Aantjes C, Quinlan T, Bunders J. Integration of community home based care programmes within national primary health care revitalisation strategies in Ethiopia, Malawi, South-Africa and Zambia: a comparative assessment. *Glob Health*. 2014;10(1):85.
175. Lopes LV, Conceição AV, Oliveira JB, Tavares A, Domingos C, Santos LL. Cancer in Angola, resources and strategy for its control. *Pan African Medical Journal*. 2012;12(1).
176. LeBaron VT. Implementing a palliative care nurse leadership fellowship program in Uganda. In *Oncology nursing forum* 2016 May (Vol. 43, No. 3, p. 395).
177. Government of Tanzania. BRN Health care NKRA Lab: Lab report part 1 [Internet]. 2015 [cited 2017 Jul 24]. Available from: [http://www.tzdpg.or.tz/fileadmin/documents/dpg\\_internal/dpg\\_working\\_groups\\_clusters/cluster\\_2/health/Sub\\_Sector\\_Group/BRN\\_documents/Tanz\\_Healthcare\\_Lab\\_Report\\_Part\\_1\\_0212\\_RH\\_-\\_v21\\_Final\\_Lab\\_Report\\_.pdf](http://www.tzdpg.or.tz/fileadmin/documents/dpg_internal/dpg_working_groups_clusters/cluster_2/health/Sub_Sector_Group/BRN_documents/Tanz_Healthcare_Lab_Report_Part_1_0212_RH_-_v21_Final_Lab_Report_.pdf)
178. World Health Organization. WHO country cooperation strategy at a glance: Burundi [Internet]. 2015 [cited 2017 Jul 24]. Available from: <http://www.who.int/iris/handle/10665/137042>
179. World Health Organization, African Health Observatory. ANGOLA FactsheetsofHealthStatistics 2016 [Internet]. 2016 [cited 2017 Jul 24]. Available from: [http://www.aho.afro.who.int/profiles\\_information/images/b/ba/Angola-Statistical\\_Factsheet.pdf](http://www.aho.afro.who.int/profiles_information/images/b/ba/Angola-Statistical_Factsheet.pdf)
180. World Health Organization. Human resources for health. Congo [Internet]. [cited 2017 Jul 24]. Available from: <http://www.who.int/workforcealliance/countries/cog/en/>

181. World Health Organization. Global health Observatory (GHO) data. Country statistics [Internet]. WHO. [cited 2017 Aug 8]. Available from: <http://www.who.int/gho/countries/en/>
182. Aantjes CJ, Quinlan TK, Bunders JF. Practicalities and challenges in re-orienting the health system in Zambia for treating chronic conditions. *BMC Health Serv Res.* 2014;14(1):295.
183. Kwesigabo G, Mwangu MA, Kakoko DC, Killewo J. Health challenges in Tanzania: Context for educating health professionals. *J Public Health Policy.* 2012 Dec 1;33(1):S23–34.
184. Maree JE, Mulonda JK. Caring for Patients with Advanced Breast Cancer: The Experiences of Zambian Nurses. *Asia-Pac J Oncol Nurs.* 2017;4(1):23–8.
185. Scheil-Adlung X, Scheil-Adlung X. Health workforce benchmarks for universal health coverage and sustainable development. *Bull World Health Organ.* 2013 Nov;91(11):888–888.
186. Sato M, Maufi D, Mwingira UJ, Leshabari MT, Ohnishi M, Honda S. Measuring three aspects of motivation among health workers at primary level health facilities in rural Tanzania. *PLOS ONE.* 2017 May 5;12(5):e0176973.
187. Costa Mendes I a., Marchi-Alves L m., Mazzo A, Nogueira M s., Trevizan M a., de Godoy S, et al. Healthcare context and nursing workforce in a main city of Angola. *Int Nurs Rev.* 2013 Mar 1;60(1):37–44.
188. Kakoma JB. Postgraduate and research programmes in Medicine and Public Health in Rwanda: an exciting experience about training of human resources for health in a limited resources country. *Pan African Medical Journal.* 2016;23(1).
189. PIH. Integration of Chronic Care Services in Rwanda [Internet]. [cited 2017 Jul 24]. Available from: [https://act.pih.org/page/-/publications/NCD-Chapter-1-integration\\_of-Chronic-Care-Services.pdf](https://act.pih.org/page/-/publications/NCD-Chapter-1-integration_of-Chronic-Care-Services.pdf)
190. Davila EP, Suleiman Z, Mghamba J, Rolle I, Ahluwalia I, Mmbuji P, et al. Non-communicable disease training for public health workers in low- and middle-income countries: lessons learned from a pilot training in Tanzania. *Int Health.* 2015 Sep 1;7(5):339–47.
191. Kiberu VM, Matovu JK, Makumbi F, Kyozi C, Mukooyo E, Wanyenze RK. Strengthening district-based health reporting through the district health management information software system: the Ugandan experience. *BMC Med Inform Decis Mak.* 2014;14(1):40.
192. Muhindo R, Joloba EN, Nakanjako D. Health Management Information System (HMIS); Whose Data is it Anyway? Contextual Challenges. *Rev Public Adm Manag .* 2016 Jul 2 [cited 2017 Jul 25];
193. Global Health Initiative. Global Health Initiative Strategy 2011-2015 [Internet]. 2011 [cited 2017 Jul 25]. Available from: <https://www.ghi.gov/wherewework/docs/BurundiStrategy.pdf>
194. Moucheraud C, Schwitters A, Boudreaux C, Giles D, Kilmarx PH, Ntolo N, et al. Sustainability of health information systems: a three-country qualitative study in southern Africa. *BMC Health Serv Res.* 2017;17(1):23.
195. Catherine C, Denise E, Maria M. Angola Health System Assessment 2010 [Internet]. 2010 Jul [cited 2017 Jul 26]. Available from: <https://www.hfgproject.org/angola-health-system-assessment-2010/>



196. World Health Organization. Congo:Health information, research, evidence and knowledge [Internet]. [cited 2017 Jul 26]. Available from: [http://www.who.int/profiles\\_information/index.php/Congo:Health\\_information\\_research\\_evidence\\_and\\_knowledge#Stockage\\_et\\_diffusion\\_de\\_l27information.2C\\_bases\\_factuelles\\_et\\_connaissances](http://www.who.int/profiles_information/index.php/Congo:Health_information_research_evidence_and_knowledge#Stockage_et_diffusion_de_l27information.2C_bases_factuelles_et_connaissances)
197. Karara G, Verbeke F, Nyssen M. The Role of Hospital Information Systems in Universal Health Coverage Monitoring in Rwanda. In *MedInfo 2015* Aug 12 (pp. 193-197).
198. World Health Organization. Cancer Country Profile, Rwanda 2014 [Internet]. [cited 2017 Jul 24]. Available from: [http://www.who.int/cancer/country-profiles/rwa\\_fr.pdf?ua=1](http://www.who.int/cancer/country-profiles/rwa_fr.pdf?ua=1)
199. National Bureau of Statistics Tanzania, ICF. Tanzania Demographic and Health Survey 2010. 2011 [cited 2017 Jul 24]; Available from: <http://dhsprogram.com/publications/publication-fr243-dhs-final-reports.cfm>
200. Ministère de la Santé Publique et de la Lutte contre le Sida Burundi. Manuel des normes et procédures de gestion du Système national d'information sanitaire – Mesure Evaluation [Internet]. [cited 2017 Jul 25]. Available from: <https://www.measureevaluation.org/resources/publications/sr-16-131-fr>
201. Verbeke F, Hategekimana T, Karara G, Ly O, Nimburanira M, Kayembe C, Nyssen M. Information Systems for Monitoring the Burden of Chronic Diseases in Public Reference Health Facilities in Central Africa. *Journal of Health Informatics in Africa*. 2013 Sep 25;1(1).
202. Nsondé MJ, Nkoua MJ, Bambara AT, Ibara G, Minga B, Nkoua EB, et al. Twelve years of working of Brazzaville cancer registry. *Bull Cancer (Paris)*. 2013;100(2):135–9.
203. Vialle-Valentin CE, Serumaga B, Wagner AK, Ross-Degnan D. Evidence on access to medicines for chronic diseases from household surveys in five low- and middle-income countries. *Health Policy Plan*. 2015 Oct 1;30(8):1044–52.
204. World Health Organization. Contaminated Isotab® (isosorbide mononitrate) incident in Lahore Pakistan [Internet]. 2012 Feb [cited 2017 Jul 24]. Available from: <http://www.who.int/medicines/publications/drugalerts/DrugSafetyAlert125.pdf?ua=1>
205. Yohana E, Kamuhabwa A, Mujinja P. Availability and affordability of anticancer medicines at the Ocean Road Cancer Institute in Dar es Salaam, Tanzania. *East Afr J Public Health*. 2011 Jan 1;8(1):51–6.
206. World Health Organization. Diabetes Country Profile, Burundi 2014 [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/diabetes/country-profiles/bdi\\_en.pdf?ua=1](http://www.who.int/diabetes/country-profiles/bdi_en.pdf?ua=1)
207. World Health Organization. Health Action in crisis, Angola [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/hac/crises/ago/background/Angola\\_Dec05.pdf](http://www.who.int/hac/crises/ago/background/Angola_Dec05.pdf)
208. World Health Organization. Tanzania making steady progress in access to essential medicines and health products as new challenges emerge [Internet]. WHO. [cited 2017 Jul 24]. Available from: <http://www.who.int/medicines/about/country-stories/tanzania-overview/en/>
209. Schwartz JI, Guwatudde D, Nugent R, Kiiza CM. Looking at non-communicable diseases in Uganda through a local lens: an analysis using locally derived data. *Glob Health*. 2014;10(1):77.

210. World Health Organization. The Abuja Declaration: Ten Years On [Internet]. [cited 2017 Aug 4]. Available from: <http://www.who.int/healthsystems/publications/Abuja10.pdf>
211. Nyandekwe M, Nzayirambaho M, Kakoma JB. Universal health coverage in Rwanda: dream or reality. *The Pan African Medical Journal*. 2014;17.
212. Cailhol J, Craveiro I, Madede T, Makoa E, Mathole T, Parsons AN, et al. Analysis of human resources for health strategies and policies in 5 countries in Sub-Saharan Africa, in response to GFATM and PEPFAR-funded HIV-activities. *Glob Health*. 2013;9(1):52.
213. Sundewall J, Forsberg BC, Jönsson K, Chansa C, Tomson G. The Paris Declaration in practice: challenges of health sector aid coordination at the district level in Zambia. *Health Res Policy Syst*. 2009;7(1):14.
214. World Health Organization. Congo Fact sheets of Health Statistics 2016 [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/profiles\\_information/images/d/dd/Congo-Statistical\\_Factsheet.pdf](http://www.who.int/profiles_information/images/d/dd/Congo-Statistical_Factsheet.pdf)
215. Ministry of Health Uganda. Non-communicable diseases [Internet]. [cited 2017 Jul 24]. Available from: <http://www.health.go.ug/MoH/comm.php>
216. World Health Organization. Non-communicable diseases Country Profile 2014, Rwanda [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/nmh/countries/rwa\\_en.pdf](http://www.who.int/nmh/countries/rwa_en.pdf)
217. Mfinangai S, Kivuyo S, Ezekiel L, Ngadaya E, Mghamba J, Ramaiya K. Public health concern and initiatives on the priority action towards non-communicable diseases in Tanzania. *Tanzan J Health Res*. 2011;13(5 Suppl 1):365–77.
218. NCD Alliance. Strategic Plan 2016-2020, NCD Alliance [Internet]. [cited 2017 Jul 17]. Available from: <https://ncdalliance.org/who-we-are/our-vision-mission-history/strategic-plan-2016-2020>
219. Ministry of Health Rwanda. Non-communicable diseases Policy [Internet]. Kigali; 2015 Mar [cited 2017 Jul 24]. Available from: [http://www.moh.gov.rw/fileadmin/templates/policies/NCDs\\_Policy.2015.pdf](http://www.moh.gov.rw/fileadmin/templates/policies/NCDs_Policy.2015.pdf)
220. Ministry of Health Rwanda. The National Health Research Agenda 2014-2018 [Internet]. 2013. Available from: [http://www.rbc.gov.rw/documentation/opac\\_css/index.php?lvl=notice\\_display&id=1237](http://www.rbc.gov.rw/documentation/opac_css/index.php?lvl=notice_display&id=1237)
221. Binagwaho A, Farmer PE, Nsanzimana S, Karema C, Gasana M, de Dieu Ngirabega J, et al. Rwanda 20 years on: investing in life. *The Lancet*. 2014 Jul 26;384(9940):371–5.
222. Dhillon RS, Phillips J. State capability and Rwanda's health gains. *Lancet Glob Health*. 2015 Jun 1;3(6):e308–10.
223. Alleyne G. Lessons and Leadership in Health. *Int J Health Policy Manag*. 2015 May 30;4(8):553–5.
224. Ministry of Health and Social Welfare. National Noncommunicable disease strategy 2008-2018 [Internet]. Dar Es Salaam; 2008 Jun [cited 2017 Jul 24]. Available from: [http://www.iccp-portal.org/system/files/plans/Tanzania\\_National%20NCD%20strategy\\_2008-1.pdf](http://www.iccp-portal.org/system/files/plans/Tanzania_National%20NCD%20strategy_2008-1.pdf)

225. Ministry of Health and Social Welfare Tanzania. National Cancer Control Strategy (NCCS) 2012-2022 [Internet]. [cited 2017 Jul 24]. Available from: <http://www.iccp-portal.org/system/files/plans/NCSS%20Book.pdf>
226. Ministère de la sante publique et de la lutte contre le sida, Organisation Mondiale de la Santé. Programme national intégré de lutte contre les maladies chroniques non transmissibles. Bujumbura; 2005 Dec.
227. World Health Organization. Joint Mission of the United Nations Interagency Task Force on the Prevention and Control of Non Communicable Diseases Zambia, 5-9 December 2015 [Internet]. [cited 2017 Jul 24]. Available from: <http://www.who.int/ncds/un-task-force/country-missions/joint-mission-zambia.pdf?ua=1>
228. World Health Organization. Non-Communicable diseases Country Profile, Zambia 2014 [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/nmh/countries/zmb\\_en.pdf](http://www.who.int/nmh/countries/zmb_en.pdf)
229. World Health Organization. Non-communicable diseases country profile, Angola 2014 [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/nmh/countries/ago\\_en.pdf](http://www.who.int/nmh/countries/ago_en.pdf)
230. World Health Organization. Non-communicable diseases Country Profile, Congo 2014 [Internet]. Geneva; [cited 2017 Jul 24]. Available from: [http://www.who.int/nmh/countries/cog\\_en.pdf?ua=1](http://www.who.int/nmh/countries/cog_en.pdf?ua=1)
231. Ministry of Health Uganda. The Tobacco Control Act 2015 [Internet]. [cited 2017 Jul 24]. Available from: <http://health.go.ug/content/tobacco-control-act-2015>
232. World Health Organization. Rwanda – Comprehensive tobacco control legislation adopted [Internet]. WHO. [cited 2017 Jul 24]. Available from: [http://www.who.int/fctc/implementation/news/news\\_rwa/en/](http://www.who.int/fctc/implementation/news/news_rwa/en/)
233. Ministry of Health Rwanda. Tobacco control: Rwanda ranked second in EAC [Internet]. [cited 2017 Jul 24]. Available from: [http://www.moh.gov.rw/index.php?id=34&tx\\_ttnews%5Btt\\_news%5D=210&cHash=f8200bcae222a0c67049caf7b3cc81ae](http://www.moh.gov.rw/index.php?id=34&tx_ttnews%5Btt_news%5D=210&cHash=f8200bcae222a0c67049caf7b3cc81ae)
234. World Health Organization. Cancer Country Profile, Tanzania 1014 [Internet]. [cited 2017 Jul 24]. Available from: [http://www.who.int/cancer/country-profiles/tza\\_en.pdf](http://www.who.int/cancer/country-profiles/tza_en.pdf)
235. Yale School of Public Health. Uganda - Integrated Management of NCD [Internet]. [cited 2017 Jul 24]. Available from: <http://publichealth.yale.edu/research/training/ghes/uincd.aspx>
236. Fred Hutch Cancer Center. Uganda [Internet]. [cited 2017 Jul 24]. Available from: <https://www.fredhutch.org/en/labs/vaccine-and-infectious-disease/international-programs/global-oncology/uganda.html>
237. Parliament of Uganda. Uganda Parliamentary Forum on Non-Communicable Diseases (PFNCDS) heightens advocacy for the Tobacco Control Bill 2012 [Internet]. [cited 2017 Jul 24]. Available from: <http://ctc-africa.org/index.php/news/300-uganda-parliamentary-forum-on-non-communicable-diseases-pfncds-heightens-advocacy-for-the-tobacco-control-bill-2012>
238. Global Nutrition Reports. Investing in Civil Society to Promote Accountability to Policy and Governance Commitments on Obesity and Nutrition-Related Noncommunicable Diseases

- [Internet]. [cited 2017 Jul 24]. Available from:  
[http://www.globalnutritionreport.org/files/2014/11/gnr14\\_pn4g\\_18hawkes.pdf](http://www.globalnutritionreport.org/files/2014/11/gnr14_pn4g_18hawkes.pdf)
239. Uganda Cancer Society. UCS launches Advocacy Strategy [Internet]. [cited 2017 Jul 24]. Available from: <https://www.ugandacancersociety.org/>
  240. NCDs Synergies. NCDs, Injuries, and Extreme Poverty [Internet]. [cited 2017 Jul 24]. Available from: <http://ncdsynergies.org/ncds-injuries-poverty/>
  241. World diabetes foundation. Tanzania National NCD Response Programme support WDF06-221 [Internet]. [cited 2017 Jul 17]. Available from: <https://www.worlddiabetesfoundation.org/projects/tanzania-wdf06-221>
  242. Metta E, Msambichaka B, Mwangome M, Nyato DJ, Dieleman M, Haisma H, et al. Public policy, health system, and community actions against illness as platforms for response to NCDs in Tanzania: a narrative review. *Glob Health Action*. 2014 Aug 1;7(s6):23439.
  243. Siddharthan T, Ramaiya K, Yonga G, Mutungi GN, Rabin TL, List JM, et al. Non-communicable Diseases In East Africa: Assessing The Gaps In Care And Identifying Opportunities For Improvement. *Health Aff (Millwood)*. 2015 Sep 1;34(9):1506–13.

## **Annexes**

### **Annex 1. Questionnaire for interviews**

#### **Identification**

- What is your name?
- What is the name of your facility?
- What is your position in the facility?
- For how long have you been working in the position?
- How many doctors and nurses work in your hospital;
- Is your hospital public or private? If private, is it for profit or not for profit
- Is your hospital situated in rural or urban area?

#### **Services**

1. Do you receive people with these conditions: some cancers, diabetes, cardiovascular diseases, chronic respiratory diseases like asthma ...
2. Can you elaborate how you organize the management of these patients? What are the options that you can offer for them in term of diagnostics, treatment
3. Do you have guidelines for the treatment or management of these conditions?
4. How many people in your facility are trained for the management of these conditions? Do you have specialists for them?
5. Can you perform mammography in your hospital? Pap smear? Hepatitis C vaccination?
6. How do you diagnose people with these conditions?
7. Do you have a separate clinic for people with diabetes or hypertension in your hospital?
8. Which drug available in your health facility for these conditions
9. Who pays for medication for these patients? How much it costs for one-week treatment for these patients?
10. Are most of your patients able to pay these services?
11. Where is the nearest Referral Centre where you can refer these patients if needed?
12. What are the preventive measures that are put in place to protect people from getting these diseases in the community where you live?

## Annex 2. List of consulted documents

<b>N o</b>	<b>Document</b>	<b>Type</b>	<b>Author</b>	<b>Year</b>	<b>Country</b>
1	Angola Fact Sheet of Health Statistics 2016	Report	WHO	2016	Angola
2	Health Action in crisis, Angola	Report	WHO		Angola
3	Joint Mission of the United Nations Interagency Task Force on the Prevention and Control of Non Communicable Diseases Zambia	Report	WHO	2015	Angola
4	Non-communicable diseases country profile, Angola 2014	Report	WHO	2014	Angola
5	Cancer Country Profile, Burundi 2014	Report	WHO	2014	Burundi
6	WHO country cooperation strategy at a glance: Burundi.	Strategy	WHO	2015	Burundi
7	Manuel des normes et procédures de gestion du Système national d'information sanitaire	Policy	MOH Burundi		Burundi
8	Diabetes Country Profile, Burundi 2014	Report	WHO	2014	Burundi
9	Programme national intégré de lutte contre les maladies chroniques non transmissibles	Policy	Ministère de la Santé Publique et de la lutte contre le SIDA, OMS	2005	Burundi
10	Human resources for health. Congo	Report	WHO		Congo
11	Fact sheet of Health Statistics 2016 Congo	Report	WHO	2016	Congo
12	Non-communicable diseases Country Profile, Congo 2014	Report	WHO	2014	Congo
13	Enquête Démographique et de Santé (EDS-RDC) 2013-2014	Survey report	Ministère du Plan, MOH DRC, ICF International.	2014	DRC
14	Plan National de Développement Sanitaire PNDS 2011-2015	Plan/strategy	MOH/DRC	2010	DRC
15	Annuaire statistique 2014	Report/statistics	Ministère du Plan et Révolution de la Modernité, Institut National de la Statistique	2015	DRC
16	Plan National de développement sanitaire 2016-2020: vers la couverture sanitaire universelle	Plan/strategy	MOH/DRC	2016	DRC
17	Non-communicable Diseases Country Profiles 2014	Report	WHO	2014	DRC
18	Diabetes country profile DRC 2016	Report	WHO	2016	DRC
19	Cancer Country Profiles DRC 2014	Report	WHO	2014	DRC
20	Normes des Zones de santé en RDC. Deuxième édition	Policy	MOH/DRC	2010	DRC
21	Ordinogramme de soins	Guideline	MOH/DRC	2008	DRC
22	Etat des Lieux du Secteur de la santé en RDC	Survey report	MOH/DRC	2009	DRC

23	Rapport de l'Etat des lieux des ITM et IEM de la RDC	Survey report	MOH/DRC	2009	DRC
24	Plan national de développement de Ressources Humaines pour la Santé en RDC 2011-2015	Plan/strategy	MOH/DRC	2011	DRC
25	Rapport narratif Profil pharmaceutique de la RDC	Survey report	MOH/DRC	2011	DRC
26	Liste National des Médicaments Essentiels	Policy	MOH/DRC	2010	DRC
27	Enquête sur les prix des médicaments en République Démocratique du Congo	Survey report	MOH/DRC	2007	DRC
28	Arrêté ministériel n° 008/CAB/MIN.INFO.PRES & COM.NAT./2007 du 09 juillet 2007 modifiant et complétant l'Arrêté ministériel n° 04/MCP/009/2002 du 15 octobre 2002 fixant les critères d'appréciation de la publicité sur le tabac et boissons alcoolisées	Law	Government	2007	DRC
29	The Tobacco Atlas Country fact sheet DRC	Report	American Cancer Society	2015	DRC
30	Global Youth Tobacco Survey DRC	Survey report	Institute for health Metrics and Evaluation	2008	DRC
31	WHO Report on the Global Tobacco Epidemic, 2015 Country profile Democratic Republic of the Congo	Report	WHO	2015	DRC
32	Loi n° 08/002 du 16 mai 2008 modifiant et complétant l'Ordonnance-loi n° 68/010 du 06 janvier 1968 relative aux droits d'accises et de consommation et au régime des boissons alcooliques	Law	Government	2008	DRC
33	Diabetes country profile, Rwanda	Report	WHO	2014	Rwanda
34	Cancer Country Profile, Rwanda 2014	Report	WHO	2014	Rwanda
35	Contaminated Isotab® (isosorbide mononitrate) incident in Lahore Pakistan	Report	WHO	2012	Rwanda
36	Non-communicable diseases Country Profile 2014, Rwanda	Report	WHO	2014	Rwanda
37	Non-communicable diseases Rwanda Policy	Policy	MOH Rwanda	2015	Rwanda
38	The National Health Research Agenda 2014-2018	Plan/strategy	MOH Rwanda	2013	Rwanda
39	Tobacco control legislation	Law	Government	2015	Rwanda
40	Lab report part 1	Report	Government	2015	Tanzania
41	National Non-communicable disease strategy 2008-2018	Plan/strategy	MOH and Social Welfare	2008	Tanzania
42	National Cancer Control Strategy (NCCS) 2012-2022	Plan/strategy	MOH and Social Welfare	2012	Tanzania
43	Cancer Country Profile, Tanzania 1014	Report	WHO	2014	Tanzania
44	Tanzania Demographic and Health Survey 2010. 2011	Survey report	NBS Tanzania, ICF	2011	Tanzania
45	Strategic Plan for Cervical Cancer Prevention and Control in Uganda	Plan/strategy	MOH Uganda	2010	Uganda
46	The Tobacco Control Act, 2015	Law	MOH Uganda	2015	Uganda

47	Non-Communicable diseases Country Profile, Zambia 2014	Report	WHO	2014	Zambia
48	Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases	Report	UN/General Assembly	2012	
49	Global Atlas of medical devices	Atlas	WHO	2017	
50	Best buys and other recommended intervention for the prevention and control of non-communicable diseases		WHO	2017	
51	Monitoring the building blocs of health systems: a handbook of indicators and their measurement strategies	Handbook	WHO	2010	
52	The world health report –Health system financing: the path to Universal health coverage	Report	WHO	2010	
53	Health System Governance for Universal Health Coverage. Action Plan	Plan/strategy	WHO	2014	
54	Global health Observatory (GHO) data. Country statistics	Report	WHO		
55	Global Health Initiatives Strategy 2011-2015	Strategy	Global Health Initiative	2011	
56	The Abuja Declaration: Ten Years On	Report	WHO		
57	Strategic Plan 2016-2020 NCD Alliance	Plan/Strategy	NCD Alliance	2016	
58	Investing in Civil Society to Promote Accountability to Policy and Governance Commitments on Obesity and Nutrition-Related Non-communicable Diseases	Report	Global Nutrition Strategy	2014	
59	Global status report on non-communicable diseases	Report	WHO	2014	



### Annex 3. List of Websites consulted

No	Website	Language	Title of the page consulted
1	Association of Private Health Facilities in Tanzania	English	Non-communicable disease Programme, 2011
2	Banque Mondiale	French	DRC, Profil Pays
3	CambridgeDictionnary	English	Non-communicable diseases definition
4	Fred Hutch Cancer Center	English	Uganda
5	Global Disease Burden	English	Demographic Statistics
6	International Diabetes Federation	English	Members DRC
7	Knoema	English	WHO Statistical Information System, 2012
8	Ministry of health Burundi	French	
9	Ministry of health Congo	French	
10	Ministry of health DRC	French	Programmes
			Programmes spécialisés
11	Ministry of health Rwanda	English	Tobacco control: Rwanda ranked second in EAC
12	Ministry of Health Uganda	English	Non-communicable diseases
		English	Uganda Cancer Institute
13	Ministry of health Zambia	English	
14	NCD Synergies	English	NCDs, Injuries, and Extreme Poverty
15	Partners in Health	English	Faster, Better Care for Breast Cancer in Rwanda
		English	Integration of Chronic Care Services in Rwanda
16	Tanzania Cancer Care	English	Meeting the challenge of cancer care in Northern Tanzania. A program for comprehensive and sustainable care
17	Uganda Cancer Society	English	UCS launches Advocacy Strategy
18	Uganda Parliament	English	Uganda Parliamentary Forum on Non-Communicable Diseases (PFNCDS) heightens advocacy for the Tobacco Control Bill 2012

19	UN Data	English	Country profile Democratic Republic of the Congo
20	World Diabetes Foundation	English	Tanzania National NCD Response Programme support WDF06-221
21	World Health organization	English	Monitoring and surveillance of NCDs
		English	Congo: Health information, research, evidence and knowledge
		English	Diabetes Fact Sheets
		French	Maladies non transmissibles et états de santé connexes, Burundi
		English	Non-communicable diseases Fact sheets
		French	Profil sanitaire de la République Démocratique du Congo, statistiques, action de l'OMS dans le pays, informations et reportages
		English	Tanzania making steady progress in access to essential medicines and health products as new challenges emerge
		English	The WHO Health Systems Framework
22	Yale School of Public Health	English	Uganda - Integrated Management of NCD

#### Annex 4. List of articles found

No	Author	Ref. num	Country	Topic/disease	Evaluation/aim	Remark
1	Pyres et al	128	Angola	Hypertension	Prevalence, factors, awareness and treatment	Disease oriented
2	Tavares et al	129	Angola	Breast cancer	Knowledge, attitude and practice of patients	Disease oriented
3	Sambanje et al	130	Angola	Breast cancer	Knowledge and awareness among students	Disease oriented
4	Lopes et al	131	Angola	Breast cancer	Stage at presentation	Disease oriented
5	Miguel et al	153	Angola	Cancer	Establishing cancer unit	Disease oriented
6	Lopes et al	175	Angola	Cancer	Resources and strategy for control	Disease oriented
7	Catherine et al	195	Angola	Health system	Health system assessment	Health system oriented
8	Mendes et al	187	Angola	Health workforce	Context and nursing workforce	Health system oriented
9	Ntagibari et al	137	Burundi	Stomach cancer	Evaluation of 22 years at the university hospital	Disease oriented
10	Niyonsavye	143	Burundi	Diabetes	Knowledge, attitude and practice of nurses	Disease oriented
11	Nsabiyumva et al	149	Burundi	Diabetes	Epidemiological and clinical aspects	Disease oriented
12	Julia et al	170	Burundi	CVD	Heart center conception and design	Disease oriented
13	Cailhol et al	212	Burundi	Financing	Impact of global health initiatives in the health system	Health system oriented
14	Siddharthan et al	243	Burundi	Leadership and governance	Civil society role	Health system oriented
15	Scheil-Adlung et al	185	Burundi	Health workforce	Health workforce benchmark	Health system oriented
16	Islami et al	42	Congo	Breast cancer	Tumor size and stage at diagnostic	Disease oriented
17	Ikama et al	132	Congo	Hypertension	Measurement practice	Disease oriented
18	Ikama et al	154	Congo	Hypertension	Level of control	Disease oriented

19	Gombe et al	133	Congo	Cancer	Responsibility in delay of diagnosis	Disease oriented
20	Nsonde et al	202	Congo	Health Information system	Working with cancer registry	Disease oriented
21	Risasi et al	41	DRC	Cervical cancer	Knowledge of women	Disease oriented
22	Luyeye et al	44	DRC	Breast cancer	Prognostic	Disease oriented
23	Risasi et al	48	DRC	Cervical cancer	Prevalence and risk factors	Disease oriented
24	Mottini et al	49	DRC	Diabetes	Clinical future	Disease oriented
25	Katchunga et al	50	DRC	Hypertension and diabetes	Knowledge of the general population	Disease oriented
26	Limbole et al	51	DRC	Stroke	Stroke characterization	Disease oriented
27	Houser et al	52	DRC	Diabetes	Prevalence and risk factors	Disease oriented
28	Muyer et al	54	DRC	Diabetes	Mortality of young patients	Disease oriented
29	Longo et al	55	DRC	Diabetes	Metabolic syndrom	Disease oriented
30	Kaimbo et al	30	DRC	Diabetes	Retinopathy incidence	Disease oriented
31	Kakoma et al	31	DRC	Diabetes	Acidocetose incidence	Disease oriented
32	Katchunga et al	22	DRC	Hypertension	Prevalence and risk factors	Disease oriented
33	M'buyamba et al	60	DRC	Hypertension	Mortality	Disease oriented
34	Lulebo et al	62	DRC	Hypertension	Reasons for non-adherence	Disease oriented
35	Sumaili et al	63	DRC	Hypertension and diabetes	Epidemiology of kidney diseases	Disease oriented
36	Longo et al	64	DRC	Hypertension and diabetes	Risk factor for stroke	Disease oriented
37	Lubaki et al	65	DRC	Hypertension	Reasons for non-compliance to treatment	Disease oriented
38	Lulebo et al	66	DRC	Hypertension	Use of complementary and alternative medicine	Disease oriented
39	Muzembo et al	67	DRC	COPD	Respiratory rehabilitation	Disease oriented
40	Obel et al	68	DRC	Asthma	Prevalence and determinants	Disease oriented

41	Azevedo et al	97	DRC	Diabetes	Situation	Disease oriented
42	Volman et al	104	DRC	Diabetes medicine	Cost and availability of medicine	Disease oriented
43	Nelson et al	45	DRC	Cancer	Care and pathology	Disease oriented
44	Kapongo et al	53	DRC	Diabetes	Health service capacity, health providers' knowledge	Disease oriented
45	Van Olmen et al	56	DRC	Diabetes	Outcome of health care program	Disease oriented
46	Lulebo et al	61	DRC	Hypertension	Assessment management in Primary health care settings	Disease oriented
47	Soeters et al	102	DRC	Health financing	PBF	Health system oriented
48	Tumwine et al	111	DRC	Tobacco control	Evaluation of the implementation of the framework on Tobacco Control	Health system oriented
49	Ngbolua et al	47	DRC	Pharmacology	Screening of plants	Disease oriented
50	Ngbolua et al	57	DRC	Pharmacology	Plants activity	Health system oriented
51	Katemo et al	58	DRC	Pharmacology/Diabetes	Screening of plants	Disease oriented
52	Kohler et al	95	DRC	Pharmaceutical system	Examination	Health system oriented
53	Bertone et al	83	DRC	Health financing	Investigating the remuneration of health workers	Health system oriented
54	Maini et al	84	DRC	Health financing	Income sources of health workers in PHC	Health system oriented
55	Roome et al	82	DRC	Human resources for health	Review of research and knowledge gaps	Health system oriented
56	Rajan et al	101	DRC	Health service planning	Contribution to strengthening health system	Health system oriented
57	Ponsar et al	103	DRC, Burundi	Health financing	How user fees endanger health	Health system oriented
58	Challinor et al	46	LMIC	Cancer	Nursing potential	Disease oriented
59	Kamanzi et al	135	Rwanda	Cancer	Expanding radiotherapy	Disease oriented
60	Alleyne et al	161	Rwanda	NCDs	Embedding in the post-2015 development agenda	Disease oriented

61	Binagwaho et al	162	Rwanda	Cervical cancer	HPV coverage	Disease oriented
62	Pace et al	164	Rwanda	Breast cancer	Reasons for delay in presentation	Disease oriented
63	Binagwaho et al	163	Rwanda	Cervical cancer	Integration into health system	Disease oriented
64	Nyandekwe et al	211	Rwanda	Financing	UHC: dream or reality	Health system oriented
65	Binagwaho et al	221	Rwanda	Leadership and governance	Evaluation of 20 years investment on health	Health system oriented
66	Dhillon et al	222	Rwanda	Leadership and governance	State capability	Health system oriented
67	Alleyne et al	223	Rwanda	Leadership and governance	Lessons and leadership in health	Health system oriented
68	Kakoma et al	188	Rwanda	Health workforce	Training	Health system oriented
69	Karara et al	197	Rwanda	Health Information system	Role of HIS in UHC monitoring	Health system oriented
70	Verbeke et al	201	Rwanda, Burundi, RDC	Health Information system	Information system for monitoring chronic diseases in referral hospitals	Health system oriented
71	Yohana et al	205	Tanzania	Access to medicine	Availability and affordability of cancer medicines	Disease oriented
72	Staniffer et al	121	Tanzania	Diabetes	Risk factors and complications	Disease oriented
73	Lyimo et al	122	Tanzania	Cervical cancer	Factors associated with uptake	Disease oriented
74	Rambau et al	123	Tanzania	Breast cancer	Testing	Disease oriented
75	Urasa et al	142	Tanzania	Cervical cancer	Knowledge and screening practices of nurses	Disease oriented
76	Noorani et al	146	Tanzania	Diabetes	Glycemic control of type 1 among children and adolescents	Disease oriented
77	Mukama et al	147	Tanzania	Diabetes	Level of care for glycemic control	Disease oriented
78	Stanifer et al	148	Tanzania	Chronic diseases	Knowledge, attitude and practice associated	Disease oriented
79	Cunningham et al	167	Tanzania	Cervical cancer	Screening and HPV acceptability	Disease oriented
80	Abbas et al	169	Tanzania	Diabetes	Diabetic foot control and management	Disease oriented

81	Peck et al	136	Tanzania	Hypertension and diabetes	Preparedness of health facilities for care	Disease oriented
82	Mfinangai et al	217	Tanzania	Leadership and governance	Priority action towards NCDs	Health system oriented
83	Metta et al	242	Tanzania	Leadership and governance	Policy to respond to NCD	Health system oriented
84	Kwesigabo et al	183	Tanzania	Health workforce	Challenges in educating health care personnel	Health system oriented
85	Sato et al	186	Tanzania	Health workforce	Aspect of motivation of health workers at primary health care	Health system oriented
86	Davila et al	190	Tanzania	Health workforce	NCDs training for public health workers	Health system oriented
87	Frank et al	168	Tanzania	NCDs	Public health and palliative care mix	Disease oriented
88	Nnko et al	124	Tanzania and Uganda	Chronic diseases	Public perception, preferred management	Disease oriented
89	Nakisige et al	119	Uganda	Cervical cancer	Screening and treatment	Disease oriented
90	Kalyesubula et al	144	Uganda	Hypertension	Trends and level of control	Disease oriented
91	Mukama et al	159	Uganda	Cervical cancer	Knowledge and attitude of women towards prevention	Disease oriented
92	Katende et al	140	Uganda	Chronic diseases	Readiness of health facilities for management	Disease oriented
93	Chamie et al	157	Uganda	NCDs	Community-based testing campaign	Disease oriented
94	LeBAron	176	Uganda	Chronic diseases	Implementing palliative care	Disease oriented
95	Schwartz et al	209	Uganda	NCDs	Looking with local lenses	Health system oriented
96	Hogerzeil et al	155	Uganda	NCDs	Access to essential medicines	Health system oriented
97	Vialle-Valentin et al	203	Uganda	Access to medicine	Evidence and access for chronic diseases from households	Health system oriented
98	Kiberu et al	191	Uganda	Health Information system	District-based reporting	Health system oriented
99	Muhindo et al	192	Uganda	Health Information system	Contextual challenges	Health system oriented

100	Rogers H	134	Uganda	NCDs	Health facilities capacity to prevent and control	Disease oriented
101	Marsden et al	126	Zambia	Asthma	Knowledge and perception	Disease oriented
102	Oelke et al	127	Zambia	Hypertension	Perceptions and practices	Disease oriented
103	Wa Somwe et al	141	Zambia	Asthma	Improving pediatric care	Disease oriented
104	Yan et al	150	Zambia	Hypertension	Prevalence and treatment	Disease oriented
105	Musenge et al	151	Zambia	Diabetes	Glycemic control and associated self-management behaviors	Disease oriented
106	Musenge et al	152	Zambia	Diabetes	Glycemic control	Disease oriented
107	Parham et al	171	Zambia	Cervical cancer	Scaling up prevention services	Disease oriented
108	White et al	172	Zambia	Cervical cancer	Motivation and experiences of women about prevention services	Disease oriented
109	Liu et al	173	Zambia	Cervical cancer	Knowledge and attitude of women towards HPV vaccination	Disease oriented
110	Maree et al	184	Zambia	Breast cancer	Experience of nurses	Disease oriented
111	Aantjes et al	182	Zambia	Chronic diseases	Practices and challenges in reorienting health system	Health system oriented
112	Sundewall et al	213	Zambia	Leadership and governance	Challenges of health sector aid coordination	Health system oriented
113	Moucheraud et al	194	Zambia	Health Information system	Sustainability	Health system oriented
114	Aantjes et al	174	Zambia	Chronic diseases	Integration of community home care	Disease oriented