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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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.

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# Table of Contents

Table of Contents .......................... i
List of abbreviations ........................... iii
List of Tables and figures ....................... iii
Acknowledgements ................................ iv
Glossary .......................................... v
Abstract ....................................... vi
Introduction ..................................... vii

Chapter 1: Background ................................ 1

Chapter 2: Problem statement, Justification, Objectives and Methodology ........... 3
  2.1. Problem statement ................................ 3
  2.2. Justification ..................................... 6
  2.3. Objectives of the study .............................. 7
  2.4. Methodology ...................................... 8
    2.4.1. Methods of search ............................ 8
    2.4.2. Inclusion criteria .............................. 9
    2.4.3. Selection process ............................. 9
    2.4.4. Conceptual Framework .........................10

Chapter 3: Results and Findings ................................ 12
  3.1. Findings from DRC ............................. 12
    3.1.1. Service delivery ............................. 12
    3.1.2. Health workforce ............................ 16
    3.1.3. Health information system (HIS) ............ 17
    3.1.4. Access to essential medicines ................ 18
    3.1.5. Financing .................................. 19
    3.1.6. Leadership and governance ................... 20
  3.2. Findings from neighboring countries ............. 21
    3.2.1. Service delivery .............................. 22
    3.2.2. Health workforce ............................. 25
    3.2.3. Information system ........................... 27
    3.2.4. Access to Medicine ............................ 28
    3.2.5. Financing .................................. 29
    3.2.6. Leadership and governance ................... 30
Chapter 4: Discussion ...........................................................................................................34
  Limitations of the study ....................................................................................................37

Chapter 5: Conclusion and recommendations .................................................................38
  5.1. Conclusion ................................................................................................................38
  5.2. Recommendations ....................................................................................................39

References ..........................................................................................................................41

Annexes .............................................................................................................................59
  Annex 1. Questionnaire for interviews ..........................................................................59
  Annex 2. List of consulted documents ..........................................................................60
  Annex 3. List of Websites consulted ..............................................................................63
  Annex 4. List of articles found .......................................................................................65
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

List of Tables and figures

Figure 1. Map of DRC.......................................................... 1
Figure 2. Proportionate mortality in DRC in 2014 (all ages, both sexes).......................... 3
Figure 3. Trends in age-standardized prevalence of diabetes in DRC ....................... 5
Figure 4. Flow chart of the selection criteria......................................................... 10
Figure 5. The WHO Health System framework.................................................. 10
Table 1. Table of key words and search strategy .............................................. 11
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My deepest gratitude to my family and friends who have been a constant source of love, sacrifice, support and strength during my time at KIT, especially my daughter Daniella, to whom this thesis is dedicated.
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). Worldwide, 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 (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 into 5 chapters: 1) Background; 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).

![Map of DRC](image.jpg)

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 7th 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).
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 leaned 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 includes 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.
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).
<table>
<thead>
<tr>
<th>Conditions or diseases</th>
<th>AND/ OR</th>
<th>Risk factors</th>
<th>AND</th>
<th>Health system</th>
<th>Or</th>
<th>Intervention</th>
<th>AND</th>
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<tr>
<td>• Non-communicable diseases</td>
<td>• Cancer</td>
<td>• Breast cancer</td>
<td>• Lung cancer</td>
<td>• Cervical cancer</td>
<td>• Prostate cancer</td>
<td>• Liver cancer</td>
<td>• Gastric cancer</td>
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<td>• Smoking</td>
<td>• Tobacco use</td>
<td>• Alcohol use</td>
<td>• HPV infection</td>
<td>• Obesity</td>
<td>• Overweight</td>
<td>• Physical inactivity</td>
<td>• Service delivery</td>
<td>• Financing</td>
</tr>
</tbody>
</table>
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-pocket. Decision-making remains very centralized at the national level, especially for budget allocation (212).

In Zamb, 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 in 2013 was 8.7%. 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 Zamb, 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 ongoing 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 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 stakeholders 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 founds 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.
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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 theses 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

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<th>Author</th>
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<td>WHO</td>
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<td>Report</td>
<td>WHO</td>
<td>2016</td>
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<td>Report</td>
<td>WHO</td>
<td>2014</td>
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</tr>
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<td>WHO country cooperation strategy at a glance: Burundi.</td>
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<td>WHO</td>
<td>2015</td>
<td>Burundi</td>
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<td>Policy</td>
<td>MOH Burundi</td>
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<td>Ministère de la Santé Publique</td>
<td>2005</td>
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<td>Guideline</td>
<td>MOH/DRC</td>
<td>2008</td>
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<td>Etat des Lieux du Secteur de la santé en RDC</td>
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<td>2009</td>
<td>DRC</td>
</tr>
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<td>Rapport narratif Profil pharmaceutique de la RDC</td>
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<td>MOH/DRC</td>
<td>2011</td>
<td>DRC</td>
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<td>2010</td>
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<td>Report</td>
<td>WHO</td>
<td>2014</td>
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</tr>
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<td>Cancer Country Profile, Rwanda 2014</td>
<td>Report</td>
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<td>2014</td>
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</tr>
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<td>2012</td>
<td>Rwanda</td>
</tr>
<tr>
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<td>Non-communicable diseases Country Profile 2014, Rwanda</td>
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<td>2014</td>
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</tr>
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<td>Non-communicable diseases Rwanda Policy</td>
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</tr>
<tr>
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<td>The National Health Research Agenda 2014-2018</td>
<td>Plan/strategy</td>
<td>MOH Rwanda</td>
<td>2013</td>
<td>Rwanda</td>
</tr>
<tr>
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<td>Tobacco control legislation</td>
<td>Law</td>
<td>Government</td>
<td>2015</td>
<td>Rwanda</td>
</tr>
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<td>Lab report part 1</td>
<td>Report</td>
<td>Government</td>
<td>2015</td>
<td>Tanzania</td>
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<td>2008</td>
<td>Tanzania</td>
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<td>82</td>
<td>Mfinangai et al</td>
<td>217</td>
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<td>Metta et al</td>
<td>242</td>
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<td>Kwesigabo et al</td>
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<td>Sato et al</td>
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<td>Nnko et al</td>
<td>124</td>
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<td>Nakisige et al</td>
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<td>Kalyesubula et al</td>
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<td>Uganda</td>
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