

**Republic of the Sudan
National Ministry of Health
Directorate General of Public health and Emergency**



**Non-communicable
Disease
National Strategic
Plan**

2010-2015

Prepared By

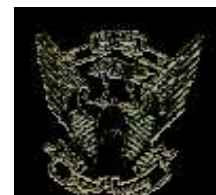
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Abbreviations

ARI	Acute Respiratory Illness
ATLS	Advanced Trauma Life Support
CBR	Crude Birth Rate
CRD	Chronic Renal Disease
CRF	Chronic Renal Failure
ED	Emergency Department
EPI	Expanded Program on Immunization
FBG	Fasting Blood Sugar
FMOH	Federal Ministry of Health
GDP	Gross Domestic Product
HIS	Health Information System
IDP	Internally Displaced Persons
MDGs	Mellinium Development Goals
NCDs	Non-communicable Diseases
NHL	Non Hodgkin lymphoma
NGOs	Non- Governmental Organizations
INGOs	Int. Non Governmental Organizations
OLS	The Operation Lifeline Sudan
OPD	Out Patient Department
pts	Patients
PHC	Primary Health Care
RICK	Radioisotope Center Khartoum
RTA	Road Traffic Accidents
SHHS	Sudan Household Health Survey

SWAps	Sector Wide Approaches
TB	Tuberculosis
UN	United Nations
UNDP	United Nations Development Project
WHO	World Health Organization
WDF	World Diabetes Foundation

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Acknowledgment

The unavailability of guiding documents for Non-communicable Disease (NCD) strategy prevention and control in Sudan necessitated conducting a strategic plan for the program. The National NCDs strategy was developed through an intensive and inclusive process of data, collection and collation; analysis and drafting of inputs from a range of stakeholders and national consultancy. The National NCD Directorate at Federal Ministry of Health were instrumental in leading these efforts which culminated in the production of this document.

First of all I thank the WHO which made available its support in a number of ways to develop these tasks.

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EXECUTIVE SUMMARY

The National NCD strategy for Sudan 2010-2015 flows from The Sudan's National Strategic plan for the health sector (2003-2027) reflecting a strong political commitment towards NCDs. The unavailability of guiding documents for NCD prevention and control in Sudan necessitated conducting an exercise to develop a strategic plan for the program. In October 2007 a committee was formulated, under the leadership of its chairperson, Director General of Primary Healthcare services. This committee culminated in the National Non-communicable Disease strategy (NNCDS) which was developed through an intensive and inclusive process of drafting, collection and collation of inputs from a range of stakeholders through e-mails, meetings and national consultancy.

The NNCDS was developed in the context of:

- Burden of non-communicable diseases; and
- The need for joint action at all levels of the health system;

The NNCDS emphasizes a population health perspective to prevent and delay onset and a clinical perspective to limit progression and complications of diseases

The strategy took certain measures and indicators including disease prevalence, affected age groups, risk factors, and linkage to other diseases, deaths and financial burden on the health system. However it also emphasizes the need for an adequate continuous surveillance system to properly measure prevalence and so enable tailored responses. It focuses on the most common NCDs as a priority for health intervention in Sudan.

The document is divided into four parts:

- Part 1:** Gives the background to the current state of NCDs worldwide regarding impact, prevalence and management
- Part 2:** Justifies the need for an NCD strategy in Sudan
- Part 3:** Provides a framework for the NCD strategy
- Part 4:** A roadmap to implement the framework

The primary aim of The National NCD strategy is to provide an overarching, consistent, and practical approach to the prevention, diagnosis, management and rehabilitation of non-communicable disease sufferers.

PART 1: THE CURRENT INTERNATIONAL STATE

Introduction

In this section after a background review we introduce NCDs as an entity then present the evidence base that we have today of the recognized evidence based measures to control them.

Background

The UN Summit has maximized the opportunity to put NCDs, which include diabetes, cancer, cardiovascular disease and chronic respiratory disease, and their common risk factors of tobacco

use, unhealthy diet, physical inactivity and harmful use of alcohol, on the global health and development agenda.

Countries are expected to deliver a set of outcomes which help stop or reverse the growing burden of NCDs affecting millions of people around the world. Governments should allocate more resources to improve NCD early detection, diagnosis, treatment and care in current health systems and in the context of a robust national NCD Control Plan.

The mission of WHO is the attainment by all peoples of the highest possible level of health. However, this remains a dream which is to be aspired and prioritization has to be done and for the WHO this took the form of the Millennium Development Goals (MDGs), adopted at the Millennium Summit of the United Nations in September 2000. The MDGs call for a dramatic reduction in poverty and marked improvements in the health of the poor. The idea is that disease burden itself will slow the economic growth that is presumed to solve the health problems.

However one contentious issue in the MDGs was the failure to recognize non communicable diseases as a deterrent to economic growth despite the fact that the trend of transition of disease pattern from predominantly communicable diseases to non-communicable diseases has been remarkably noted throughout the world. Non-communicable diseases caused an estimated 35 million deaths in 2005 (figure 1). This figure represents 60% of all deaths globally, with 80% of deaths due to non-communicable diseases occurring in low- and middle-income countries, and approximately 16 million deaths involving people less than 70 years of age (1) Total deaths from non-communicable diseases are projected to increase by a further 17% over the next 10 years The greatest increase will be seen in the African region (27%) and the Eastern Mediterranean region (EMR=25%) (Figure 2). Therefore it is noticeable that the rapidly increasing incidence of these diseases is affecting poor and disadvantaged populations disproportionately, contributing to widening health gaps between and within countries.(1)

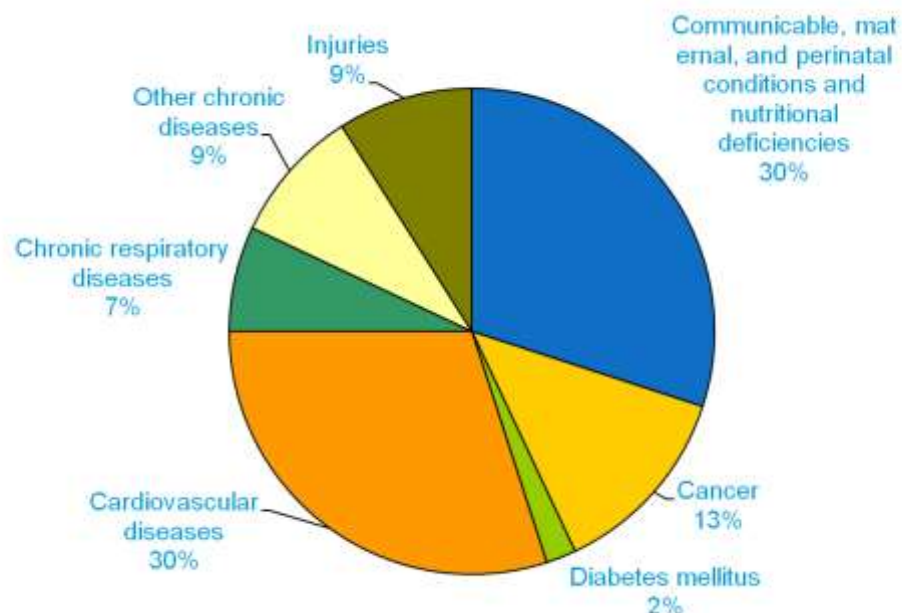


Figure (1) % of global mortality in 2005((1))

Most non-communicable diseases do not result in sudden death. Rather, they are likely to cause people to become progressively ill and debilitated, especially if their illness is not managed

correctly. Death is inevitable, but a life of protracted ill-health is not. Non-communicable disease prevention and control helps people to live longer and healthier lives.

Without action, an estimated 388 million people will die from non-communicable diseases in the next 10 years. Likewise, countries will forego billions in national income.

With increased investment in non-communicable prevention, it will be possible to prevent 36 million premature deaths in the next 10 years. Averted deaths would in turn translate into substantial economic gains. (1)

The knowledge of how to prevent these diseases is available now. The way forward is clear. It's our turn to take action.

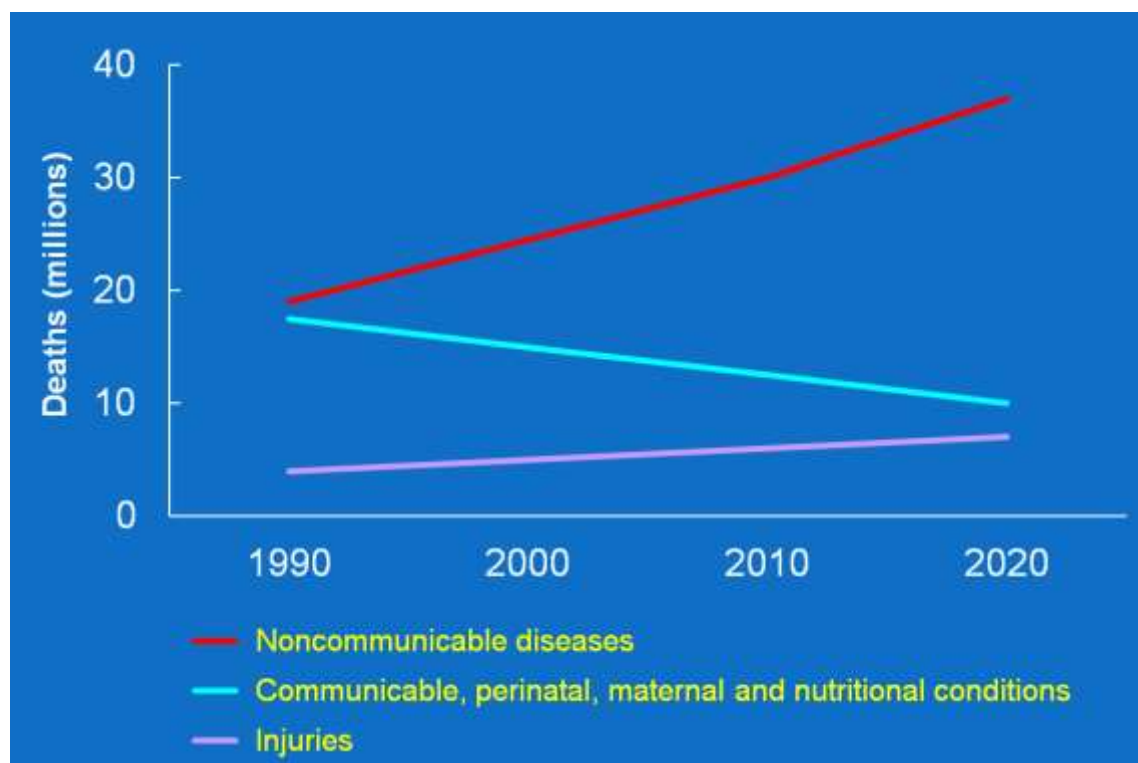


Figure (2) Projected trends in death by broad cause group in developing countries

Source: The Harvard School of Public Health, *Global Burden of Disease and Injury Series, Volume 1, 1996*

What are NCDs

The following list of elements can define NCDs:

- Have complex and multiple causes.
- Usually have a gradual onset, although they can have sudden onset and acute stages.
- Are long term and persistent, leading to a gradual morbidity.
- Occur across the life cycle, although they become more prevalent with older age.
- Can compromise quality of life through physical limitations and disability.

The main NCDs contributing to the burden of disease are;

- Cardiovascular Diseases and hypertension
- Diabetes Mellitus
- Asthma
- Cancer
- Renal Disease

- General Injuries and road Traffic Accidents
- Mental Health Disorders

As seen from Figure (3) 7 out of the 10 leading causes of mortality in 2004 are NCDs and as mentioned above they are projected to increase in incidence over the few coming decades unless a concerted effort is done to reduce their incidence. The WHO recognized this fact through a series of strategy documents, conventions and resolutions which culminated in the 2008 Action plan for the global strategy for the prevention and control of NCDs. The main goal of this strategy was to control NCDs by control and prevention of their risk factors

1. High blood pressure	12.8
2. Tobacco use	8.7
3. High blood glucose	5.8
4. Physical inactivity	5.5
5. Overweight and obesity	4.8
6. High cholesterol	4.5
7. Unsafe sex	4.0
8. Alcohol use	3.8
9. Childhood underweight	3.8
10. Indoor smoke from solid fuels	3.3

% 59 million total global deaths in 2004

Figure 3; Leading causes of attributable global mortality and burden of disease, 2004(WHO)

Risk Factors for NCDs

Risk is defined as “a probability of an adverse outcome, or a factor that raises this probability” (2). Sometimes whole populations are in danger, at other times only an individual is involved. Most risks cluster themselves around the poor. No risk occurs in isolation: many have their roots in complex chains of events spanning long periods of time. Each has its cause, and some have many causes. There are known modifiable risk factors which contribute to non-communicable disease such as smoking and tobacco use, alcohol consumption, low fruit/vegetable diet, physical inactivity, high fat and fast food. These lead to physiological risk factors such as obesity, elevated serum cholesterol, high blood pressure and high blood sugar. Although the relative importance of these may vary in different populations, these conventional risk factors may explain 75% of NCDs. (see figure 4). The vast majority of non-communicable diseases can be traced back to the common risk factors, and can be prevented by eliminating these risks

So since the increasing prevalence of NCDs can be attributed to a range of factors, including demographic and lifestyle changes, NCDs can be prevented by eliminating these risks. Risk-factor prevention is the most cost-effective approach that low and middle-income countries can adopt to control adverse health and social outcomes attributable to non-communicable diseases. . If these risk factors were eliminated, at least 80% of all heart disease, stroke and type 2 diabetes would be prevented and over 40% of cancer would be prevented(1). So risk factor prevention is the solution, however to prevent them they first need to be quantified which means surveillance

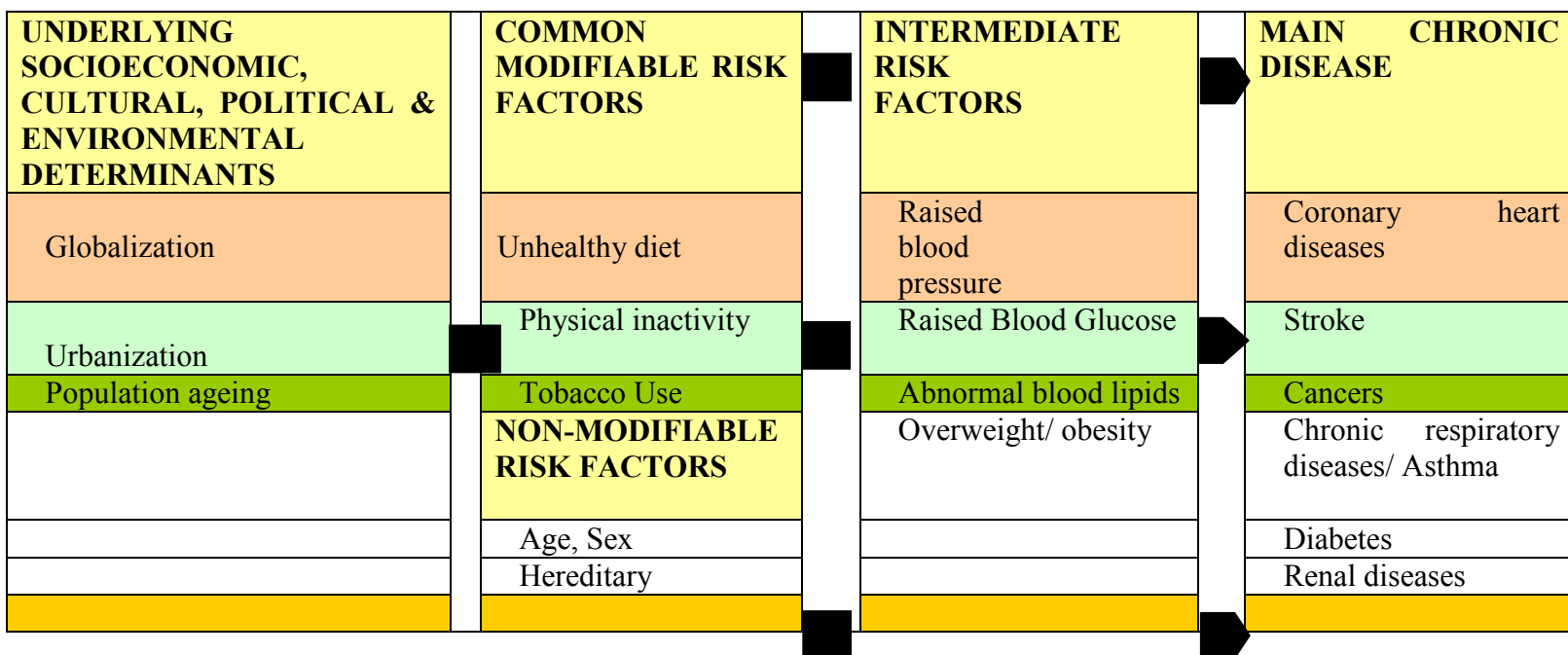


Figure 4: Relationship of risk factors and non communicable disease (1)

Surveillance system for NCDs and their risk factors

There is a relatively long time between exposure to a risk factor and development of NCDs. Consequently, the most effective strategy for surveillance is to focus efforts on the major NCD risk factors that predict disease. The population distribution of these risk factors is the key information required by countries in their planning of prevention and control programs. It can also contribute to the monitoring and evaluation of these activities.

Objectives of NCD strategy

The WHO action plan for the global strategy for prevention and control of NCDs sets out 6 objectives which are to be tailored to each country. These are:

1. To raise the priority accorded to NCDs at global and national levels and to integrate prevention and control of such diseases into policies across all government departments
2. To establish and strengthen national policies and plans for the prevention and control of NCDs
3. To promote interventions to reduce the main shared modifiable risk factors for NCDs
4. To promote research for the prevention and control of NCDs

5. To promote partnerships for the prevention and control of NCDs
6. To monitor NCDs and their determinants and evaluate progress at the national, regional and global levels

Key target groups for NCD strategy:

1. Policy makers at health and non-health sectors
2. Health staff
3. NGOs, research institutes and other civil bodies
4. People who are well to raise awareness
5. People at risk of NCDs to prevent them
6. People with NCDs to prevent complications and disabilities
7. People with NCDs to reverse the disease state where possible.
8. People with NCDs to assist them to appropriately manage their condition.

Special challenges of NCDs on the health system

Public health problems associated with risk factors for non-communicable diseases have the potential to overwhelm health-care systems, since people with such conditions use health services frequently and over extended periods of time and often develop complex conditions with associated co-morbidities. This causes significant social and economic hardship for individuals, families and communities, especially in the countries and groups least able to afford the health-care costs they engender

PART 2: THE NEED FOR A NATIONAL NON-COMMUNICABLE DISEASE STRATEGY IN SUDAN

Introduction

Sudan is not an exception from the international trend of transition of disease pattern from predominantly communicable to non-communicable diseases

Sudan is part of EMR where currently 47% of the region's burden of disease is due to non-communicable diseases and it is expected that this will rise to 60% by the year 2020. Prevention and control of NCDs is one of the policy foundations of Sudan's National Strategic plan for the health sector (2003-2027) reflecting a strong political commitment towards NCDs. However, data on the disease burden of NCDs in Sudan is scarce and deficient. The situation is further complicated by other factors in the country i.e. armed conflicts and political instability, scarce resources and poor capacity for future foreseeing and strategic planning. There is also lack of staff retention policies particularly at state and locality levels.

Some fragmented efforts have been made at federal level to formulate control programs but these have not yet been materialized into tangible outcomes due to limited coverage of services, low effectiveness and absence of clear national policy to combat the diseases.

Sudanese people are exposed all their lives to a range of risks to their health, whether in the shape of communicable or non-communicable disease, injury, consumer products, violence or natural catastrophe. Sometimes whole populations are in danger, at other times only an individual is involved

Before reviewing some of the available data an overview of Sudan is given first

Sudan a background

Sudan is the largest country in Africa. It has an area of 2.5 million km². Decentralization was introduced as an appropriate system of governance compatible with the needs of the multi-ethnic and multi-cultural society of Sudan. The population of Sudan, comprising some 19 major ethnic groups, was over 39 million in 2009 census with 63.8% living in rural areas and the growth rate is 2.6%, indicating that the population doubles every 27 years. Children of the age 0-14 years comprise 42.6% of the total population while the under-five children comprise 14.9% of total population(3).

The country is divided into 25 states and 134 Localities and the majority of the population is concentrated in six States of the Central Region with 60% living around the River Nile. The system is founded upon a multi-tier government: federal, state and local governments. The federal level is concerned with policy making, planning, supervision & co-ordination.

The state governments are empowered to plan, policy making and implementation at state level. Some problems have appeared during the implementation of the federal system, the prominent problem is uneven distribution of financial resources & manpower between states and between rural and urban areas. An unevenly distributed population is again demarcated by the fact that while the country shows a mean population density of 10 persons per square Km it reaches up to 50 at certain agricultural areas and in regions like Khartoum and Gezira it is five times as high as in the rest of the country. Natural disasters and civil conflict have also added to this uneven proportions through the high rates of rural-urban migration rates during the last two or more decades. Around 30% of the population live in urban areas due to migration which includes large numbers of internally displaced persons (IDPs) mainly from southern Sudan but also from other parts of the country. The UN estimates that there are 4 million IDPs. In many cases, particularly in Khartoum, the distinction between IDPs and urban poor has become blurred over the years(4). Immigration of skilled professionals is also a significant issue in northern Sudan, causing a continuing brain drain "

Health system of Sudan

Delivery of care has been based on the primary health care (PHC) approach, with over 6000 PHC facilities, supposed to but have never functioned as such. The PHC system is supposed to deliver primary care services through a primary care system as follows:

- a) basic health units
- b) health center
- c) rural hospital

Rural hospitals represent the first referral level.

Accessibility to services varies considerably between areas and health services are also provided through different partners including in addition to federal and state ministries of health, armed forces, universities, private sector (both for profit and non-profit) civil society and the health insurance system. The governmental health services at different levels and poor coordination between departments are some of the main problems facing these services (5)

WHO estimates of national health accounts suggest that the percentage of the gross domestic product (GDP) for expenditure on health has been increasing over the past 5 years up to an estimated 4.7% in 2005 composing of both public and private expenditure(2) [about US\$ 48 PPP – a purchasing power parity - per head].

Sudan demographic indicators (3)

The main demographic features include:

- Total population estimated for year 2008,40.2 million
- Urban population 38.27%, Rural populations account for 63.82% [%s of Total] for the year 2004
- Population Under Age 5 the year 2008 is 14.9% [% of Total]
- Population Under 15 Years [% of Total] the year 2008 is 42.6%
- Population 6-24 Years [% of Total] the year 2008 is 47.4%
- Population 60 & over the year 2008 is 5.3%
- Women 15-49 MWRA 52.54%
- Crude Birth Rate CBR 1998-2003 is 37.8 (per 1000 population)
- Crude Death Rate CDR 1998-2003 is 11.5(per 1000 population)
- Natural Increase Rate per Thousand 1998-2003 is 26.3
- Annual Growth Rate [%] is 2.53
- Life Expectancy At birth : 52.5 years males /55.5 females in 1993 [compared to 46 years males / 50 females in 1973]
- Crude Death Rate 14/1000(1998-2003)

Sudan health and other general indicators

- Infant Mortality Rate 81 per 1000 live births(6)
- % of women delivered by trained personnel 58.1) (6)
- Maternal mortality ratio 509:100.000 live births (SMS 2000)
- Under-five mortality rate 112.16/1000 live births (6)
- % of population with safe drinking water 59.2 (6)
- % of population with adequate excreta disposal facilities 31.4(6)
- Estimated malaria episodes: 8 million / year
- Deaths due to malaria: 35,000 / year app.)
- Bilharzias range of prevalence rate among school children in irrigated areas: 10-50%
- HIV/AIDS estimated prevalence rate 1.6% (2003)
- TB Annual Risk of Infection 1.8 /1000
- Routine EPI coverage 83% (4)
- ARI two weeks prevalence rate among children 12-23 months 41.1%
- Diarrheal diseases two weeks prevalence rate among children 12-23 months 16%
- Under five Malnutrition prevalence rate 18.5%
- Exclusive breast feeding 0-5 month 33.7% (6)
- Infertility rate 7.2%
- Total fertility rate 5.9 child
- Enrolment of school age children to school: 48%.

Political context

The government adopted the federal system in 1994. Decentralization was introduced as a system of governance compatible with the needs of the multi-ethnic and multi-cultural society of Sudan. The country is divided into 26 states and 134 Localities.

The system is founded upon a multi-tier government:

Federal, state and local governments.

The federal level is concerned with policy making, planning, supervision & co-ordination. The state governments are empowered for planning, policy making and implementation at state level. A number of problems appeared during the implementation of the federal system, the most prominent being uneven distribution of financial resources & manpower between states and between rural and urban areas" (7).

Marked internal and external changes have occurred and are expected to affect health in the coming few years, these could be summarized as follows:

- Globalization of economic forces and increasing demand for competitiveness. The world shifted to a neoliberal and market approach in health with recent focus on health system development, poverty reduction and sector wide approaches SWAps.
- The international pressure for structural adjustment from international donors and organizations.
- The growing role of the private sector supported by government policies.
- Disease transition towards non communicable diseases, diseases related to life style and diseases of elderly.
- Progressive advances and invention in medical technology.
- Increased population awareness towards their rights.
- Consideration of the fact that health is a human right which has to be spelt in health policies.
- Country movement towards industrialization and investment in petrochemicals.
- Continuing peace in all of Sudan.

Socio-economic context:

Sudan is rich in terms of natural and human resources, but economic and social development have been far below expectations. The GDP per capita was US \$395 in 2001. Agriculture is considered as the backbone of the Sudanese economy and the most important production sector involving 55 - 80% of the population and accounting for about 38% of GDP and 15% of total export(5). The industrial sector, mainly of oil, is gaining increasing importance for growth in urban areas how the situation will be if theseperation occurred. The agriculture contribution to GDP has declined during the last five years while the contribution of oil sector has increased to more than 11% of GDP during the same period. Oil and petroleum products now account for over 80% of exports and 40% of public revenues ^(ibid). Sudan is classified as a lower- middle income country by World Bank standards. On the Human Development Index devised by UNDP, human development is also extremely low in Sudan. In 2002, Sudan ranked 139 out of 173 countries for which the index was calculated. Life expectancy at birth, a measure of the general health condition and an indicator of the standard of living was estimated at about 55 years, about the average of least developed countries.. The country is suffering from strife in the west leading to successive waves of massive population movement, coupled with drought and desertification, major floods in the northern part of the country, and severe loss of human

resources (brain drain) especially in health sector, all have severely affected the health infrastructure and health status of the country. These further reduce the country's ability to undertake major control effort in a sustainable way without external support.

Economic reform packages have been implemented since 1992. Encouraging results in curbing macroeconomic imbalances and inflation were obtained. It resulted in revival of economic growth and increased per capita income. However, widespread poverty, highly skewed income distribution and inadequate delivery of social services remain serious problems(5)

The prospect of economic growth in Sudan in the coming years will make more resources available. Macro-economic stability, renewed engagement with the international community, increased oil production, and above all, peace are setting the stage for further economic growth.

Conflict and post conflict context

Sudan has suffered from civil conflict for much of the period since independence in 1956, with the present civil war having started in 1983. Most of the fighting has occurred in Southern Sudan, as well as areas of Southern Kordofan and Blue Nile states. Civil conflict has also flared up in other parts of northern Sudan in recent years, in particular Darfur, Kassala and Red Sea.

The health, nutrition and population effects of the war have undoubtedly been significant, with the figure of 2 million deaths often cited (5) Health services, not well-developed even before the war, have deteriorated over two decades of conflict The Operation Lifeline Sudan (OLS), formed in 1989, is a coordination mechanism which includes various UN agencies and NGOs. It provides humanitarian assistance to government and non government held war affected areas. A number of NGOs also operate in southern Sudan outside this mechanism.

A cease fire has been in effect between the fighting parties since October 2002 and a comprehensive peace plan was signed in 2005. After the peace agreement, reconstruction and development are needed as well as humanitarian assistance in the health and nutrition sectors, particularly in newly accessible areas. Lack of coordination and weak local capacity are seen as the main challenges facing the health sector development in the post conflict setting.

Burden of non-communicable diseases

Sudan does not have a surveillance system for NCDs and NCD risk factors but has only a few scattered studies. This is due to difficulties in the health information system and lack of research resulting from shortage of human and financial resources.

The data to be presented here is from the few studies that are available. These are the annual health statistic records of the Federal Ministry of Health (7), Sudan Household Survey (6) and the WHO STEPs study done in Khartoum (8). These studies reveal a rising prevalence and an overwhelming impact of NCDs on the Sudan health system.

From the data available the most common diseases in Sudan include diabetes mellitus, asthma, hypertension, ischemic heart disease, cancers, renal disease, general injuries and road traffic accidents, injuries and mental health disorders. These selected diseases accounted for 41% of all deaths in 2005. This was 143,000 from 346,000 total deaths (7).

Perhaps the most useful study to shed some light on the prevalence of NCDs and their risk factors was a WHO STEP wise risk factor indicator survey(8) that was conducted in 2005 in Khartoum State, Sudan (figure 5).

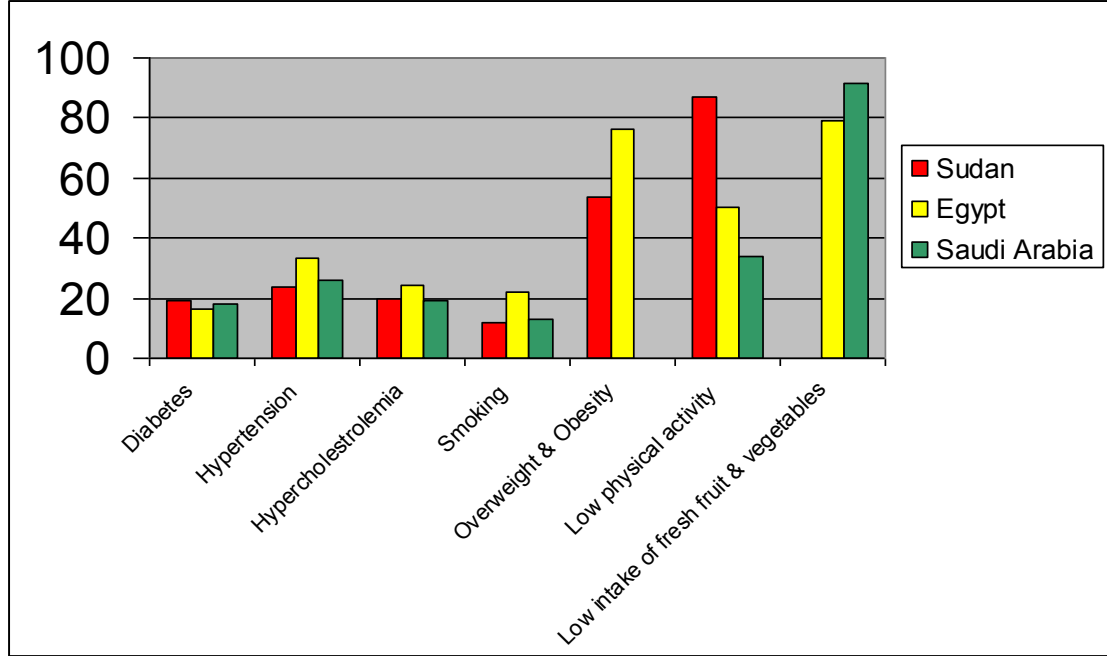


Figure (5) STEP survey results in Sudan, Egypt and Saudi Arabia
 Source: WHO STEP-wise for NCDs, 2006.

The results of the study were as follows:

Smoking and tobacco use:

The prevalence of smoking was high, 29.1% of total male participants were current smokers and 24.7% were daily smokers. Similar results were obtained from Kuwait in 2003 where 31.7% of males were current smokers. 25.9% of the total male participants currently used snuff.

Physical activity at work:

87% proximately of the participants were physically inactive (compared to Egypt where 73% and 89% of low and high socioeconomic status respectively were sedentary). Although most of the participants eat vegetables and fruits daily, they also consume beef meat daily.

Obesity:

41.5% of male participants and 62.5% of female participants were overweight or obese compared to 52.8% and 58.8% of males and females respectively in Syria.

Hyperlipidemia (High blood cholesterol):

The percentage of high serum cholesterol was 19.6% and 19.9% in male and female participants respectively, similar to those in Saudi Arabia.

Blood pressure:

24.8% of male participants and 22.7% of female participants had high blood pressure compared to 24.1% and 18.3% of males and females respectively in Saudi Arabia. Only 8.1% of males and 13.5% of females were aware of the fact that they had hypertension and were being medically followed.

Fasting blood glucose:

22.2% and 17.8% of male and female participants respectively had high levels of fasting blood glucose similar to the results from Syria. Again only 8.1% of males and 8.9% of females were aware of the fact that they had diabetes and were being medically followed

Cardiovascular diseases

Cardiovascular diseases are caused by disorders of the heart and blood vessels, and include coronary heart disease, cerebro-vascular disease, hypertension, peripheral artery disease, rheumatic heart disease, congenital heart disease and heart failure.

Hypertension has the highest prevalence among the major NCDs in Sudan representing 22 %. The age group mostly affected is 25 years and above, for both males and females (7). This is similar to results from Egypt where hypertension had an equal prevalence in both males and females representing 26%. There has been a dramatic increase in hospital admission rates within the age group 25-44 years since 2001. (7) Hypertension also ranks first as an overall cause of NCDs treated in outpatient clinics. Sudan is considered the second country in Africa regarding prevalence of hypertension (6)

Hospital admission rates due to heart disease and prevalence of heart disease among outpatients have experienced an increase since 2002. (7). Heart disease is more prevalent above the age of 25 for both males and females.

Number of deaths due to heart disease in 2002 was 28458 accounting for 15 DALYs /1000 population which is almost the same in Tunisia and Morocco (9) .Deaths due to cardiovascular disease represented 20% of all deaths due to NCDs (1)

Diabetes mellitus

Diabetes Mellitus ranks second among the major NCDs representing a prevalence of 12% (6). The prevalence is highest among adults and the highest prevalence is in Khartoum State and the lowest in West Darfur representing 19.35 and 2% respectively (7).

Some community based studies revealed a high prevalence of diabetes of 24.3% in Argo Town in Dongola (2003) and 24.6% in Alkabashi Area.

Diabetes Mellitus also ranks second as an overall cause of NCDs treated in outpatient clinics. There has been a dramatic rise in the prevalence of Diabetes Mellitus treated in outpatient clinics since 2001, despite a slight drop in 2005 (5). Hospital admissions have also increased since 2006. Deaths due to diabetes in 2005 represented 2% from all deaths due to NCDs (1).

Diabetics receive no special care at primary health care level when it comes to early diagnosis and management. Education for patients and public awareness are almost nonexistent. However, the overall health care provided to patients with Diabetes Mellitus and to communities is far from optimum. There are few local NGOs, which help low-income poor local population. The national diabetes program has started a demonstration project in collaboration with the WDF to integrate the diabetes management into the PHC in a form of diabetes mini clinics having a well

trained diabetes team, the experience was implemented in some states and evaluated as a successful one. Now the challenge is to assess and readjust the policy accordingly for expansion.

Asthma

Asthma ranks third among the major NCDs representing a prevalence of 9.2% (6). The highest prevalence being in Gedarif and the lowest in Kassala representing 15.4% and 3% respectively (6). According to another report the 25-44yr group is the most affected (7)

Hospital admission rates for asthma are very high since 2003. Actually they are the highest among admissions for the major NCDs (7). There has been a gradual increase in the prevalence of asthma among outpatients since 2001 with a sharp rise in 2006. (10)

Risk factors for asthma can be either inherent or external. Asthma risk factors differ depending on whether you are a child or an adult.

Asthma risk factors for children could either be inherent such as family history, allergies and gender (boys are more likely to have asthma than girls) or external such as frequent infections of the respiratory tract and exposure to second-hand tobacco smoke, allergens and air pollution. Many people who have asthma as adults developed the condition when they were children. Therefore, the risk factors for adults are the same as for children with the additional risk factor of exposure to occupational irritants which include fumes, gases dust, latex products and metals.

Asthma in Sudan:

Asthma affects 12.2% of the children in Khartoum state (11). Asthma ranks as the third cause of hospital admission following pneumonia and Malaria according to federal ministry of health data in 2004. The number of asthma patients visited the emergency department increased from 22000 to 80000 in the period from 1998 to 2004 (FMOH data). No national guidelines for asthma management are present in Sudan, and the treatment is based on the different physicians' policy. Data from asthma emergency room survey which conducted by the Epi-Lab 2003 (12) and included 100 patients in three tertiary hospitals has reflected the following: (not published) 1.4 % of the patients receive regular care from a single facility, 84.2% visited the ED in the same year, 8.6 % visit the ED during the week of the study and steroid inhaler found to be remarkably underused

Trigger factors for asthma

As trigger factors are often the same for a patient, they can be identified easily. Identifying them is necessary to propose preventive measures adapted to the case of each patient and they include:

- Indoor allergens and particularly house dust mites
- Outdoor allergens
- Sensitizers at workplace
- Irritants: smoke from wood and other biomass, household aerosols.
- Bacterial or viral infections in the respiratory tract.
- Exercise may bring on short attacks.
- Weather changes, such as a fall in temperature, humidity and fog;
- Gastro-esophageal reflux;
- Pregnancy, menstruation or menopause may increase the number attacks
- Stress and emotional situations;
- Animals: cats, dogs etc...

Cancers

The top ten leading cancers in Sudanese patients are Breast , Esophagus, Cervix, Non Hodgkin Lymphoma (NHL), Ovary, Prostate , Chronic Myeloid Lymphoma , Bladder , Naso-Pharyngeal Carcinoma and Acute Lymphocytic Leukemia ;which are similar to the leading cancers in Egyptian patients (13) Breast cancer has the highest incidence accounting for 34.9% of cases and Acute Lymphocytic Leukemia the lowest accounting for 4.4% of cases (13) (Table 1).

In males and females cancer is more prevalent at above 70 years of age with the highest prevalence in the Northern State at 0.8 %.

Cancer is a group of more than 100 different diseases, each with their own set of risk factors. The risk of developing cancer increases as we age, so age along with gender, race and personal and family medical history, are risk factors for cancer. Other risk factors are largely related to lifestyle choices such as diet, tobacco and alcohol use, while certain infections, occupational exposures and some environmental factors can also be related to developing cancer.

Cancer types	No. of cases	%
Breast	4092	34.9
Esophagus	1305	11.1%
Cervix	1196	10.2%
Non Hodgkin lymphoma (NHL)	1060	9%
Ovary	796	6.8%
Prostate	741	6.3%
Chronic Myeloid Lymphoma	735	6.3%
Bladder	667	5.7%
Naso-Pharyngeal Carcinoma	618	5.3%
Acute Lymphocytic Leukemia	510	4.4%
Top ten types	11720	100%

Table 1: Top Ten Cancer Types during the Years 2000-2006 (RICK)

Research shows that about 30% of all cancer deaths are related to dietary factors and lack of physical activity in adulthood (14)

Table 2 below shows the cancer incidence by states of Sudan for the years 2004 and 2005 both showing the persistently high incidence in Northern Khartoum, River Nile and North Kordofan states. This may be partly related to access to care but this is definitely not the only cause and it needs further research. Cancer deaths in 2005, represented 6% of all NCD deaths (7)

States	2004 Incidence /100.000	2005Incidence /100.000
Northern	182.2	179.3
Khartoum	171.4	165.2
River Nile	151	148.3
N. Kordofan	104.5	102.9
Red sea	83.4	83
White Nile	80	80
Aljazeera	69.7	67.8
Kassala	48.7	47.5
N Darfur	45.7	44.2
Sinnar	43.4	42.3
S. Kordofan	36.2	35.7
W. Kordofan	32.3	31.9
W.Darfour	31.4	30.7
Gadarif	38.7	27.8
Blue Nile	22.9	22.2
S. Darfur	3.5	3.4
Southern Regions	6.5	6.4

Table 2:Cancer Incidence in all the states of Sudan 2004,2005

Renal disease

Chronic renal disease is a serious condition associated with premature mortality, decreased quality of life, and increased health-care expenditures. Untreated chronic renal disease can result in end-stage renal disease and necessitate long term dialysis or kidney transplantation.

There has been a gradual increase in the overall number of outpatients and hospital admissions for renal failure since 1996-2005(15) (Table 3). Patient affected by CRD were 93.9% adults and 6.1% were children, of them 29.7% were females and 70.3% are males (7)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
OPD	1107	1025	1189	861	1285	2014	2168	3969	4730	5004
In patients	203	159	763	791	510	1292	1603	3942	3109	4767
Deaths/ In pts	78	47	236	219	176	289	363	678	524	765
% Deaths In pts	38.5 %	29.6%	31%	27.7 %	34.5 %	22.4 %	22.7 %	17.1 %	17%	16%
Incidence /1000	0.04	0.03	0.04	0.02	0.04	0.06	0.07	0.12	0.14	0.2

Table (3) Number of outpatients and hospital admissions for renal failure since 1996-2005

Risk factors for renal disease include suffering from cardiovascular disease, diabetes, hypertension, and obesity. A strong relationship has been determined between being obese and developing end-stage renal disease, or renal failure. A long-range study found that the obese have up to a seven times greater risk of kidney failure than normal weight people, suggesting that obesity should be considered a risk factor for the condition, and that kidney failure is yet another consequence of obesity.(16)

In Sudan, 20.8% of Chronic Renal Failure (CRF) is due to Hypertension, 13.8% to Glomerulonephritis, 10.1% to Diabetes mellitus and 36.2% to Unknown causes (17)

Deaths due to Renal failure increased considerably from 1996-2005 with the highest ever recorded in 2004 to 2005 (15) (Table 3). Case fatality rate of CRF was 20.3% in 2000, 7.37% in 2006

The situation for renal patients has greatly improved over the last decade especially since the decree that dialysis should be free. This had led to a proliferation of public and private dialysis units which now cater for 4000 patients. However a bottleneck has occurred since there are only two continuously functioning renal transplant centers which have led to a huge waiting list for this procedure.

Regarding the primary and secondary health infrastructure for this specialty it is practically nonexistent

Road traffic accidents and injuries (RTI)

Over one million people every year are killed in road crashes, and 20-50 million are injured. The human and economic toll of road crashes on low- and middle-income countries represents 85% of deaths and the lion's share of injuries. As developing-country vehicle use rises, road traffic injuries (RTIs) are also growing. By 2020, RTIs are expected to be the third leading cause of death and disability worldwide, by some calculations matching the toll of AIDS (18). For every RTI death, there are four cases of severe, permanent disabilities, typically to the brain, spinal cord or lower limb joints; 10 cases requiring hospital admission and 30 requiring treatment in an ER. Crash victims are often working-age adults, whose families are left without a primary source of financial support and as a result experience a decline in household income and food consumption.

Victims and their family members frequently experience depression, travel-related anxiety and sleep disturbance for years after a crash.

The direct global cost of road traffic crashes is over US\$500 billion annually, while the cost to developing nations is estimated at US\$65 billion, almost double the total amount of development assistance sent to such nations every year. Indirect costs to victims, families and governments -- such as potential income and societal contributions lost -- are not included in these calculations. The average impact of crash costs on low- and middle-income countries has been estimated at 1-1.5% of GDP (18)

Residents of developing countries are at much higher risk of RTIs than are residents of high-income countries because of a combination of the below factors

- Rapid motorization which often accompanies rapid economic development leads to higher RTI risk.
- There are greater populations of vulnerable road users in motorizing nations than in higher-income countries. In many developing nations, though vehicle use has skyrocketed, the vast majority of people still walks or bicycle to work. Those traveling in motorized vehicles are often bus passengers or motorized two-wheeler riders.
- Vehicles are less safe in developing nations. Buses are often second-hand imports from wealthier countries and lack up-to-date safety features. Passenger cars tend to be older and do not have air bags, collapsible steering columns or other crash-protective features. In addition, vehicles are not as well maintained in developing countries.
- Poor road and land-use planning often leads to a deadly mix of high-speed through traffic, heavy commercial vehicles, pedestrians and bicyclists on developing-country roads. Accommodations for vulnerable road users, such as sidewalks and bicycle lanes, are rare.

In Sudan the number of injuries due to RTA is approximately double in men when compared to women (5). 56% of injuries due to RTA occur in those below 30 years of age and they account for 43.3% of deaths (5). Hospital admissions due to RTA represent 13.6% of total admissions and this is considered high regarding the economic burden it constitutes. The number of RTA related deaths in 2005 was higher than those due to malaria (5).

Unfortunately there is no structured response system to any major trauma incidences and furthermore till now the Advanced Trauma Life Support (ATLS) courses are not widespread available. Also the concept of accident and emergency departments has been introduced in Khartoum only and is not available in the states

As for the primary and secondary services there is no organization for legislation and even public safety and there are no proper ambulance services .

Mental health disorders

The majority of the population of Sudan is experiencing broad psychological distress (demoralization, anxiety, trauma-related distress, loss-related distress etc) due to the long standing conflict situation in the country that does not amount to a diagnosable disorder, there are special groups that are vulnerable to psychological problems, namely, those living in camps (IDPs); child warriors, women experiencing gender based violence and humanitarian workers. Mental health disorders are more prevalent at the age of 40-49 in males and at a much older age in females (60-69years). The highest prevalence is in West Darfur and the lowest in The River Nile representing 7.5% and 0.6% respectively (19)

Recent studies have provided information about the magnitude of mental disorders and the need for mental care in the community. Prevalence of major depressive disorder in the population was 4.2% (20) Another study of IDPs in Darfur Camp showed that there were 21 suicides in 9000 population making the suicidal rate 100 times that of the general population(4) Situation analysis of Darfur in 2005 revealed high rates of psychological disturbances and increased rates of suicide and suicidal tendencies.

There is growing evidence to link physical illnesses like risk for coronary heart disease and depression. Studies from developed countries have shown that among the workforce the cost of depression in terms of loss of workdays and disability is more than heart diseases. Schizophrenia is associated with greater chronic disability than other disorders. The suicide rate in schizophrenia is also high. Recent studies estimating the total burden of schizophrenia have found that the disease causes distress, loss of productivity, a lower quality of life, and secondary mental and medical problems for patients and their families.

Health system for NCDs in Sudan

Despite the increasing prevalence of non-communicable disease and their overwhelming impact on the health system, Sudan health services and systems remain oriented to respond to acute conditions such as infectious diseases (table 4 and 5 below show the outpatient and inpatient load of selected NCDs from 2000 to 2006). Some adjustments have been made but, on the whole, current service delivery and funding arrangements favor an acute and short term response.

In order to cope with current and future demand of non-communicable diseases the health sector must achieve significant and sustainable change. The health system must develop consistent, integrated, evidence based, practical and effective (including cost effective), consumer focused approaches to improve the prevention, detection and management of non-communicable diseases. However the health system can't work in isolation from other sectors and services and must take a leadership role in advocating, engaging and partnering with other sectors to influence the social and environmental factors that determine the burden of non-communicable diseases.

Disease		2001	2002	2003	2004	2005	2006	%
Diabetes	OPD	81951	112524	129518	178691	153698	215282	162%
	in-patient	9063	8979	11262	11193	13399	14677	61.9
Hypertension	OPD	242388	257761	255223	241717	395117	274448	132%
	in-patient	6986	6710	8941	11834	14031	15528	122%
Heart disease	OPD	7493	15158	20006	38259	27859	38780	410%
	in-patient	4897	5804	6695	9314	15871	14610	198%
Asthma	OPD	54158	66747	70533	83280	82778	101128	86%
	in-patient	7319	6724	35308	34378	36923	36228	394%
Trauma	OPD	697935	797639	898743	574911	692338	330215	0.5%
	in-patient	16879	14978	22961	22155	21334	23735	40%
Population		3191300	3276900	3364800	3451200	35397000	36297000	

Table 4: Outpatient and in-patient burden of selected NCDs

2001-2006

Disease		2001	2002	2003	2004	2005	2006	%
Malignancy	OPD	3006	3896	4412	9430	8621	2125	
	In-patient	2330	2439	2975	3935	3948	4675	
Anemia	OPD	443551	469045	371760	237418	66647	73879	
	In-patient	11781	11650	14871	13511	15336	15878	
Psychiatric	OPD	18264	37663	14263	47911	21531	33520	
	In-patient	1680	2393	3411	3512	3731	5577	
Eye diseases	OPD	7002	5087	32529	69773	66697	16808	
	In-patient	3695	1809	2074	2795	3260	3035	
Renal failure	OPD	2014	2168	3169	4730	3383	5357	
	In-patient	1292	1603	3948	3109	4767	4933	
Rheumatoid Arthritis	OPD	43	4434	125949	119416	21392	151868	
	In-patient	28	212	1126	631	516	528	
Population		31913000	32769000	33648000	34512000	35397000	36297000	

Table 5: Out-patient and in--patient burden of selected NCDs 2001-2006

Before giving suggestions for the future we will now review the current state of health services provided for the mentioned NCDs

Status of health services for NCDs in Sudan

Cardiovascular diseases

The ideal services for cardiovascular patients include a diverse group of specialties which include general practitioners, community physicians, cardiologists, cardiac surgeons and a lot of other medical, nursing and paramedical staff. In most developing countries however the emphasis has been on tertiary services with little if any concerted continued effort being done in the primary and secondary health settings.

The tertiary services were present in Sudan since the beginning of the 20th century and they continued to keep pace with the international advances although the services were concentrated in Khartoum only. However, these services started deteriorating in the 70's until they stopped completely in the 80s. In the late 80's these services experienced a resurgence and from then on they have reached a scale where they are at least in the top 10 in the African continent if not in the top 5. Unfortunately primary and secondary services are still far behind that is why in this strategy the focus will be on these two with a little input into the tertiary services.

At present the available services are

1. At the primary level no services are available
2. At the secondary level general consultants in district hospitals cater for the services each one according to his level of training and experience because there are no national guidelines. Efforts are currently underway to rectify this situation.
3. The tertiary services are served by 5 dedicated hospitals all but one in Khartoum. These are AlShaab Hospital, Ahmed Gasim Hospital, Sudan Heart Center, Alsalaam Hospital and in Wad Medani Center.

All these centers have a full complement of cardiologists and cardiac surgeons.

Diabetes

Through some local efforts and with some help from international NGOs there is a very good effort being done in the primary and secondary field for diabetic patients.

In the tertiary level the service is given by Jabir Abualizz hospital from which a dedicated training program is underway to train regional centers to share in this burden

Road traffic accidents

Unfortunately there is poor coordination between the other non health sectors to combat the increasing problem of the road traffic injuries even though there is no structured response system to any major trauma incidences and furthermore till now the Advanced Trauma Life Support (ATLS) courses are not widespread available. Also the concept of accident and emergency departments has been introduced in Khartoum only and is not available in the states. As for the primary and secondary services there is no organization for legislation and even public safety and there are no proper ambulance

Mental Health

El Tigani El Mahi and Taha Baasher (Khartoum North) psychiatric hospitals are the main facilities in Sudan. Their admissions constitute about 1/3 of the total inpatient care in the country. The main psychiatric disorders encountered were schizophrenia, mania, depression, toxic psychosis, stress situations and drug addiction.

There are three outpatients units in Khartoum state – Khartoum, Omdurman and Khartoum North, as well as 9 urban clinics in Medani, Atbara, Port Sudan, ElObeid, Kosti, Sennar, Kassala El Fashir and Gedarif.

Voluntary Custodial Care is provided at Central Mental Hospital in Khartoum North and asylums in Kassala, and Port Sudan institutions and also reserved places attached to the general prisons. Admission is based on court order and patients in these settings receive service similar to in-patient case management.

Religious faith healing is favored by both the mental health patients and healers. The practice is common in urban as well as rural populations. Religious faith healing may require long stay with healers and may prevent early detection of disease and early medical intervention by modern psychiatry. However, attempts have been made to promote reciprocal communication and intervention with religious faith healers.

Services are provided in 13 psychiatric wards attached to the general hospitals of Khartoum, Khartoum North, Military Hospital, Police Hospital, Medani, Port Sudan, Kassala, Atbara, Gadarif, Kosti, El Obeid, El Fashir and Sennar. Patients are usually admitted for a short stay for management and rehabilitation. Family members are allowed to remain beside beds for family support and creation of homely atmosphere.

There are a total of 28 psychiatrists working in Sudan, of these, 16 psychiatrists practice at units of the Ministry of Health, Military Hospital, Police Hospital and Private Clinics in Khartoum state. At the State level, there are 11 psychiatrists at Urban Units in Medani, Port Sudan, Atbara, Kassala, Sennar, Kosti, Gadarif, and El Obeid and El Fashir. 15 of the 25 states do not have any formal psychiatric services. There are 14 departments of psychology in different universities offering 5 degrees in general psychology. The University of Khartoum is almost the sole institution offering graduate programs in Clinical Psychology and post-graduate Diploma in Clinical Psychology. 75% of the Psychologists are holding postgraduate qualifications.

There are 74 psychologists working in Khartoum State at units of Ministry of Health, Ministry of Interior and Ministry of Defense (3). There are 133 working in 8 State mental health units. There are only two departments offering Bachelor degrees of social sciences. The post-graduate program in social sciences is available only in Khartoum University. There are 258 social workers 109 working in FMOH and Khartoum State and 149 working in 8 state Units 43 Medical Assistants are working in different parts of the country (3).

PART 3: FRAMEWORK FOR A NATIONAL NON-COMMUNICABLE DISEASE STRATEGY

Vision

Building a healthy nation with a good quality of life and lessen NCDS burden i.e. preventable NCD will be at minimal, curable NCD are detected early and treated effectively with special focus to reach the most vulnerable population working with all concerned parties to achieve the vision burden.

Mission

To improve health status of the Sudanese population through promotion of healthy lifestyles and prevention of NCDs through development of health care system that focuses on access, equity, efficiency, quality and sustainability.

Aim

The aim of the NCDs strategy is to provide an overarching, consistent, and practical approach to the prevention, diagnosis, and management of non-communicable diseases across Sudan.

Principles

Key principles have been identified to guide the focus of strategies implemented under the NCDS, and all actions undertaken under the strategy should be designed to apply the following principles.

Principle 1: To provide the most effective care by making the NCD services more responsive to empower the users of the health care system and making providers more accountable and satisfied

People should receive the most effective care for NCDs across the care continuum, from detection and diagnosis to ongoing risk reduction, management and end of life care. Effective care achieves the desired patient outcomes based on the best available evidence at the time, including evidence of cost effectiveness, and practice needs to be updated in response to emerging evidence.

Optimizing self-management is essential to achieve person centered care and needs to be supported at all levels of the health system. Self-management enhances people's capacity to take responsibility for their own health and, with the support of health care providers, make informed decisions and undertake the health actions that maximize their wellbeing and quality of life.

The most effective care will have the capacity to delay the progression of the disease and the onset of complications, co-morbidities and disabilities. It will achieve outcomes desired by the person, including improving quality of life, reducing hospitalizations, and maintaining functional capacity, independence and participation in work and social activities.

Principle 2: Re-orientation and strengthening the health system to achieve significant and sustainable change

The health system requires significant change to achieve quality NCD prevention and care that is able to meet demand. Primary health care networks which link primary, acute and specialist care within a broader network of allied health and community support services are a key element in providing patients with complex needs integrated multidisciplinary care, and this capacity must be enhanced. Health care practitioners operating in effective primary health care networks are best placed to provide a team based approach.

Sustainable quality NCD prevention and care requires effective and ongoing collaborations between governments at all levels, and the non-government and private sectors.

Effective leadership by the health sector will significantly progress change by supporting the implementation of promotive and cost effective strategies that can be embedded within the health and community care systems and sustained for the long term.

Principle 3: Adopt a population health approach and reduce health inequalities

Throughout the life course inequities in access to protection, exposure to risk factors are the cause of major inequalities regarding the occurrence and the outcome of the NCDs. Action will be taken to respond to the social and environmental determinants of NCDs by adopting comprehensive approach through greater public and private participation and multi-sectored action for better health.

This aims to improve the health of the whole Sudanese population and reduce health inequities among them. It acknowledges the wide range of social, economic and environmental factors that influence the development and progression of NCDs, as well as the behavioral factors that affect health.

The needs of all Sudan's population groups and communities must be recognized and addressed, and. The special challenges confronted to meet the needs of all those vulnerable to NCDs, Such as those who are socio-economically disadvantaged, and people with mental illness, physical or mental disabilities. NCD prevention and care must be responsive to the needs of people with respect to:

- Cultural and linguistic backgrounds.
- Should be across all stages of the lifespan, including children and older Sudanese people.
- The socio-economic and educational backgrounds.
- Living in all types of settings, including rural and remote communities.

Principle 4: Prioritize health promotion and disease prevention

A significant proportion of the NCD burden can be prevented, and health promotion and risk reduction must be prioritized for people at all stages of these diseases—people without disease, at risk of disease, and with chronic disease of varying levels of complexity.

Health promotion is the process of enabling people to increase control over and improve their health. Interventions must include actions not only at the level of the individual, but also aimed at building healthy public policy, creating supportive environments, strengthening community action, developing personal skills and reorienting health services.

Prevention and risk reduction strategies acknowledge that there are known preventable risk factors, such as smoking and lack of physical activity, that have impact on the development and progression of many of the chronic diseases. These risk factors should be the focus of significant, targeted and coordinated action.

Using the emerging evidence, appropriate and effective prevention interventions must be identified, implemented and sustained by engaging not only the health sector in health promotion and illness prevention, but also reaching beyond the health sector to all those sectors and settings that impact on the risk and protective factors for non-communicable disease.

Principle 5 : Facilitate coordinated and integrated multidisciplinary care across services, settings and sectors to develop strong process to assist in mobilizing resources

Influencing the changes in policies in other non-health sectors like trade, education, agriculture, urban development, food and pharmaceutical production and Integration of prevention and control of NCDs into the national health development plan will improve the care of people with chronic disease. This coordination also includes general practice, community health facilities, private providers, and community and non-government organizations. It may also require community and disability support, as well as support from family and care providers.

The integrated provision of NCD prevention and care requires a flexible health system that can coordinate care planning across services, settings, sectors and over time. This means commitment from a range of services and sectors, and the ability to work together to achieve shared goals. Multidisciplinary care planning must be person centered, incorporate prevention, self-management and co-morbid conditions, and be responsive to changing patient needs.

Principle 6: Monitor progress

Throughout implementation of the NCD strategy there must be a focus on developing, collecting and the timely reporting of useful measures to monitor

progress against expected outcomes. Such monitoring will determine whether appropriate directions have been identified to achieve success in terms of the objectives, and whether effective implementation is taking place.

Action areas: Action areas have been identified as essential to achieving the objectives and putting into practice the principles of the NCD strategy. The action areas reflect the overall theme of non-communicable disease prevention and care. These action areas include the following:

1. National multisectoral frame work for the prevention and control of Non communicable disease
2. Policy Development
3. Strengthening the health system and Integrating the prevention and control of NCDs
- 4- Capacity Building and human resource development
- 5- Health promotion and primary prevention through high level multi- sectored action
- 6- Monitoring and Evaluation
- 7- Research and Surveillance

Action Area 1: National multisectoral frame work for the prevention and control of Non communicable disease

Objectives To advocate for the multisectoral approach where all government departments and key stakeholders work together to achieve the equity in protection

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- To establish a comprehensive national policy and plan involving all relevant sectors outside the health e.g. academia, civil societies and other professional associations
- To develop a high level multispectral mechanism in a form of a council for guiding, monitoring and evaluating the multisectoral plan
- To raise and improve access to fund

Action Area (2) Policy Development

Objective:

- To establish national policies and plans for the prevention and control of NCDs at federal, states and community level

Action Area(3): Strengthening the health system and Integrating the prevention and control of NCDs into the all Health System levels

Objectives

- Addressing the prevention and management of chronic conditions should be given high priority across the health system with special focus on the primary health care
- To ensure that the health system has the essential elements for the effective management of the chronic conditions such as adequate access to essential medicines, basic equipment, standards for the primary care and well functioning referral mechanism
- To develop and update the standards guide lines and protocols for the management of common conditions like cardiovascular, diabetes, chronic respiratory disease and common injuries at all levels and integrate their management whenever possible into the primary health care
- To improve the access to fund allocated to the prevention and control of NCDs
- To incorporate the evidence based and cost effective primary and secondary prevention interventions with more emphasis on the primary health care services

Action Area 4: Capacity Building and human resource development:

- Improve the training of NCDs care providers and establish a continuing basic and in-service education program and link that with extension of licensing in public and private sectors of the health care system with special focus on primary healthcare
- Build workforce capacity to identify, support self-management and prevent or delay onset of complications in people with non-communicable diseases.

Action Area 5

Health promotion and primary prevention through high level multi- sectored action

Objectives:

- To develop high level policies and plan to involve the public , private actors such as agriculture and food factories, finance, trade, transport, education, sport and urban planning and the primary health care system development
- To raise the awareness of the community regarding non-communicable diseases and advocate for their prevention and control having special focus on people at risk.

- To promote specific measures and interventions to reduce the main shared risk factors for non-communicable diseases: tobacco use, unhealthy diets, physical inactivity and harmful use of alcohol and integrate these interventions at PHC level.
- To improve the PHC programs of early detection of cases with targeted NCDs that can significantly improve prevention and care.
- To develop Partnerships between key stakeholders for prevention and control of NCD with the relevant health program like health system development, CBI, nutrition, environmental health, school health etc with clear Roles and Responsibilities
- To promote the physical activity in coordination with the related sector
- To develop Partnerships with Tobacco control program

Action Area 6: Monitoring and Evaluation

Objectives:

- To monitor and evaluate the effectiveness of the NCDs programs in national Sudan Health Service delivery and at community level.

Action Area 7 : Research and Surveillance

Objectives:

- To conduct periodical NCDs risk factor survey for tracking the trend in distribution of risk factors
- To contribute on a routine national data collection to evaluate the progress of the implemented plans.
- To promote and support research.

PART 4: IMPLEMENTATION ROADMAP

Four main components are needed to realize the strategy:

1-Preventive component

This is to be done through a community participation plan and preventive GLs with the concerned parties (Ministries of Interior {police department}, education {schools}, trade & taxation, food production strategies, health insurance, road and transport, civil societies, and the local health system) Another aspect is to strengthen the PHC referral system with coordination mechanisms and putting work legislation in place

2-Curative component

This is to be done by strengthening the coordination mechanism and referral system between the all levels of care

Another aspect is to make sure protocols and standard operating procedures are implemented and to put legislation in place.

3-Rehabilitative component

This is to be done by assessing the current rehabilitative institutes and developing a multi-

sector plan with the tertiary and specialized centers to upgrade these facilities and setting the roles and regulation to organize their work, further more ensuring the availability of tertiary standard GLs to combat the disability

4-System of finance.

Rules and regulation regarding the re adjustment of NCDs finance system at primary health level have to be in place.

The main domains of the road map implementations:

1. Objectives to be achieved and their corresponding indicators to be measured
2. Groups or role players to achieve the objectives and their specific remit
3. Framework of role of each above group above and who would be the body responsible to monitor the action

Road map and the role of stake holders:

Before implementation of the strategic plan certain predetermined indicators must be set so that the success of the plan can be measured against them. The indicators for each action area are shown below:

1. Stakeholders

The ultimate body responsible will be the Federal Ministry of Health which is responsible for the Health of Sudanese individuals, however to be able to implement the strategy specific stakeholders are designated in details for each objective

They are:

- a. Policymakers (legislative authority)
- b. National primary health care structure
- c. Secondary and tertiary healthcare facilities
- d. The State Ministries of health
- e. Professional societies and Research Institutes in universities.
- f. Community
- g. NGOs
- h. INGOs

The priority working areas are:

- 1-Cvd &hypertension
- 2-Diabetes
- 3-Asthma
- 4-Cancer
- 5-Common injuries mainly road traffic injuries
- 6-Mental Health

ROADMAP

OBJECTIVES	ACTIONS	INDICATORS	Stakeholders
<p>1-To raise the priority accorded to NCDs at the national level &to integrate the prevention and control of NCDs into policies across all government programs.</p>	<ul style="list-style-type: none"> • Advocate to involve the NCD plan in the national developmental plan • Develop national and multi-sectored plan across the all relevant sectors with focus on key people involved in policy development for the prevention and control of NCDS. • Establish health insurance policy of finance that covers the NCDs problems at primary care level. • Advocate to improve the finance system of NCD basic package • Establish a consultation advisory council involving the all relevant sectors with aim of orientation on NCDs and their impact • Improve the routine NCD surveillance mechanism to reflect the burden of NCD 	<ul style="list-style-type: none"> • No of national seminars conducted • No. of federal and state developed plans for NCDs • Availability of policies revised and endorsed at federal level. • No. of localities implementing finance policy. • % of NCD patient covered by the insurance system • Council developed • % of NCD statistical information reported to higher level 	<ul style="list-style-type: none"> • National NCD department • Local health system • national PHC policy department • NCD department • Health insurance and the national health policy • NCD coordinator at state and locality level • National NCD supervisors • NCD department • National health statistical department • State ministry of health

<p>2- Strengthen health systems to respond effectively to the health needs of chronic cases with special focus on the PHC services.</p>	<ul style="list-style-type: none"> • Define the roles and the job description of the care providers at PHC level • Integrate the prevention and control of major NCDs into the PHC level • Availing the necessary prerequisites and supplies (essential equipment and drugs, NCD HIS, standard guidelines, educational materials and operational procedures) needed for the integration • Develop supervisory and operational procedures (SOPs) • Improving the referral mechanism from the primary to upper level 	<ul style="list-style-type: none"> • NCD organization structure developed at PHC level • -Number of the localities implement the policy of integration • Number of PHC health facilities operating the integration (No of PHC centers equipped with essential supplies and equipments for NCDs.) • No of supervisory visits conducted • SOPs and supervisory check list developed • Referral guidelines developed 	<ul style="list-style-type: none"> • National planning department • National PHC policy • Local health system • National NCD department
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<p>3-To promote specific measures and interventions to reduce the main shared risk factors for non-communicable diseases:</p> <ul style="list-style-type: none"> - tobacco use, unhealthy diets, -physical inactivity - harmful use of alcohol 	<ul style="list-style-type: none"> • Implement programs that tackle social determinants of NCDs e.g. (health in early childhood, health of the urban poor and fair financing and equitable access to PHC service • Promote the risk reduction strategies through the coordinated approach involving the whole stake holders • -Involvement of both public and private sectors such as agriculture, finance, trade, transport, urban planning and management, education and sport. • -Influence public policies and legislation in the following sectors e.g. trade, taxation, urban development, education and food production and policies to improve the physical activity <ul style="list-style-type: none"> • -Implementation and enforcement of tobacco control and alcohol prohibition law • -Control of unhealthy diet 	<ul style="list-style-type: none"> • % of coverage by exclusive breast feeding • % of population coverage by the free PHC basic package • Availability of community health promoters (CHP) at local health area • NCD strategy endorsed • National multisectoral council developed. • National and multi-sectored plan across all relevant sectors Developed 	<ul style="list-style-type: none"> • National nutrition department and food production strategy • -Urban planning and transport sector • Ministry of education • -Ministry of agriculture • -Ministry of youth and sport • National school health programs • Civil societies • State ministry of health • Ministry of social affairs and women society • Parliament
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	<p>Examples are:</p> <ul style="list-style-type: none">• legislation on tobacco use tax on cigarettes, smoke free areas legislation, ban on tobacco advertising• Advocate to develop the walkable and recreation places• Develop strategy on healthy food and physical activity• Enforce the programs that encourage the physical activity in schools• Promote the Legislations on injuries, road and transport safety-	<ul style="list-style-type: none">• Food based national dietary guidelines legislation developed	
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<p>4-To raise community awareness regarding non-communicable diseases and advocate for their prevention and control.</p>	<ul style="list-style-type: none"> • Prepare the health education (HE) materials • Build the capacity of the NCD coordinators at the local health system • Involvement of the national and local media • Prepare community HE plan implemented through the CBI, local NGOs, school health programs and the NCDs coordinators at locality level • To identify, support self-management and prevent or delay onset of complications in people with NCD) • Set a list of monitoring indicators for the state and the local health system 	<ul style="list-style-type: none"> • No .of developed Facilitators and educational guide lines • No .of HE and IEC materials prepared • -Plan developed • -No. of TOT conducted to train the health educators • Examples: (% of health awareness sessions, • number of schools adopting the NCD key messages programs, • No. of home visit program per village, • No. of IEC materials developed and distributed ...) 	<p>National health promotion department</p> <p>-CBIs and health education programs</p> <p>-states and local NCDs coordinators</p>
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<p>5-To promote the effectiveness of secondary and tertiary prevention including the long term care and the rehabilitation</p>	<ul style="list-style-type: none"> • Increase early detection of new cases of targeted NCDs. • Improve the follow up strategy at PHC level • Contribute to develop and update the NCD standard management guide lines at the three preventive levels 	<ul style="list-style-type: none"> • PHC standards developed • Management guidelines for early detection developed • Rehabilitation guidelines developed <p>Examples: No. of protocols for CVD,Cancers.DM and COPD developed and disseminated % of cases detected having NCDs at an early stage</p>	<ul style="list-style-type: none"> • PHC department/ FMoH • Curative department state and FMoH • Curative, mental health and ministry of social affairs sectors
<p>6- To promote partnership for the prevention and control of NCDs</p>	<ul style="list-style-type: none"> • Developments of partnerships between key stakeholders with clear roles and responsibilities and provide access to funds for the NCDs programs 	<ul style="list-style-type: none"> • Amount of funds secured from partners • No. of national and international stakeholders involved in non-communicable disease control program. 	<ul style="list-style-type: none"> • National NCD department • National planning and development department • National and international NGOs

<p>7-To promote and support research for the prevention and control of non-communicable diseases.</p>	<ul style="list-style-type: none"> • Establish NCDs surveillance system for tracking national progress in the prevention and control of non-communicable diseases. • Carry out national surveys (as part of standard global and regional surveys) e.g. Step wise survey. • -Review and document existing research and studies and invest in epidemiological, behavioral and health system research. • Encourage national medical associations to be involved in scientific and operation research 	<ul style="list-style-type: none"> • No. of states conducting the (risk factor survey) RFS • Availability of functioning surveillance system for NCDs at federal and state levels (e.g. mortality statistics by cause, cancer registry, data on NCD risk factors) • No. of researches conducted • No .of researches conducted and documented in non-communicable diseases and their risk factors. • No .of national medical associations which conducted research in NCDs 	<ul style="list-style-type: none"> • National and state statistic and information department • National research department • Professional societies and Research Institutes in universities
<p>8- To monitor non-communicable diseases and their determinants and evaluate the progress at national level</p>	<ul style="list-style-type: none"> • Develop the NCD monitoring indicators • Establish an updated NCDs information data base system • Conduct mid-term and annual evaluation study 	<ul style="list-style-type: none"> • availability of national updated NCD monitoring indicators system • Availability of regular reporting system • No. of supervisory visits conducted 	<ul style="list-style-type: none"> • Directorate general of health planning and development • NCD program • National information centre

References

1. Global Report (2005), Preventing Chronic Diseases a vital investment.
2. World health report 2002: Reducing risks, promoting healthy life
By World Health Organization
- 3-Sudan annual report 2009
4. The International Medical Corps Study of IDPs in Darfur camp (2005
5. - 25 years strategic PLAN for health sector, Sudan 2005 -2027

6. Sudan Household Health Survey- 2006
- 7- Federal Ministry of Health Annual health statistical reports- (2001-2006)
8. WHO STEP-wise Risk factor indicator Survey, conducted in Sudan (Khartoum State) in 2005

- 9- Eastern Mediterranean Health journal, Non-communicable diseases: risk factors and regional strategies for prevention and care, Volume 10, No.6, November 2004, Pages 778-788).

10. Medium-Term Strategic Plan 2008-2013
11. N Ait-Khaled, N Pearce, H R Anderson, P Ellwood, S Montefort, J Shah, and the ISAAC
Phase Three Study Group (Musa OA)

12. Epi-lab emergency room survey 2003

13. Radioisotope Center Khartoum (RICK)-(2000-2006)(report)

14. American cancer society, Cancer reference information
15. -Registries from Renal Units-(1996-2005)

16. Obesity Is A Risk Factor For Kidney Failure -University Of California, San Francisco, Article Date: 04 Jan 2006 - 0:00 PST
17. National renal disease & transplant statistics centre (report)
18. Road Traffic Injuries: Can We Stop A Global Epidemic?)
Lauren P. Giles, B.A.; Elisabeth S. Hayes, M.B.A.; and Mark L. Rosenberg, M.D., M.P.P.)
19. The UINCEF/ UNFPA analysis of Darfur (2005)
20. Epidemiological survey for major depressive disorder, Shaaban and Baasher (2003)

