



**Sudan**

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# The Republic of Sudan

## Country Report

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# Geography and Population

The Republic of Sudan is located in northeastern Africa. It is bordered by Egypt to the north, the Red Sea, Eritrea, and Ethiopia to the east, South Sudan to the south, the Central African Republic to the southwest, Chad to the west, and Libya to the northwest.

Sudan's capital is Khartoum, which is its economic, cultural, and political center. The country is made up of eighteen states (wilayat, singular - wilayah): Al Gazira, Al Gedaref, Blue Nile, Central Darfur, East Darfur, Kassala, Khartoum, North Darfur, North Kordofan, Northern, Red Sea, River Nile, Sennar, South Darfur, South Kordofan, West Darfur, Western Kordofan, and White Nile.

The population of Sudan is 36,108,853 (July 2015 est.). It is primarily Sudanese Arab (approximately 70%), followed by Fur, Beja, Nuba, and Fallata. The majority of the Sudanese population is Sunni Muslim with a small Christian minority. The mean age of the population is 19.3 years (male: 19.1 years, female: 19.6 years) as estimated in 2015.<sup>1</sup>

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<sup>1</sup> *The World Factbook* 2015. Washington, DC: Central Intelligence Agency, 2015.



Sudan's total land size is 1,861,484 sq km, making it the world's sixteenth largest country. The terrain is generally flat, featureless plain with desert dominating the north.

Sudan has an arid desert climate, with rainy seasons varying by region (April to November). Known natural hazards include dust storms and periodic, persistent droughts. The current environmental issues are inadequate supplies of potable water and wildlife population threats due to excessive hunting, soil erosion, desertification, and periodic drought.

## Government and Politics

The country's conventional long name is the "Republic of the Sudan," and the conventional short form is Sudan. Sudan gained independence from Egypt and the United Kingdom on January 1, 1956.

The country is a federal republic, ruled by the National Congress Party (NCP) since 1989. The Comprehensive Peace Agreement (CPA) between the north and south, signed in January 2005, granted the southern rebels autonomy for six years, followed by a referendum on independence for South Sudan. The CPA mandated Government of National Unity and between 2005 and 2011 and provided a

percentage of leadership posts to the southern Sudan-based Sudan People's Liberation Movement (SPLM). This was disbanded following the secession of South Sudan. The people of South Sudan voted for independence in a 2011 referendum. After South Sudan's independence, conflict broke out between the government and the Sudan People's Liberation Movement-North in Southern Kordofan and Blue Nile states.

Islamic-oriented military governments have dominated national politics since Sudan's independence from Anglo-Egyptian co-rule in 1956. Sudan was involved in two exhausting civil wars during the majority of the remainder of the 20th century.

In 2003 another war ignited in Darfur. Some politicians explained the fight was for water resources, and other politicians suggested the war started with a dispute between livestock herders due to land conflict. In 2007, the UN and the African Union jointly commanded a Darfur peacekeeping operation known as the African Union-United Nations Hybrid Mission in Darfur (UNAMID).

Sudan is a destination for many refugees from neighbouring countries, primarily Ethiopia, Eritrea, Chad, Central African Republic, and South Sudan. Armed conflict, poor transportation infrastructure, and government denial of access have impeded the provision of humanitarian assistance to affected populations.

# Economy

Sudan has a diversity of natural resources, but unfortunately, due to continuous wars and conflicts, most of these resources are underutilized. The country's main resources include petroleum, small reserves of iron ore, copper, chromium ore, zinc, tungsten, mica, silver, and gold, and hydropower.

Agricultural land in Sudan makes up 100% of the land as estimated by the World Factbook and is divided into arable land (15.7%), permanent crops (0.2%), and permanent pasture (84.2%). Irrigated land takes up 18,900 sq km (2012), and total renewable water resources 64.5 cu km (2011). As a result of South Sudan's independence and secession, Sudan lost almost three-quarters of its oil production.<sup>2</sup>

South Sudan independence and the War in Darfur caused a major economic slowdown in Sudan. The lack of basic infrastructure in large areas and reliance by much of the population on subsistence agriculture kept close to half of the population at or below the poverty line.<sup>3</sup>

The added burden of the United States' economic sanctions in 1997 made it more difficult to grow the economy. Sudan is attempting to

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<sup>2</sup> *The World Factbook* 2015. Washington, DC: Central Intelligence Agency, 2015.

<sup>3</sup> HDR, SSNHDR, World Bank

develop non-oil sources of revenues, such as gold mining. It is the largest Arabic gum exporter and produces around 75-80% of the total world's output.<sup>4</sup>

There are three major contributors to poverty in Sudan, (1) multiple sustained conflicts undermining opportunities for economic and social development, which in turn feed long standing grievances driving fresh conflict, (2) dependence on oil, adversely affecting agriculture and livestock sectors, and (3) unequal distribution of fiscal resources and access to natural resources, especially between the center and periphery of the country. This feeds into a complex of ideology, ethnicity, and socio-economic marginalization that is tearing the country further apart.

Table 1 lists some of the major economic and employment facts. The inflation rate is increasingly annually, about 18.2% as estimated in 2015, very high compared to the world statistics. As aforementioned the unemployment and low salary employment cause almost half of the population to exist below the poverty line. The labor force is distributed mainly in agriculture (80%), followed by services (13%), and industry (7%), according to 1998 estimates.

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<sup>4</sup> *The World Factbook* 2015. Washington, DC: Central Intelligence Agency, 2015.

**Table 1.** Economic and employment facts<sup>5</sup>

Economic Factor	Statistic
<b>Labor force</b>	11.92 million (2007 est.)
<b>Unemployment rate</b>	13.6% (2014 est.)
<b>Population below poverty line</b>	46.5% (2009 est.)
<b>Budget</b>	revenues: \$6.518 billion expenditures: \$9.754 billion (2015 est.)
<b>Budget surplus (+) or deficit (-)</b>	-3.8% of GDP (2015 est.)

Sudan is a highly-indebted country with a sizeable external arrears and has been in non-accrual status with the World Bank Group (WBG) since 1994. At the end of 2013, Sudan's external debt stock stood at \$45.1 billion in nominal terms, about 85% of which was in arrears.<sup>6</sup>

## Health System

The current health system in Sudan was created by the army in 1899. In 1905, the Central Sanitary Board was established to guard the public and curative health affairs. In 1924, the Sudan Medical Services was established and managed by a director responsible for

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<sup>5</sup> *The World Factbook* 2015. Washington, DC: Central Intelligence Agency, 2015.

<sup>6</sup> World development indicators. Washington DC: World Bank Group; 2014

all health services, including military medical services. In 1949, the Ministry of Health was established.

The change to Sudan's federal system began in 1991. A single ministry for health and social affairs was founded in each of the states, while separate ministries for health and social affairs were founded in Khartoum.

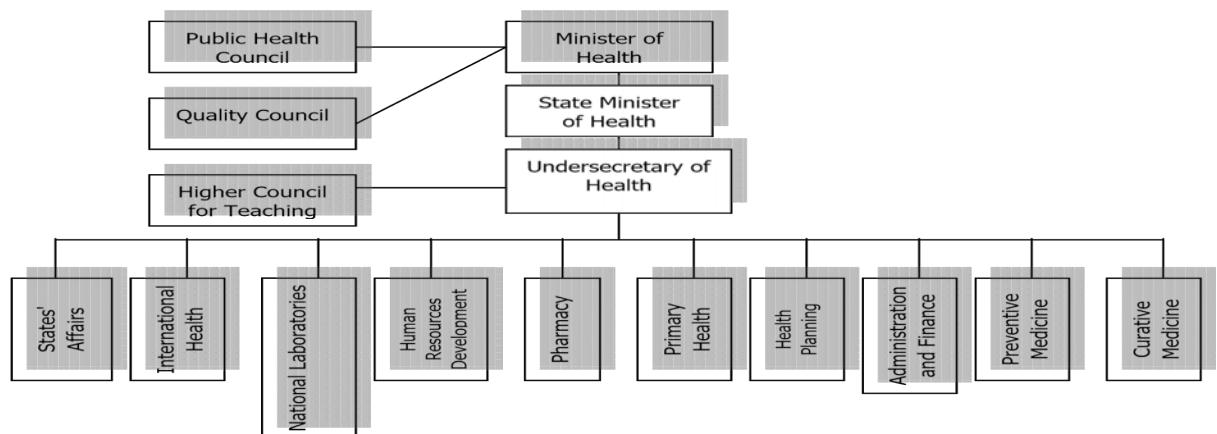
The current system has a three-layered structure: the Federal Ministry of Health (FMOH), State Ministries of Health (SMOH) and the Local Health System. The FMOH remains the main layer for policy making, strategic planning, coordination, regulation, international relations and the central source of technical support and guidance for the states.

The FMOH is linked to twenty-six State Ministries of Health. Within each state there are a number of localities, (134 in total) managed through a district health system (Figure 1). The Federal Ministry of Health is responsible for developing national health policies, human resources planning and development, strategic planning, health legislation, response to epidemics, and international health relations and coordination. FMOH is also responsible for the management of the National Health Information System, in addition to the monitoring and evaluation of all health activities and interventions in the country.

The second layer, composed of twenty-six State Ministries of Health, shares the responsibility of planning, legislation, and financing with the FMOH. However, it takes direct responsibility for the organization of health in the state and support of the local health system. Due to weak capacity of the Ministries of Health, there are notable gaps in providing the primary healthcare required by the local communities. The exceptions are Khartoum and Gezira SMOH, which have relatively better performing health systems.

The third layer in Sudan's health system is the local level. The Local Health System is based on the district health system approach. It emphasizes the principles of primary health care represented in decentralization, community participation, intersectoral coordination and integration of services. Local councils are also responsible for water and sanitation services.

**Figure 1.** Organizational Structure of Federal Ministry Of Health<sup>7</sup>



<sup>7</sup> Sudan ministry of health 2013 health report. Health Systems Profile- Sudan

The government health system is a three-tiered network. Primary health care was adopted as the main strategy for health care provision in Sudan in 1976 and re-emphasized in the National Comprehensive Strategy for Health in 1992 and in the 25-Year Strategic Health Plan 2003-2027.

Primary health care facilities consist of primary healthcare units (PHCU), dressing stations (DS), dispensaries, health centers, and rural hospitals. In principle, PHC units are staffed by community health workers (CHWs), and dressing stations are staffed by a nurse, whereas dispensaries are headed by a medical assistant. The health center is the referral point for the lower-level facilities and is headed by a physician and managed by the localities.

The rural hospitals, on average, have bed capacities of forty to one hundred and are managed by SMOHs. Tertiary hospitals, including teaching, specialized, and general hospitals, are located in state capitals and are operated by SMOHs. In addition, the FMOH operates twenty-one tertiary-level hospitals and specialized centers.

There is a deficiency in the availability of information about NGOs (non-governmental organizations) working in Sudan regarding their plans, budget, and distribution. However, they play an important role in filling some of the gaps in coverage by the government system. The government spends around 6.5% of its GDP, as of a 2013

estimate. There is a low physician number with a density of 0.28 physicians/1,000 population (2008 est). The high maternity mortality rate has always been a major concern for health authorities.

**Table 2.** Major Sudan health indicators<sup>8</sup>

Health Indicator	Statistic
<b>Population growth rate</b>	1.72%
<b>Birth rate</b>	29.19 births/1,000 population
<b>Death rate</b>	7.66 deaths/1,000 population
<b>Maternal mortality rate</b>	311 deaths/100,000 live births
<b>Infant mortality rate</b>	51.52 deaths/1,000 live births
<b>Health expenditures</b>	6.5% of GDP (2013)
<b>Physicians density</b>	0.28 physicians/1,000 population (2008)
<b>Hospital bed density</b>	0.8 beds/1,000 population (2012)
<b>Drinking water source</b>	improved water: 55.5% of population unimproved water: 44.5% of population (2012 est.)
<b>HIV/AIDS adult prevalence rate</b>	0.25% (2014 est.)
<b>Obesity adult prevalence rate</b>	6.6% (2014)

<sup>8</sup> *The World Factbook* 2015. Washington, DC: Central Intelligence Agency, 2015.

The number of health personnel has decreased in the last few years. Many of Sudan's trained doctors leave to other countries for further medical training. Low salaries in Sudan compared to other Gulf and European countries hinder health staff retention. Table 3 lists changes in personnel numbers between 2009 to 2013, and notably the number of the consultants in different medical specialities remained fairly constant.

**Table 3.** Number of health personnel in Sudan /100.000, 2009 – 2013<sup>9</sup>

Personnel Position	2009	2010	2011	2012	2013
<b>Doctors</b>	31.6	35.2	34.6	38	35.6
<b>Specialists</b>	4.2	6.2	5.6	5.9	5.6
<b>Dentists</b>	2.7	1	1.7	1.8	1.6
<b>Pharmacists</b>	4.3	4.7	4.7	2.6	2.3
<b>Technicians</b>	34.6	29.6	25.5	20	17.5
<b>Medical Assistants</b>	18.7	21.5	23	20.1	18.9
<b>Nurses</b>	47.3	51.8	52.8	46.8	43.7
<b>Public health officers</b>	3.7	3.1	3.3	2.5	2.5

<sup>9</sup> Sudan ministry of health 2013 health report. Health Systems Profile- Sudan

The private health sector has markedly expanded in the last 10 years. With the general deterioration of the public health system, more investors explored the Sudanese health system in search of projects. The majority of private health services are located in Khartoum.

**Table 4.** Major medical specialities consultants numbers 2009-2013<sup>10</sup>

Speciality	2013	2012	2011	2010	2009
<b>Obstetrician &amp; Gynecologist</b>	267	313	316	328	283
<b>Pediatrician</b>	211	274	258	255	242
<b>General medicine</b>	223	286	301	303	249
<b>Chest physician</b>	47	62	64	58	56
<b>Cardiologist</b>	18	18	15	15	17
<b>Dermatologist</b>	71	94	99	98	87
<b>Anesthesiologist</b>	60	83	79	74	58
<b>Radiotherapist</b>	18	20	19	19	14
<b>Radiologist</b>	30	42	45	41	34
<b>Pathologist</b>	19	60	52	53	65

<sup>10</sup> Sudan ministry of health 2013 health report. Health Systems Profile- Sudan

<b>General surgeon</b>	179	173	153	155	180
<b>Neurosurgeon</b>	16	14	16	15	18
<b>Orthopedic surgeon</b>	37	64	63	59	50
<b>E.N.T.* surgeon</b>	54	65	66	64	51
<b>Plastic Surgeon</b>	1	12	32	12	7
<b>Dental Surgeon</b>	33	32	12	32	35
<b>Ophthalmologist</b>	77	96	97	91	112

\*=Ear, nose, and throat

There is no recent, accurate data on the exact number of radiological examinations performed in Sudan. Radiology services cater to the country's center. A very small number of radiological services exist at the peripheries, especially in the western part of the country. War and economic instability played a major role in limiting the development of public and private health facilities.

Most of the radiology units provide basic imaging services. A limited number of units provide cross-sectional imaging and are mainly centered in Khartoum. No exact data on the number of MRI (magnetic resonance imaging) or CT (computed tomography) examinations performed in Sudan exists. Nuclear imaging is limited to Sudan's center as well.

**Table 5.** Distribution of basic radiology equipment in Sudan<sup>11</sup>

State	Ultrasound Machines	X-ray Machines
<b>Northern</b>	27	27
<b>River Nile</b>	9	11
<b>Red Sea</b>	10	7
<b>Gadarief</b>	7	10
<b>Kassala</b>	6	7
<b>Khartoum State</b>	12	27
<b>Gezeria</b>	22	33
<b>Sinnar</b>	13	6
<b>White Nile</b>	4	5
<b>Blue Nile</b>	4	2
<b>North Kordofan</b>	5	9
<b>South Kordofan</b>	8	8
<b>North Darfour</b>	2	5
<b>West Darfour</b>	1	1
<b>South Darfour</b>	2	2

<sup>11</sup> Sudan ministry of health 2013 health report. Health Systems Profile- Sudan

<b>Centre Darfour</b>	0	0
<b>East Darfour</b>	0	0
<b>Total</b>	<b>132</b>	<b>160</b>

Trained radiology personnel are located mainly at the center of Sudan, leaving some states with no radiology staff at all. More than half of the country's radiologists are based in Khartoum, along with most of the public and private centers. Some states are staffed with radiographers only and no radiologist. Most of the radiographs performed are interpreted by the clinicians, who generally only have basic image interpretation skills. Centralization of radiology personnel often requires patients to travel for diagnostic imaging and potential treatment (**Table 6**).

The number of trained radiologists has decreased in the last fifteen years as a result of two main contributing factors. Firstly, there exists a limited number of diagnostic training centers in Sudan. The low numbers of radiology units and trained radiologists makes it difficult to raise these numbers. With limited qualified personnel, training more radiology staff in a very busy and low-paying work environment is not feasible.

Secondly, outside of Sudan there is a high international demand for qualified radiologists and the offer of more lucrative salaries. Most radiology trainees move within a year or two of the completion of their training.

There are few subspecialized radiology services within Sudan. Simple interventional radiology procedures are mostly performed by non-specifically trained interventional radiologists. The same is true with nuclear imaging.

The government is attempting to limit the emigration of medical personnel and provide more treatment locally. They are trying to provide extra payment and allow mixing the public work with the private work and to increase the consultant's income to retain them in the country. They are also developing subspecialities training.

Although the telecommunication sector is one of the most developed in Sudan, there is no established teleradiology service. Sudan would greatly benefit from tele-radiology given the country's poor transportation infrastructure and the tendency of reporting radiologists to remain in Khartoum.

**Table 6.** Distribution of radiology personnel across Sudanese states<sup>12</sup>

State	Number of Radiologists	Number of Radiographers
<b>Northern</b>	0	24
<b>R. Nile</b>	3	33
<b>Red Sea</b>	2	133
<b>Gadarief</b>	1	22
<b>Kassala</b>	3	16
<b>E. Darfour</b>	0	0
<b>Khartoum State</b>	17	350
<b>Gezeria</b>	2	129
<b>Sinnar</b>	0	22
<b>White Nile</b>	0	35
<b>Blue Nile</b>	0	16
<b>N. Kordofan</b>	0	25
<b>S. Kordofan</b>	0	16
<b>N. Darfour</b>	0	8
<b>W. Darfour</b>	1	5
<b>S. Darfour</b>	1	2
<b>C. Darfour</b>	0	2
<b>Total</b>	<b>30</b>	<b>727</b>

<sup>12</sup> Sudan ministry of health 2013 health report. Health Systems Profile- Sudan

## **Summary**

Sudan is a large country facing many challenges. One of the major challenges is its health service, complicated by continuous wars and economic instability. These factors have led to a scarcity of radiology services throughout the country. Fortunately, there is work that can be done, starting with increasing the number of radiology training centers and setting up infrastructure to support tele-radiology.

As of 2013, the total percentage of population who have electricity is 35%, and this is represented in 63% of the urban areas and 21% of the rural areas.<sup>1</sup> In addition, as of July 2016, only 28% of the population has access to internet; this includes people who only have access to it once in a period of few months. Furthermore, the internet connectivity is not reliable, with only 31,000 individuals have broadband fixed line subscriptions and rest getting through mobile broadband devices or personal hotspots from their mobile phones (both of which are supplied by mobile telecommunication companies) with varying coverage.

There are some places in Sudan where there are no radiology services at all; these underserved areas would benefit greatly from NGO support in order to establish basic imaging services.

<sup>1</sup> *The World Factbook* 2017. Washington, DC: Central Intelligence Agency, 2017

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## Appendix A. Abbreviations

### **NCP**

National Congress Party

### **SPLM**

Sudan People's Liberation Movement

### **CPA**

Comprehensive Peace Agreement

### **UNAMID**

African Union-United Nations Hybrid Mission in Darfur

### **GDP**

Gross domestic product

### **WBG**

World Bank Group

### **FMOH**

Federal Ministry of Health

### **SMOH**

State Ministries of Health

### **PHCU**

Primary healthcare units

### **DS**

Dressing stations

### **CHW**

Community health workers

### **NGO**

Non-governmental organization

**HIV**

Human immunodeficiency virus

**AIDS**

Acquired immunodeficiency syndrome

**MRI**

Magnetic resonance imaging

**CT**

Computed tomography