RAD-AID International Country Reports

Zimbabwe

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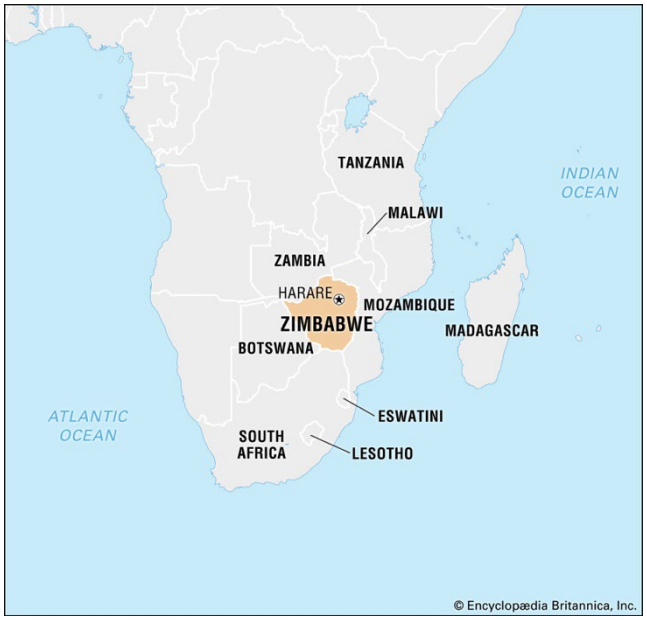
General Country Profile



Geography and Population

Zimbabwe, officially known as the Republic of Zimbabwe, is a landlocked country in Southern Africa, slightly larger than the state of Montana, approximately 390,757 square kilometers (150,872 square miles). [1] It shares a southern border with the Republic of South Africa, a northern border with Zambia. It is bordered on the southwest and west by Botswana and the east by Mozambique. The majority of the country is over 1,000 feet (300 meters) above sea level, with a broad ridge known as the *Highveld* running from the southwest to the northeast across the country to the Inyanga Mountains, which separate Zimbabwe from Mozambique. The Highveld comprises about 25% of the country's total area with elevations ranging from 4,000 feet to 8,504 feet (2,592 meters) and creating a watershed between the Limpopo and Zambezi river systems. On either side of the Highveld, is the *Middleveld*, with an altitude of 3,000 to

4,000 feet, comprising approximately 40% of the area of Zimbabwe. Beyond this, mainly in the south, are the *Lowveld*, comprising 23% of the country's area. [2]

The northwest of the country is separated from Zambia by the Zambezi River, which is known for Victoria Falls, the world's largest sheet of falling water. Lake Kariba, also on the Zambia-Zimbabwe border, forms the world's largest reservoir by volume. [1] Although Zimbabwe is within the tropics, its high elevation creates subtropical conditions. [2] There is a prolonged rainy season that extends from November to March. While recurring droughts may occur, floods and severe storms are rare. [1]

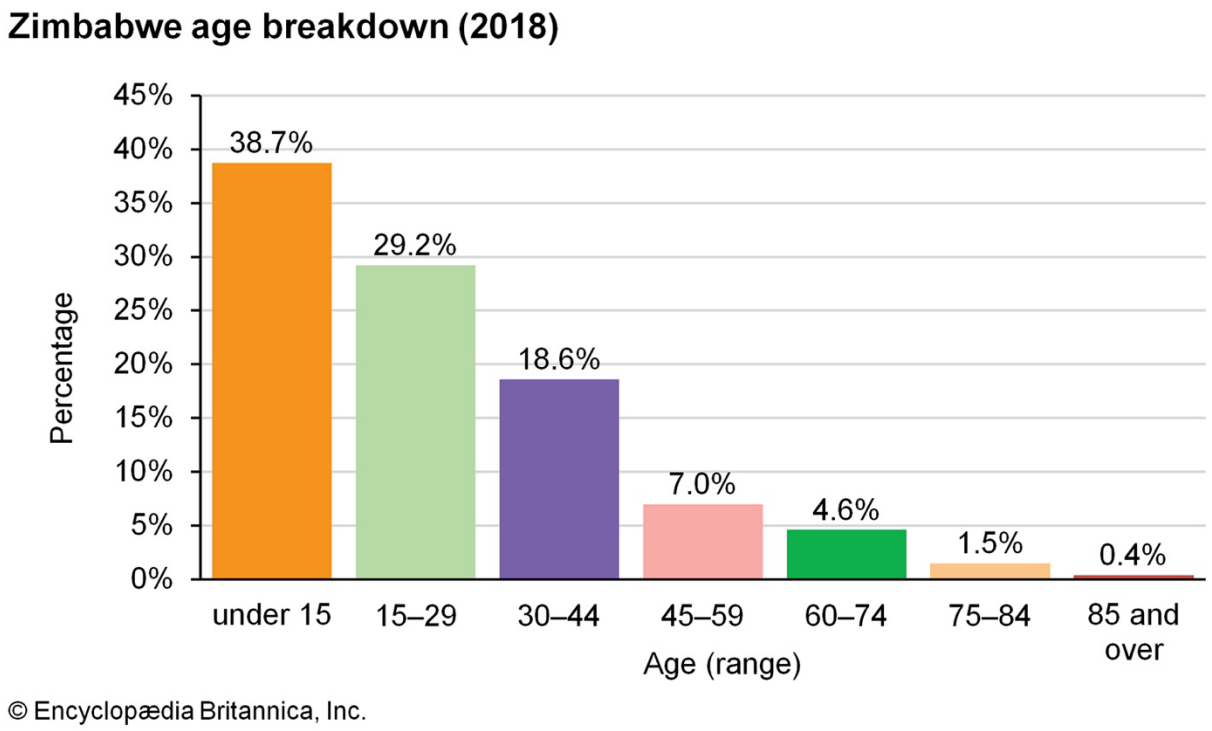
The population of Zimbabwe is approximately 14,650,000 (2019). [3] The country is 99.4% African, predominantly the Shona ethnic group, followed by Ndebele. The Shona traditionally have a strong regional clan structure with six main groups- the Manyika, the Ndau, the Zezuru, the Karanga, the Korekore and the Rovi- formed on the basis of linguistic and cultural similarities. Although there are thirteen official languages, Shona is the most widely spoken language with over two thirds of the population speaking it, followed by Ndebele and English, although English is traditionally used for official business. [1]

The population is young, with more than a third of the population under the age of fifteen and one-third between the ages of fifteen and twenty-nine. [2] Approximately one-third of the population lives in urban centers. [2,3] The average life expectancy has been increasing, 61.5 years as of 2019 with 38.3% of the country living below the poverty line. [3] As of 2014, the literacy rate was high, at 89% with a 98% primary school completion in 2013. [3] The Human Development Index Score was 0.550 in 2022, ranked 159 out of 189 countries and territories. [4]

Table 1. Facts and figures [3]

Capitol	Harare
Total population (2019)	14,645,468
World rank	74
Annual population growth	1.4%
Urban population/rural population	32.2%/68.8%
Population density (people per km^2)	37.3

Figure 1. Zimbabwe age breakdown



History and Culture

Zimbabwe's early settlements were a series of trading states, the largest of which was the Kingdom of Zimbabwe. The Kingdom of Zimbabwe lasted from the mid 1200s until the 1400s and was part of a vast trade network, extending from the east African coast to India. Its decline was linked to migration away from cities and possibly climate change. There was a period of successive kingdoms in the area, including the Mutapa Kingdom, the Rozvi Kingdom and the Ndebele Kingdom. [5] Outside of a few larger cities, pre-colonial Zimbabwe societies were mainly farming communities practiced pastoralism, augmented by trade and gold mining. [6] The Portuguese arrived on the east coast of Africa in the late 1400's, establishing trade with many of these kingdoms and introducing Christianity to the region. [2]

In the 1880's European colonists arrived with the British South Africa Company (BSAC) and claimed prospecting and mining rights, establishing company rule in the region. The colony had a complex caste system of racial segregation and allowed colonial authorities to exclude the Africa population from direct rule and civil power. Urban areas were divided by race, class, gender and ethnicity. Land dispossession and forcible proletarianism were characteristic of the colonial era, restricting African access to land and increasing taxation. [6] There was a significant displacement of the native population into reserves or confiscation of land via taxes, forcing much of the native population into wage labor rather than farming. [5,6] In 1923, Rhodesia became a self-governing British colony, controlled by European settlers.

The late 1950's saw increased resistance to colonial rule in Southern Rhodesia and other South African countries. In 1953, the British government formed the Federation of Northern and Southern Rhodesia and Nyasaland, over the objections of the African political representation. [5] However, increasing African political power and increasing pressure led to the dissolution of the

federation in 1963. The government declared independence in 1965 but the United Kingdom did not recognize this until 1979, when the country held its first free election leading to its independence, as Zimbabwe, in 1980. Robert Mugabe was the nation's first prime minister and later president until his resignation in 2017.

Following independence, the new Zimbabwe government sought to redress class, and race inequalities and redistribute land. Drought, white emigration and civil war damaged the economy during the 1980's. Land reform continued to be a struggle for the government through the 1980's and 1990's and into the early 2000's, as confiscating land from the white farmers caused widespread unemployment and a decline in agricultural productivity, resulting in food shortages. Mugabe's intervention in the civil war in 1998 in the Democratic Republic of Congo led to economic sanctions. These sanctions and inflation compounded economic difficulties and high unemployment rates caused a wave of emigration to South Africa. In the early 2000's, Mugabe's popularity declined and the regime became increasingly brutal and repressive. There was suspicion of election tampering and continued civil unrest. The economy began to improve in 2009, with restructuring programs to rebuild the agricultural and mining sectors and halt inflation. The controversial and contested presidency of Mugabe ended in 2017, and he was succeeded by former vice president Emmerson Nangagwa, who continued Zimbabwe's economic recovery. [2]

Historically, most migration in Zimbabwe has been internal, with a rural to urban flow. In the past 40 years, there has been emigration from Zimbabwe, with a major exodus in the years before and after independence in 1980 of the white European population. Following independence, emigration occurred due to a poor economy and hyperinflation. Zimbabwe is a

majority Christian nation, with more than 80% of the population practicing some form of Christianity. [1]

Table 2. Worldwide Governance Indicators 2020 [3]

INDICATOR	PERCENTILE RANK
Voice and accountability	16.75
Political stability and absence of violence/terrorism	14.76
Government effectiveness	10.58
Regulatory quality	6.25
Rule of Law	8.17
Control of corruption	10.10

Government and Legal System

Under the 2013 constitution, Zimbabwe became a unitary republic. The head of state is the president, who may serve no more than two five-year terms. The president is assisted by two vice presidents. The parliament consists of the National Assembly and a Senate. The National Assembly has 210 members who are directly elected, with an additional sixty members reserved for women elected through a proportion representation system. The Senate has 80 members, elected by a party list system. All parliament members serve five years.

Zimbabwe is divided into eight provinces and two provincial cities, Bulawayo and Harare, which are further divided into districts. Provinces and cities are led by councils, headed

by a chairperson, or the cities' mayor. [2] The legal system is a mixture of English common law, Roman-Dutch civil law and customary law, divided into a series of court systems. [1,2]

Economy and Employment

Zimbabwe is considered a lower-middle-income country by the World Bank. Its GDP was 21.14 billion in 2019. The unemployment rate in 2020 was 5.7% [3] While the period from 1998 to 2008 represented a period of economic contraction, following that the country has been recording growth, although growth slowed 2014-2017 due to agricultural difficulties, low diamond revenue and decreased investment. Growth remains hampered by lower mineral prices, poor infrastructure, a large debt burden and high government wage expenses.[1]

Although the agriculture sector has been declining, it still generates approximately 15% of the country's GDP, with more than half the total labor force engaged in agricultural activities. About 40% of the total land area is large-scale commercial farming, historically dominated by white farmers. Small scale farming occupies a similar area and is steadily increasing in the share of the country's total agriculture output. The most important food crop is corn. Tobacco is the country's principal cash crop, sugar is grown in the Lowveld and coffee production is increasing. Cattle is the preferred livestock and Zimbabwe is one of the few African countries permitted to export beef to the European Union.

Mining only accounts for less than 10% of the GDP and employs about 5% of the labor force but is a major foreign exchange earner, accounting for about one-third of total export earnings. Manufacturing generates about one-tenth of the GDP, with a large diversity of products. Prior to the late 1990 economic decline, Zimbabwe was able to provide nearly 90% of the manufactured goods used in the country

Table 3. Economic Indicators (2019) [3]

GDP	21.14 billion
GDP rank	227
GDP per capita	1,464.0
GDP rank	200
Growth rate	-8.1
Inflation	-4%
Ease of doing business index	54.5
Tax revenue (% of GDP)	20.7

Physical and Technical Infrastructure

Currently, in Zimbabwe, there are supply energy challenges, where only approximately 41% of the population has access to electricity. There is a marked urban/rural divide in electricity access (21% rural, 80% urban). [3] The primary energy source in the country is biofuels and waste with fuelwood being used for the majority of energy in 64% of homes. [7] This is followed by coal, oil and lastly hydroelectric power. The Kariba Dam shared with Zambia, is a large source of hydroelectric power. Energy is controlled by the Zimbabwe Electricity Supply Authority (ZESA), a state-owned company responsible for generating, transmitting and distributing electricity. Electricity is frequently unreliable, and the country faces supply challenges. Even residents connected to the national electricity grid often buy diesel or solar powered standby generators. In 2011, 18% of households owned a solar panel. [7] The country imports about 40% of its energy.[2] However, Zimbabwe has tremendous potential to develop

clean, renewable energy, namely hydroelectric power from the Zambezi river and solar power owing to its tropical location.

The International Telecommunications Union (ITU) ranks Zimbabwe relatively low, with a rank of 136 out of 176 listed countries in 2017. Approximately 20% of households had internet access with a similar percentage of individuals using the internet. There are 83.18 mobile telephone subscriptions per 100 inhabitants [8]

Table 4. Information and telecommunication use [8]

Fixed telephone subscriptions per 100 inhabitants	1.97
Mobile cellular telephone subscriptions per 100 inhabitants	83.18
Wired broadband subscriptions per 100 inhabitants	1.10
Active mobile broadband subscriptions per 100 inhabitants	38.12
Percentage households with computer	12.89
Percentage households with internet access	22.07
Percentage of individuals using the internet	23.12

Although there are over 97,000 km of roadways in Zimbabwe, only 18,481 are paved and Zimbabwe's transportation infrastructure is in generally poor repair. [1] The past decade has seen a decline in the maintenance of roads and the railway network. The current rail network is unable to meet demands for freight services, hindering growth. Air travel has also declined.[6,9]

Zimbabwe is semi-arid and heavily relies on regular rains for water. There is an extensive dam network, with over 8,000 dams in total, but utilization is low, as many dams are

far from the population that require water resources and are not maintained. A progressive decline in water and sanitation maintenance led to a large cholera outbreak in 2018, which has helped prompt the rehabilitation of water and sanitation services, although resources remain strained. The Zimbabwe National Water Authority (ZINWA) manages the national water resources. [9]

Zimbabwe has six international and four domestic airports. The three main international airports are the Robert Gabriel Mugabe International Airport in Harare (main hub), Victoria Falls International Airport in Victoria Falls and JM Nkomo International airport in Bulawaya.[9]

National Health Sector

National Health Care Profile

During the 1980s and 1990s, Zimbabwe had a relatively robust health care infrastructure, with primary health care services within 10 kilometers of at least 80% of the population. [10] However, the economic and political instability contributed to a corresponding deterioration in health care infrastructure combined with loss of health care workers due to an emigration from the country from the late 1990's until 2008. [11] However, in 2009, the newly formed Inclusive Government launched a 10 step Short Term Emergency Recovery Plan to address economic and infrastructures challenges. The plan's primary goals were to increase access and utilization of comprehensive primary health care services and referral facilities. This has led to slow but sustained improvements in health care since 2009, targeting the most common preventable and treatable diseases, namely nutritional deficiencies, communicable disease and pregnancy, childbirth and newborn related conditions. [12]

Child mortality in 2019 was 40 deaths per 1,000 live births in children under one and 52.6 deaths per 1,000 live births in children under five, showing steady improvement since 2008. Maternal mortality was 458 per 100,000 live births in 2017, again showing slow but steady improvement since 2008. Fertility rates have also been declining with increasing use of contraception, with the average number of children a woman delivers in her lifetime declining from 4.9 in 1990 to 3.5 in 2019. [13] The percentage of births attended by a skilled birth attendant has increased from 60.2% (2009) to 86% (2019). [14]

Table 5: Trends in mortality

	2004	2009	2014	2019
Infant mortality (per 1,000 live births)*	52.0	55.9	44.2	38.4
Under 5 mortality (per 1,000 live births)*	91.3	92.1	64.4	54.6
Neonatal mortality (per 1,000 live births)*	29.9	32.3	28.5	25.9
Maternal mortality (per 100,000 live births)**	686	632	494	458***
Crude birth rate (per 1,000)**	33.2	36.1	35.0	29.7
Crude death rate (per 1,000)**	18.0	14.2	9.3	7.8
Life expectancy at birth (in years)**	43.1	48.4	58.4	61.5
Total fertility rate (births per woman)**	3.7	4.0	3.8	3.5

*UNICEF data

** The World Bank Data

*** 2017 data

While childhood malnutrition and growth stunting in childhood is improving, food insecurity in a predominantly rural population remains high, especially from January to March. [15] Malnutrition remains a major contributing factor to morbidity and mortality of children under five years old. [16] Among children between 6 months and two years, only 10% receive a minimally acceptable diet. Childhood malnutrition is compounded by early childbearing, as

younger mothers also tend to be malnourished, leading to low birth weight infants and increased risk of illness and death.[15]

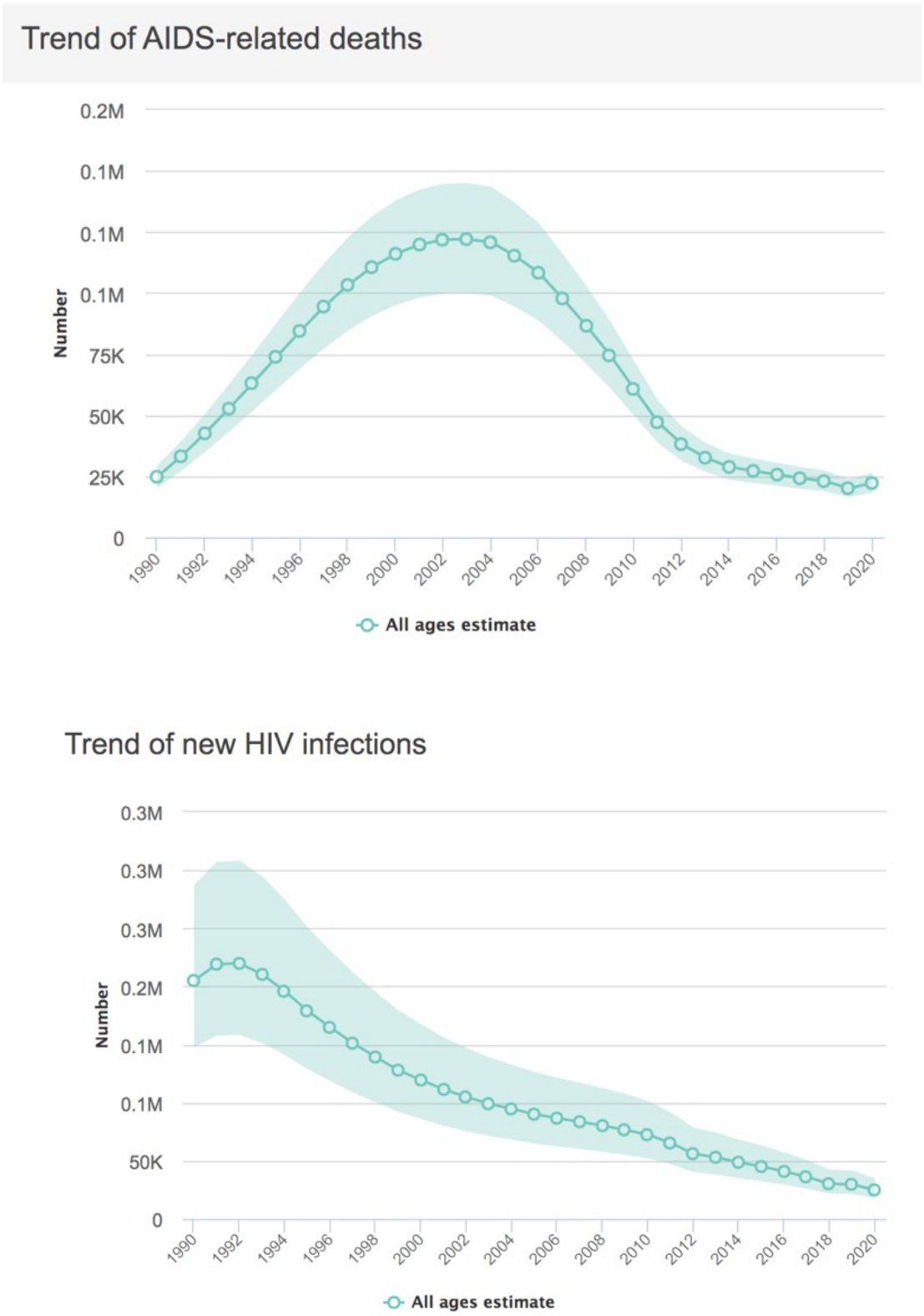
Table 6:

Zimbabwe Nutritional Data (DHS 2010-2011 and 2015)		
	DHS 2010-2011	DHS 2015
Prevalence and stunting in children under 5	32%	27%
Prevalence of underweight children under 5	10%	8%
Prevalence of low birth weight (less than 2.5 kg)	10%	10%
Prevalence of anemia among children 6-59 months	56%	37%

*Source: USAID[15]

HIV remains the largest cause of death and disability in Zimbabwe. [13] The past decade has seen a marked decrease in the rates of and deaths from HIV, largely due to prevention programs and increased use of antiretroviral therapy. [12] While rates remain high, new HIV infections have declined by 66% since 2010 and AIDS related deaths have declined by 63%. [14] The number of individuals on antiretroviral treatment has increased from approximately 363,000 in 2010 to nearly 1.2 million in 2020.[17]

Figure 2: Trends in HIV Deaths and Infections

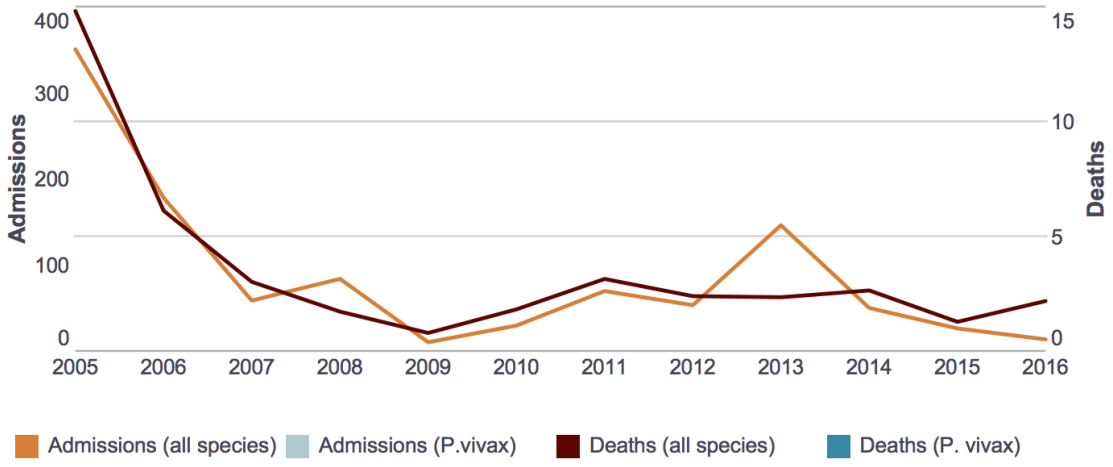


Source: UNAIDS epidemiological estimates, 2021

Similarly, while tuberculosis remains one of the top three causes of death and disability, the incidence of tuberculosis per 100,000 people has dropped from a peak of 617 in 2004 to 199 in 2019.[3] However, high tuberculosis rates, drug resistant strains and co-infection with HIV continue to present major challenges.

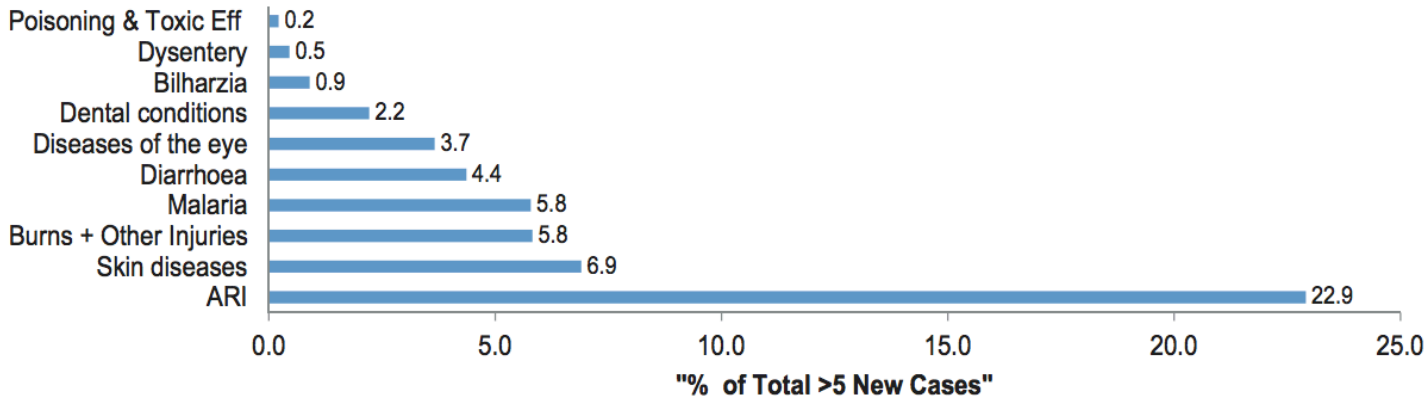
Malaria also remains a major infectious disease in Zimbabwe, with 50% of the population residing in malaria-endemic areas. It is a seasonal disease, affecting the population during the rainy season of November to April. Similar to other infectious diseases, rates have declined, but it remains a major cause of morbidity and mortality.[12] Zimbabwe is also endemic to other tropical diseases such as soil-transmitted helminthiasis, schistosomiasis, lymphatic filariasis and blinding trachoma.

Figure 3: Malaria admissions and deaths (per 100,000)



Source: World Health Organization

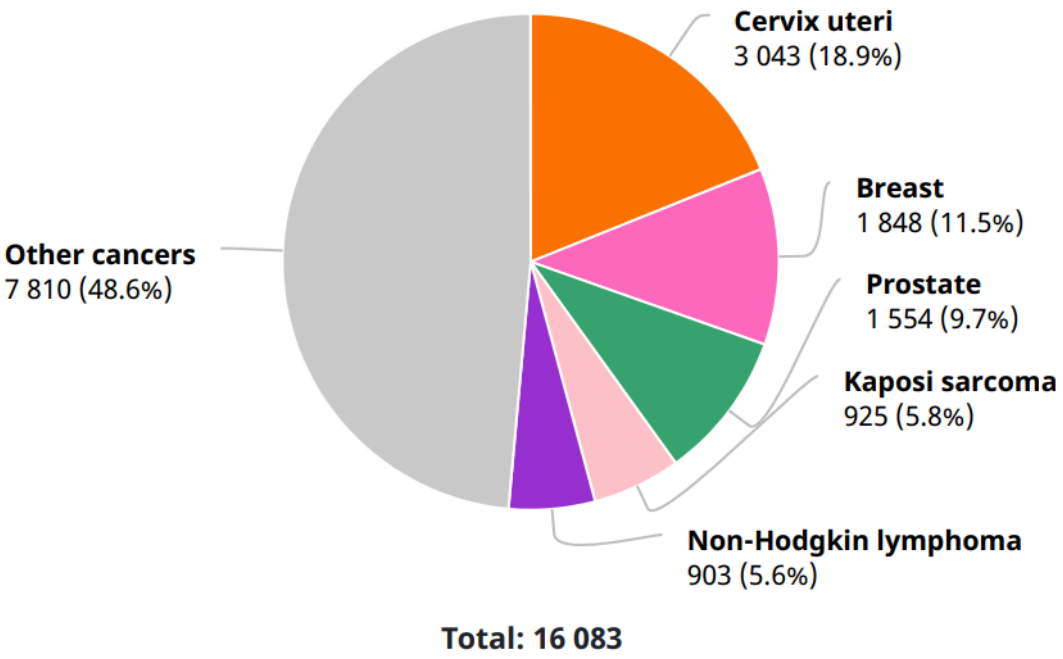
Figure 4: Top ten outpatient general disease and conditions, five years and above, 2014



Source: MOHCC 2014[9]

The past decade has seen a steady increase in the rates of non-communicable diseases such as ischemic heart disease, stroke, diabetes and cancer. This is compounded by the prevalence of HIV, which has a major influence on the incidence and pattern of cancer. Rising road traffic accidents and assaults have also led to increased death due to injuries. In 2018, it was estimated that non-communicable diseases accounted for 33% of all deaths. [18] In the coming decades, Zimbabwe will be facing the double burden of both communicable and non-communicable diseases as major health care concerns.

Figure 5: Number of new cases of cancer in 2020, both sexes, all ages



Source: International Agency for Research on Cancer, World Health Organization

National Health Care Structure

Health care structure, policy and expenditure

The Zimbabwe health system is built on a constitutional right to health care, which states that every citizen and permanent resident of Zimbabwe has the right to access basic health care services. Zimbabwe's health services are accessed through several platforms: public facilities, non-profit facilities, religious or mission organizations and private/for-profit sector. The public sector is the major provider of health services in Zimbabwe, with the government owning approximately 70% of the facilities.

There are four levels of health system available in the public sector: primary, secondary, tertiary and quaternary (central). The primary level consists of rural health center clinics, of which there are approximately 1,300 in the country. These are staffed by village health workers, nurses and environmental technicians. The secondary level is comprised of mission hospitals (62) and district hospitals (44). Both the primary and secondary levels of the health system are managed by the district health offices and are staffed by doctors and are supported by nurses. The tertiary level of care is the provincial hospitals, managed by the provincial health office. These facilities are staffed by physicians, supported by nurses with some specialty services. The quaternary level of care is the central hospitals, managed by the Ministry of Health and Child Welfare (MOHCW), where most medical specialists practice. [19,20]

Table 7: Number and type of healthcare facilities

Level	Type of facility	Number of facilities	Administration
Quaternary	Central Hospital	6	MOHCW
Tertiary	Provincial Hospital	8	Provincial health office
Secondary	District and Mission Hospitals	200 (32 private)	District Health Office
Primary	Clinics	1634 (69 private)	

Source: The National Health Strategy for Zimbabwe 2016-2020

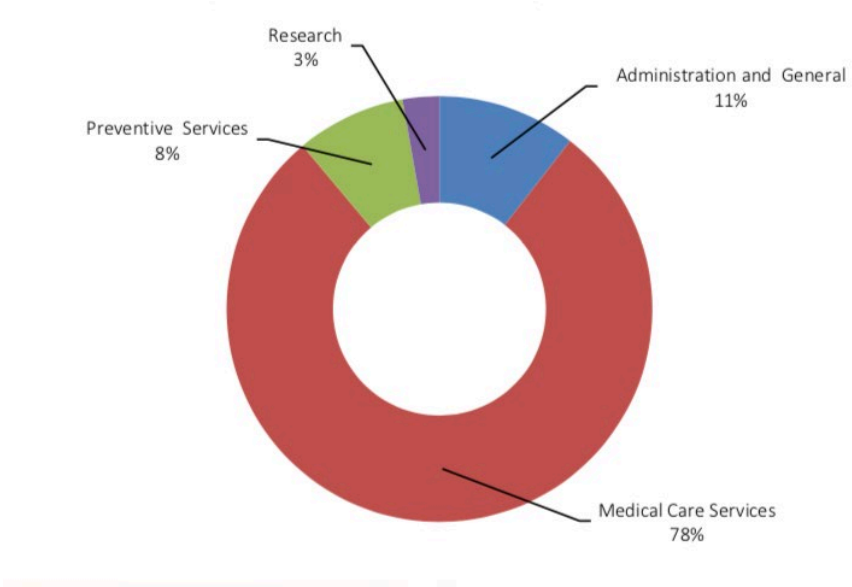
The underlying structure of Zimbabwe health care as it was designed in the 19980s was the Primary Health Care Approach, where the majority of healthcare facilities are at the primary care level, that refer complicated cases to the next level of care. This pattern has become disrupted, with many people bypassing the primary level and proceeding straight to hospitals,

further taxing an under-resourced health care system. Some of the government's restructuring efforts have centered on rebuilding the primary care referral pattern, so that hospital services a are not utilized for ailments that can be managed at a primary care facility.

Domestic financing for Zimbabwe's health care comes from a mixture of sources; the central government through budget allocation, local government, user fees, non-government organizations (NGO) and private companies.[20] User fees have been a declining source of funding, dropping from 39% in 2010 to 15.5% in 2017. This is thought to reflect the inability of households to fund their healthcare expenses. [21]

The percentage of GDP spent on health care has been declining since 2014 from 8.1% to 4.7% (2018), although current health expenditure per capita has been increased since 2011, rising from $88.37 to $140.32 (2018). [3] This remains well below the recommended 15% of GDP indicated in the Abuja Declaration of 2001, where African Leaders agreed to allocate 15% of their countries' total annual budget to the health sector. [22] Of the central government allocated funds, 80% goes to salaries in the health care sector, limiting the amount available for prevention, treatment, infrastructure and research. Of the remaining funds, a disproportionate amount is spent on curative care rather than preventative care, leaving preventative care predominantly funded by external donors.[21]

Figure 6: Ministry of Health and Child Care, Expenditures, 2014

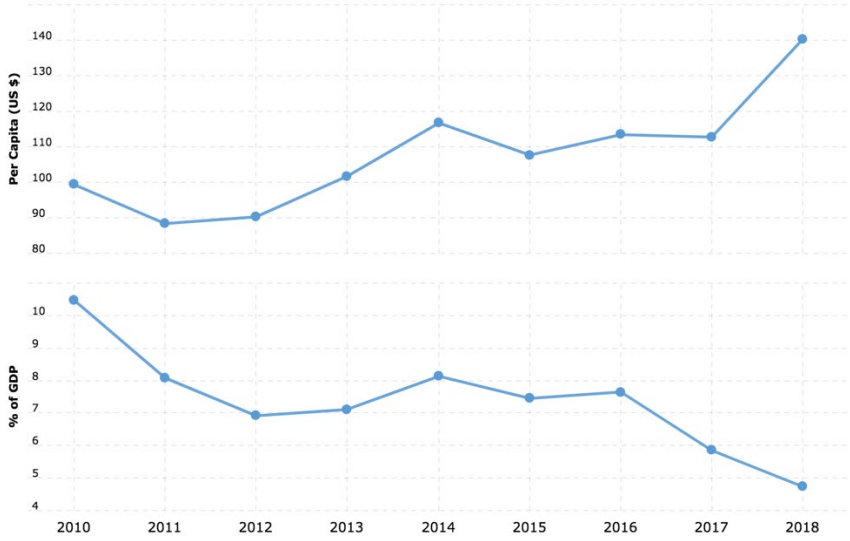


Source: National Health Profile 2014[16]

External funding to Zimbabwe's health system has been an important source of financing but has been declining since 2014. Such funds are usually earmarked for specific diseases, such as HIV/AIDS or maternal or child health. For example, the US President's Emergency Plan for AIDS Relief (PEPFAR) has contributed significantly to the decline in HIV related deaths. USAID supports the national tuberculosis control program to find, detect and treat TB cases across the country. The U.S. President's Malaria initiative has contributed over one hundred million dollars in the past decade for the prevention, diagnosis and treatment of malaria. These programs have contributed greatly to improvements in morbidity and mortality. However, the specific nature of many of these programs limit the ability of these funds for more general strengthening of the healthcare system. Overall, the health sector is underfunded and dependent on external funding and user fees. One of the major efforts of the country's health care planning

is to be more efficient and better coordinate internal and external funding sourcesto improve health care outcomes.

Figure 7: Government spending on healthcare expenses, per capita and % GDP



Source: World Bank Data

Table 8: Disaggregation of Healthcare Funding by Source of Funding

	FY 2015		FY 2017		FY 2018	
Financing sources	$US Million	Share (%)	$US Million	Share (%)	$US Million	Share (%)
Government	309.7	21.4	437.69	33.0	762.84	44.1
Corporations	411.54	28.4	228.72	17.3	274.06	15.8
Households	365.7	25.3	205.23	15.5	230.60	13.3
External	360.85	24.9	453.05	34.2	462.2	26.7
Total	**1,447.79**	**100**	**1,324.69**	**100**	**1,729.67**	**100**

Source: National Health Accounts Assessment report (2017-2018)

Health Service Coverage, infrastructure and staff:

The National Health Strategy put forth in 2016 by the Ministry of Health and Child Care proposed four major priorities; (i) communicable disease, (ii) non-communicable diseases, (iii) reproductive, maternal, newborn, child and adolescents, (iv) public health surveillance and disaster preparedness and response. With this, there were four major sectors of weakness that were highlighted (i) deficit of medical and managerial health professionals, (ii) irregular availability of essential medicines and medical supplies, (iii) inadequate provision and maintenance and infrastructure, especially at the peripheral level and (iv) disrupted basic utilities and services. This strategy also recognized user fees as a barrier to healthcare access.[19] Prior to 1991, there were no fees for healthcare services. However, in 1991, health fees were introduced to the public system. While official policy exempts pregnant women, people over sixty-five and children under five from fees, the rates and collection system vary widely across the country and serves as a significant barrier to women and children. These exemptions are not uniform and in practice, many of these exemptions are not observed or enforced. In a recent survey, only about half of centers provide maternity services free of charge. [12] Fees will vary from $3 to $80, which may be prohibitive in a country where the average income is $3.24 per day. [23] Only a minority of the population has health insurance (11% of women and 12% of men). [24] Poverty remains an enduring issue in Zimbabwe and a barrier to accessing care. This is exacerbated in rural areas, where the rates of poverty and extreme poverty are higher.

In general, there is a large rural/urban divide in the quality and administration of health care. In rural areas, there are physical barriers in access to care, with 35% of rural health care users having to walk between six and ten kilometers to the nearest health facility and 14%

walking more than ten kilometers. Public transportation is sparse and road conditions are often poor. Even though 67% of the population lives in rural areas, rural health care facilities tend to be less staffed and less resourced. When surveying health care facilities for general readiness, urban health care facilities were more likely to have basic amenities and had higher overall readiness. [19]

Adding to this, Zimbabwe has an acute shortage of healthcare workers. The period of emigration prior to 2009 led to a "brain drain" of many of the nation's health care workers. This also contributed to the decline of in-country medical education, with lack of faculty and infrastructure and low enrollments further contributing to the shortage by failing to train new providers. [25] Currently, there are 1.6 physicians and 7.2 nurses for every 10,000 people in Zimbabwe, falling well short of the WHO recommendations of 23 doctors, nurses and midwives per 10,000. Lack of staff for medical education training, and high dropout rates in the public sector have resulted in high vacancies and staffing shortages, with vacancy rates at hospitals at up to 65%. [26] This has been compounded by recent physician strikes starting in 2019, with physicians striking due to poor wages and working conditions and again in 2020, due to lack of personal protective equipment, lack of supplies and unsustainable working conditions during the COVID-10 pandemic. [27–29]

There is also considerable geographic disparity of providers by province, with higher density of health care workers in more affluent and urban areas and clustering of specialties. For example, 95% of the general surgeons are based in Harare, while there are relatively few pediatricians or anesthesiologists in Harare. [19] Staffing shortages lead to long wait times and limited hospital capabilities at the local or community level. There is high turnover of the government funded Village Health Workers in rural settings as well, further contributing to the

rural/urban divide. [26] Medical supplies and medications have an inconsistent supply chain. Some hospitals have pharmaceutical manufacturing units for compounding of some simple medications such as Silver Sulfadiazine Cream, but the supply chain management of hospitals is generally poor, with the average medicine availability at a hospital at 42%. [19]

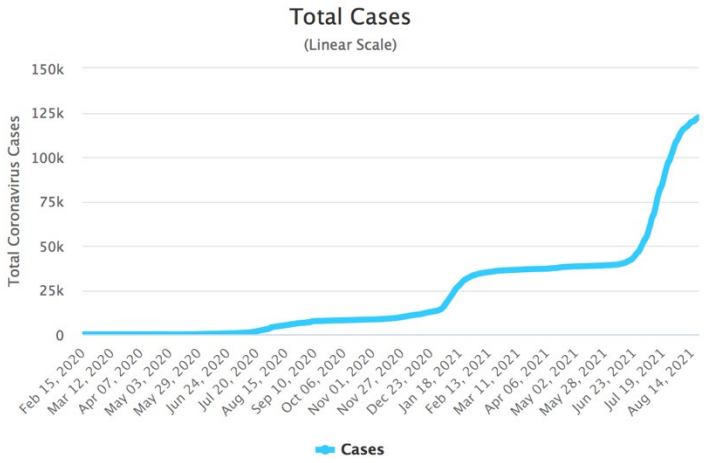
Impact of COVID-19

At the time of this report, COVID-19 has had a devastating effect on the economics and health infrastructure of the Republic of Zimbabwe. Surveys conducted in 2020 showed that nearly half a million Zimbabwean households have at least one family member who lost their job, increasing the number of households in poverty. The pandemic has also strained public resources, severely affecting health, education and social protection. Food insecurity increased, as social protection programs have struggled in the setting of rising needs and falling supplies. Virtual schooling during the national lockdown was limited, with only 9% of rural school age children and 40% of urban school age children using mobile applications during pandemic related school closures.[30]

The pandemic has also caused a series of physician strikes and further disrupted already fragile supply chains, leading to shortages in personal protective equipment and medical supplies as well as a decline in the coverage and quality of essential health services. [27,30] Comparing 2018 to 2020, the number of institutional maternal deaths increased by 29% and home deliveries increased by 30%.[30] While the full effect of the pandemic in Zimbabwe is yet to be realized, the country has suffered both economically and socially. If there is a silver lining of the pandemic, it has led to unprecedented collaborative effort between the government, private sector,

development partners and other stakeholders to mobilize resources, which may benefit Zimbabwe's health care system in future developments.[31]

Figure 8: Total coronavirus cases in Zimbabwe as of August 2021



Source: Worldometeter, www.worldometers.info/

National Radiology Profile

Radiology Workforce

In general, diagnostic imaging, excepting ultrasound, has predominantly been practiced by diagnostic radiographers and radiologists. To practice, they must be registered with the Allied Health Professional Council (AHPC) for radiographers and the Health Professions council (HPC) for radiologists. There is a large deficit of both radiographers and radiologists in Zimbabwe. In May of 2013, vacancy rates for radiographers were over 50%, reportedly due to poor service conditions and a poor service environment. [32] At the time of this report, there are

thirty-seven registered specialist ultrasonographers, approximately 3880 diagnostic radiographers, approximately six hundred and fifty X-ray operators, and ten therapeutic radiographers registered with the AHPC.[33] There are approximately fifteen specialist radiologists and less than ten specialist radiotherapists listed the with HPC. [34]

Ultrasound is used by a more diverse group of caregivers, since users aren't required to be registered, as the work does not involve a radiation source. A recent survey looking at ultrasound use found that there were one hundred and forty-two healthcare workers from many different professional groupings routinely performing ultrasound. Nearly half of these were radiographers, who completed a four-year degree program in radiography but without formal accreditation in ultrasound. The remainder of personal performing ultrasounds were mostly medical specialists (including radiologists and obstetricians), medical officers or midwives; however, none of the users in this group had formal accreditation. [35]

Table 9: Analysis of ultrasound use by healthcare facility[35]

Health-care facility	All facilities	Facilities with ultrasound equipment	No. of ultrasound units.	Health care workers n (%)
Central hospitals	6(0.3%)	5(7.6%)	22(22.2%)	69(48.6%)
Provincial hospitals	7(0.4%)	7(10.6%)	14(14.2%)	23(16.2%)
General hospitals	5(0.3%)	5(7.6%)	5(5.1%)	6 (4.2%)
District hospitals	45(2.5%)	32(48.5%)	41(41.4%)	33(23.2%)
Mission hospitals	56(3.1%)	12(18.2%)	12(12.1%)	8(5.6%)
Rural health hospitals	77(4.3%)	2(3.0%)	2(2.0%)	2(1.5%)
Clinics	1602(89.1%)	3(4.5%)	3(3.03%)	1(0.7%)
Totals	**1798(100%)**	**66(100%)**	**99(100%)**	**142(100%)**

Table 10: Analysis of ultrasound use by healthcare worker[35]

Healthcare workers	Central hospital	Provincial hospital	General hospital	District hospital	Mission hospital	Rural hospital	Municipal clinic	Total
Radiographer	41	14	4	5	0	0	1	65
Medical officer	0	2	1	6	4	2	0	15
Medical specialists	15	3	0	0	0	0	0	18
Sonographer	8	3	0	0	0	0	0	11
Midwife	5	0	0	6	0	0	0	11
X-ray operator	0	1	1	16	4	0	0	22
Total	**69**	**23**	**6**	**33**	**8**	**2**	**1**	**142**

Training and professional representation

Zimbabwe has two institutions in the country for training radiographers. These are the National University of Science and Technology and the Zimbabwe School of Radiology (affiliated to the University of Zimbabwe College of Health Sciences). Prospective candidates have prerequisites in biology, mathematics, physics and chemistry. [35] The Harare Institute of Technology also offers a similar four-year Bachelors in Radiography degree. The Zimbabwe School of Radiography also trains X ray operators, an eighteen-month course that confers a certificate in basic radiography. [35]

Two Zimbabwean institutions conduct ultrasound training for qualified radiographers. The National University of Science and Technology offers a two-year Master's program and the Harare Institute of Technology offers an eighteen month post graduate diploma. There is a third option involving home study through remote courses offered by the Burwin Institute of Diagnostic Medical Ultrasound in Winnipeg, Canada, followed by six months of supervised

observation at a recognized health facility. The completion of any of these three programs confers form sonographer accreditation. [35]

The International Atomic Energy Agency (IAEA) has worked with the National University of Science and Technology to introduce a Master's in science Degree in Medical Physics to fulfill the academic requirements for training of medical physicists. This program started in September 2015 and accepts ten students per year, with a completion time of two years. As of 2019, there were a total of ten medical physicists in Zimbabwe, with eight specializing in radiotherapy, one in nuclear medicine. [36] At present, there is no radiology residency in Zimbabwe. [37]

Equipment inventory and distribution

The WHO recommends one x-ray and ultrasound unit for every 50,000 people, or twenty units per million people, postulating that this will meet 90% of global imaging needs. However, Zimbabwe has an overall shortfall of approximately nine units per million people. There is also a large discrepancy in concentration between the least and best resourced public sector regions. More than half of all Zimbabwe's radiology equipment is located in the two major cities of Harare and Bulawayo and almost two-thirds of all units are in the private sector. [38]

There is a cost driven hierarchy of access to imaging. X rays tend to be available at the district hospitals, CT and provincial or central hospitals, and MR at the teaching hospitals. In four out of ten provinces, with a combined population of 3.9 million people (approximately 30% of the total country population), plain radiographs are the only imaging available through the

public sector. Only Bulawayo meets the WHO benchmark of at least twenty units per million people, reaching 25.7 units per million, but only eleven of these units are available through the public sector. There is only a single publicly accessible fluoroscopic unit, found in Harare and private units are also only found in major cities. Similarly, mammography is only found in major cities and nine of the eleven units in the country are private. In eight of the provinces (99% of the country's total land area), there is no access to mammography. [38]

There is also geographic disparity of CT and MR distribution. Thirteen of the country's nineteen CT units are in major cities. Of the thirteen units found in cities, twelve of them are private. The country has six MR scanners, located exclusively in cities and four of the six units are private. There is no PET-CT or digital subtraction angiography available in the country at the time of this report. [38]

Since ultrasound does not produce ionizing radiation, it is not registered and therefore there is no national registry on ultrasound equipment. However, a recent audit found that only sixty-six (3.7%) of the nation's 1,798 public sector healthcare facilities had ultrasound equipment. Of these public units, more than half were in district and mission hospitals and one-fifth were in central hospitals. [35]

TABLE 11: Registered Zimbabwe radiology equipment units by region, modality and healthcare sector [38]

Modality		Harare	Bulawayo	Manicaland	Masvingo	Midlands	Mashonaland			Matabeleland		Total
							West	Central	East	North	South	
		units/10^6 people										
x-ray	tot	68	51	11	20	16	10	17	10	19	15	26
	pub	7	29	8	14	8	11	14	9	11	15	11
	pvt	603	245	40	74	86	93	35	15	133	15	155
fluoro-scopy	tot	4.5	1.5	0	0	0	0	0	0	0	0	0.8
	pub	0.5	0	0	0	0	0	0	0	0	0	0.1
	pvt	38	15	0	0	0	0	0	0	0	0	7
mammo-graphy	tot	4	5	0	0	0	0	0	0	0	0	0.8
	pub	0.5	3	0	0	0	0	0	0	0	0	0.3
	pvt	33	15	0	0	0	0	0	0	0	0	6
CT	tot	5	5	1	0.7	1	0.7	0	0	0	0	1.5
	pub	0.5	3	0.6	0.7	0.7	0.8	0	0	0	0	0.6
	pvt	42	15	6	0	6	0	0	0	0	0	9
MR	tot	2	3	0	0	0	0	0	0	0	0	0.5
	pub	0.5	1.5	0	0	0	0	0	0	0	0	0.2
	pvt	14	15	0	0	0	0	0	0	0	0	3

Regulation and Policy

In 2004, the Radiation Protection Act was passed in Zimbabwe. This act provided the legislative basis for radiation protection and served to regulate radiation and radioactive material used in medicine, industry, research and education. It also established the Radiation Protection Authority of Zimbabwe (RPAZ). The role of the RPAZ, among other responsibilities, includes registration, licensing and regulation of radiation sources, radiation protection, radiation safety and inspecting and assessing performance of radiation sources. It also serves to regulate personnel who can work with radiation and approves persons with specified radiation protection responsibilities.[39]

The Republic of Zimbabwe has also been a member of the IAEA since 1986. Zimbabwe still largely lacks formal national policy on health technologies. However, the IAEA has worked together with the RPAZ to set goals, more recently collaborating on the 2017-2021 Country Programme Framework which included nuclear security and radiation safety as one of its five

priorities. Active national projects include strengthening nuclear medicine services and strengthening radiotherapy and quality assurance services at government centers. [40]

Diagnostic radiology services in Zimbabwe are provided to the majority of the population through the public health sector. The management in radiology departments consists of a radiologist and chief radiographer. Policy stipulates that each radiology department must have a radiation protection supervisor, but this is generally not observed. [32]

Conclusion

The past decade has seen improvements in the political stability and infrastructure in Zimbabwe. However, there remain considerable infrastructure gaps in health care and there is a pronounced disparity between rural and urban distribution of resources. Medical imaging has undergone slow progress, hampered by lack of resources and limited in country staffing. Many imaging resources are only available in major urban areas and mostly available only through the private sector rather than public sector. Poor and rural populations have little to no access to these services.

Education and human resources development through training, including formalized ultrasound training are some of the areas that need particular attention. However, investment in high yield imaging modalities, such as x-ray and ultrasound will improve access to the more underserved areas of the population. At the time of this report, the impact of the COVID-19 pandemic has not been fully realized, but it is anticipated that it will cause a delay or temporary reversal of progress in improving access to healthcare and imaging services.

References

1. Zimbabwe. In: *The World Factbook*. Central Intelligence Agency; 2024. https://www.cia.gov/the-world-factbook/countries/zimbabwe/

2. Ingham K, Bradley K, Sanger CW. Zimbabwe. In: *Britannica*. https://www.britannica.com/place/Zimbabwe

3. Zimbabwe. World Bank. https://www.worldbank.org/en/country/zimbabwe

4. Human Development Index: Zimbabwe. United Nations. https://hdr.undp.org/data-center/specific-country-data

5. Zimbabwe. South African History Online. Published August 2011. http://www.tandfonline.com/doi/abs/10.1080/0067270X.2011.580149

6. History of Zimbabwe. Official Government of Zimbabwe Web Portal. https://www.zim.gov.zw/index.php/en/my-government/government-ministries/about-zimbabwe/460-history-of-zimbabwe?showall=1

7. Mzezewa CT, Murove EngCS. *Renewable Energy Market Study: Zimbabwe 2017*. http://large.stanford.edu/courses/2017/ph240/afshar1/docs/nea-17jul17.pdf

8. ICT Development Index 2017. ITU. Published 2017. https://www.itu.int/net4/ITU-D/idi/2017/index.html

9. Zimbabwe Infrastructure Report 2019. African Development Bank Group. Published 2019. https://www.afdb.org/en

10. Zeng, W., Lannes, L. & Mutasa, R. Utilization of Health Care and Burden of Out-of-Pocket Health Expenditure in Zimbabwe: Results from a National Household Survey. *Heal. Syst. Reform* 4, 300–312 (2018)

11. Global Workforce Alliance: Zimbabwe. World Health Organization (WHO). https://www.who.int/workforcealliance/countries/zwe/en/

12. *Data Collection Survey on Health Sector: Country Report Republic of Zimbabwe*.; 2012. https://openjicareport.jica.go.jp/pdf/12085064.pdf

13. Zimbabwe | Institute for Health Metrics and Evaluation. https://www.healthdata.org/research-analysis/health-by-location/profiles/zimbabwe

14. Zimbabwe (ZWE) - Country Profiles. UNICEF DATA. https://data.unicef.org/country/zwe/

15. USAID. *Zimbabwe: Nutrition Profile*.; 2018. https://2017-2020.usaid.gov/sites/default/files/documents/1864/Zimbabwe-Nutrition-Profile-Mar2018-508.pdf

16. Zimbabwe National Health Profiles 2014. Published online 2014. https://www.zimstat.co.zw/wp-content/uploads/publications/Social/Health/NHP-2014.pdf

17. AIDSinfo: Global data on HIV epidemiology and response. https://aidsinfo.unaids.org/

18. Noncommunicable Disease Surveillance, Monitoring and Reporting. World Health Organization (WHO). https://www.who.int/teams/noncommunicable-diseases/surveillance/data/profiles-ncd

19. *The National Health Strategy for Zimbabwe : 2016-2020*. https://documents1.worldbank.org/curated/en/364731563173429622/pdf/The-National-Health-Strategy-Equity-and-Quality-in-Health-Leaving-No-One-Behind-for-Zimbabwe-2016-2020.pdf

20. *Zimbabwe National Health Financing Policy: Resourcing Pathway to Universal Health Coverage 2016*. https://documents1.worldbank.org/curated/en/840661563174110288/pdf/Zimbabwe-National-Health-Financing-Policy-Resourcing-Pathway-to-Universal-Health-Coverage-2016-Equity-and-Quality-in-Health-Leaving-No-One-Behind.pdf

21. Zimbini, G. *The Zimbabwe Healthcare Financing Landscape*. https://www.arasa.info/media/arasa/galleries/budget advocacy/resources Zimbabwe/policy-brief-zimbabwe-healthcare-financing-landscape-final.pdf

22. Mangundu, M., Roets, L. & Janse van Rensberg, E. Accessibility of Healthcare in Rural Zimbabwe: The Perspective of Nurses and Healthcare Users. *Afr J Prim Heal. Care Fam Med* 12, 2245 (2020)

23. Nhapi, T. G. Socioeconomic Barriers to Universal Health Coverage in Zimbabwe: Present Issues and Pathways Toward Progress. *Journal of Developing Societies* https://doi.org/10.1177/0169796X19826762

24. *Zimbabwe: Demographic and Health Survey 2015*.; 2016. https://dhsprogram.com/pubs/pdf/FR322/FR322.pdf

25. Hakim, J. G. *et al.* Medical Education Partnership Initiative (MEPI) in Zimbabwe: Outcomes and Challenges. *Glob. Heal. Sci. Pract.* 6, 82–92 (2018).

26. *Zimbabwe Country Operational Plan COP 2020*.; 2020. https://www.state.gov/wp-content/uploads/2020/07/COP-2020-Zimbabwe-SDS-FINAL-with-Appendix-C.pdf

27. Chingono N. Zimbabwe Doctors and Nurses down Tools Over Lack of Protective Coronavirus Gear. CNN World. Published March 25, 2020. https://www.cnn.com/2020/03/25/africa/zimbabwe-doctors-nurses-ppe-strike/index.html

28. Mutsaka F. Zimbabwe Doctors, Nurses Strike, Say Little Virus Protection. CTV News. Published March 25, 2020. https://www.ctvnews.ca/health/coronavirus/zimbabwe-doctors-nurses-strike-say-little-virus-protection-1.4867221

29. Chingono N, Busari S. Zimbabwe Doctors Strike: Poor Conditions in Hospitals Causing 'Silent Genocide.' CNN World. Published November 27, 2019. https://www.cnn.com/2019/11/27/africa/zimbabwe-doctors-strike-intl/index.html

30. Zimbabwe Economic Update: COVID-19 Further Complicates Zimbabwe's Economic and Social Conditions. World Bank. https://www.worldbank.org/en/country/zimbabwe/publication/zimbabwe-economic-update-covid-19-further-complicates-zimbabwe-s-economic-and-social-conditions

31. *Policy Brief: A Preliminary Assessment of the Socio-Economic Impact of Coronavirus (COVID-19) on Zimbabwe*. https://www.undp.org/zimbabwe/publications/preliminary-assessment-socio-economic-impact-coronavirus-covid-19-zimbabwe

32. Sibanda L. *Diagnostic Radiology Capacity and Demand in Zimbabwe: Trends and Forecast*. Cape Peninsula University of Technology; 2016. https://etd.cput.ac.za/bitstream/20.500.11838/2517/1/210115556-Sibanda-Lidion-D.Rad-Radiography-HWSci-2017.pdf

33. Allied Health Practitioners Council of Zimbabwe. http://www.ahpcz.co.zw/

34. Health Professions Authority Zimbabwe. https://www.hpa.co.zw/moa.php

35. Mapuranga, H., Pitcher, R. D., Jakanani, G. C. & Banhwa, J. An Audit of Zimbabwean Public Sector Diagnostic Ultrasound Services. *Pan Afr. Med. J.* 39, (2021)

36. Azangwe, G., Ndlovu, D., Thatha, T., Mhatiwa, L. & Mhukayesango, E. Medical Physics and Training in Zimbabwe. *Med. Phys. Int.* 7, 275–276 (2019)

37. Iyawe, E., Idowu, B. & Omoleye, O. Radiology Subspecialisation in Africa: A Review of The Current Status. *SA J. Radiol.* 25, (2021)

38. Maboreke, T., Banhwa, J. & Pitcher, R. D. An Audit of Licensed Zimbabwean Radiology Equipment Resources as Measure of Healthcare Access and Equity. *Pan Afr. Med. J.* 34, 1–10 (2019)

39. Radiation Protection Act. Vol Chapter 15:15.; 2004. https://www.vertic.org/media/National%20Legislation/Zimbabwe/ZW_Radiation%20Protection%20Act.pdf

40. Central African Republic Signs its Country Programme Framework for 2017-2021. IAEA. https://www.iaea.org/newscenter/news/central-african-republic-signs-its-country-programme-framework-cpf-for-2017-2021