South Africa

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November 2020

COUNTRY REPORT

South Africa

RAD AID – Certificate of Proficiency in Global Health Radiology
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Cover page: South African flag [2]

General Country Profile

Geography

South Africa is the southernmost country of the continent of Africa. It is bordered by Namibia in the north-west; Botswana and Zimbabwe in the north; Swaziland (now renamed Eswatini) and Mozambique in the east and north-east; Lesotho – an enclaved country – in the center-west; the Atlantic Ocean on its western coasts and the Indian Ocean on its eastern coasts.

Figure 1 - Map of South Africa [1]

South Africa covers a geographical area of approximately 1219 thousand km^2, out of which 1214 thousand km^2 of land and 4.6 thousand km^2 of water [2].

The size of South Africa is compared to Europe and the USA in the figures below.

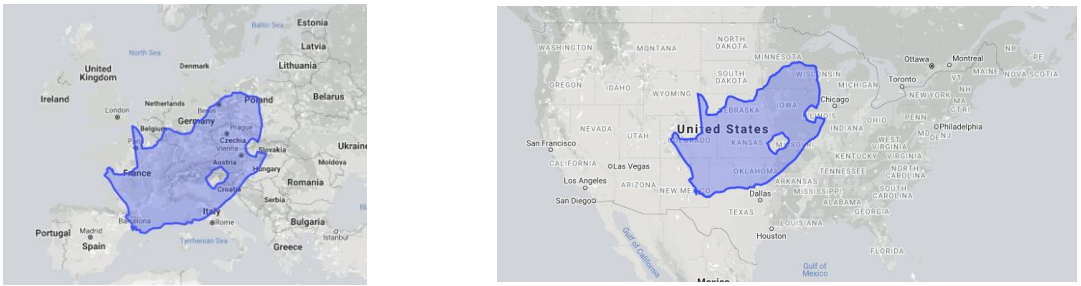


Figure 2 – Relative size of South Africa compared to Europe and the USA [4]

There are two major physiographic categories: the interior plateau – with wide plains with an average height of 1200m – and the land between the plateau and the coast, an area of land wide between 60km and 240km; the boundary between the two is called "the Great Escarpment", reaching a maximum height of 3482m in the KwaZulu-Natal Drakensberg.

The longest river of South Africa is the Orange River that is 2200km long and flows from east to west. There are many other rivers though most of them do not have a regular flow and may be dry during part of the year; this makes them unsuitable for navigation or hydroelectric power.

Climate

The South Africa Yearbook 2018/19 [6] describes the South African climate as follows: "a subtropical location, moderated by ocean on three sides of the country and the altitude of the interior plateau, account for the warm temperate conditions. South Africa is a relatively dry country, with an average annual rainfall of about 500 mm. While the Western Cape gets most of its rainfall in winter, the rest of the country is generally a summer-rainfall region. Temperatures in South Africa tend to be lower than in other countries at similar latitudes owing mainly to greater elevation above sea level. On the interior plateau, the altitude – Johannesburg lies at 1 694 m – keeps the average summer temperatures below 30 °C. In winter, for the same reason, night-time temperatures can drop to freezing point or lower in some places. South Africa's coastal regions are therefore relatively warm in winter.

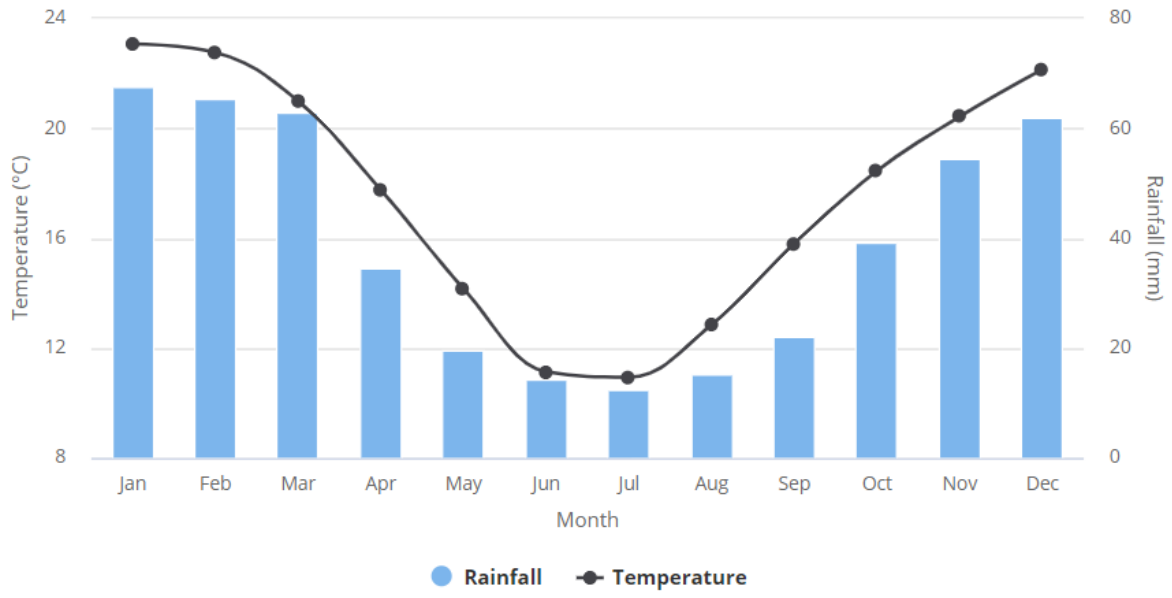


Figure 3 - Average monthly temperature and rainfall [5]

Population

South Africa counted 56.5 million inhabitants [1] (July 2020 est.), making it the 24th most populated country in the world [5]. The South African population is growing at an estimated rate of 0.97% [2].

The median age is 27.6 years [7]. The population is distributed as shown in the figures below.

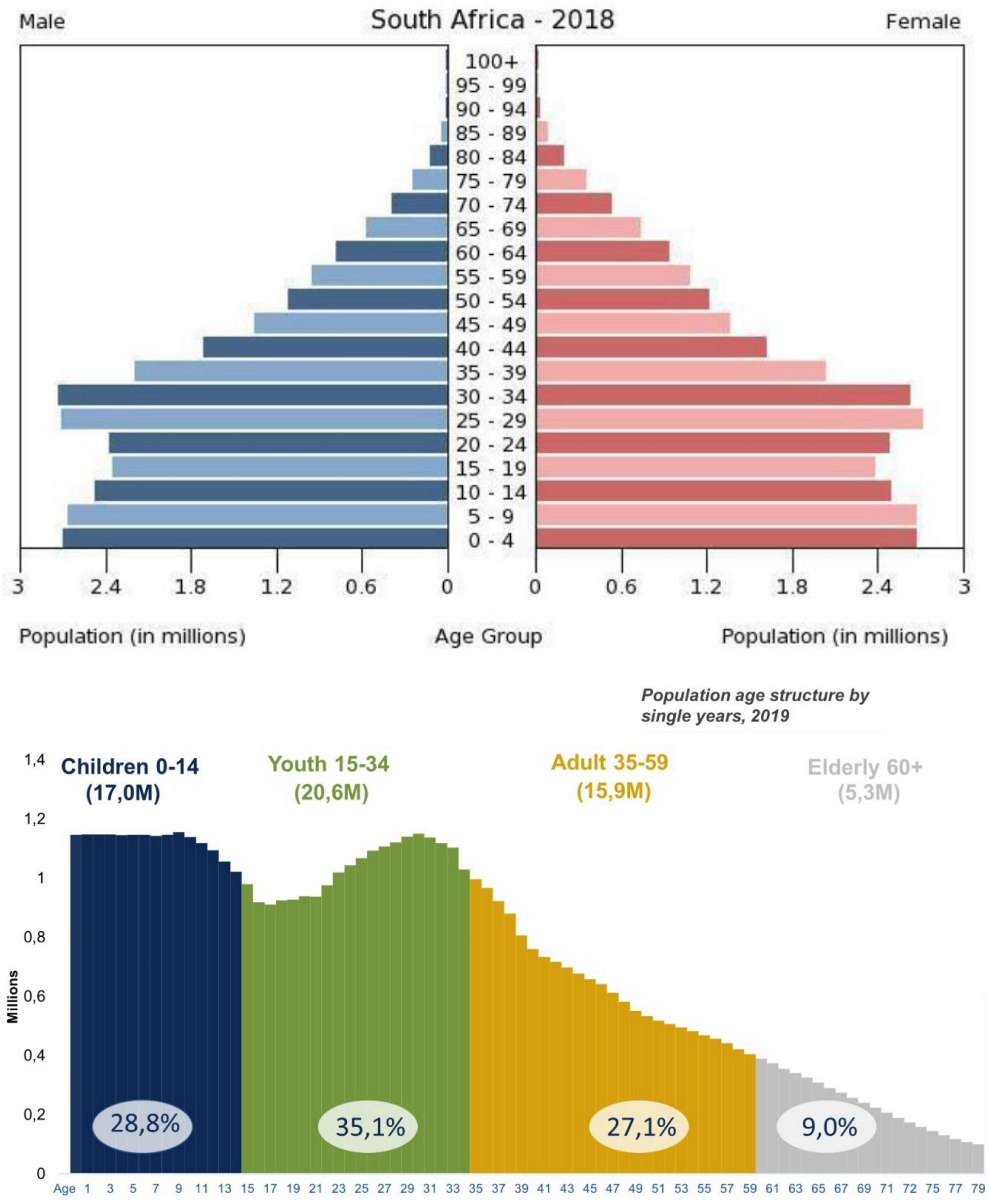


Figure 4 - Distribution of population per age and gender [1, 3]

In terms of ethnicity [2], 80.9% of South African are black African, 8.8% are colored – official South African term meaning "persons of mixed-race ancestry" – 7.8% are while and 2.5% and Indian/Asian.

There are many official languages in South Africa [2] – isiZulu (official) 24.7%, isiXhosa (official) 15.6%, Afrikaans (official) 12.1%, Sepedi (official) 9.8%, Setswana (official) 8.9%, English (official) 8.4%, Sesotho (official) 8%, Xitsonga (official) 4%, siSwati (official) 2.6%, Tshivenda (official) 2.5%, isiNdebele (official) 1.6%, other 1.9% – though English is generally understood across the country as the main business language and it is also the language used for politics and by the media.

With regards to religion [2]:

- 86% of South Africans are Christians
- 5.4% are of ancestral, tribal, animist, or other traditional African religions
- 1.9% are Muslim
- 1.5% are of other religion
- 5.2% are not explicitly religious.

Approximately 67% of the population is urban. The distribution of the population by province is shown below.

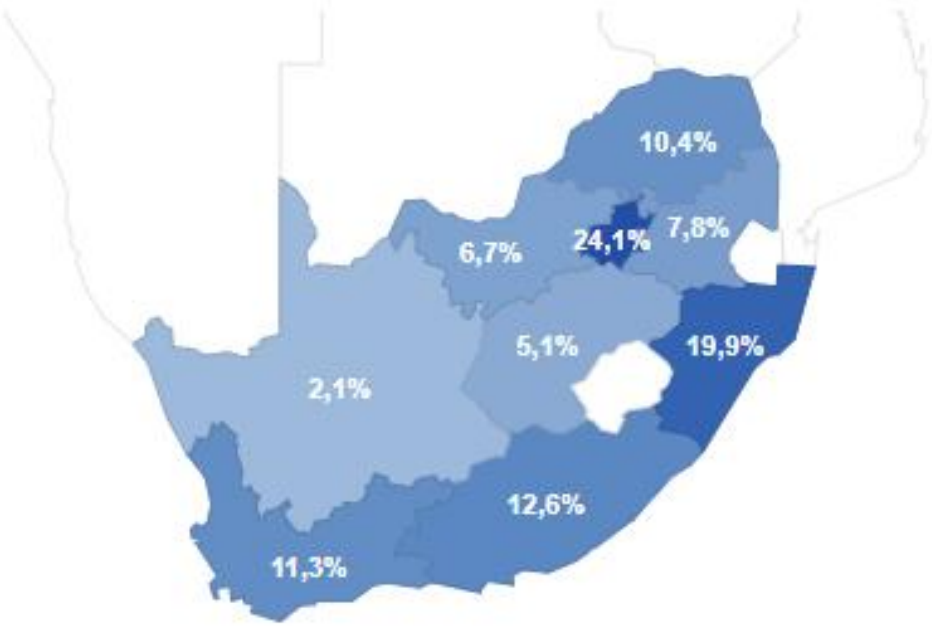


Figure 5- Geographical distribution of population [3]

Human Development Index

The calculated Human Development Index [7] for South Africa is 0.705, ranking at 113th place in the world. This index is below the average of 0.750 for countries in the high human development group and above the average of 0.541 for countries in Sub-Saharan Africa. This index reports many additional parameters, among which:

- Health
  - 63.9 years of life expectancy at birth
  - 27.4% child malnutrition (moderate or severe)
  - 8.1% of GDP spent on health
  - 18.8% HIV prevalence for adults aged 15 to 49.
- Education
  - 13.7 years of schooling
  - 6.1% of GDP spent on education
  - 76.5% population (aged 25 and older) with at least some secondary education
- Income
  - USD 11756 gross national income per capita
- Inequality
  - 0.463 inequality-adjusted HDI, to be compared against an average of 0.615 in the high human development group (0.790 in the OECD); 0.376 in Sub-Saharan Africa.
- Poverty
  - 6.3% of the population is in poverty
  - 18.9% of the population is living below the income poverty line (USD 1.90 per day)
- Work and employment
  - 40.6% employment to population ratio (aged 15 and older).
  - 27% unemployment, 52.9% unemployment for youth.

  - 31.6% youth not in school or employment (aged 15-24)
  - 5.2% employment in agriculture, 71.6% in services.
- Human security
  - 35.9 homicide rate per 100000 people (one of the highest in the world), to be compared against an average of 6.5 in the high human development group (3.1 in the very high human development group).

History and Politics [6,9]

The region of modern-day South Africa had tribal populations since ancient times. Portuguese travelers discovered the Cape of Good Hope at the end of the 15th century; Dutch settlers and French Huguenots arrived in the 17th century and the British followed in the early 19th century.

The British and the Boer (descendants of the Dutch) started fighting local tribes in the 18th and 19th centuries, annexing their lands. They then fought against each other in the Anglo-Boer war that started in 1899 and was won by the British in 1902; the Boer territories became British colonies in 1910 and the Boers were relegated to poor farmers; in 1914, a group of radical Afrikaners founded the National Party to represent the Afrikaner interest.

Gold and diamonds were discovered in the second half of the 19th century and this attracted many fortune hunters from nearby countries and Europe (mainly British); this incoming flow of low-wage workforce further impoverished the South African population.

Between 1910 and 1948, black South Africans were almost completely marginalized, with legislation that limited their rights, including to vote and own land. The South African National Congress was founded in 1912 to promote the rights of black South African and was renamed African National Congress (ANC) in 1923.

In 1948, the National Party came to power and segregation – known as “Apartheid” – became official: people were classified into racial groups, schools and public services were segregated, and the black population was forced to live in “homelands”.

Apartheid triggered opposition from the outside, with many countries imposing economic sanctions on South Africa, and from the inside, where demonstrations from the opposition were violently repressed. In the early 1980s, the country was almost isolated from the rest of the world; this forced politicians to relax some apartheid laws. In 1989, the prime-minister Botha resigned and was replaced by de Klerk, who began the process to end the apartheid; he removed most apartheid laws and he freed in 1990, after 27 years of prison, the opposition leader Nelson Mandela.

On April 27, 1994 (“Freedom Day”), the ANC won with a large majority the first democratic election of South Africa, and Nelson Mandela was elected president. Even after the end of Mandela’s term in 1999, the ANC remained the party in power, despite many corruption scandals and growing opposition.

Government and Legal System [2, 6, 9]

South Africa is a parliamentary republic, based on two houses: the National Assembly and the National Council of Provinces. Elections for both houses are held every five years. The National Assembly has between 350 and 4000 members, elected by universal adult suffrage on proportional representation; the National Council of Provinces includes six permanent delegates and four special delegates from each of the nine provincial legislatures and is mandated to represent the provinces to ensure that provincial interests are taken into account at the national level.

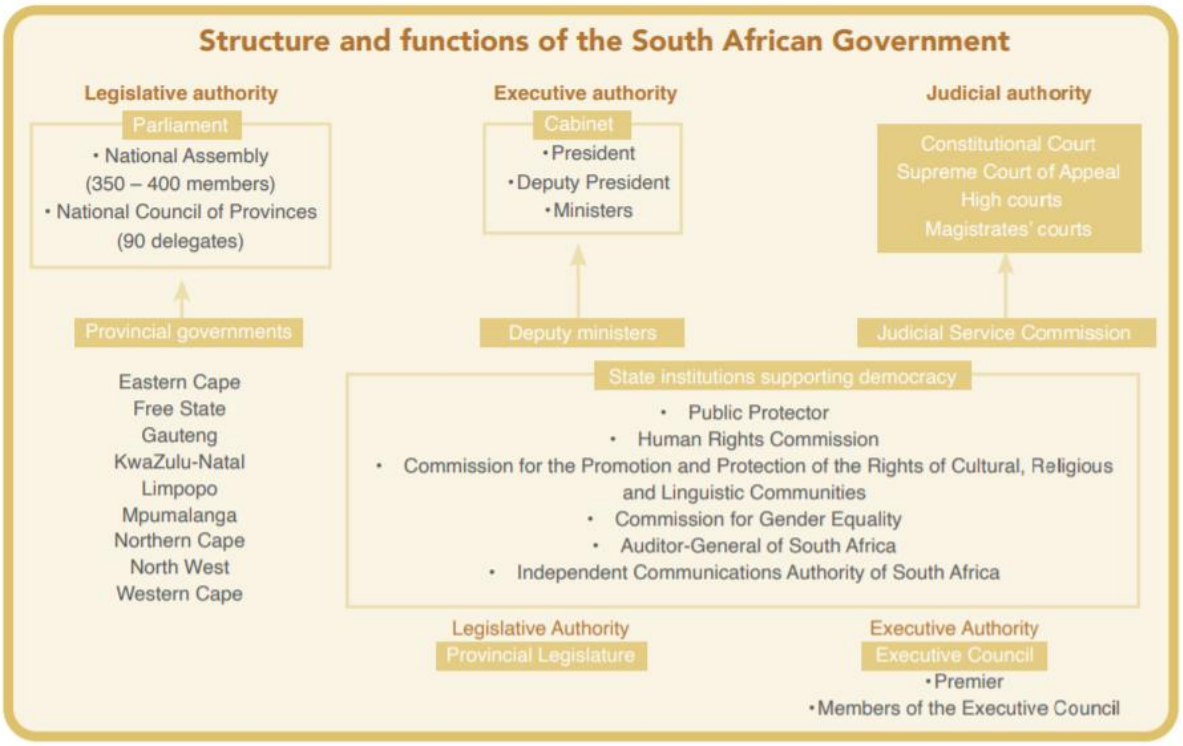


Figure 6 - Structure and functions of the South African Government [6]

The president is elected from the members of the National Assembly and holds executive power.

The national, provincial, and local levels of governments all have legislative and executive authority in their spheres and are defined in the Constitution – which took effect in 1997 – as distinctive, interdependent, and interrelated.

Governance Indicators

The World Bank provides multiple "Worldwide Governance Indicators" [5] that are reported below for South Africa and other relevant groups.

Figure 7 - The World Bank - Governance Indicators for South Africa compared to Sub-Saharan, Low and High Income OECD [5]

An additional indicator is provided by Transparency International [10] via its Corruption Perception Index (CPI): in 2019, South Africa ranked 70th out of 180 countries with a score of 44/100. 64% of people thought that corruption increased in the past 12 months and 18% of public service users paid a bribe in the previous 12 months. South African CPI is above the average for Sub Saharan Africa (32) shown below.

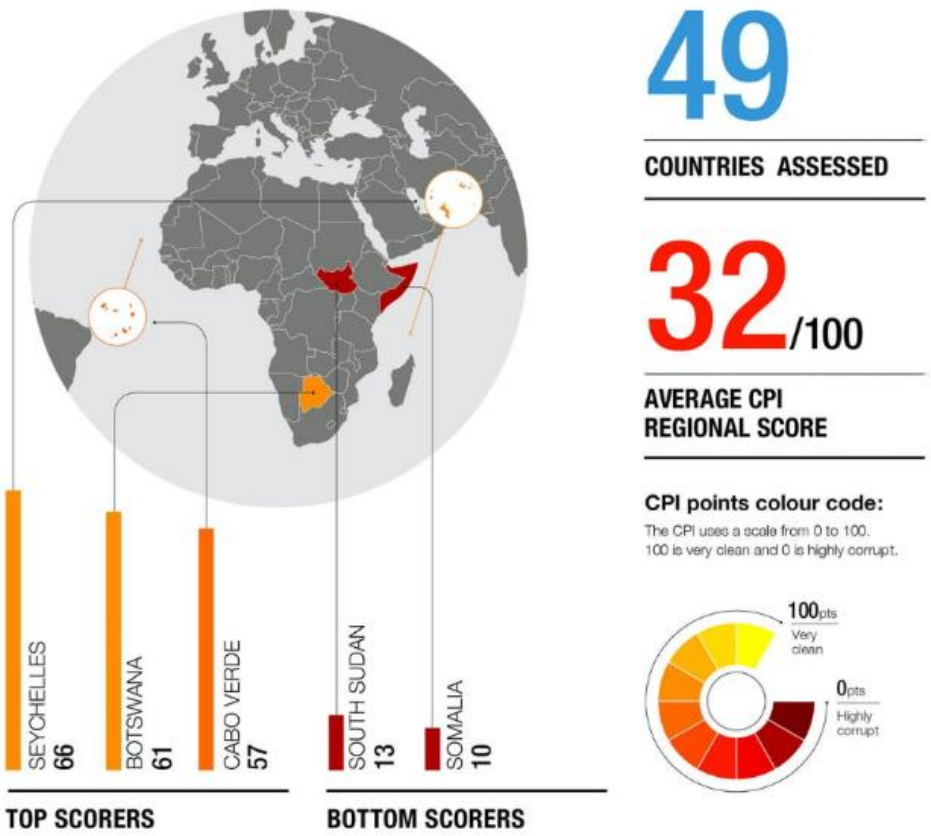


Figure 8 - Corruption Perception Index for Sub-Saharan Africa [10]

Economy and Employment

The World Bank [5] categorizes South Africa as an "upper-middle-income emerging market". In 2018, the country's GNI (formerly GDP) was USD 368.28 billion and the GNI per capita was USD 5750; when applying Purchase Power Parity, the values become USD 723.96 billion and USD 12530. South Africa ranked 30th in the world for GNI with PPP and 119th for GNI per capita with PPP.

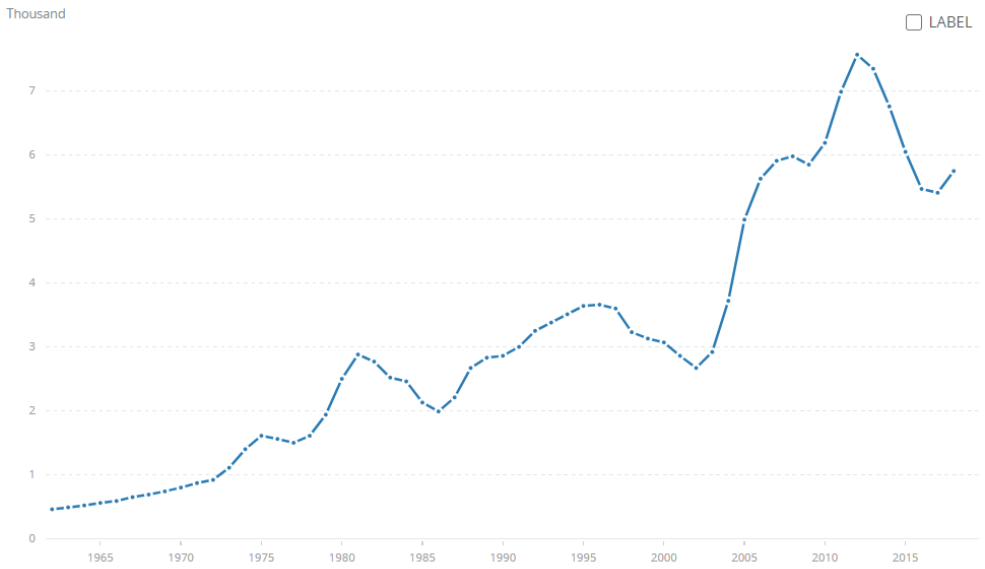


Figure 9 – Evolution of South Africa GNI [5]

The GNI has grown by 1.4% in 2017, 0.8% in 2018, 0.2% in 2019; it is expected to shrink by 7.2% in 2020 and to grow by 2.9% in 2021.

In 2017, agriculture, forestry and fishing represented 2.7% of the GNI; industry 29.7%; import/export of goods and services 67.5%.

The inflation rate in 2018 was 3.9% and evolved as shown in the figure below.

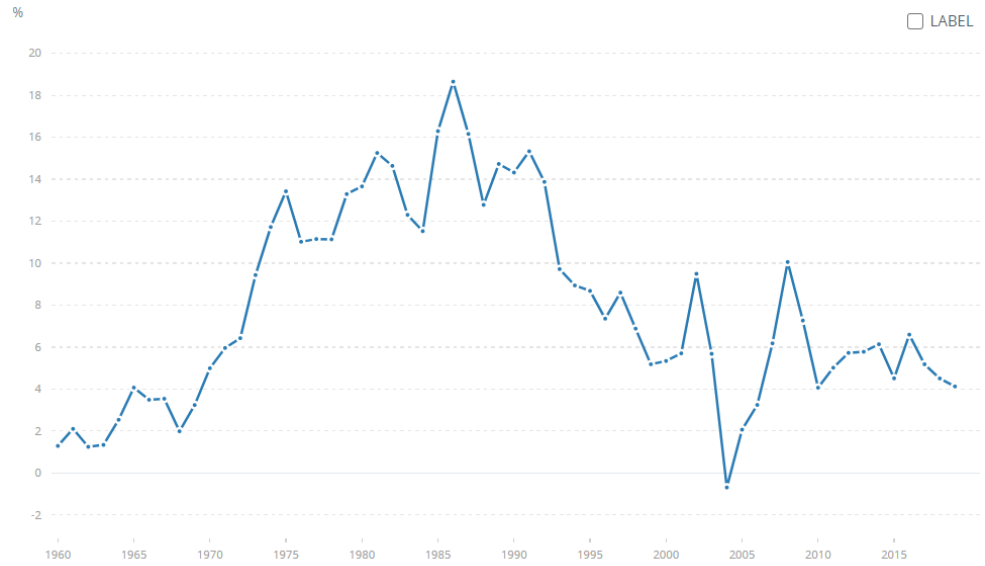


Figure 10 - South African inflation rate (%) [5]

The major industries were mining – South Africa is the world's largest producer of platinum, gold and chromium – automotive assembly, metalworking, machinery, textiles, iron and steel, chemicals, fertilizer, foodstuffs and commercial ship repair.

In 2014, South Africa had a GINI Index of 63, making it one of the most unequal countries in the world.

Additional elements were also provided in the Human Development Index section, previously in this document.

Doing business

The World Bank publishes the "Ease of doing business score" [5] that is reported below for South Africa and additional groups for comparison.

Ease of doing business score (0 = lowest performance to 100 = best performance)

	2015	2016	2017	2018	2019
South Africa	66.2	65.4	65.3	66.7	67.0
Sub-Saharan Africa	47.7	48.5	49.7	50.9	51.8
Low & middle income	54.3	55.1	56.0	57.2	58.1
OECD members	77.2	77.5	77.7	78.0	78.1

The GlobeSmart [9] reference for South Africa mentions the following when summarizing "core values and implications for business":

- "South Africa is a complex mosaic of ethnic, racial, linguistic, and regional diversity". This implies many different perspectives and backgrounds, that must be taken into consideration. Also, there are now many South African businesspeople of African descent (vs. European) which results in more traditional African values when doing business.
- "Due to the sense of group orientation, business deals are usually negotiated only after a relationship has been developed between the principals". The idea of community is very strong in South Africa, with extended families, strong respect for the elders and a limited sense of "individual property" within a family. The principle of "ubuntu" is very important in South Africa and implies that no one is isolated from society and that individual success derives from the connection to other humans.
- "Pay attention to status and rank in South African society and business and respect these hierarchies as you encounter them". Companies are traditionally run hierarchically and employees expect decisions to come from above.

In terms of communication, it is important to pay attention to non-verbal cues and clarify expectations; silence is considered a sign of listening and respect; tact is more valued than directness; respectful language should be used when speaking with elders or those of higher status; storytelling is a valued skill and will help in building relationships.

Source and amounts of international aid

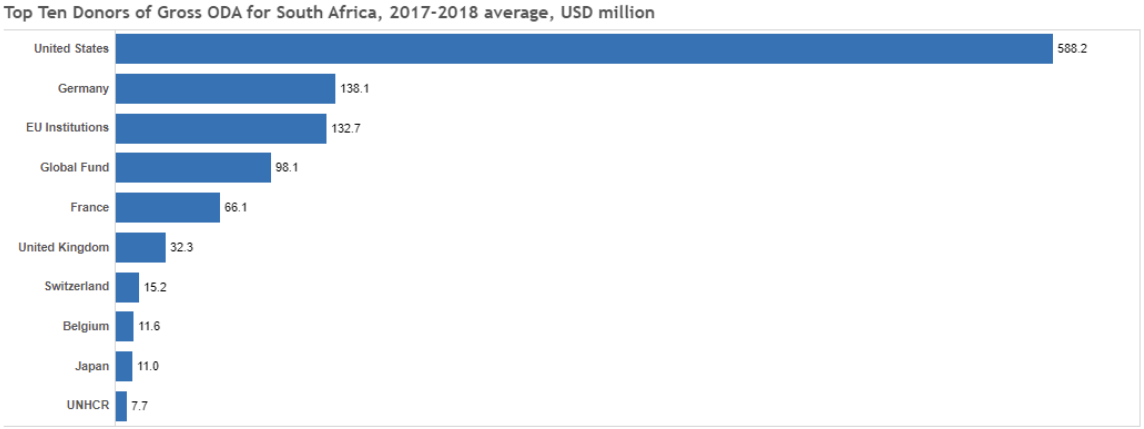
South Africa has received USD 914.8 million of international aid in 2018; more detailed statistics are reported below [5, 8].

Receipts for South Africa

	2016	2017	2018
Net ODA (USD million)	1,180.3	1,014.8	914.8
Net ODA/GNI (%)	0.4	0.3	0.3
Gross ODA (USD million)	1,314.2	1,138.4	1,152.1
Bilateral share (gross ODA) (%)	83.6	78.5	77.8
Total net receipts (USD million)	4,692.0	4,585.5	3,372.5

For reference

	2016	2017	2018
Population (million)	56	57	58
GNI per capita (Atlas USD)	5,470	5,410	5,750



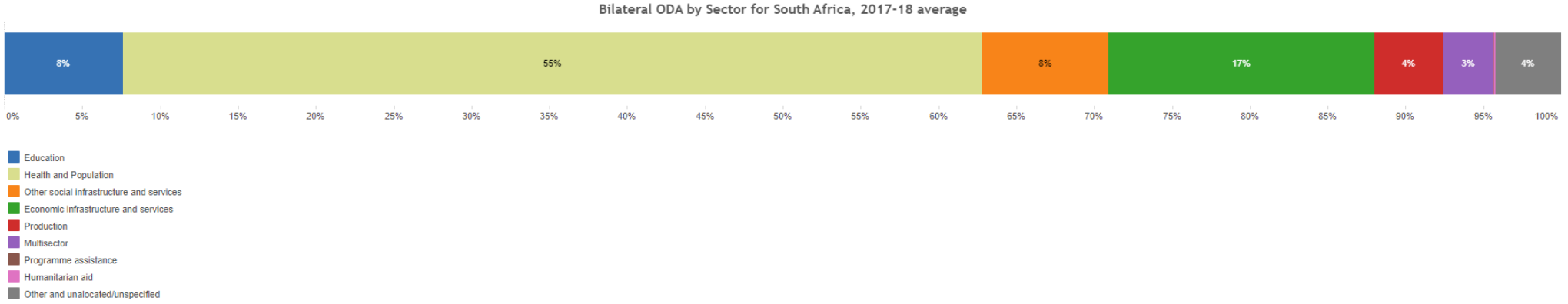


Figure 11 - OECD aid information for South Africa [8]

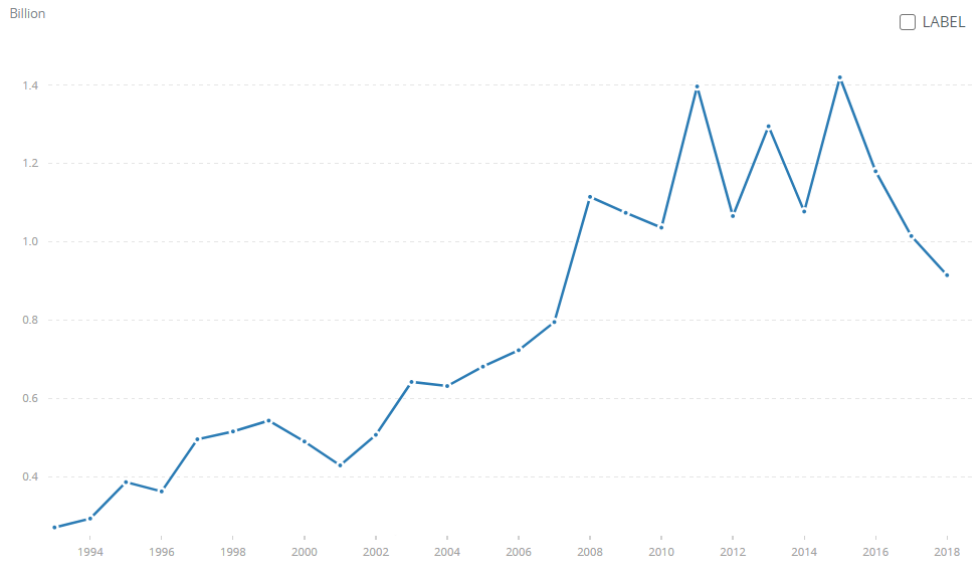


Figure 12 - Net development assistance received (USD) South Africa [5]

Physical and Technological Infrastructure

Telecommunication

South Africa has one of the largest telecommunications markets of the continent [6], with five operators: Cell C, MTN, Vodacom, Telkom Mobile and virtual network operator Virgin Mobile.

The Human Development Index for South Africa [7] reports 56.2% internet users and 153.2 mobile phone subscriptions per 100 people, ranking 17th in the world. Mobile Internet represents 95% of Internet connections; South Africa will be one of the first countries in the region to launch commercial 5G services.

It is difficult to obtain independent information about mobile network coverage in South Africa; the following figures were taken from the South African operator's WEB sites in June 2020 to provide at least a broad idea.

Figure 13 - 2G, 3G and 4G coverage for Cell C. [16]

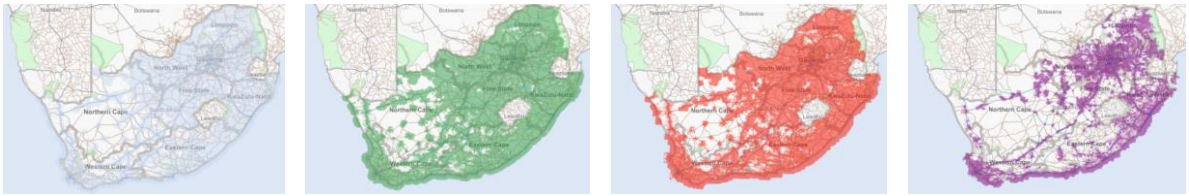


Figure 14 - GPRS, EDGE, 3G and LTE coverage for Vodacom [17]

Figure 15 – 2G, 3G (900), 3G (2199) and LTE coverage for MTN [18]

Electricity [5]

In 2018, almost 90% of the population had access to electricity in both urban and rural areas. Almost 93% of electricity is produced by coal sources, 5.5% from nuclear sources and less than 2% from renewable sources.

South Africa has experienced power deficits and/or outages since 2007; this was due to generation capacity constraints, inadequate electrical power delivery system, as well as load growth in areas that were not adequately planned for [11]. South African energy suppliers have implemented a system of "load shedding" [12] whereby they reduce demand when the electricity power system cannot respond to the load; in a first phase – "load curtailment" – some large industrial groups can be instructed to reduce their load by up to 20%; if after curtailment the demand is still greater than the supply, the energy suppliers will cut power in specific areas for specific durations. Load shedding is performed in multiple stages depending on the unbalance potential of the system; the energy supplier could stop power supply from 3 times over four days for two hours at a time (stage 1) to 12 times over four days for two hours at a time (stage 4).

Transportation

South Africa ranks 20th for the number of airports, has 20986 km of railways (13th in the world) and 75000 km of roadways (10th in the world) [5].

The South African department of transportation provides more detailed information [13], shown below.

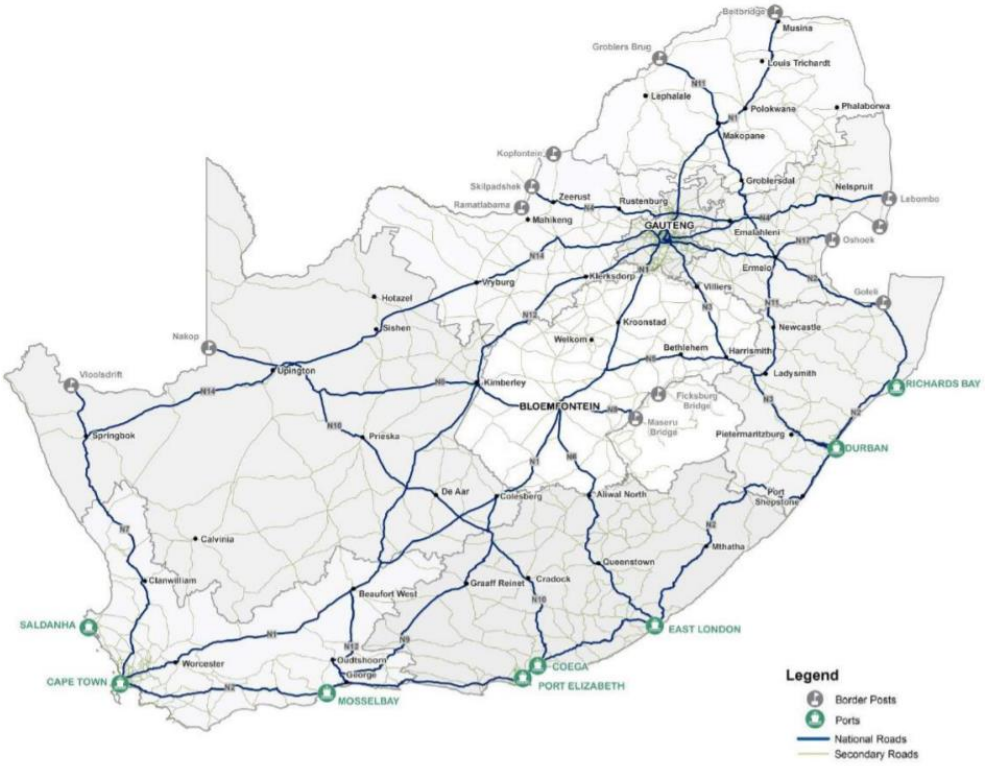


Figure 16 - Major road network [13]

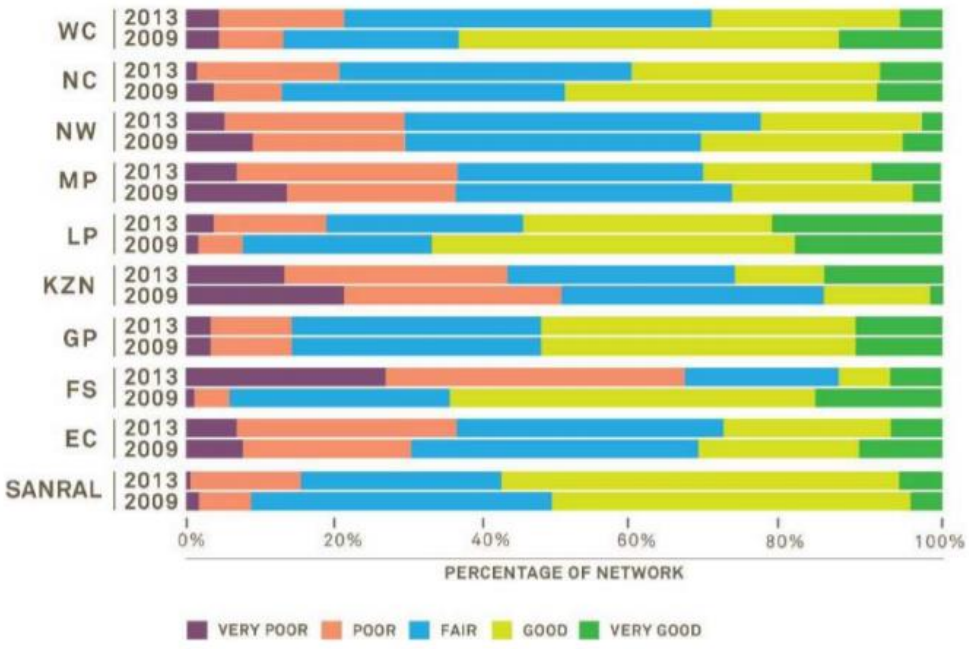


Figure 17 - Road network condition [13]

The condition of provincial roads has deteriorated since the 1990s; the average condition of the core rail network is considered “fair” and the branch line network is considered “poor to very poor”.

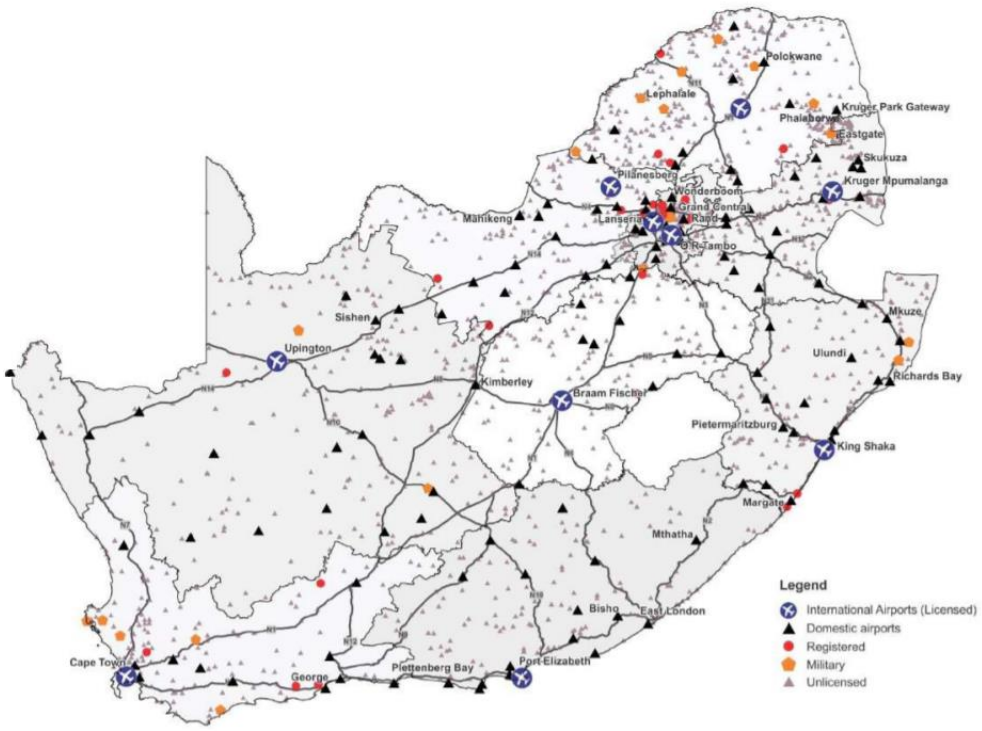


Figure 18 - Airports in South Africa [13]

Water and Sanitation

South Africa has a free basic water policy. In 2009 [14], the water supply was 82% for rural and 96% for urban, for a total of 91%; the rural sanitation was at 61% and the urban sanitation at 85%, for a total of 76%.

According to the South African government's resources [15], 46.5% of households had access to piped water in 2018; 28.5% accessed water on site, 12.3% relied on communal taps and 1.9% relied on neighbors' taps; 2.7% of households still had to fetch water from rivers, streams, stagnant water pools, damns, wells, and springs.

By mid-2019, 2.5% of water is directed to mining, 3% to industrial use, 2% to power generation, 61% to agriculture, leaving 27% for the consumption of the population.

National Health Care

National Health Care Profile

Overall health

In 2015, life expectancy at birth was 62.9 years (66.2 for women, 59.3 for men) [20]. Many indicators and trends related to South Africa's high-level health situation are published by the South African authorities.

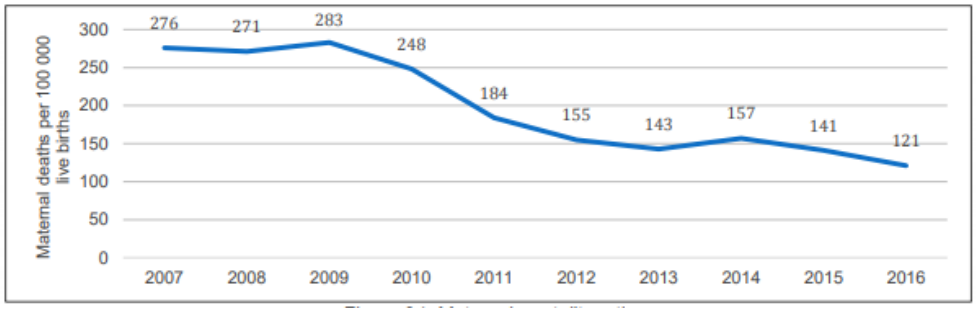


Figure 19 - Maternal mortality ratio [24]

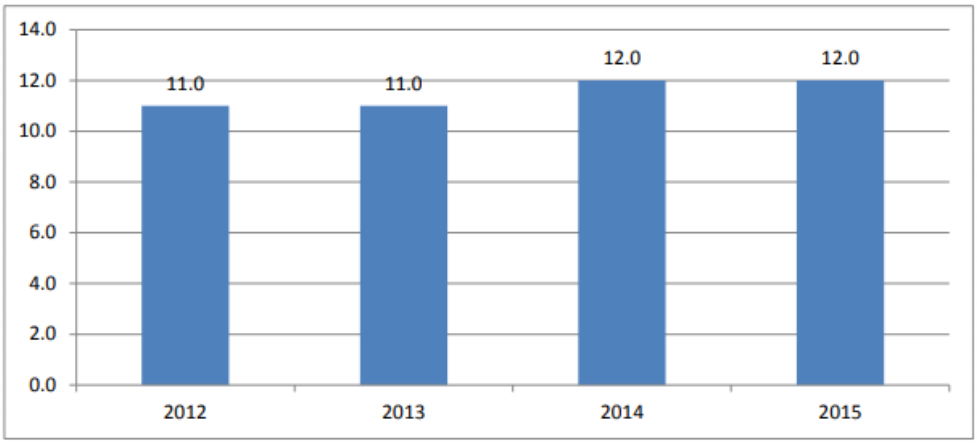


Figure 20 - Neonatal mortality ratio [24]

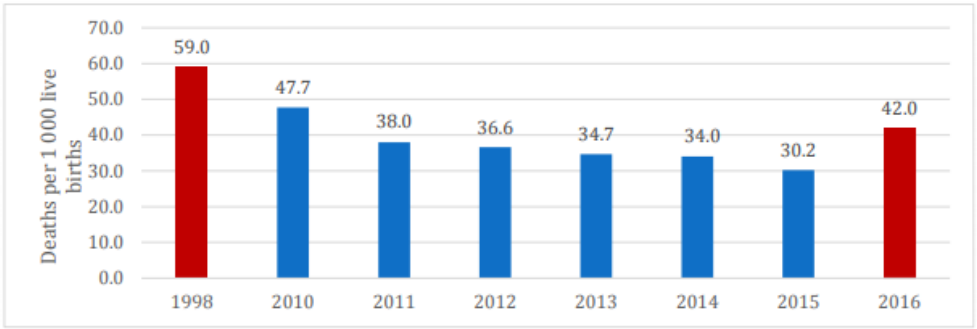


Figure 21 - Under-5 mortality ratio [24]

Main causes of death

The top ten causes of natural death are reported below.

Causes of death (based on ICD-10)	2015			2016			2017		
	Rank	Number	%	Rank	Number	%	Rank	Number	%
Tuberculosis (A15-A19)**	1	34 106	7,2	1	30 441	6,5	1	28 678	6,4
Diabetes mellitus (E10-E14)	2	25 805	5,4	2	25 799	5,5	2	25 336	5,7
Cerebrovascular diseases (I60-I69)	3	23 540	5,0	4	23 695	5,0	3	22 259	5,0
Other forms of heart disease (I30-I52)	4	23 324	4,9	3	24 552	5,2	4	22 098	4,9
Human immunodeficiency virus [HIV] disease (B20-B24)	5	22 594	4,8	5	22 483	4,8	5	21 439	4,8
Hypertensive diseases (I10-I15)	7	19 876	4,2	6	20 289	4,3	6	19 900	4,5
Influenza and pneumonia (J09-J18)	6	21 055	4,4	7	20 152	4,3	7	18 837	4,2
Chronic lower respiratory diseases (J40-J47)	9	13 031	2,7	10	13 040	2,8	8	13 167	2,9
Ischaemic heart diseases (I20-I25)	10	12 726	2,7	9	13 269	2,8	9	12 766	2,9
Other viral diseases (B25-B34)	8	16 501	3,5	8	16 877	3,6	10	12 622	2,8
Other natural causes		208 242	43,9		206 281	43,9		198 278	44,4
Non-natural causes		53 375	11,3		53 518	11,4		51 164	11,5
All causes		**474 175**	**100,0**		**470 396**	**100,1**		**446 544**	**100,0**

Figure 22 - Ten leading causes of natural death [19]

Please note that due to the high level of violence and deaths attributed to accidents, Statistics South Africa treats data for natural and non-natural deaths in separate groups.

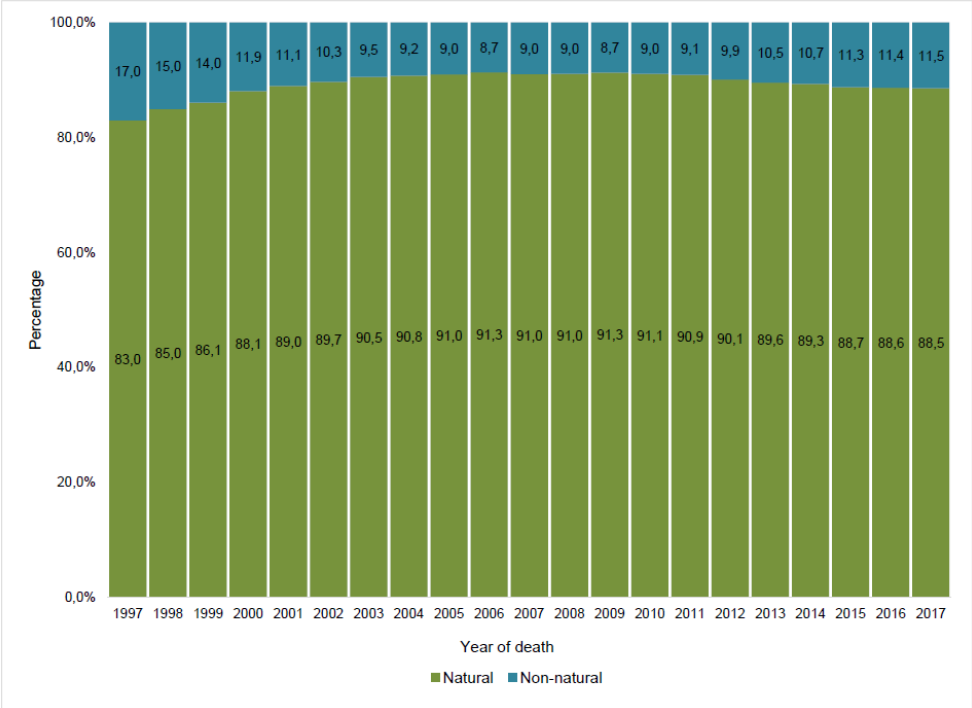


Figure 23 - Distribution of natural vs. non-natural causes of death [19]

The proportion of deaths attributed to non-natural causes has increased from 8.7% in 2006 to 11.5% in 2017. The murder rate in each South African province is shown below.

Province	Number of murders	Murder rate per 100,000 people
Eastern Cape	3,965	60.9
Western Cape	3,974	59.4
KwaZulu-Natal	4,395	39.1
Free State	1,000	34.5
Gauteng	4,495	30.5
Northern Cape	322	26.1
North West	961	24.4
Mpumalanga	996	21.9
Limpopo	914	15.6

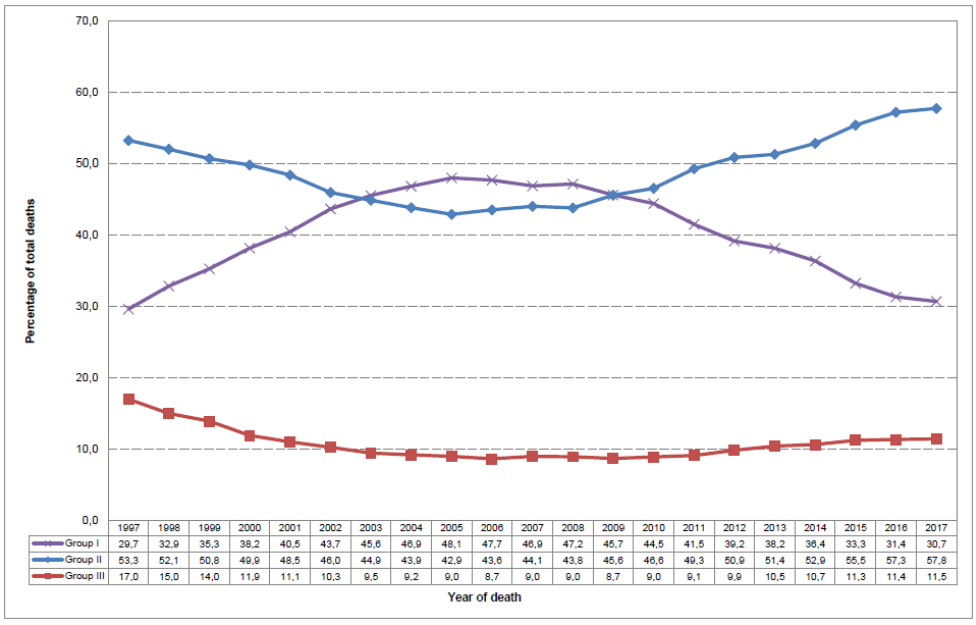
Figure 24 - Murder rates per province [29]

Burden of diseases

Statistics South Africa reports its data based on three groups [19]:

- Group I includes communicable diseases (TB, pneumonia, malaria, etc.), maternal and perinatal causes, and nutritional conditions.
- Group II includes non-communicable diseases (cancer, diabetes, etc.)
- Group III includes generic external causes (accidents, homicides, etc.)

The percentage of deaths for each group is shown in the figure below.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Group I	29,7	32,9	35,3	38,2	40,5	43,7	45,6	46,9	48,1	47,7	46,9	47,2	45,7	44,5	41,5	39,2	38,2	36,4	33,3	31,4	30,7
Group II	53,3	52,1	50,8	49,9	48,5	46,0	44,9	43,9	42,9	43,6	44,1	43,8	45,6	46,6	49,3	50,9	51,4	52,9	55,5	57,3	57,8
Group III	17,0	15,0	14,0	11,9	11,1	10,3	9,5	9,2	9,0	8,7	9,0	9,0	8,7	9,0	9,1	9,9	10,5	10,7	11,3	11,4	11,5

Figure 25 - Percentage of deaths per disease group [19]

As with many African countries, South Africa data shows an epidemiological shift away from communicable diseases towards non-communicable diseases.

Additional indicators on communicable and non-communicable diseases are reported in the figures below.

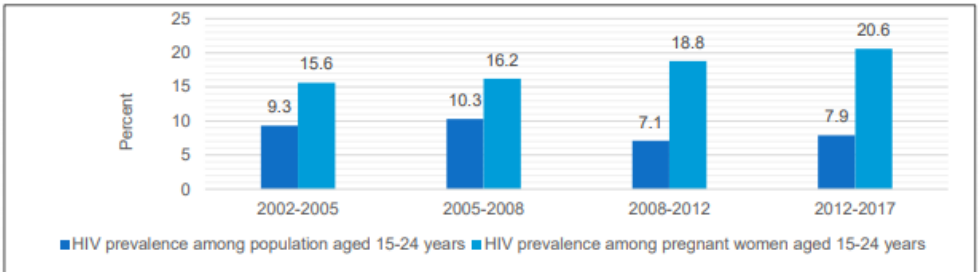


Figure 26 - HIV prevalence [24]

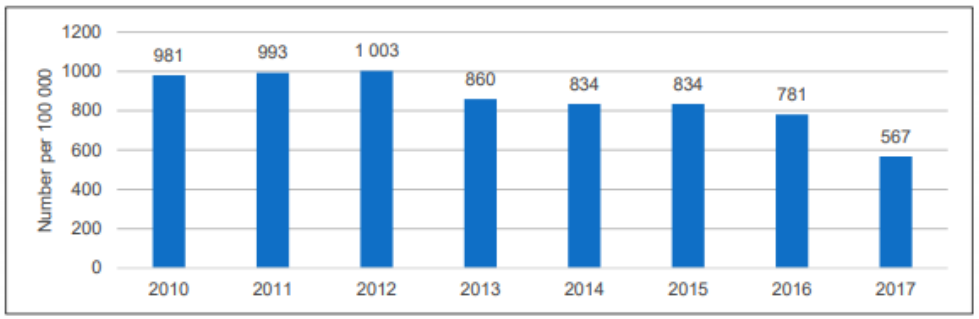


Figure 27 - Tuberculosis incidence [24]

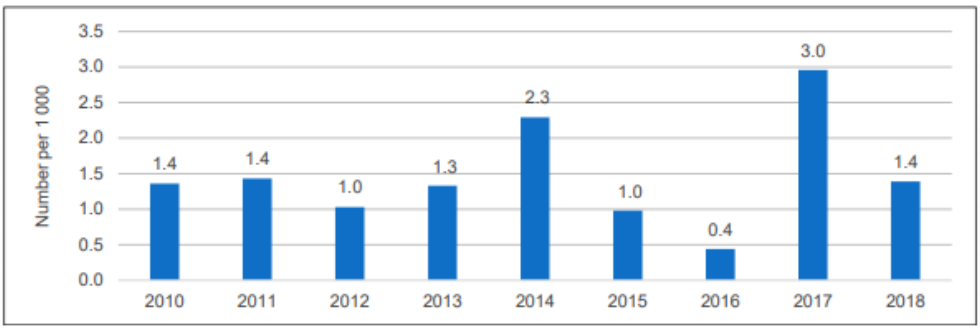


Figure 28 - Malaria incidence [24]

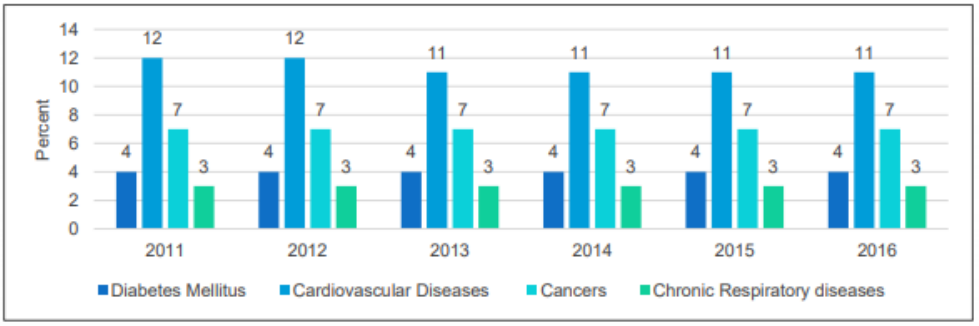


Figure 29 - Mortality rate due to non-communicable diseases [24]

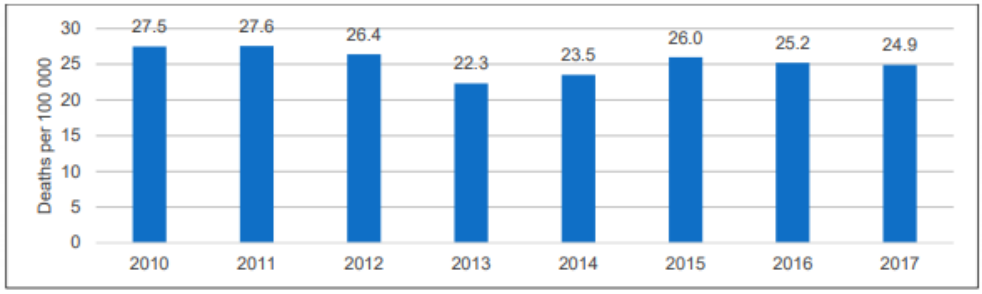


Figure 30 - Mortality due to road traffic injuries [24]

Nutrition profile

In South Africa, almost 3 children out of 10 (27%) are stunted i.e. they have a low height-for-age or are suffering from chronic under-nutrition [21]; this value is lower than other SADC countries but is still considered high according to international standards. 13% of children are overweight.

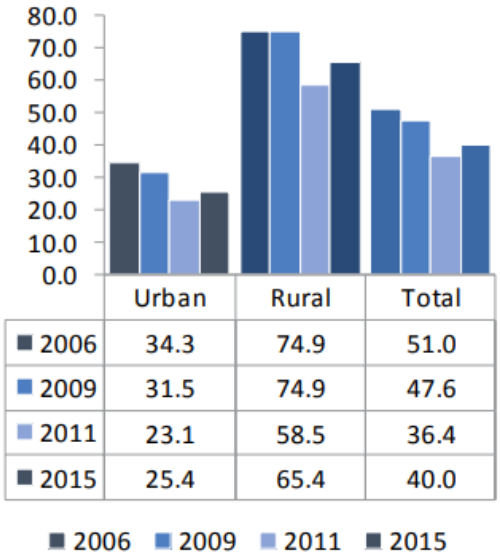
Other nutrition-related information is shown in the table below.

KEY INDICATORS	VALUE	YEAR
Low-birthweight (% of births <2.5kg)	14.5%	2016
Infants exclusively breastfed (% of children under 6 months)	31.6%	2016
Children fed 5+ food groups (% of children 6-23 months)	39.9%	2016
Children who received a minimum acceptable diet (% of children 6-23 months)	22.9%	2016
Anaemia in children (% of children 6-59 months)	61.3%	2016
Anaemia in women of reproductive age (% of women age 15-49)	25.8%	2016
Women who are thin according to BMI (<18.5 kg/m2) (% of women age 15-49)	3.1%	2016
Women who are overweight or obese according to BMI (≥25 kg/m2) (% of women age 15-49)	62.1%	2016

Figure 31 - Nutrition profile indicators [21]

Poverty

Poverty is a major concern in South Africa, with 40% of the population living below the poverty line in 2015 [21].



	Urban	Rural	Total
2006	34.3	74.9	51.0
2009	31.5	74.9	47.6
2011	23.1	58.5	36.4
2015	25.4	65.4	40.0

Figure 32 - National poverty rates [22]

When focusing on children [23], 62.1% of them are considered "multidimensionally poor" (88.4% in rural areas vs. 41.3% in urban areas). The image below shows further details about such dimensions and related percentages (including health).

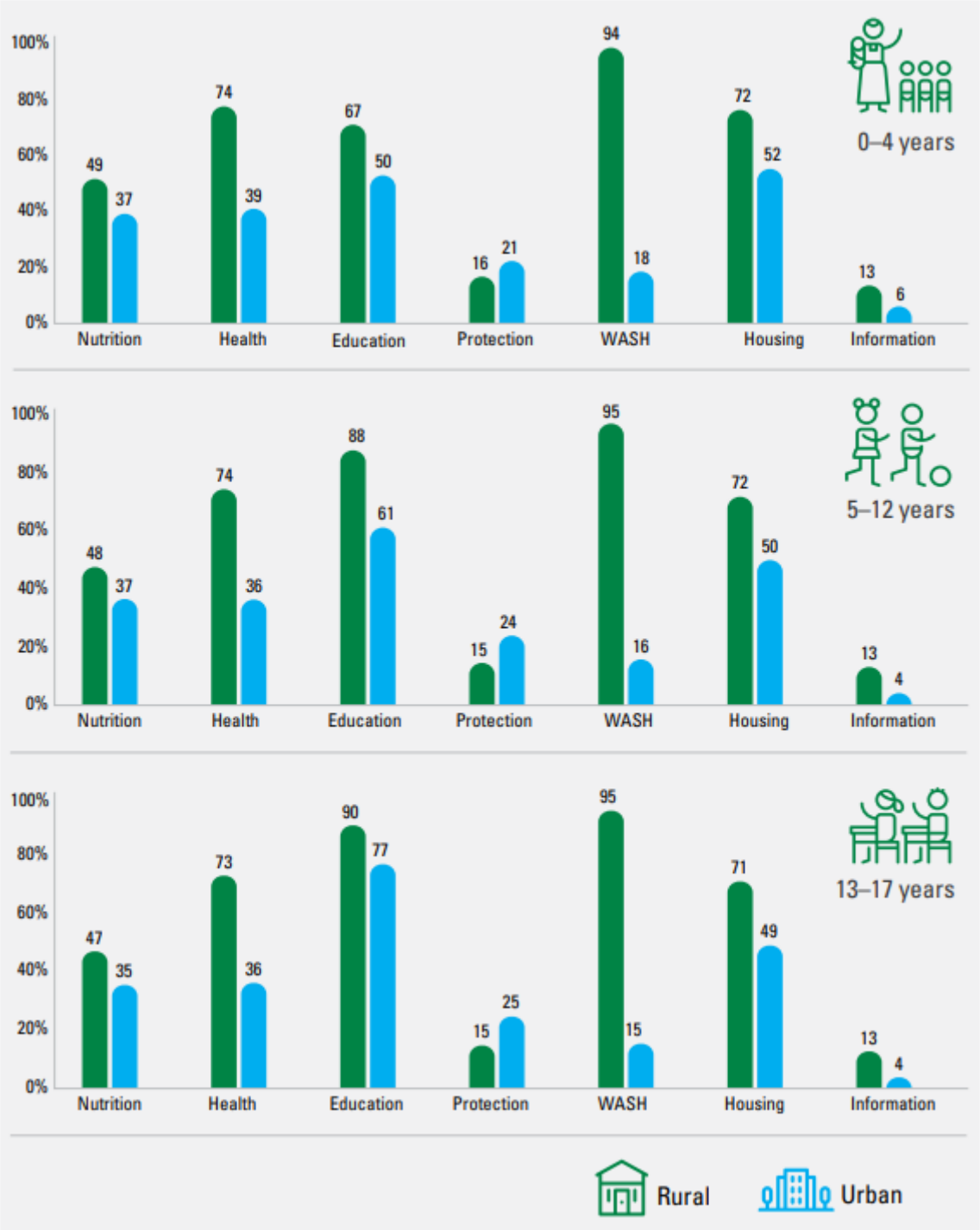


Figure 33 - Deprivation headcount poverty rate for children by dimension and settlement type [23]

National Health Care Structure

Overview

The foundation of public health is made of primary care facilities, representing the first line of access to formal healthcare services; district hospitals are the next tier to which patients are referred from primary care facilities when necessary; tertiary (or "provincial" or "central") hospitals represent the final tier and should focus on more advanced treatments; in practice though, patients can freely choose their providers and end up accessing the closer facility, forcing tertiary hospitals to also provide primary care.

Public healthcare is free for all citizens, who can also decide to subscribe private insurance to be treated at private hospitals and clinics. Uninsured patients can consult general practitioners and make out-of-pocket payments [20]. Information about out-of-pocket payments is shown below.

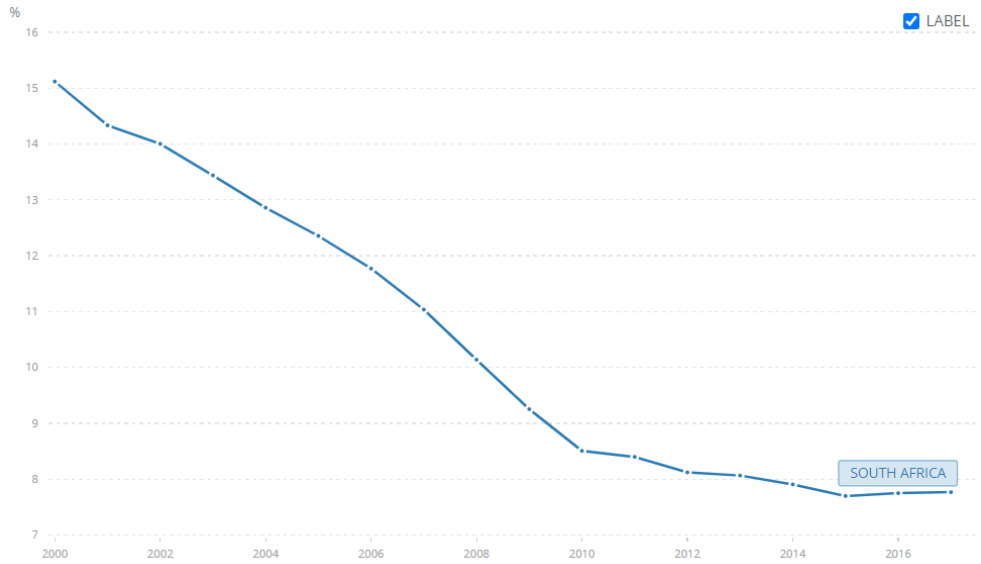


Figure 34 - Out-of-pocket expenditure (% health expenditure) [5]

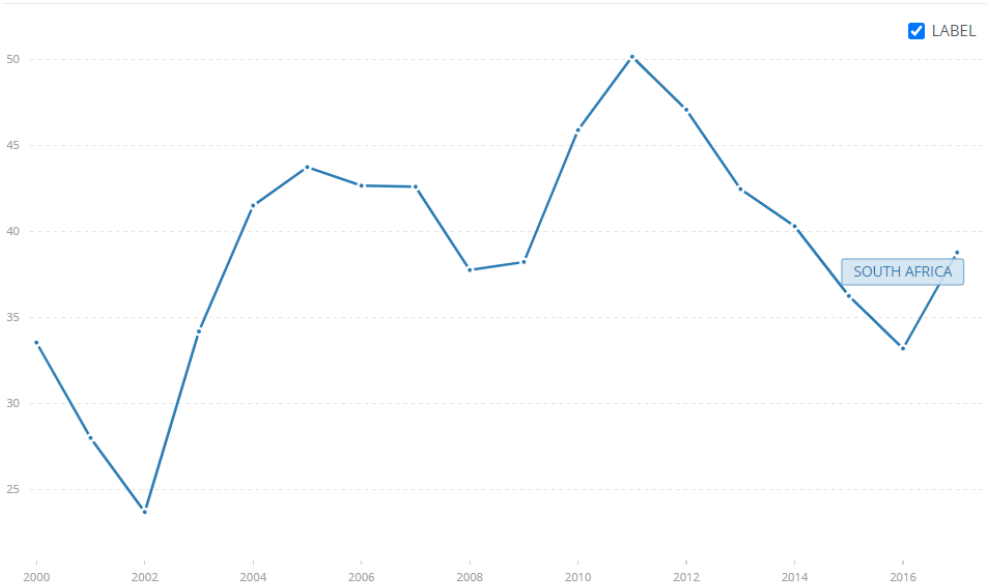


Figure 35 - Out-of-pocket expenditure per capita (USD) [5]

A study [25] found that private health care in South Africa is characterized by high and rising costs in a predominantly fee-for-service market, with little innovation and almost no competition (though consistent profits).

The market is dominated by Netcare, Mediclinic and Life Healthcare, collectively owning 83.1% of hospital beds in the private sector and accounting for more than 85% of admissions. The study seems to mention that these players apply ethically debatable practices to attract practitioners and to pre-qualify the health risk of customers.

The share of private-funded health expenditure is shown in the figure below.

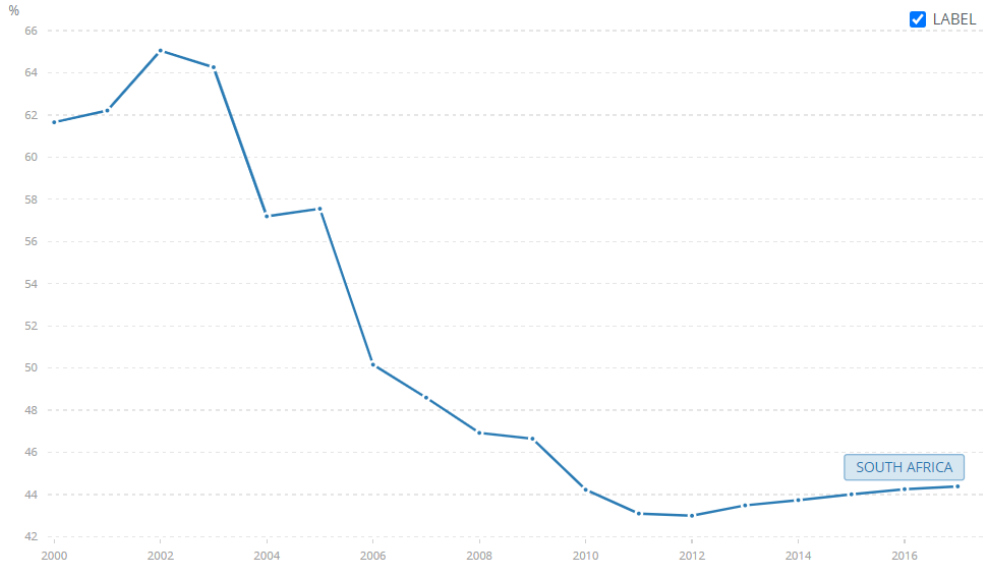


Figure 36 - Domestic private health expenditure (% current health expenditure) [5]

State of health care

Multiple publications seem to agree on qualifying the state of health care in South Africa as "poor":

- "Despite increasing resources and growing utilization, quality of primary health care is a major problem, with drug stock-outs common […]. The development of the District Health System is highly uneven across the country " [27].
- "[…] Gaps in ethical leadership, management and governance contribute to poor quality of care. These gaps are exacerbated by mismanagement, inefficiencies, and incompetence at various levels of the health system. Corruption and fraud are major threats to equitable access to quality health care" [26].
- "Patient safety and security" and "positive and care attitude" scored 30% and 34% respectively during an audit in 2012 [28]. The same audit showed a "high percentage failure in compliance with the viral measure dealing with the availability of medicines".

Category	ZA
Waiting times	31%
Patient care	29%
Staff attitude	26%
Other	13%
Access to information	8%
Safe and secure environment	5%
Waiting list	4%
Hygiene and cleanliness	3%
Availability of medicines	3%
Physical access	3%

Figure 37 - Complaints logged in 2018/19 [29]

The National Health Insurance bill

In 2019, the National Health Insurance (NHI) bill was tabled as a response to the WHO Sustainable Development Goals (SDGs) and specifically to SDG 3.8 that requires a commitment to achieve Universal Health Coverage (UHC). The NHI is the latest outcome of a set of very long and complex processes – to replace legislation dating from the apartheid – that started from a White Paper in 1997 on the Transformation of the Health System in South Africa", then included various policy proposals, the promulgation of the National Health Act – not entirely in effect to this day – and many more. The scale of the challenge is huge, and analysts seem to consider that the NHI still requires critical alignment between all South African provinces and improved participation from the public. [25]

The NHI envisages changes to the following [25]:

- Revenue collection, with a gradual allocation of tax funding to the health sector. Target is also to reduce out-of-pocket payments.
- Pooling, with a unique pool of tax funds for the entire population.

- Purchasing, with a unique institution responsible to purchase health services for the entire population.

Health financing

Healthcare is financed by the South African government and represents around 8% of the country's GDP.

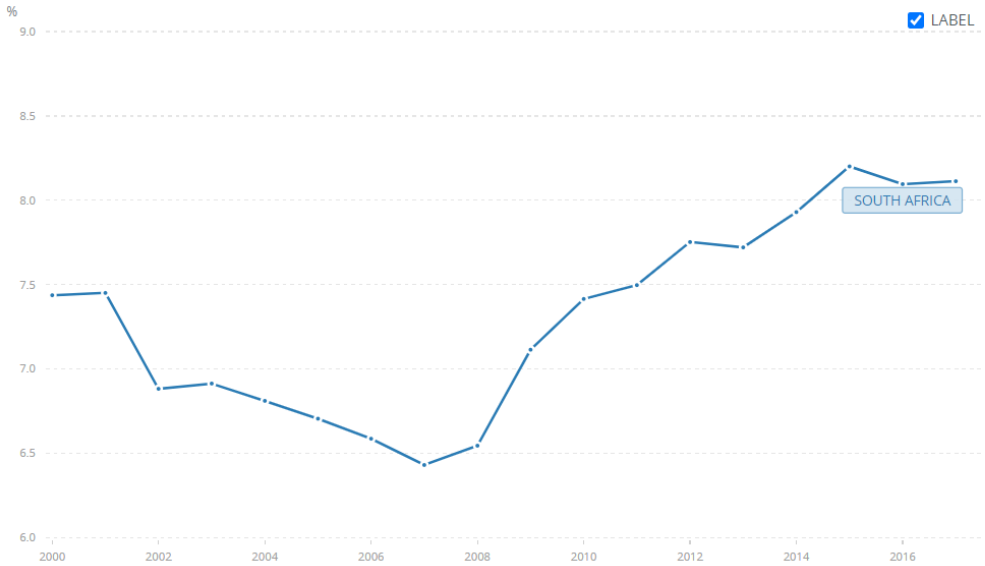


Figure 38 - Health expenditure (% of GDP) [5]

Health care facilities

One study from 2017 [26] identified 544 hospitals in South Africa:

- 327 public hospitals, out of which 257 (79%) were district-level, 49 (15%) were regional-level and 21 (6%) were tertiary-level; these had an average of 131 beds/20 surgical beds, 471 beds/86 surgical beds and 763 beds/144 surgical beds respectively.
- 217 private hospitals.

Overall, the number of hospital beds per 10 000 uninsured population dropped from 24.0 in 2003 to 17.9 in 2019 [25].

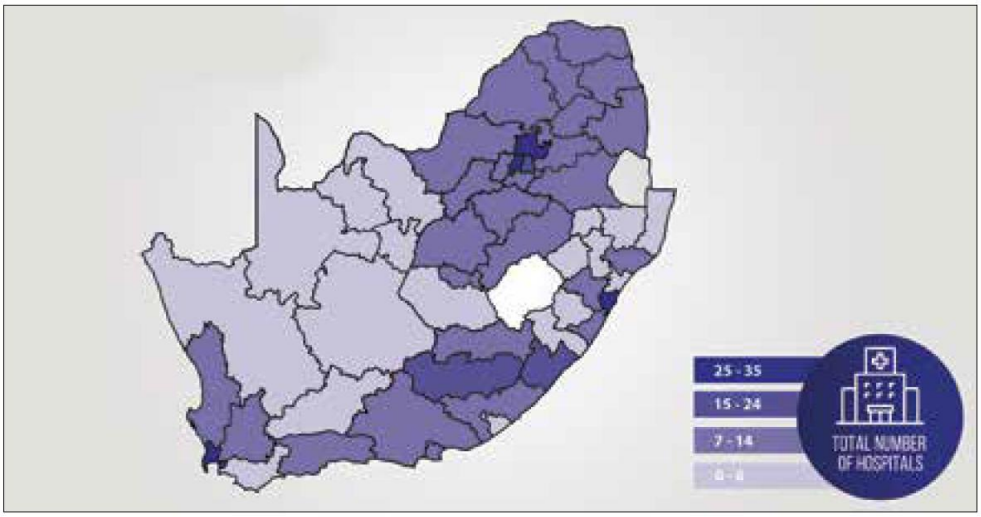


Figure 39 - Total number of hospitals [26]

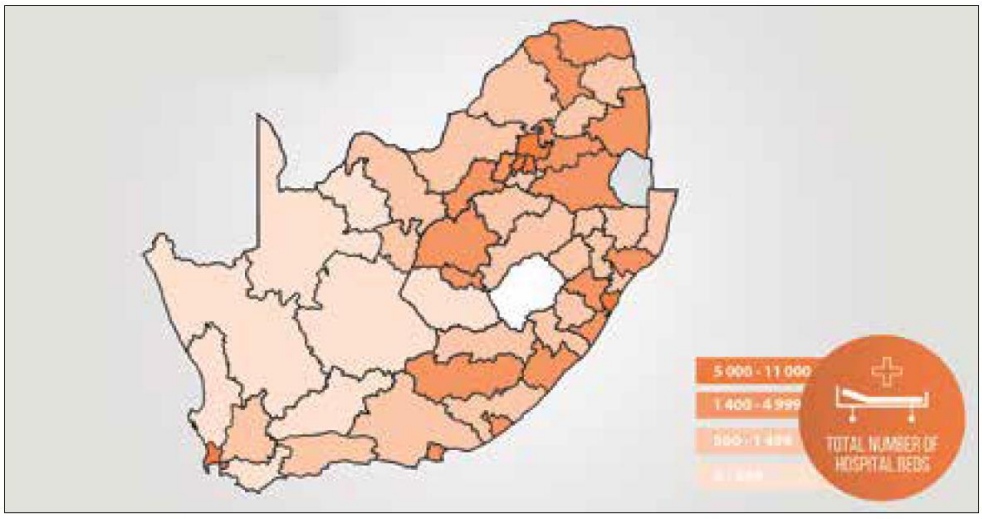


Figure 40 - Total number of hospital beds [26]

More detailed classification – from slightly older data (2012) [28] – is available from an audit of the Department of Health that estimated 4300 facilities and audited 3880, categorized below.

Facility classification	Number of facilities
Satellite Clinic	125
Clinic	3 074
Specialised Clinic	4
Maternal Obstetrics Unit (MOU)	1
Community Day Centre (CDC)	44
Community Health Centre (CHC)	238
District Hospital	253
Regional Hospital	55
Tertiary Hospital	10
National Central Hospital	6
Rehabilitation Hospital	3
Children's Hospital	1
Chronic Hospital	4
Orthopaedic Hospital	1
Psychiatric Hospital	23
TB Hospital	35
TB and Psychiatric Hospital	2
Private Hospital	1
Total	**3 880**

Health workforce and infrastructure

There is an absolute deficit of health workers in the public sector in South Africa[25]:

- 32 medical practitioners for 100 000 population.
- 144.8 professional nurses for 100 000 population.

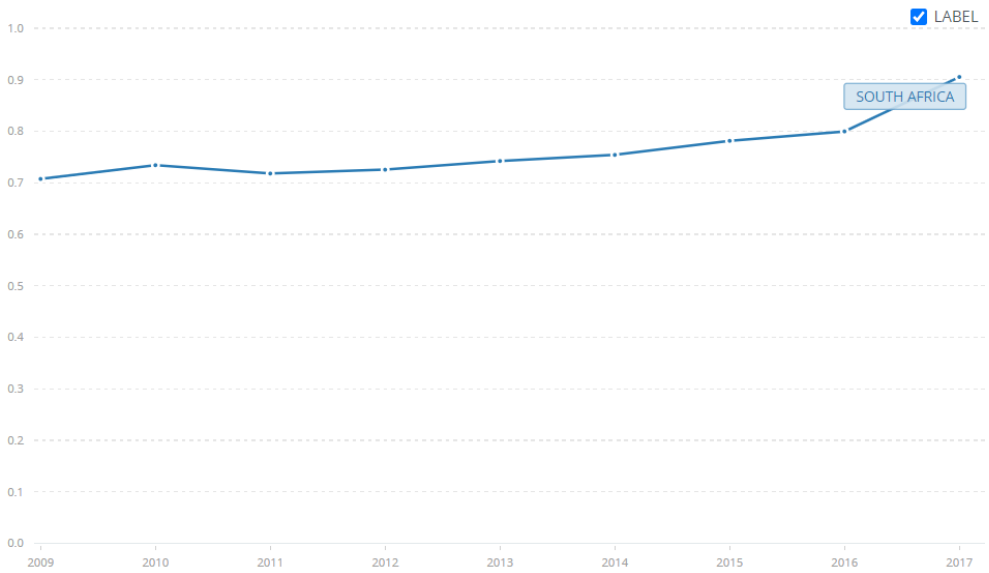


Figure 41 - Physicians per 1000 people [5]

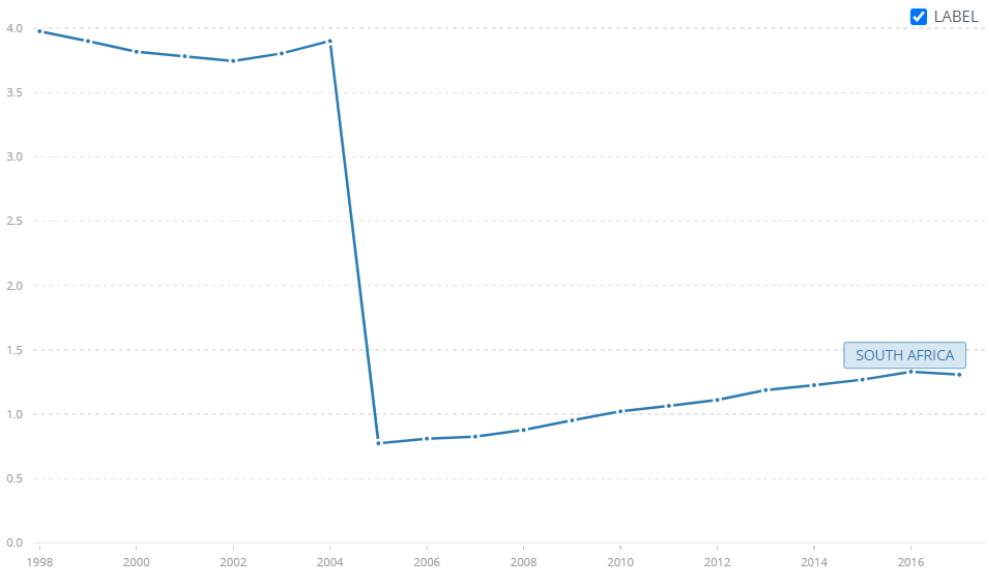


Figure 42 - Nurses and Midwives per 1000 people [5]

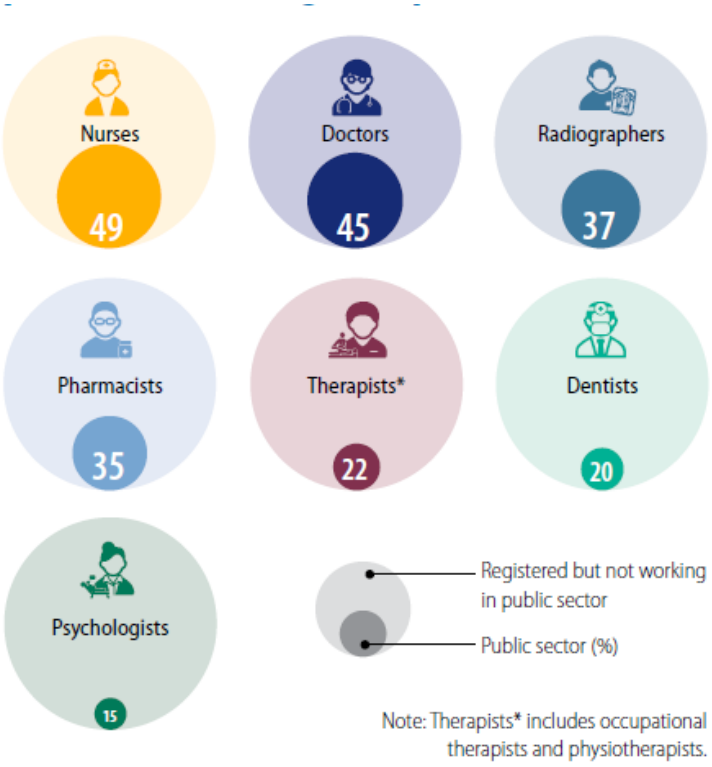


Figure 43 - Percentage of registered health professionals working in public sector [27]

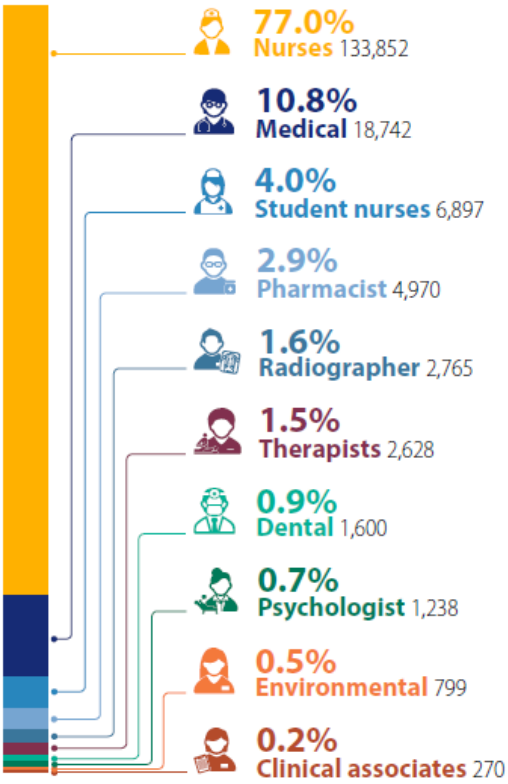


Figure 44 - Distribution of personnel in public health system [27]

Strategic plans and public entities

The South African Department of Health has released the target plans until 2024/25, based on the National Development Plan with goals to be reached by 2030 [29].

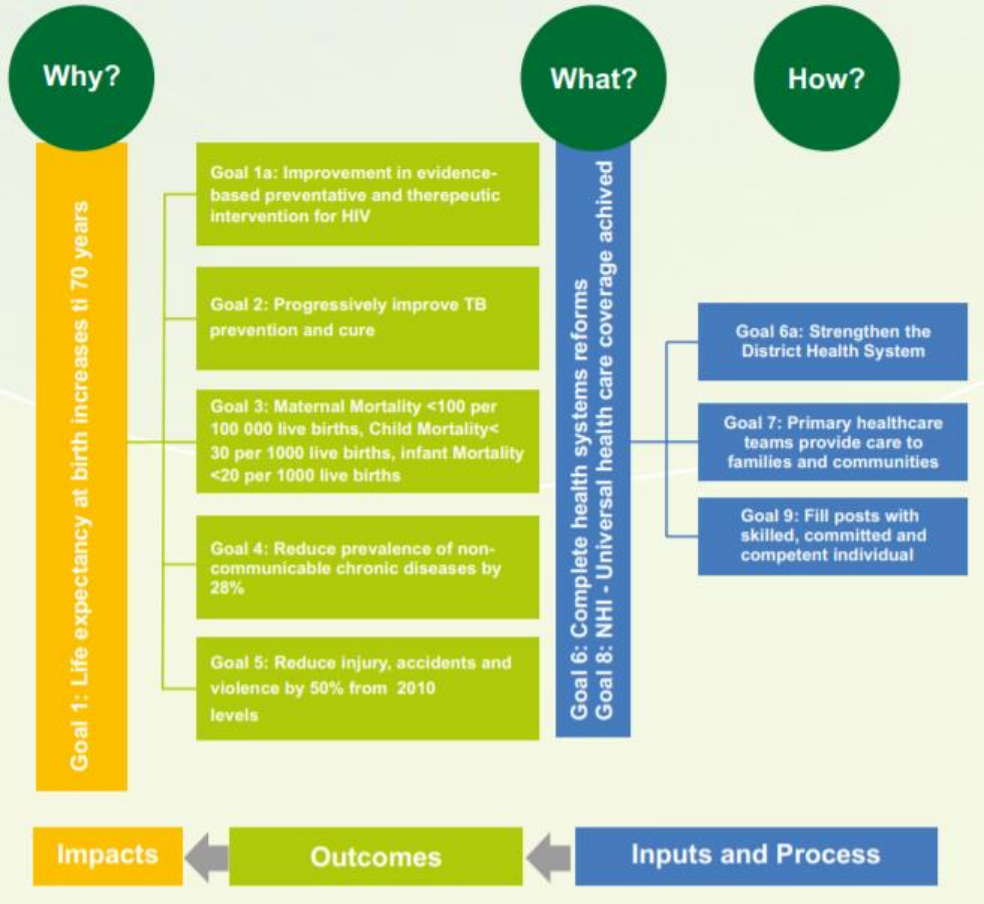


Figure 45 - National development plan 2030 goals [29]

Many public entities are involved in South African healthcare [29]:

- Council for Medical Schemes: regulatory authority for medical schemes.
- National Health Laboratory Service: cost-effective diagnostic laboratory services to all state clinics and hospitals.
- South African Medical Research Council: promotion of the improvement of health and quality of life through research, development, and technology transfers.
- Compensation Commissioner for Occupational Diseases in Mines and Works: a collection of levies from controlled mines and works, compensation of workers for occupational (cardiorespiratory) diseases, compensation for income loss during tuberculosis treatment.
- Office of Health Standards Compliance: compliance of health establishments with the norms and standards prescribed by the Minister of Health.
- South African Health Products Regulatory Authority: regulation and control of pharmaceutical components, including clinical trials.

National Radiology Profile

Radiology Workforce and Training and Professional Representation

Number and distribution

Information about the numbers does not seem to be easily available in a single consolidated document or research. The elements provided below are taken from multiple references and may not be entirely "coherent" between them.

The Health Professions Council of South Africa provides the table below [32].

REG NAME	TOTAL
Radiographer	7 309
Student Radiographer	2 328
Visiting Student Radiographer	38
Electro-Encephalographic Technician	60
Student Electro-Encephalographic Technician	143
Clinical Technologist	682
Student Clinical Technologist	516
Graduate Clinical Technologist	689
Radiation Technologist	10
Student Radiation Technologist	1
Restricted Supp Diag Radiographer	1
Supplementary Diagnostic Radiographer	100
Student Supplementary Diagnostic Radiographer	9
Supplementary Clinical Technologist	2
Total	11 888

The Radiology Society of South Africa [33] WEB site includes a search tool for "radiology practices" that lists 11 "academic institutions" and 88 "private practices", each referencing between 1 and 15 radiologists or more generic "specialists". Another reference [36] mentions 497 radiologists and 685 radiographers in 2011 (a surprising ratio considering the table above), while yet another one [43] mentions 885 radiologists and 7771 radiographers in 2015.

A thesis effort [37] – based on a limited survey – shows the following specialty distribution for South African radiologists; this is provided purely for "curiosity".

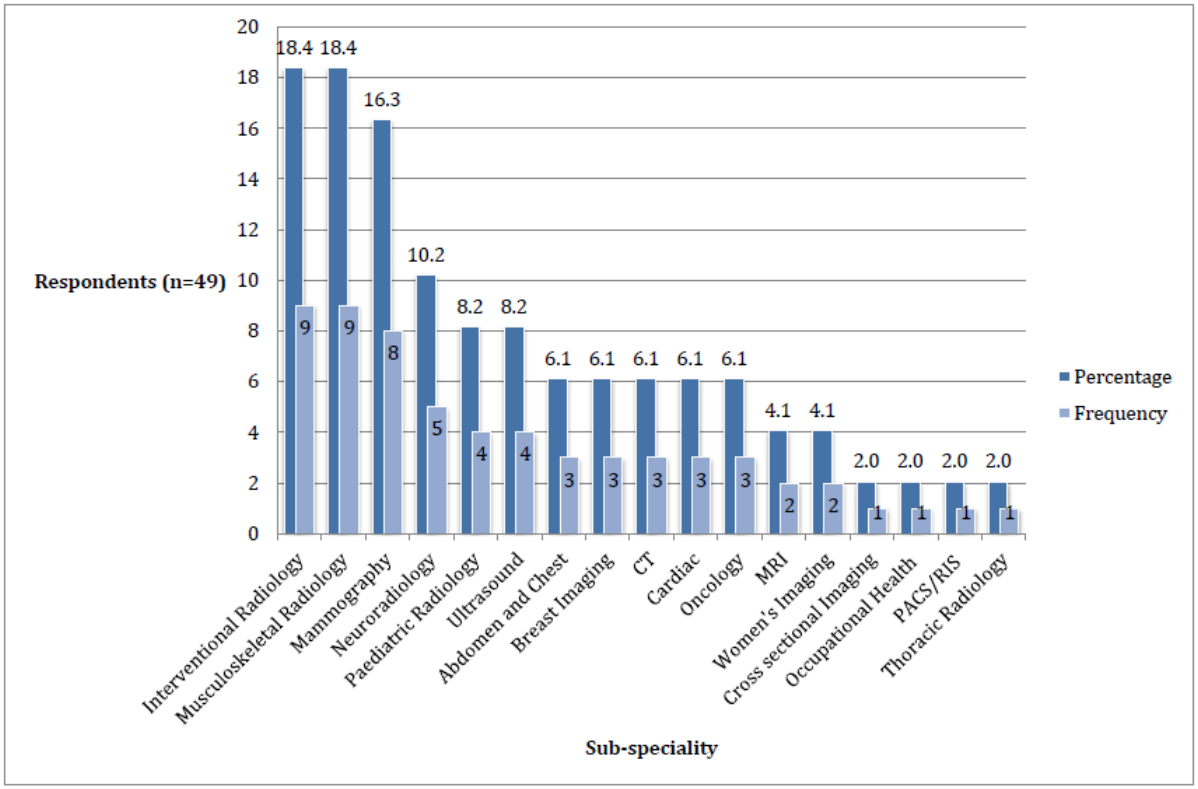


Figure 46 - Sub-specialties of survey's respondents [37]

With regards to medical physicists, specific information is reported below [38].

Medical Physicists	Total
Radiotherapy	33 + 1 x 5/8th
Nuclear Medicine	10.5
Radiology	9.5 + 1 x 5/8th
University appointed	6
Total	59 + 2 x 5/8th

Figure 47 - Distribution of medical physicists in the public sector [38]

Medical Physicists	Total
Radiotherapy	51
Nuclear Medicine	2
Radiology	6
Metrology (SSDL)	3
Regulators	3
Industry and other	8
Total	73

Figure 48 - Distribution of medical physicists in the private sector [38]

Medical training [36]

There are eight medical schools in South Africa, shown in the table below (please note that data refers to 2003).

Institution	Province	Year medical school opened	Total number of on-campus students	Annual medical enrolment (2003)		Annual medical graduates (2003)	
				Number	% of total*	Number	% of total*
University of Pretoria (HWU)	Gauteng	1943	38 500	1 241	14.5	184	14.2
University of the Witwatersrand (HWU)		1921	24 000	1 343	15.7	188	14.5
Stellenbosch University (HWU)	Western Cape	1956	21 700	1 054	12.3	177	13.7
University of Cape Town (HWU)		1900	16 000	1 044	12.2	155	12.0
Free State University(HWU)	Free State	1969	16 000	676	7.9	88	6.8
University of Kwa-Zulu Natal**	Kwa-Zulu Natal	2005	18 000	1 113	13.0	165	12.7
Walter Sisulu University***	Eastern Cape	2005	20 000	475	5.6	56	4.3
University of Limpopo****	Limpopo	2005	3 000	1 590	18.6	283	21.8
National total			157 200	8 536	100.0	1 296	100.0

Data derived from FAIMER International Directory of Medical Schools;[9] Department of Education EMIS database;[10] Breier and Wildschut, 2006.[1] HWU = Historically White university; percentage total may not add up to 100% because of the effects of rounding off; ** UKZN formed by a merger between the University of Natal, which opened a medical school in 1951, and the University of Durban-Westville; ***WSU formed by a merger between the University of the Transkei (UNITRA), which opened a medical school in 1986, and the former Border and Eastern Cape technikons; ****UL formed by a merger between the Medical University of South Africa (MEDUNSA), which opened a medical school in 1977, and the University of the North*

Figure 49 -South African medical schools [36]

All medical schools are funded by the government and were until recently following the British model, with the first three “pre-clinical” years focusing on basic science, followed by three “clinical” years as clerkships in various clinical disciplines and specialties. After graduation, students must follow a twelve-month internship. This training approach has been reformed in the last decades by implementing “Problem-Based Learning (PBL)”, “community-based education sites” and others.

Post-graduate studies are also within the range of public health care and last between four years for Internal Medicine to seven years for subspecialties such as Cardiology.

Six medical schools provide training for medical physicists, though two programs are currently suspended; in 2019, there were 23 MSc students in medical physics and 13 Ph.D. students [38].

Professional societies

The following professional societies are regularly mentioned in articles and WEB site:

- Radiological Society of South Africa [33]
- Society of Radiographers of South Africa [34]
- Health Professions Council of South Africa [32]
- South African Medical Physics Society [38]
- South African Radiation Protection Society [38]
- South African Radiobiology Society [38]

The College of Radiologists [35] is one of the 28 "Colleges of Medicine in South Africa", presented as "the custodian of the quality of medical care in South Africa" and acting as an independent examining body.

Migration of the medical workforce ("brain drain")

South Africa is no exception in the migration of health professionals from LMIC to HIC. The "migration factor" [36] was estimated to 22.5%. The main destinations are Australia, Canada, the UK, and the USA.

The main professional and personal reasons for leaving the country are reported below [37].

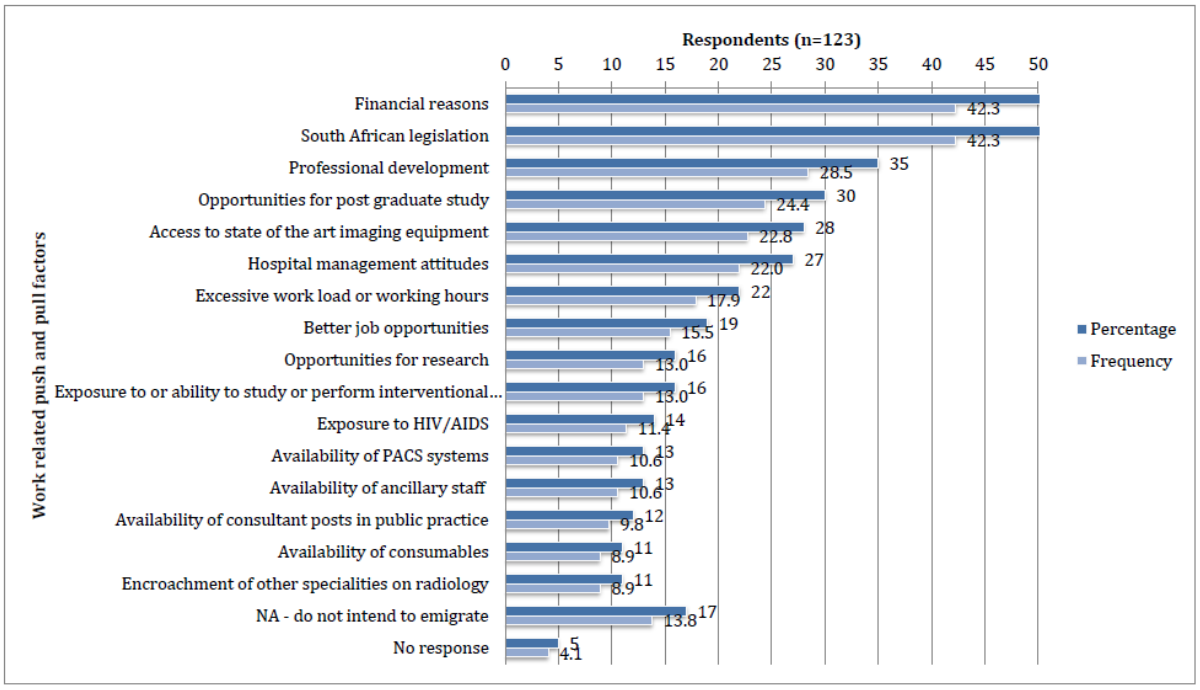


Figure 50 - Professional reasons related to migration [37]

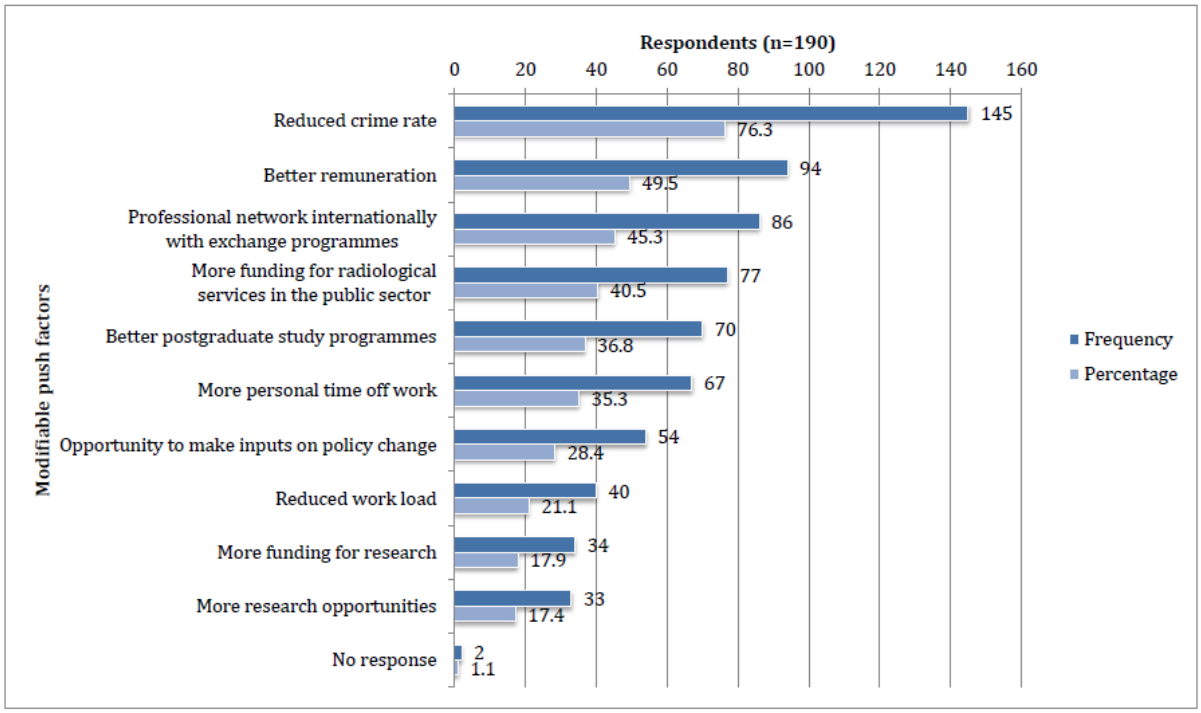


Figure 51 - Personal reasons related to migration [37]

Criminality is indeed one of the aspects of South Africa mentioned in previous sections of this document.

Equipment Inventory, Distribution, and rules and regulations

Available imaging equipment and distribution

The WHO [30] reports the following for 2013 (density per million):

- Computer tomography units: 0.97 (10.13 in France)
- Positron emission tomography: 0.06
- Gamma camera or nuclear medicine: 0.53
- Linear accelerator: 0.4 (11.93 in the USA)
- Telecobalt units: 0.17 (0.44 in the USA)
- Radiotherapy units: 0.57 (12.37 in the USA)
- Mammography units: 9.11 (from 2012).

Dedicated research on South Africa [31] reports information per province, including the distinction between private and public (see table below). The document also shows the discrepancy in distribution between provinces and between the public and the private sectors, with an average 11-fold discrepancy between the least and the best-equipped provinces for fluoroscopy, mammography, CT, and 46-fold discrepancy between the public and the private sector in MRI.

Table 1: South Africa diagnostic radiology resources by modality per million population

Province (Population)	General radiography			Fluoroscopy			Mammography			Computed tomography			Magnetic Resonance			Digital Subtraction Angiogram			Positron Emission Tomography/Computer Tomography		
	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private
Eastern Cape (6620100)	26.1	18.7	111.4	2.9	1.31	20.7	3.7	2.4	18.8	2.8	1.3	20.7	1	0.1	11.3	0.45	0.32	1.88	0	0	0
Free State (2753200)	41.8	27.5	**312.4**	6.2	1.9	**87.1**	6.1	**2.6**	**72.6**	6.5	**3.4**	**65.3**	2.5	0.3	2.5	1.08	**1.14**	0	0	0	0
Gauteng (12728400)	41.3	16.4	87.8	**13.8**	**5.2**	29.8	**9.3**	1.8	23.3	**8.8**	2.2	21.1	4.8	0.3	4.8	**1.72**	0.84	**3.36**	**0.39**	**0.24**	0.67
Kwazulu-Natal (10456900)	29.4	18.8	84.9	6.3	2.8	17.3	3.4	0.7	17.3	4.2	1.7	17.3	2	0.5	2	1.05	0.79	2.39	0.19	0.11	0.59
Limpopo (5518000)	29.2	20.0	203.0	2.2	1.1	21.7	1.2	0.3	18.1	1.1	1.1	14.4	0.7	0.1	0.7	0.36	0.38	0	0	0	0
Mpumalanga (4128000)	29.2	16.6	266.5	1.5	1.0	6.9	0.7	0.5	3.4	0.7	0.5	3.4	1.9	0	1.9	0	0	0	0	0	0
Northern Cape (1162900)	**61.1**	**43.9**	90.2	5.2	2.6	12.8	1.7	0	8.5	3.4	1.7	8.5	1.7	**0.8**	1.7	0	0	0	0	0	0
North West (3597600)	31.4	16.6	50.1	3.0	0.6	25	2.2	0.5	16.6	2.2	0.5	16.6	0.8	0	0.8	0	0	0	0	0	0
Western Cape (6016900)	39.2	24.5	116.3	9.3	3.2	41.5	7.6	1.5	39.4	7.9	2.7	35.3	**6.6**	0.5	**38.4**	0.66	0.39	2.07	0.33	0.19	**1.03**
Total (52982000)	34.8	19.8	104.0	6.6	2.5	26.8	4.96	1.29	22.3	5.0	1.7	20.7	2.9	0.3	15.14	0.84	0.51	2.63	0.16	0.08	0.59
Least: Best	2.3	2.6	6.2	9.2	8.6	12.6	1.3	N/A	21.3	12.5	6.8	19.2	9.4	N/A	54.8	N/A	N/A	N/A	N/A	N/A	N/A
Private: Public	5.3			10.7			17.3			12.1			45.8			5.15			7.37		

South Africa's Country Profile: Population 52 982 000 with General Radiography 34.8, Fluoroscopy 6.6, Mammography 4.9, Computer Tomography 5, Magnetic Resonance Imaging 2.9, Digital Subtraction Angiography 0.8 and Positron Emission Tomography 0.2 units per million population. Only three provinces (Gauteng, Western Cape and Kwazulu-Natal) have the full spectrum of diagnostic imaging modalities in both the public and private sectors. Overall, Gauteng has the best provincial resources and Mpumalanga the least

Figure 52 - Diagnostic radiology resources by modality per million population [31]

Additional information is available for equipment related to radiotherapy [38], though the table below is supposed to be an *under*-estimation of the real situation on the field.

Equipment	Total
Linear Accelerator	32 (17 Elekta, 11 Varian, 4 Siemens)
Co-60 EBRT	2
HDR Brachytherapy	12
LDR Brachytherapy (eye, prostate)	1
CT in Radiotherapy	13
MR in Radiotherapy	1
SPECT/CT	16
SPECT	10
PET/CT	5
Dose calibrators	Between 1 and 7 per site
General X-Ray*	116
MRI*	14
CT*	27
Mammography*	13
Lodox*	13
Interventional*	27

*not all sites supplied data, number represents a lower limit

Figure 53 - Medical imaging at public institutions employing medical physicists [38]

Local manufacturers

The South African production of medical elements relies on small to medium companies and focuses mainly on bandages and dressings, medical furniture, and low technology items [39], though CapeRay does produce radiology devices for mammography.

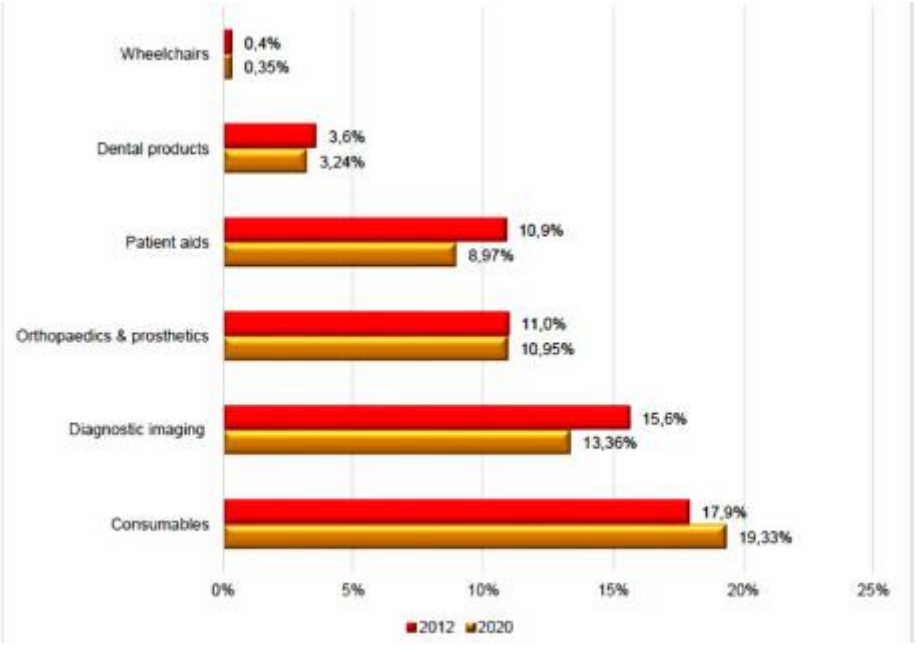


Figure 54 - South African medical devices market share [40]

Major multinationals – such as Philips, GE Healthcare, Siemens, Varian, etc. – have at least a sales, distribution, or service center in South Africa but typically no manufacturing sites (the exception being Fresenius.)

Export targets mainly the African continent (Zimbabwe, Zambia, and Kenya) and import comes mainly from the USA, Germany, and China.

Regulatory bodies

Based on the information provided by the World Bank [40], South Africa does have a legal framework related to medical devices, in-vitro diagnostic medical devices and electromedical devices. There is a dedicated National Regulatory Authority: the South African Health Product Regulatory Authority (SAHPRA).

South Africa provides a medical device classification (class A for low risk, B for low-moderate risk, C for moderate-high risk or D for high risk) and essential principles, as well as a conformity assessment of Notified Bodies, and registration and listing of manufacturers. The country also enforces post-market controls on QMS, adverse event reporting, advertising, and labeling.

Most of the above are described in the General Regulations document from the South African Department of Health as well as in a few guidelines' documents.

Please note that the Medicines and Related Substances Amendment Act 14 of 2015 has brought significant changes to the regulation of medical devices [41]:

- It defines medical devices broadly.
- It stipulates new licensing requirements, formally forbidding the import of devices that have not been registered with SAHPRA or another recognized registration body (CE and FDA included).
- It clarifies licensing application processes for manufacturers and distributors, stating that only registered devices can be sold in South Africa.

Please note that research [41] seems to indicate that, despite the clear positive impact of new regulations, the new SAHPRA entity may face delays in processing requests and possible skillsets issues as its mandate has been extended compared to the previous Medicines Control Council.

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