



Egypt

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January 2024

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Table of Contents

General Country Profile	3
<i>Geography and Population</i>	3
<i>History and Politics</i>	4
<i>Government and Legal System</i>	5
<i>Economy and Employment</i>	6
<i>Physical and Technological Infrastructure</i>	6
National Health Care Profile	8
<i>National Health Care Structure</i>	10
National Radiology Profile	12
Conclusion	15
References.....	16

General Country Profile

Geography and Population

Egypt, officially the Arab Republic of Egypt, is a large desert nation that bridges North Africa and the Middle East. Occupying 386,662 square miles (1,001,450 km²), it is bordered by Libya to the west and the Gaza Strip and Israel to the east.¹ With the Mediterranean Sea to the north and the Red Sea to the east, it has just over 1500 miles (2450 km) of coastline. Between mainland Egypt and its eastern border sits the Sinai Peninsula which contains the country's highpoint, Mount Catherine, at 8,625 ft (2629 m). Defined by broad swathes of desert and a hot, arid climate, Egypt is split by the world's longest river, the Nile. The Nile stretches 4,100 miles (6600 km) from Lake Victoria in Uganda to its outflow into the Mediterranean at the Egyptian city of Alexandria.³

From ancient times, Egyptian life has centered on the Nile and 95% of the country's inhabitants live in population centers within 13 miles of its banks.¹ The Egyptian population is growing steadily at a rate of approximately 1.59% and as of 2023 its total population is estimated to be nearly 110 million, making it the world's 15th most populous nation and the most populous in the Arab world. 43% of this population lives in urban settings including the capital, Cairo, which is home to 22 million people. Egypt has an expansive population pyramid with a median age of 24 years and a life expectancy of 74 years. The overall literacy rate is 73% with Egyptians attending 14 years of school on average. Ranking 136th worldwide, GDP per capita is \$11,600.¹

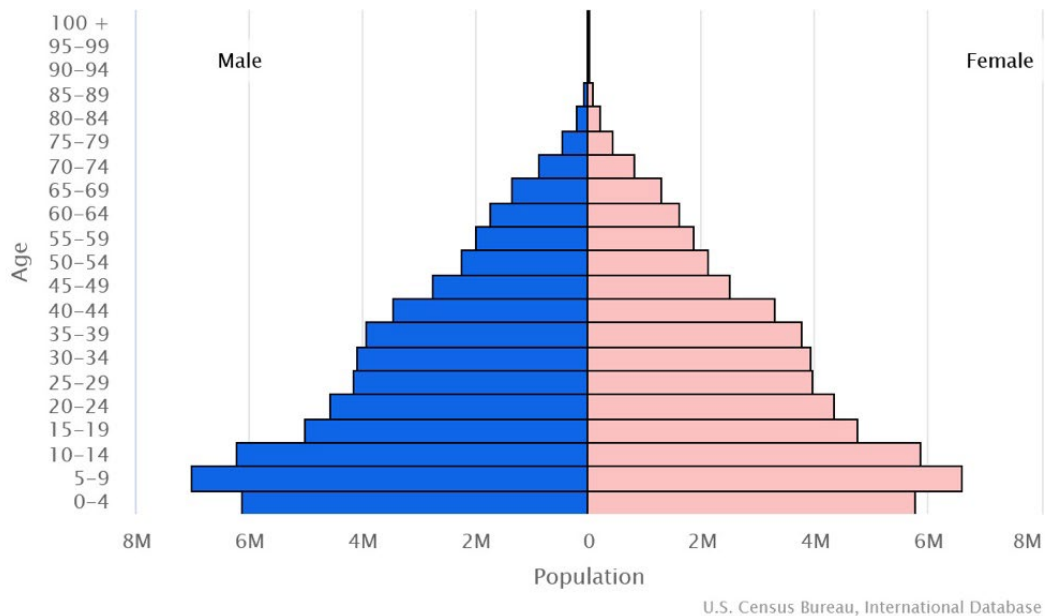


Figure 1: Egypt Population Pyramid¹

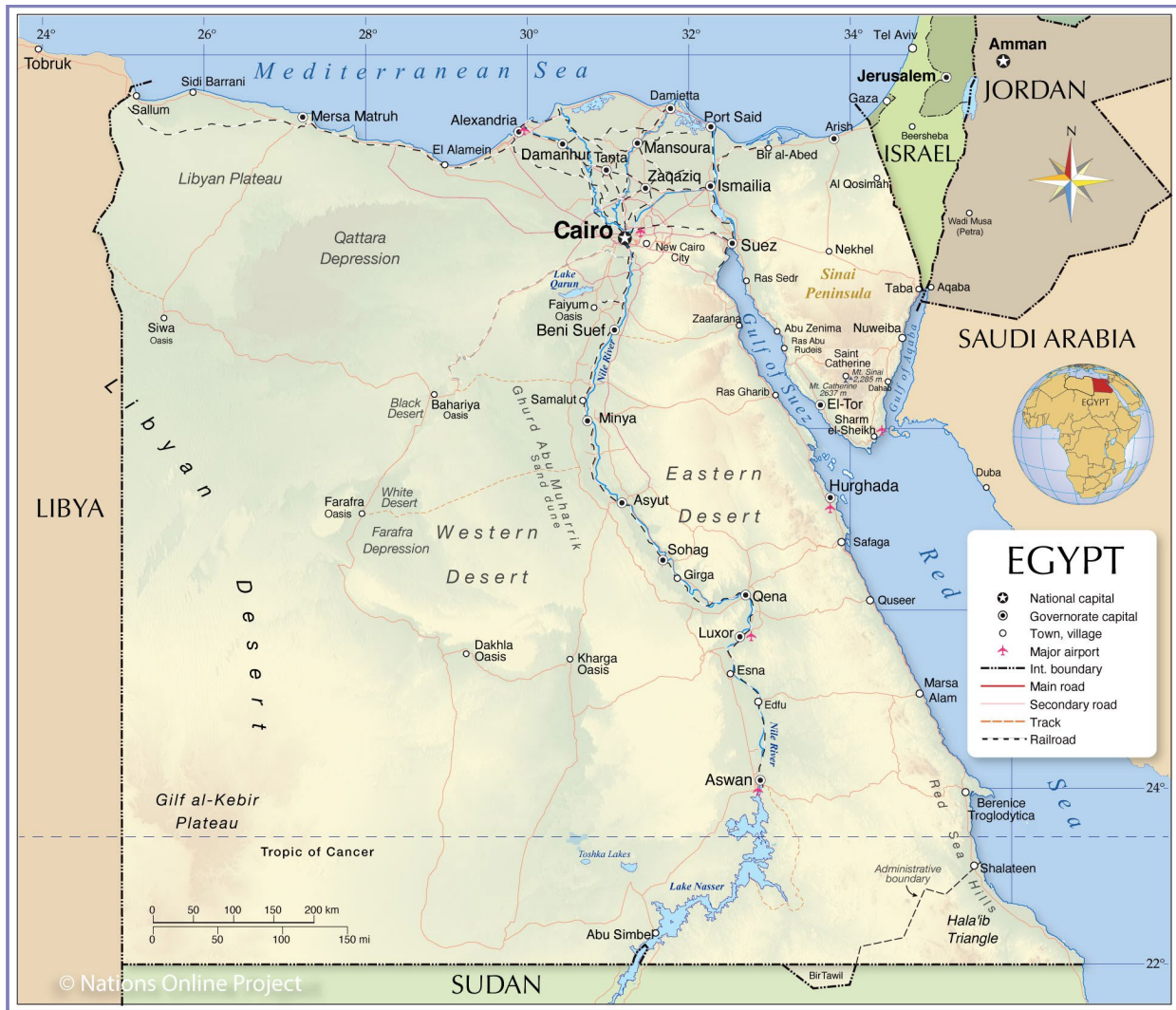


Figure 2: Map of Egypt⁴

History and Politics

Referred to by Egyptians as “Um al-Dunya,” translated from the Arabic as “Mother of the World,” Egypt is blessed with a rich historical and cultural inheritance. The Nile river valley was home to one of the ancient world’s greatest civilizations, with various native Egyptian dynasties, among them the famed Pharaohs, governing Egypt during the period stretching from circa 3200 BC to 341 BC.⁵ Ancient Egyptian civilization is defined by its iconic legacy, from great monuments such as the Great Pyramid of Giza and the Sphinx to the development of hieroglyphics and advances in construction, irrigation, and mathematics. Following the fall of the last Pharaonic dynasty, Egypt was governed by a series of conquerors including the Persians, Greeks, Romans, and Byzantines.¹ Islam and the Arabic language were introduced to Egypt by invading Arab armies in the 7th century which preceded 6 centuries of Arab rule. A legacy of this history, Arabic is the country’s official language and 90% of Egyptians are Muslim (majority

Sunni), with the remaining 10% of citizens identifying as Christians (majority from the Coptic sect).¹ The Egyptian dialect of Arabic is unique and distinctive, but well understood across the region as a result of Egypt's significant cultural influence in the Arab world, particularly in television and film.⁶ English is the most common foreign language spoken by Egyptians, followed by French. Egypt has also historically wielded great religious influence in the world of Islamic education. It is home to the historic al-Azhar mosque, founded in 970 AD, and its associated al-Azhar University, which has long been considered a pillar of Sunni Islamic jurisprudence.⁷

Egypt fell under Ottoman Turkish control in the early 16th century until the British colonial takeover of the Egyptian government in 1882, largely to protect its economic interests through control of the Suez Canal.¹ Egypt reclaimed full sovereignty from the British in the 1952 Egyptian Revolution, led by the iconic Egyptian leader Gamal Abdel Nasser who revolutionized Egypt through his policies centered on anti-imperialism, Arab unification, and modernization. Egypt's third president, Anwar Sadat, was a leader whose tenure was defined by the Egypt-Israel peace treaty prior to his assassination in 1981.⁸ This was followed by the government of Hosni Mubarak, an Egyptian military officer and politician who ruled the country for 30 years. Mubarak's tenure ended in dramatic fashion during the Arab Spring when he stepped down from power after weeks of massive popular demonstrations centered in Tahrir Square in February of 2011.⁸ This was followed by a period of tumult, including the rule of Muslim Brotherhood politician Mohamed Morsi who won a contentious election before being deposed in a military coup in July 2013.

Government and Legal System

The Arab republic of Egypt is a presidential republic with executive, legislative, and judicial branches. The current head of state, President Abdel Fattah al-Sisi, is a former Egyptian military general who seized power in a 2013 coup. Though a republic in name with its most recent election in 2018, Egypt under President al-Sisi is widely recognized to be closer to an authoritarian state, with a rating of "not free" in the 2023 Freedom House global survey.⁹ Freedom House's report details highly circumscribed political rights and civil liberties, with an absence of meaningful political opposition. There are also tight restrictions on freedom of assembly and the press.

Egypt under al-Sisi has been defined by economic challenges and anemic government service delivery. Further threats to stability exist in the form of a counter-insurgency campaign against an Islamic State affiliate branch in the Sinai Peninsula and concerns over water scarcity in the context of a dispute with Ethiopia over an Ethiopian dam on the Nile River.¹⁰ Freedom House's report notes limited rule of law in Egypt, with minimal judicial independence, few due process protections in criminal cases, and expansive law enforcement powers.⁹ Corruption is also a

significant concern, with pervasive corruption across government and a Transparency International Corruption Perceptions ranking of 130/180 globally.¹¹ Despite these challenges, the Egyptian people, particularly younger Egyptians, include progressive and activist elements pushing for greater freedoms and more democratic governance.

Economy and Employment

Egypt has the 2nd largest economy in Africa with a GDP of \$402.8 billion in 2022.¹² Per the World Bank, it is classified as a lower middle-income country.¹³ Its major industries include oil and gas production, textiles, agriculture, construction materials, and tourism. Its foremost export partner is the United States and primary exported products are refined petroleum products, natural gas, and gold.¹ The unemployment rate was 9.3% in 2021 with a high youth unemployment rate of nearly 25% and the youth female employment rate sitting at 60%. Approximately a third of the Egyptian population lives below the poverty line. Heavily reliant on foreign aid, Egypt has a historic strategic aid relationship with the United States, which has provided it with over \$50 billion in military aid and \$30 billion in economic assistance since 1978.¹⁴ More recently, Gulf nations have provided tens of billions in economic aid with some estimates reaching as high as \$92 billion since 2011.¹⁵ Egypt has also sought relief with substantial loans from the International Monetary Fund. The Egyptian economy was heavily impacted by COVID-19 given the reduction in tourist visitation. High global food and fuel prices have also weighed on the economy.¹²

Physical and Technological Infrastructure

Egypt has invested heavily in the electricity grid over the past several decades with national electrification near 100%.^{1,12} Reforms since 2014 have made electricity more reliable in both urban and rural areas. The majority of its electricity is generated with fossil fuels, with hydroelectricity contributing as well. In recent years, Egypt has invested in wind and solar energy capacity which will further bolster its status as a regional energy hub.¹² Regarding telecommunications, Egypt has a robust telecom market which supports over 100 million mobile cellular subscribers with among the highest subscription rates in North Africa. The government has invested in increasing internet speeds, with a goal of fiber broadband installation serving 66% of the population. Currently, 72% of Egyptians have access to the internet.¹

There are 83 airports across Egypt, 72 with paved runways and 7 total heliports. There is an aging yet extensive railway system with over 3500 miles (5600 km) of track, ranking 38th globally.¹ Major Egyptian waterways such as the Nile and the Suez Canal contribute to the merchant transport capacity. In addition, its coastline provides 9 major ports. Egypt has a large road network, 80% of which is paved.¹⁶ Though extensive, Egyptian roads are often poorly maintained, and infrastructure is generally outdated. Cairo is infamous for its chaotic traffic.

Efforts to privatize infrastructure firms are planned to improve investment in the sector. Egypt's primary water supply is the Nile River. An estimated 97% of the population has access to safely managed drinking water. Sanitation efforts are ongoing, with an increase in percentage of treated wastewater rising from 50% in 2015 to 68% in 2019. Many rural areas still lack appropriate sewage infrastructure, but efforts are underway to expand access through the construction of new wastewater treatment facilities in rural Upper Egypt.¹⁷ Though water supply is currently stable, it is heavily dependent on continued flow levels of the Nile River, which is threatened by upstream factors like the aforementioned construction of the Ethiopian Renaissance Dam.

National Health Care Profile

Egypt's healthcare profile is a study in contrasts. On the one hand, the last several decades have seen steady improvement in aggregate markers of population health, including a marked reduction in communicable disease. On the other hand, the fall in communicable disease has been mirrored by increased mortality from non-communicable conditions such as heart disease and diabetes.¹⁸ Furthermore, Egyptian healthcare has been chronically underfunded and there are striking disparities between public and private healthcare facilities. As such, the profile of healthcare in Egypt reflects health trends globally, wherein the threat of infectious disease has been supplanted by lifestyle-related conditions, and marked inequities persist for vulnerable populations.¹⁹

Key markers of population health, including life expectancy, infant mortality rate, and maternal mortality ratio have improved steadily in recent decades, especially since 1990 (see Table 1). The most recent data suggests an overall rate of mortality of 4.32 deaths/1000 population, an infant mortality rate of 17.27 deaths/1000 population, and a maternal mortality rate of 17 deaths/100,000 live births. Egypt ranks 137th globally in terms of overall life expectancy.¹

Indicators	1990	1995	2000	2005	2010	2013	2023
Life Expectancy at Birth (years)	65.3	66.9	67.1	70.1	73	73.19	74.72
Infant Mortality Rate (per 1000)	63	66	24.5	20.5	--	23.3	17.72
Maternal Mortality Rate (per 100,000 live births)	174	96	84	63	66	--	17

Table 1- Overall Health Trends¹⁸

The current greatest threats to health in Egypt are noncommunicable diseases (NCDs). NCDs including cardiovascular disease, diabetes, cancer, and chronic respiratory diseases account for approximately 85% of all deaths in Egypt and about two-thirds of premature deaths.²⁰ Among these, cardiovascular disease is the greatest threat, stemming from an increase in metabolic and behavioral risk factors including increasing rates of obesity, hypertension, diabetes, and insufficient physical activity. Tobacco smoking remains a challenge with nearly a quarter of the population using tobacco products including cigarettes and water pipes.²¹ The Egyptian Ministry of Health (MOH), in collaboration with the World Health Organization (WHO), has established several initiatives to address NCDs including the creation of a noncommunicable disease unit in

the MOH, establishment of a national cancer committee, and improved tracking of NCD indicators.²¹

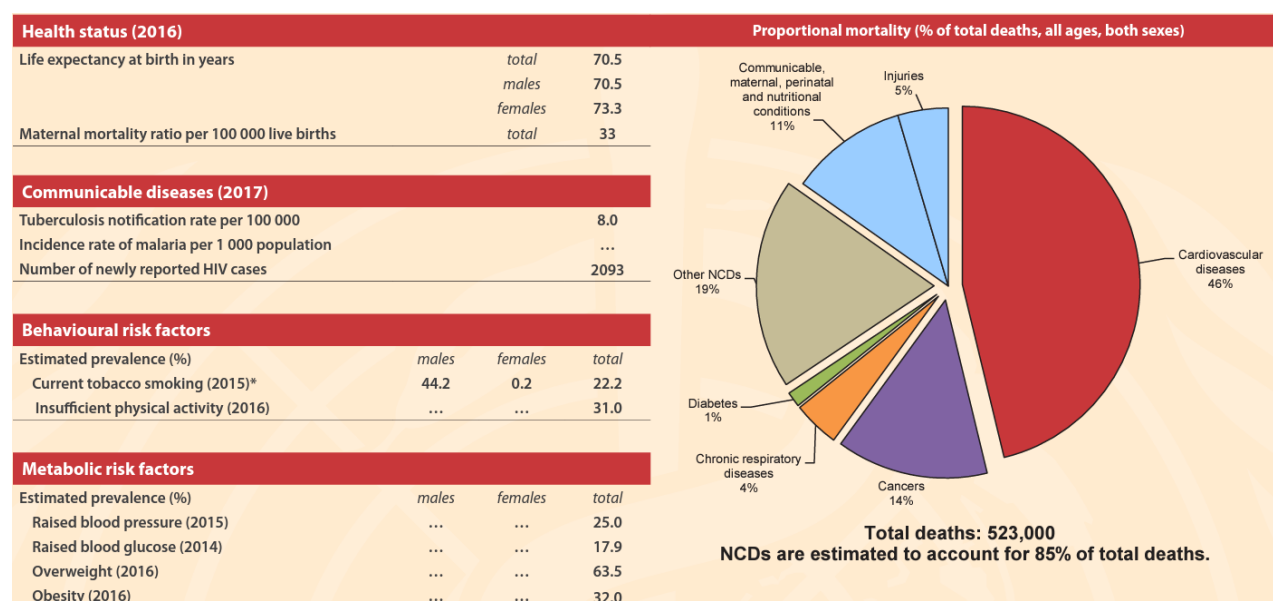


Figure 3-Egypt Health Status Overview²²

In the first half of the 20th century, communicable diseases were the primary cause of early death for Egyptians, particularly from schistosomiasis. The effort to treat the disease led to the development of rural clinics and hospitals and drove advances in domestic Egyptian medical capacity, accelerating under the rule of Nasser in the 1950s.²³ Rates of schistosomiasis dropped substantially after the development of widely available oral treatments in the 1980s and have continued to decline with the government's national schistosomiasis control plan which includes treatment of infected school-age children with antihelminthics.²¹ Rates of Malaria and HIV are low in Egypt. Tuberculosis has been brought under better control with Egypt meeting its 2015 TB Millenium Development Goal targets. Hepatitis C rates are high with a national prevalence of 7% among 15-59 year-olds (2014), with the first direct acting antivirals becoming locally available in 2014.²¹ Immunization coverage among children has increased in recent decades with coverage around 97% for BCG, DTP3, Polio, and Hepatitis B. The WHO certified Egypt as polio-free in 2006.

Maternal and infant mortality have declined markedly in recent decades, as illustrated in Table 1. Approximately 90% of women receive at least one antenatal care visit. In addition, access to contraception and family planning tools has increased substantially since the 1980s.²¹ However, obstetric conditions in public hospitals remain substandard, particularly in rural areas like Upper Egypt. Primary causes of maternal mortality are hemorrhage, infection, high blood pressure, and obstructed labor.²¹ Reflecting broader struggles with health equity, infants born to mothers in the lowest-income group are twice as likely to die in the first month of life as high-income group

infants and nutritional deficiencies are far more common in rural areas.¹⁹ The WHO, UNICEF, and UNFPA have partnered with the Egyptian MOH on a maternal and child health initiative to target improved care delivery in rural areas.²¹

National Health Care Structure

Established medical practice has deep roots in Egypt, with the groundwork of healthcare infrastructure originating as a state-building project under Ottoman leadership in the latter half of the 19th century.²³ Development of medical schools, academic hospitals, and tertiary care centers accelerated in the 20th century, particularly under the rule of Nasser during the drive to modernize Egypt.

Today, Egypt has a complex healthcare system with a combination of public and private care available. The health sector is regulated by the Egyptian Ministry of Health and Population (MHOP), which is responsible for preventive and curative care services nationwide and is the single largest care-provider with 5,000 personnel and 4,500 health facilities across all governorates.¹⁸ Public insurance is provided by an independent governmental organization, the Health Insurance Organization, which provides coverage to government employees, some public and private sector employees, pensioners, and widows, covering an estimated 60% of the population.²⁴ Despite providing free and low-cost care to a wide swathe of the population, public healthcare in Egypt is plagued by underfunding, low quality care, lack of modern equipment, and personnel shortages.²⁴ These factors drive a substantial number of citizens to seek care in private facilities.

The low quality of public healthcare facilities has driven increased utilization of private healthcare with estimates that more than half of Egyptians seek private care.²⁵ This trend contributes to the fact that an estimated 60% of total health spending in Egypt is from out-of-pocket costs. Private insurance is available but generally limited to higher-income individuals. Private facilities tend to offer higher quality care, better equipment and better provider ratios, though regulation is sparse so care delivery can be uneven.¹⁸

Government expenditures on healthcare in Egypt are low with only 1.5% of GDP directed towards public healthcare and 4.75% of GDP allotted to all health services.²⁴ Financing is derived from direct tax revenues, household out of pocket costs, HIO premiums, private insurance premiums, and employer health spending. Per capita health expenditure as of 2017 was a mere \$131 annually.²⁶

Regarding health workforce and infrastructure, the MHOP oversees 80,000 plus public hospital beds.²⁷ Including private sector facilities, there are an estimated 14.3 hospital beds per 10,000 population and 95% of Egyptians live within 3 miles (5 km) of a healthcare facility.^{18,22} As of

2016, the provider density of physicians, nurses/midwives, dentists and pharmacists was 8.5, 14.5, 1.9, and 4.1 per 10,000 population respectively. Given the continued population growth, this provider density is on the lower end compared to regional peers as illustrated in Figure 4 below.

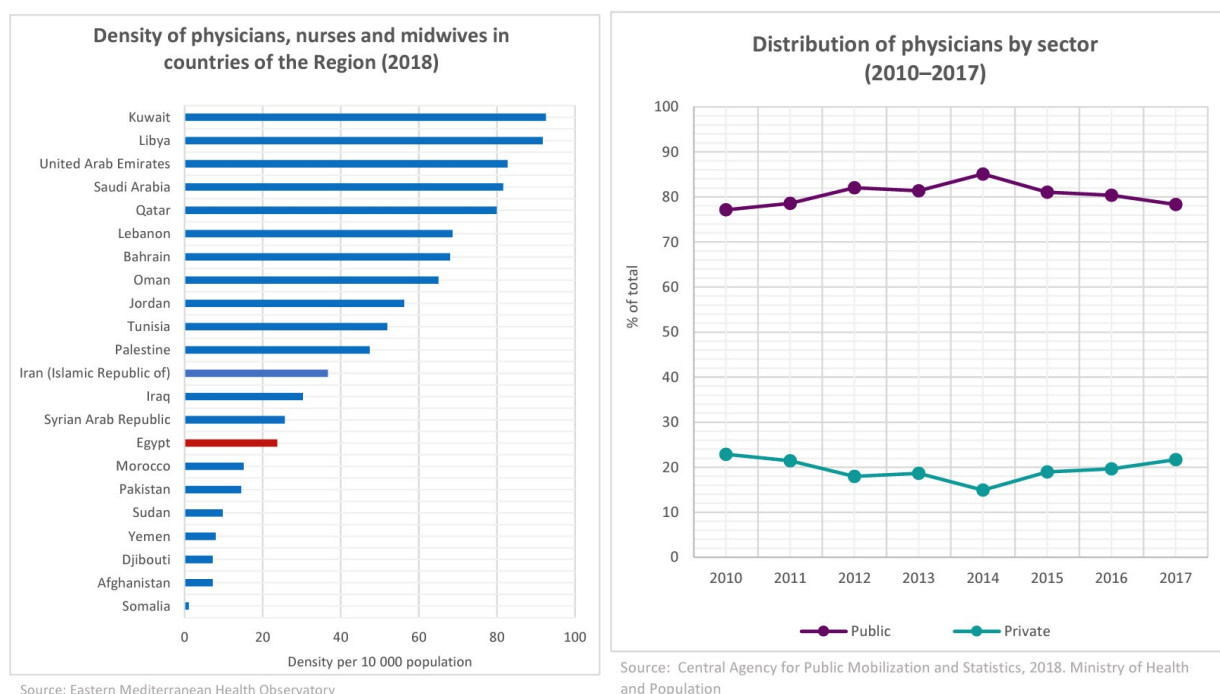


Figure 4: Provider Density and Public/Private Physician Distribution²⁶

In sum, while broad spectrum care is available in Egypt, public facilities are lacking, government spending is low, and the need to access private care at elevated rates leads to high out of pocket costs for Egyptian citizens. Substandard healthcare was among the drivers of discontent that contributed to the uprising during the 2011 Arab Spring. Fortunately, there are numerous healthcare reform efforts ongoing in Egypt that seek to ameliorate these shortfalls. Chief among them is the Social Health Insurance Law, ratified in 2018, which seeks to transition Egypt to full universal health coverage by 2032. The law plans to expand coverage to the estimated 42 million Egyptians who currently lack insurance.²⁸ While this program is in its early stages, successful implementation will be essential for expanding care to address the rise in non-communicable diseases.

National Radiology Profile

Egypt has one of the strongest cohorts of radiologists in the Middle East and North Africa. Its national radiology society, the Egyptian Society of Radiology and Nuclear Medicine (ESRNM) was founded in the early 1960s and is one of the oldest and largest radiology professional organizations in the Middle East and North Africa region.²⁹ The number of active radiologists practicing in Egypt is estimated to be 5150, including 3600 who are ESRNM members. There are 567 radiology departments nationally and 258 specialized radiology centers.³⁰ Private imaging centers in large urban areas such as Cairo and Alexandria offer a wide variety of imaging services including CT, MRI, and PET scans, while rural areas are served predominantly by public facilities.³¹

Large Egyptian teaching hospitals have modern radiology practices with research faculty, residency programs, and subspecialty departments. For example, the radiology department of Kasr al-Ainy hospital, affiliated with Egypt's oldest medical school, Cairo University, houses subspecialty departments in MSK, neuro, pediatrics, GI, cardiothoracic, urological, women's imaging, and interventional radiology divisions.³² Formal radiology training in Egypt consists of 5 years of medical school and 4 years of radiology residency (including internship). There are currently between 6-10 radiology training programs in Egypt.³³ There is limited availability of information on fellowship training in Egypt, and subspecialty training often consists of clinical apprenticeships. For example, there is a nascent formal pathway for Interventional Radiology certification consisting of institution-based clinical apprenticeships followed by exam-based certification by the Egyptian Board of Interventional Radiology.³⁴

The broader radiology workforce in Egypt is also well-established compared with regional peers. There are 12 medical physics PhD programs and an estimated 374 medical physicists working nationally with the majority working in radiation therapy fields and the remainder specializing in nuclear medicine and general imaging.³⁵ Surveys by the Egyptian Association for Medical Physics indicate that the number of medical physicists has doubled in the last decade. Egypt likewise has a robust radiation oncology workforce, with radiation oncologists trained both through clinical oncology programs in addition to two specific programs for radiation oncology. Radiation therapy is available to most Egyptians through government, NGO, and private hospitals and Egypt houses a third of the African continent's megavoltage (MV) radiation machines.³⁶

Radiology infrastructure in Egypt is relatively modern and many imaging modalities are available in both public and private hospitals. Currently, most, if not all, imaging devices are imported and are regulated under the policies of the Medical Device Safety Department as part of the Ministry of Health and Population.^{37,38} According to a 2019 estimate, Egypt has 4000 ultrasound units, 3852 x-ray machines, 725 CT scanners, 230 MRI machines, 185 mammography

units, 105 IR angiography suites, 52 PET/CT machines, and 15 SPECT/CT machines.^{30,35} Plain films, US, and CT are the most commonly utilized modalities, with a representative distribution of studies from Kasr al-Ainy Hospital, a premier teaching institution in Cairo, detailed in Table 2 below.

Imaging procedures	Number of studies
Plain X-ray and radiographic techniques	170,000
Ultrasonography	10,000
Doppler	5,000
Angiography and interventional radiology	1,400
Computed tomography	22,000
Magnetic resonance imaging	10,000

Table 2: Average radiological studies performed at Kasr al-Ainy hospital annually³²

According to an interview with a former president of ESRNM, bolstering domestic radiology research capacity is a key goal for academic radiology programs in Egypt.³⁰ The Egyptian government supports the *Egyptian Journal of Radiology and Nuclear Medicine* which publishes domestic and international radiology research. Perhaps one of the most unique radiology research niches is that of paleoradiology, which mixes imaging technology and ancient Egyptian history. Dr. Sahar Saleem, a neuroradiologist in Cairo, is a specialist in CT mummy imaging, a practice which stretches back nearly 40 years and is an invaluable tool for archaeological analysis.³⁰ Overall, the practice of radiology in Egypt is well-established, with significant room for future expansion in advanced and subspecialty training.



Figure 5: Mummy CT Imaging^{39,40}

Conclusion

The story of Egyptian healthcare is one of steady progress despite the political and economic turmoil that has roiled the country over the last decade. Notable advances have been made in controlling communicable disease, improving maternal and infant mortality, and moving towards universal health coverage. This progress will be foundational in addressing the shift in the burden of disease from communicable to non-communicable diseases. Cardiovascular pathology and cancer require a robust array of treatment modalities, many requiring surgical and procedural interventions for which appropriate medical imaging capacity is fundamental. Fortunately, as outlined above, Egypt has a strong foundation of radiology expertise and infrastructure from which to expand to meet the increasing demand. However, certain aspects of the radiology establishment in Egypt, in particular subspecialty, interventional, and research training, remain nascent. As such, they represent an excellent opportunity for global collaboration between Egyptian radiologists and international peers, including through organizations like RAD-AID International, to work towards building robust pipelines for advanced radiology training in Egypt. As a central bridge between the African continent and the Middle East, Egypt has the potential to serve as a regional hub for further investment in imaging technology and as a site for trainees across the MENA region to advance their skills. With continued development, it can represent a model for building radiology capacity in a region where introducing imaging technologies will be central to addressing emerging global health challenges.

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