Kenya

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Fig 1: Flag of Kenya

Source: CIA, 2018

Fig 2: Map of Kenya

Source: CIA, 2018

General Country Profile

1.1.Geography and Population

Kenya is located in east Africa and bordered by the Indian Ocean along the southeast coastline and five other countries; Tanzania, Uganda, South Sudan, Ethiopia, and Somalia. It spans a total area of over 580, 367 sq. km comprising both land (569, 140 sq. km) and water (11, 227 sq. km). The land boundaries and coastline covers a total of 3, 457 km and 536 km respectively (CIA, 2018; World Bank, 2018a).

The climate across the region varies from being hot and humid at the coast, temperate inland and arid or semi-arid with minimal rainfall in the northeast. The terrain comprises central and western highlands, which is divided by the Great Rift Valley and a fertile plateau in the west. The lowest and the highest point of elevation are the Indian Ocean and Mount Kenya respectively. Mount Kenya is the highest mountain in Kenya and Africa's second highest peak after Kilimanjaro. Kenya's highlands breed one of the most successful agricultural production regions in Africa. Additionally, its unique physical pattern harbors abundant and different kinds of wildlife of scientific and economic importance. The two major bodies of water are Lake Turkana and Victoria Lake. While Lake Turkana is located at the northwestern region and having its small portion within the Ethiopian territory, Victoria Lake, the world's largest tropical lake and second largest fresh lake water, is situated at the western part of the country and shares some of its borders with two other countries Uganda and Tanzania (CIA, 2018).

The population of Kenya is estimated to be over 51,393,010 and is ranked twenty-seven in the world. This population is made up of 49.7 percent male and 50.3 percent female. The

average annual percent change in the population is 2.306 percent and is ranked sixty-eighth in the world. The largest percentage of the population lives in the rural areas consisting of 72.97 percent, whereas only 27.03 percent of the people live in urban areas. Annual rural population growth is estimated to be 1.67 percent (CIA, 2018; World Bank, 2018a).

The population pyramid in figure 3 shows the distribution of the population according to their age groups and sex from 0 to 100. The population is distributed along the horizontal axis, with males shown on the left and females on the right. The male and female populations are broken down into five-year age groups represented as horizontal bars along the vertical axis, with the youngest age groups at the bottom and the oldest at the top. The highest percentage of the population are below the age of fifteen years (CIA, 2018).

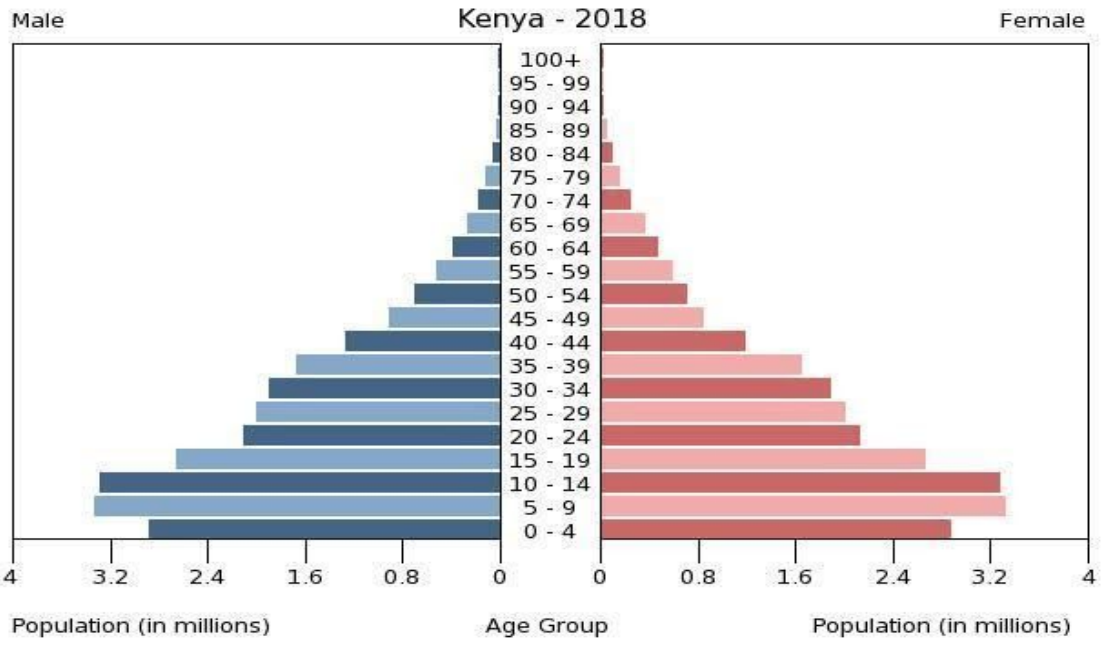

Figure 3: Population Pyramid Distribution According to Age Groups

Table 1 shows Kenya's human development index (HDI). The Human development index is a summary measure for assessing long-term progress in three dimensions of human development: a long and healthy life, access to knowledge, and a decent standard of living. These dimensions of human index are measured by life expectancy, knowledge level and gross national income (GNI). Kenya's human development index score value is 0.590. This put the country in the medium human development category, positioning it at 143 out of 189 countries and territories. A 26.1 percent increase in the human development index was shown in table 1 between 1990 and 2017. Between 1990 and 2017, Kenya's life expectancy at birth increased by 9.8 years, mean years of schooling increased by 2.8 years, and expected years of schooling increased by 3.0 years. Kenya's GNI per capita increased by about 28.9 percent between 1990 and 2017 (UNDP, 2018).

Table 1: Human Development Index

Year	Life Expected at Birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP$)	HDI
1990	57.5	9.1	3.7	2,297	0.468
1995	53.9	8.7	4.5	2,130	0.456
2000	51.8	8.4	5.3	2,112	0.451
2005	55.8	9.4	5.8	2,223	0.490
2010	62.9	10.7	6.1	2,467	0.543
2015	66.7	11.7	6.3	2,806	0.578
2016	67.0	11.9	6.4	2,898	0.585
2017	67.3	12.1	6.5	2,961	0.590

Source: UNDP – Kenya, 2018.

1.2. History and Politics

In 1963, Jumo Kenyatta became the first president of Kenya after a liberation struggle. He died ten years later and was succeeded by his Vice President Daniel Arab Moi. The country was in practice a one party state since independence until 1982 when the constitution was changed to make the ruling Kenyan African National Union (KANU) the sole legal party in Kenya. After much pressure, President Arab Moi finally agreed in 1991 to political liberation. However, the opposition party was unable to dislodge KANU at elections carried out in 1992 and 1999. In 2002, the opposition candidate Mwai Kibaki defeated the KANU candidate Uhuru Kenyatta following a free and peaceful election, and President Arab Moi stepped down (CIA, 2018).

Kibaki's reelection in 2007 led to vigorous protests and considerable political unrest in Kenya due to charges of vote rigging from Orange Democratic Movement candidate Raila Odinga. This led to a power sharing accord that brought Odinga into government as prime minister. There was a broad reformation centered on the constitution as a result of the power sharing accord. Through a national referendum, the majority of Kenyans adopted a new constitution. The new constitution removed the position of the prime minister, introduced additional checks and balances to executive power, and devolved power and resources to forty-seven newly created counties. General elections were organized in 2013, and Uhuru Kenyatta, the son of the founding president Jumo Kenyatta, became the first president under the new constitution. He was reelected in 2017 after finishing his first tenure.

Kenya's significant political, structural, and economic reforms have largely driven sustained economic growth, social development, and political gains over the past years.

Devolution remains the biggest gain from the August 2010 constitution, which ushered in a new political and economic governance system. It has been transformative and has promoted greater investments in the grassroots, strengthened accountability, and public service delivery at local levels (World Bank, 2019).

1.3 Government and Legal System

The current system of government is a democracy and presidential type where the executive branch exists separately from the legislature. Kenya has its capital in Nairobi and consists of forty-seven administrative divisions called counties. The executive branch is made up of chief of state, head of government, cabinet, and other appointments. The president, who is directly elected with his deputy by qualified majority popular vote for a five-year term and eligible for a second term, is the chief of state as well as the head of government. To avoid a run-off election, the presidential candidate must win at least 25% of the votes cast in at least twenty-four of the forty-seven counties. The position of the prime minister was abolished after the March 2013 election. The presidential cabinets are appointed by the president subject to confirmation by the national assembly (CIA, 2018).

The legislative branch, on the other hand, consists of the lower and the upper legislative house known as the Senate and National Assembly respectively. The Senate house has a total of sixty-seven seats. Forty-seven members are directly elected in single constituencies by simple majority, and twenty members are directly elected by proportional representation vote – sixteen women, two representing the youth and two representing the disabled. The National Assembly consists of 347 seats. Of these seats, 290 members are elected directly by single-seat constituencies by simple majority vote, forty-seven women in single seat

constituencies elected by simple majority vote, and twelve members nominated by the National Assembly – six representing youth and six representing the disabled members. Members in the Senate and National Assembly serve five-year terms. The percentage of women in the Senate and National Assembly is 31.3% and 23% respectively (CIA, 2018).

Kenya has a mixed legal system of English common law, Islamic law and customary law. Judicial review is done at the highest court, which is the Supreme Court. The Supreme Court is made up of the Chief Justice and his deputy and five other judges. The Chief Justice and his deputy are nominated by the judicial service commission and appointed by the president with approval of the National Assembly. The Chief Justice serves a non-renewable ten-year term or until seventy years of age, whichever comes first, while other judges serve until age seventy years. Other subordinate courts include the High Court, Court of Appeal, military, magistrates' and religious courts (CIA, 2018).

Governance can be described as custom by which authority is exerted in a country. This includes the process in which government is chosen, monitored and substituted; the ability to formulate and implement policies effectively; and respect for citizens and government institutions that determine economic and social interactions among them. There are six basic indicators for governance. They are: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. The unit in which governance is measured follows a normal distribution with a mean and standard error. Mean estimate of governance ranges from – 2.5 (weak) to 2.5 (strong) with higher score corresponding to better outcomes. Percentile ranking ranges from 0 (lowest) to 100 (highest) rank.

Table 2, shows estimate, standard error and percentile rank of governance indicators for Kenya from 1996 to 2018 and changes in relative position over time. All governance indicators showed progressive increase in estimated mean value from 1996 to 2018, except political stability and absence of violence/terrorism, which shows a significant decrease within the same period. This shows a very weak outcome in political stability and absence of violence/terrorism with a relative change of 0.51. Overall average governance indicators in 1996 and 2018, which covers a period of 22 years, are -0.72 and - 0.57 respectively. This shows an increase of about – 0.15 within that period (World Bank 2018b).

Table 2: World Governance Indicators for Kenya

Governance Indicator	**1996**			**2018**			**Change**
	Est	**StdErr**	**Rank**	**Est**	**StdErr**	**Rank**	**in Est**
Voice & Accountability	- 0.65	0.21	28.50	- 0.36	0.12	34.98	- 0.29
Political Stability & Absence of Violence	- 0.65	0.37	23.94	- 1.16	0.22	12.38	0.51
Government Effectiveness	- 0.52	0.17	34.97	- 0.41	0.18	38.94	- 0.11
Regulatory Quality	- 0.31	0.31	39.13	- 0.23	0.17	43.75	- 0.08
Rule of Law	- 1.02	0.21	18.09	- 0.41	0.14	37.98	- 0.61
Control of Corruption	- 1.16	0.26	10.75	- 0.85	0.13	19.23	- 0.31
Average	- 0.72	0.26	25.80	-0.57	0.16	31.21	- 0.15

Source: World Bank 2018b estimate.

Keys: Est = Estimate, StdErr = Standard Error, Rank = Percentile rank

1.4.Economy and Employment

The major industries in Kenya are small-scale consumer goods, agricultural products, horticulture, oil refining, aluminum, steel, lead, cement, commercial ship repair, tourism, and information technology. Small-scale consumer goods include plastic, furniture, batteries, textiles, and clothing. Even with these major industries, agriculture remains the backbone of the Kenyan economy, contributing one-third of gross domestic product (GDP) (CIA, 2018).

The total amount of net official development assistance received in 2018 was 2 488 389 893 billion dollars compared to the 2 480 219 971 billion dollars that was received in 2017. This showed a marginal increase of 8.17 million dollars. The aid is largely coming through partnership with European Union, European Investment Bank, the African Development Bank, Frances Agence Francaise de Development, United Kingdom Department for International Development, the German Development Bank, the Japan International Cooperation Agency, and China (World Bank, 2018a).

The economic and financial hub of East Africa is Kenya. Kenya's gross domestic products (GDP) growth has averaged over 5% for the last decade, while its current gross national income per capita is $1620, a 12.5% increase from 2017. Since 2014, Kenya's economy has been ranked as a lower middle income country. The most recent unemployment rate is estimated to be 9.3 percent of total labour force (CIA, 2018; World Bank, 2018a)

Table 3 shows the World Bank ease of doing business index score of Kenya for 2018 and 2019. The ease of doing business score assesses the level of regulatory performance of 190 economies of the world over time. It captures the gap of each economy from the best regulatory performance observed on each of the indicators across all economies. The score is

reflected on a scale from 0 to 100, where 0 represents the lowest and 100 represents the best performance. Kenya is ranked fifty-six out of 190 economies of the world on the ease of doing business. This shows an overall increase of 2.2% from the 2019 score. Individual regulatory performance indicators such as starting a business, getting electricity and credit, protecting minority investors, paying taxes, and resolving insolvency also showed increase in score from the previous year, but registering property and enforcing contracts did not (World Bank/Doing Business, 2020).

Table 3: World Bank Ease of Doing Business Index for Kenya

Indicators	2020 rank	2020 score	2019 score	Change in score (%)
Overall	56	73.2	71.0	2.2
Starting a Business	129	82.7	82.4	0.3
Getting Electricity	70	80.1	76.8	3.3
Registering Property	134	53.8	55.1	1.3
Getting Credit	4	95.0	90.0	5
Protecting Minority Investors	1	92.0	90.0	2
Paying Taxes	94	72.8	68.2	4.6
Enforcing Contracts	89	58.3	58.3	0
Resolving Insolvency	50	62.4	57.4	5

Source: Word Bank estimate 2020 (www.doingbusiness.org)

1.5.Physical and Technological Infrastructure

According to the International Communication Union, 49 815 109 million people out of the total population subscribe to mobile cellular phones while 17.83 million individuals have access to the internet. In terms of electrification, 63.3% of the total population have access to electricity. Access to electricity is higher in the urban area (81%) than in the rural area (57.57%). Kenya has varying sources of electricity consumption, ranging from oil to renewable sources. While the total production is 9.634 billion KWh, consumption per capita is 164 KWh. The average number of outages that a firm experiences in a typical month is 3.8 times. There are different types of transportation network systems in Kenya, ranging from air, car, and railways**.** Of the total population, 42 815 109 million people have access to these transportation system networks (ITU, 2018; World Bank, 2018a).

National Health Care Sector Review

2.1.National Health Care Profile

Between 2000 and 2017, the expectation of life at birth in Kenya, for both sexes, increased by 14.988 years, from 50.921 to 65.909 years. This improvement was particularly noteworthy for children under five years and adults due to improvements in health. Kenya has a varied disease burden, ranging from communicable, maternal, perinatal, and nutritional conditions, which caused the highest number of deaths (63 percent). This is followed by non-communicable diseases (27 percent) and then injuries, which accounted for the remaining 10 percent. Consequently, the risk of premature death between 30-70 years for noncommunicable disease has been reported to be 13 percent (World Bank, 2018a; WHO, 2014; 2017a).

Malaria is one of the leading causes of mortality, especially in children under five years in Kenya. Reported confirmed cases of Malaria at community level, public health facilities, and private sector was estimated to be over 3.5 million. More than 13,000 deaths were reported from these cases. There have been several government and nongovernmental interventional efforts to reduce the rate of Malaria in Kenya, among them are distribution of insecticide-treated nets (ITN) free of charge, use of intermittent preventive treatment (IPT) during pregnancy, free treatment for all ages in public health facilities with artemisinin – based combination therapies (ACT), and surveillance through mandatory case reporting from private sector (WHO, 2018a).

Tuberculosis (TB) remains one of the major disease burdens in Kenya. The total incidence has been estimated to be 292 per 100,000 population. HIV positive TB and multi

drug rifampicin resistant (MDR/RR) TB incidences are estimated to be 79 and 4.5 per 100,000 population respectively. The incidence rate is higher in females between the ages of 0 – 14 years. However, over the age of 14 years, the incidence rate is higher in males. The incidence rate of TB as well as mortality rate have continued to show progressive decline since 2005. Mortality rate for HIV negative TB and HIV positive TB are estimated to be 38 and 26 per 100,000 population respectively. Treatment coverage in 2018 was 63% percent with an estimated success rate of over 81 percent in new and relapse cases registered. Funding for the national TB budget drastically reduced from over 60 million dollars in 2017 to 42 million dollars in 2018. Domestic and international funding of this budget is estimated at 33 and 31 percent respectively. Thirty six percent of this national TB budget was never funded (WHO, 2017b; 2018d).

Diarrheal disease is also a significant threat to life in Kenya. Within the last four decades Kenya has experienced several occurrences of cholera outbreak. The largest epidemic occurred between 1997 to 1999 with more than 33,400 reported cases followed by another in 2009 in which 11,789 notified cases were recorded(WHO, 2010).

The trends of maternal mortality showed a progressive increase from 687 per 100,000 live births to 759 per 100,000 live births from 1990 to 2000. However, these trends changed between 2005 to 2015 as there was a significant decline in mortality rate from 738 to 510 per 100,000 live births. The annual percentage of reduction rate also increases within the same period from 2.7 to 3.6 percent (WHO, 2015a).

Table 4 shows the trends of child mortality in the Kenyan population. Evidence suggests a significant improvement in child mortality especially in under 5 mortality rates. In regards

to child nutrition, moderate to severe wasting prevalence is estimated at seven percent while the incidence of moderate to severe low birth weight is eight percent (UNIEGCE, 2018; WHO, 2013).

Table 4: Trends of Child Mortality

Children Category	2013	2014	2015	2016	2017
Under 5 Mortality Rate	52.3	50.5	48.7	47.1	45.6
Infant Mortality Rate	37.4	36.3	35.1	34.3	33.6
Neonatal Mortality Rate	22.6	22.2	21.8	21.3	20.9
Mortality Rate Age 5 – 14	11.3	11.1	10.8	10.5	10.2

UNIEGCE, 2018

Cancer has been implicated as the most prevalent noncommunicable disease in Kenya (10%), followed by cardiovascular diseases (8%), chronic respiratory diseases (1%) and diabetes mellitus (1%). Other noncommunicable diseases accounted for 8% of all deaths. The percentage of population at high risk or with existing cardiovascular diseases (CVD) is 8%, while the percentage of high-risk persons receiving any drug therapy and counselling to prevent heart attacks and strokes is 6%. The percentage of primary health care centers reported as offering CVD risk stratification was less than 25%. Nine out of ten cardiovascular treatment medicines and four out of six cardiovascular treatment technologies are reported as generally available. Injuries accounted for 10%of all deaths in Kenya in 2016 (WHO, 2018b).

2.2.National Health Care Structure

2.2.1. Structure and Policy

Historically, the Kenyan health care system was a three tier system at independence with the central government, missionaries, and local government respectively at the national, sub district and urban areas. However, over recent decades, the healthcare system underwent several modifications and transformations to become a four tier healthcare system, which consists of community care (1st level), primary care facilities (2nd level), County Hospitals (3rd level) and the National Hospitals (4th level). The first level of care provides community-based health care activities. The 2nd level of primary care consists of health facilities such as dispensaries, health centers, medical clinics, and maternity and nursing homes that provide preventive care and health promotion. The 3rd and 4th levels of care are made up of County and National Hospitals providing curative healthcare services as well as serving as referral centers for the primary healthcare facilities (WHO, 2014).

Table 5 shows the distribution of healthcare facilities at different levels of care. The healthcare services in Kenya are provided by a wide range of stakeholders, ranging from government, faith-based organizations (FBO), nongovernmental organizations (NGO), and private organizations. However, the government serves as the largest provider of healthcare services, providing at least half of all services at all levels of care. The only exceptions to this are some primary healthcare facilities such as the medical clinics, maternity and nursing homes, at which the private sector leads. The total percentage of coverage of healthcare services provision for government, FBOs, NGOs, and private sectors are 50.75 percent, 11.30 percent, 3.93 percent and 34.02 percent respectively (Table 2). Many of these health

facilities have deteriorated and are significantly lacking in terms of desired workforce, infrastructure and equipment quality (WHO, 2014).

One of the strategic healthcare plans is to strive to make healthcare products and technologies available and affordable to all people. However, this has not been possible to achieve due to inadequate funding and due to an inefficient procurement and supply system. Expenditure on medicines accounts for 95 percent of out-of-pocket spending for the poorest households, compared to 50 percent for the wealthiest. Households' insurance coverage is very low (5 percent) across all households, and virtually non-existent in poor households (1%) compared to the wealthiest households (16 percent) (WHO, 2014).

Table 5: Distribution of Healthcare Facilities at Different Levels of Care

Healthcare providers	**Primary Care Facilities (Level 2)**					**Counties hospitals (Level 3)**	**National Hospitals (Level 4)**	**Total**
	Dispensaries	**Health centers**	**Medical clinics**	**Maternity homes**	**Nursing homes**			
Government	2954	682	35	1	0	268	16	3956
FBO	561	166	61	3	11	79	-	881
NGO	200	24	73	4	5	-	-	306
Private	196	60	2098	32	150	116	-	2652
Total	3911	932	2267	40	166	463	16	7795

2.2.2. Health Service Coverage

Recently the Government of Kenya identified 100 percent achievement of Universal Health Coverage (UHC) as one of the four priority agenda items during the period 2018-2022. The goals include: to increase the population covered by health insurance from 36 percent (2017) to 100 percent by 2022; to reduce the out of pocket household expenditure from 26 percent (2017) to 10 percent by 2022; to increase the population having access to a defined essential health services package, and to strengthen coordination among the health sector stakeholders for attainment of UHC. Although the government is the major provider of health services, the private sector also plays a significant and growing role in health service delivery (WHO, 2014).

2.2.3. Health Care Expenditure

Recent reports on Kenya's gross domestic products spending on healthcare showed an increase from 5.4 percent according to the National Health Account in 2010 to 5.74 percent in 2020. Expenditure has continued to fluctuate between 4 to 7 percent. Public funded expenditure including external donor support and health insurance is estimated to be 63.3 percent of total health expenditure. The private funded healthcare expenditure accounted for the remaining 36.7 percent with out of pocket expenditure at the point of service being predominant. Private health insurance is limited; only an estimated 25 percent of the population is covered by any form of health insurance (WHO, 2014; 2017a)

2.2.4. Health Care Workforce and Infrastructure

Table 6 shows the distribution of the healthcare workforce according to Cadres in Kenya. The country has an estimated healthcare workforce of over 94,000 persons. The ratio of

health workers per 10,000 population for medical doctors, nursing and midwifery personnel, dentistry, and pharmacists are 1.988, 15.421, 0.23, and 0.512 respectively. There are a total of 802 people in the surgical workforce, which is composed of surgeons, obstetricians and anesthesiologists. The number of hospital beds per 10,000 population is 14 (WHO, 2015b; 2018c).

The health sector has three major active stakeholders that support interventions in the country. They are: state, international, and non-state actors. The state actors are either agents of the National or County Governments. National Government agents include the National Ministry of Health (which oversees the overall sector stewardship), parastatals, and other health-related sectors, whereas, County Governments are the 47 Counties. The international actors are all international partners supporting the health sector. They are broadly categorized as technical partners and funding partners who support financing for health activities in the country either directly or indirectly by supporting implementing partners. Lastly, the non-state actors are the actors supporting the delivery of health services to Kenyans. They are broadly categorized as private for-profit organizations, private not-for-profit organizations such as faith-based organizations, nongovernmental organizations and civil society organizations, and traditional practitioners (TPs) (WHO, 2014).

Table 6: Distribution of Kenyan's Healthcare Workforce According to Cadres

Health workforce Cadres	Numbers	Per 10,000 population
Medical Doctors	9149	1.988
Nursing and Midwifery personnel	70975	15.421
Dentistry personnel	1090	0.237
Pharmaceutical personnel	2355	0.512
Environmental and occupational health and hygiene professional	182	----
Medical and pathology laboratory personnel	6,000	----
Physiotherapy personnel	1,000	----
Traditional and complimentary medicine personnel	----	----
Community health workers	----	----
Biomedical engineers	50	0.05
Biomedical technicians	4000	0.83
Surgical workforce		
Qualified surgeons	316	----
Qualified obstetricians	357	----
Qualified Anesthesiologists	129	----
Skilled health personnel	----	17.86
Mental health workers		
Psychiatrist	----	0.184
Psychiatrist Nurse	----	----
Social Worker	----	----
Psychologist	----	----

National Radiology Profile

3.1.Radiology Workforce

The radiology enterprise is a multi-disciplinary profession and is made up of highly trained personnel that provide diagnostic imaging services, therapeutic and image guided procedures. In a well-developed setting, the radiology stakeholders consist of administrators,

nurses, technologists/radiographers, medical physicists, information technologists and radiologists. However, in many low- and middle-income countries such as Kenya, this setting may not necessarily be applicable due to lack of adequate radiology personnel.

3.2.Training and Professional Representation

The Society of Radiography Kenya (SORK) is a professional body that caters to the professional interests of all radiographers practicing in Kenya. According to SORK, there are approximately 1,070 registered radiographers in Kenya, which is estimated to be more than 90% of the diagnostic and therapeutic radiographers in Kenya (SORK, 2019). Diagnostic radiographers account for the largest number of practicing radiographers (73%) followed by therapeutic radiographers (25%), while lecturing radiographers account for only 2% of radiographers in Kenya. Radiography in Kenya is an unregulated profession due to the absence of a professional board. As a result, SORK has taken an active role in regulating training, practice, and ethical issues for radiographers (Kenya Health Workforce Report, 2015).

Radiography training in Kenya is offered in two institutions: Kenya Medical Training College (KMTC), which trains at diploma and higher diploma levels, and the Jomo Kenyatta University of Agriculture and Technology (JKUAT), which trains at bachelor's level. For KMTC, radiographers are trained in six campuses: Nairobi, Eldoret, Nyeri, Manza, Mombasa, and Kisumu. The programs trained at diploma level include medical imaging science. Those at higher diploma level include radiotherapy and ultrasound. The programs offered at bachelor's level include diagnostic and therapy radiography. The SORK, through its Professional Development, Education and Research (PDERC) Committee, is also

currently overseeing the development of Computed Tomography and Magnetic Resonance (CTMR), ultrasound, and nuclear medicine curricula for master's programs. The degree program in JKUAT has been running since 2012 and by 31st December 2015, a total of 159 people were enrolled in the bachelor's program, both by direct entry and upgrading. Kenya Medical Training College has an average intake of twenty-five radiography students per campus and an average number of 160 radiographers graduating annually in the last five years. The society is in the process of accrediting Thika School of Medical and Health Sciences, a private institution, to train Diploma of Medical Imaging Sciences, and will be initiating indexing protocols. Furthermore, in pursuant to the provisions of the radiation protection act of Kenya and regulations, it is required that all radiation workers, including radiographers, apply for registration and/or license to administer ionizing radiation. With that regard, the Radiation Protection Board ensures that all radiographers applying for license to administer ionizing radiation have been vetted by SORK for professional regulation in training and practice. The radiation protection board also regulates the quality of medical imaging equipment (Kenya Health Workforce Report, 2015).

The Kenya Association of Radiologists (KAR) is the national specialty society for radiologists in Kenya and the voice of Kenyan Radiology. It aims to maintain the highest standards of care, promote patient safety and help radiologists contribute to the very best health care for patients. The association works with government, health professionals and technology leaders to make optimal use of diagnostic imaging. They also accredit and promote opportunities for continuing medical education and research, helping radiologists stay at the leading edge of diagnostic imaging health care (KAR, 2019). The number of

radiologists has been estimated to be about 105 in 2012 based on one study (Kawooya, 2012).

According to Rehani, et al., a subspecialty in radiology in Kenya requires six years of medical school followed by six years of a radiology residency, including an internship. There is no subspecialty radiology fellowship training program offered in Kenya. The radiology residency also has research requirements as well as oral and written board certifying examinations for candidates to complete the program (Rehani et al. 2016).

Although a medical physics degree is not offered in Kenya, according to a study by Birgit E 2016, there is active involvement of medical physicists in educating radiology residents (Rehani et al. 2016).

3.3.Equipment Inventory

Table 7 shows the summary of equipment inventory in Kenya. According to the national inventory for medical imaging, in 2017 there were a total of seven Magnetic Resonance Imaging (MRI) scanners, eleven Computed Tomography (CT) scanners, two nuclear medicine cameras and one radiotherapy machine in Kenya. Over half of the MRI and CT scan machines are operated by the private sector. There are no nuclear medicine, mammography and radiotherapy equipment available in the private sector. (WHO, 2017c).

Table 7: Medical Imaging Equipment Inventory

Medical equipment	Public sector	Private sector	Total	Density per 1,000,000 population
Magnetic Resonance Imaging	2	5	7	0.158
Computed Tomography	3	8	11	0.248
Positron Emission Tomography Scanner	0	0	0	0.000
Nuclear Medicine	2	0	2	0.0458
Mammography	12	Not available	12	6.825
Linear Accelerator	0	0	0	0.000
Telecobalt Unit (Cobalt 60)	1	0	1	0.023
Radiotherapy	1	0	1	0.023

(WHO, 2017c) Global atlas of medical devices – 2017

A survey regarding examination was provided to x-ray facilities in Kenya and was completed by 140 (47% of total) facilities. As seen on Table 2, this data showed that 868,747 patient examinations were completed in total. Within these examinations, 748,116 were general radiography procedures. In addition to general radiography, there was mammography (5,578), fluoroscopy (29,440), interventional procedures (1,401), and CT (84,212). This data consisted of 68 percent adults and 32 percent children and was projected to cover the whole country (Korir et al, 2013).

Table 8: A Survey of Radiology Examinations Request

Radiological Procedures	Frequency	Percentage
General radiography	748,116	86%
Mammography	5,578	0.64%
Fluoroscopy	29,440	3.38%
Interventional procedures	1,401	0.16%
Computed Tomography	84,212	9.69%
Total children's Examination	590,748	68%
Total Adults Examination	277,999	32%
Overall total	868,747	

(Korir et al, 2013).

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