Ghana

By Julia Hitchins

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RAD-AID Country Report:

Ghana

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Ghana Geography and Population

Ghana is a country in West Africa, bordering with Côte d'Ivoire to the west, Burkina Faso to the north and Togo to the East, and the Gulf of Guinea and the Atlantic Ocean to the south, covering a total area of 238,533 square kilometres (92,098 square miles) with 539 kilometres of coastline. Its location, only a few degrees north of the equator, gives the country a warm, tropical climate. The north is hot and dry, the south-west corner hot and humid, and the east warm and relatively dry. There are two main seasons: wet and dry, with the rainy season in the north being from April to mid-October, and from March to mid-November in the south (CIA, 2018; UNDP, 2018).

The current population is 29.5 million, increasing from 18.94 million in 2010, and estimated to grow to 37.3 million by 2030. The population is mostly concentrated in the southern half of the country, with the highest concentrations being on or near the Atlantic coast. Over half of the population lives in urban areas. Ghana has a pyramidal age structure with nearly 40% of the population being under 15-years old and 57% under 25-years old. The phenomenal population growth rate of around 2.2-2.7% per year is due to persistently high fertility rates at around four children per woman, rapidly falling mortality rates, a youthful age structure of the population, and the volume, persistence and direction of migration flows in and out of the country (WHO Ghana, 2016; CIA, 2018; The World Bank, 2018).

Ghana General Facts	
Capital	Accra
Total area	238 533 sq km (92 098 sq mi)
Accra Area	3245 sq km (1253 sq mi)
Total Population (mid-2018)	29.5 million
Accra population (2018)	2.439 million
Population living in urban/rural areas (2018)	56.1%/44.9%
Life expectancy at birth m/f (2018)	62/64
Infant mortality rate (2018)	37 per 1000 live births
Population under 15 years (2018)	39%
Population age 15-49 with HIV m/f (2016)	1.0%/2.3%
Gross national income per capita (2017)	US$4990
Total expenditure on health per capita (2014)	US$145
Gross Domestic Product (GDP) (2017)	US$ 47.33billion
Total expenditure of GDP on health (2016)	3.6%
UN Human Development Index (HDI) score (2016)	0.579 (rank 135 of 177 countries)

Ghana's diverse geography and ecology range from tropical rainforests to coastal savannah, with the terrain mostly being low plains with dissected plateau in the south-central area. Lake Volta in Eastern Ghana is the world's largest artificial lake created in 1965 by the creation of the Akosombo hydroelectric dam, which holds back the White Volta and Black Volta rivers. The lake spans an area of 8,484 square kilometres (3,275 square miles). The highest point is Mount Afadjato at 885 meters (CIA, 2018).

Ghana History and Culture

Ghana was the first place in sub-Saharan Africa where Europeans arrived to trade in gold and later in slaves after the Portuguese opened a sea-route in the 15th Century. Kingdoms that had developed amongst various Akan-speaking and neighbouring groups were already expanding their wealth, size and power, with the Ashanti Kingdom emerging as the predominant Akan political force, expanding up into the Northern Savannah. From the 19th Century, the British established a protectorate over the local African communities of the area. At the end of the 19th century, the British established the colony of the 'Gold Coast,' following the defeat of the Ashanti, which covered many previously separate and independent kingdoms and tribal boundaries, including the kingdom of the Ashanti, coastal regions and northern territories. Investment, infrastructure and institutional development were concentrated on urban areas emerging within the coastal ports, whilst the north received little attention. The disadvantaged rural masses were able to gain some wealth through the growth and export of cocoa (Every Culture, 2018).

After World War 2 (WW2), independence movements were on the rise, and the Republic of Ghana became the first sub-Saharan African country to gain colonial independence on 6th March 1957. Soon after independence Ghana fell victim to corruption and mismanagement, despite being endowed with a good education system, efficient civil service and being rich in mineral resources, so in 1966 Kwame Nkrumah, Ghana's first president was deposed in a coup, leading to years of mostly military rule until a second coup in 1981 by Flight Lieutenant Jerry Rawlings (UNDP, 2018; Every Culture, 2018).

English is the official language of the Republic of Ghana and the main language of government and instruction, teaching and medical services. There are more than sixty indigenous languages, although it is hard to state an exact number due to different classifications of language and dialect. Twi and Fante are two dialects of Akan and the most commonly spoken local languages. Hausa, a Nigerian language, is often used by traders in the north of Ghana (Commisceo Global Consultancy Ltd., 2017; Every Culture, 2018).

At the 2010 census, the predominant religion practiced in Ghana was Christianity (71.2%), followed by Muslim (17.6%), traditional (5.2%), other (0.8%) and none (5.2%). Ethnic groups number over 100, but Akan is the largest at 47.5% of the population, followed by Mole-Dagbon (16.6%), Ewe (13.9%), Ga-Dangme (7.4%) and the others making up the remaining 14.6% (CIA, 2018). The Ashanti tribe of the Akan is the largest tribe, and intergroup relations are usually affable with few hostilities (Commisceo Global Consultancy Ltd., 2017; Every Culture, 2018).

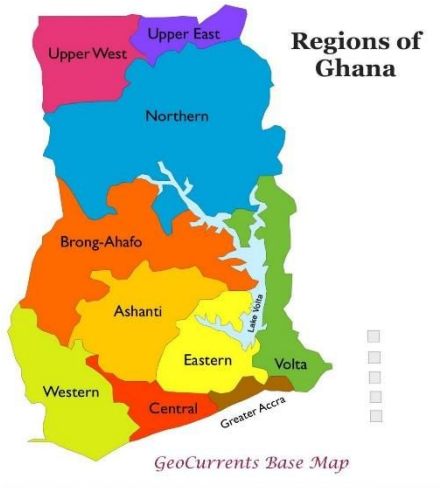
Ghanaian etiquette is always focussed on politeness, hospitality, and formality. Greetings are formal with a handshake using the right hand and using a person's title and surname. It is important not to rush greetings but to take the time to inquire about a person's health and family. Indirect communication styles are used to maintain harmonious relationships and protect their own and other's faces; often wise sayings or analogies are used to convey a message rather than speaking it directly. In business, first meetings are often to find out more about each other, build rapport and to see if personalities fit, and then business will be discussed at a later meeting (Commisceo Global Consultancy Ltd., 2017; Every Culture, 2018).

In terms of natural disasters, Ghana mostly suffers from multiple weather-related hazards. Risks are floods and droughts, particularly in the northern savannah belt, as well as coastal storm surges and erosion, landslides, earthquakes, pest infections, and wildfires. Between 1991 and 2011 there were seven major floods, with floods in the White Volta river basin destroying the livelihoods of hundreds of thousands of people in 2010. The last major flood in Accra was in 2015. Rapid urbanisation, rural poverty, and environmental degradation, plus demographic change compound the risk factors. Mostly it is agriculture and livestock which are affected. These industries employ 55% of the economically active population and therefore this affects the economy of the whole country (GFDRR, 2017; NADMO, 2016).

The military employs around 8,000 staff in an army and subordinate navy and air force and is supported by the government with less than 1% of gross domestic product (GDP). It has not been involved in any wars since WW2 and now mostly participates in peacekeeping operations with the United Nations, Organisation of African Unity and The West African Community. The most recent interventions have included Liberia and Sierra Leone (Every Culture, 2018).

Ghana Government and Legal System

The political system in Ghana is a multi-party democracy with an elected president, a legislature and independent judiciary that was established along with a new constitution in 1992 by Lt. Jerry Rawlings. In 2016, a new President Nana Addo Dankwa Akufo-Addo of the New Patriotic Party (NPP) was elected for a four-year term. The country is divided into ten administrative regions: Ashanti, Brong-Ahfo, Central, Eastern, Greater Accra, Northern, Upper East, Upper West, Volta, and Western. Each of these regions is staffed from central government and headed by an appointed Regional Minister. Each region is sub-divided into local districts, totalling 216 across the whole country in 2012, that are organised under district assemblies. Most assembly members are elected with some seats for traditional hereditary chiefs. Chiefs are responsible for traditional affairs and are also represented in the National House of



Chiefs. In comparison to other countries in the region, Ghana is a well-administered country with increasingly stable and democratic governance, and is seen as a model for economic and political reform in Africa (CIA, 2018; WHO Ghana, 2016; UNDP, 2018; Every Culture, 2018).

The legal system is a mixture of English common law and customary law. British law is used for criminal cases, whereas indigenous customs are used for civil cases, with both enforced by the national police force. The highest court in the country is the Supreme Court which consists of a Chief Justice and twelve justices. Civil cases concerning customary matters such as inheritance, marriage or land disputes are usually heard by a traditional Chief (CIA, 2018; Every Culture, 2018).

According to the World Bank Six Indicators of Worldwide Governance, Ghana rates in the 25-50th percentile for political stability and absence of violence, government effectiveness, regulatory quality, and control of corruption. Voice and accountability and the rule of law are ranked in the 50-75th percentile (The World Bank, 2018a).

Ghana Economy and Employment

Ghana has a market-based economy with relatively few policy barriers to trade and investment in comparison with other countries in the region. Ghana is well-endowed with natural resources and is the second largest cocoa producer in the world and the second biggest gold miner in Africa, which help to make the economy more resilient. Timber is the other primary product export. These, plus oil exports are major sources of foreign exchange. Other exports include fish, palm oil, rubber, manganese, aluminium, and fruit and vegetables (CIA, 2018; UNDP, 2018; Every Culture, 2018).

The domestic economy is primarily agriculture and a substantial training and service sector. Agriculture accounts for 18.3% of GDP, industry 24.5% and services 57.2%. Education and healthcare are the most important public services. Unemployment rates rose from an estimated 5.2% in 2013 to 11.9% in 2015, and people in the north of the country tend to hold more menial positions and have a lower job status. The majority of Ghanaians are rural peasant farmers and small-scale traders in the informal sector with irregular income. A recent drought in the north has severely affected agricultural activities (CIA, 2018; Every Culture, 2018).

In 2011, following the increase in oil export from the discovery of major offshore oil reserves in 2007, the Ghanaian economy reached a GDP growth rate of 14%. Unfortunately, the economy took a downturn in 2015 following a fall in oil prices and has been performing poorly since, with GDP falling to 3.9%. The country had to negotiate US$918 million extended credit from the International Monetary Fund (IMF) to address the growing economic crisis. Key economic concerns in 2018 are the lack of affordable electricity, lack of a solid domestic revenue base, and the high debt burden (CIA, 2018; WHO Ghana, 2016).

Ghana's Human Development Index (HDI) rating by the United Nations Development Program (UNDP), which measures and analyses developmental progress, ranked the country

as 135 out of 177 countries in 2016 and places it in the category of Low-Medium Human Development countries. In 2015, Ghana was the first country in sub-Saharan Africa to achieve Millennium Development Goal (MDG) One by halving the national level of poverty to 24.5%. Despite this, due to a more rapid drop in urban poverty compared with rural areas, the gap between these two has recently doubled, meaning that rural poverty is now almost four times as high as urban poverty, compared to twice as high in the 1990s (WHO Ghana, 2016; UNDP, 2018).

In the World Bank 'ease of doing business' index 2017, Ghana ranks 120 out of 264 countries, and the annual inflation rate is currently 9.9%, lower than the average of 16.64% between 1998 and 2018 (The World Bank, 2018b).

Ghana Physical and Technological Infrastructure

There is a high degree of media freedom in Ghana, with one state-owned television station, two state-owned radio networks, plus privately-owned TV and radio stations and access to cable and satellite subscription services. Radio is Ghana's most popular medium and the media are free to criticise the authorities without fear of reprisals. In 2016, 9.8million people (34.7% of the population) had access to the internet (CIA, 2018; UNDP, 2018).

In Africa, Ghana has one of the highest rates of access to electricity, but still not enough power is produced to meet the demand. An ageing electricity grid and extremely low water levels in the Akosombo Dam in the early 2000s has meant that the power supply has been erratic since. Electricity in Ghana is generated from hydropower, fossil-fuels and renewable energy sources (University of Cambridge/Phys.Org, 2017).

In 2013, Electricity was accessible to 72% of the total population, but only 50% of rural areas had been electrified, compared with 92% of urban areas (CIA, 2018). Not including hydropower, the goal is to have 10% of energy produced by renewable sources by 2020. Bio-energy has recently attracted investment which may stimulate rural development and create jobs. Scheduled outages occur regularly in different regions as publicised on the Electricity Company of Ghana Ltd website (ECG Ltd, 2016). These outages are planned for maintenance and upgrading equipment in addition to any unexpected outages due to, for example, the weather, equipment breakdown, construction error, vandalism or contact with animals or fallen trees. In 2015 there were 159-days of blackouts across the country (University of Cambridge/Phys.Org, 2017).

The telephone system in primarily microwave radio replay, although a wireless local loop has been installed. Predominantly in Accra, there is an outdated and unreliable fixed-line infrastructure. In 2016, there were 251,490 subscriptions to fixed telephone lines or the equivalent of one subscription per 100 inhabitants, and 38,305,078 subscriptions to cellular phones or 139 subscriptions per 100 inhabitants, making cellular communication the most accessible (CIA, 2018).

There are four registered air carriers and ten airports, seven of which have paved runways. Narrow-gauge railways cover 947 km, and in 2009 there was 109,515 km of roadway,

although only 13,787 km (12.5%) of these were paved. Road transport is the most widely available form of transport carrying 97% of passenger and freight traffic, but an estimated 74,000km of road needs to be constructed to meet the needs of the Ghanaian citizens. In 2016, the 209km Oti Danako-Nakpanduri Road was opened, linking Volta and the Northern regions and therefore helping to increase the standard of living there. Major seaports are at Takoradi and Tema, and there are 1,283 km of waterways (Logistics Capacity Assessment, 2016; CIA, 2018).

Ghana National Health Care Profile

Prior to the introduction of the National Health Insurance Scheme (NHIS) in 2003 by President John Kufour and the NPP, the Ghanaian people had to pay high 'out of pocket' fees for healthcare at every point of service. This excluded many individuals from public healthcare who could not afford to pay. Many people died due to a lack of money to pay for their healthcare needs. The NHIS has allowed all Ghanaians access to primary care creating an increase in patient numbers and a decrease in deaths. The current healthcare system is funded and administered by the government with additional funding from the Internally Generated Fund (IGF), financial credits, and Donors Pooled Health Fund, as well as participation from church groups, international agencies and non-government organisations (NGOs). The National Health Service Authority (NHSA) licenses, monitors and regulates the operation of the insurance scheme (NHIS, 2018; GhanaWeb, 2018; Every Culture, 2018)

In 2015, life expectancy was an average of 66.18 years (male 63.76/females 68.66) and infant mortality was 37.37 per 1000 live births. The fertility rate was 4.06 children per woman. In 2016, there was an 84.1% antenatal coverage rate and 56.2 % of deliveries were supervised, compared with 91.1% and 32.1% respectively in 2007. Maternal mortality has reduced from 195 maternal deaths per 100,000 live births in 2011 to 151.1 per 100,000 live births in 2016 (GHS, 2017a; GHS 2017).

Indicator	1988	1993	1998	2003	2008	2014
Infant Mortality Rate (per 1,000 live births)	77	66	57	64	50	41
Under 5 Mortality Rate (per 1,000 live births)	155	119	108	111	80	60
Neonatal Mortality Rate (per 1,000 live births)	44	41	30	43	30	29
Post-Neonatal Mortality Rate (per 1,000 live births)	33	26	27	21	21	13
Child Mortality	84	57	54	50	31	19
Crude Birth Rate (per 1,000)	47	44	39	33	29	30.6
Crude Death Rate (per 1,000)	17	12.5	10	10	9.4	8.5
Life Expectancy at birth (in years)	54	55.7	57	58	60	62
Total Fertility Rate	6.4	5.5	4.6	4.4	4.0	4.2

Table of Health Status Indicators - GHS, 2017a

The decreasing infant mortality and increased life expectancy are a reflection of general healthcare improvements, although the poor performing economy since 2011 has had impairing consequences for the health sector. This has caused a reduction in the availability of resources and supplies, hindered the recruitment and payment of the health workforce,

and an reduced the ability to meet financial commitments to development partners such as the Global Fund and Gavi who support the health sector (GHS, 2017; WHO Ghana, 2016).

The most common major infectious diseases found in Ghana are endemic to sub-Saharan Africa: cholera, bacterial and protozoal diarrhoea, hepatitis A, typhoid fever, malaria, tuberculosis, dengue fever, yellow fever, schistosomiasis (bilharzia), HIV/AIDs, measles, meningococcal meningitis, and rabies.

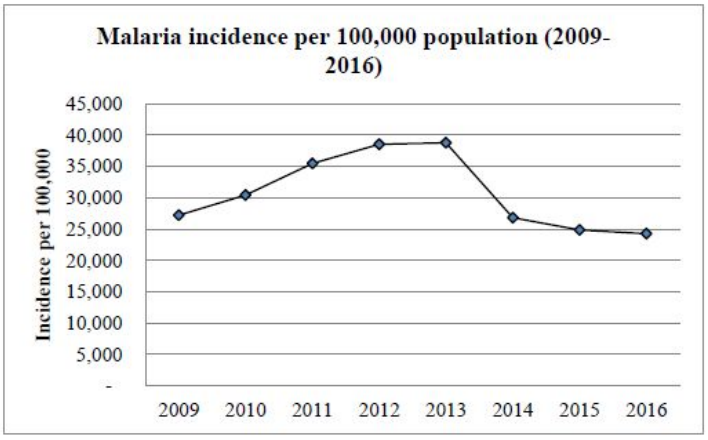
About 60% of all outpatient cases are made up of malaria, upper respiratory tract infections (URTIs), diarrheal diseases and diseases of the skin. Malaria still remains a leading cause of morbidity and accounted for 32.5% of those admitted to medical facilities in 2011 (Ghana News Agency, 2011).

Top 10 causes of outpatient morbidity in Ghana			
2016	**2012**	**2008**	**2004**
Malaria (6,969,525 cases)	Malaria (10,171,048 cases)	Malaria (5,041,025 cases)	Malaria (3,379,527 cases)
Upper respiratory tract infections	Other acute respiratory infection	Upper respiratory tract infection	Upper respiratory tract infection
Rheumatism and other joint pains	Skin diseases and ulcers	Diarrhoeal diseases	Diarrhoeal diseases
Diarrhoeal diseases	Diarrhoeal diseases	Skin diseases	Skin diseases
Skin diseases	Rheumatism and joint pains	Hypertension	Hypertension
Anaemia	Hypertension	Home/occupational injuries	Home/occupational injuries
Intestinal worms	Anaemia	Acute eye infections	Acute eye infections
Acute urinary tract infection	Intestinal worms	Pregnancy and related complications	Pregnancy and related complications
hypertension	Acute eye infection	Rheumatic and joint diseases	Rheumatic and joint diseases
Acute eye infection	Acute urinary tract infection	Anaemia	Anaemia

Table of top 10 causes of outpatient morbidity in Ghana 2004-2016 (GHS, 2017a)

In 2016, approximately 45% of outpatient visits and 25% of mortality in under five-year olds were due to malaria, although many cases go unreported. As time has gone on, despite the overall rise in reported cases of malaria and slight fall in morbidity rates since 2013, the rise in rates of other diseases, such as URTIs, has led to a decreased percentage of malaria cases compared with other diseases. Malaria-related deaths in adults decreased from 2133 in 2015 to 1264 in 2016, and in

8.4 INCIDENCE OF MALARIA PER 100,000 POPUATION



under five-year olds from 1037 to 590 (GHS, 2017a; GHS, 2017).

Incidence of Malaria per 100,000 population 2009-2016 (GHS, 2017a)

Mycobacterium tuberculosis (TB) affects one-third of the global population and is one of the most prominent treatable diseases in Africa. HIV/AIDs fuels the cases of TB with 18% of adult patients with TB also being HIV positive in 2004, and increasing yearly to 23% in 2016 (CDC, 2018). In 1994, the World Health Organisation (WHO) Directly Observed Treatment, Short Course (DOTS) strategy was put in place to tackle the diagnosis and treatment of TB. According to the World Bank it is one of the most cost-effective health strategies for tackling TB (GHS, 2017). In 2010, Ghana achieved 100% DOTS coverage which is now maintained with the Stop TB strategy which is managed by the WHO and the National TB Program (NTB). In 2016 there were 54 cases per 100,000 population, compared with 63 per 100,000 in 2010 and 57 per 100,000 in 2005. The treatment success rate increased from 73% in 2005 to 85.5% in 2010 and 85.1% in 2015. According to the GHS 2016 Annual Report (2017), the number of reported TB cases has reduced, but this may be due to poor access to TB services.

In 2016 it was estimated that 190,000 people living with HIV/AIDs in Ghana, with an adult prevalence rate of 1.6%. 53% of HIV positive pregnant women were given anti-retroviral drugs (ARVs) to prevent mother-to-child transmission. There is an annual review of TB and HIV status and in 2016 approximately US $100 million was invested in the GHS HIV/AIDS program from the United States President's Emergency Plan for AIDS Relief (PEPFAR) (GHS, 2017; CDC, 2018; US Embassy Ghana, 2016).

Top Ten Causes of Death All Ages – National 2016 (GHS, 2017a)

Rank	Cause of Death	Total cases seen	Proportional Morbidity Rate (%)
1	Malaria	926	**7.2**
2	Pneumonia	903	**7.0**
3	Asphyxia	842	**6.5**
4	HIV/AIDS	828	**6.4**
5	Anaemia	747	**5.8**
6	Hypertension	588	**4.6**
7	Cerebrovascular Accident	489	**3.8**
8	diabetes	331	**2.6**
9	Septicaemia	300	**2.3**
10	Gastroenteritis	211	**1.6**
All others		6724	**52.2**
Total		12889	**100.0**

Top Ten Causes of Deaths for Children Under 5 Years – National 2016 (GHS, 2017a)

Rank	Causes of Death	Number of Cases	% of morbidity
1	Asphyxia	436	16.6
2	Malaria	308	11.8
3	Pneumonia	195	7.4
4	Anaemia	129	4.9
5	Bronchopneumonia	82	3.1
6	Septicaemia	45	1.7
7	Gastroenteritis	38	1.5
8	Hypoglycaemia	34	1.3
9	HIV/AIDS	23	0.9

10	Enteritis	11	0.4
All other Diseases		1318	50.3
Total		**2619**	**100.0**

The Ghana Health Service (GHS) and Ministry of Health (MoH) conduct many programs to survey and combat the main diseases prevalent in Ghana: malaria, TB, HIV/AIDS, polio, yellow fever, cholera, meningitis, measles, and guinea worm. In addition, there are programs such as the National Viral Hepatitis Control Programme, Neglected Tropical Diseases Programme, Expanded Programme of Immunisation, Non-communicable Diseases Programme and various Maternal, newborn and infant health programmes which include focus on antenatal care, family planning, and nutrition. All immunisations are at a 94.6% national coverage rate for measles, typhoid, yellow fever amongst others in 2016, and whilst it still needs to be monitored, the Guinea Worm Eradication Scheme has been effective in making Ghana guinea worm-free since 2015 (WHO Ghana, 2016; GHS, 2017).

The Ebola virus epidemic in neighbouring countries in 2013-2015 has led to intensified public health surveillance. A comprehensive preparedness and response plan was developed, including isolation units designated in Tema, Kumasi and Tamale; Personal Protective equipment procured and distributed; a walk-through thermometer installed at Kotoka International Airport and staff trained in how to respond.

In January-February 2018, there were 230 deaths and 2671 serious injuries from road traffic accidents due to speeding, poor road construction and potholes, indicating an increasing need for emergency services and acute medical care (FairPlanet, 2018).

Main causes of mortality - CDC, 2016

Main causes of mortality (WHO, 2012)	
LRTI	11%
Stroke	9%
Malaria	8%
Ischaemic Heart Disease	6%
HIV/AIDS	5%
Pre-term birth complications	4%
Diarrheal disease	4%
Birth asphyxia or birth trauma	4%
Meningitis	3%
Protein-energy malnutrition	3%

Non-communicable diseases (NCDs) are chronic diseases which contribute significantly to illness, disability and death. In Ghana, the most prevalent are cardiovascular diseases such as ischaemic heart disease and stroke, cancers, chronic respiratory diseases, diabetes and sickle cell. Risk factors such as unhealthy diet, reduced physical activity, and tobacco and alcohol use increase the possibility of the first four of these diseases. From 2002 to 2008 hypertension consistently remained the fifth cause of outpatient morbidity and its increasing prevalence is concerning since 70% of those diagnosed are not on treatment and only 13% of those have their blood pressure well controlled. The rate of diabetes was 9% and rate obesity was 20.9% in 2016 (CIA, 2018). There has been recent engagement with the Danish government in initiatives to decrease morbidity, mortality and disability from diabetes and one of the aims for the Sustainable Development Goals (SDGs) set out by the

UN General Assembly in 2015 is to reduce mortality caused by NCDs by one-third (GHS, 2017; GHS, 2017a; WHO Ghana, 2016).

National Health Care structure and policy:

Most healthcare is provided by the government and administered by the MoH and the GHS, with 21% private/for-profit services and several hospitals and clinics run by the Christian Health Association of Ghana (CHAG). Rural-urban disparities in health care services exist with care varying between well-served urban areas and rural areas with little or no modern healthcare services, and there are five levels of providers: health posts, health centres and clinics, district hospitals, regional hospitals, and tertiary hospitals. In rural areas, health posts are the first level of primary care, but traditional medicine remains important due to the lack of public facilities, or otherwise people must travel vast distances. The establishment of some dispensaries in these areas which are staffed by nurses or pharmacists can be effective in treating common diseases such as malaria (UNDP, 2018; Every Culture, 2018).

According to the GHS Annual Report (2016), increasing/expansion of community health planning and services (CHPS) to increase access to basic and essential health services to all communities in Ghana is a current priority. Patient referral process and criterion is set out in a document by the Ministry of Health.

Numbers of Health Facilities in Ghana by type and region 2016 (GHS, 2017A)

Region	CHPS	Clinic	District Hospital	Health Centre	Hospital	Midwife / Maternity	Mines	Polyclinic	Psychiatric Hospital
Ashanti	1041	130	25	135	96	73	0	1	0
Brong Ahafo	458	102	18	90	12	41	0	4	0
Central	235	67	12	61	16	35	0	2	1
Eastern	611	116	17	99	14	25	0	2	0
Greater Accra	201	283	6	28	76	85	0	13	2
Northern	386	56	15	96	13	9	0	4	0
Upper East	225	50	6	53	1	2	0	0	0
Upper West	208	14	3	68	8	5	0	5	0
Volta	350	40	17	161	11	16	0	3	0
Western	470	145	18	64	20	37	3	0	0
National	**4185**	**1003**	**137**	**855**	**267**	**328**	3	**34**	3

The Ghana Health Sector Medium Development Plan 2014-2017 stated that 'providing affordable primary health care to all people living in Ghana under-pinned by the desire to attain universal health coverage for basic health services'. The Annual Programme of work 2015 included increasing maternal and child health interventions to reduce institutional maternal deaths in 2014, focussing on making healthcare accessible and affordable to all (GHS, 2017a; MoH, 2016).

Health service coverage:

The NHIS started in 2003 and all residents were required to join one of three schemes: distinct mutual insurance, private mutual insurance or private commercial health insurance schemes. A biometric membership system was initiated in 2013 to improve membership identification care management and ensure accurate membership data and validation for

subscribers. Aims to increase active membership to 60% of the population and achieve universal coverage. Whilst the NHIS has been successful at providing healthcare to many at an affordable rate relative to income, a lack of trained personnel and key medical equipment are still big challenges to the health service, but problems with slow reimbursement of services from the NHIS and increased use of private services have exacerbated this more recently (NHIS, 2018; GhanaWeb, 2018). Various health information management systems are used including an eTracker for patients with HIV/AIDS or TB to collect data and ensure patient compliance with treatment (CDC, 2018).

Health care expenditures:

In 2012, only 5.2% of GDP was spent on health, less than the global average of 8.6%, dropping to 3.6% of GDP in 2014. In 2011 the Ghana government spent only 10.6% of their total expenditure on health. This only accounted for 68.3% of the total health expenditure for the year as the remaining 31.7% was from the private sector (GHS, 2017a; CIA, 2018).

Money donated to fund the Ghana health system from international donors includes the WHO, UNDP, USAID, UNICEF, CDC, The World Bank, amongst many others, and includes collaborations with the governments of European countries such as the UK, Holland and Norway, as well as private donors.

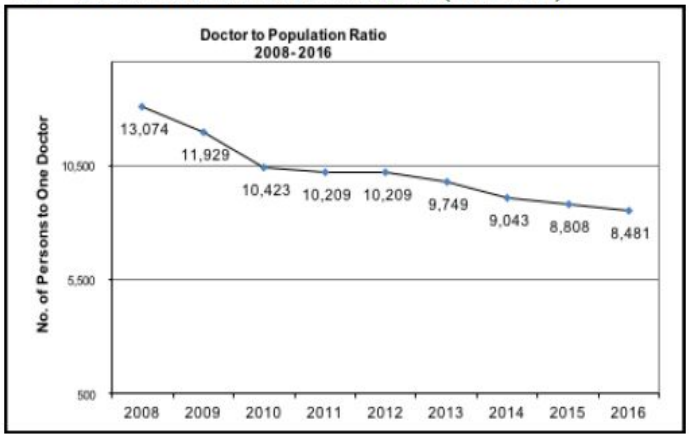
Health workforce and infrastructure:

In 2016 the number of healthcare workers enrolled in the Ministry of Health payroll was 102,019. The GHS has a workforce of 68,132 people, representing 66% of the total health care workforce, with 16% at CHAG and 11% in teaching hospitals. In 2010 there were 15 physicians and 93 nurses per 100,000 persons. In 2015, the GHS reported a total 3263 doctors, or the equivalent of 1 doctor per 8808 people, and in 2017, the total number of nurses in Ghana was 46,137, or the equivalent of 627 people per nurse. The number of nurses in the workforce plummeted to just 9,777 in 2011 but has risen again significantly since (GHS, 2017a).

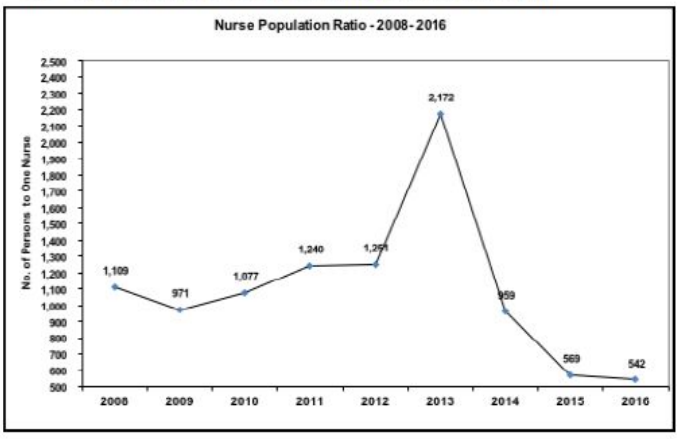
Nurses	45,212
Midwives	>7,662
Doctors (inc. medical officers, consultants, specialists)	3,263
Radiographers	97
Pharmacists	570
Physiotherapists	96

Number of healthcare professionals in Ghana in 2015 (GHS, 2017a)

8.5 DOCTOR POPULATION RATIO (2008-2016)



8.6 NURSE POPULATION RATIO (2008-2016)



Number of Doctors and Nurses Per population 2008-2016 (GHS, 2017a)

Disparities in the distribution of the health workforce between urban and rural settlements still persist. The Ashanti and Greater Accra regions make up 40% of the total health workforce, with the Eastern Region having the third highest proportion of the health workforce (9.5%), and both Upper West and Upper East regions have the least (GHS report 2016).

In 2011 there were just 0.9 hospital beds per 1000 population. In 2016, the rate of hospital admissions was 53.9 per 1000 population, and 29,741,608 people attended outpatients, averaging 1 outpatient visit per patient per year (GHS, 2017A, CIA, 2018).

Ghana National Radiology Profile

Much of the information about Radiology in Ghana is limited and largely out-of-date. Private facilities, largely in Accra and Kumasi, have a much greater amount of information published in terms of websites for increasing numbers of individual diagnostic clinics, advertising the radiology equipment they have available and the type of procedures they offer.

According to Schandorf and Tetteh (1998) the structure of radiology services across Ghana is as follows:

- University Teaching Hospitals - have specialist radiologists, radiographers, and operate a department of radiology in conjunction with the Medical School. Radiography, fluoroscopy, angiography, CT, ultrasound, and theatre equipment.
- Regional Hospitals – ten regional radiological services manned by radiographers under the supervision of senior medical officer in charge of the hospital. Basic equipment is available for most radiological examinations.
- District Hospitals – 60% have basic radiological equipment available for conventional radiography operated by trained senior technical officers under the supervision of senior medical officer in charge.
- District Health Posts and Centres – no imaging services. Refer to district medical officer for radiological procedures.
- Service Agency Hospitals – established by police, military and social security agencies. Offer conventional radiography and fluoroscopy. In 1998 there were three of these hospitals.

Radiology workforce:

It is difficult to establish exact numbers regarding the numbers of different radiology professionals, including radiation technologists and therapists, radiologists, radiation oncologists, medical physicists, radiology-specific nurses, radiation safety officers, imaging device engineers and radiology educators. According to the GHS Facts and Figures report (2016), in 2015 there were 97 radiographers in Ghana; and the Ghana Society of Radiographers (GSoR) (2018) reports a little over 100 radiographers in public service, with 250 in the country that are certified. Due to the small number of radiographers compared to

the size of the population, many radiographers work well over the required 40 hours per week, as is most likely true of the radiologists and other members of the radiology workforce as well.

In a presentation by Doctors Joekes and Quansah from the Rad-Aid Ghana Project to the Royal College of Radiologists in 2014, they described the distribution of radiologists as follows: Northern Region: 2, Brong-Ahafo: 1, Western: 1, Ashanti: 6, Central: 1, Eastern: 1, Greater Accra: 23, and none in Upper West, Upper East or Volta regions. This totals 35 radiologists in the whole of Ghana. Most recently in the media, it has been noted that there is now one Interventional radiologist at Korle-Bu Teaching Hospital (KBTH) (Hansen, 2017).

Training and professional representation:

The Department of Radiology at the University of Ghana runs four-year long diagnostic and therapeutic radiographer bachelors (BSc) degree courses. The university has partnerships with West Sussex University in the UK and Washington University in St Louis, USA, amongst others. Medical Physics MPhil and PhD programmes are run by the School of Nuclear and Allied Sciences. The University of Health and Allied Sciences conduct Bachelors, MPhil and PhD courses in Medical Imaging. Medical Diagnostic Ultrasound can be undertaken as either a BSc or Masters (MSc) at various institutions (GSoR, 2018; UHAS, 2018).

For radiologists, training colleges include the West Africa College of Surgeon and Physicians, and the Ghana College of Surgeons and Physicians. The KBTH, 37 Military Hospital and Komfo Anokye Teaching Hospital (KATH) are the training institutions available for radiologists (Joekes and Quansah, 2014).

The Ghana Society of Radiographers exists as the professional body representing radiographers, and since 2013 all radiographers are required to be registered with the Allied Health Professions Council to be able to practice (GSoR, 2018).

A few opportunities do seem to exist for continuous professional development (CPD), for example the National Training Course on Radiation Protection 2018 organised by Radiation protection Institute of Ghana Atomic Energy Commission, and the Ghana-Norway Summer School 2018, which is a five day medical physics and radiography course through the collaboration between University of Ghana and Norwegian University of Science and Technology (GAEC, 2018; GSMP, 2018).

Equipment inventory and distribution:

It is difficult to obtain specific numbers of what radiology equipment exists in the country and if it is functional. According to Schandorf and Tetteh (1998), the first x-ray equipment in Ghana was installed in colonial times. Since then fluoroscopy and dental procedures have been undertaken, with use of mammography and ultrasound established in 1993. The use of ultrasound appears to be widespread as in most lower-income countries due to its portability, ease of use and cost-effectiveness. In 1997, the National Radiotherapy Centre was established at KBTH in Accra, followed closely by another centre at KATH in Kumasi which are also available to patients from surrounding countries, such as Côte d'Ivoire, Sierra

Leone or Benin. In 2015 there was an ongoing project to expand these radiotherapy services at both hospitals and establish and emergency trauma and acute care centre at KATH.

The WHO Global atlas of medical devices 2014 indicates that in the Ghana public sector the equipment available are two Magnetic Resonance Imaging (MRI) scanners, four Computed Tomography (CT) scanners, two nuclear medicine gamma-cameras and two radiotherapy units (WHO, 2014).

Emi-Reynolds et al (2012) describes sixty-two medical facilities with eighty-six diagnostic units in the Greater Accra Area, which included fifty-six general radiography units, thirteen for dental radiography, nine fluoroscopy, five CT and three mammography.

In 2016, MRI scanning was available in thirteen facilities which were tertiary hospitals, private hospitals, and private diagnostic centres. The majority of MRI facilities were found in private hospitals in the Greater Accra area, with only five of the ten regions having an MRI scanner, implying that 40% of the general population have no access to an MRI scanner at all. There were 0.5 MRI scanners per million population and scans were mainly only covered by private health insurance rather than the public-funded health insurance (Piersson and Gorleku, 2017).

According to the RAD-AID Radiology Readiness report in 2012, KBTH had the following equipment: ten film radiography units (only three working), eight film developers (only three working), one non-functioning computed radiography (CR) unit, one mammography unit, two two-slice CT scanners (only one functioning), one 1.5T MRI scanner, two ultrasound scanners, one standard fluoroscopy unit, one C-arm/angiography fluoroscopy unit, and one SPECT gamma camera. All of this equipment is non-digital. At the 37 Military Hospital, the equipment includes a 16-slice CT scanner, one film radiography unit, one film developer, one CR unit, one direct digital radiography unit, one ultrasound, one 1.5T MRI scanner, one standard fluoroscopy unit, and a PACS system. These two hospitals alone indicate the wide range of differences in equipment and technology that are available in Ghana, and the quantity of equipment that is non-functioning due to a lack of parts, investment and maintenance skills available (Quansah, 2012).

The Greater Accra Regional Hospital was opened in 2017 with the single largest installation of GE Healthcare radiology equipment in Ghana. This included a 1.5Tesla MRI scanner, a 64 Slice multi-detector CT scanner, ultrasound, digital x-ray unit, digital fluoroscopy unit and a PACS and RIS system (Citifmonline, 2017a).

In July 2017, the MoH received support from Delft Imaging Systems Ltd, a Dutch company in a 21 million Euro joint project for the screening of TB around the country using modern, digital x-ray equipment. This involved the installation of 52 digital x-ray machines over two years, with the majority in solar-powered Delft mobile One-stop TB Clinic containers, but also eighteen in hospitals and four in portable vans. There is a seven year maintenance contract and plans to build the capacity of more the 540 staff to run and manage the facilities (Citifmonline, 2017; Delft Imaging Systems, 2018).

The Ghana-Norway Collaboration in Medical Physics and Radiographer education Global Academic project (NORPART) donated a mobile x-ray machine to the GAEC Hospital in Accra in July 2018 (Addo, 2018).

Radiographers were trained on using the Medex Z-Ray administration system (GHS, 2017) but Picture Archiving Communication Systems (PACS) only exists in a few centres. In 2016, a PACS system was installed at KBTH following a donation from IBM, and in recent weeks a Radiology Information System (RIS), both supported by RAD-AID International (RAD-AID International, 2018). GHS has introduced Telemedicine schemes, but currently do not include radiology reporting as far as I could establish.

The major medical suppliers are Philips Healthcare, Siemens and GE Healthcare (Export.gov, 2018). There do not appear to be any local manufacturers for either radiology equipment or parts, meaning that anything required needs to be imported. This causes delays in fixing broken equipment due to a potential lack of funding to import the relevant parts.

Regulation and policy:

Various agencies exist in Ghana to oversee radiology services. There is a Radiation protection Board as part of the Ghana Atomic Energy Commission (GAEC) and a Physics Department, University of Ghana to assess the safety of and ensure the quality control of medical x-ray facilities. In terms of procuring new equipment, the Ghana Standards Board states that medical equipment imported must have a quality certificate from a recognised ISO900 lab (Export.gov, 2018). The MoH will issue a national or international competitive bidding advertisement in the press for complex and expensive capital items.

Conclusion

Whilst Ghana remains one of the most economically stable countries in West Africa, with multiple forms of overseas investment, its healthcare system is still lacking. Great efforts have been made to increase personnel and extend primary care to the most rural communities, but still large disparities between urban and rural populations exist.

Information regarding Radiology services in Ghana was difficult to find, with little to nothing mentioned in the literature from the Ghana Health Service or Ministry of Health, although media reports do show that efforts are being made to increase x-ray facilities. Due to a lack of definitive data, it is difficult to assess how the current workforce and available equipment meet the radiological needs of the country. Things appear to be moving in the right direction with training for radiographers, radiotherapists, medical physicists, radiologists and sonographers. Despite this, with only approximately 100 radiographers and 35 radiologists to serve the entire 29.5 million population, and limited functioning equipment, there is much still to do to ensure adequate public access to up-to-date and functional radiology services. This is of particular importance if Ghana is to achieve the UN SDG 3 of universal health coverage.

"Ghana did not achieve its 2015 health-related Millennium Development Goals (MDGs) and to remedy some of its shortfalls, a number of activities are being implemented to promote Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs). These include the expansion of healthcare infrastructure, health insurance coverage and availability of equitably distributed Human Resources for Health (HRH), which has contributed to doubling the Essential Health Worker to population density (physicians, nurses and midwives) from 1.07 per 1,000 population in 2005 to 2.14 per 1,000 population in 2015" (WHO, 2016).

GHS, 2017

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