Guyana

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Guyana Country Report
2019
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Part 1: General Country Profile

A. Geography and population

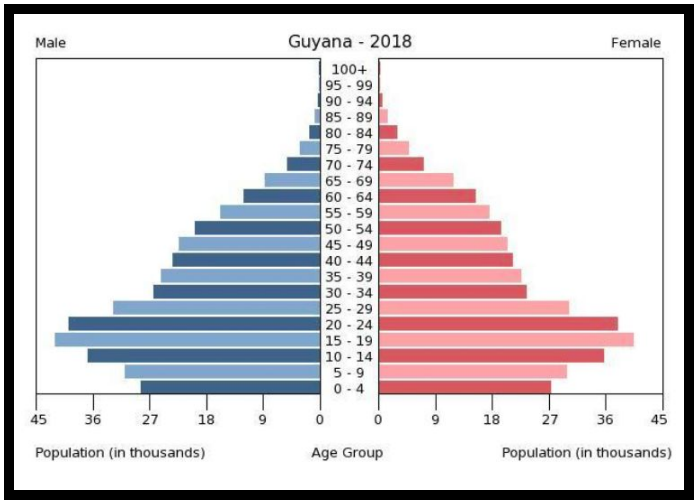
Guyana -- officially known as the Co-operative Republic of Guyana and formerly known as British Guiana -- is a coastal country located along the northeastern edge of the South American continent. Bordered by Venezuela to the west, Brazil to the south and Suriname to the east, Guyana has more than 450 km of coastline bordering the North Atlantic Ocean and is ranked 86th in the world by land area (196,849 square kilometers) (CIA World Factbook, 2018).

Figure 1: South America

(CIA World Factbook, 2018)

Ranked 166th in the world by population, Guyana's estimated 740,685 inhabitants are largely centralized in and around the nation's capital, Georgetown, as well as along the Berbice river. Guyana has on average a young population with a total median age of

26.7 years and a slow rate of population growth at 0.48% per year, ranking it 148th and 156th among the world, respectively. Life expectancy currently ranks 164th in the world at 68.9 years. Interestingly, the Guyanese government dedicates a relatively large part of the country's GDP to education (ranked 28th in the world at 6.3%) which contributes to the country's literacy rate of 88.5%. This translates to a school life expectancy of eleven years on average; however, there remains a significantly high unemployment rate of 21.6% (ranked 62nd globally). It is notable the country has an overall net emigration of -3.2 migrants/100,000 population. In light of the fact that more than 55% of Guyana's citizens live outside of the country, it makes sense that remittances today constitute a considerable source of income for the country's inhabitants. This source of income is critical, as Guyana demonstrates a distribution of family income Gini index score of 44.6 (CIA World Factbook, 2018).



Figures 2 & 3: Guyana & Population Distribution

(CIA World Factbook and World Bank, 2018)

Although access to economic opportunity influences the country's population distribution, it is also greatly affected by the largely forested landscape. With up to 77% of the land surface still covered by rainforest, Guyana represents a precious natural resource to the continent that is today under the threat of deforestation. Interestingly, much of this geographic composition is intentionally incorporated into its flag, which utilizes green to represent the country's rainforest and white to represent its rivers and waterways (CIA World Factbook, 2018).

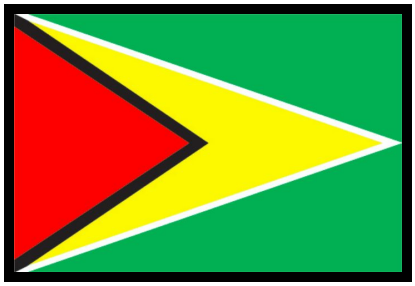


Figure 4: Guyanese Flag

(CIA World Factbook, 2018)

The climate of the country is typical of what one would expect given its equatorial location, central highlands covered in rainforest, and coastal plains with primarily hot and humid weather punctuated by two rainy seasons throughout the summer and late fall. Apart from the constant threat of deforestation, as mentioned above, water pollution also stands as a primary threat to the country's ecology.

B. History and Politics

The history of Guyana is very interesting in that it reflects the influence of several different countries, cultures and empires. The region was originally colonized by the

Dutch in the 1600s, with the colonial title of Guiana -- derived from an indiginous dialect said to mean “Land of Many Waters” -- used to refer to a generic region that included Dutch, British and French colonial presence. At the resolution of the Napoleonic wars in 1815, a period notable for many exchanges of colonial holdings, the country came under British rule with the name being anglicized to Guyana. Guyana would remain a part of the British commonwealth until May 26th, 1966 when it finally gained its independence from the United Kingdom. It is secondary to this British influence that the official language of the country is English, although Guyanese Creole is also prominent in usage (CIA World Factbook, 2018).

Great Britain instituted the Slavery Abolition Act in 1833 to abolish slavery in its overseas colonies, which “led to [the] settlement of urban areas by urban areas by former slaves and the importation of indentured servants from India to work the sugar plantations. The resulting ethnocultural divide has persisted and has led to turbulent politics” (CIA World Factbook, 2018). In fact, much of what defines modern divisions in the Guyanese political landscape is predicated on ethno-cultural divides, rather than ideological differences, which date back to the colonial and early post-colonial period. The country’s varied influences are reflected in its ethnic diversity (39.8% East Indian, 29.3% African, 19.9% mixed and 10.5% Amerindian) as well as its religious pluralism (34.8% Protestant, 24.8% Hindu, 7.1% Catholic, 6.8% Muslim) (CIA World Factbook, 2018).

C. Government and Legal System

Today, Guyana's government is classified as a parliamentary republic with a unicameral legislature composed of sixty-five seats, which represent ten different administrative regions. Universal suffrage is in place with voting eligibility starting at eighteen years of age. His Excellency David Arthur Granger, elected as president in 2015, currently presides as both the Chief of State and Head of Government in a five-year term. His election in 2015 marked the first change in the governing party away from the People's Progressive Party (PPP), which had been leading the government since the 1992 elections. The current constitution of the state dates back to 1980, with several amendments having been added since that time (CIA World Factbook, 2018).

The foundations of the court system are rooted in English common law, and the government is seen as being generally stable dating back to reforms implemented in 1990-1992, which allowed for the first free elections which have continued to date. Multiple independent government advisories corroborate on the point that political demonstrations can occur -- particularly concomitant with ongoing elections -- which can involve violence. The United States Department of State classifies Guyana with a Travel Advisory Level 2, meaning that travelers should exercise increased caution while in-country (CIA World Factbook, 2018).

The majority of crime within the country is often non-violent: theft, robbery, pick-pocketing, and carjacking. Violent crime can and does occur, however, and

particularly highlighted areas in the literature include the East Coast Demerara Region as well as traveling to and from the Cheddi Jagan International Airport while traveling at night. It should be noted for potential travelers and volunteers that homosexuality is classified as a crime in Guyana. Additionally, punishment for drug-related offenses is severe and often includes prison time that must be served in country.

Corruption remains a central roadblock to progress within the country, with U.S. Ambassador Sarah-Ann Lynch recently citing the World Bank's ranking of Guyana's ease of doing business at 134 out of 190 countries as evidence of this fact. She lists corruption and lack of transparency as chief among causal factors (Guyana Times, 2019).

D. Economy and Employment

Guyana is classified as a middle income country by the World Bank (World Bank Database, 2019). Primary contributions to the country's GDP of $6.301 billion are agriculture and mining operations. The principal commodities exported are gold, bauxite, sugar, shrimp, lumbar and rice, which "are highly susceptible to adverse weather conditions and fluctuations in commodity prices" (CIA World Factbook, 2018). Although the country has demonstrated moderate growth of 2-3% over the last five years, the industrial growth rate has most recently been reported as downtrending at 5% annually (World Bank Database, 2019). Primary export partners include Canada, the United States, Panama, the U.K., Jamaica and Trinidad & Tobago. Recent debt

forgiveness and debt restructuring have greatly decreased the debt burden of the country on the world stage, allowing for easier international lending and contributing to the country's continued slow but steadily increasing economy. Recent government sponsored initiatives include beginning to develop and cultivate a market for petroleum extraction and refinement, although this and other efforts continue to be limited by the lack of skilled labor and the out of date public infrastructure throughout the country (World Bank Database, 2019).

E. Physical and Technological Infrastructure

Telecommunication in Guyana, as in most LMICs, is heavily reliant on mobile cellular phone technology. This technology has become increasingly affordable and available, with only 5.3% of the population having access in the year 2000, now up to 82.7% in 2018. Likewise, access to the internet has shown a steady increase over the past twenty years, although not at the rate seen with mobile phone utilization and access. Approximately 6.6% of the population had access to the internet in 2000, compared to 37.3% in 2018 (World Bank Database, 2019).

Access to electricity within the country is reportedly fairly reliable. Within the primary urban centers, the World Bank database lists access at up to 96.7%. In more rural areas, access is estimated at 88.8%. Travelers and those utilizing medical equipment should be aware that the standard voltage utilized is 240 V, and the standard frequency is 60 Hz (World Bank Database, 2019).

The primary form of available transportation within the capital of Georgetown and the surrounding area are minibuses which charge a small fare. An additional option would include use of private taxi services. For over water transportation, private water ferries are available, although several sources recommend utilizing the official state water ferries as they will be more reliably held to safety standards. Two official Guyanese airlines also operate within the country. Of note, there remain significant transportation challenges for individuals with physical disabilities who live in or are travelling within the country (Jacobus, 2018).

According to the Food and Agriculture Organization of the United Nations, an estimated 98% of the inhabitants of Guyana had access to improved water sources as of 2012. Sanitation coverage at that time for urban and rural populations was estimated at 88% and 82%, respectively (Food and Agriculture Organization of the United Nations, 2019).

Part 2: National Health Care Profile

A. National Health Care Profile

The health of the Guyanese state can be measured through several metrics. Among them, the overall mortality rate was estimated in 2018 to be 7.4 deaths/1,000 population and the life expectancy at birth is 68.9 years, ranking Guyana 115th and 164th worldwide, respectively. A mother's mean age of first birth is 20.8 years in Guyana, with

a total fertility rate of 1.97 children born per woman. Relevant to this statistic, the reported contraceptive use rate in the country is 33.9%. Additional very important statistics to consider -- especially in light of the United Nations' Millennium Development Goals -- are the maternal mortality rate (229 deaths per 100,000 live births, 47th internationally) and infant mortality rate (29.5 deaths per 1,000 live births, 63rd internationally) (CIA World Factbook, 2018). An additional important consideration with respect to reproductive health is the percentage of women who received at least one antenatal care visit during their pregnancy, reported at a rate of 81.0% in 2006, lower than the country's reported regional average of 89.8% (Osika et al., 6).

Specifically, the leading causes of death in the country are, in order from most to least common: ischemic heart disease, cerebrovascular disease, cancer, diabetes mellitus, hypertensive disease, HIV/AIDS and suicide (Osika et al., 9). It is interesting to note that the top 5 most common causes of death in the country are strongly related to chronic disease, similar to healthcare in the United States and other high-income countries. This includes an adult obesity prevalence rate of 20.2%, ranking 103rd worldwide. Conversely, nutritional deficiency contributes to 8.2% of children under the age of five being underweight, ranking 70th worldwide. HIV/AIDS has a reported prevalence rate of 1.7%, with up to 8,200 people living with the disease. Additional infectious diseases affecting the population include bacterial and protozoal diarrhea, hepatitis A, typhoid fever, and Zika virus (CIA World Factbook, 2018). These major causes of death within the country are detailed more completely in *Figure 5* below:

Cause of Death	Rank	Total	Rate (per 1,000 population)
Ischemic heart diseases	1	631	0.8
Cerebrovascular diseases	2	567	0.7
Neoplasms	3	469	0.6
Diabetes mellitus	4	426	0.6
Hypertensive diseases	5	309	0.4
HIV disease (AIDS)	6	239	0.3
Intentional self-harm (suicide)	7	169	0.2
Heart failure	8	165	0.2
Acute respiratory infections	9	161	0.2
Cirrhosis and other chronic diseases of the liver	10	132	0.2
Land transport accidents	11	125	0.2
Assault (homicide)	12	118	0.2

Figure 5 : Major Causes of Mortality in Guyana, 2008
(Osika et al., 9)

The dichotomy between communicable and chronic diseases is echoed in the *USAID Guyana Health Systems Assessment of 2010,* where a current health trend toward focusing on chronic disease is noted: “disease burden is shifting from communicable diseases to chronic, noncommunicable diseases, due in large part to its success in combating communicable and vaccine-preventable diseases” (8). Among the communicable diseases detailed above, additional causes of morbidity and mortality within the country include tuberculosis and malaria. Common morbidity and mortality indicators, compared with regional averages within South America, are detailed in *Figure 6* below:

Health Systems Indicator	Source of Data	Guyana	Year of Data	LAC Regional Average	Year of Data
Core Module					
Measles coverage (% of children age 18–24 months receiving MMR)	DHS	66.60	2009	90.72	2008
Pentavalent vaccine coverage (% of children age 18–24 months receiving 3 doses)	DHS	84.70	2009	-	-
BCG coverage (% of children age 18–24 months receiving vaccines)	DHS	94.10	2009	-	-
Polio coverage (% of children age 18–24 months receiving vaccines)	DHS	70.00	2009	-	-
Prevalence of HIV, total (% of population aged 15–49)	UNAIDS 2008	2.50	2007	0.89	2007
TB prevalence, all forms (per 100,000 population)	WHO	110.00	2008	55.96	2008
Percentage of children under 5 with low height for age (stunting)	MICS, WHO	13.70	2006	10.94	2007
Percentage of children underweight	WHO	10.80	2007	4.46	2007

Note: MMR=measles, mumps, rubella

Figure 6 : Morbidity and Mortality Indicators within Guyana, compared to regional averages (Osika et al., 13)

B. National Health Care Structure

a. Structure and policy

The public sector, under the direction of the Ministry of Public Health, is organized into a 5-level system for more comprehensive care. Levels 1 and 2 -- primarily composed of health huts, posts and centers -- are geared toward primary care and outreach to a population that is predominantly rural. Levels 3 and 4 -- composed of diagnostic centers, and district, community and regional hospitals -- are responsible for diagnostics and higher level secondary care. Finally, level 5 is the tertiary care offered at the tertiary referral Georgetown Public Hospital, located in the country's capital (Osika et al., 12).

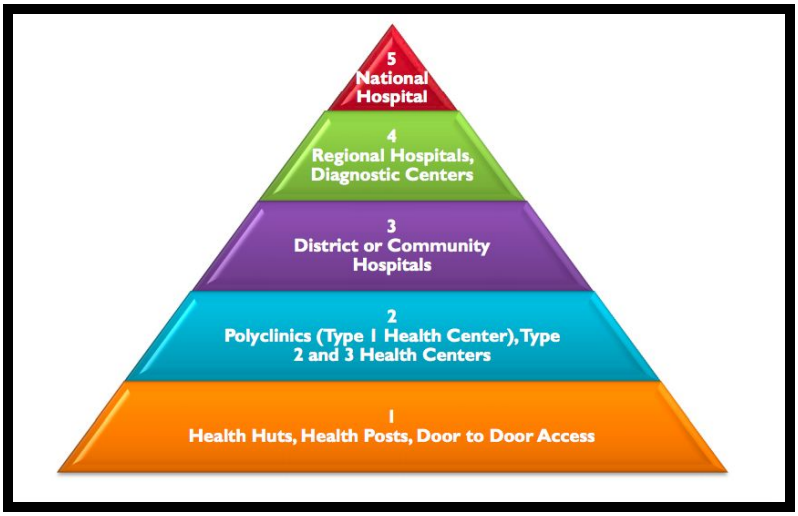


Figure 7 : Levels of Public Health Sector Care Facilities (Osika et al., 13)

In the Guyana public health sector, there is a total of one national tertiary hospital, four specialist hospitals, twenty-six regional and district hospitals, and 343 health centers and posts. The private sector, alternatively, accounts for six private hospitals in the country. This totals 380 total healthcare facilities in the country, servicing approximately 86.5% of the population along the coastal regions, and approximately 13.4% of the population in the hinterland regions. The distribution of these healthcare facilities with regard to their geographic distribution is detailed in *Figure 8* below (Osika et al., 13).

Type of Facility	National Total	Coastal Regions					Hinterland Regions				
		3	4	5	6	10	1	2	7	8	9
Specialist hospital*	4	0	2		2						
National hospitals	1	0	1	0	0	0	0	0	0	0	0
Regional hospitals	6	1	2	0	1	1	0	1	0	0	0
District hospitals	20	3	0	2	2	2	4	1	2	2	2
Health centers	133	13	39	15	28	12	3	12	3	5	3
Health posts	210	27	10	1	4	16	42	20	22	16	52
Private hospitals	6	0	6	0	0	0	0	0	0	0	0
Facility totals	380	44	60	18	37	31	49	34	27	22	57
% total population		13.3	41.0	7.1	19.7	5.4	2.5	6.0	2.0	0.8	2.1

Source: MOH – Regional Health Services.
* Includes geriatric and rehabilitation facilities.

Figure 8: Distribution of Health Facilities by Level and Region (Osika et al., 13)

In order to promote equitable and affordable access to healthcare resources, the system is designed such that most patient encounters should begin at level 1 and 2 facilities, with primary care interaction and decision-making dictating which patients progress to higher levels of care. This structure is dependent on the referral system within the country, which provides the necessary agreements between healthcare centers to facilitate the flow of appropriate patients to higher levels of care as necessary. Despite this arrangement, “geographic and transportation barriers continue to be a challenge” with many facilities “only accessible by boat and/or air” (Osika et al., 99-100). This referral structure is depicted graphically in *Figure 9* below, where patients in public sector primary care health posts (HP) and health centers (HC), as well as from the private sector, are escalated to higher levels of care as necessary.

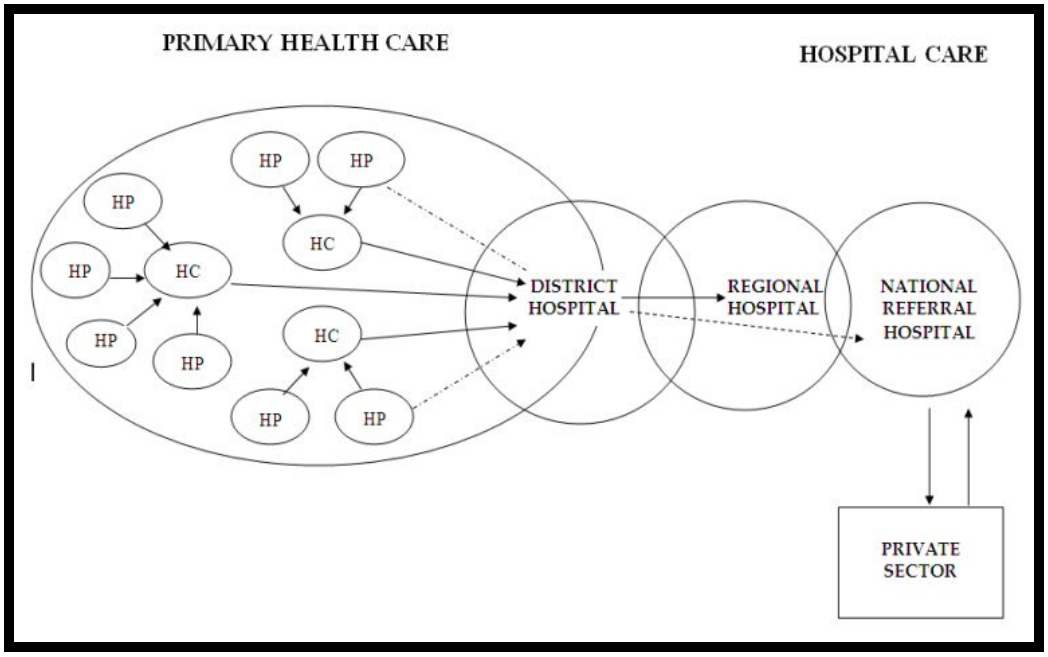


Figure 9: Referral system operating in 5 levels of care and private sector (Osika et al., 99)

Among the most common health insurance systems in Guyana includes participation in the National Insurance Scheme (NIS). “All individuals employed in Guyana, including the self-employed, are legally required to join the NIS,” with NIS membership representing 45% of the labor force in Guyana as of 2008 (Osika et al., 47). The NIS “provides health insurance benefits...as well as pension, disability and other coverages...[including] loss of pay due to medical reasons” (Osika et al., 47). This method, in addition to out-of-pocket expenditure on behalf of a family for health care services -- primarily in the private sector -- accounts for the main healthcare payment models within the country. The true extent of private household expenditure on healthcare, as sampled in the year 2006, is treated in the following *Figure 10*:

	Per capita household expenditure on health (total)	Per capita household expenditure on health (medical care and health services)	Per capita household expenditure on health (hospital care)
Region 1	2.79	2.33	0.46
Region 2	3.59	3.31	0.28
Region 3	8.83	6.80	2.02
Region 4	11.97	9.97	2.00
Region 5	14.05	12.70	1.35
Region 6	13.61	10.53	3.08
Region 7	7.33	5.72	1.61
Region 8	1.14	0.22	0.91
Region 9	2.68	1.82	0.85
Region 10	19.05	13.22	5.84
Total	10.91	8.79	2.12

Figure 10: Per Capita Expenditure on Health by Households by Region, 2006 (Osika et al., 45)

Another important aspect of healthcare structure and policy is to ensure that health systems "define, communicate, and monitor the level of the quality of care" (Osika et al., 105). In this vein, the Health Facilities Licensing Act of 2006 was passed in Guyana to standardize the quality of care offered in both public and private facilities, which includes both physical resources as well as standardizing treatment guidelines. Unfortunately, however, "monitoring the use of guidelines" remains a challenge (Osika et al., 105).

b. Health service coverage

The Guyanese constitution guarantees healthcare coverage as a fundamental human right. As such, an initiative within the government to "ensure equitable access and provision of basic, essential, quality health care services to people across Guyana" was

implemented in 2008 known as the *Package of Publicly Guaranteed Health Services*. Health care services in Guyana, similar to many LMICs, are available both through the public and private sectors. Healthcare in the public sector is free, as guaranteed by the constitution, while private care is based on a standard fee-for-service model (Osika et al., 12).

The majority of private health care services are offered in Region 4, where the capital Georgetown is located, “as well as through a network of for-profit private doctors and clinics functioning in more populous areas” of the country (Osika et al., 100). The private sector constitutes six private hospitals, which routinely receive referrals themselves from the public sector when necessary services and/or equipment are not readily available at a public facility. In this case, the National Insurance Scheme (NIS) covers costs incurred by the patient. Unfortunately, due to the lack of reporting requirements for the private sector, there exists no “adequate documentation on the number, type and location of doctors active in the private sector” (Osika et al., 100).

One of the greatest challenges to delivering sufficient health care to Guyana’s population is the reported “brain drain” phenomenon, wherein healthcare professionals -- especially those who seek their training out of country -- have a tendency to only offer their skills and services within the capital of Georgetown or emigrate out of the country, depriving the care they would have provided altogether. Staggeringly, “more than 80% of Guyanese nationals with tertiary level educations have emigrated”, and “brain drain

and the concentration of limited medical resources in Georgetown hamper Guyana's ability to meet the health needs of its predominantly rural population" (CIA World Factbook, 2018).

Among the most important services that are offered through the Guyanese public health system are those relating to interventions for preventable diseases in what are deemed the "Priority Service Areas," including HIV, TB and malaria. "Increased funding from development partners…[has] seen a dramatic increase in HIV/AIDS services" (Osika et al., 101). This includes public sector voluntary counseling and treatment (VCT) services, now available across the country. With respect to TB, apart from increasing the number of research and treatment sites across the country, there has also been implementation of "training for prison service staff on TB control, provision of VCT, and the development of a strategic plan for TB/HIV control in Guyana"; however, "major challenges...include decentralization and integration of…services, availability of human resources, and a lack of incentives for outreach workers" (Osika et al., 101). Finally, with respect to malaria, efforts include "the distribution of long-lasting insecticidal nets, indoor residual spraying programs, distribution of malaria awareness brochures, and the creation of malaria councils in at-risk communities" (Osika et al., 102).

c. Health care expenditures

The current health expenditure in Guyana as a percentage of the national economy is reported at 4.5% as of 2015 (CIA World Factbook, 2018). This is decreased from a

reported 10.0% in 2009 (Osika et al., 30). The vast majority of health care expenditures in Guyana, mainly due to the large public health sector, is paid for by the government. The Ministry of Finance (MOF) in Guyana allocates a certain percentage of government resources each year to the Ministry of Health, regional health sites and the Georgetown Public Hospital. These funds are primarily derived through tax revenue as well as contributions from external partners (Osika et al., 31). The complete extent of external partner contributions is detailed more completely in *Figure 11* below:

Funding Agency	2007 (US$)	2008 (US$)	2009 (US$)
USAID/PEPFAR: HIV/AIDS	25,300,000	20,000,000	17,750,000
The Global Fund: HIV/AIDS: National Initiative to Accelerate Access to Prevention, Treatment, Care and Support for Persons Affected by HIV/AIDS	1,497,204	3,890,384	7,338,235
The Global Fund: TB: Strengthening and Expanding of DOTS Strategy for the control of Tuberculosis in Guyana; Strengthening Local Capacity to Respond to Tuberculosis through Alliances	361,769	286,754	173,437
The Global Fund: Malaria: Strengthening Local Capacity to Respond to Malaria through Alliances	398,716	238,842	660,848
IDB: Institutional Capacity Improvement; Health Service Delivery Improvement (Linden, GPHC), Basic Nutrition Programme	5,536,288	6,219,540	6,211,376
The World Bank: HIV/AIDS, M&E and other	2,233,692	2,476,596	3,777,910
GAVI: Maternal and Child Health Immunizations	133,600	129,753	180,242
AIFO: Italian NGO supporting response to Disabilities and Leprosy	-	-	1,628
CDC: Disease Control: HIV/AIDS and Surveillance	1,488,482	1,016,257	1,336,847
CDC: National Blood Transfusion Services	-	391,408	469,281
Clinton Foundation: Project support, including HIV Care and Treatment and PMTCT	5,471	3,303	-
PAHO: Disease Control programme and Human Resource Department strengthening	71,026	22,491	78,841
Proctor and Gamble: Supporting Environmental Health through provision of water purification packets	-	50,273	-
UNFPA: Support for youths with HIV/AIDS living with especially difficult circumstances	21,608	5,906	2,727
UNICEF: Support to MCH and PMTCT activities	191,310	103,418	77,954
Miscellaneous	-	-	100,046
Total donor funding	37,239,164	34,834,925	38,159,372
Donor funding captured under MOH capital expenditure	7,769,979	8,696,137	9,989,286
Donor funding not captured by MOH expenditure	29,469,185	26,138,789	28,170,087

Note: DOTS= Direct Observation Therapy, Short Course, PMTCT=Prevention of Mother-to-Child Transmission, MCH=Maternal and Child Health

Figure 11: External Source Funding for Guyanese Health Development (Osika et al., 34)

Payment from the government on the public health system accounts for a total of 84.5% of all health care expenditure in the country, whereas out-of-pocket costs account for

approximately 15.5% of total health care expenditures (Osika et al., 30). These data are clearly summarized in *Figure 12* below:

Health Financing Indicator	Guyana	Average value of comparator countries (lower-middle-income)	Source of Data	Year of Data
Total health spending per capita (US$)	US$67	US$107	WHO	2006
	US$118 *	-	MOH	2009
Government expenditure on health as % of total government expenditure	8.3%	9.6%	WHO	2006
	10.0%	-	MOH	2009
Total expenditure on health as % of GDP	5.5%	6.1%	WHO	2006
	5.7%*	-	MOH	2009
Public (government) spending on health as % of total health expenditure	84.5%	57.2%	WHO	2006
Donor spending on health as % of total health spending**	29.3%	11.3%	WHO	2006
Out-of-pocket expenditure as % of total expenditures on health	15.5%	37.5%	WHO	2006

Figure 12: Health Financing Indicators in Guyana
(Osika et al., 30)

d. Health workforce and infrastructure

As with many LMICs, one of the ongoing challenges in Guyanese healthcare is both training and keeping enough medical personnel in-country to meet the healthcare demands and needs of its people. In Guyana, as of 2018, there were only 0.8 physicians per 1,000 people (CIA World Factbook, 2018). Regarding mid-level providers, the literature suggests that midwives play an important role in perinatal healthcare in the country, with a country-wide 87% of total births attended by a skilled healthcare professional (World Bank Database, 2019). According to Commonwealth Health Online, there were 53 nurses and midwives per 100,000 people between

1997-2010 (Commonwealth Health Online, 2019). The role of midwives seems particularly pivotal in the rural setting (Pan American Health Organization, 2011). There is no readily available data on the presence and prevalence of nurses and pharmaceutical personnel, although they certainly play an important role in healthcare delivery in Guyana. Additionally in Guyana, as of 2014 there were 1.6 hospital beds per 1,000 population, which serves as a general measure of inpatient availability in the country (CIA World Factbook, 2018). In the public sector, these healthcare workers form part of the previously described 5-level public health system implemented throughout the country under the direction of the Ministry of Public Health, currently headed by the Honorable Volda Lawrence (Guyana Ministry of Health Website, 2016).

National Radiology Profile - Part 3

A. Radiology Workforce and Training and Professional Representation:

Regarding the overall medical workforce in Guyana, access to physicians and services can be limited, especially outside of the capital city of Georgetown. “Because the majority of health workers are employed in the public sector and the public sector is often the only source of health care in the hinterlands, shortages in the sector affect the majority of the country, and rural communities especially” (Osika et al., 49). Additionally, further challenges that confront the public healthcare system in Guyana include: “an inefficient and complex public sector hiring system; high attrition rates of health workers,

especially nurses; and a lack of a systematic tracking of health worker information" (Osika et al., 49).

The government has implemented different strategies to improve access to physicians, including "recruiting foreign doctors, training doctors in Cuba, and inviting Cuban doctors to work in Guyana…[resulting in a] net positive to improving the health workforce in Guyana, especially at the tertiary level" (Osika et al., 50). Nevertheless, there have remained significant gaps in coverage provided by medical professionals throughout the country. For example, a 2009 estimate showed a 28% shortage of physicians, a 24% shortage of nurses, a 74% shortage of dentists, and up to an 83% shortage of dentists (Osika et al., 54).

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Doctors	4.2	3.1	4.5	4.2	4.2	4.9	4.9	3.8	5.1
Nurses	NA	14.1	14.1	14.1	14.2	11.6	10.8	14.1	12.6

Figure 13: Doctors and Nurses per 10,000 Population, 2000-2008 (Osika et al., 51)

Staff Category	Required	Available	Gap	% of Total Required
Medical Staff				
Doctors	223	161	62	28%
Medexes	166	77	89	54%
Nurses (incl. nurse/midwife)	609	399	210	34%
Dentists	64	11	53	83%
Dentex	79	29	50	63%
Pharmacists	57	15	42	74%
Midwives	213	200	13	6%
Medical Assistants				
Dental assistants	161	6	155	96%
Nursing assistants	450	390	60	13%
Pharmacy assistants	196	72	124	63%
Laboratory Staff				
Medical technologists	89	32	57	64%
Multipurpose technologists	90	33	57	63%
Microscopists	106	13	93	88%
Community-based Staff				
Social Workers/Counselors	151	28	123	81%
CHWs	270	245	25	9%
Total	**2924**	**1711**	**1213**	**41%**

Figure 14: Selected Public Sector Gaps from the HRH Gap Analysis, 2009 (Osika et al., 54)

In order to address access issues specifically in the field of radiology, the first Radiology Readiness Assessment in Guyana was conducted by Dr. Teodora Bochnakova in November/December 2015. At the time of her assessment, the primary public teaching and tertiary referral hospital in Guyana -- the Georgetown Public Hospital Corporation (GPHC) -- had one full-time radiologist trained and appointed from China for interpretation of radiographs, one full-time Cuban-trained radiologist whose primary responsibility involved ultrasound interpretation, as well as a part-time Indian-trained radiologist who also provided ultrasound interpretation for GPHC. In addition to these residency-trained radiologists, at that time, there was also an internal medicine

physician who received ultrasound training in the United States and performed ultrasound studies in the radiology department. Apart from physicians, the radiology department also included a senior radiographer primarily responsible for departmental administrative duties, with general departmental oversight at the administrative level performed by the hospital's Chief Medical Officer. Four Cuban-trained radiographers were also present and working in the department, all of whom had university-level training. Finally, as of the assessment data available from 2015, there was also a Mexican-trained medical physicist with master's level training working at GPHC. At that time, she was serving as the chief radiation safety officer as well as an instructor at the University of Guyana Medical Imaging Programme (RadAid Program Director, email communication, October 2019).

Little data regarding the exact number and distribution of radiologists outside of the public system were available for comparison and analysis at the time of the *Radiology Readiness Assessment* in 2015. It was noted, however, that additional services were offered in the adjacent, privately-owned Cancer Institute of Guyana (CIG). Additionally, the assessment makes note that many patients required referral to the neighboring island country of Trinidad and Tobago for more advanced services as required and financially able. Regarding ancillary staff, there were no dedicated radiology nurses at the time of assessment (RadAid Program Director, email communication, October 2019).

Following the Radiology Readiness Assessment of 2015, a partnership between RAD-AID, Northwell Health of New York, the University of Guyana and Georgetown Public Hospital Corporation was formed to create a three-year radiology residency program for Guyanese physicians to pursue an education and career in radiology. The program involves six months of intensive on-site training at the Northwell hospital in New York, followed by additional two-and-a-half years of training at the Georgetown Public Hospital in Guyana. The residents in Guyana will continue their training with Guyanese radiologists, visiting radiology professors from abroad and supplemental teleconferences for learning. The first class started their training at Northwell in November 2017, with additional classes slated to enroll (Davis, 2018).

In addition to the creation of the radiology residency, the GPHC and the University of Guyana also support the Bachelor of Science program in Medical Imaging, a four-year university level degree in radiography which underwent a program revision and upgrade from an associate degree in 2013 (University of Guyana, 2018).

More recent readiness assessments for radiology administration and interventional radiology, performed by Dr. Gillian Battino in 2019, provide additional updates and insight into the public sector radiology capabilities that have been implemented and developed since 2015. Presently at GPHC, two consultant radiologists (one of whom serves as the department head), eleven radiology residents (one of whom serves as chief resident), twelve medical imaging technologists, twelve x-ray technicians, six

nursing staff, five clerical staff, and one administrative assistant (Rad-Aid Program Director, email communication, October 2019).

Regarding interventional radiology, the readiness assessment revealed that there are not currently any interventional radiologists within the public health sector, although there are occasional image-guided procedures performed (core biopsy, drain placement, vascular access). No nursing staff are currently trained in sedation administration, although they are available for periprocedural patient monitoring. Surgical pathology and general surgery services are available on-site. Finally, there is a functioning cath lab with interventional cardiology at GPHC, so there remains the possibility of integrating interventional training into the residency program at some point in the future (RadAid Program Director, email communication, October 2019).

B. Equipment Inventory, Distribution, and rules and regulations:

Published data regarding the exact number of imaging devices and the presence or absence of medical imaging services throughout Guyana is limited. Of the data that does exist, there is no precise accounting for where in the country extant medical devices reside, although it is likely that the greatest access remains in the region of the capital as that is where the vast majority of healthcare services are offered, as discussed previously.

According to the *Radiology Readiness Assessment* for the Georgetown Public Hospital Corporation performed in 2015, the GPHC did not have a CT scanner, although an arrangement was in place to allow public access to a nearby private CT scanner located in the Cancer Institute of Guyana for a discounted price. The public hospital did not have an MRI machine or Nuclear Medicine capabilities, although these were thought to be available in the private sector. At that time, the primary modalities available in the hospital included radiography and ultrasound, with a fluoroscopy machine being installed and a C-arm located in the orthopedic surgery department (RadAid Program Director, email communication, October 2019).

The World Health Organization's Global Atlas of Medical Devices -- published in 2017 -- notes that Guyanese patients have access to CT, MRI, and mammography in the private sector, but offers no available data for the public sector. According to this report, the private sector contains three CT scanners, one MRI machine and three mammography units. Additionally, it notes the presence of one linear accelerator in the country for private sector radiotherapy. The report offers no data on the presence of ultrasound, nuclear medicine or PET services (WHO, 2017).

According to this same 2017 WHO report, the overall responsible regulatory body for medical devices is the Guyanese Food and Drug Department. Additionally, it's important to note that according to the WHO, there are no medical device manufacturers in Guyana to facilitate the local acquisition of medical imaging devices.

More recent data available from Dr. Gillian Battino's Interventional Radiology Readiness Assessment performed in January 2019 shows interval changes with respect to the availability of functioning imaging equipment in the public sector at GPHC: two ultrasound machines, one 64-slice CT scanner, and a conventional fluoroscopy room. The assessment also notes the presence of two non-operational C-arm units in the hospital operating rooms. The only intravenous contrast agent available for use is Ultravist 300, and there are eight total lead body aprons available for use in the radiology department (RadAid Program Director, email communication, October 2019).

On-Site Assessment

A. A brief summary of the radiology readiness assessment for each site

As previously mentioned, the first Rad-Aid Radiology Readiness Assessment was performed in November and December 2015. At that time, many radiology services existed in Guyana but access to education for training new radiologists to meet the demand of the public sector remained the primary need. As such, the purpose of the assessment was to ascertain whether or not implementation of a radiology residency training program would be feasible as many radiology services. Since that time, a number of gains and accomplishments have been made, the most important of which is the implementation and support of the radiology residency. The residency currently has five second-year residents and six first-year residents, all of whom have completed or are completing the initial portion of their training in the United States and will complete

the remainder of their training in Guyana. The organization of the Georgetown radiology department to support their training, as well as the implementation of a PACS system that supports remote viewing of images from the United States, remains a great stride forward in the implementation of radiology services in the country of Guyana.

According to the recently performed Radiology Administration Assessment of the Guyana site, the current primary points of contact at present in the country are Dr. Fawcett Jeffrey, Director of Medical and Professional Services of the Georgetown Public Corporation Hospital, as well as Dr. Tania Aguilera Garcia, a consultant radiologist on-site (RadAid Program Director, email communication, October 2019). It is through a partnership with these individuals that the program will continue to grow and thrive.

Looking into the future, there is an opportunity for the implementation of broader and more advanced radiology services. The Interventional Radiology Readiness Assessment performed in 2019 notes that some image-guided procedures are already available at the hospital, but that there remains much room and desire for growth (RadAid Program Director, email communication, October 2019). Likewise, breast imaging services at the hospital are another important area for potential future growth.

Conclusion

Guyana is a country unique among South America, with a rich tapestry of ethnicities and a singular blend of different world cultures. Additionally, Guyana is a country with an emerging market of valuable natural resources -- namely oil -- that could potentially be leveraged in part to support public health initiatives such as radiology implementation. Given that Guyana already has a somewhat developed system of public and privatized radiology services, there is a unique opportunity for intervention in the form of education and the implementation and support of the radiology residency program at the Georgetown Public Hospital. The most useful way that other volunteers and organizations can get involved would be to reach out to Rad-Aid Guyana leadership and explore avenues for involvement and support of medical education in Guyana. As the current residents complete their training and graduate to become attending radiologists, there will be more opportunities for assisting with the expansion of services outside of the Georgetown area. Additionally, these residents may stay on as faculty and there will be a role for new faculty mentorship for those that are looking for ways to get involved.

The future for radiology is promising in Guyana, and will only continue to improve with the newest generations of Guyanese radiologists.

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