



Seychelles

By Mohammad Ziaul Haque,
MBBS, M.phil



A Nonprofit Public Service

RAD-AID.org
Radiology serving the world

SEYCHELLES COUNTRY REPORT

For use in Radiology Outreach Initiatives

Author

Mohammad Ziaul Haque, MBBS, M.phil

Table of Contents

General Country Profile

A. Geography and Population	3
B. History and Culture	7
C. Government and Legal System	9
D. Economy and Employment	10
E. Physical and Technological Infrastructure	14

National Health Care Sector Review

A. National Health Care Profile	16
B. National Health Care Structure	24

National Radiology Profile

A. Overview of Imaging in Seychelles	27
B. Workforce, Training and Professional Representation	30
C. Radiology Regulation and Policy	32

Conclusion	33
-------------------	----

References	36
-------------------	----

Appendix A	38
-------------------	----

SEYCHELLES

“The Paradise”

General Country Profile



Figure 1: Seychelles Flag (CIA, 2018) [1]



Figure 2: Seychelles Map (CIA, 2018) [1]

A. Geography and Population

The Republic of Seychelles is an island nation that lies more than 1,500 km from the east coast of Africa and north of Madagascar in the Indian Ocean. Its 155 scattered islands have a combined land area of 455 sqkm with an exclusive economic zone of 200 nm.

The islands fall into two main physical types. The islands of the central group, including the main island ‘Mahé’, are formed from granite and consist of a mountainous heart surrounded by a flat coastal strip. The “Outer Islands” are made up of coral accretions at various stages of formation, from reefs to atolls. These are generally smaller and almost entirely flat, lying only a few meters above sea level. The majority of these islands have no water, and only a few are inhabited. The three main islands, housing nearly the entire population, are deemed the “Inner Islands” and include: Mahé, Praslin, and La Digue. The main islands enjoy high humidity and rainfall, feeding the lush tropical rainforest. Wildlife include the rare Giant Land Turtle and colorful reef animals such as the Green Sea Turtle. The islands have in the past suffered from human incursions but are now strictly preserved and maintained. The

islands are valued greatly for their unique forests and wildlife, some of which are only found within these islands.

June to September is the drier, cooler, southeast trade winds season. January, the wettest month, brings 380 millimeters of precipitation to Mahé, where rainfall is heaviest. Precipitation drops to less than 63 millimeters in June, the driest month. The government has established several marine parks and placed about half of the nation's land area under environmental protection to preserve biodiversity. (CIA, 2018)[\[1\]](#)

Geographic coordinates: 4 37 S, 55 27 E

Time difference: UTC+4 (9 hours ahead of Washington, DC, during Standard Time)

Population: 95,834(National Bureau of Statistics, Seychelles. 2017) [\[2\]](#)

MID-YEAR POPULATION ESTIMATES 2013-2017

Sex and Age Group	2013	2014	2015	2016	2017
<u>MALES</u>	<u>44,735</u>	<u>45,278</u>	<u>46,322</u>	<u>47,343</u>	<u>48,793</u>
0-19	13,498	12,989	12,962	12,542	11,805
20-44	17,938	18,528	18,543	18,520	18,593
45-64	10,465	10,780	11,558	12,786	14,402
65+	2,834	2,981	3,259	3,495	3,993
<u>FEMALES</u>	<u>45,214</u>	<u>46,081</u>	<u>47,097</u>	<u>47,334</u>	<u>47,050</u>
0-19	12,985	12,623	12,738	12,271	11,443
20-44	17,227	17,607	17,765	16,844	15,231
45-64	10,736	11,459	12,068	13,396	15,129
65+	4,266	4,392	4,526	4,823	5,247
<u>BOTH SEXES</u>	<u>89,949</u>	<u>91,359</u>	<u>93,419</u>	<u>94,677</u>	<u>95,843</u>
0-19	26,483	25,612	25,700	24,813	23,248
20-44	35,165	36,135	36,308	35,364	33,824
45-64	21,201	22,239	23,626	26,182	29,531
65+	7,100	7,373	7,785	8,318	9,240
<u>BOTH SEXES</u>					
%					
0-19	29.4	28.0	27.5	26.2	24.3
20-44	39.1	39.6	38.9	37.4	35.3
45-64	23.6	24.3	25.3	27.7	30.8
65+	7.9	8.1	8.3	8.8	9.6

Source: National Bureau of Statistics

Table 1: Mid-year population estimates 2013-2017(National Bureau of Statistics, Seychelles. 2017) [2]

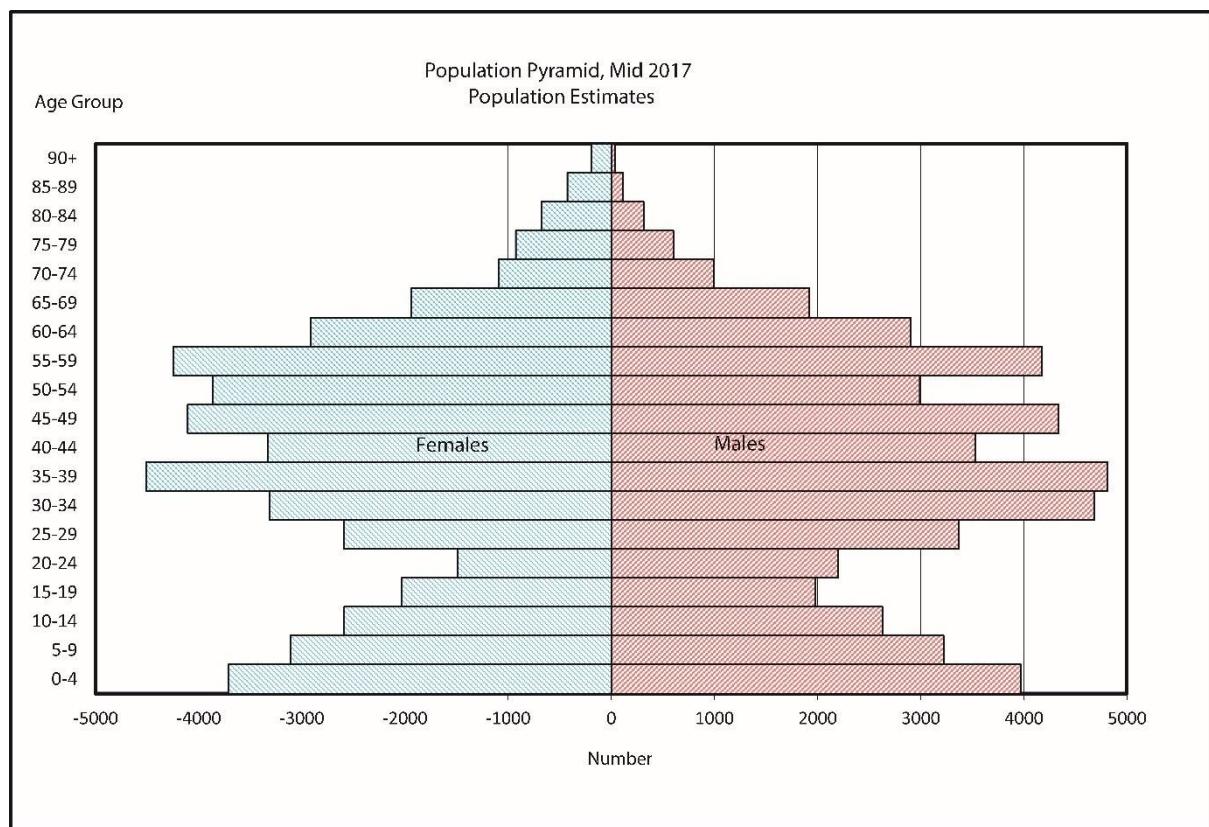


Figure 3: Population pyramid; total 95,834(National Bureau of Statistics, Seychelles. 2017,June 30) [2]

Roughly 90% of Seychellois live on Mahé; its population is concentrated around the nation's capital city, Victoria. About eight percent of the population lives on nearby Praslin, and another one percent is on La Digue. The remaining 152 islands are sparsely populated or uninhabited.

Nationality: Seychellois (singular and plural).

Ethnic Group: Mixed French, African, Indian, Chinese, and Arab

Language: Seychellois Creole (official) 89.1%, English (official) 5.1%, French (official) 0.7%, other 3.8%, unspecified 1.4% (2010 est.)

Religion: Roman Catholic 76.2%, Protestant 10.6% (Anglican 6.1%, Pentecostal Assembly 1.5%, Seventh-Day Adventist 1.2%, other Protestant 1.6), other Christian 2.4%, Hindu 2.4%, Muslim 1.6%, other non-Christian 1.1%, unspecified 4.8%, none 0.9% (2010) (CIA, 2018)[1]

Demographic profile

The population of Seychelles is composed of the descendants of African slaves, South Indians, French planters, and later British settlers, Africans, and Indian, Chinese, and Middle Eastern traders. The majority of the population is concentrated on three of its 155 islands, the vast majority on Mahé, and lesser numbers on Praslin and La Digue. Seychelles' population grew rapidly during the second half of the 20th century, largely due to natural increase, but the pace has slowed due to fertility decline. The total fertility rate dropped sharply from 4.0 births per woman in 1980, to 2.3 births per woman in 2016. This was largely due to implementation of a family planning program, free education and health care, and increased female labor force participation. By 2035, the predicted population will be 106,000, exhibiting further growth rate decline. In 20 years, there will be fewer births per year, and longevity of the elderly will increase the need for regenerative and restitutive care.

Life expectancy has increased steadily, but women on average live 9 years longer than men, a difference higher than that of typical developed countries.

This change of population structure is seen in a growing number of citizens over the age of 65. Due to gradual but significant economic growth and sanitation and health sector developments, quality of life improvement remains an essential goal of all future strategic plans.

An increasing number of migrant workers, predominately young males, have been migrating to Seychelles in recent years to work in the construction and tourism industries. As of 2011, foreign workers made up nearly a quarter of the workforce. Indians are the largest non-Seychellois population, representing half of the country's foreigners, followed by Malagasy. (CIA, 2018)[\[1\]](#)

B. History and Culture

Colonial Roots

Seychelles was named by French Captain Corneille Nicholas Morphey after Jean Moreau de Séchelles, the finance minister of France in 1756. Seychelles was not permanently inhabited until the 18th century, though Arab sailors may have possessed knowledge of the islands as early as the 7th century. Seychelles Archipelago first appeared on European maps at the beginning of the sixteenth century after Portuguese explorers sighted the islands during voyages to India. (The Ministry of Foreign Affairs, Seychelles. The National Humanitarian Affairs Committee, Seychelles, 2004) [\[3\]](#) The crew of the British ship "Ascension" became the first Europeans to set foot in Seychelles when they anchored off the coast of Mahé in 1609. Pirates later used the islands as safe havens, as their remoteness made them of little interest to other seafarers. The governor of the then French territory Mauritius (an island southeast of Seychelles), François Mahé de Labourdonnais, sent an expedition to Seychelles

in 1742. After a second expedition two years later, the island of Mahé was named in his honor. It was not until 1756, when the French feared the British would attempt to occupy Seychelles, that the French formally claimed it. The first settlers arrived in 1770, and the French established a military base on Mahé in 1786. Possession of Seychelles passed to the British in the 1814 Treaty of Paris. After Britain abolished slavery in 1835, it liberated over 6,500 African slaves from captured slave ships and relocated them to Seychelles, where they became laborers on plantations that produced coconut oil, cinnamon oil, and vanilla.

In 1903, the islands became a crown colony and separated from Mauritius. Chinese, Indians, and other ethnic groups settled in Seychelles; by the 20th century intermarriage between the islands' various groups had created the cosmopolitan Seychellois population that exists today. (CultureGrams™ World Edition 2014 Republic of Seychelles, 2014, p.1) [4]

Independence and Democracy

The involvement of Seychellois in their own political affairs began in 1948 after World War II, when Britain granted suffrage to approximately 2,000 adult male property owners.

Two political parties, the Seychelles Democratic Party (SDP) and Seychelles People's United Party (SPUP), were formed in 1964.

The SPUP represented a socialist ideology, favoring worker oriented policies and pressing for complete independence from Britain and a non aligned foreign policy. The SDP was characterized by a more laissez-faire, capitalist approach, supporting continued association with Britain and allowing British and United States bases on the islands. The SDP, led by James Mancham, won the islands' next two elections and formed a coalition government with the SPUP to prepare the colony for independence. Finally, Britain granted the colony complete independence, and on June 29, 1976, the Republic of Seychelles became a sovereign nation. Mancham became president and SPUP leader France Albert René became prime minister.

In 1977, René staged a coup while Mancham was out of the country and established himself as the president of a socialist state under a single party which he referred to as the Seychelles People's Progressive Front (SPPF). In the 1990's, the economy declined, due in part to the expiration of foreign support (from both the United States and the Soviet Union) that followed with the end of the Cold War, as the country's strategic location lost importance. In 1991, a resolution was adopted by the SPPF Congress to liberalize the political system; the government invited all political stakeholders to assist in rewriting the Constitution and re-establishing multiparty politics.

France Albert René defeated Mancham in the 1993 presidential poll and was reelected in 1998 and 2001. The SPPF continued to win the majority of parliamentary seats. After nearly three decades in power, René stood down in 2004 to make way for his long time vice president James Michel, who won the 2006 presidential election and was reelected in 2011. Upon taking office, Michel encouraged open communication within the government and has since made significant progress in stabilizing and privatizing the economy. In October 2016, James Michel resigned and handed over the presidency to his Vice-President, Danny Faure.

(The Ministry of Foreign Affairs, Seychelles. The National Humanitarian Affairs Committee, Seychelles, 2004) [3], (CultureGrams™ World Edition 2014 Republic of Seychelles, 2014.p.2) [4]

C. Government and Legal System



Figure 4: Coat of arms of Seychelles

The Seychelles form of government is a “Presidential System,” based on the concept of the “Separation of Powers Doctrine” between the judiciary, executive, and legislature branches. The offices of Head of the State, Head of the Government, and Commander-in-Chief of the Defense Forces are held for a period of five years by a citizen who is not disqualified from registration as a voter under the Constitution (Articles 50, 51). (The Ministry of Foreign Affairs, Seychelles, The National Humanitarian Affairs Committee, Seychelles, 2004) [3] The Constitution establishes an articulated system of checks and balances to ensure proper governance.

Chief of State and Head of Government is currently President Danny Faure (since 16 October 2016); the office of Vice President is currently held by Vincent Meriton (since 28 October 2016).

The president of Seychelles is elected by universal adult suffrage, empowered under the 1993 Constitution to rule by decree, and serves a five year term.(The Ministry of Foreign Affairs, Seychelles, The National Humanitarian Affairs Committee, Seychelles, 2004)[3] The legislative branch is made up of an National Assembly, with 34 seats in total elected by universal adult suffrage through combinations of the “first-past-the-post system” (twenty five seats) meaning that the candidate with the plurality of votes is the winner of the parliament seat. The losing party or parties win no representation at all, and proportional representation of nine seats. Members of the National Assembly serve a four year term.

The Seychelles government is a socialist, multiparty republic with the“PartiLepep” (People’s Party) currently in power. Administratively, the country is divided into 25 districts, each as signed a District Administrator responsible for the wellbeing of its Constituents. The judicial power of Seychelles is divided into the following:

- The Court of Appeal (highest court)
- The Supreme Court
- Other subordinate courts and tribunals established under the Constitution

Chapter IX of the Constitution calls for an independent “Constitutional Appointments Authority”, established to select and recommend to the executive branch appointments of judges, the Office of the Attorney General, Auditor General, Ombudsman, and Electoral Commissioner. (The Ministry of Foreign Affairs, Seychelles., The National Humanitarian Affairs Committee, Seychelles, 2004)[3] The Authority comprises of members nominated by both opposition and government. The removal of a Justice of Appeal or judge from office for inability or misbehavior shall be the consequence of a presidential decision, based on a recommendation made by an “ad hoc” tribunal appointed by the Constitutional Appointment Authority to investigate the matter (Chapter VII, Cap 143(3)). (The Ministry of Foreign Affairs, Seychelles, The National Humanitarian Affairs Committee, Seychelles, 2004)[3]

Civil law is based on the French Napoleonic Code adapted to Seychelles and is known as the “Civil Code of Seychelles”. Criminal law is based on British laws. The current Constitution was approved by 73.9% of voters in a referendum held on June 18, 1993, effective June 23, 1993(The Ministry of Foreign Affairs, Seychelles., The National Humanitarian Affairs Committee, Seychelles, 2004)[3]. The most recent elections took place September 8-10, 2016(next to be held in 2021), and the election results were:

Percent of vote by party: LDS 49.6%,PL 49.6%,other 1.2%

Seats by party: LDS 19,PL 14.(CIA, 2018) [1]

Main Political Parties in Seychelles:

- Lafors DemoKratik Seselwa (LDS).
- Parti Lepep (PL) (formerly SPPF).
- Seselwa (Seychelles) United Party (SUP) (formerly the New Democratic Party or NDP).
- Seychelles National Party (SNP) (formerly the United Opposition or UO).
- Seychelles Party for Social Justice and Democracy (SPSD).
- Seychelles Patriotic Movement (SPM).
- Seychelloise Alliance (Lalyans Seselwa)
- Seychellois Democratic Alliance(Linyon Demokratik Seselwa)(alliance consisting of SNP, Seychelloise Alliance ,SPSD, and SUP) (CIA, 2018)[1]

D. Economy and Employment

The economy of Seychelles grew in 2016, driven primarily by tourism. However, GDP growth slowed to an estimated 4.8% from 5.7% in 2015. The medium-term growth outlook is moderate, with GDP projected to grow by 3.5% in 2017 and 3.3% in 2018. The country reached high-income status in 2015. The traditional tourism and fisheries sectors are expected to remain the main drivers of growth, along with information and communications technology (ICT). Prudent fiscal and monetary policies, coupled with continued political stability, have helped consolidate macroeconomic stability, and inflation is expected to remain in single digits, in December, 2017 inflation rate is 2.9 % (12 months average). (Central Bank of Seychelles, 2018) [5]

Despite having one of the highest per capita incomes in Africa, Seychelles is economically vulnerable due to its small size, isolation, limited natural resources, and dependence on tourism, which accounts for the bulk of foreign-exchange earnings.

Challenges facing the country include insufficient economic diversification and vulnerability to external shocks such as world recession. Growth needs to be made greener and more inclusive in order to protect Seychelles' fragile natural environment against the adverse impacts of climate change and to ensure that growth benefits all members of the society. The development of the private sector is paramount to achieving a more diversified economy, but it requires a more enabling environment to exploit its potential and expand into new business areas.(African Development Bank Group, 2017).)[6]

Seychelles will no longer be eligible for trade benefits under the US African Growth and Opportunities Act after having gained developed country status.

Seychelles Country Profile				
Source: World Development Indicators database				
	1990	2000	2010	2016
Population, total (millions)	0.07	0.08	0.09	0.09
Population growth (annual %)	0.5	0.9	2.8	1.3
Surface area (sq km) (thousands)	0.5	0.5	0.5	0.5
Population density (people per sq km of land area)	151.1	176.4	195.2	205.8
Poverty headcount ratio at national poverty lines (% of population)	..	..	39.3	39.3
Poverty headcount ratio at \$1.90/day (2011 PPP) (% of population)	..	0.6	1.1	1.1
GNI, Atlas method (current US\$, billions)	0.35	0.59	0.92	1.46
GNI per capita, Atlas method (current US\$)	5,030	7,290	10,190	15,410
GNI, PPP (current international \$, billions)	0.62	1.13	1.69	2.69
GNI per capita, PPP (current international \$)	8,860	13,870	18,840	28,390

Income share held by lowest 20%	..	5.7	5.4	5.4
People				
Life expectancy at birth, total (years)	71	73	73	73
Fertility rate, total (births per woman)	2.7	2.1	2.1	2.3
Adolescent fertility rate (births per 1,000 women ages 15-19 yrs)	68	58	60	57
Contraceptive prevalence, any method (% of women ages 15-49 yrs)	..	..	..	..
Births attended by skilled health staff (% of total)	98	99	99	..
Mortality rate, under 5 yrs (per 1,000 live births)	17	14	14	14
Prevalence of underweight, weight for age (% of children under 5yrs)	5	..	3.6	..
Immunization, measles (% of children ages 12-23 months)	86	97	99	98
Primary education completion rate, total (% of relevant age group)	102	99	111	109
School enrollment, primary (% gross)	99.7	105.5	110.7	102.3
School enrollment, secondary (% gross)	111	73	74	82
School enrollment, primary and secondary (gross), gender parity index (GPI)	1	1	1	1
Environment				
Forest area (sq km, thousands)	0.4	0.4	0.4	0.4
Terrestrial and marine protected areas (% of total territorial area)	0	0	..	0.1
Annual freshwater withdrawals, total (% of internal resources)	..	..	..	..
Improved water source (% of population with access)	96	96	96	96
Improved sanitation facilities (% of population with access)	98	98	98	98

Urban population growth (annual %)	0.5	1.2	3.3	1.9
Energy use (kg of oil equivalent per capita)	541	..	2,411	..
CO2 emissions (metric tons per capita)	2.16	7.05	7.68	7.18
Economy				
GDP (current US\$, billions)	0.37	0.61	0.97	1.43
GDP growth (annual %)	7	1.5	6	4.5
Inflation, GDP deflator (annual %)	6.8	4	-4.2	-5
Agriculture, value added (% of GDP)	6	3	3	3
Industry, value added (% of GDP)	21	35	17	14
Services, etc., value added (% of GDP)	103	83	80	83
Exports of goods and services (% of GDP)	15	75	94	83
Imports of goods and services (% of GDP)	51	82	108	98
Gross capital formation (% of GDP)	25	25	37	34
Revenue, excluding grants (% of GDP)	55.9	38.7	32.8	32.5
Net lending (+) / net borrowing (-) (% of GDP)	0.7	-13.9	1.1	1
States and Markets				
Time required to start a business (days)	..	..	33	32
Domestic credit provided by financial sector (% of GDP)	42.3	110.1	49.6	40.2
Tax revenue (% of GDP)	36.8	26.1	27.9	28.3
Military expenditure (% of GDP)	4	1.7	0.7	1.3
Mobile cellular subscriptions (per 100 people)	0	32.5	128.9	158.1
Individuals using the internet (% of population)	0	7.4	41	58.1
High-technology exports (% of manufactured exports)	1	2	4	7
Overall level of statistical capacity (scale 0 - 100)	..	..	59	70
Global Links				

Merchandise trade (% of GDP)	66	87	143	104
Net barter terms of trade index (2,000 = 100)	78	100	86	94
Total debt service (% of exports of goods, services and primary income)	9.1	4.2	5.7	5.7
Net migration (thousands)	1	3	-2	..
Personal remittances, received (current US\$, millions)	8	3	17	18
Foreign direct investment, net inflows (BoP, current US\$, millions)	20	24	160	106
Net official development assistance received (current US\$, millions)	35.6	23.6	53.9	6.8

Table 2: Seychelles country profile. Source: World Development Indicators database. Last updated December 22, 2017. World Bank.org, 2017. [\[7\]](#)

E. Physical and Technological Infrastructure

Electricity-production (2015): 347 million kWh (CIA, 2018) [\[1\]](#)

Electricity-consumption (2015): 322.7 million kWh (CIA, 2018) [\[1\]](#)

Electrification - total population: 97 %(CIA, 2018) [\[1\]](#)

Number of registered air carriers: 1(CIA, 2018) [\[1\]](#)

Airports (2013): 14(CIA, 2018) [\[1\]](#)

Airports - with paved runways (2013): Total: 7(CIA, 2018) [\[1\]](#)

Roadways (2015): Total: 526 km (CIA, 2018) [\[1\]](#)

Major seaport: Victoria (CIA, 2018) [\[1\]](#)

Telecommunications in Seychelles

Local and international telecommunications lines are operated by Cable & Wireless. Digital microwave systems were introduced to the Seychelles in 1992 and Cable & Wireless offers other services from its Seychelles radio coast station. Direct international calls are available to over 100 countries worldwide.

Telephone –Landline

Total subscriptions: 20,836

Subscriptions per 100 inhabitants: 22 (July 2016) (CIA, 2018) [\[1\]](#)

Telephones - Mobile Cellular

Total: 151,857

Subscriptions per 100 inhabitants: 163 (July 2016) (CIA, 2018) [\[1\]](#)

Internet

There are three internet service providers in Seychelles: Atlas, Intelvision, and Kokonet.

Atlas was formed by the three main computer companies in Seychelles: Space 95, VCS, and MBM. Internet was introduced in Seychelles by Atlas Seychelles Ltd in September, 1996. In 2012, Seychelles East Africa System's (SEAS) submarine cable (1,930-km) landed at Beau Vallon, on the island of Mahé, connecting Seychelles with Tanzania. [\[8\]](#)

The Department of information and communication technology (DICT) recently unveiled its latest e-service, which they have been working on with the Seychelles Land Transport Agency (SLTA). This e-service provides online booking services for the Vehicle Testing Services (VTS). In order to get a vehicle tested, an appointment has to be booked with VTS so prior to the launch of this new service, the customer had to call the vehicle testing station and place an appointment with the cashier, following the new online system established by the Seychelles Planning Authority. (Office of the President, Department of Information Communications Technology, Seychelles.2017) [\[9\]](#) There are an estimated 52,664 internet users country-wide, representing 56.5% of the population (July 2016).(CIA, 2018)[\[1\]](#)

Newspaper

The main daily newspaper is “The Seychelles Nation”, dedicated to local government views and current affairs. Other political parties operate other papers such as “Regar”. Foreign newspapers and magazines are readily available in most bookshops and newsagents. The papers are mostly written in Seychellois Creole, French, and English.

Television and Radio

The main Television and Radio network is operated by the Seychelles Broadcasting Corporation (SBC) which broadcast all kinds of programs in the three national languages (Creole, English and French): music, news, documentaries, panel games, drama and children's programs and International productions in 24 hours service.

The SBC also broadcast foreign television services; BBC News, CNN World, CCTV News, France 24, Russia Today as well as Korean broadcasting System's KBS World.

The popular SBC Radio stations include AM (Amplitude modulation) Radio and Paradise FM (Frequency modulation). The SBC Radio also broadcast two foreign radio stations, Radio France International (RFI) and the British Broadcasting Corporation (BBC).
(Seychelles Broadcasting Corporation (2018).)[10]

The FEBA Seychelles Radio [The Far Eastern Broadcasting Associates (later known as "Feba Radio")] transmits from Mahé to over 30 countries in the Indian Ocean and throughout Eastern Africa in numerous languages. [8].

National Health Care Sector Review

A. National Health Care Profile

Right to Health Care

“The State recognizes the right of every citizen to protection of health and to the enjoyment of the highest attainable standards of physical and mental health and with a view to ensuring the effective exercise of this right, the State undertakes:

- *To take steps to provide for free primary health care in state institutions for all its citizens;*
- *To take appropriate measures to prevent, treat and control epidemic, endemic and other diseases;*
- *To take steps to reduce infant mortality and promote the healthy development of the child;*
- *To promote individual responsibility in health matters;*
- *To allow, subject to such supervision and conditions as are necessary in a democratic society, for the establishment of private medical services.”*

Article 29

Constitution of the Republic of Seychelles, p.30, 1994
(Ministry of Health, Seychelles, 2017)[11]

The Government of Seychelles provides free health services to the entire population and has very strong policies and programs in place for newborns, youth, and the elderly. Highly specialized treatment takes place overseas, with the government providing the majority of the funding. This principle is enshrined in the Constitution of the Republic of Seychelles and the Health Policy Declaration, which underscore the principles of basic human rights and health equity.

Seychelles is now at an important crossroads where the epidemiological shift from communicable to non communicable diseases is posing new and significant challenges. Of significant concern are the noncommunicable diseases: diabetes, cerebrovascular disease, hypertension, cancer and mental health disorders, as well as some communicable diseases: HIV/AIDS and hepatitis.

Every citizen has the right to protection of health and to the enjoyment of the highest attainable standard of physical and mental health. (Larue. M. H. 2016). [12]

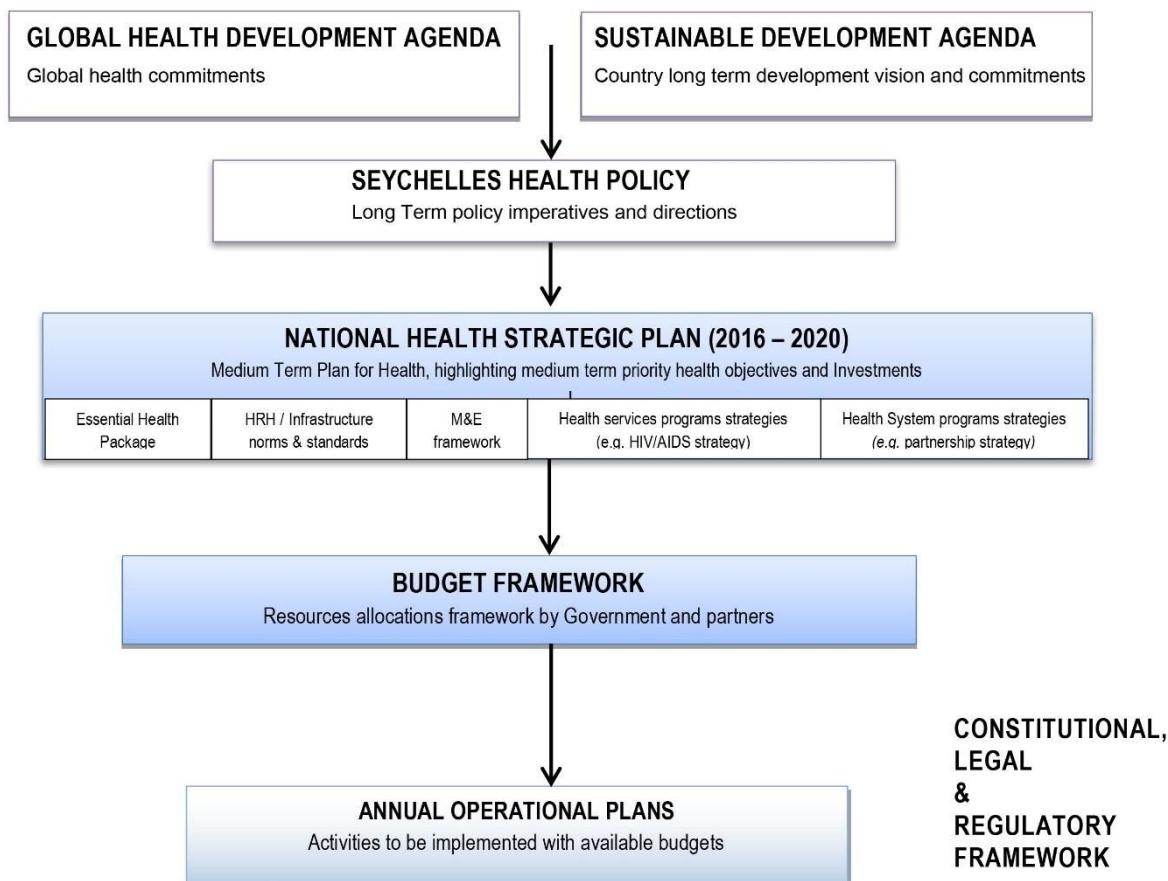


Figure 5: Planning framework for health sector of Seychelles. (Ministry of Health, Seychelles, 2016)[13]

Seychelles is currently working towards achieving the United Nations Millennium Development Goals (MDGs). To achieve the targets for reduction of child mortality (MDG 4), Seychelles must reduce “under-five deaths” (death of children younger than 5 years) per 1,000 live births to six, and increase measles immunization to 100% by 2015. In 2013, “under-five” mortality stood at 14 deaths per 1,000 live births, and measles immunization at 99%. The Fact Sheets of Health Statistics 2016 MDG progress report for Seychelles highlighted the need for more inclusive medical and health service provision for mothers and children, including widespread improvements in antenatal, delivery and postnatal services, with the aim of conforming to international standards. (Commonwealthhealth.org,2016)[\[15\]](#)

The Global MDG 5 target for maternal health is to reduce the number of women who die in pregnancy and childbirth by three quarters between 1990 and 2015. In 2008, maternal mortality in Seychelles was 57 deaths per 100,000 live births (an estimate from UN agencies/World Bank). There is insufficient data available to assess Seychelles’ progress towards this goal. The 2012 MDG progress report for Seychelles highlights the issue of low contraceptive use in the country, which has led to a high adolescent birth rate, causing ongoing concern. There have been numerous programs throughout the country aimed at reducing teenage motherhood such as sex education in school, availability of contraceptive pills depending on age group, and youth program etc.(Bonte, R.,2016)[\[14\]](#), nevertheless there is still significant work to be done. Other health concerns include the rate of drug use within the 15-25 yrs. Age group (specifically targeting the number of heroin-dependent mothers), improving health education for adolescents, and combating child sexual abuse.

MDG 6 aims for a reduction in the prevalence of HIV, malaria, and other diseases. Progress must be made in reducing tuberculosis deaths and stopping the spread of HIV/AIDS in order to achieve MDG 6 by 2015. The 2013 MDG progress report for Seychelles highlights the need for widespread surveying of key populations, including sex workers and prison inmates, in a bid to develop prevention and intervention programming, as well as methods of sustaining national HIV and AIDS programs. The MDGs status report of 2015 clearly indicates that Seychelles is well on track for meeting the set health targets.
(Commonwealthhealth.org, 2016)[\[15\]](#)

As of the year 2011, there were 1.2 mental health outpatient facilities and 47.3 beds in psychiatric hospitals per 100,000 people. (Commonwealthhealth.org, 2016)[\[16\]](#)

There is no local pharmaceuticals manufacturing in Seychelles, thus all pharmaceutical requirements are imported. Additionally, there are no legal provisions for regulating the private sector pharmaceutical market. (Commonwealthhealth.org, 2016)[\[16\]](#)

Health expenditures (2014):	3.4% of GDP. (CIA, 2018) [1]
Hospital bed density (2011):	3.6 beds/1,000population. (CIA, 2018) [1]
Total expenditure on health as % of GDP (2014)	3.4(WHO, Seychelles, 2016) [17]
Total expenditure on health per capita (Intl \$, 2014)	844(WHO, Seychelles, 2016) [17]
Total number of registered physicians in Seychelles (2016):	368 (Ministry of Health, Seychelles, 2017) [18]
Total number of registered nurses in Seychelles (2016):	844 (Ministry of Health, Seychelles, 2017) [18]
Number of registered midwives in Seychelles (2016):	352 (Ministry of Health, Seychelles, 2017) [18]
Hospital bed occupancy rate (2016):	76% (Ministry of Health, Seychelles, 2017) [18]

SEYCHELLES Progress on the MDGs

Health MDGs

MDG - 4: Reduce child mortality

Target 4.A: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate

(Source: WHO, 2015)

	1990	2015	MDG Target 2015	Reduction (%)	Progress on the MDGs
Under-five mortality rate (deaths per 1,000 live births)	17	14	67	18	Not achieved
Measles (MCV) immunization coverage among 1-year-olds (%)	86	99	100	15	Achieved

MDG - 5: Improve maternal health

Target 5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

(Source: WHO, 2015)

	1990	2015	MDG Target 2015	Reduction (%)	Progress on the MDGs
Maternal mortality ratio (per 100 000 live births)			75		No data

Target 5.B: Achieve, by 2015, universal access to reproductive health

(Source: WHO, 2015)

	2007-2014	MDG Target 2015	Progress on the MDGs
Antenatal care coverage at least one visit		100.00	Not achieved
Births attended by skilled health personnel (%)	99.00	90.00	Achieved
Unmet need for family planning (%)		0.00	No data

MDG - 6: Combat HIV/AIDS, malaria and other diseases

Target 6.A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS

Target 6.B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it

Target 6.C: Have halted by 2015 and begun to incidence of malaria and other major diseases

(Source: WHO, 2015)

	1990	2007	2014	MDG Target 2015	Reduction (%)	Progress on the MDGs
Antiretroviral therapy coverage (%)				80.00		No data
Malaria incidence (%)				75.00		No data
Tuberculosis mortality rate (per 100 000 population per year)	2.00		1.50	50.00	65.12	Not categorized

Health-Related MDGs

MDG - 7: Ensure environment sustainability

Target 7.C: Halve, by the proportion of people without sustainable access to safe drinking water and basic sanitation

(Source: WHO, 2015)

	1990	2015	MDG Target 2015	Reduction (%)	Progress on the MDGs
Population using improved drinking-water sources (%)	95.70	95.70	50.00	0.00	Not achieved
Population using improved sanitation (%)	98.40	98.40	50.00	0.00	Not achieved

MDG - 1: Eradicate extreme poverty and hunger

Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

(Source: WHO, 2015)

	MDG Target 2015		Progress on the MDGs
Children aged <5 years underweight (%)	0.0		No data

Other MDGs

MDG - 2: Achieve Universal Primary Education

Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

(Source: UNICEF, 2015)

	2007-2014	MDG Target 2015	Progress on the MDGs
Percentage of net enrolment ratio in primary education	91.0	100.0	Not on track

MDG - 3: Promote Gender Equality and Empower Women

Target 3.A: Eliminate gender disparity in primary and secondary education, preferably by, 2005, and in all levels of education no later than 2015

(Source: UNICEF, 2015)

	2007-2014	MDG Target 2015	Progress on the MDGs
The gender parity index in percentage of net enrolment ratio in primary education	1.01	1.00	On track

MDG - 8: Develop a global partnership for development

Target 8.A: Develop further an open, rule-based, non discriminatory trading and financial system

Target 8.D: In cooperation with pharmaceutical companies, provide access to affordable essential drugs

(Source: World Bank, 2015)

	Private	Public		
Median availability of selected generic medicines, 2007-2013				
Median consumer price ratio of selected generic medicines, 2007-2013				
	1990	2005	2011	2013
Official development assistance (ODA) received as percentage of GDP	9.60	2.70	2.07	1.90

Table 3: Seychelles progress on the MDGs (WHO Regional office for Africa, 2016). [19]

Mortality Trends and Disease Burden of Seychelles

Mortality levels for specific age groups are low in Seychelles and have remained stagnant. Over the past 5 years, Seychelles had an average of 15 neonatal deaths, 27 perinatal deaths, 20 infant deaths, and 1 maternal death for just under 1,600 live births. (Ministry of Health, Seychelles, 2016) [13]

The top 30 contributors to morbidity and mortality, measured in disability adjusted life years (DALYs) and the top 30 conditions whose burden has increased most in Seychelles in 2014 are shown below:

Contributors to Morbidity and Mortality		Conditions with Increased Burden		
	Cause of death or injury	% of total DALYs	Cause of death or injury	DALYs % annual change
1	Ischemic heart disease	8.40%	HIV/AIDS	10.33%
2	Cerebrovascular disease	6.24%	Kidney cancer	6.69%
3	Lower respiratory infections	5.90%	Larynx cancer	5.74%
4	Diabetes mellitus	4.08%	Other unintentional injuries	5.45%
5	Low back and neck pain	3.89%	Liver cancer	4.78%
6	Hypertensive heart disease	3.87%	Endocrine, metabolic, blood, & immune disorders	4.70%

7	Sense organ diseases	3.37%	Leukemia	4.56%
8	Chronic obstructive pulmonary disease	2.66%	Multiple sclerosis	4.45%
9	Depressive disorders	2.25%	Cirrhosis due to hepatitis C	4.13%
10	Road injuries	2.23%	Ovarian cancer	3.97%
11	Drowning	2.08%	Non-Hodgkin lymphoma	3.96%
12	Congenital anomalies	2.04%	Cirrhosis due to other causes	3.88%
13	Skin and subcutaneous diseases	1.96%	Prostate cancer	3.75%
14	Chronic kidney disease	1.85%	Pancreatic cancer	3.70%
15	Other cardiovascular & circulatory diseases	1.71%	Tetanus	3.53%
16	Migraine	1.63%	Diabetes mellitus	3.51%
17	Drug use disorders	1.55%	Paralytic ileus and intestinal obstruction	3.40%

18	Self-harm	1.47%	Atrial fibrillation and flutter	3.35%
19	Breast cancer	1.46%	Cirrhosis due to hepatitis B	3.16%
20	Interpersonal violence	1.44%	Breast cancer	3.05%
21	Tracheal, bronchus, and lung cancer	1.34%	Testicular cancer	3.03%
22	Prostate cancer	1.33%	Medication overuse headache	2.82%
23	Preterm birth complications	1.31%	Cirrhosis due to alcohol use	2.55%
24	Colon and rectum cancer	1.31%	Vascular intestinal disorders	2.19%
25	Alzheimer disease and other dementias	1.25%	Rheumatoid arthritis	2.12%
26	Paralytic ileus and intestinal obstruction	1.05%	Appendicitis	1.99%
27	Schizophrenia	0.97%	Gallbladder and biliary tract cancer	1.95%

28	Anxiety disorders	0.97%	Gout	1.92%
29	Cervical cancer	0.95%	Maternal deaths aggravated by HIV/AIDS	1.80%
30	Asthma	0.90%	Protein-energy malnutrition	1.80%

Table 4: Distribution of mortality cause and increases in disease burden. (Ministry of Health, Seychelles, 2016) [13]

B. National Health Care Structure

The Seychelles health system is organized into primary, secondary, and tertiary care, with a patient referral system from primary to secondary and tertiary care centers. Seychelles Hospital, the highest institution for acute and chronic inpatient care, is the only referral center of the country.

Seychelles Hospital

The role of Seychelles Hospital is to ensure that a high level of health services are provided to the population; the hospital is the implementer of the Ministry of Health's secondary and tertiary care strategy for the entire country. Clinical services include: inpatient and outpatient services, internal medicine, general surgery, urology, orthopedics, pediatrics, cardiology, nephrology, neuromedicine, neurosurgery, dental and maxillofacial surgery, ENT, gynecology and obstetrics, ICU, NICU, dermatology, physical medicine, accident and emergency care, mental health care, pathology, hematology, biochemistry and blood bank, oncology, and a department of radio diagnosis and imaging.

Despite the existence of other centers in the south and north of Mahé, and on the islands of Praslin and La Digue, Seychelles Hospital meets the majority of demand.

Community Health Services of Seychelles

Community health services provide primary health care as the first point of contact. They specifically aim to bring health services closer to the people, remove congestion at the Seychelles Hospital and make better use of existing facilities, and to provide specialist outpatient services in the Community. They are responsible for the promotion of health and for the prevention and control of communicable and noncommunicable diseases at a primary care level. Therefore, community health services are the main arm of the health sector entrusted with the delivery of the primary health care package. It comprises 17 health districts for primary care service delivery, three cottage hospitals (Anse Royale Hospital on Mahé, Baie St. Anne Hospital on Praslin, and Logan Hospital on La Digue), and various satellite centers (such as the psychiatric center, geriatric and terminal care centers, a chronic care center at the North East Point, and the Acute Psychosis and Drug Addict Rehabilitation Centerat Les Cannelles).

The country's growing population with various pathologies requires further planned development of the health sector. This includes the development of a comprehensive master plan for the six hospitals in Seychelles to address both current and future needs and the evolution of the healthcare sector, such a "Briefing Document For The Concept Master plan of Six Hospital In Seychelles" has been prepared for the Seychelles Ministry of Health, and considers the existing Seychelles Health Facilities and their functioning, and seeks to propose a functional overlay in the form of a master plan, against which an improvement in services and spatial operational relationships can be proposed for implementation. (Miodrag, T., MD, FCS, MSc. 2015)[20]

Services and Programs of Community Health Services of Seychelles:

- Medical consultation
- Dental consultation
- Dental therapy services
- Mother and child program
- Antenatal care program
- Reproductive health program (includes family planning)
- Youth health program
- Domiciliary care program
- Rehabilitation services (physiotherapy, occupational therapy, speech therapy)
- Community mental health program

Private Health Sector in Seychelles

The private sector is also playing a key role in improving access to healthcare. Economic expansion as a part of the reform process that started three years ago has seen an improvement in both the variety and quality of services available to people.

In the last two to three years Seychelles private health sector has recorded unprecedented growth. New health cottages have been constructed, offering more diversified services previously unavailable at private healthcare facilities.

Seychelles government is encouraging investment in the private health sector, according to the country's regulatory framework. (Lablache, J., Uranie, S. and Kabukuru, W. 2014) [\[21\]](#)

The Following organizations contribute their services in the private health sector:

- The Euro medical Family Clinic.
- Le Chantier Health Services (Pty) Ltd.
- Eureka Medical Specialist Clinic.
- Nawaloka Hospitals International.
- Health Centre Dr. K.S. Chetty.
- Dr. Murthy's Medical and Gastro Clinic.

Undergraduate and Postgraduate Medical Training

There are no medical teaching institutes in Seychelles; students receive their undergraduate and postgraduate training abroad, with the government providing full funding. Medical graduates complete a two-year internship in Seychelles Hospital under the Ministry of Health. A main focus has been to secure postgraduate training venues for the large number of young doctors who have returned to Seychelles over the past four to five years.

The Health Department was able to secure positions for two pediatricians at the University of Pretoria in 2017. The next step will be to develop clear procedures for applications to South African Universities. There is an ongoing process to officially formalize relationships with the Health Professionals Council of South Africa in a Memorandum of understanding (MoU). The Health Department has also explored training opportunities in Malaysia, specifically with the Universiti Sains Malaysia (USM). Postgraduate training in Malaysia opens up opportunities for those young doctors who completed their training in Malaysia, but could not complete their internship there.

Five doctors continued postgraduate training in 2016 (Ministry of Health, Seychelles. 2017) [18]. In 2017, one doctor continued his postgraduate study in radiology at Yerevan State University, Armenia. There were 53 students who participated in undergraduate medical (48) and dental (5) courses in 2016 from abroad. The majority of these students were from Cuba, (14) followed by Slovakia, (9) and India (8). The three dental student received training from New Zealand, India, and Hungary.

Five new medical graduates are expected in 2017 and eleven more are expected in 2018. (Ministry of Health, Seychelles. 2017) [18]

National Radiology Profile

A. Overview of Imaging in Seychelles

Seychelles Hospital was established on Sunday, November 30, 1924. In 1929, an X-Ray and Electro-Therapeutic department was created to serve patients, an initiative of the resident surgeon Dr. Maxime Paul Lanier. (Health Care Agency, Ministry of Health, Seychelles.) [22]

There currently exists a Department of Radio Diagnosis and Imaging, Seychelles Hospital at The H.H Sheikh Khalifa Bin Zayed Al Nahyan Diagnostic Centre, donated by the H.H Sheikh Khalifa Bin Zayed Al Nahyan, President of the United Arab Emirates. It opened on April 25th, 2011 and is the main radiology service delivery center of the country. It is a modern radiological center, providing 24 hour service for Seychellois and foreign patients. Available modalities include: general radiography, fluoroscopy, ultrasound, mammography, MDCT scan, MRI, portable and operating room x-ray, and portable ultrasound.

Goals and Targets of the Department of Radio Diagnosis and Imaging, Seychelles Hospital:

1. “Do no harm”
2. Provide high quality, 24 hour diagnostic service.
3. Maintain high performance level of services for all diagnostic modalities: X-ray, fluoroscopy, mammography, ultrasound, MDCT, and MRI
4. Perform medical radiation imaging according to standards
5. Keep diagnostic center equipment in working condition through close contact with biomedical engineering groups and Ireland Blyth Limited, Mauritius (IBL).
6. Implement infection control procedures on a regular basis
7. Increased public awareness about ionizing radiation hazards,
8. Protection and safety, especially among the referring clinicians
9. Special attention to pediatric, women's, and geriatric imaging

10. Follow the evidence based need and justification of the imaging procedure
11. Minimize patient waiting time
12. Coordinated report delivery as per the clinicians' requests.
13. Decentralization of radiology service, especially X-ray and ultrasound services at English River Health Centre (ERC) and Anse Royale Hospital and Health Centre (ARC).

Major Achievements of the Department of Radio Diagnosis and Imaging, Seychelles Hospital :(Kovalska,O., MD. 2017) [23]

1. New MDCT 20 slice scanner functioning for the emergency department and ICU and for brain, spine, and musculoskeletal work. It reduced work load on the MDCT 64 slice scanner. Simultaneous work on 2 MDCT scanners lead to more intensive and productive CT scan service, a significant decrease in waiting times
2. Renewed maintenance contract with Ireland Blyth Limited, Mauritius (IBL)for radiology equipment servicing during 2016-2018.
3. Created the post of Radiation Safety Officer
4. Updated National Radiation Protection Policy and Local Radiation Protection Rules
5. Extended the use of MRI to the cervix and endometrial cancer with the high diagnostic value
6. More intense use of ultrasound and MDCT guided biopsy and drainage, preventing many open surgeries
7. Increased number of coronary angiography cases, preventing unnecessary overseas referrals and saving many patients' lives
8. Performing peripheral angiography for planning diabetic patient vascular surgery, vascular angioplasty, and amputation
9. Providing breast cancer screening mammograms.

Constraints of the Department of Radio Diagnosis and Imaging, Seychelles Hospital: (Kovalska,O., MD. 2017)[23]

1. The Department of Radio Diagnosis and Imaging, Seychelles Hospital is seriously understaffed. Management of the night shift duty is very difficult.
2. Absence of nurses for CT scan patient cannulation.
3. Absence of PACS network in the hospital ward and especially in medicine, surgery and orthopedic department
4. Absence of user licenses for the new MDCT 20 slice scanner, portable X-ray, portable ultrasound, and mammography unit, preventing access to the PACS system
5. Absence of reporting and reconstruction station in the new MDCT 20 slice scanner

6. Absence of dual syringe power injector in new MDCT20 slice scanner
7. Absence of high capacity external storage/discs, so unable to archive imaging data past 5 years
8. Absence of the radiology assistant on night duty, causing problems, especially when the radiographer is working in OT
9. All radiological equipment Maintenance Licenses are out of date. They require immediate renewal for continuous maintenance and repair to ensure radiation safety.
10. Absence of radiological library, periodic literature, and special refresher training for radiologists, radiology technologists, radiology assistants, and IT technologist.

Number of examination per modality. Radiology Statistical Annual Report, 2017
 Department of Radio Diagnosis and Imaging, Seychelles Hospital, Seychelles.

Modality	MRI	CT Scan	X-Ray	Ultra sonogram	Fluoroscopy	Mammogram	Total per month
Month							
January'17	158	683	2,616	977	14	59	4,507
February'17	68	264	1,074	435	1	26	1,868
March'17	182	675	2,664	1,047	29	58	4,665
April'17	149	613	2,438	974	15	47	4,236
May'17	183	674	3,072	1,286	17	66	5,298
June'17	156	609	2,788	1,013	4	21	4,591
July'17	147	531	2,250	937	-	54	3,919
August'17	139	735	2,866	1,179	14	59	4,992
September'17	141	629	2,682	1,089	18	32	4,591
October'17	150	605	3,095	1,081	12	80	5,023
November'17	166	659	2,775	953	20	20	4,593
December'17	127	651	2,353	900	17	-	4,048
Total per modality	1,766	7,328	30,673	11,871	161	522	Grand total: 52,321

Table 5: Number of examination per modality. Radiology Statistical Annual Report, 2017.
 Department of Radio Diagnosis and Imaging, Seychelles Hospital, Seychelles.

B. Workforce, Training, and Professional Representation

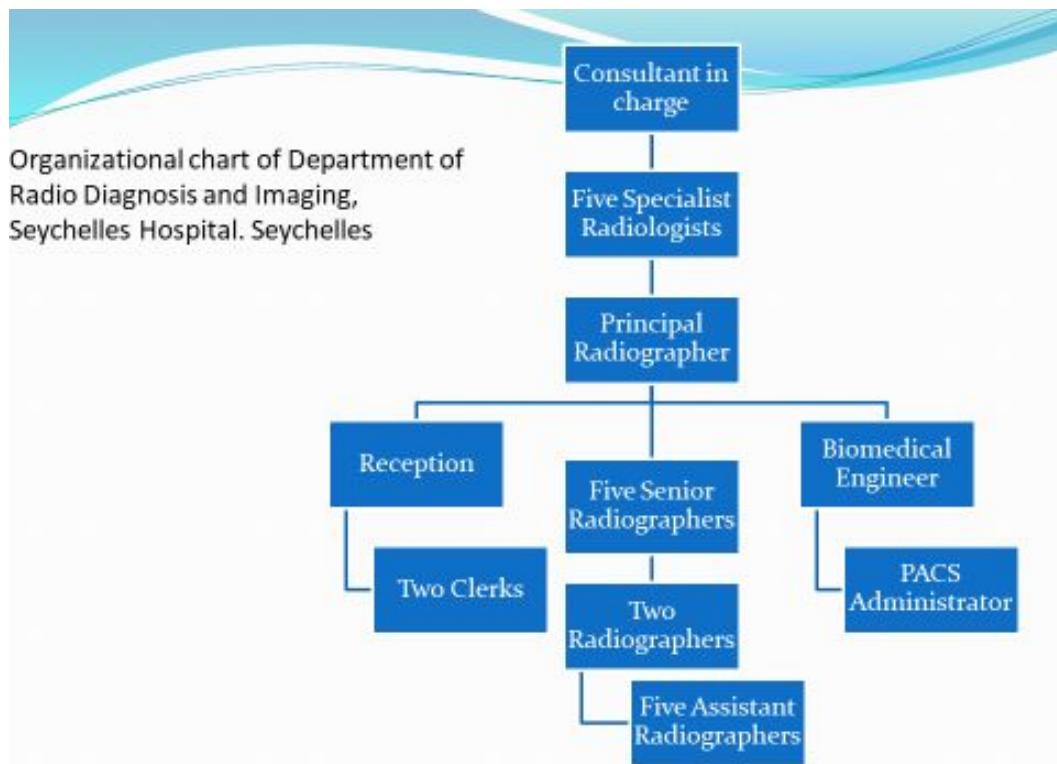


Figure 6: Organizational chart of Department of Radio Diagnosis and Imaging, Seychelles Hospital (Kovalska,O., MD. 2017)[23]

The Ministry of Health organized training of the occupational staffs of Department of Radio Diagnosis and Imaging, Seychelles Hospital in collaboration with WHO and other international organizations.

Equipment Inventory and Distribution

The H.H Sheikh Khalifa Bin Zayed Al Nahyan Diagnostic Centre is equipped with the following medical devices: (Kovalska,O., MD. 2017)[23]

Digital X-ray:3

Fluoroscopy: 1

Digital Mammography: 1

Ultrasound: 4

Portable ultrasound: 1

X-ray C-arm: 1

MDCT 64 slice scanner: 1

MDCT 20 slice scanner: 1

MRI 1.5T: 1

Portable X-Ray: 2

Operating room X-Ray: 1

PACS and RIS systems:

1. XS server: Syngo XS and Syngo Plaza
2. RIS server: Syngo Workflow and Portal Radiologist
3. Speech server (voice detection):SpeechMagic-Nuance

An additional radiology unit in Praslin Hospital and Health Centre (one digital X-ray, one portable X-ray, and one ultrasound machine) operates with 24 hour X-ray service and monthly ultrasound clinics. The hospital has a separate reporting system that allows written reports to be sent immediately to a specialist.

Additionally two digital X-ray machines are under process of installation at Praslin Hospital and Health Centre and Anse Royale Hospital and Health Centre, Mahé. In the private sector, only The Euro medical Family Clinic operates one ultrasound machine.

Almost 90% of equipment are donations, some of which lack specifications and standardization, creating challenges for operation, maintenance, repair, and acquisition of spare parts. Planning for new equipment and infrastructure must include a detailed budget for running costs, including preventive maintenance and calibration.

A MRI compatible ICU monitor, ventilator, and injector were installed in Department of Radio Diagnosis and Imaging, Seychelles Hospital .in December 2015(Kovalska,O., MD. 2017)[23].It has allowed performance of MRI scans for ICU and pediatric patients groups.

The original Seychelles Hospital, the building now referred to as the “Red Roof Building”, is now used as the administration block. The current hospital is a series of newer buildings behind the Red Roof Building. The former sanatorium is now the Hermitte(Female) and D'Offay(Male) surgical wards. The pavilion which constitutes the square shape of the Red Roof ensemble is used as both the dialysis and oncology units.

The H.H Sheikh Khalifa Bin Zayed Al Nahyan Diagnostic Centre (Aquamarine Roof) contains a brick frame with lead shielding and an steel sheet roof. Colorful steel/tin sheet roofing is a part of the heritage of Seychelles architecture. The flooring consists of mosaic tiles. There is also one 500kV electric power substation specifically for The H.H Sheikh Khalifa Bin Zayed Al Nahyan Diagnostic Centre, maintained by PUC, Seychelles. Indoor temperatures are maintained at 15-25 degrees centigrade. The building has adequate space and is well furnished, though it is gradually losing its beauty due to lack of proper maintenance.

Another two buildings include “Yellow Roof”, used as an outpatient department and “Green Roof”, used as the pharmacy and occupational health department. The Biomedical Engineering Unit works in a separate building.

C. Radiology Regulation and Policy of Seychelles:



MINISTRY OF HEALTH HEALTH CARE AGENCY

Radiation Safety Policy

1.0 INTRODUCTION

The Ministry of Health through the Radiological Unit is committed to providing its patients, visitors, students and employees with an environment where sources of radiation are used safely for the purposes of medicine, research and teaching. Attainment of this goal requires the cooperation and commitment of all persons involved.

The Health & Safety Unit within the Health Care Agency is responsible for implementing the Ministry's radiation safety program as defined by its Radiation Safety Committees, broad scope license, and the ***Radiation Safety and Security Act 2014 and Regulations 2015***. Department heads, workers, supervisors and individual users are directly responsible for maintaining an environment that promotes compliance with these policies, license conditions, and regulations.

Figure 7: Radiation Safety Policy, Ministry of Health, Seychelles. (Ministry of Health, Seychelles, 2016) [24]



MINISTRY OF HEALTH

HEALTH CARE AGENCY

LOCAL RULES FOR DIAGNOSTIC RADIOLOGY

1. INTRODUCTION

These Local Rules have been produced for the purposes of satisfying the requirement of ***Radiation Safety and Security Act 17 of 2014***. This document describes the radiation protection arrangements for Radiological Unit employees, patients, visitors and members of the public within Ministry of Health Hospital.

The Local Rules presented herein are designed to enable the work within the Diagnostic Radiology Department to be carried out safely and in accordance with the above Regulations.

Figure 8: Local Rules for Diagnostic Radiology, Ministry of Health, Seychelles. (Ministry of Health, Seychelles, 2016) [25]

The Health & Safety Unit within the Health Care Agency is responsible for implementing the Ministry of Health radiation safety program as defined by the radiation Safety Committees, broad scope license, and *the Radiation Safety and Security Act 2014 and Regulation 2015*.

The local Rules have been produced for the purpose of satisfying the requirement of *Radiation Safety and Security Act 17 of 2014*. The rules describe the radiation protection arrangements of radiological unit employees, patients, visitors, and members of the public within the Ministry of Health.

The Radiation Safety Policy shall be reviewed and updated every three years.

Some important guideline of Radiation Safety policy:

- Plan of action for x-ray tube monitoring in case of leakage
- Plan of action for patient radiation protection and safety
- Radiation safety for occupational staffs.
- Risk package for the radiology classify workers
- Increased public awareness of ionizing radiation hazards and protection and safety, especially among referring physicians
- Reduce rate of portable x-ray in ward and ICU
- Establish international registration of the Seychelles Radiology unit in the International Atomic Energy Agency (IAEA) and The African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA). (Ministry of Health, Seychelles, 2016) [24, 25]

Conclusion

Seychelles is an archipelago of beauty, worth of its nickname “The Paradise”. Seychelles forms part of the planet’s longest coral reef system and has some of the world’s best scuba diving sites. It is often referred to as “a living museum” for rare species of flora and fauna. Situated outside of the cyclone belt, it enjoys a pleasant tropical climate all year round.

In spite of the country’s improved health status, a multitude of challenges remain. Its ranking as a high-income country has affected Seychelles’ eligibility for certain global funding opportunities, but areas of poverty still exist.

The population's health is not solely determined by biological and genetic factors, but also by gender-based behavior, socio-economic status, income levels, education, and social support systems. Thus, all health sectors have a responsibility to address the social determinants of health in Seychelles, radiology included. Radiology can play an important role in leading and supporting inter sectoral collaboration and community actions to improve population health and well-being.

The department of Radio Diagnosis and Imaging in Seychelles Hospital plays a central role in integrated patient care. Imaging professionals do a remarkable job with severely resource-constrained environments, where retaining trained personnel is difficult.

Major health challenges in Seychelles, specific to the radiology sector, include: a weak health system, insufficient trained human resources, inadequate financing, shortages of essential supplies, equipment, and infrastructure, and absence of continuous maintenance and repair.

To improve radiology services, the following initiatives should be undertaken:

- Urgent recruitment of radiologist, medical physicist, radiographers, radiology assistants, IT technologists, PACS administrator, and part time nurses
- Extend PACS with all 30 licenses to connect the hospital wards, peripheral clinics, and Praslin Hospital.
- Upgrade from Syngo.plaza to Syngo. via picture archiving and communication system (PACS), Radiology information system(RIS) system
- Urgent purchase of new reconstruction and reporting station for new MDCT 20 slice scanner
- Organize radiation safety training for biomedical engineer and radiation safety officer
- Upgrade software for MDCT 64 slice scanner for advanced reconstruction
- Supply main PACS server with additional high capacity external discs for image archiving
- Installation of urgent power supply (UPS) system in the main server, CT scanners, and MRI PC to prevent system failure
- Procurement of MRI breast coil
- Create radiologist post for Baie St. Anne Hospital, Praslin
- Establish x-ray and ultrasound unit at Logan Hospital, LA Digue Island
- Organize training for radiologists, radiology technologists, radiology assistants and IT technologists
- Purchase modern radiological books and magazine
- Organize essential course training in angiography, neuroradiology and interventional radiology
- Online institutional access to Journal of The American College of Radiology, www. elsevier.com, and Radiological Society of North America(RSNA)
- Establish Medical Teaching Institute and Radiology Technologist Teaching Institute

- Establish RAD-AID chapter to improve efficiency and quality of diagnostic imaging services in Seychelles and active participation with radiology in global health initiatives

Support from international organizations such as the Commonwealth, UN agencies, and international voluntary organizations such as RAD-AID International present valuable opportunities to participate in sustainable and appropriate diagnostic radiology care in order to achieve advanced and quality health services for the country of Seychelles.

References

1. Central Intelligence Agency CIA.(2018, January 03).The World Factbook, Africa, Seychelles. Retrieved from
<https://www.cia.gov/library/publications/resources/the-world-factbook/geos/se.html>
2. National Bureau of Statistics, Seychelles. (2017, August 31). Population and vital Statistics mid-year population estimates 2017.National Bureau of Statistics Statistical Bulletin. Catalogue Number: Population 2017/2, Released 31 August 2017. Retrieved from
<https://www.nbs.gov.sc/downloads/data-acquisition-census/population-and-vital-statistics/2017>
3. The Ministry of Foreign Affairs, Seychelles, The National Humanitarian Affairs Committee, Seychelles. (2004). Report by the Government of the Republic of Seychelles to the African Commission on Human and Peoples Rights 1994-2004.Retrieved from
http://www.achpr.org/files/sessions/39th/state-reports/2nd-1994-2004/staterp1_seychelles_2004_eng.pdf
4. CultureGrams™ World Edition,2014, Republic of Seychelles ,(2014).p.1-2.Retrieved from
http://burnet.twpunionschools.org/subsites/slama/documents/CultureGrams/unit_7/file%20-45-.pdf
5. Central Bank Of Seychelles.(2018,January 06).Retrieved from
<http://www.cbs.sc/inflation.jsp>
6. African Development Bank Group. (2017).Seychelles Economic Outlook, Source: African Economic Outlook. Retrieved from
<https://www.afdb.org/en/countries/east-africa/seychelles/seychelles-economic-outlook/>
7. World Bank.org.(2017, December 22). Seychelles, Country profile. Source: World Development Indicators database. Retrieved from
http://databank.worldbank.org/data/Views/Reports/ReportWidgetCustom.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zrn=n&country=SYC
8. Fibre-optic cable on its way to Seychelles. (2008). Retrieved from
http://seychellesweekly.com/May%202013,%202012/econ2_fiber_optic.html.
9. Office of the President, Department of Information Communications Technology, Seychelles. (2017, May 22). Retrieved from <http://www.ict.gov.sc/>
10. Seychelles Broadcasting Corporation (2018).Retrieved from
<http://www.sbc.sc/About%20Us.htm>
11. Ministry of Health, Republic of Seychelles. (2017).The Seychelles Constitution and Health. Retrieved from
<http://www.health.gov.sc/index.php/about-us/the-seychelles-constitution-and-health/>
12. Larue. M. H. (2016).Health in Seychelles. Commonwealth Health Online. Retrieved from <http://www.commonwealthhealth.org/africa/seychelles/>
13. Ministry of Health, Seychelles. (2016, November 01). Seychelles National Health Strategic Plan 2016-2020.p.4.Retrieved from

<http://moh.seydevplus.com/wp-content/uploads/SEYCHELLES-NATIONAL-HEALTH-STRATEGIC-PLAN.pdf>

14. Bonte, R. (2016). Teenage Pregnancy/ Innovating Prevention Techniques. Retrieved from
<http://www.missseychelles.info/sites/default/files/downloads/Contestant%205.pdf>
15. Commonwealthhealth.org. (2016). Current Health Issues and Progress in Seychelles. Commonwealth Health Online. Retrieved from
http://www.commonwealthhealth.org/africa/seychelles/current_health_issues_and_progress_in_seychelles/
16. Commonwealthhealth.org. (2016). Health System in Seychelles. Commonwealth Health Online. Retrieved from
http://www.commonwealthhealth.org/africa/seychelles/health_systems_in_seychelles/
17. WHO, Seychelles. (2016) .The Global Health Observatory. Retrieved from
<http://www.who.int/countries/syc/en/>
18. Ministry of Health, Seychelles. (2017, March 10). Health Department Secretariat (HDS) Annual Report 2016. Retrieved from
<http://www.health.gov.sc/wp-content/uploads/Health-Department-Annual-Report-2016-10TH-ARCH-Prefinal-Noon.pdf>
19. WHO Regional office for Africa. (2016). Seychelles Fact sheets of Health Statistics 2016. Retrieved from
http://www.aho.afro.who.int/profiles_information/images/c/ca/Seychelles-Statistical_Factsheet.pdf
20. Miodrag, T., MD, FCS, MSc, Lead Consultant. (2015, November 9). Briefing Document for the Concept Master plan of Six Hospital in Seychelles. Ministry of Health, Seychelles. Retrieved from
<http://moh.seydevplus.com/wp-content/uploads/Seychelles-Hospital-Masterplan-Concept.pdf>
21. Lablache, J., Uranie, S. and Kabukuru, W. (2014, July 30). Seychelles health care grows as private health providers join in race to offer more choices to the islanders. Seychelles News Agency. Retrieved from
<http://www.seychellesnewsagency.com/articles/1049/Seychelles+health+care+grows+as+private+health+providers+join+in+race+to+offer+more+choices+to+the+islanders>
22. Health Care Agency, Ministry of Health, Seychelles. Seychelles Hospital History.pdf. Retrieved from <http://hca.seydevplus.com/index.php/seychelles-hospital/>
23. Kovalska, O., MD. Consultant in charge (2017). 2016 Annual Report, Department Of Radio Diagnosis and Imaging, Seychelles Hospital. Seychelles.
24. Ministry of Health, Seychelles, (2016, July 27). Radiation safety Policy (Radiation Safety and Security Act 2014 and Regulation 2015), Ministry of Health, Seychelles.
25. Ministry of Health, Seychelles, (2016, July 27). Local Rules for Diagnostic Radiology (Radiation Safety and Security). Ministry of Health, Seychelles.

Appendix A. Abbreviations

AFRA

The African Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology

ARC

Anse Royale Hospital and Health Centre

AM

Amplitude modulation

CCTV

China Central Television

CIC

Consultant in charge

CNN

Cable News Network

DICT

Department of Information and Communication Technology

DALYs

Disability-adjusted life years

ERC

English River Health Centre

FEBA Radio

The Far Eastern Broadcasting Associates (later known as “Feba Radio”)

FM

Frequency modulation

GDP

Gross domestic product

HIV/AIDS

Human immunodeficiency virus and acquired immunodeficiency syndrome

IAEA

The International Atomic Energy Agency

IBL

Ireland Blyth Limited, Mauritius

ICU

Intensive Care Unit

IMF

International Monetary Fund

kV

Kilovolt

MBM Seychelles Ltd

Mahé Business Machines, Seychelles Ltd

MDCT

Multiple detector computed tomography

MDG

Millennium Development Goals

MoU

Memorandum of Understanding

MRI

Magnetic resonance imaging

NICU

Neonatal intensive care unit

PACS

Picture archiving and communication system

PUC

Public Utilities Corporation, Seychelles

RIS

Radiology information system

SBC

Seychelles Broadcasting Corporation

SDP

The Seychelles Democratic Party

SLTA

Seychelles Land Transport Agency

SPUP

The Seychelles People's United Party

SPPF

The Seychelles People's Progressive Front

SEAS

Seychelles East Africa System

UPS

Urgent Power Supply

USM

Universiti Sains Malaysia

UN

The United Nations

VTS

The Vehicle Testing Services

VCS

Victoria Computer Services

WHO

World Health Organization