

Fungal Diagnostic Survey Africa 2022

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**APPENDIX 4**  
**COUNTRY REPORTS**  
**A GAFFI SURVEY 2022**



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[gaffi.org](http://gaffi.org)

## Country Reports

This appendix provides a single page summary of the diagnostic situation for fungal disease in each country (state). Each summary is necessarily very brief and only touches the highlights. The primary sources for the demographic information are:

**Population:** CIA World Factbook. [weblink](#)

**GDP:** IMF World Economic Outlook Database, October 2021. Nominal & per capita GDP. [weblink](#)

**Health expenditure:** (% of GDP). [weblink](#)

**Health expenditure:** (% of total). [weblink](#)

**HIV burden:** UNAIDS at [weblink](#)

**TB:** WHO at [weblink](#)

**Asthma:** Various including country estimates of fungal disease burden at [weblink](#)

**Cancer:** Globocan at [weblink](#)

Gross domestic product (GDP) is stated for purchasing power equity (PPP) and is estimated for 2021. All the other data is derived from direct conversations with GAFFI Ambassadors and knowledgeable in country healthcare workers, and corroborated by further dialogue with leaders in public health in each country.

Cette annexe fournit un résumé d'une page de la situation du diagnostic des maladies fongiques dans chaque pays (état). Chaque résumé est nécessairement très bref et n'aborde que les points essentiels. Les sources principales pour les informations démographiques sont :

Le produit intérieur brut (PIB) est exprimé en parité de pouvoir d'achat (PPA) et est estimé pour 2021. Toutes les autres données proviennent de conversations directes avec les ambassadeurs du GAFFI et des travailleurs de la santé bien informés dans les pays, et sont corroborées par un dialogue plus approfondi avec les responsables de la santé publique dans chaque pays.

All reports are in English, 20 en français (FR), 3 em portugês (PT)

North Africa	Sub-Saharan Africa		
Algeria (FR)	Angola (PT)	Gabon (FR)	Nigeria
Egypt	Benin (FR)	The Gambia	Puntland (Somalia)
Libya	Botswana	Ghana	Rwanda
Morocco (FR)	Burkina Faso (FR)	Guinea (FR)	Senegal (FR)
Tunisia (FR)	Burundi (FR)	Guinea-Bissau (PT)	Sierra Leone
	Cameroon (FR)	Kenya	Somalia
	Central African Republic (FR)	Lesotho	Somaliland (Somalia)
	Chad (FR)	Liberia	South Africa
	Congo (FR)	Madagascar (FR)	South Sudan
	Côte d'Ivoire (FR)	Malawi	Sudan
	DR Congo (FR)	Mali (FR)	Tanzania
	Equatorial Guinea	Mauritania (FR)	Togo (FR)
	Eritrea	Mauritius	Uganda
	Eswatini	Mozambique (PT)	Zambia
	Ethiopia	Namibia	Zimbabwe
		Niger (FR)	

## Pays / Afrique subsaharienne / ALGÉRIE



### Informations de base

- **Population** : 44,2 m (2022)  
29,6% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Algér ; (7.9 millions d'habitants).
- **Superficie** : 2 381 740 km<sup>2</sup>.
- **Langue officielle** : Arabe, berbère.
- **Principales religion** : Islam (97,9 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 21 000 (0.05%) ; décès dus à des maladies liées au sida : <500 (2021).
- **TB**: *incidence totale* : 24 000 (0,05%) ; mortalité : 2 746 ; Incidence de la séropositivité : 0,8% (2021).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 58 418 ; décès : 32 802 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 162,1 milliards de dollars ; par habitant : 3 760 dollars (2021).
- **Dépenses de santé** : *total*: 6,22 % du PIB ; *dépenses publiques intérieures de santé* : 65,8 % du total (2018).
- L'Algérie fournit des soins de santé universels gratuits dans le secteur public.
- Le diagnostic et la recherche sur les champignons sont concentrés dans les hôpitaux universitaires publics, bien qu'il y ait un manque de spécialistes en mycologie médicale.
- On trouve des mycologues principalement dans les grandes villes du nord, mais généralement pas dans le sud.
- En 2018, on comptait 16 hôpitaux universitaires, 297 autres hôpitaux publics, 273 établissements de santé locaux, 1 708 polycliniques, 6 226 centres de soins et 575 établissements privés.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent pratiquée dans tous les hôpitaux publics et les établissements de santé locaux.
- Le scanner et l'IRM sont souvent pratiqués dans les hôpitaux universitaires.
- Les radiologues font régulièrement des rapports dans tous les hôpitaux publics et les établissements de santé locaux.
- La bronchoscopie et la spirométrie sont souvent pratiquées dans les hôpitaux universitaires.
- Le grattage de la cornée est souvent effectué dans les hôpitaux publics spécialisés.
- La ponction lombaire est pratiquée dans tous les hôpitaux publics.
- La biopsie de la peau n'est pas du tout utilisée.

### Tests de laboratoire

- Il y a un laboratoire BSL-3, qui a des protocoles pour la manipulation des champignons pathogènes.
- La microscopie directe du LCR est souvent réalisée dans les hôpitaux universitaires.
- La microscopie directe de la peau, des cheveux et des ongles est souvent pratiquée dans tous les hôpitaux publics et les établissements de santé locaux.
- D'autres types de microscopie directe (par exemple, urine, LBA, échantillons vaginaux) sont réalisés occasionnellement dans les hôpitaux universitaires.
- L'hémoculture n'est réalisée que très rarement dans les hôpitaux universitaires et uniquement en cas de suspicion de septicémie bactérienne.
- L'histopathologie n'est pas réalisée pour le diagnostic fongique.
- La culture fongique est souvent réalisée dans la plupart des hôpitaux universitaires.
- Les tests CrAg, *Histoplasma* antigen et *Pneumocystis* PCR ne sont pas disponibles en Algérie.
- Les tests d'antigène d'*Aspergillus* et d'anticorps d'*Aspergillus* sont très rarement effectués dans certains hôpitaux universitaires. Les tests d'antigène d'*Aspergillus* ne sont utilisés que dans des cas très spécifiques (par exemple en cas d'immunodéficience).
- La numération des CD4 est utilisée pour presque tous les patients séropositifs, y compris les nouveaux patients et ceux qui sont malades et/ou admis à l'hôpital.

## Country / North Africa / ALGERIA



### Basic information

- **Population:** 44.2 m (2022). 29.6% aged <15 years (2021).
- **Capital and largest city:** Algiers (population 7.9 m).
- **Area:** 2,381,740 km<sup>2</sup>.
- **Official languages:** Arabic, Berber.
- **Major religion:** Islam (97.9%).

### Key fungal health indicators

- **HIV:** *total prevalence:* 21,000 (0.05%); *deaths from AIDS-related illness:* <500 (2021).
- **TB:** *total incidence:* 24,000 (0.05%); *mortality:* 2,746; *HIV-positive incidence:* 0.8% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 58,418; *deaths:* 32,802 (2020).

### Country health system

- **GDP (PPP):** *total:* \$162.1 bn; *per capita:* \$3,760 (2021).
- **Health expenditure:** *total:* 6.22% of GDP; *domestic public health expenditure:* 65.8% of total (2018).
- Algeria provides free universal healthcare in the public sector.
- Fungal diagnosis and research are concentrated in the public university hospitals, although there is a lack of specialists in medical mycology.
- Mycologists are found mainly in the large cities in the north but not generally in the south.
- In 2018, there were 16 university hospitals, 297 other public hospitals, 273 local healthcare institutions, 1,708 polyclinics, 6,226 healthcare centres and 575 private institutions.

### Clinical diagnostic procedures + radiology

- **Chest X-ray** is performed often at all public hospitals and local healthcare institutions.
- **CT and MRI scans** are performed often in university hospitals.
- **Radiologists** routinely report at all public hospitals and local healthcare institutions.
- **Bronchoscopy** and **spirometry** are performed often in university hospitals.
- **Corneal scraping** is performed often at specialist public hospitals.
- **Lumbar puncture** is performed at all public hospitals.
- **Skin biopsy** is not used at all.

### Lab tests

- There is a **BSL-3** lab, which has protocols for handling pathogenic fungi.
- Direct microscopy of **CSF** is performed often at university hospitals.
- Direct microscopy of **skin, hair, nails** is performed often at all public hospitals and local healthcare institutions.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed occasionally at university hospitals
- **Blood culture** is only performed very rarely at university hospitals and then only for suspected bacterial sepsis.
- **Histopathology** is not performed for fungal diagnosis.
- **Fungal culture** is performed often in most university hospitals.
- **CrAg, Histoplasma antigen and Pneumocystis PCR** tests are not available in Algeria.
- **Aspergillus antigen** and **Aspergillus antibody** tests are very rarely performed in some university hospitals. *Aspergillus* antigen tests are only used in very specific instances (e.g. immunodeficiency).
- **CD4 counts** are used on nearly all HIV patients, including new patients and those who are ill and/or admitted to hospital.

\* Not verified by Ministry of Health or another knowledgeable agency.

Country / North Africa / **EGYPT****Basic information**

- **Population:** 107.8 m (2022). 33.6% aged <15 years (2021).
- **Capital and largest city:** Cairo (population 21.3 m).
- **Area:** 1,001,450 km<sup>2</sup>.
- **Official languages:** Arabic.
- **Major religion:** Islam (94.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 30,000 (0.03%); *deaths from AIDS-related illness:* <1000 (2021).
- **TB:** *total incidence:* 11,000 (0.01%); *mortality:* 508; *HIV-positive incidence:* 0.9% (2021).
- **Clinical asthma in adults:** 9.4% (2017).
- **Total cancer caseload:** *new cases:* 134,632; *deaths:* 89,042 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$1,381 bn; *per capita:* \$13,422 (2021).
- **Health expenditure:** *total:* 4.95% of GDP; *domestic public health expenditure:* 24.1% of total (2018).
- The healthcare hierarchy in Egypt is: university hospitals (of which there are approx. 20), district hospitals, and community health centres. District hospitals are somewhat basic and will often refer patients to the nearest university hospital. There is also a substantial private sector, which can be very sought-after due to low capacity in the public sector.
- The Health Insurance Organization (HIO) covers some basic healthcare costs for some of the population, but most treatments still require some level of out-of-pocket payment.
- Expensive procedures (e.g. CT and MRI scans) are sometimes covered by charitable foundations.
- Provision of some of the diagnostics in this document can vary between regions.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are performed often at university hospitals and at some district hospitals.
- **MRI scan** is performed often at university hospitals, although it is not used to diagnose fungal disease.
- **Radiologists** report often at university hospitals and at some district hospitals.
- **Bronchoscopy** and **spirometry** are performed often at university hospitals.
- **Corneal scraping, lumbar puncture** and **skin biopsy** are performed occasionally at university hospitals.

**Lab tests**

- There is a **BSL-3** lab in Cairo, which is only for viral diseases. Two more are either under construction or planned, one in Alexandria and one at Ain Shams University, Cairo. These will both be able to handle pathogenic fungi.
- Direct microscopy of **skin, hair, nails** is performed often at university and district hospitals.
- Direct microscopy of **CSF** is performed often at some university hospitals and rarely at others.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at some university hospitals and occasionally at others.
- **Blood culture** is performed often at university hospitals and at some district hospitals.
- **Histopathology** and **fungal culture** are performed often at some university and district hospitals and occasionally at others.
- **CrAg** test is available at a few private facilities.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all uncommon but each are available at a few private and university hospitals.
- **CD4 counts** are performed on request, for new HIV patients and those with high viral load.

## Country / North Africa / LIBYA

**Basic information**

- **Population:** 7.1 m (2022). 33.7% aged <15 years (2021).
- **Capital and largest city:** Tripoli (population 1.2 m).
- **Area:** 1,759,540 km<sup>2</sup>.
- **Official language:** Arabic.
- **Major religion:** Islam (96.6%)

**Key fungal health indicators**

- **HIV:** *total prevalence:* 8,300 (0.12%); *deaths from AIDS-related illness:* <200 (2021)
- **TB:** *total incidence:* 4,000 (0.06%); *mortality:* 931; *HIV-positive incidence:* 0.7% (2021)
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 7,661; *deaths:* 4,750 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$90.5 bn; *per capita:* \$13,489 (2021).
- **Health expenditure:** *total:* 6.05% of GDP; *domestic public health expenditure:* 63.3% (2011).
- There are no available health expenditure data since 2011.
- The 2011 conflict and the ongoing instability since has had a significant negative effect on the ability of the health service to provide care. This is due to various issues such as supply shortages and significant security concerns.
- The country's major hospitals are in Tripoli and Benghazi.

**Clinical diagnostic procedures + radiology\***

- **Chest X-ray** and **CT scan** are performed often at specialist hospitals and at community health centres.
- **MRI scan** is available nationwide in both public and private health facilities.
- **Radiologists** regularly report images in public and private hospitals.
- **Bronchoscopy, spirometry, corneal scraping, lumbar puncture** and **skin biopsy** are all available at specialized centers.

**Lab tests\***

- There is no **BSL-3** lab in Libya.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) is available and done occasionally.
- **Blood culture** and **histopathology** are available and done occasionally.
- **Fungal culture** is unavailable.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** tests are unavailable.
- **Pneumocystis PCR** test is unavailable.
- **CD4 counts** are performed on those with high viral load.

\* Not verified by Ministry of Health or another knowledgeable agency.

## Pays / Afrique du Nord / MAROC



### Informations de base

- **Population** : 36,7 m millions d'habitants (2021)  
27,0% âgés de moins de 15 ans (2021).
- **Capitale** : Rabat ; Plus grande ville : Casablanca (population 4,3 millions).
- **Superficie** : 716 550 km<sup>2</sup>.
- **Langue officielle** : Arabe, Amazigh (Berber).
- **Principales religion** : Islam (99,9 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 23 000 Prévalence du VIH (0,06%); décès dus à des maladies liées au sida : < 500 (2021).
- **TB**: *incidence totale* : 35 000 (0,1 %) ; mortalité : 3 384 ; Incidence de l'HIV chez les tuberculeux : 1,2 % (2021).
- **Asthme chez les adultes** : 3,89 % (2009).
- **Nombre total de cas de cancer** : *nouveaux cas* : 59 370 ; décès : 35 265 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 303 milliards de dollars ; par habitant : 8 338 \$ (2021).
- **Dépenses de santé** : *total*: 5,31% du PIB ; *dépenses publiques intérieures de santé* : 40,2 % du total (2020).
- Les services de Mycologie et Parasitologie sont opérationnels dans 8 de 9 hôpitaux universitaires avec 13 cadres supérieurs.
- Il y a plus de 30 hôpitaux offrant des soins tertiaires et plus de 100 dispensant des soins secondaires, avec environ 400 autres fournir des soins primaires.
- Le paiement des soins de santé se fait généralement par une combinaison de transferts gouvernementaux, paiement direct par le patient, et via un système d'assurance maladie obligatoire.

### Procédures de diagnostic clinique + radiologie\*

- La radiographie pulmonaire et la tomodensitométrie sont souvent réalisées au niveau des centres hospitaliers universitaires CHU et hôpitaux régionaux et hôpitaux provinciaux.
- L'examen IRM est souvent effectué dans les CHU.
- Les radiologues se présentent souvent dans les CHU et occasionnellement dans les hôpitaux provinciaux.
- La bronchoscopie et la spirométrie sont souvent pratiquées aux CHU et rarement dans les hôpitaux régionaux.
- Le raclage cornéen est souvent pratiqué dans les CHU.
- La ponction lombaire est souvent pratiquée aux CHU et aux CHP (centre hospitalier provincial) et CHR (centre hospitalier régional).
- La biopsie cutanée est souvent pratiquée dans les CHU et parfois dans les hôpitaux Provinciaux.

### Tests de laboratoire\*

- Il existe plusieurs laboratoires BSL-3 au Maroc, dont l'Institut Pasteur de Casablanca. Aucun d'entre eux n'a de protocole pour la manipulation de champignons pathogènes.
- Microscopie directe du LCR, de la peau, des cheveux, des ongles et d'autres types (p. ex. urine, LBA, prélèvements vaginaux) sont effectués souvent aux CHU.
- L'hémoculture et la culture fongique sont souvent réalisées aux CHU.
- L'histopathologie est souvent pratiquée aux CHU et hôpitaux provinciaux.
- Tests CrAg, antigène d'*Aspergillus* et anticorps d'*Aspergillus* sont souvent effectués dans les CHU.
- Le test PCR *Pneumocystis* est souvent effectué au CHU Ibn-Rochd de Casablanca.
- Le test pour l'antigène *Histoplasma* n'est pas effectué au Maroc, car les réactifs ne sont pas disponibles.
- La numération des CD4 est effectuée sur les personnes ayant une charge virale élevée, et ceux qui sont malades et/ou admis à l'hôpital, en utilisant le FACS analyse sur place.

Country / North Africa / **MOROCCO****Basic information**

- **Population:** 36.7 m (2022). 27.0% aged <15 years (2021).
- **Capital:** Rabat; **Largest city:** Casablanca (population 4.3 m).
- **Area:** 716,550 km<sup>2</sup>.
- **Official languages:** Arabic, Amazigh (Berber).
- **Major religions:** Islam (99.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 23,000 (0.06%); *deaths from AIDS-related illness:* <500 (2021).
- **TB:** *total incidence:* 35,000 (0.1%); *mortality:* 3,384; *HIV-positive incidence:* 1.2% (2021).
- **Clinical asthma in adults:** 3.89% (2009).
- **Total cancer caseload:** *new cases:* 59,370; *deaths:* 35,265 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$303 bn; *per capita:* \$8,338 (2021).
- **Health expenditure:** *total:* 5.31% of GDP; *domestic public health expenditure:* 40.2% of total (2020).
- Mycology and Parasitology departments are operational in 8 of 9 teaching hospitals with 13 senior staff.
- There are over 30 hospitals providing tertiary care and over 100 providing secondary care, with around 400 more providing primary care.
- Payment for healthcare is generally by a combination of government transfers, out-of-pocket payment by the patient, and via a mandatory health insurance system.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are performed often at central, regional and provincial hospitals.
- **MRI scan** is performed often at central hospitals.
- **Radiologists** report often at central hospitals and occasionally at provincial hospitals.
- **Bronchoscopy**, and **spirometry** are performed often at central hospitals and rarely at regional hospitals.
- **Corneal scraping** is performed often at central hospitals.
- **Lumbar puncture** is performed often at central, regional and provincial, and rarely at community health centres.
- **Skin biopsy** is performed often at central hospitals and occasionally at provincial hospitals.

**Lab tests**

- There are several **BSL-3** labs in Morocco, including the Pasteur Institute in Casablanca. None of these have protocols for handling pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at central hospitals.
- **Blood culture** and **fungal culture** are performed often at central hospitals.
- **Histopathology** is performed often at central and provincial hospitals.
- **CrAg, Aspergillus antigen** and **Aspergillus antibody** tests are performed often at central hospitals.
- **Pneumocystis PCR** test is performed often at the Ibn-Rochd University Hospital in Casablanca but only occasionally at other central hospitals.
- **Histoplasma antigen**, test is not performed in Morocco, as the reagents are unavailable.
- **CD4 counts** are performed on new HIV patients with high viral load, and those who are ill and/or admitted to hospital, using FACS analysis on site.

## Pays / Afrique du Nord / TUNISIE



### Informations de base

- **Population** : 11,9 m millions d'habitants (2022)  
25,3 % âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Tunis  
(2,9 million d'habitants).
- **Superficie** : 163 610 km<sup>2</sup>.
- **Langue officielle** : Français (répandu).
- **Principales religion** : Islam (99,5 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 5 400 (0,05%) ; décès dus à une maladie liée au sida : < 500 (2021).
- **TB**: *incidence totale* : 4 500 (0,04 %) ; mortalité : 152 ;  
Incidence de la séropositivité : 0,7% (2021).
- **Asthme chez les adultes** : 7,25% (2018).
- **Nombre total de cas de cancer\*** : *nouveaux cas* : 19 446 ;  
décès : 11 855 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 129 milliards de dollars ; par habitant :  
10 720 dollars (2021).
- **Dépenses de santé** : *total*: 7,29 % du PIB ; *dépenses publiques intérieures de santé* : 57,4 % du total (2020).
- Il existe plusieurs régimes d'assurance nationale, qui couvrent environ 70 % de la population.
- Les soins tertiaires sont dispensés par 24 hôpitaux universitaires, les soins secondaires par 33 hôpitaux régionaux et les soins primaires par 109 hôpitaux locaux et 2 172 centres de santé primaires. Les hôpitaux régionaux ne se trouvent que dans les villes qui ne disposent pas d'un hôpital universitaire.
- Il existe 7 laboratoires de mycologie dans le pays, 4 à Tunis, 2 par la côte à Sousse et Monastir et 1 au sud par Sfax.

### Procédures de diagnostic clinique + radiologie\*

- La radiographie du thorax est souvent effectuée dans les hôpitaux universitaires et régionaux.
- Les tomodensitogrammes et les IRM sont souvent effectués dans les hôpitaux universitaires.
- Les radiologues travaillent régulièrement dans les hôpitaux privés et universitaires, et occasionnellement dans les hôpitaux régionaux.
- La bronchoscopie et la spirométrie sont souvent pratiquées dans les hôpitaux universitaires.
- La ponction lombaire et la biopsie cutanée sont souvent pratiquées dans les hôpitaux universitaires.
- Le grattage de la cornée est effectué occasionnellement dans les hôpitaux universitaires.
- Biopsie cutanée fréquemment pratiquée à travers le pays.

### Tests de laboratoire

- Il existe six laboratoires publics de mycologie en Tunisie, dont aucun n'est de niveau BSL-3. Il existe également quelques laboratoires privés, mais pour les recherches fongiques, ils sont généralement limités aux mycoses superficielles.
- La microscopie directe du LCR est réalisée occasionnellement dans les hôpitaux universitaires.
- La microscopie directe de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple, urine, LBA, échantillons vaginaux) est souvent réalisée dans les hôpitaux universitaires.
- L'hémoculture, l'histopathologie et la culture fongique sont souvent réalisées dans les hôpitaux universitaires.
- Le test CrAg est souvent effectué dans les hôpitaux universitaires.
- Les tests d'anticorps anti-*Apergillus* et de PCR *Pneumocystis* sont effectués occasionnellement dans les hôpitaux universitaires.
- Le test de l'antigène d'*Aspergillus* est pratiquée souvent dans seulement 3 des 7 laboratoires de mycologie et occasionnellement dans les autres mais aussi dans très peu de laboratoires privés.
- Le test de l'antigène d'*Histoplasma* n'est pas disponible en Tunisie.
- La numération des CD4 est effectuée sur presque tous les patients séropositifs, par analyse FACS sur place.

Country / North Africa / **TUNISIA****Basic information**

- **Population:** 11.9 m (2022). 25.3% aged <15 years (2021).
- **Capital and largest city:** Tunis (population 2.9 m).
- **Area:** 163,610 km<sup>2</sup>.
- **Languages:** Arabic (official); French (widespread).
- **Major religion:** Islam (99.5%).

**Key fungal health indicators**

- **HIV:** total prevalence: 5,400 (0.05%); deaths from AIDS-related illness: <500 (2021).
- **TB:** total incidence: 4,500 (0.04%); mortality: 152; HIV-positive incidence: 0.7% (2021).
- **Clinical asthma in adults:** 7.25% (2018).
- **Total cancer caseload\*:** new cases: 19,446; deaths: 11,855 (2020).

**Country health system**

- **GDP (PPP):** total: \$129 bn; per capita: \$10,720 (2021).
- **Health expenditure:** total: 7.29% of GDP; domestic public health expenditure: 57.4% of total (2020).
- There are several national insurance schemes, covering around 70% of the population.
- Tertiary care is delivered by 24 university hospitals, secondary care by 33 regional hospitals, and primary care by 109 local hospitals and 2,172 primary health centres. Regional hospitals are only found in cities which do not have a university hospital.
- There are 7 mycology laboratories in the country, 4 in Tunis, 2 by the coast in Sousse and Monastir and 1 in the south by Sfax.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university and regional hospitals.
- **CT and MRI scans** are performed often at university hospitals.
- **Radiologists** report routinely at private and university hospitals, and occasionally at regional hospitals.
- **Bronchoscopy** and **spirometry** are performed often at university hospitals.
- **Lumbar puncture** and **skin biopsy** are performed often at university hospitals.
- **Corneal scraping** is performed occasionally at university hospitals.
- **Skin biopsy** is frequently done across the country.

**Lab tests**

- There are six public mycology labs in Tunisia, none of which are **BSL-3** facilities. There are also some private-sector labs but for fungal investigations they are generally limited to superficial mycoses.
- Direct microscopy of **CSF** is performed occasionally at university hospitals.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at university hospitals.
- **Blood culture, histopathology** and **fungal culture** are performed often at university hospitals.
- **CrAg** test is performed occasionally at university hospitals.
- **Aspergillus antibody** and **Pneumocystis PCR** tests are performed occasionally at university hospitals.
- **Aspergillus antigen** test is performed often at only 3 out of the 7 mycology laboratories and occasionally in the others but also in very few private laboratories.
- **Histoplasma antigen** test is not available in Tunisia.
- **CD4 counts** are taken on nearly all HIV patients, using FACS analysis on site.

## País / África Subariana / ANGOLA



### Informação básica

- **População:** 34,8 m (2022).  
47,8% com idades <15 anos (2021).
- **Capital e maior cidade:** Luanda (população 8,3 m).
- **Área:** 1,246,700 km<sup>2</sup>.
- **Língua oficial:** Português.
- **Religião predominante:** Cristianismo (90,5%).

### Indicadores de saúde chave nas infeções fúngicas

- **VIH:** *prevalência total:* 320,000 (0,92%); *mortes associadas a SIDA:* 15,000 (2021).
- **TB:** *incidência total:* 112,000 (0,32%); *mortalidade:* 21,100; *incidência em indivíduos positivos para VIH:* 12,5% (2021).
- **Asma clínica em adultos:** sem dados disponíveis.
- **Número total de casos de cancro:** *novos casos:* 15,949; *mortes:* 10,569 (2020).

### Sistema de saúde do país

- **PIB (PPC):** *total:* \$218 bn; *per capita:* \$6,820 (2021).
- **Gastos em saúde:** *total:* 2,55% do PIB; *gastos em saúde público domésticos:* 41,9% do total (2018).
- Os serviços de saúde são gratuitos em teoria, mas muitos pagamentos são feitos pelos próprios indivíduos e alguns através de seguros.
- No Setor Público há aproximadamente 246 hospitais em Angola, incluindo 17 Hospitais Nacionais/Centrais de nível terciário, 23 Hospitais Gerais/de Província, 34 Hospitais de Especialidade, de nível secundário e cerca de 172 Hospitais Municipais. Existem cerca de 651 Centros de Saúde e mais de 2,311 Postos de Saúde.

### Procedimentos de diagnóstico clínico + radiologia

- Radiografias pulmonares são realizadas regularmente em todos os hospitais.
- CT (tomografia axial computadorizada) e RM (ressonância magnética) são realizadas ocasionalmente em hospitais de especialidade e raramente em hospitais distritais.
- Os radiologistas desenvolvem a sua atividade rotineiramente em hospitais de especialidade e ocasionalmente em hospitais distritais.

- Broncoscopia e espirometria são raramente realizadas em hospitais especializados.
- Raspagem da córnea e punção lombar são realizadas ocasionalmente em hospitais especializados.
- Biópsias de pele são realizadas em hospitais especializados em oncologia e nos serviços de patologia clínica, mas não nos serviços de dermatologia.

### Testes laboratoriais

- Existe um laboratório BSL-3 em Angola; não tem no entanto um protocolo para manuseamento de fungos patogénicos.
- Microscopia direta do LCR é raramente realizada em Angola.
- Microscopia direta de pele, unhas e cabelo é realizada ocasionalmente em alguns hospitais de especialidade e frequentemente em alguns hospitais privados.
- Outros tipos de microscopia direta (ex. urina, LBA, amostras vaginais) são realizadas frequentemente em alguns hospitais de especialidade, no laboratório de referência e outros laboratórios públicos.
- Hemoculturas são realizadas ocasionalmente no laboratório de referência e outros laboratórios de saúde pública, em alguns hospitais de especialidade e unidades de saúde privadas.
- Histopatologia é realizada ocasionalmente em alguns hospitais de especialidade e raramente em hospitais distritais.
- A cultura fúngica é realizada frequentemente em alguns hospitais de especialidade e raramente em alguns hospitais distritais e outros laboratórios de saúde pública.
- Testes para deteção de CrAg, antigénio de *Histoplasma*, antigénio de *Aspergillus*, e anticorpos para *Aspergillus* são realizados raramente em hospitais de especialidade e ocasionalmente no laboratório de referência e alguns laboratórios privados.
- Teste de PCR para deteção de *Pneumocystis* não está disponível em Angola.
- Contagem de CD4 é realizada ocasionalmente em alguns hospitais e laboratórios privados.

Country / Subsaharan Africa / **ANGOLA****Basic information**

- **Population:** 34.8 m (2022). 47.8% aged <15 years (2021).
- **Capital and largest city:** Luanda (population 8.3 m).
- **Area:** 1,246,700 km<sup>2</sup>.
- **Official language:** Portuguese.
- **Major religion:** Christianity (90.5%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 320,000 (0.92%); *deaths from AIDS-related illness:* 15,000 (2021).
- **TB:** *total incidence:* 112,000 (0.32%); *mortality:* 21,100; *HIV-positive incidence:* 12.5% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 15,949; *deaths:* 10,569 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$218 bn; *per capita:* \$6,820 (2021).
- **Health expenditure:** *total:* 2.55% of GDP; *domestic public health expenditure:* 41.9% of total (2018).
- Health services are free in theory, but there is a lot of out-of-pocket payment and some insurance.
- In the Public Sector there are approximately 246 hospitals in Angola, including 17 National/Central Hospitals at tertiary level, 23 General/Provincial Hospitals, 34 Specialized Hospitals, at secondary level and about 172 Municipal hospitals. There are 651 Health Centres and more than 2,311 Health Posts.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at all hospitals.
- **CT and MRI scans** are performed occasionally at specialist hospitals and rarely at district hospitals.
- **Radiologists** report routinely at specialist hospitals and occasionally at district hospitals.
- **Bronchoscopy** and **spirometry** are performed rarely at specialist hospitals.
- **Corneal scraping and lumbar puncture** are performed occasionally at specialist hospitals.
- **Skin biopsy** is performed in specialized oncology and pathological anatomy services, but not in dermatology services.

**Lab tests**

- There is a **BSL-3** lab in Angola; it does not yet have a protocol for handling pathogenic fungi.
- Direct microscopy of **CSF** is rarely performed in Angola.
- Direct microscopy of **skin, hair** and **nails** is performed occasionally in some specialist hospitals and often in some private settings.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often in some specialist hospitals and in the reference lab and other public laboratories.
- **Blood culture** is performed occasionally in the reference lab and other public health laboratories, in some specialist hospitals and private health units.
- **Histopathology** is performed occasionally in some specialist hospitals and rarely in some district hospitals.
- **Fungal culture** is performed often in some specialist hospitals and rarely in some district hospitals and other public health laboratories.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** tests are performed rarely in some specialist hospitals and occasionally in the reference laboratory and in some private settings.
- **Pneumocystis PCR** test is unavailable in Angola.
- **CD4 count** is performed occasionally in some hospitals and private settings.

## Pays / Afrique subsaharienne / **BENIN**



### Informations de base

- **Population** : 13,8 m (2022)  
45,5% âgés de moins de 15 ans (2021).
- **Capitale** : Porto Novo ; Plus grande ville : Cotonou  
(2,4 millions d'habitants).
- **Superficie** : 112 622 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religions** : Christianisme (53,0 %) ; Islam (23,8 %) ;  
; Confessions traditionnelles (18,1 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 69 000 (0,5%) ; décès dus à des  
maladies liées au sida : 1 600 (2021).
- **TB**: *incidence totale* : 6 900 (0,05 %) ; mortalité : 1 680 ;  
Incidence de la séropositivité : 13,5% (2021).
- **Asthme chez les adultes** : 3,77% (2018).
- **Nombre total de cas de cancer** : *nouveaux cas* : 6 747 ;  
décès : 4 662 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 46,5 milliards de dollars ; par habitant :  
3 720 dollars (2021).
- **Dépenses de santé** : *total*: 2,49 % du PIB ; *dépenses  
publiques intérieures de santé* : 19,7 % du total (2018).
- Les travailleurs du secteur public bénéficient d'une assurance  
maladie publique ; un nouveau régime (ARCH) rendant  
l'assurance maladie obligatoire pour les travailleurs du  
secteur informel et privé est en cours de déploiement. Il existe  
également un petit nombre d'assurances privées.
- Les 12 départements du pays sont répartis en 34 "zones de  
santé", qui comptent chacune au moins un hôpital.
- Le Bénin compte 48 hôpitaux, dont deux hôpitaux  
universitaires nationaux, tous deux situés à Cotonou, et quatre  
hôpitaux centraux.

### Procédures de diagnostic clinique + radiologie

- Les radiographies du thorax sont souvent effectuées dans les  
hôpitaux publics régionaux et nationaux.
- Il y a cinq tomodensitomètres disponibles dans le secteur  
public, qui sont utilisés fréquemment. Il y en a quatre dans le  
secteur privé, également utilisés fréquemment.
- Il y a deux scanners IRM dans le secteur public et deux dans  
le secteur privé.
- Le Bénin compte 24 radiologues, environ 50/50 public/privé,  
qui font régulièrement des rapports au niveau tertiaire.
- La ponction lombaire est souvent effectuée au niveau tertiaire  
mais pas ailleurs.
- Un équipement cassé empêche actuellement toute  
bronchoscopie en cours de réalisation.
- Le grattage cornéen n'est pas disponible au Bénin.
- La biopsie cutanée est pratiquée régulièrement dans le  
secteur public et privé au Bénin.

### Tests de laboratoire

- Il existe un laboratoire BSL-3 à Cotonou mais il ne dispose  
pas de protocoles pour la manipulation des champignons  
pathogènes.
- Au Bénin, les laboratoires publics offrent une plus grande  
variété de tests que les laboratoires privés.
- L'hémoculture, l'histopathologie, la culture fongique et la  
microscopie directe du LCR, de la peau, des cheveux et  
des ongles sont toutes réalisées fréquemment dans les  
établissements tertiaires.
- D'autres types de microscopie directe, comme les  
échantillons d'urine, de LBA et de vagin, sont souvent  
effectués dans des établissements tertiaires et  
occasionnellement dans des hôpitaux départementaux.
- Études sur les tests le CrAg, l'anticorps d'*Aspergillus* et  
*Aspergillus* d'antigènes ont été réalisés récemment (CrAg) ou  
sont en cours (*Aspergillus*). Cependant, ces trois tests restent  
indisponibles la plupart du temps.
- Les tests PCR d'antigène d'*Histoplasma* et de *Pneumocystis*  
ne sont pas disponibles au Bénin ; l'équipement pour les tests  
PCR est disponible mais il y a un manque de réactifs.
- Des numérations de CD4 sont régulièrement effectuées pour  
la plupart des patients à l'aide de compteurs PIMA ou CyFlow.

Country / Subsaharan Africa / **BENIN****Basic information**

- **Population:** 13.8 m (2022). 45.5% aged <15 years (2021).
- **Capital:** Porto Novo; **Largest city:** Cotonou (population 2.4 m)
- **Area:** 112,622 km<sup>2</sup>.
- **Official language:** French.
- **Major religions:** Christianity (53.0%); Islam (23.8%); Traditional faiths (18.1%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 69,000 (0.5%); *deaths from AIDS-related illness:* 1,600 (2021).
- **TB:** *total incidence:* 6,900 (0.05%); *mortality:* 1,680; *HIV-positive incidence:* 13.5% (2021).
- **Asthma in adults:** 3.77% (2018).
- **Total cancer caseload:** *new cases:* 6,747; *deaths:* 4,662 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$46.5 bn; *per capita:* \$3,720 (2021).
- **Health expenditure:** *total:* 2.49% of GDP; *domestic public health expenditure:* 19.7% of total (2018).
- There is a very small level of government healthcare subsidy and a significant amount of foreign aid.
- Workers in the public sector receive public health insurance; a new scheme (ARCH) making health insurance mandatory for informal and private-sector workers is currently being rolled out. There is also a small amount of private insurance.
- The country's 12 departments are split into 34 'health zones', each of which has at least one hospital.
- Benin has 48 hospitals, including two National University Hospitals, both in Cotonou, and four Central Hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-rays** are performed often in regional and national public hospitals.
- There are five **CT scanners** available in the public sector, which are used frequently. There are four in the private sector, also used frequently.
- There are two **MRI scanners** in the public sector and two in the private sector.
- Benin has **24 radiologists**, roughly 50:50 public/private, reporting regularly at tertiary level.
- **Lumbar puncture** is performed often at the tertiary level but not elsewhere.
- Broken equipment currently prevents any **bronchoscopy** being performed.
- **Spirometry** is currently available at one facility in Cotonou.
- **Corneal scraping** is not available in Benin.
- **Skin biopsy** is done regularly in both the public and private sector in Benin.

**Lab tests**

- There is a **BSL-3** lab in Cotonou but it does not have protocols for handling pathogenic fungi.
- Public labs in Benin offer a wider variety of tests than private labs.
- **Blood culture, histopathology, fungal culture and direct microscopy of CSF, skin, hair and nails** are all performed often in tertiary facilities.
- Other types of direct microscopy such as **urine, BAL and vaginal samples** are done often in tertiary facilities and occasionally in department-level hospitals.
- Studies into **CrAg, Aspergillus antibody and Aspergillus antigen** tests have been recently completed (CrAg) or are ongoing (Aspergillus). However, all three tests remain unavailable most of the time.
- **Histoplasma antigen and Pneumocystis PCR** tests are not available in Benin; equipment for PCR tests is available but there is a lack of reagents.
- **CD4 counts** are regularly performed for most patients using PIMA or CyFlow counters.

Country / Subsaharan Africa / **BOTSWANA****Basic information**

- **Population:** 2.4 m (2022). 30.5% aged <15 years (2021).
- **Capital and largest city:** Gaborone (population 0.4 m).
- **Area:** 581,730 km<sup>2</sup>.
- **Languages:** English, Setswana.
- **Major religions:** Christianity (73%), no religion (20%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 360,000 (15.1%); *deaths from AIDS-related illness:* 4,600 (2021).
- **TB:** *total incidence:* 6,100 (0.26%); *mortality:* 2,120; *HIV-positive incidence:* 49.2% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 1,112; *deaths:* 5,253 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$41.1 bn; *per capita:* \$17,163 (2021).
- **Health expenditure:** *total:* 5.85% of GDP; *domestic public health expenditure:* 77.5% of total (2018).
- Universal healthcare is available to all citizens; a small nominal fee (BWP5 ≈ \$0.43) is charged (under-5s and over-65s are exempt). A small proportion of population has employer-provided private insurance.
- There are 26 hospitals in a three-tier system – three referral hospitals (two general and one psychiatric), seven district hospitals and 16 primary hospitals. Basic care is provided at clinics.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often in referral, district and primary hospitals and rarely at clinics.
- **CT scan** is performed occasionally in referral hospitals.
- **MRI scan** is performed rarely in referral hospitals.
- **Radiologists** report occasionally at referral hospitals.
- **Bronchoscopy, corneal scraping and skin biopsy** are performed rarely at referral hospitals.
- **Spirometry** is performed often at referral hospitals and occasionally at district hospitals, primary hospitals and clinics.
- **Lumbar puncture** is performed often at referral, district and primary hospitals.
- **Skin biopsy** is performed rarely at referral hospitals.

**Lab tests**

- There is a **BSL-3** lab in Botswana, the National Health Laboratory (NHL), which does not have protocols for handling pathogenic fungi.
- Direct microscopy of **skin, hair and nails** is performed occasionally at NHL and referral hospitals, and rarely at district and primary hospitals.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) is performed often at NHL and referral, district and primary hospitals.
- **Blood culture** and **fungal culture** are performed often at NHL and referral hospitals, and occasionally at district and primary hospitals.
- **Histopathology** is performed often at NHL and one referral hospital.
- **CrAg** test is performed often at referral, district and primary hospitals.
- **Histoplasma antigen, Aspergillus antigen and Aspergillus antibody** tests are not available.
- **Pneumocystis PCR** test is not available within Botswana, but patients are rarely referred to South Africa from referral hospitals.
- **CD4 counts** are taken routinely for all HIV patients, using FACS analysis at centralised locations.

Pays / Afrique subsaharienne / **BURKINA FASO****Informations de base**

- **Population** : 21,9 m millions d'habitants (2022)  
43,6% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Ouagadougou ; (3,0 millions d'habitants).
- **Superficie** : 274 200 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religions** : Islam (60,5 %) ; christianisme (23,2 %) ; religions traditionnelles (15,3 %).

**Indicateurs clés de la santé fongique**

- **VIH**: *prévalence totale* : 88 000 (0,4%) ; décès dus à des maladies liées au sida : 2 000 (2021).
- **TB**: *incidence totale* : 9 900 (0,05 %) ; mortalité : 1 570 ; Incidence de la séropositivité : 5,8% (2020).
- **Asthme chez les adultes** : 2,26% (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 12 045 ; décès : 8 695 (2020).

**Système de santé du pays**

- **PIB (PPA)** : *total* : 52,6 milliards de dollars ; par habitant : 2 444 dollars (2021).
- **Dépenses de santé** : *total*: 5,6 % du PIB ; *dépenses publiques intérieures de santé* : 42,5 % du total (2018).
- Environ 5 % de la population ont une assurance maladie, mais pour la plupart, les soins de santé sont payés directement par le patient.
- Il existe cinq hôpitaux centraux universitaires ou nationaux ; quatre se trouvent à Ouagadougou et un à Bobo-Dioulasso (la deuxième plus grande ville). C'est dans ce dernier que se trouve le plus grand laboratoire du pays.
- Il existe 10 hôpitaux régionaux et 46 hôpitaux de district.

**Procédures de diagnostic clinique + radiologie**

- La radiographie du thorax est disponible dans les hôpitaux régionaux et de district. Elle est gratuite pour les patients atteints de tuberculose.
- La tomodensitométrie est disponible au niveau central, mais elle est inabordable pour les personnes suivantes la plupart.
- L'IRM n'est disponible que dans un hôpital privé à Ouagadougou.
- Les radiologues font régulièrement des rapports dans les hôpitaux régionaux et de district.
- Ni la bronchoscopie ni la spirométrie ne sont accessibles au public ; certains établissements privés pratiquent la spirométrie.
- Le grattage de la cornée n'est pas systématique mais occasionnel disponibles par le biais d'études spécifiques.
- La ponction lombaire est pratiquée régulièrement à tous les hôpitaux.
- Une biopsie de la peau est parfois effectuée au niveau central ; la demande pour cette procédure est faible.

**Tests de laboratoire**

- Il y a deux laboratoires BSL-3 : un laboratoire à Ouagadougou et un laboratoire mobile basé à Bobo-Dioulasso, aucun d'entre eux ne dispose de protocoles fongiques spécifiques.
- La microscopie directe du LCR est souvent réalisée dans les hôpitaux régionaux ; la microscopie de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple, urine, LBA, échantillons vaginaux) est réalisée occasionnellement.
- L'hémoculture est disponible à Ouagadougou et au laboratoire de Bobo-Dioulasso.
- L'histopathologie et la culture fongique sont disponibles dans les hôpitaux régionaux.
- Le test CrAg n'est disponible qu'au niveau central.
- L'anticorps contre *Aspergillus* est disponible chez Bobo-Dioulasso mais rarement utilisé.
- Antigène d'*Histoplasma*, antigène d'*Aspergillus* et Les tests PCR de *Pneumocystis* sont tous indisponibles.
- La numération des CD4 est effectuée au moment du diagnostic, puis au moins une fois par an.

Country / Subsaharan Africa / **BURKINA FASO****Basic information**

- **Population:** 21.9 m (2022). 43.6% aged <15 years (2021).
- **Capital and largest city:** Ouagadougou (population 3.0 m).
- **Area:** 274,200 km<sup>2</sup>.
- **Official language:** French.
- **Major religions:** Islam (60.5%); Christianity (23.2%); Traditional faiths (15.3%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 88,000 (0.4%); *deaths from AIDS-related illness:* 2,000 (2021).
- **TB:** *total incidence:* 9,900 (0.05%); *mortality:* 1,570; *HIV-positive incidence:* 5.8% (2021).
- **Clinical asthma in adults:** 2.26% (2012).
- **Total cancer caseload:** *new cases:* 12,045; *deaths:* 8,695 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$52.6 bn; *per capita:* \$2,444 (2021).
- **Health expenditure:** *total:* 5.6% of GDP; *of GDP;* *domestic public health expenditure:* 42.5% of total (2018).
- Approximately 5% of the population have health insurance but for most, healthcare is paid for directly by the patient.
- There are five central university or national hospitals; four are in Ouagadougou and one is in Bobo-Dioulasso (the second-largest city). The latter is the location of the largest lab in the country.
- There are 10 regional hospitals and 46 district hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is available at regional and district hospitals. For TB patients this is free.
- **CT scan** is available at the central level but is unaffordable for most.
- **MRI scan** is only available at one private hospital in Ouagadougou.
- **Radiologists** report regularly at regional and district hospitals.
- Neither **bronchoscopy** nor **spirometry** is publicly available; some private facilities perform spirometry.
- **Corneal scraping** is not routinely done but occasionally available through specific studies.
- **Lumbar puncture** is performed regularly in all hospitals.
- **Skin biopsy** is occasionally performed at the central level; demand for this procedure is low.

**Lab tests**

- There are two **BSL-3** labs: one lab in Ouagadougou and one mobile lab based in Bobo-Dioulasso, neither of which has specific fungal protocols.
- Direct microscopy of **CSF** is performed often in the regional hospitals; microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed occasionally.
- **Blood culture** is available in Ouagadougou and at the Bobo-Dioulasso lab.
- **Histopathology** and **fungal culture** are available at the regional hospitals.
- **CrAg** test is only available at the central level.
- **Aspergillus antibody** is available at Bobo-Dioulasso but rarely used.
- **Histoplasma antigen, Aspergillus antigen** and **Pneumocystis PCR** tests are all unavailable.
- **CD4 counts** are performed at diagnosis and then at least once a year.

Pays / Afrique subsaharienne / **BURUNDI****Informations de base**

- **Population** : 12,7 m millions d'habitants (2022)  
43,8% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Bujumbura ; (1,0 millions d'habitants).
- **Superficie** : 27 834 km<sup>2</sup>.
- **Langue officielle** : Kirundi, français.
- **Principales religions** : Christianisme (91,5 %).

**Indicateurs clés de la santé fongique**

- **VIH**: *prévalence totale* : 80 000 (0.63%) ; décès dus à des maladies liées au sida : 1 400 (2021).
- **TB**: *incidence totale* : 13 000 (0,1 %) ; mortalité : 2 790 ; Incidence de la séropositivité : 5,5% (2021).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 7 929 ; décès : 5 701 (2020).

**Système de santé du pays**

- **PIB (PPA)** : *total* : 9,5 milliards de dollars ; par habitant : 779 dollars (2021).
- **Dépenses de santé** : *total*: 7,74 % du PIB ; *dépenses publiques intérieures de santé* : 27,8 % du total (2018).
- Le financement des soins de santé est réparti de manière assez égale entre le gouvernement (27,8 %), l'aide extérieure (32,6 %) et les dépenses personnelles (23,9 %), les 15,7 % restants provenant de diverses sources, notamment les assurances privées.
- La hiérarchie des soins de santé se compose de trois hôpitaux tertiaires (tous situés à Bujumbura), de 46 hôpitaux de district et de 616 centres de santé.

**Procédures de diagnostic clinique + radiologie**

- La radiographie du thorax est souvent effectuée dans les hôpitaux tertiaires.
- Des tomodensitomètres sont disponibles dans plusieurs hôpitaux.
- L'IRM n'est disponible qu'à l'hôpital de Karusi.
- Il ne semble pas que des radiologues (la plupart à Bujumbura) fassent régulièrement des rapports.
- La bronchoscopie, la spirométrie et le grattage cornéen sont pratiqués occasionnellement dans les hôpitaux tertiaires.
- La ponction lombaire et la biopsie cutanée sont souvent pratiquées dans les hôpitaux tertiaires et de district.

**Tests de laboratoire**

- Il y a un laboratoire BSL-3 au Burundi.
- La microscopie directe du LCR, de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est souvent réalisée dans les hôpitaux tertiaires et occasionnellement dans les hôpitaux de district.
- L'hémoculture est souvent réalisée dans les hôpitaux tertiaires et occasionnellement dans les hôpitaux de district.
- L'histopathologie est souvent pratiquée dans les hôpitaux tertiaires.
- La culture fongique est effectuée occasionnellement dans les hôpitaux tertiaires.
- Les tests CrAg et *Histoplasma* antigène sont effectués occasionnellement dans les hôpitaux tertiaires.
- Les tests d'antigène d'*Aspergillus* et d'anticorps d'*Aspergillus* sont réalisés occasionnellement dans les centres privés mais rarement, voire jamais, dans les hôpitaux tertiaires.
- Le test PCR de *Pneumocystis* est souvent effectué dans les hôpitaux tertiaires.
- La numération des CD4 n'est généralement pas effectuée au Burundi. La charge virale est mesurée sur presque tous les patients séropositifs, y compris ceux qui sont malades et/ou admis à l'hôpital.

Country / Subsaharan Africa / **BURUNDI****Basic information**

- **Population:** 12.7 m (2022). 43.8 aged <15 years (2021).
- **Capital:** Gitega; **largest city:** Bujumbura (population 1.0 m).
- **Area:** 27,834 km<sup>2</sup>.
- **Official languages:** Kirundi, French.
- **Major religion:** Christianity (91.5%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 80,000 (0.63%); *deaths from AIDS-related illness:* 1,400 (2021).
- **TB:** *total incidence:* 13,000 (0.1%); *mortality:* 2,790; *HIV-positive incidence:* 5.5% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 7,929; *deaths:* 5,701 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$9.5 bn; *per capita:* \$779 (2021).
- **Health expenditure:** *total:* 7.74% of GDP; *domestic public health expenditure:* 27.8% of total (2018).
- Healthcare funding is somewhat evenly split between the government (27.8%), external aid (32.6%) and out-of-pocket spending (23.9%), with the remaining 15.7% comprising various sources including private insurance.
- The healthcare hierarchy is made up of three Tertiary Hospitals (all in Bujumbura), 46 District Hospitals, and 616 Health Centres.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at tertiary hospitals.
- **CT scanners** are available in several hospitals.
- **MR scanning** is available only at Karusi Hospital.
- There are a few **radiologists** in Burundi (most in Bujumbura) who report scans.
- **Bronchoscopy, spirometry** and **corneal scraping** are performed occasionally at tertiary hospitals.
- **Lumbar puncture** and **skin biopsy** are performed often at tertiary and district hospitals.

**Lab tests**

- There is a **BSL-3** lab in Burundi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at tertiary hospitals and occasionally at district hospitals.
- **Blood culture** is performed often at tertiary hospitals and occasionally at district hospitals.
- **Histopathology** is performed often at tertiary hospitals.
- **Fungal culture** is performed occasionally at tertiary hospitals.
- **CrAg** and **Histoplasma antigen** tests are performed occasionally at tertiary hospitals.
- **Aspergillus antigen** and **Aspergillus antibody** tests are performed occasionally in private centres but rarely, if ever, at tertiary hospitals.
- **Pneumocystis PCR** test is performed often at tertiary hospitals.
- **CD4 counts** are not generally performed in Burundi. Viral loads are taken on nearly all HIV patients, including those who are ill and/or admitted to hospital.

## Pays / Afrique subsaharienne / CAMEROUN



### Informations de base

- **Population** : 29,3 m millions d'habitants (2022)  
42,3% âgés de moins de 15 ans (2021).
- **Capitale** : Yaoundé ; Plus grande ville : Douala.  
(2,8 millions d'habitants).
- **Superficie** : 475 440 km<sup>2</sup>.
- **Langue officielles** : Français, anglais.
- **Principales religions** : Christianisme (70,7%) ; islam (24,4%).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 500 000 (1,8%) ; décès dus à des maladies liées au sida : 13 000 (2021).
- **TB**: *incidence totale* : 45 000 (0,15 %) ; mortalité : 12 000 ; Incidence de la séropositivité : 20,2% (2021).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 20 745 ; décès : 13 199 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 105 milliards de dollars ; par habitant : 3 860 dollars (2021).
- **Dépenses de santé** : *total*: 3,53 % du PIB ; *dépenses publiques intérieures de santé* : 6,0 % du total (2018).
- Les soins de santé au Cameroun sont généralement payés de leur poche ; très peu de personnes ont une assurance.
- La hiérarchie des soins de santé publics est organisée en sept catégories, à savoir : les hôpitaux généraux (au nombre de trois) ; les hôpitaux centraux (deux) ; les hôpitaux régionaux (14) et les hôpitaux de district (165).
- Les hôpitaux généraux et centraux se trouvent tous dans le centre du sud-ouest, mais les hôpitaux régionaux et de district sont assez bien répartis dans le pays. Un hôpital général vient d'ouvrir ses portes à Garoua, dans la région du Nord du Cameroun.
- La disponibilité d'un grand nombre de ces diagnostics varie considérablement d'un pays à l'autre.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est pratiquée souvent dans la plupart des hôpitaux généraux/centraux, régionaux et de district, et occasionnellement dans certains établissements plus bas dans la hiérarchie.

- Le scanner est souvent réalisé dans les hôpitaux généraux/centraux et occasionnellement dans les hôpitaux régionaux.
- L'IRM n'est disponible qu'à Douala, tant dans le secteur public que privé.
- Les radiologues travaillent régulièrement dans les hôpitaux généraux/centraux, régionaux et certains hôpitaux de district.
- La bronchoscopie n'est disponible qu'à l'hôpital général de Yaoundé, ainsi que dans des établissements privés.
- La spirométrie n'est disponible que dans les hôpitaux généraux de Yaoundé et Douala, ainsi que dans des établissements privés.
- Le grattage de la cornée n'est disponible que dans les établissements privés.
- La ponction lombaire est souvent pratiquée dans la plupart des hôpitaux généraux/centraux, régionaux et de district.
- La biopsie cutanée est pratiquée occasionnellement dans les hôpitaux généraux/centraux.

### Tests de laboratoire

- Le Centre Pasteur de Yaoundé est le seul laboratoire BSL-3 du Cameroun.
- La microscopie directe du LCR, de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est disponible dans certains hôpitaux généraux/centraux et certains hôpitaux privés.
- L'hémoculture est disponible dans certains hôpitaux généraux/centraux et dans certains hôpitaux privés.
- La culture fongique (pour les infections fongiques superficielles) est souvent réalisée dans les hôpitaux généraux/centraux et rarement dans certains hôpitaux de district.
- L'histopathologie est pratiquée occasionnellement dans les hôpitaux centraux et rarement dans certains hôpitaux de district.
- Les tests CrAg, *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR ne sont disponibles que dans les laboratoires de référence lorsqu'une étude est en cours.
- La numération des CD4 n'est parfois effectuée que sur les patients malades et/ou admis à l'hôpital mais ont récemment été abandonnées au profit de la charge virale des mesures.

## Country / Subsaharan Africa / CAMEROON

**Basic information**

- **Population:** 29.3 m (2022). 42.3% aged <15 years (2021).
- **Capital:** Yaoundé; **Largest city:** Douala (population 2.8 m)
- **Area:** 475,440 km<sup>2</sup>.
- **Official languages:** French, English.
- **Major religions:** Christianity (70.7%); Islam (24.4%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 500,000 (1.71%); *deaths from AIDS-related illness:* 13,000 (2021).
- **TB:** *total incidence:* 45,000 (0.15%); *mortality:* 12,000; *HIV-positive incidence:* 20.2% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 20,745; *deaths:* 13,199 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$105 bn; *per capita:* \$3,860 (2021).
- **Health expenditure:** *total:* 3.53% of GDP; *domestic public health expenditure:* 6.0% of total (2018)
- Healthcare in Cameroon is generally paid for out-of-pocket; very few people have insurance.
- The public healthcare hierarchy is organised into seven categories, including: general hospitals (of which there are three); central hospitals (two); regional hospitals (14) and district hospitals (165).
- The general and central hospitals are all in the central south-west but the regional and district hospitals are fairly well spread out across the country. A general hospital has just opened in Garoua, in the North of Cameroon.
- Availability of many of these diagnostics varies widely across the country.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at most general/central, regional and district hospitals, and occasionally at some facilities lower in the hierarchy.
- **CT scan** is performed often at general/central and occasionally at regional hospitals and Yaoundé.
- **MRI scan** is only available in Douala, both in the public and private sector.
- **Radiologists** report regularly at general/central, regional and some district hospitals.
- **Bronchoscopy** is only available in 3 hospitals in Yaoundé and Douala.
- **Spirometry** is only available at Yaoundé and Douala.
- **Corneal scraping** is only available in private facilities.
- **Lumbar puncture** is performed often at most general/central, regional and district hospitals.
- **Skin biopsy** is performed occasionally at general/central hospitals.

**Lab tests**

- The Pasteur Centre in Yaoundé is the only **BSL-3** lab in Cameroon.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) is available in some general/central hospitals and some private hospitals.
- **Blood culture** is available at some general/central hospitals and some private hospitals.
- **Fungal culture** (for superficial fungal infections) is performed often at general/central hospitals and rarely at some district hospitals.
- **Histopathology** is performed occasionally at central hospitals and rarely at some district hospitals.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are only available in reference laboratories when a study is ongoing.
- **CD4 counts** were occasionally performed only on HIV patients who were ill and/or admitted to hospital, but have recently been abandoned in favour of viral load measurements.

Pays / Afrique subsaharienne / **RÉPUBLIQUE CENTRAFRICAINE****Informations de base**

- **Population** : 5,4 m millions d'habitants (2022). 39,5% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Bangui ; (0,9 millions d'habitants).
- **Superficie** : 622 984 km<sup>2</sup>.
- **Langue officielles** : Français, sango.
- **Principales religions** : Christianisme (89,5%)

**Indicateurs clés de la santé fongique**

- **VIH**: *prévalence totale* : 29 000 (1,52%) ; décès dus à des maladies liées au sida : 2 600 (2021).
- **TB**: *incidence totale* : 29 000 (0,53%) ; mortalité : 6 800 ; Incidence de la séropositivité : 28,3% (2021).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 2 675; des morts : 1 957 (2020).

**Système de santé du pays**

- **PIB (PPA)** : *total* : 4,9 milliards de dollars ; par habitant : \$996 (2021).
- **Dépenses de santé** : *total*: 10,99% du PIB ; *dépenses publiques intérieures de santé* : 6,3 % du total (2018).
- La République centrafricaine (RCA) compte environ 20 hôpitaux, dont trois hôpitaux centraux (tous à Bangui), cinq hôpitaux universitaires régionaux et 35 hôpitaux de district préfectoraux.
- Le paiement se fait généralement par une combinaison de paiements directs et de financement caritatif. Une petite partie de la population est assurée.
- La plupart des données de ce profil se réfèrent à la ville de Bangui ; l'approvisionnement ailleurs risque d'être pire.

**Procédures de diagnostic clinique + radiologie**

- La radiographie pulmonaire et la tomodensitométrie sont souvent effectuées dans les hôpitaux centraux, mais pas ailleurs.
- L'examen IRM n'est pas disponible en RCA.
- Les radiologues signalent régulièrement dans les hôpitaux centraux mais pas ailleurs.
- La bronchoscopie, la spirométrie et le grattage cornéen ne sont pas disponibles en RCA.
- La ponction lombaire est souvent pratiquée dans les hôpitaux centraux et de district.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux centraux.

**Tests de laboratoire**

- L'Institut Pasteur de Bangui est le seul laboratoire BSL-3 en RCA. Il n'a pas de protocoles pour les champignons pathogènes.
- La microscopie directe du LCR, de la peau, des cheveux, des ongles et d'autres types (par exemple, urine, BAL, échantillons vaginaux) est souvent effectuée dans les laboratoires centraux et occasionnellement dans les hôpitaux de district.
- L'hémoculture et la culture fongique sont souvent réalisées dans des laboratoires centraux.
- L'histopathologie est pratiquée au Laboratoire National de Biologie Clinique et de Santé Publique (LNBCSP).
- Les tests CrAg, antigène *Histoplasma*, antigène *Aspergillus*, anticorps *Aspergillus* et PCR *Pneumocystis* ne sont pas disponibles en RCA.
- La numération des CD4 n'est effectuée que sur les nouveaux patients, à l'aide du test « Facscanto II » et sur d'autres plateformes dans d'autres institutions.

Country / Subsaharan Africa / **CENTRAL AFRICAN REPUBLIC****Basic information**

- **Population:** 5.5 m (2022). 39.5% aged <15 years (2021).
- **Capital and largest city:** Bangui (population 0.9 m).
- **Area:** 622,984 km<sup>2</sup>.
- **Official languages:** French, Sango.
- **Major religions:** Christianity (89.5%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 83,000 (1.52%); *deaths from AIDS-related illness:* 2,600 (2021).
- **TB:** *total incidence:* 29,000 (0.53%); *mortality:* 6,800; *HIV-positive incidence:* 28.3% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 2,675; *deaths:* 1,957 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$4.9 bn; *per capita:* \$996 (2021).
- **Health expenditure:** *total:* 10.99% of GDP; *domestic public health expenditure:* 6.3% of total (2018)
- The Central African Republic (CAR) has approximately 20 hospitals, including three Central Hospitals (all in Bangui), five Regional University Hospitals and 35 Prefecture-level District Hospitals.
- Payment is generally by a combination of out-of-pocket payment and charity funding. A small proportion of the population have insurance.
- Most of the data in this profile refers to the city of Bangui; provision elsewhere is likely to be worse.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are both performed often at central hospitals but not elsewhere.
- **MRI scan** is unavailable in the CAR.
- **Radiologists** report routinely in central hospitals but not elsewhere.
- **Bronchoscopy, spirometry** and **corneal scraping** are all unavailable in the CAR.
- **Lumbar puncture** is performed often in central and district hospitals.
- **Skin biopsy** is performed often in central hospitals.

**Lab tests**

- The Institut Pasteur de Bangui is the only **BSL-3** lab in the CAR. It does not have protocols for pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at central laboratories and occasionally at district hospitals.
- **Blood culture** and **fungal culture** are performed often at central laboratories.
- **Histopathology** is only performed at the National Laboratory of Clinical Biology and Public Health (LNBCSP).
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in the CAR.
- **CD4 counts** are only performed on new patients, using 'Facscanto II' assay and on other platforms in other institutions.



## Pays / Afrique subsaharienne / TCHAD

## Informations de base

- **Population** : 18,0 m millions d'habitants (2022)  
47,4% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : N'Djamena ; (1,6 millions d'habitants).
- **Superficie** : 1 284 000 km<sup>2</sup>.
- **Langue officielles** : Français, arabe.
- **Principales religions** : Islam (52,1%) ; christianisme (44,1%)

## Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 110 000 (1,61%) ; décès dus à des maladies liées au sida : 2 700 (2021).
- **TB**: *incidence totale* : 24 000 (0,13 %) ; mortalité : 5 500 ; Incidence de la séropositivité : 14,2% (2021).
- **Asthme chez les adultes** : 3,94% (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 8 575 ; décès : 6 083 (2020).

## Système de santé du pays

- **PIB (PPA)** : *total* : 27,7 milliards de dollars ; par habitant : 1 637 dollars (2021).
- **Dépenses de santé** : *total*: 4,1 % du PIB ; *dépenses publiques intérieures de santé* : 17,0 % du total (2018).
- Le système de santé du Tchad est composé de trois niveaux : central, intermédiaire et périphérique. Le niveau central fournit des soins tertiaires et est composé des hôpitaux universitaires suivants : l'Hôpital Général de Référence Nationale (HGRN) ; l'Hôpital de la Mère et de l'Enfant (HME) ; l'Hôpital de la Renaissance (HR), et l'Hôpital de l'Amitié Tchad-Chine (HATC).
- Les niveaux intermédiaire et périphérique fournissent des soins secondaires et primaires sous la forme d'environ 70 hôpitaux de district et de plus de 1 000 centres de santé, bien qu'une grande minorité d'entre eux ne soient pas fonctionnels, soit parce qu'ils ne sont pas entièrement conformes aux normes, soit parce qu'ils sont encore en construction.
- Tous les diagnostics dont il est question dans ce profil sont entièrement pris en charge par le patient, sauf indication contraire.

## Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est effectuée souvent dans les hôpitaux centraux et occasionnellement dans les hôpitaux de district.

- Le scanner est souvent pratiqué dans les hôpitaux centraux de l'HGRN, de l'HME et de la HR, mais pas ailleurs.
- L'IRM n'est pratiquée qu'à l'hôpital central de la HR.
- Les radiologues font régulièrement des rapports dans les hôpitaux centraux et de district.
- La bronchoscopie et la spirométrie sont toutes deux pratiquées occasionnellement dans les hôpitaux centraux, bien que les patients puissent être envoyés par les hôpitaux de district.
- La spirométrie n'est pas disponible au Tchad.
- Le grattage de la cornée est effectué occasionnellement dans les hôpitaux centraux et de district.
- La ponction lombaire est souvent effectuée dans les hôpitaux centraux et occasionnellement dans les hôpitaux de district et les centres de santé.
- Une biopsie de la peau est parfois effectuée au niveau central ; la demande pour cette procédure est faible.

## Tests de laboratoire

- Il y a un laboratoire BSL-3 à N'Djamena ; il a des protocoles pour la manipulation des champignons pathogènes.
- La microscopie directe du LCR, de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est effectuée occasionnellement dans les hôpitaux centraux et de district.
- L'hémoculture est pratiquée occasionnellement dans les hôpitaux centraux, les hôpitaux de district et les centres de santé.
- L'histopathologie est pratiquée occasionnellement dans les hôpitaux centraux et de district.
- La culture fongique est disponible dans les hôpitaux centraux mais elle est rarement demandée par les cliniciens.
- CrAg, antigène *Histoplasma* et PCR *Pneumocystis* Les tests ne semblent pas être disponibles au Tchad.
- Les tests d'antigène d'*Aspergillus* et d'anticorps d'*Aspergillus* sont effectués occasionnellement dans les hôpitaux centraux et de district. Il existe une petite subvention gouvernementale, mais le patient paie ces tests dans la plupart des cas.
- La numération des CD4 est effectuée sur la plupart des patients séropositifs tous les trois mois, en utilisant l'analyse FACS au HGRN et dans un petit nombre d'autres établissements.



## Country / Subsaharan Africa / CHAD

**Basic information**

- **Population:** 18.0 m (2022). 47.4% aged <15 years (2021).
- **Capital and largest city:** N'Djamena (population 1.6 m).
- **Area:** 1,284,000 km<sup>2</sup>.
- **Official languages:** French, Arabic.
- **Major religions:** Islam (52.1%), Christianity (44.1%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 110,000 (0.61%); *deaths from AIDS-related illness:* 2,700 (2021).
- **TB:** *total incidence:* 24,000 (0.13%); *mortality:* 5,500; *HIV-positive incidence:* 14.2% (2021).
- **Clinical asthma in adults:** 3.94% (2012).
- **Total cancer caseload:** *new cases:* 8,575; *deaths:* 6,083 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$27.7 bn; *per capita:* \$1,637 (2021).
- **Health expenditure:** *total:* 4.1% of GDP; *of GDP;* *domestic public health expenditure:* 17.0% of total (2018)
- Chad's health system is composed of three tiers: central, intermediate and peripheral. The central level provides tertiary care and is composed of the following university teaching hospitals: the National Reference General Hospital (HGRN); the Mother and Child Hospital (HME); the Hospital of the Renaissance (HR), and the Chad-China Friendship Hospital (HATC).
- The intermediate and peripheral levels provide secondary and primary care in the form of around 70 district hospitals and over 1,000 health centres, although a large minority of these are not functional, either because they do not fully comply with standards or because they are still under construction.
- All diagnostics discussed in this profile are paid for entirely by the patient, except where noted.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at central hospitals and occasionally at district hospitals.
- **CT scan** is performed often at HGRN, HME and HR central hospitals but not elsewhere.
- **MRI** is only performed at the HR central hospital.
- **Radiologists** routinely report at central and district hospitals.
- **Bronchoscopy** and **spirometry** are both performed occasionally at central hospitals, although patients can be referred from district hospitals.
- **Spirometry** is not available in Chad.
- **Corneal scraping** is performed occasionally at central and district hospitals.
- **Lumbar puncture** is performed often at central hospitals and occasionally at district hospitals and health centres.
- **Skin biopsy** is occasionally performed at the central level; demand for this procedure is low.

**Lab tests**

- There is a **BSL-3** lab in N'Djamena; it has protocols for handling pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed occasionally at central and district hospitals.
- **Blood culture** is performed occasionally at central hospitals, district hospitals and health centres.
- **Histopathology** is performed occasionally at central and district hospitals
- **Fungal culture** is available at central hospitals but is rarely requested by clinicians.
- **CrAg, Histoplasma antigen** and **Pneumocystis PCR** tests do not seem to be available in Chad.
- **Aspergillus antigen** and **Aspergillus antibody** tests are performed occasionally at central and district hospitals. There is a small amount of government subsidy available but the patient pays for these tests in most cases.
- **CD4 counts** are performed on most HIV patients every three months, using FACS analysis at the HGRN and a small number of other facilities.

## Pays / Afrique subsaharienne / CONGO (DR du)



### Informations de base

- **Population** : 108,4 m millions d'habitants (2022)  
46,4% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Kinshasa ; (14,3 millions d'habitants).
- **Superficie** : 2 345 409 km<sup>2</sup>.
- **Langue officielles** : Français.
- **Principales religion** : Christianisme (94,9%).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 540 000 (0,5%) ; décès dus à des maladies liées au sida : 14 000 (2021).
- **TB**: *incidence totale* : 305 000 (0,28 %) ; mortalité : 49 200 ; Incidence de la séropositivité : 7,9% (2021).
- **Asthme chez les adultes** : 6,9% à Kinshasa. (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 48 839 ; décès : 34 412 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 111 milliards de dollars ; par habitant : 1 203 dollars (2021).
- **Dépenses de santé** : *total*: 3,30 % du PIB ; *dépenses publiques intérieures de santé* : 15,1 % du total (2018).
- Les soins de santé en RDC sont divisés en un système à trois niveaux. Les soins primaires sont dispensés dans les centres de santé communautaires, suivis des centres de santé et des centres de santé de référence, des hôpitaux de district/provinciaux et enfin des hôpitaux universitaires.
- Il existe trois grands laboratoires publics dans les hôpitaux universitaires en RDC, ainsi que des installations privées.
- Les hôpitaux de district et les centres de santé communautaires ne disposent généralement pas d'un équipement suffisant ni d'une électricité fiable ; le personnel préfère souvent travailler dans de grands centres privés ou universitaires.
- Les soins de santé sont très concentrés à Kinshasa et dans d'autres grands centres de population.
- Certains employeurs offrent une couverture maladie, mais la plupart des gens n'ont pas d'assurance et paient leurs soins en espèces.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent effectuée dans les centres universitaires et privés, et occasionnellement dans les centres de district.
- Le scanner est pratiqué occasionnellement dans les centres privés et universitaires, mais il est trop cher pour la plupart.
- L'IRM n'est disponible que dans les centres privés.
- Les radiologues sont concentrés à Kinshasa ; des rapports réguliers sont disponibles dans les hôpitaux privés, universitaires et de district.
- La bronchoscopie, la spirométrie et le grattage cornéen ne sont disponibles que dans les centres privés et universitaires.
- La ponction lombaire est souvent pratiquée dans les hôpitaux privés et universitaires et occasionnellement dans les hôpitaux de district.
- La biopsie cutanée est pratiquée occasionnellement dans les hôpitaux privés et universitaires.

### Tests de laboratoire

- Il existe des laboratoires BSL-3 à Kinshasa et à Goma, sans protocoles pour la microscopie directe et la culture des champignons pathogènes.
- Microscopie directe du LCR, de la peau, des cheveux et des ongles sont disponibles dans les hôpitaux universitaires mais ne sont qu'occasionnellement demandés par les cliniciens.
- D'autres formes de microscopie (par exemple, urine, LBA, échantillons vaginaux) sont réalisées plus souvent, et sont également disponibles dans les petits hôpitaux.
- L'hémoculture et l'histopathologie sont pratiquées occasionnellement dans les hôpitaux privés et souvent dans les hôpitaux universitaires, mais l'hémoculture est inabordable pour une grande partie de la population.
- La culture fongique est réalisée occasionnellement dans des centres privés et universitaires.
- Une étude est en cours sur le test CrAg mais il reste indisponible en dehors de Kinshasa. La recherche CrAg a été intégrée dans le guide de prise en charge du VIH par le programme national de lutte contre le sida (septembre 2021).
- Les tests *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR sont tous indisponibles en raison du manque de réactifs et de personnel qualifié.
- La numération des CD4 est sporadiquement effectuée au début du traitement, généralement à l'aide de FACS (Facsprest) et de PIMA.



## Country / Subsaharan Africa / CONGO (DR of the)

**Basic information**

- **Population:** 108.4 m (46.4% aged <15 years) (2021).
- **Capital and largest city:** Kinshasa (population 14.3 m).
- **Area:** 2,345,409 km<sup>2</sup>.
- **Official languages:** French.
- **Major religion:** Christianity (94.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 540,000 (0.5%); *deaths from AIDS-related illness:* 14,000 (2021).
- **TB:** *total incidence:* 305,000 (0.28%); *mortality:* 49,200; *HIV-positive incidence:* 7.9% (2021).
- **Clinical asthma in adults:** 6.9% in Kinshasa.
- **Total cancer caseload:** *new cases:* 48,839; *deaths:* 34,412 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$111 bn; *per capita:* \$1,203 (2021).
- **Health expenditure:** *total:* 3.30% of GDP; *domestic public health expenditure:* 15.1% of total (2018).
- Healthcare in DRC is divided into a three-tier system. Primary care is at community health centres, followed by health centres and reference health centres, district/provincial hospitals and finally university hospitals.
- There are three large public labs in university hospitals in DRC, as well as private facilities.
- District hospitals and community health centres do not usually have sufficient equipment or reliable electricity; staff will often prefer to work in large private or university centres.
- Healthcare is very concentrated in Kinshasa and other large population centres.
- Some employers provide health cover but most people have no insurance and pay cash for treatment.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university and private centres, and occasionally at district centres.
- **CT scan** is performed occasionally at private and university centres, but is too expensive for most.
- **MRI** is only available in private centres.
- **Radiologists** are concentrated in Kinshasa; regular reporting is available in private, university and district hospitals.
- **Bronchoscopy, spirometry** and **corneal scraping** are only available at private and university centres.
- **Lumbar puncture** is performed often at private and university hospitals and occasionally at district hospitals.
- **Skin biopsy** is performed occasionally at private and university hospitals.

**Lab tests**

- There are **BSL-3** labs in Kinshasa and Goma, without protocols for direct microscopy and culture of pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, and nails** are available at university hospitals but only occasionally requested by clinicians.
- Other forms of microscopy (e.g. **urine, BAL, vaginal samples**) are performed more often, and are available at smaller hospitals as well.
- **Blood culture** and **histopathology** are performed occasionally at private hospitals and often in university hospitals, but blood culture is unaffordable for much of the population.
- **Fungal culture** is performed occasionally at private and university centres.
- A study is ongoing into the **CrAg** test but it remains unavailable outside Kinshasa. CrAg research has been integrated into the guide for HIV care by the national AIDS programme (September 2021).
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable due to lack of reagents and trained personnel.
- **CD4 counts** are sporadically performed at the start of treatment, usually using FACS (Facsprest0) and PIMA.

## Pays / Afrique subsaharienne / CONGO (RD du)



### Informations de base

- **Population** : 5,5 m millions d'habitants (2022)  
41,6 % âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Brazzaville ; (2,3 millions d'habitants).
- **Superficie** : 342 000 km<sup>2</sup>.
- **Langue officielles** : Français.
- **Principales religion** : Christianisme (88,5 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 130 000 (2,34%) ; décès dus à des maladies liées au sida : 7 400 (2021).
- **TB**: *incidence totale* : 22 000 (0,4 %) ; mortalité : 5 700 ; Incidence de la séropositivité : 30 % (2021).
- **Asthme chez les adultes** : 4,79% (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 2 478 ; décès : 1 595 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 20,6 milliards de dollars ; par habitant : 4 288 dollars (2021).
- **Dépenses de santé** : *total*: 2,14 % du PIB ; *dépenses publiques intérieures de santé* : 36,8 % du total (2018).
- Il existe un centre hospitalier universitaire (CHU) à Brazzaville. Il existe 14 hôpitaux généraux (dont six seulement sont fonctionnels) et 32 hôpitaux de référence de base, soit un total de 39 hôpitaux dans le pays.
- Au niveau communautaire, les soins de santé sont dispensés par plus de 300 Centres de Santé Intégrés (CSI).
- Il existe 59 cliniques privées, qui fournissent tous les diagnostics disponibles au CHU.
- La plupart des soins de santé sont payés de leur poche.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax et le scanner sont souvent réalisés dans les hôpitaux universitaires, généraux et de base.
- L'IRM n'est accessible au public qu'à l'hôpital universitaire.
- Les radiologues travaillent régulièrement dans les hôpitaux universitaires, généraux et de base.
- La spirométrie n'est pas accessible au public au Congo.
- La bronchoscopie et le grattage cornéen sont souvent pratiqués à l'hôpital universitaire.
- La ponction lombaire est souvent pratiquée dans les hôpitaux universitaires, généraux et de base, ainsi que dans les CSI.
- Une biopsie de la peau est pratiquée occasionnellement à l'hôpital universitaire.

### Tests de laboratoire

- Il n'y a pas de laboratoire BSL-3 au Congo.
- La microscopie directe du LCR, de la peau, des cheveux et des ongles n'est pas pratiquée régulièrement au Congo.
- La microscopie pour d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est effectuée dans les hôpitaux universitaires, généraux et de base.
- L'hémoculture et la culture fongique sont réalisées occasionnellement dans les hôpitaux universitaires, généraux et de base.
- L'histopathologie est souvent pratiquée à l'hôpital universitaire et à l'hôpital général ELBO d'Oyo.
- Le test CrAg est rarement effectué à l'hôpital universitaire.
- Les tests *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR sont tous indisponibles au Congo.
- La numération des CD4 est effectuée pour presque tous les patients séropositifs, par analyse FACS sur place.

## Country / Subsaharan Africa / CONGO (Republic of the)

**Basic information**

- **Population:** 5.5 m (2022). 41.6% aged <15 years (2021).
- **Capital and largest city:** Brazzaville (population 2.3 m).
- **Area:** 342,000 km<sup>2</sup>.
- **Official languages:** French.
- **Major religion:** Christianity (88.5%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 130,000 (2.34%); *deaths from AIDS-related illness:* 7,400 (2021).
- **TB:** *total incidence:* 22,000 (0.4%); *mortality:* 5,700; *HIV-positive incidence:* 30% (2021).
- **Clinical asthma in adults:** 4.79% (2012).
- **Total cancer caseload:** *new cases:* 2,478; *deaths:* 1,595 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$20.6 bn; *per capita:* \$4,288 (2021).
- **Health expenditure:** *total:* 2.14% of GDP; *domestic public health expenditure:* 36.8% of total (2018).
- There is one university hospital (CHU) in Brazzaville. There are 14 general hospitals (of which only six are functional) and 32 base-level referral hospitals, for a total of 39 hospitals in the country.
- At the community level, healthcare is provided by over 300 Integrated Health Centres/Centres de Santé Intégrés (CSIs).
- There are 59 private clinics, which provide all diagnostics that are available at the CHU.
- Most healthcare is paid for out-of-pocket.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are performed often in university, general and base hospitals.
- **MRI scan** is only publicly available at the university hospital.
- **Radiologists** routinely report at university, general and base hospitals.
- **Spirometry** is not publicly available in Congo.
- **Bronchoscopy** and **corneal scraping** are performed often at the university hospital.
- **Lumbar puncture** is performed often at university, general and base hospitals and CSIs.
- **Skin biopsy** is performed occasionally at the university hospital.

**Lab tests**

- There is no **BSL-3** lab in Congo.
- Direct microscopy of **CSF, skin, hair, and nails** are not regularly done anywhere in Congo.
- Microscopy for other sample types (e.g. **urine, BAL, vaginal samples**) are performed at university, general and base hospitals.
- **Blood culture** and **fungal culture** are performed occasionally at university, general and base hospitals.
- **Histopathology** is performed often at the university hospital, and at ELBO General Hospital in Oyo.
- **CrAg** test is performed rarely at the university hospital.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in Congo.
- **CD4 counts** are taken for nearly all HIV patients, using FACS analysis on site.

## Pays / Afrique subsaharienne / CÔTE D'IVOIRE



### Informations de base

- **Population** : 28.7 m millions d'habitants (2022)  
38,5% âgés de moins de 15 ans (2021).
- **Capitale** : Yamoussoukro ; Plus grande ville : Abidjan  
(5,2 millions d'habitants).
- **Superficie** : 322 463 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religions** : Islam (42,9%) ; christianisme (33,9%)  
non-religieux (19,1%).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 380 000 (1,32%) ; décès dus à des  
maladies liées au sida : 8 800 (2021).
- **TB**: *incidence totale* : 35 000 (0,1%) ; mortalité : 7 600 ;  
Incidence de la séropositivité : 13,4% (2020).
- **Asthme chez les adultes** : 4,59% (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 17 300 ;  
décès : 11 760 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 158 milliards de dollars ; par habitant :  
5 724 dollars (2021).
- **Dépenses de santé** : *total*: 4,19 % du PIB ; *dépenses  
publiques intérieures de santé* : 28,5 % du total (2018).
- Il existe cinq hôpitaux universitaires (dont quatre à Abidjan),  
131 hôpitaux dont 112 hôpitaux généraux (100 publics et 12  
privés) et 19 centres hospitaliers régionaux.
- Une petite partie de la population bénéficie d'une assurance  
privée, souvent par l'intermédiaire de son employeur.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent effectuée dans les  
hôpitaux universitaires et régionaux.
- Les tomodensitogrammes et les IRM sont souvent effectués  
dans les hôpitaux universitaires.
- Les radiologues font souvent des rapports dans les hôpitaux  
universitaires.
- Les radiologues font souvent des rapports dans les hôpitaux  
universitaires.
- La bronchoscopie, la spirométrie, le grattage de la cornée et  
la biopsie cutanée sont tous pratiqués fréquemment dans les  
hôpitaux universitaires, mais pas aux niveaux inférieurs.
- La ponction lombaire est souvent pratiquée dans les hôpitaux  
universitaires et régionaux.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux  
universitaires.

### Tests de laboratoire

- L'Institut Pasteur (IPCI) d'Abidjan est le seul laboratoire BSL-  
3 de Côte d'Ivoire ; des protocoles sont en place pour la  
manipulation des champignons pathogènes.
- La microscopie directe du LCR, de la peau, des cheveux, des  
ongles et d'autres types d'échantillons (par exemple urine,  
LBA, échantillons vaginaux) est souvent réalisée dans les  
hôpitaux universitaires et les IPCI.
- L'hémoculture est souvent réalisée dans les hôpitaux IPCI,  
universitaires et régionaux.
- L'histopathologie et la culture fongique sont souvent  
pratiquées dans les IP et les hôpitaux universitaires.
- Les tests CrAg sont effectués souvent à l'IPCI et  
occasionnellement en autre hôpital.
- Les tests *Pneumocystis* PCR sont effectués  
occasionnellement à l'IPCI.
- Les tests de l'antigène d'*Aspergillus* et des anticorps  
d'*Aspergillus* sont effectués uniquement au IPCI. Le test de  
l'antigène d'*Histoplasma* n'est pas disponible.
- La numération des CD4 est effectuée sur presque tous les  
patients séropositifs, par analyse FACS sur place.

Country / Subsaharan Africa / **CÔTE D'IVOIRE** (Republic of the)**Basic information**

- **Population:** 28.7 m (2022). 38.5% aged <15 years (2021).
- **Capital:** Yamoussoukro.
- **Largest city:** Abidjan (population 5.2 m).
- **Area:** 322,463 km<sup>2</sup>.
- **Official languages:** French.
- **Major religions:** Islam (42.9%); Christianity (33.9%); non-religious (19.1%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 380,000 (1.32%); *deaths from AIDS-related illness:* 8,800 (2021).
- **TB:** *total incidence:* 35,000 (0.12%); *mortality:* 7,600 *HIV-positive incidence:* 13.4% (2021).
- **Clinical asthma in adults:** 4.59% (2012).
- **Total cancer caseload:** *new cases:* 17,300; *deaths:* 11,760 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$158 bn; *per capita:* \$5,724 (2021).
- **Health expenditure:** *total:* 4.19% of GDP; *domestic public health expenditure:* 28.5% of total (2018).
- There are five university hospitals (four of which are in Abidjan), 131 hospitals including 112 general hospitals (100 public and 12 private) and 19 regional hospital centers.
- A small segment of the population has private insurance, often through their employer.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university and regional hospitals.
- **CT and MRI scans** are performed often at university hospitals.
- **Radiologists** report often at university hospitals.
- **Bronchoscopy, spirometry, corneal scraping and skin biopsy** are all performed often at university hospitals but not at lower levels.
- **Lumbar puncture** is performed often at university and regional hospitals.
- **Skin biopsy** is often undertaken at university hospitals.

**Lab tests**

- Institut Pasteur of Côte d'Ivoire (IPCI) in Abidjan is the only **BSL-3** lab in Côte d'Ivoire; protocols are in place for handling pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are all performed often in university hospitals and ICPI.
- **Blood culture** is performed often at ICPI, university and regional hospitals.
- **Histopathology** and **fungal culture** are performed often at IP and university hospitals.
- **CrAg** tests are performed often at IPCI and occasionally in other hospitals.
- **Pneumocystis PCR** tests are performed occasionally at IPCI.
- **Aspergillus antigen** and **Aspergillus antibody** tests are performed only at the Institute Pasteur laboratory. **Histoplasma antigen** test is not available.
- **CD4 counts** are performed on nearly all HIV patients, using FACS analysis on site.

## Country / Subsaharan Africa / EQUATORIAL GUINEA



### Basic information

- **Population:** 1.7 m (2022). 38.7% aged <15 years (2021).
- **Capital Malabo; Largest city:** Bata (population 0.25 m).
- **Area:** 28,051 km<sup>2</sup>.
- **Official languages:** Spanish, Portuguese, French.
- **Major religion:** Christianity (88.7%).

### Key fungal health indicators

- **HIV:** *total prevalence:* 66,000 (3.93%); *deaths from AIDS-related illness:* 2,300 (2021).
- **TB:** *total incidence:* 4,500 (0.27%); *mortality:* 1,610; *HIV-positive incidence:* 40% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 927; *deaths:* 592 (2020).

### Country health system

- **GDP (PPP):** *total:* \$27.2 bn; *per capita:* \$18,698 (2021).
- **Health expenditure:** *total:* 3.00% of GDP; *domestic public health expenditure:* 9.9% of total (2018).
- Most diagnostics discussed in this profile are paid for out-of-pocket by the patient in almost all cases. Semi-private facilities are social security insurance based.
- Equatorial Guinea's public health hierarchy is divided into 2 regional hospitals, 5 province hospitals, 11 district hospitals and 47 health centres.

### Clinical diagnostic procedures + radiology

- **Chest X-ray** is performed occasionally at regional hospitals and often at private and semi-private facilities.
- **CT and MRI scans** are both unavailable in the public sector and performed often in private and semi-private facilities.
- **Radiologists** do not regularly report in the public sector, but report often in private facilities.
- **Bronchoscopy** and **spirometry** are both unavailable in the public sector and performed often in private facilities.
- **Corneal scraping** is unavailable in Equatorial Guinea.
- **Lumbar puncture** is performed rarely in regional and sometimes in private facilities.
- **Skin biopsy** is unavailable in the public sector and performed rarely in private facilities.

### Lab tests

- There is no **BSL-3** lab currently operational in Equatorial Guinea.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are all unavailable in the public sector and performed rarely in private facilities.
- **Blood culture**, is performed rarely in regional hospitals and often in private facilities.
- **Histopathology** is unavailable in the public sector and performed rarely in private facilities.
- **Fungal culture** is unavailable in the public sector and performed occasionally in private facilities.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody and Pneumocystis PCR** tests are all unavailable in Equatorial Guinea. CrAg tests should be available in 2022.
- **CD4 counts** are performed at both regional public hospitals and private laboratories on HIV patients who are ill and/or admitted to hospital, using FACS analysis. Also performed in one private lab in the capital.

## Country / Subsaharan Africa / ERITREA

**Basic information**

- **Population:** 6.2 m (2022). 38.2% aged <15 years (2021).
- **Capital and largest city:** Asmara (population 1.3 m).
- **Area:** 117,600 km<sup>2</sup>.
- **Official languages:** Tigrinya, Arabic, English.
- **Major religions:** Christianity, Islam.

**Key fungal health indicators**

- **HIV:** *total prevalence:* 12,000 (0.19%); *deaths from AIDS-related illness:* <500 (2021).
- **TB:** *total incidence:* 2,700 (0.04%); *mortality:* 526; *HIV-positive incidence:* 2.6% (2021).
- **Clinical asthma in adults:** (not known).
- **Total cancer caseload:** *new cases:* 2,408; *deaths:* 1,670 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$2.2 bn; *per capita:* \$611 (2021).
- **Health expenditure:** *total:* 4.09% of GDP; *domestic public health expenditure:* 15.6% of total (2018).
- There are 22 hospitals in Eritrea, including the Hanssenian National Referral Hospital (HNRH), 16 hospitals and five mini hospitals. In addition, there are six clinics, two mini clinics and 239 health stations. These are all under the Ministry of Health, except for the HNRH, which is run by an NGO.
- Virtually all healthcare is paid for out-of-pocket by the patient.
- There is one National Health Laboratory with culture and microscopy facilities.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** and **MRI scan** are all performed often at the HNRH and rarely at other hospitals.
- **Radiologists** routinely report at the HNRH and rarely at other hospitals.
- **Bronchoscopy, spirometry and corneal scraping, lumbar puncture** and **skin biopsy** are all performed often at the HNRH and rarely at other hospitals.

**Lab tests**

- There is a **BSL-3** lab in Eritrea but it has no protocols for handling pathogenic fungi.
- Direct microscopy of **skin, hair, nails** is performed occasionally at referral hospitals using potassium hydroxide.
- Direct microscopy of **CSF** using India Ink staining is rarely done.
- Direct microscopy of other types (e.g. **urine, BAL and vaginal samples**) is not available.
- **Blood culture** and **histopathology** are unavailable in Eritrea.
- **Fungal culture** is rarely done in National Health Laboratory with only morphologic identification.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody and Pneumocystis PCR** tests are all unavailable in Eritrea.
- **CrAg** is rarely done at the National Referral Hospital.
- **CD4 counts** are performed on nearly all HIV patients, including those with high viral load, using FACS analysis on site.

Country / Subsaharan Africa / **ESWATINI****Basic information**

- **Population:** 1.1 m (2022). 33.6% aged <15 years (2021).
- **Capital and largest city:** Mbabane (population 0.095 m).
- **Area:** 17,364 km<sup>2</sup>.
- **Official languages:** Swazi, English.
- **Major religion:** Christianity (89.3%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 220,000 (19.6%); *deaths from AIDS-related illness:* 2,600 (2021).
- **TB:** *total incidence:* 4,200 (0.37%); *mortality:* 1020; *HIV-positive incidence:* 57.1% (2021).
- **Clinical asthma in adults:** 9.69% (2012).
- **Total cancer caseload:** *new cases:* 992; *deaths:* 613 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$10.7 bn; *per capita:* \$9,409 (2021).
- **Health expenditure:** *total:* 6.54% of GDP; *domestic public health expenditure:* 32.9% of total.
- Healthcare in government facilities is subsidised; patients pay a nominal fee, then can access a range of treatments. Only a small minority have health insurance.
- For fungal infections, the private sector has a wider array of treatments available than the public sector.
- There are 9 major hospitals in Eswatini: three referral hospitals (in Mbabane), four regional hospitals and two hospitals run by NGO missions. There are four major private hospitals in Eswatini.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at central and district facilities.
- **CT scan** is performed often at central hospitals.
- **MRI scan** is only available in the private sector, where it is performed occasionally.
- **Radiologists** report occasionally at central and district facilities.
- **Bronchoscopy** is performed often at central hospitals.
- **Spirometry** is performed occasionally at central hospitals.
- **Corneal scraping** is performed rarely, and only at central hospitals; there are two ophthalmologists in the country, one public and one private sector.
- **Lumbar puncture** is performed occasionally at central and district facilities.
- **Skin biopsy** is performed routinely at central hospitals but rarely for suspected fungal diseases; it is performed often at private facilities.

**Lab tests**

- The National TB reference laboratory is the only **BSL-3** lab in the country.
- Direct microscopy of **skin, hair** and **nails** is performed only rarely at central hospitals.
- Direct microscopy of **CSF**, and other samples (e.g. **urine, BAL, vaginal samples**) is performed occasionally at central hospitals; CSF is also performed occasionally at district facilities.
- **Blood culture and histopathology** are both performed occasionally at central hospitals.
- **Fungal culture** is performed rarely at central hospitals.
- **CrAg** test is performed often at central and district facilities.
- **Pneumocystis PCR** test is performed occasionally in central hospitals.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** are all only available in private centres; sometimes tests need to be sent across the border to South Africa.
- **CD4 counts** are performed only on new patients and those re-engaging in care, using on-site analysis of either FACS or Pima. Counts used to be performed also for monitoring treatment but no longer.

## Country / Subsaharan Africa / ETHIOPIA

**Basic information**

- **Population:** 113.7 m (2022). 39.8% aged <15 years (2021).
- **Capital and largest city:** Addis Ababa (population 4.6 m).
- **Area:** 1,104,300 km<sup>2</sup>.
- **Official languages:** Afar, Amharic, Oromo, Somali, Tigrinya, English.
- **Major religions:** Christianity (62.8%); Islam (33.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 610,000 (0.54%); *deaths from AIDS-related illness:* 12,000 (2021).
- **TB:** *total incidence:* 143,000 (0.13%); *mortality:* 21,100; *HIV-positive incidence:* 5.2% (2021).
- **Clinical asthma in adults:** 2.00% (2012).
- **Total cancer caseload:** *new cases:* 77,352; *deaths:* 51,865 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$299 bn; *per capita:* \$3,024 (2021).
- **Health expenditure:** *total:* 3.30% of GDP; *domestic public health expenditure:* 23.4% of total (2018).
- A very small amount of the population is covered by private or state-provided insurance, but most of the population pay for medical care out-of-pocket.
- There are a total of 119 state-run hospitals and 412 health centres in the country.
- In Addis Ababa, there are 12 public hospitals and over 40 private hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often in major hospitals but not at regional or community level.
- **CT and MRI scans** are performed at a few private and teaching/referral hospitals.
- **Radiologists** report often in major hospitals.
- **Lumbar puncture** is performed occasionally in major hospitals if there are meningitis symptoms.
- **Bronchoscopy, spirometry and corneal scraping** are all performed at a few private and teaching/referral hospitals.
- **Skin biopsy** is performed occasionally in major hospitals.

**Lab tests**

- There are about ten **BSL-3** TB reference labs but none have protocols for pathogenic fungi.
- Direct microscopy of **CSF** is performed occasionally at major hospitals/labs
- Direct microscopy of **skin, hair and nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed rarely at major hospitals/labs.
- **Blood culture** is performed occasionally at major hospitals/labs.
- **Fungal culture** is performed rarely at major hospitals/labs.
- **Histopathology** is performed occasionally
- Two small studies of **CrAg** testing are ongoing in Asella and Adama teaching hospitals.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in Ethiopia.
- **CD4 counts** are performed on all new HIV patients and on request from clinicians, using FACS analysis on site in central laboratories PIMA and FACSPresto point of care CD4 tests are also widely used in the country.

## Pays / Afrique subsaharienne / GABON



### Informations de base

- **Population** : 2,3 m millions d'habitants (2022). 36,5% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Libreville ; (0,70 millions d'habitants).
- **Superficie** : 267 667 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religion** : Christianisme (82.0%).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 47 000 (2,0%) ; décès dus à des maladies liées au sida : 2 000 (2021).
- **TB**: *incidence totale* : 12 000 (0,5%) ; mortalité : 3 900 ; Incidence de la séropositivité : 30,0% (2021)
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 1 750 ; décès : 1 030 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 35.3 milliards de dollars ; par habitant : 16,559 (2021).
- **Dépenses de santé** : *total*: 2,75% du PIB ; *dépenses publiques intérieures de santé* : 47,8% du total (2018).
- Il existe 16 hôpitaux au Gabon, dont deux hôpitaux universitaires (tous deux à Libreville) et dix hôpitaux régionaux. Des niveaux inférieurs de soins sont dispensés dans 43 centres médicaux et 92 centres de santé.
- Il existe une combinaison de paiement direct et de paiement du gouvernement ; par exemple. pour les tests de laboratoire, les réactifs sont fournis par le gouvernement.

### Procédures de diagnostic clinique + radiologie

- La radiographie pulmonaire est souvent pratiquée dans tous les hôpitaux.
- Les tomodensitogrammes et IRM sont souvent pratiqués dans les hôpitaux universitaires.
- Les radiologues se présentent souvent dans les hôpitaux universitaires et occasionnellement dans d'autres hôpitaux.
- La bronchoscopie est souvent pratiquée dans les hôpitaux universitaires.
- La spirométrie n'est pas considérée comme disponible au Gabon.
- Le grattage cornéen n'est pas disponible au Gabon.
- La ponction lombaire est pratiquée occasionnellement dans les hôpitaux universitaires.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux universitaires.

### Tests de laboratoire

- Il existe un laboratoire BSL-3 au Gabon, qui a des protocoles pour la manipulation de toutes les espèces de *Candida*.
- La microscopie directe du LCR est pratiquée occasionnellement dans les hôpitaux universitaires.
- La microscopie directe de la peau, des cheveux, des ongles et d'autres types (p. ex. urine, BAL, échantillons vaginaux) est souvent effectuée dans les hôpitaux universitaires.
- L'hémoculture et l'histopathologie sont effectuées occasionnellement dans les hôpitaux universitaires.
- La culture fongique est rarement pratiquée dans les hôpitaux universitaires.
- Les tests CrAg, antigène *Histoplasma*, antigène *Aspergillus*, anticorps *Aspergillus* et PCR *Pneumocystis* sont essentiellement indisponibles au Gabon.
- La numération des CD4 est réalisée chez tous les patients.

Country / Subsaharan Africa / **GABON****Basic information**

- **Population:** 2.3 m (2022). 36.5% aged <15 years (2021).
- **Capital and largest city:** Libreville (population 0.70 m).
- **Area:** 267,667 km<sup>2</sup>.
- **Official language:** French.
- **Major religion:** Christianity (82.0%)

**Key fungal health indicators**

- **HIV:** *total prevalence:* 47,000 (2.01%); *deaths from AIDS-related illness:* 2000 (2021).
- **TB:** *total incidence:* 12,000 (0.51%); *mortality:* 3,900; *HIV-positive incidence:* 30.0% (2021)
- **Clinical asthma in adults:** (no data).
- **Total cancer caseload:** *new cases:* 1,750; *deaths:* 1,030 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$35.3 bn; *per capita:* \$16,559 (2021).
- **Health expenditure:** *total:* 2.75% of GDP; *domestic public health expenditure:* 47.8% of total (2018).
- There are 16 hospitals in Gabon, including two university hospitals (both in Libreville) and ten regional hospitals. Lower levels of care are provided at 43 medical centres and 92 health centres.
- There is a combination of out-of-pocket and government payment; e.g. for lab tests, reagents are provided by the government.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at all hospitals.
- **CT and MRI scans** are performed often at university hospitals.
- **Radiologists** report often at university hospitals and occasionally at other hospitals.
- **Bronchoscopy** is performed often at university hospitals.
- **Spirometry** is not thought to be available in Gabon.
- **Corneal scraping** is not available in Gabon.
- **Lumbar puncture** is performed occasionally at university hospitals.
- **Skin biopsy** is performed often at university hospitals.

**Lab tests**

- There is a **BSL-3** lab in Gabon, which has protocols for handling all *Candida* species.
- Direct microscopy of **CSF** is performed occasionally at university hospitals.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) is performed often at university hospitals.
- **Blood culture** and **histopathology** are performed occasionally at university hospitals.
- **Fungal culture** is performed rarely at university hospitals.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody and Pneumocystis PCR** tests are essentially unavailable in Gabon.
- **CD4 counts** are performed on all patients.

Country / Subsaharan Africa / **THE GAMBIA****Basic information**

- **Population:** 2.4 m (2022). 35.2% aged <15 years (2021).
- **Capital:** Banjul; **Largest city:** Serekunda (population 0.34 m).
- **Area:** 11,300 km<sup>2</sup>.
- **Official language:** English.
- **Major religion:** Islam (95.8%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 26,000 (1.08%); *deaths from AIDS-related illness:* 1,300 (2021).
- **TB:** *total incidence:* 3,900 (0.16%); *mortality:* 890; *HIV-positive incidence:* 13.1% (2021).
- **Clinical asthma in adults:** common but unquantified.
- **Total cancer caseload:** *new cases:* 1,035; *deaths:* 810 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$6 bn; *per capita:* \$2,399 (2021).
- **Health expenditure:** *total:* 3.1% of GDP; *domestic public health expenditure:* 30.6% of total (2018).
- Edward Francis Small Teaching Hospital (EFSTH) in Banjul is the largest hospital in the country, and the only teaching hospital. There are four public referral hospitals.
- Secondary health care is delivered by 8 large and 16 small health centres.
- There are several private and NGO-operated clinics running in The Gambia, mostly in urban centres.
- The UK-funded Medical Research Council and London School of Hygiene and Tropical Medicine fund a BSL-3 laboratory called the MRC Unit The Gambia at LSHTM.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** are available at most facilities in The Gambia.
- **CT scans** are available at EFSTH and Serekunda, but are unaffordable for much of the population.
- There is an **MRI** scanner at EFSTH but it is not currently functional; patients can be sent to Dakar, Senegal if they can afford it.
- There are currently only two **radiologists** in the country, based at EFSTH; one also reports at the private hospital in Abuko.
- **Bronchoscopy** has recently become available, but is still performed very rarely.
- A **spirometry** study was recently completed but it remains unavailable most of the time.
- **Corneal scraping** is not performed in The Gambia.
- **Lumbar puncture** is performed at almost all levels of the healthcare pyramid.
- **Skin biopsies** are performed rarely at the referral hospitals and the MRC, but not for fungal diagnosis.

**Lab tests**

- There are two **BSL-3** labs in the country: MRC and the National Public Health Laboratory (NPHL), neither of which has protocols for handling pathogenic fungi.
- The MRC regularly performs **blood culture, fungal culture**, and direct microscopy of **CSF, BAL, vaginal samples, hair** and **nails**. These are not available at any other facility.
- **Skin microscopy** and **histopathology** are performed often at both MRC and NPHL.
- **Histoplasma antigen** tests are rarely performed at a single private facility.
- **CrAg, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** are not available in The Gambia, although there are efforts to introduce CrAg.
- **CD4 counts** are done on people who are ill/admitted to hospital and babies born to HIV-positive mothers, using FACS analysis on site.

## Country / Subsaharan Africa / GHANA

**Basic information**

- **Population:** 33.1 m (2022). 37.4% aged <15 years (2021).
- **Capital and largest city:** Accra (population 5.1 m).
- **Area:** 238,533 km<sup>2</sup>.
- **Official language:** English.
- **Major religion:** Christianity (71.2%); Islam (17.6%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 350,000 (1.06%); *deaths from AIDS-related illness:* 9,900 (2021).
- **TB:** *total incidence:* 45,000 (0.14%); *mortality:* 15,700; *HIV-positive incidence:* 14.4% (2021).
- **Clinical asthma in adults:** 3.77% (2012).
- **Total cancer caseload:** *new cases:* 24,009; *deaths:* 15,802 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$194 bn; *per capita:* \$6,190 (2021).
- **Health expenditure:** *total:* 3.26% of GDP; *domestic public health expenditure:* 38.9% of total (2018).
- Roughly 60% of the population is insured by the national health scheme (NHIS), which offers fairly minimal coverage. People in rural areas are much less likely to be insured.
- The healthcare system has five levels of providers: 1) health posts, the first level of primary care in rural areas; 2) health centers and clinics; 3) district hospitals; 4) regional hospitals; and 5) tertiary hospitals.
- Most drugs, tests or specialist consultations associated with fungal infections are not included.
- There is very little awareness or suspicion of fungal infection in Ghana.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is available at most facilities in Ghana and is performed regularly due to its low cost, availability of trained professionals and easy accessibility.
- **CT and MRI scans** are both available at most levels but are not covered by public health insurance, so are not routinely performed; mostly requested as a final approach to diagnostics.
- **Radiologists** do not routinely report in most facilities except tertiary or private hospitals, and consultations are unaffordable for most.
- **Bronchoscopy** and **spirometry** are performed rarely in rural centres and commonly in regional and tertiary hospitals, due to unavailability of equipment, high cost of procedure and lack of suspicion.
- **Corneal scraping** and **lumbar puncture** are not routinely performed except at tertiary hospitals, due to cost and lack of trained personnel.
- **Skin biopsy** is performed occasionally.

**Lab tests**

- There are several **BSL-3** labs in Ghana with protocols for handling pathogenic fungi. Lab capacity has been increased since the start of the Covid-19 pandemic.
- Direct microscopy is performed at all levels of laboratory, although many rural labs lack reagents such as KOH. **Skin, hair, nails** and **vaginal samples** are all performed often where reagents are available, whilst **CSF** is occasionally performed and **BAL** is rarely performed.
- **Blood culture, histopathology** and **fungal culture** are mostly restricted to specialist and private hospitals, largely due to lack of technical expertise. Associated drugs (e.g. voriconazole and griseofulvin) are mostly unaffordable for patients.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** tests are all almost non-existent in Ghana, except in a handful of private centres. **Pneumocystis PCR** test is not available at all.
- In some cases, private facilities will send tests to South Africa for analysis.
- **CD4 counts** are done for patients with very low lymphocyte counts, and are available routinely from private centres.

## Pays / Afrique subsaharienne / GUINEE



### Informations de base

- **Population** : 13,2 m millions d'habitants (2022)  
41,2% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Conakry ; (1,7 millions d'habitants).
- **Superficie** : 245 857 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religion** : Islam (84,8%).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 120 000 (0,9%) ; décès dus à des maladies liées au sida : 3 900 (2021).
- **TB**: *incidence totale* : 24 000 (0,2%) ; mortalité : 3 200 ; Incidence de la séropositivité : 20,0% (2020).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 7 871 ; décès : 5 888 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 40,3 milliards de dollars ; par habitant : 2 818 dollars (2021).
- **Dépenses de santé** : *total*: 3,93 % du PIB ; *dépenses publiques intérieures de santé* : 14,6 % du total (2018).
- Il existe trois hôpitaux nationaux (tous situés à Conakry), sept hôpitaux régionaux et 25 hôpitaux préfectoraux.
- La quasi-totalité des soins de santé est payée de sa poche par le patient, bien que certaines structures MSF offrent des soins subventionnés.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent pratiquée dans les hôpitaux nationaux, régionaux et préfectoraux.
- Les tomodensitogrammes et les IRM sont souvent effectués dans les hôpitaux nationaux.
- Les radiologues font régulièrement des rapports dans les hôpitaux nationaux.
- La bronchoscopie, la spirométrie et la biopsie cutanée ne sont pas disponibles en Guinée.
- Le grattage de la cornée est effectué occasionnellement dans les hôpitaux nationaux.
- La ponction lombaire est souvent pratiquée dans les hôpitaux nationaux, régionaux et préfectoraux pour les patients atteints de tuberculose et de VIH.
- La biopsie cutanée n'est pas pratiquée en Guinée.

### Tests de laboratoire

- Il y a deux laboratoires BSL-3 à Conakry qui sont bien équipés pour les infections émergentes comme Ebola et SARS-CoV-2 mais il n'y a pas de protocoles pour les champignons pathogènes.
- La microscopie directe de la peau, des cheveux et des ongles n'est pas actuellement disponible en Guinée.
- La microscopie directe du LCR et d'autres types d'échantillons (par exemple, urine, LBA, échantillons vaginaux) est souvent réalisée dans des laboratoires centraux.
- L'hémoculture est pratiquée occasionnellement dans un laboratoire à Conakry.
- L'histopathologie est réalisée dans les laboratoires centraux mais pas pour les maladies fongiques.
- La culture fongique n'est pas disponible, mais un projet de recherche est actuellement en attente d'approbation.
- Le test rapide CrAg, n'est pas disponible, bien que Cryptococcus Le diagnostic par PCR est disponible au laboratoire du VIH.
- Les tests pour antigène d'*Histoplasma*, antigène d'*Aspergillus* et *Aspergillus* d'anticorps ne sont pas disponibles.
- Le test PCR de *Pneumocystis* est disponible à l'Institut national de santé publique mais pas ailleurs.
- La numération des CD4 est effectuée sur presque tous les patients séropositifs, généralement à l'aide d'un analyseur PIMA dans des lieux centralisés.



## Country / Subsaharan Africa / GUINEA

**Basic information**

- **Population:** 13.2 m (2022). 41.2% aged <15 years (2021).
- **Capital and largest city:** Conakry (population 1.7 m).
- **Area:** 245,857 km<sup>2</sup>.
- **Official language:** French.
- **Major religion:** Islam (84.8%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 120,000 (0.91%); *deaths from AIDS-related illness:* 3,900 (2021).
- **TB:** *total incidence:* 24,000 (0.18%); *mortality:* 3,200; *HIV-positive incidence:* 20.0% (2021)
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 7,871; *deaths:* 5,888 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$40.3 bn; *per capita:* \$2,818 (2021).
- **Health expenditure:** *total:* 3.93% of GDP; *domestic public health expenditure:* 14.6% of total (2018).
- There are three National Hospitals (all of which are in Conakry), seven Regional Hospitals and 25 Prefectural Hospitals.
- Almost all healthcare is paid for out-of-pocket by the patient, although there are some MSF facilities which provide subsidised healthcare.

**Clinical diagnostic procedures + radiology\***

- **Chest X-ray** is performed often at national, regional and prefectural hospitals.
- **CT and MRI scans** are performed often at national hospitals.
- **Radiologists** report regularly at national hospitals.
- **Bronchoscopy, spirometry and skin biopsy** are not available in Guinea.
- **Corneal scraping** is performed occasionally at national hospitals.
- **Lumbar puncture** is performed often at national, regional and prefectural hospitals for TB and HIV patients.
- **Skin biopsy** is not undertaken in Guinea

**Lab tests\***

- There are two **BSL-3** labs in Conakry which are well-equipped for emerging infections such as Ebola and SARS-CoV-2 but there are no protocols for pathogenic fungi.
- Direct microscopy of **skin, hair and nails** is not currently available in Guinea.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) is performed often at central labs.
- **Blood culture** is performed occasionally at one lab in Conakry.
- **Histopathology** is performed at central labs but not for fungal diseases.
- **Fungal culture** is unavailable, although a research project is currently awaiting approval.
- The rapid **CrAg** test is unavailable, although *Cryptococcus* diagnosis via PCR is available at the HIV lab
- **Histoplasma antigen, Aspergillus antigen and Aspergillus antibody** tests are unavailable.
- **Pneumocystis PCR** test is available at the National Institute of Public Health but not elsewhere.
- **CD4 counts** are performed on nearly all HIV patients, usually using a PIMA analyser at centralised locations.

\* Not verified by Ministry of Health or another knowledgeable agency.

## País / África Subsariana / GUINÉ-BISSAU



### Basic information

- **População:** 2,0 m (2022).  
43,2% com idades <15 anos (2021).
- **Capital e maior cidade:** Bissau (população 0,5 m).
- **Área:** 36,125 km<sup>2</sup>.
- **Língua oficial:** Português
- **Religião predominante:** Islamismo (45,1%), Cristianismo (22,1%), animismo (14,9%), não especificada (15,9%).

### Indicadores de saúde chave nas infeções fúngicas

- **VIH:** *prevalência total:* 40,000 (1,97%);  
*Mortes associadas a SIDA:* 1,700 (2021).
- **TB:** *incidência total:* 7,400 (0,37%); *mortalidade:* 2,800;  
*Incidência em indivíduos positivos para VIH* 29,7% (2021).
- **Asma em adultos:** sem dados disponíveis.
- **Número total de casos de cancro:** *novos casos:* 1,127;  
*mortes:* 836.

### Sistema de saúde do país

- **PIB (PPC):** *total:* \$4,6 bn; *per capita:* \$2,483 (2021).
- **Gastos em saúde:** *total:* 7,00% do PIB; *gastos em saúde público domésticos:* 8,1% of total (2018).
- A maioria dos serviços médicos estão concentrados perto da cidade de Bissau, apesar de a maioria das regiões ter pelo menos um hospital. No total, existem oito hospitais.
- Todas as consultas e testes de diagnóstico são pagos pelo doente, exceto para mães e crianças com idades inferiores a 5 anos, isentas de pagamentos de consultas. Doentes hospitalizados têm de pagar a sua comida, medicação, etc.
- Funcionários públicos têm seguro que contribui para o pagamento de despesas associadas à sua saída do país para realização de procedimentos clínicos.

### Procedimentos de diagnóstico clínico + radiologia

- O único aparelho de RX do país é portátil. No entanto, a falta de treino dos profissionais leva a que este aparelho raramente seja útil. Não existem radiologistas treinados para interpretar as imagens obtidas.
- Existe apenas um aparelho de TAC mas não funciona. Dois aparelhos estão em processo de aquisição, doados por Itália. No entanto, é improvável existirem técnicos especializados para usar e manter estes aparelhos.
- RM (ressonância magnética) não é realizada na Guiné-Bissau.
- Broncoscopia, espirometria, raspagem da córnea e biópsias de pele são técnicas que não se encontram disponíveis na Guiné-Bissau.
- Punção lombar é por vezes realizada em hospitais mas não necessariamente efetuadas por clínicos treinados.

### Testes laboratoriais

- Existe um laboratório BSL-3 no Instituto Nacional de Saúde. Os laboratórios médicos fazem apenas a análise bioquímica básica mas um novo laboratório encontra-se em construção e esta situação deverá melhorar no futuro.
- Microscopia direta de urina é realizada por rotina em hospitais privados e hospitais públicos de topo.
- Microscopia direta de pele, unhas e cabelo e outros tipos de produtos (ex. LBA, amostras vaginais) é realizada muito raramente na Guiné Bissau.
- Hemoculturas são realizadas muito raramente num hospital privado e não são realizadas em hospitais públicos.
- Histopatologia e culturas fúngicas não estão disponíveis na Guiné-Bissau.
- Testes para deteção antigénio de *Histoplasma*, antigénio de *Aspergillus*, e anticorpos para *Aspergillus* não estão disponíveis.
- Teste de PCR para deteção de *Pneumocystis* estão disponíveis em teoria mas nunca realizados devido ao baixo número de suspeitas, falta de treino na interpretação dos resultados e falta de reagentes.
- Contagem de CD4 é realizada rotineiramente em quase todos os indivíduos positivos para VIH usando a técnica de seleção de células ativadas por fluorescência, em localidades centrais; os testes rápidos para diagnóstico de VIH são também realizados frequentemente. Estes testes são suportados por diversos programas financeiros, incluindo o Fundo Global.

## Country / Subsaharan Africa / GUINEA-BISSAU

**Basic information**

- **Population:** 2.0 m (2022). 43.2% aged <15 years (2021).
- **Capital and largest city:** Bissau (population 0.5 m).
- **Area:** 36,125 km<sup>2</sup>.
- **Official languages:** Portuguese.
- **Major religions:** Islam (45.1%), Christianity (22.1%), animism (14.9%), unspecified (15.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 40,000 (1.97%); *deaths from AIDS-related illness:* 1,700 (2021).
- **TB:** *total incidence:* 7,400 (0.37%); *mortality:* 2,800; *HIV-positive incidence:* 29.7% (2021).
- **Asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 1,127; *deaths:* 836.

**Country health system**

- **GDP (PPP):** *total:* \$4.6 bn; *per capita:* \$2,483 (2021).
- **Health expenditure:** *total:* 7.00% of GDP; *domestic public health expenditure:* 8.1% of total (2018).
- Most medical services are concentrated around the city of Bissau, although most regions have at least one hospital. In total, there are eight hospitals.
- All consultations and diagnostics are paid for by the patient, except mothers and children under 5, who are not charged for consultation. Hospitalised patients have to pay for all food, medication, etc.
- Government employees have insurance which contributes if they have to leave the country for a clinical procedure.

**Clinical diagnostic procedures + radiology**

- The only **X-ray** machine in the country is a portable one; however, lack of training means it is rarely useful. There are no trained **radiologists** to interpret images.
- There is one **CT scanner** but it is broken. Two scanners are in the process of being donated from Italy; however, it is unlikely there will be the expertise to use and/or maintain them.
- **MRI scan** is unavailable in Guinea-Bissau.
- **Bronchoscopy, spirometry, corneal scraping and skin biopsy** are all unavailable in Guinea-Bissau.
- **Lumbar puncture** is sometimes done at hospitals but not necessarily by trained clinicians.

**Lab tests**

- There is a **BSL-3** lab at the National Health Institute. Medical labs usually only do very basic biochemical analysis, but a new laboratory is under construction so this may improve in the future.
- Direct microscopy of **urine** is performed routinely in private hospitals and at the top public hospitals.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **BAL, vaginal samples**) are performed very rarely in Guinea-Bissau.
- **Blood culture** is performed very rarely in one private hospital and not at all in the public sector.
- **Histopathology** and **fungal culture** are not available in Guinea-Bissau.
- **Histoplasma antigen, Aspergillus antigen** and **Aspergillus antibody** tests are unavailable.
- **Pneumocystis PCR** test is available in theory but is never used due to low index of suspicion, lack of training to interpret results, and lack of reagents.
- **CD4 counts** are performed routinely on almost all HIV patients using FACS analysis at centralised locations; rapid HIV tests are also used frequently. This is supported by several financial programmes, including the Global Fund.

Country / Subsaharan Africa / **KENYA****Basic information**

- **Population:** 55.9 m (2022). 38.7% aged <15 years (2021).
- **Capital and largest city:** Nairobi (population 10.4 m).
- **Area:** 580,367 km<sup>2</sup>.
- **Official languages:** English, Swahili.
- **Major religions:** Christianity (85.5%); Islam (10.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 1,400,000 (2.51%); *deaths from AIDS-related illness:* 22,000 (2021).
- **TB:** *total incidence:* 133,000 (0.24%); *mortality:* 31,000; *HIV-positive incidence:* 24.1% (2021).
- **Asthma in adults:** 3.12% (2012).
- **Total cancer caseload:** *new cases:* 42,116; *deaths:* 27,092 (2020)

**Country health system**

- **GDP (PPP):** *total:* \$269 bn; *per capita:* \$5,407 (2021).
- **Health expenditure:** *total:* 5.19% of GDP; *of GDP; domestic public health expenditure:* 32.7% of total (2018).
- Kenya's public healthcare hierarchy is organised into six tiers: Level 6 – National Referral Hospitals and County Referral Hospitals (of which there are five); L5 – Provincial Hospitals (10); L4 – District Hospitals (>100); L3 – Health Centres (>1,000); L2 – Dispensaries; and L1 – Community Units.
- There is some subsidisation of healthcare (e.g. for malaria, pregnant women and under-5s), but most patients pay for the majority of costs. Some employers offer private insurance.
- All diagnostics and procedures mentioned here are readily available in the private sector.

**Clinical diagnostic procedures + radiology**

- A recent government initiative, Managed Equipment Services (MES) has significantly increased access to radiology training and equipment in L6, L5 and L4 facilities
- **Chest X-ray, CT scan, MRI scan and lumbar puncture** are performed often at L6, L5 and L4 facilities.
- **Radiologists** report regularly at L6, L5 and L4 facilities.
- **Bronchoscopy** is performed rarely at L6, L5 and L4 facilities.
- **Spirometry** is performed rarely at L6 and L5 facilities.
- **Corneal scraping** is performed occasionally at L6 and L5 facilities, and rarely at L4 facilities.
- **Skin biopsy** is rarely done in the public sector and occasionally in the private sector and there is one dermatopathologist based in Nairobi.

**Lab tests**

- There are nine **BSL-3** labs in Kenya but none deal with pathogenic fungi.
- Direct microscopy of **skin, hair, nails** is performed occasionally at L6 and L5 facilities
- Direct microscopy of **BAL** is performed often at L6 and L5 facilities, and at some L4 facilities.
- Direct microscopy of CSF and other types (e.g. **urine** and **vaginal samples**) is performed often at L6 and L5 facilities, and occasionally at L4 and L3 facilities.
- **Blood culture** is performed often at L6 and L5 facilities.
- **Histopathology** is performed at all L6 and some L5 facilities, but rarely for fungal diseases.
- **Fungal culture** is performed very rarely at L6 facilities.
- **CrAg** test is performed often at L6 and L5 facilities, and at some L4 facilities but not systematically.
- **Histoplasma antigen, Aspergillus antigen and Aspergillus antibody** tests are performed rarely at L6 facilities, but are all available in private facilities.
- **Pneumocystis PCR** test is almost non-existent in the public sector but is available in private facilities.
- **CD4 counts** are taken on new HIV patients, those with high viral load, and those who are ill and/or admitted to hospital, using as assay either FACS calibre at centralised locations or point-of-care PIMA.

Country / Subsaharan Africa / **LESOTHO****Basic information**

- **Population:** 2.2 m (31.3% aged <15 years) (2021).
- **Capital and largest city:** Maseru (population 0.3 m).
- **Area:** 30,355 km<sup>2</sup>.
- **Official languages:** Sesotho, English.
- **Major religion:** Christianity (96.8%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 290,000 (13.22%); *deaths from AIDS-related illness:* 4,500 (2021).
- **TB:** *total incidence:* 14,000 (0.64%); *mortality:* 5,300; *HIV-positive incidence:* 62.1% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 1,876; *deaths:* 1,256 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$5.8 bn; *per capita:* \$2,761 (2021).
- **Health expenditure:** *total:* 9.3% of GDP; *domestic public health expenditure:* 47.2% of total.
- Government transfers (47.2%) and external aid (38.3%) make up the bulk of health expenditure, with out-of-pocket payment by the patient (14.1%) making up most of the remainder.
- Ten years ago, the run-down Queen Elizabeth II hospital was replaced by a newly-built National Referral Centre, the Queen Mamohato Memorial Hospital (QMMH). The QMMH is funded using a public-private partnership (PPP) initiative and has significantly improved outcomes.
- Other Ministry of Health facilities include 11 district hospitals, two filter clinics and 20 health centres.
- Faith-based organisations also provide eight mission hospitals and 72 health centres.
- There is some level of referral to Bloemfontein, South Africa, for certain services such as cancer care.

**Clinical diagnostic procedures + radiology****No data on:**

- Chest X-ray
- CT scan
- MRI scan
- Radiologists
- Bronchoscopy
- Spirometry
- Corneal scraping
- Lumbar puncture
- Skin biopsy

**Lab tests**

- There is no **BSL-3** lab in Lesotho.
- **CrAg** test is available to some extent.

**No data on:**

- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**)
- **Blood culture**
- **Histopathology**
- **Fungal culture**
- ***Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody and *Pneumocystis* PCR tests**
- **CD4 counts**



## Country / Subsaharan Africa / LIBERIA

**Basic information**

- **Population:** 5.4 m (2022). 43.4% aged <15 years (2021).
- **Capital and largest city:** Monrovia (population 1.0 m).
- **Area:** 111,369 km<sup>2</sup>.
- **Official languages:** English.
- **Major religions:** Christianity (85.9%), Islam (12.0%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 34,000 (0.63%); *deaths from AIDS-related illness:* 1,100 (2021).
- **TB:** *total incidence:* 16,000 (0.3%); *mortality:* 4,350; *HIV-positive incidence:* 11.3% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 3,552; *deaths:* 2,603 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$7.8 bn; *per capita:* \$1,623 (2021).
- **Health expenditure:** *total:* 6.74% of GDP; *of GDP;* *domestic public health expenditure:* 25.2% of total (2018).
- Most healthcare funds come from a combination of international aid and out-of-pocket payments by patients. A small proportion of the population have insurance, including private sector employees. The most affluent patients sometimes fly abroad to receive treatment.
- There is one national referral hospital and 37 other hospitals; there is also a very well-equipped private hospital which is only available to those with insurance.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at the national referral hospital and occasionally at district hospitals.
- **CT scan** is performed often at the national referral hospital.
- **MRI scan** is available at the national referral hospital but not commonly ordered by physicians; the machine was installed in 2020.
- **Radiologists** routinely report at the national referral hospital but only rarely at district hospitals.
- **Bronchoscopy** is performed occasionally at the national referral hospital.
- **Spirometry** is available at the national referral hospital but rarely ordered by physicians.
- **Corneal scraping** is available at the national referral hospital but not commonly ordered by physicians; a large ophthalmology department was recently established by the Indian government.
- **Lumbar puncture** and **skin biopsy** are both performed often at the national referral hospital.

**Lab tests**

- There is no **BSL-3** lab.
- Direct microscopy of **CSF** is available at the national referral hospital but is rarely ordered by physicians.
- Direct microscopy of **skin, hair** and **nails** is only available in the private sector, where it is used rarely.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at the national referral hospital and occasionally at district hospitals.
- **Blood culture** is performed occasionally at the national referral hospital.
- **Histopathology** and **fungal culture** are only available in the private sector, where they are performed occasionally.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all theoretically available in the private sector but are rarely ordered by physicians.
- **CD4 counts** are commonly performed on all patients, using recently-acquired portable CD4 machines; the referral hospital uses Visitect® 200. Viral load testing has also recently become available.

## Pays / Afrique subsaharienne / MADAGASCAR



### Informations de base

- **Population** : 28,2 m millions d'habitants (2022)  
38,9% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Antananarivo  
(1,3 million d'habitants).
- **Superficie** : 587 041 km<sup>2</sup>.
- **Langue officielle** : Malgache, français.
- **Principales religion** : Christianisme (85,3 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 60 000 (0,2%) ; décès dus à des maladies liées au sida : 2 900 (2021).
- **TB**: *incidence totale* : 67 000 (0,241%) ; mortalité : 3 410 ; Incidence de la séropositivité : 1,6% (2021).
- **Asthme chez les adultes** : 4,67% (2015).
- **Nombre total de cas de cancer** : *nouveaux cas* : 20 681 ; décès:13 837 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 46,1 milliards de dollars ; par habitant : 1 630 dollars (2021).
- **Dépenses de santé** : *total*: 4,8 % du PIB ; *dépenses publiques intérieures de santé* : 35,7 % du total (2018).
- La hiérarchie de la santé publique comprend trois niveaux principaux : les hôpitaux universitaires et régionaux, les hôpitaux de district et les centres de santé communautaires. Les deux niveaux supérieurs comprennent un total d'environ 125 hôpitaux, dont 6 hôpitaux universitaires.
- Les soins de santé sont théoriquement gratuits, mais les patients paient généralement les extras, notamment les médicaments et les tests.
- Les employés du secteur public et certains employés du secteur privé ont une assurance maladie, mais pas beaucoup.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent réalisée dans les hôpitaux universitaires et régionaux, et rarement au niveau des districts et des communautés.
- La tomodensitométrie est pratiquée dans les hôpitaux régionaux des six provinces, mais le coût est un facteur limitant pour beaucoup.
- L'IRM n'est disponible que dans les hôpitaux régionaux des grandes villes.
- Les radiologues travaillent souvent dans les hôpitaux universitaires et régionaux, mais rarement dans les hôpitaux de district.
- La bronchoscopie, la spirométrie et le grattage de la cornée sont seulement disponible dans quelques hôpitaux régionaux.
- La ponction lombaire est souvent effectuée dans les hôpitaux spécialisés/universitaires et occasionnellement dans les hôpitaux de district.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux universitaires et rarement dans les hôpitaux régionaux.

### Tests de laboratoire

- L'Institut Pasteur semi-privé d'Antananarivo est le seul laboratoire BSL-3 du pays. Il dispose de protocoles pour les champignons pathogènes, notamment la chromoblastomycose, la sporotrichose et le mycétome.
- La microscopie directe du LCR n'est pas disponible publiquement à Madagascar.
- La microscopie directe de la peau, des cheveux, des ongles et d'autres types d'échantillons (par exemple, urine, LBA, échantillons vaginaux) n'est pratiquée qu'à l'Institut Pasteur et occasionnellement dans les hôpitaux universitaires.
- L'hémoculture, l'histopathologie et la culture fongique sont souvent réalisées dans les hôpitaux universitaires mais ne sont pas disponibles ailleurs.
- Les tests CrAg et *Pneumocystis* PCR ne sont disponibles que dans les laboratoires des hôpitaux universitaires et de l'Institut Pasteur.
- Les tests pour antigène d'*Histoplasma*, antigène d'*Aspergillus* et *Aspergillus* d'anticorps ne sont pas disponibles publiquement.
- La numération des CD4 est effectuée gratuitement sur presque tous les patients atteints du VIH, à l'aide de l'analyseur Pima.

Country / Subsaharan Africa / **MADAGASCAR****Basic information**

- **Population:** 28.2 m (2022). 38.9% aged <15 years (2021).
- **Capital and largest city:** Antananarivo (population 1.3 m).
- **Area:** 587,041 km<sup>2</sup>.
- **Official languages:** Malagasy, French.
- **Major religion:** Christianity (85.3%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 60,000 (0.21%); *deaths from AIDS-related illness:* 2,900 (2021).
- **TB:** *total incidence:* 67,000 (0.24%); *mortality:* 13,410; *HIV-positive incidence:* 1.6% (2021).
- **Asthma in adults:** 4.67% (2015).
- **Total cancer caseload:** *new cases:* 20,681; *deaths:* 13,837 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$46.1 bn; *per capita:* \$1,630 (2021).
- **Health expenditure:** *total:* 4.8% of GDP; *of GDP; domestic public health expenditure:* 35.7% of total (2018).
- The public health hierarchy is in three main tiers: university & regional hospitals; district hospitals; and community health centres. The top two tiers comprise a total of roughly 125 hospitals, including 6 university hospitals.
- Healthcare is nominally free, but patients generally pay for extras including medication and tests.
- Public sector employees and some private sector employees have health insurance, but not many.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university and regional hospitals, and rarely at district and community levels.
- **CT scan** is performed at regional hospitals in all six provinces, but cost is a limiting factor for many.
- **MRI scan** is only available at regional hospitals in Antananarivo and at a few private clinics.
- **Radiologists** report often in university and regional hospitals but rarely in district hospitals.
- **Bronchoscopy, spirometry** and **corneal scraping** are only available in a few regional hospitals.
- **Lumbar puncture** is performed often in specialist/university hospitals and occasionally in district hospitals.
- **Skin biopsy** is performed often in university hospitals and rarely in regional hospitals.

**Lab tests**

- The semi-private Pasteur Institute in Antananarivo and CICM (Centre d'infectiologie Charles Merieux) are the only **BSL-3** labs in the country. They have protocols for pathogenic fungi including chromoblastomycosis, sporotrichosis and mycetoma.
- Direct microscopy of **CSF** is not publicly available in Madagascar.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are only performed at the University Hospital Antananarivo, CICM and Pasteur Institute.
- **Blood culture, histopathology** and **fungal culture** are performed often at the university hospitals but are not available elsewhere.
- **CrAg** and **Pneumocystis PCR** tests are only available at the university hospital labs and Pasteur Institute.
- **Histoplasma antigen, Aspergillus antigen** and **Aspergillus antibody** tests are not publicly available.
- **CD4 counts** are performed on nearly all HIV patients free of charge, using Pima Analyser.

Country / Subsaharan Africa / **MALAWI****Basic information**

- **Population:** 20.8 m (45.9% aged <15 years) (2021).
- **Capital and largest city:** Lilongwe (population 0.99 m).
- **Area:** 118,484 km<sup>2</sup>.
- **Official languages:** English, Chewa.
- **Major religions:** Christianity (77.3%); Islam (13.8%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 990,000 (4.76%); *deaths from AIDS-related illness:* 13,000 (2021).
- **TB:** *total incidence:* 26,000 (0.13%); *mortality:* 7,700; *HIV-positive incidence:* 46.2% (2021).
- **Asthma in adults:** 4.67% (2012).
- **Total cancer caseload:** *new cases:* 17,936; *deaths:* 12,454 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$32.3 bn; *per capita:* \$1,503 (2021).
- **Health expenditure:** *total:* 9.3% of GDP; *of GDP; domestic public health expenditure:* 28.9% of total.
- The majority of healthcare is provided by governmental facilities, with a significant minority (roughly one-third) provided by the non-government Christian Health Association of Malawi (CHAM).
- Healthcare at government facilities is free.
- There are 4 central hospitals and 28 district hospitals, with many basic rural community hospitals.
- District hospitals can be up to 300 km from the nearest central hospital, so patients in more remote areas have access to significantly fewer procedures and tests.
- There is no national system for patient records.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at central and district hospitals.
- **CT and MRI scans** are only available at some central hospitals; there are only one or two publicly-owned MRI scanners in the country; radiologists regularly report at central and district hospitals.
- **Bronchoscopy** and **spirometry** are performed rarely at central hospitals.
- **Radiologists** report often in university and regional hospitals but rarely in district hospitals.
- **Corneal scraping** is available at only one central hospital.
- **Lumbar puncture** is performed regularly at central and district hospitals, although lack of materials means that clinicians often improvise equipment (e.g. using a cannula instead of a proper LP needle).
- **Skin biopsies** are taken often at central and district hospitals but only three labs regularly analyse samples (one private, two public).

**Lab tests**

- There is a **BSL-3** lab but there are no protocols for pathogenic fungi.
- Direct microscopy of **skin, hair and nails** is performed rarely at central hospitals.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at central hospitals and occasionally at district hospitals.
- **Blood culture** and **histopathology** are both performed rarely at central hospitals.
- **Fungal culture** is performed occasionally at central hospitals.
- **CrAg** test is performed often at district hospitals and occasionally at central and community hospitals, although it has been introduced recently and the government is in the process of increasing provision.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all currently unavailable in Malawi.



## Pays / Afrique subsaharienne / MALI

## Informations de base

- **Population** : 20,7 m millions d'habitants (2022)  
47,7% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Bamako.  
(2,8 millions d'habitants).
- **Superficie** : 1 240 192 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religion** : Islam (95%).

## Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 110 000 (0,53%) ; décès dus à des maladies liées au sida : 4 100 (2021).
- **TB**: *incidence totale* : 11 000 (0,05%) ; mortalité : 1 900 ;  
Incidence de la séropositivité : 8,5% (2020).
- **Asthme chez les adultes** : 2,82% (2012)
- **Nombre total de cas de cancer** : *nouveaux cas* : 14 185 ;  
décès : 10 234 (2020).

## Système de santé du pays

- **PIB (PPA)** : *total* : 51,1 milliards de dollars ; par habitant :  
2 522 dollars (2021).
- **Dépenses de santé** : *total* : 3,88 % du PIB ; *dépenses publiques intérieures de santé* : 22,1 % du total (2018).
- Environ un tiers des soins de santé sont payés par une aide extérieure ; sinon, la quasi-totalité des coûts sont couverts par le patient.
- Il existe trois hôpitaux universitaires (tous à Bamako) et 15 autres hôpitaux.

## Procédures de diagnostic clinique + radiologie

- La radiographie du thorax est souvent effectuée dans les hôpitaux universitaires.
- La tomodensitométrie est pratiquée occasionnellement dans les hôpitaux universitaires mais reste inabordable pour beaucoup.
- L'IRM n'est disponible que dans une seule clinique privée (Clinique Pasteur à Bamako).
- Les radiologues font régulièrement des rapports dans les hôpitaux universitaires.
- La bronchoscopie, la spirométrie et le grattage cornéen sont tous pratiqués occasionnellement dans les hôpitaux universitaires.
- La biopsie cutanée est rarement pratiquée dans les hôpitaux universitaires.
- La ponction lombaire est souvent pratiquée dans les hôpitaux universitaires.

## Tests de laboratoire

- Il y a deux laboratoires BSL-3 à Bamako ; ils ont des protocoles pour la manipulation des champignons pathogènes. Il y a également trois laboratoires BSL-2 à Bamako.
- La microscopie directe d'échantillons de LCR, de peau, de cheveux, d'ongles, de LBA et de vagin est souvent réalisée dans les hôpitaux universitaires et dans certains autres laboratoires.
- L'hémoculture n'est disponible que dans les laboratoires privés.
- L'histopathologie et la culture fongique sont souvent pratiquées dans les hôpitaux universitaires.
- Une étude sur les tests CrAg a récemment été lancée mais elle reste indisponible la plupart du temps.
- Les tests *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR sont tous indisponibles au Mali.
- La numération des CD4 n'est effectuée que sur les nouveaux patients, à l'aide d'une analyse FACS dans des lieux centralisés.



## Country / Subsaharan Africa / MALI

**Basic information**

- **Population:** 20.7 m (2022). 47.7% aged <15 years (2021).
- **Capital and largest city:** Bamako (population 2.8 m).
- **Area:** 1,240,192 km<sup>2</sup>.
- **Official language:** French.
- **Major religion:** Islam (95%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 110,000 (0.53%); *deaths from AIDS-related illness:* 4,100 (2021).
- **TB:** *total incidence:* 11,000 (0.05%); *mortality:* 1,900; *HIV-positive incidence:* 8.5% (2021).
- **Clinical asthma in adults:** 2.82% (2012).
- **Total cancer caseload:** *new cases:* 14,185; *deaths:* 10,234 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$51.1 bn *per capita:* \$2,522 (2021).
- **Health expenditure:** *total:* 3.88% of GDP; *domestic public health expenditure:* 22.1% of total (2018).
- Approximately one-third of healthcare is paid for by external aid; otherwise, almost all costs are covered out-of-pocket by the patient.
- There are three university hospitals (all in Bamako) and 15 other hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university hospitals.
- **CT scan** is performed occasionally at university hospitals but remains unaffordable for many.
- **MRI scan** is only available in one private clinic (Clinique Pasteur in Bamako).
- **Radiologists** routinely report at university hospitals.
- **Bronchoscopy, spirometry** and **corneal scraping** are all performed occasionally at university hospitals.
- **Skin biopsy** is performed rarely at university hospitals.
- **Lumbar puncture** is performed often at university hospitals.

**Lab tests**

- There are two **BSL-3** labs in Bamako; they have protocols for handling pathogenic fungi. There are also three BSL-2 labs in Bamako.
- Direct microscopy of **CSF, skin, hair, nails, BAL** and **vaginal samples** is performed often at university hospitals and some other labs.
- **Blood culture** is only available at private labs.
- **Histopathology** and **fungal culture** are performed often at university hospitals.
- A study of **CrAg** testing has recently started but it remains unavailable most of the time.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in Mali.
- **CD4 counts** are performed only on new patients, using FACS analysis at centralised locations.

## Pays / Afrique subsaharienne / MAURITANIE



### Informations de base

- **Population** : 4,2 m millions d'habitants (2021)  
47,7% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Nouakchott  
(0.96 millions d'habitants).
- **Superficie** : 1 030 700 km<sup>2</sup>.
- **Langue officielle** : Arabe.
- **Principales religion** : Islam (99,9%)

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 9 400 (0,23%) ; décès dus à des maladies liées au sida : <1 000 (2021).
- **TB**: *incidence totale* : 3 800 (0,1 %) ; mortalité : 666 ;  
Incidence de la séropositivité : 3,7% (2021).
- **Asthme chez les adultes** : 7,54% (2012).
- **Nombre total de cas de cancer** : *nouveaux cas* : 3 079 ;  
décès : 2 121 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 26,7 milliards de dollars ; par habitant :  
6 293 dollars (2021).
- **Dépenses de santé** : *total*: 4,58 % du PIB ; *dépenses publiques intérieures de santé* : 35,9 % du total (2018).
- Il y a 4 hôpitaux généraux à Nouakchott et 14 hôpitaux régionaux.
- La plupart des coûts des soins de santé sont payés de leur poche par le patient, mais il existe un certain niveau de contribution du gouvernement et une petite proportion de la population a une assurance privée.

### Procédures de diagnostic clinique + radiologie

- La radiographie du thorax et le scanner sont souvent pratiqués dans les hôpitaux de Nouakchott.
- L'IRM est pratiquée occasionnellement dans les hôpitaux de Nouakchott.
- Les radiologues rapportent souvent les hôpitaux de Nouakchott.
- La bronchoscopie et la ponction lombaire sont pratiquées occasionnellement dans les hôpitaux de Nouakchott.
- La spirométrie n'est disponible que dans les établissements privés, où elle est pratiquée occasionnellement.
- Le grattage de la cornée est rarement pratiqué dans les hôpitaux de Nouakchott.
- Biopsie de la peau (est disponible en Nouakchott).

### Tests de laboratoire

- Il existe un laboratoire BSL-3 en Mauritanie mais il ne dispose pas de protocole pour la manipulation des champignons pathogènes.
- La microscopie directe du LCR, de la peau, des cheveux, des ongles est réalisée occasionnellement dans les laboratoires de Nouakchott ; la microscopie directe d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est réalisée souvent dans les laboratoires de Nouakchott.
- L'hémoculture, la culture fongique et l'histopathologie sont toutes rarement réalisées dans les laboratoires de Nouakchott.
- Les tests CrAg, *Histoplasma* antigène, *Aspergillus* antigène, *Aspergillus* anticorps et *Pneumocystis* PCR ne sont pas disponibles en Mauritanie ; certains établissements privés envoient des échantillons à l'étranger.
- La numération des CD4 est effectuée pour presque tous les patients séropositifs.



## Country / Subsaharan Africa / MAURITANIA

**Basic information**

- **Population:** 4.2 m (2022). 37.6% aged <15 years (2021).
- **Capital and largest city:** Nouakchott (population 0.96 m).
- **Area:** 1,030,700 km<sup>2</sup>.
- **Official language:** Arabic.
- **Major religion:** Islam (99.9%)

**Key fungal health indicators**

- **HIV:** *total prevalence:* 9.400 (0.23%); *deaths from AIDS-related illness:* <1000 (2021).
- **TB:** *total incidence:* 3,800 (0.09%); *mortality:* 666; *HIV-positive incidence:* 3.7% (2021).
- **Clinical asthma in adults:** 7.54% (2012).
- **Total cancer caseload:** *new cases:* 3,079; *deaths:* 2,121 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$26.7 bn *per capita:* \$6,293 (2021).
- **Health expenditure:** *total:* 4.58% of GDP; *domestic public health expenditure:* 35.9% of total (2018).
- There are 4 general hospitals in Nouakchott and 14 regional hospitals.
- Most healthcare costs are paid out-of-pocket by the patient, but there is some level of government contribution and a small proportion of the population have private insurance.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are performed often in Nouakchott hospitals.
- **MRI scan** is performed occasionally in Nouakchott hospitals.
- **Radiologists** report often Nouakchott hospitals.
- **Bronchoscopy** and **lumbar puncture** are performed occasionally in Nouakchott hospitals.
- **Spirometry** is only available in private facilities, where it is performed occasionally.
- **Corneal scraping** is performed rarely in Nouakchott hospitals.
- **Skin biopsy** is available at Nouakchott.

**Lab tests**

- There is a **BSL-3** labs in Mauritania but it does not have protocol for handling pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** is performed occasionally in Nouakchott labs; direct microscopy of other types (e.g. **urine, BAL, vaginal samples**) is performed often in Nouakchott labs.
- **Blood culture, fungal culture** and **histopathology** are all performed rarely in Nouakchott labs.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in Mauritania; some private facilities send samples abroad.
- **CD4 counts** are taken for nearly all HIV patients.

## Country / Subsaharan Africa / MAURITIUS

**Basic information**

- **Population:** 1.3 m (2022). 19.4% aged <15 years (2021).
- **Capital and largest city:** Port Louis (population 0.15 m).
- **Area:** 2,040 km<sup>2</sup>.
- **Official languages:** English, French, Mauritian Creole.
- **Major religions:** Hinduism (48.5%); Christianity (32.7%); Islam (17.3%)

**Key fungal health indicators**

- **HIV:** *total prevalence:* 12,000 (0.92%); *deaths from AIDS-related illness:* <500 (2021).
- **TB:** *total incidence:* 160 (0.01%); *mortality:* 27; *HIV-positive incidence:* 13.1% (2021).
- **Clinical asthma in adults:** 3.92% (2012).
- **Total cancer caseload:** *new cases:* 3,050; *deaths:* 1,504 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$28.3 bn; *per capita:* \$22,311 (2021).
- **Health expenditure:** *total:* 5.83% of GDP; *domestic public health expenditure:* 43.1% of total.
- Mauritius provides free universal health care for its citizens.
- There are 5 large tertiary regional hospitals and several specialist hospitals.
- Below these in the hierarchy there are 3 district hospitals, followed by mediclinics, area health clinics and finally community health centres. Patients can easily be referred upwards.
- Medical records are all still handwritten, so records are not always brought with patients when they are transferred/referred.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** and **CT scan** are performed often at the regional/specialist level and district hospitals; chest X-ray is also available at some mediclinics.
- **MRI scan** is performed often in regional/specialist hospitals.
- **Radiologists** routinely report at regional/specialist and district hospitals.
- **Bronchoscopy**, and **spirometry** are available at specialist hospitals, although patients can be referred from district hospitals. Attempts are being made to make spirometry available lower down as well.
- **Corneal scraping** is performed rarely in specialist hospitals, but occasionally in private facilities.
- **Lumbar puncture** is performed often in regional/specialist and district hospitals.
- **Skin biopsy** is performed often in regional/specialist hospitals.

**Lab tests**

- There is no **BSL-3** labs in Mauritius.
- Direct microscopy of **CSF, skin, hair and nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed often in regional/specialist and district hospitals. For skin, hair and nails, samples can be collected from district centres but the microscopy takes place at the regional hospitals/labs.
- **Blood culture** and **fungal culture** are performed often at regional/specialist and district hospitals.
- **Histopathology** is only available at regional/specialist and private hospitals.
- **CrAg** test is readily available at regional/specialist and district hospitals.
- **Histoplasma antigen, Aspergillus antigen** and **Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable.
- **CD4 counts** are performed using FACS analysis at centralised locations, on nearly all HIV patients, including those who are ill and/or admitted to hospital.

## País / África Subsariana / **MOÇAMBIQUE**



### Basic information

- **População:** 31,7 m (2022).  
45,6% com idades <15 anos (2021).
- **Capital e maior cidade:** Maputo (population 1,8 m).
- **Área:** 799,380 km<sup>2</sup>.
- **Língua oficial:** Português.
- **Religião predominante:** Cristianismo (56,1%); Islamismo (18%); sem religião (17,9%).

### Indicadores de saúde chave nas infeções fúngicas

- **VIH:** *prevalência total:* 2,100,000 (7,0%); *mortes associadas a SIDA:* 38,000 (2020).
- **TB:** *incidência total:* 116,000 (0,37%); *mortalidade:* 13,700; *incidência em indivíduos positivos para VIH:* 25,0% (2021).
- **Asma clínica em adultos:** sem dados disponíveis.
- **Número total de casos de cancro:** *novos casos:* 25,446; *mortes:* 18,014 (2020).

### Sistema de saúde do país

- **PIB (PPC):** *total:* \$43 bn; *per capita:* \$1,338 (2021).
- **Gastos em saúde:** *total:* 8,17% do PIB; *gastos em saúde público domésticos:* 21,2% do total (2018).
- Ajuda externa cobre quase 60% dos gastos em saúde em Moçambique, sendo o restante financiamento resultante de uma combinação de financiamento governamental e pagamentos realizados pelos próprios indivíduos.
- Os dados deste perfil foram confirmados como representando detalhadamente Maputo mas não necessariamente todo o país.
- Moçambique tem 61 hospitais: três Centrais, cinco Gerais, oito de Província, 16 Distritais e 29 Rurais, com aproximadamente 1,500 centros de saúde de vários tipos fornecendo cuidados de saúde primários.

### Procedimentos de diagnóstico clínico + radiologia

- Radiografias pulmonares são realizadas frequentemente em hospitais centrais e gerais e ocasionalmente em hospitais menores.
- TAC (tomografia axial computadorizada) e RM (ressonância magnética) são realizadas frequentemente em hospitais centrais e gerais.
- Os radiologistas desenvolvem a sua atividade rotineiramente em hospitais centrais e gerais e ocasionalmente em hospitais menores.
- Broncoscopia é realizada frequentemente em hospitais centrais e gerais.
- Espirometria não está disponível em Moçambique.
- Raspagem da córnea não está disponível em Moçambique devido à falta de oftalmologistas suficientemente treinados.
- Punção lombar é frequentemente realizada em hospitais centrais e gerais.
- Biópsias de pele são realizadas raramente realizada em alguns hospitais centrais e gerais.

### Testes laboratoriais

- Não existe um laboratório clínico BSL-3 no Instituto de Investigação em Agricultura de Moçambique
- Microscopia direta de LCR, pele, unhas e cabelo e outros tipos de produtos (ex. LBA, urina, amostras vaginais) são todos realizados frequentemente em hospitais centrais e gerais.
- Hemoculturas, histopatologia e culturas fúngicas são todas realizadas frequentemente em hospitais centrais e gerais.
- Testes para deteção de CrAg e antígeno de *Histoplasma* são realizadas frequentemente em laboratórios privados e ocasionalmente em hospitais centrais e gerais.
- Teste de PCR para deteção de *Pneumocystis* não está disponível, apesar de estar a decorrer um estudo com aplicação desta metodologia.
- Testes para deteção de antígeno de *Aspergillus* e de anticorpos para *Aspergillus* estão disponíveis em teoria no setor privado mas na prática há falta de reagentes já há algum tempo.
- Contagem de CD4 não é realizada em Moçambique.

Country / Subsaharan Africa / **MOZAMBIQUE****Basic information**

- **Population:** 31.7 m (2022). 45.6% aged <15 years (2021).
- **Capital and largest city:** Maputo (population 1.8 m).
- **Area:** 799,380 km<sup>2</sup>.
- **Official language:** Portuguese.
- **Major religions:** Christianity (56.1%); Islam (18%); Unaffiliated (17.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 2,100,000 (7.0%); *deaths from AIDS-related illness:* 38,000 (2020).
- **TB:** *total incidence:* 116,000 (0.37%); *mortality:* 13,700; *HIV-positive incidence:* 25.0% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 25,446; *deaths:* 18,014 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$43 bn; *per capita:* \$1,338 (2021).
- **Health expenditure:** *total:* 8.17% of GDP; *domestic public health expenditure:* 21.2% of total (2018).
- External aid provides almost 60% of healthcare expenditure in Mozambique, with the rest mostly a combination of government and out-of-pocket spending.
- The data in this profile has been confirmed as accurately representing Maputo but not necessarily the whole country.
- Mozambique has 61 hospitals: three Central, five General, eight Provincial, 16 District and 29 Rural, with approximately 1,500 health centres of various types providing primary care.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at central and general hospitals and occasionally at lower hospitals.
- **CT and MRI scans** are performed often at central and general hospitals.
- **Radiologists** report often at central and general hospitals and occasionally at lower hospitals.
- **Bronchoscopy** is performed often at central and general hospitals.
- **Spirometry** is not available in Mozambique.
- **Corneal scraping** is not available in Mozambique due to lack of sufficiently-trained ophthalmologists.
- **Lumbar puncture** is performed often at central and general hospitals.
- **Skin biopsy** is performed rarely at some central and general hospitals.

**Lab tests**

- There is a non-medical **BSL-3** lab at the Agricultural Research Institute of Mozambique.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are all performed often at central and general hospitals.
- **Blood culture, histopathology** and **fungal culture** are all performed often at central and general hospitals.
- **CrAg** and **Histoplasma antigen** tests are performed often in private facilities and occasionally at central and general hospitals.
- **Pneumocystis PCR** test is not routinely available, although a study is currently ongoing.
- **Aspergillus antigen** and **Aspergillus antibody** tests are theoretically available in the private sector, but in practice there is a long-term lack of reagents.
- **CD4 counts** are not performed in Mozambique.

Country / Sub-Saharan Africa / **NAMIBIA****Basic information**

- **Population:** 2.7 m (2022). 35.7% aged <15 years (2021).
- **Capital and largest city:** Windhoek (population 0.33 m).
- **Area:** 824,292 km<sup>2</sup>.
- **Official language:** English.
- **Major religions:** Christianity (87.9%); traditional faiths (10.2%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 220,000 (8.07%); *deaths from AIDS-related illness:* 2,900 (2021).
- **TB:** *total incidence:* 12,000 (0.44%); *mortality:* 2,800; *HIV-positive incidence:* 30.0% (2021).
- **Clinical asthma in adults:** 3.39% (2012).
- **Total cancer caseload:** *new cases:* 3,345; *deaths:* 1,876 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$25 bn; *per capita:* \$9,616 (2021).
- **Health expenditure:** *total:* 7.95% of GDP; *of GDP;* *domestic public health expenditure:* 46.1% of total (2018).
- There are 29 State hospitals and seven Mission hospitals in Namibia.
- The private sector is used by 17% of the population.
- Most public healthcare is paid for by government funding, but there is some level of private insurance and out-of-pocket payment.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at state hospitals.
- **CT scan** is performed rarely at state hospitals.
- **MRI scan** is only available at private facilities.
- **Radiologists** report rarely at state hospital at private facilities, where they are performed often.
- **Corneal scraping** is performed occasionally at state hospitals.
- **Lumbar puncture** is performed often at state hospitals.
- **Skin biopsy** is performed often at dermatological clinics.

**Lab tests**

- There are two **BSL-3** labs in Namibia but neither handle pathogenic fungi.
- Direct microscopy of **skin, hair and nails** is performed rarely at state labs.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) are performed often at state labs.
- **Blood culture** is performed often at state labs.
- **Histopathology** is performed occasionally at state labs.
- **Yeast and mould cultures** are often performed in state labs; identification of isolates are performed at the reference lab only.
- **CrAg** test is performed often at state labs.
- **Histoplasma antigen, Aspergillus antigen** and **Aspergillus antibody** tests are not available in Namibia.
- **Pneumocystis PCR** test samples can be sent to South Africa when requested by clinicians.
- **CD4 counts** are taken for new patients and subsequently only when virologic failure is suspected, using FACS analysis at centralised locations.

## Pays / Afrique subsaharienne / NIGER

**Informations de base**

- **Population** : 24,5 m millions d'habitants (2022)  
50,6% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Niamey  
(1,3 million d'habitants).
- **Superficie** : 1 267 000 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religion** : Islam (98,4 %).

**Indicateurs clés de la santé fongique**

- **VIH**: *prévalence totale* : 30 000 (0,12%) ; décès dus à une maladie liée au sida : < 1 000 (2021).
- **TB**: *incidence totale* : 20 000 (0,08%) ; mortalité : 3 620 ; Incidence de la séropositivité : 3,2% (2021).
- **Asthme chez les adultes** : pas de données.
- **Nombre total de cas de cancer** : *nouveaux cas* : 9 787 ; décès : 7 382 (2020).

**Système de santé du pays**

- **PIB (PPA)** : *total* : 34 milliards de dollars ; par habitant : 1 355 dollars (2021).
- **Dépenses de santé** : *total*: 7,33% du PIB ; *dépenses publiques intérieures de santé* : 33,2% du total.
- Le Niger dispose d'un hôpital universitaire central et de 40 autres hôpitaux. Les soins secondaires sont dispensés dans plus de 800 centres de santé intégrés.
- Environ 50% de la population ont une assurance maladie, la plupart étant des employés du secteur public et leurs familles. Ceux qui n'ont pas d'assurance paient pour tous les examens et traitements.
- En général, tous les diagnostics disponibles dans le secteur public le sont également dans les centres privés.
- La plupart des données de ce profil ne couvrent que la ville de Niamey.

**Procédures de diagnostic clinique + radiologie\***

- La radiographie du thorax se fait dans tous les hôpitaux.
- Le scanner est souvent réalisé dans tous les hôpitaux.
- L'IRM est réalisée dans les trois hôpitaux de Niamey, de Maradi et de Zinder.
- Les radiologues se trouvent dans tous les hôpitaux du Niger.
- La bronchoscopie, la spirométrie sont pratiquées dans tous les hôpitaux de Niamey.
- La ponction lombaire est réalisée dans tous les hôpitaux de Niamey mais aussi dans les centres de santé intégrés. Lors des épidémies de méningite, il est également pratiqué souvent dans les centres de santé, mais sinon rarement dans les centres de santé.

**Tests de laboratoire**

- Il n'y a pas de laboratoire BSL-3 au Niger
- La microscopie directe de la peau, des cheveux et des ongles est souvent effectuée dans tous les hôpitaux.
- La microscopie directe du LCR et d'autres types (par exemple, urine, BAL, échantillons vaginaux) est souvent réalisée à l'hôpital universitaire et dans d'autres hôpitaux.
- La microscopie est réalisée dans tous les hôpitaux.
- L'hémoculture aussi se fait dans tous les hôpitaux.
- L'histopathologie et la culture fongique sont souvent réalisées à l'hôpital universitaire.
- Les tests rapides CrAg, *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody sont réalisés occasionnellement à l'hôpital universitaire.
- Le test PCR de *Pneumocystis* n'est pas disponible au Niger.
- La numération des CD4 est effectuée sur tous les patients séropositifs, à l'aide d'une analyse FACS, soit sur place, soit sur des sites centralisés.

## Country / Subsaharan Africa / NIGER

**Basic information**

- **Population:** 24.5 m (2022). 50.6% aged <15 years (2021).
- **Capital and largest city:** Niamey (population 1.3 m).
- **Area:** 1,267,000 km<sup>2</sup>.
- **Official language:** French.
- **Major religion:** Islam (98.4%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 30,000 (0.12%); *deaths from AIDS-related illness:* <1000 (2021).
- **TB:** *total incidence:* 20,000 (0.08%); *mortality:* 3,620; *HIV-positive incidence:* 3.2% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 9,787; *deaths:* 7,382 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$34 bn; *per capita:* \$1,355 (2021).
- **Health expenditure:** *total:* 7.33% of GDP; *of GDP;* *domestic public health expenditure:* 33.2% of total.
- Niger has one central university hospital and 40 other hospitals. Secondary care is delivered at over 800 integrated health centres.
- Roughly 50% of the population has health insurance, most of whom are public sector employees and their families. Those without insurance pay for all tests and treatments.
- Generally, any diagnostics available in the public sector are also available in private centres.
- Most of the data in this profile only covers the city of Niamey.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at the university hospital and occasionally at other hospitals.
- **CT scan** is performed often at the university hospital and occasionally at other hospitals.
- **MRI scan** is available in 3 hospitals in Niamey, Maradi and Zinder.
- **Radiologists** regularly report films throughout Niger.
- **Bronchoscopy, spirometry, corneal scraping and skin biopsy** are all performed often at the university hospital and at other hospitals in Niamey, but not elsewhere.
- **Lumbar puncture** is performed often at the university hospital and other hospitals. During meningitis epidemics, it is also performed often at health centres, but otherwise only rarely at health centres.

**Lab tests**

- There is no **BSL-3** laboratory in Niger
- Direct microscopy of **skin, hair and nails** is performed often at all hospitals.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) is performed often at the university hospital and other hospitals.
- **Blood culture** is performed often in the university hospital and occasionally at other hospitals.
- **Histopathology** and **fungal culture** are performed often at the university hospital.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** rapid tests are performed occasionally at the university hospital.
- **Pneumocystis PCR** test is not available in Niger.
- **CD4 counts** are performed on all HIV patients, using FACS analysis either on site or at centralised locations.

Country / Subsaharan Africa / **NIGERIA****Basic information**

- **Population:** 225.1 m (2022). 41.7% aged <15 years (2021).
- **Capital and largest city:** Lagos (population 23.4 m).
- **Area:** 923,769 km<sup>2</sup>.
- **Official language:** English.
- **Major religion:** Islam (53.5%); Christianity (45.9%).

**Key fungal health indicators**

- **HIV:** total prevalence: 1,900,000 (0.84%); deaths from AIDS-related illness: 51,000 (2021).
- **TB:** total incidence: 467,000 (0.21%); mortality: 125,000; HIV-positive incidence: 6.0% (2021)
- **Clinical asthma:** 6.4% (2019).
- **Total cancer caseload:** new cases: 124,815 deaths: 78,899 (2020).

**Country health system**

- **GDP (PPP):** total: \$1,137 bn; per capita: \$5,377 (2021).
- **Health expenditure:** total: 3.89% of GDP; domestic public health expenditure: 14.9% of total (2018).
- Some government employees and some others have their healthcare covered by the National Health Insurance Scheme (NHIS), but the majority of the population are uninsured and pay for diagnostics and treatments out-of-pocket.
- Tertiary healthcare is provided by the federal government at University Teaching Hospitals (UTCs) in 15 states. In the other 22 states, tertiary care is provided at a Federal Medical Centre (FMC).
- Secondary healthcare is provided at general and district hospitals by state governments
- Availability of diagnostics and procedures varies somewhat between the regions of the country.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at UTCs, FMCs and general hospitals, and at some district hospitals.
- **CT scan** is performed often at UTCs and FMCs and at some general and large private hospitals.
- **MRI scan** is performed either often or occasionally at UTCs and FMCs.
- **Radiologists** routinely report at UTCs and FMCs and at some general hospitals.
- **Bronchoscopy** is performed rarely at UTCs and FMCs.
- **Spirometry** is performed at all UTCs and FMCs but with varying frequency between regions, and rarely at general hospitals in some regions.
- **Corneal scraping** and **lumbar puncture** are performed often at most UTCs and FMCs and rarely at general hospitals in some regions.
- **Skin biopsy** is performed often at UTCs and FMCs.

**Lab tests**

- In Lagos there is a **BSL-3** lab reference lab at the National Institute for Medical Research, which only does research. It does not have protocols for handling pathogenic fungi.
- Direct microscopy of **CSF** is performed with varying frequency at UTCs and FMCs, and rarely at some general hospitals. Direct microscopy of **skin, hair, nails** and **vaginal samples** is performed often at UTCs and FMCs, and rarely at general hospitals in some regions. Direct microscopy of **BAL** is available in a few private hospitals in Lagos but not elsewhere. Direct microscopy of **urine** is routine in Nigeria.
- **Blood culture** is performed often at UTCs and FMCs and at general hospitals in some regions.
- **Histopathology** and **fungal culture** are performed in most UTCs and occasionally at FMCs.
- **CrAg** test is performed at all FMCs with varying frequency between regions.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all only performed on a research basis, at one facility in Lagos.
- **CD4 count** protocols vary across the country, but in general, counts are taken for all new HIV patients and most of those who are ill and/or admitted to hospital. Counts are usually performed using FACS analysis, either on site or at centralised locations.



## State / Subsaharan Africa / PUNTLAND (Somalia)

**Basic information**

- **Population:** est. 3.0 m (2021). 42.4%† aged <15 years (2021).
- **State capital** Garoowe; **Largest city:** Bosaso (population 0.72 m)
- **Area:** 212,510 km<sup>2</sup>.
- **Languages:** Somali, Arabic, English.
- **Major religion†:** Islam (99.8%)

**Key fungal health indicators**

- **HIV†:** *total prevalence:* 7,700 (0.06%); *deaths from AIDS-related illness:* <500 (2021). *est. prevalence for Puntland alone:* 2,000 (0.07%).
- **TB†:** *total incidence:* 43,000 (0.35%); *mortality:* 11,190; *HIV-positive incidence:* 0.9% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload†:** *new cases:* 10,134; *deaths:* 7,439 (2020).

**Country health system**

- **GDP (PPP)†:** *total:* \$14.8 bn; *per capita:* \$953 (2021).
- **Health expenditure:** no data.
- Puntland is an autonomous Federal Member State of Somalia, with its own Ministry of Health and a separate health system to both the rest of Somalia to the south, and the de facto independent (but not widely recognised) state of Somaliland to the west.
- Approximately 60% of healthcare is paid for out-of-pocket by the patient. There is some external aid, and the government subsidises some treatments.
- The public healthcare hierarchy includes one Referral Hospital, five Regional Hospitals and 15 District hospitals. Private sector health facilities number roughly double that of the public sector.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at specialist hospitals, district hospitals and community health centres, with some external aid subsidy.
- **CT and MRI scans** are unavailable in the public sector, and performed occasionally in private centres.
- **Radiologists** routinely report at district hospitals, paid for by the government.
- **Bronchoscopy** and **spirometry** may be performed in 1-2 hospitals but are not widely available.
- **Corneal scraping** is unavailable in the public sector, and performed occasionally in private centres.
- **Lumbar puncture** is performed occasionally at specialist hospitals and rarely at district hospitals.
- **Skin biopsy** is unavailable in the public sector, and performed very rarely in private centres.

**Lab tests**

- There is a **BSL-3** lab but it has no protocols for handling pathogenic fungi.
- Direct microscopy of CSF is performed occasionally at specialist hospitals and rarely at district hospitals.
- Direct microscopy of **skin, hair** and **nails** is unavailable in the public sector, and performed occasionally in private centres.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at specialist hospitals, district hospitals and community health centres.
- **Blood culture** is performed occasionally at specialist hospitals.
- **Histopathology** and **fungal culture** are unavailable in Puntland.
- **CrAg** test is unavailable in the public sector, and performed occasionally in private centres.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are unavailable in Puntland.
- **CD4 counts** are performed on nearly all HIV patients, using Visitect® 350.

† Data for all of Somalia

## Country / Sub-Saharan Africa / RWANDA



### Basic information

- **Population:** 13.2 m (2022). 40.0% aged <15 years (2021).
- **Capital and largest city:** Kigali (population 1.1 m).
- **Area:** 26,338 km<sup>2</sup>.
- **Official languages:** Kinyarwanda, French, English, Swahili.
- **Major religion:** Christianity (93.4%).

### Key fungal health indicators

- **HIV:** *total prevalence:* 230,000 (1.75%); *deaths from AIDS-related illness:* 2,400 (2021).
- **TB:** *total incidence:* 7,600 (0.06%); *mortality:* 1350; *HIV-positive incidence:* 15.8% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 8,835; *deaths:* 6,044 (2020).

### Country health system

- **GDP (PPP):** *total:* \$31.2 bn; *per capita:* \$2,410 (2021).
- **Health expenditure:** *total:* 7.54% of GDP; *domestic public health expenditure:* 35.1% of total (2018).
- Rwanda's mandatory health insurance system covers over 90% of the population; however, insured patients still need to pay a small amount for treatment.
- External aid also provides a significant minority (39.3%) of health expenditure funding.
- There are four National Referral Hospitals, three of which are in Kigali. There are also three Referral Hospitals, four Provincial Hospitals and 36 District Hospitals.

### Clinical diagnostic procedures + radiology

- **Chest X-ray** is performed often at specialist hospitals and at district hospitals and most of them have digital radiography.
- **CT scan** is performed often at specialist hospitals.
- **MRI scan** is available at 3 hospitals in Rwanda.
- There do not appear to be any **Radiologists** who report regularly.
- **Bronchoscopy, spirometry, corneal scraping and skin biopsy** are all performed often at specialist hospitals.
- **Lumbar puncture** is performed often at specialist and district hospitals.

### Lab tests

- There is one **BSL-3** laboratory at the National Reference Laboratory.
- Direct microscopy of **CSF** is performed often at specialist and district hospitals.
- Direct microscopy of **skin, hair and nails** is performed often at specialist hospitals.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at specialist hospitals, district hospitals and community health centres.
- **Blood culture** and **fungal culture** are performed often at specialist hospitals and occasionally at district hospitals.
- **Histopathology** is performed often at specialist hospitals.
- **CrAg** test is performed often at specialist and district hospitals and occasionally at some community health centres.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are not available in Rwanda.
- **CD4 counts** are performed only on new HIV patients, using FACS (PIMA) analysis on site.

## Pays / Afrique subsaharienne / SENEGAL



### Informations de base

- **Population** : 17,9 m millions d'habitants (2022)  
40,4% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Dakar  
(3,9 million d'habitants).
- **Superficie** : 196 722 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religion** : Islam (95,9 %).

### Indicateurs clés de la santé fongique

- **VIH: prévalence totale** : 40 000 (0,22%) ; décès dus à une maladie liée au sida : 1 000 (2021)
- **TB: incidence totale** : 19 000 (0,11%) ; mortalité : 3 030 ; Incidence de la séropositivité : 4,0% (2021).
- **Asthme chez les adultes** : 3,72% (2012)
- **Nombre total de cas de cancer : nouveaux cas** : 11 317 ; décès : 7 893 (2020).

### Système de santé du pays

- **PIB (PPA)** : total : 63.6 milliards de dollars ; par habitant : 3 699 dollars (2021).
- **Dépenses de santé** : total: 3,98 % du PIB ; dépenses publiques intérieures de santé : 23,8 % du total (2018).
- Il existe deux hôpitaux universitaires (tous deux à Dakar), cinq hôpitaux nationaux (dont quatre à Dakar) et 13 hôpitaux régionaux.
- Les soins primaires sont dispensés dans 87 centres de santé de district et plus de 1 000 postes de santé.
- Environ 15 % de la population bénéficie d'une assurance maladie fournie par son employeur ; sinon, presque tous les soins de santé sont payés de sa poche.

### Procédures de diagnostic clinique + radiologie\*

- La radiographie du thorax est souvent réalisée dans les hôpitaux universitaires, nationaux et régionaux.
- Les tomodensitogrammes et les IRM sont souvent effectués dans les hôpitaux universitaires.
- Les radiologues travaillent régulièrement dans des hôpitaux universitaires, nationaux et régionaux.
- La bronchoscopie est pratiquée occasionnellement dans l'un des deux hôpitaux universitaires.

- La spirométrie est souvent effectuée dans les hôpitaux universitaires et rarement dans les hôpitaux nationaux et régionaux.
- Le grattage de la cornée est effectué occasionnellement dans les hôpitaux universitaires.
- La ponction lombaire est souvent pratiquée dans les hôpitaux universitaires, nationaux et régionaux.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux universitaires et occasionnellement dans les hôpitaux nationaux et régionaux.

### Tests de laboratoire

- Le Sénégal dispose d'un laboratoire BSL-3 mais il n'a pas de protocole pour la manipulation des champignons pathogènes.
- La microscopie directe de la peau, des cheveux et des ongles est souvent pratiquée dans les hôpitaux universitaires.
- La microscopie directe du LCR et d'autres types d'échantillons (par exemple, urine, LBA, échantillons vaginaux) est réalisée occasionnellement dans les hôpitaux universitaires.
- L'hémoculture n'est pas disponible au Sénégal, que dans un hôpital universitaire de Sénégal (Fann).
- L'histopathologie est rarement pratiquée dans les hôpitaux universitaires.
- La culture fongique est souvent réalisée dans les hôpitaux universitaires.
- Le test CrAg est effectué occasionnellement dans les hôpitaux universitaires (avec un financement du gouvernement).
- Les tests pour *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR ne sont pas disponibles publiquement.
- La numération des CD4 est mesurée sur presque tous les patients séropositifs, généralement par analyse FACS sur place, bien que certains laboratoires utilisent Visitect® 350 (M-TINA).

Country / Subsaharan Africa / **SENEGAL****Basic information**

- **Population:** 17.9 m (2022). 40.4% aged <15 years (2021).
- **Capital and largest city:** Dakar (population 3.9 m).
- **Area:** 196,722 km<sup>2</sup>.
- **Official language:** French.
- **Major religion:** Islam (95.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 40,000 (0.22%); *deaths from AIDS-related illness:* 1,000 (2021).
- **TB:** *total incidence:* 19,000 (0.11%); *mortality:* 3,030; *HIV-positive incidence:* 4.0% (2021).
- **Clinical asthma in adults:** 3.72% (2012)
- **Total cancer caseload:** *new cases:* 11,317; *deaths:* 7,893 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$63.6 bn; *per capita:* \$3,699 (2021).
- **Health expenditure:** *total:* 3.98% of GDP; *domestic public health expenditure:* 23.8% of total (2018).
- There are two university teaching hospitals (both in Dakar), five national hospitals (four of which are in Dakar) and 13 regional hospitals.
- Primary care is provided at 87 district health centres and over 1000 health posts.
- Roughly 15% of the population has health insurance provided by their employer; otherwise almost all healthcare is paid for out-of-pocket.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at university, national and regional hospitals.
- **CT and MRI scans** are performed often at university hospitals.
- **Radiologists** routinely report at university, national and regional hospitals.
- **Bronchoscopy** is performed occasionally at one of the two university hospitals.
- **Spirometry** is performed often at university hospitals and rarely at national and regional hospitals.
- **Corneal scraping** is performed occasionally at university hospitals.
- **Lumbar puncture** is performed often at university, national and regional hospitals.
- **Skin biopsy** is performed often at university hospitals and occasionally at national and regional hospitals.

**Lab tests**

- Senegal has a **BSL-3** lab but it does not have a protocol for handling pathogenic fungi.
- Direct microscopy of **skin, hair** and **nails** is performed often at university hospitals.
- Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) is performed occasionally at university hospitals.
- **Blood culture** is only available at one teaching hospital in Senegal (Fann).
- **Histopathology** is performed rarely at university hospitals.
- **Fungal culture** is performed often at university hospitals.
- **CrAg** test is performed occasionally at university hospitals (with government funding)
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are not publicly available.
- **CD4 counts** are measured on nearly all HIV patients, usually using FACS analysis on site, though some labs use Visitect® 350 (M-TINA).

Country / Subsaharan Africa / **SIERRA LEONE****Basic information**

- **Population:** 8.7 m (2022). 41.4% aged <15 years (2021).
- **Capital and largest city:** Freetown (population 1.5 m).
- **Area:** 71,740 km<sup>2</sup>.
- **Official language:** English.
- **Major religions:** Islam (80%); Christianity (19%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 76,000 (0.87%); *deaths from AIDS-related illness:* 3,000 (2021).
- **TB:** *total incidence:* 24,000 (0.28%); *mortality:* 3,900; *HIV-positive incidence:* 15.0% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 4,708; *deaths:* 3,389 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$14.7 bn; *per capita:* \$1,809 (2021).
- **Health expenditure:** *total:* 16.1% of GDP; *of GDP; domestic public health expenditure:* 9.7% of total (2018).
- There is one main referral hospital in Freetown for adults with medical illnesses, 19 other government hospitals, and 12 Mission hospitals. There are also several private hospitals, mostly in Freetown.
- Most treatments and diagnostics are paid for out-of-pocket; a small minority have insurance provided by their employer.
- There is government-funded free healthcare for pregnant and breast-feeding women and children under 5; a national health insurance scheme is planned but has not yet been operationalised.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at most hospitals.
- The three available **CT scanners** and single **MRI scanner** are all in private facilities.
- **Radiologists** report regularly at the referral hospital and occasionally at district hospitals.
- **Bronchoscopy** is performed rarely at the referral hospital.
- **Spirometry** and **corneal scraping** are not available in Sierra Leone.
- **Lumbar puncture** is performed often at the referral hospital.
- **Skin biopsy** is performed rarely at the referral hospital.

**Lab tests**

- There are several **BSL-3** labs in Sierra Leone but none have protocols for handling pathogenic fungi.
- Direct microscopy of **CSF** is only available in private facilities, where it is performed rarely.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are not available in Sierra Leone.
- **Blood culture** is only performed in one private facility.
- **Histopathology** and **fungal culture** are not available in Sierra Leone.
- **CrAg** test is performed often in the referral hospital, paid for by Global Fund grants through an NGO.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are not available.
- **CD4 counts** are performed on new patients and those who are ill and/or admitted to hospital, using PIMA Alere FACS analysis on site.

Country / Subsaharan Africa / **SOMALIA****Basic information**

- **Population:** 12.4 m (2022). 42.4% aged <15 years (2021).
- **Capital and largest city:** Mogadishu (population 2.2 m).
- **Area\*:** 637,657 km<sup>2</sup>.
- **Official languages:** Somali, Arabic.
- **Major religion†:** Islam (99.8%).

**Key fungal health indicators**

- **HIV†:** *total prevalence:* 7,700 (0.06%); *deaths from AIDS-related illness:* <500 (2021).
- **TB†:** *total incidence:* 43,000 (0.35%); *mortality:* 11,190; *HIV-positive incidence:* 0.9% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload†:** *new cases:* 10,134; *deaths:* 7,439 (2020).

**Country health system**

- **GDP (PPP)†:** *total:* \$14.8 bn; *per capita:* \$953 (2021).
- **Health expenditure:** no data.
- The Somali healthcare system has been damaged by the long periods of instability in the last thirty years. Provision remains significantly better in the private sector than in the public sector, although the latter is in the process of rebuilding.
- There are 56 hospitals, including three regional hospitals and two district hospitals. A large minority of these are managed by NGOs.
- Somalia is a Federal Republic; the diagnostics sections of this profile do not apply to the autonomous state of Puntland, nor the *de facto* independent (but not widely recognised) Somaliland, which both maintain their own ministries of health and have separate representation in this report.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at district hospitals and private centres.
- **CT and MRI scans** are performed often at private centres.
- **Radiologists** routinely report at district hospitals and private centres.
- **Bronchoscopy** and **spirometry** are performed often at private centres.
- **Corneal scraping** and **skin biopsy** are not available in Somalia.
- **Lumbar puncture** is performed occasionally at private centres.

**Lab tests**

- There is no **BSL-3** lab in Somalia.
- Direct microscopy of **CSF, skin, hair** and **nails** is not performed in Somalia.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at private centres.
- **Blood culture** is performed occasionally at private centres.
- **Histopathology** and **fungal culture** are not available in Somalia.
- **CrAg** test is performed rarely at private centres.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are not available in Somalia.
- **CD4 counts** are only performed on new HIV patients, using Pima Alere and Partec Cyflow assays. Counts were performed on all patients until 2019 or so.

State / Sub-Saharan Africa / **SOMALILAND (Somalia)****Basic information**

- **Population:** 5.7 m (2021) 42.38%† aged <15 years (2021).
- **State capital and largest city:** Hargeisa (population 1.2 m).
- **Area:** 177,000 km<sup>2</sup>.
- **Official language:** Somali.
- **Major religion†:** Islam (99.8%).

**Key fungal health indicators**

- **HIV†:** *total prevalence:* 7,700 (0.06%); *deaths from AIDS-related illness:* <500 (2021).
- **TB†:** *total incidence:* 43,000 (0.35%); *mortality:* 11,190; *HIV-positive incidence:* 0.9% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload†:** *new cases:* 10,134; *deaths:* 7,439 (2020).

**Country health system**

- **GDP (PPP)†:** *total:* \$14.8 bn; *per capita:* \$953 (2021).
- **Health expenditure:** no data.
- Somaliland is a *de facto* sovereign state, having declared independence from the Federal Republic of Somalia in 1991. It has limited international recognition and is still claimed by Somalia; however, it maintains its own Ministry of Health and its health system is separate to that of both Somalia and the autonomous Federal Member State of Puntland.
- The public healthcare pyramid includes one National Referral Hospital, one Regional Hospital, one District Hospital and six other hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is available at most public hospitals, and performed often at private centres.
- There is one **CT scanner** in the National Hospital and six in the private sector.
- There is one **MRI scanner** in the private sector.
- **Radiologists** report rarely at specialist hospitals and often at private centres.
- **Bronchoscopy** is only available at the National Hospital and at private centres.
- **Spirometry** is not performed in Somaliland.
- **Lumbar puncture** is performed rarely at six hospitals and often at private centres.
- **Corneal scraping** is not performed in the country.
- **Skin biopsy** is not available in Somaliland.

**Lab tests**

- There is no **BSL-3** lab in Somaliland.
- Direct microscopy of **CSF, skin, hair** and **nails** is not available in Somaliland.
- Other types of direct microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at all hospitals and at community health centres.
- **Blood culture** is performed often at all hospitals.
- **Histopathology** and **fungal culture** are not available in Somaliland.
- **CrAg, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are not available in Somaliland.
- **Histoplasma antigen**, test is performed occasionally in specialist hospitals and often in private centres.
- **CD4 counts** are performed on new HIV patients and those with high viral load, using FACS analysis at centralised locations.

† Data for all Somalia

## Country / Subsaharan Africa / SOUTH AFRICA

**Basic information**

- **Population:** 57.5 m (2022). 27.9% aged <15 years (2021).
- **Capitals:** Pretoria, Cape Town, Bloemfontein;  
**Largest city:** Johannesburg (population 5.6 m)
- **Area:** 1,221,037 km<sup>2</sup>.
- **Official languages:** 11 (including Zulu, Xhosa, Afrikaans, English, Northern Sotho, Tswana, Sesotho).
- **Major religions:** Christianity (78.0%); No religion (10.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 7,500,000 (13.04%); *deaths from AIDS-related illness:* 51,000 (2021).
- **TB:** *total incidence:* 304,000 (0.53%); *mortality:* 56,000; *HIV-positive incidence:* 53.6% (2021).
- **Clinical asthma in adults:** 6.09% (2012).
- **Total cancer caseload:** *new cases:* 108,168; *deaths:* 56,802 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$862 bn.; *per capita:* \$14,239 (2021).
- **Health expenditure:** *total:* 8.25% of GDP; *domestic public health expenditure:* 54.1% of total.
- South Africa has universal healthcare, subject to the Uniform Patient Fee Schedule (UPFS) which categorises patients into fully-subsidised, partially-subsidised and full-paying, determined on their referral and income.
- The public sector is larger in terms of hospital beds but employs a minority of the country's doctors.
- There are approximately 400 public hospitals (inc. 10 teaching hospitals) and 250 private hospitals.

**Clinical diagnostic procedures + radiology**

- **Chest X-rays** are available at all levels of hospital in South Africa.
- **CT scans** are available at all specialist hospitals and some regional and district hospitals.
- **MRI scans** are only performed at specialist hospitals.
- **Radiologists** regularly report at specialist and regional but not all district hospitals.
- **Bronchoscopy** is only available at specialist hospitals.
- **Corneal scraping** and **skin biopsy** are performed often but generally only in specialist centres with ophthalmology/dermatology departments.
- **Spirometry** and **lumbar puncture** are performed often at specialist and regional but not all district hospitals.

**Lab tests**

- The pre-eminent National Institute for Communicable Diseases (NICD) in Johannesburg hosts a national mycology reference laboratory and one of only two **BSL-4** labs in Africa. The NICD is a WHO Collaborating Centre, which includes mycology.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) is performed often at specialist and district hospitals.
- **Blood culture** and **fungal culture** are performed regularly at specialist and district hospitals.
- **Histopathology** is performed regularly at specialist hospitals, and occasionally at all other levels.
- **CrAg** test is available at specialist and district hospitals and is integrated into a national screening program for HIV patients.
- **Histoplasma antigen** test is only available at the NICD lab in Johannesburg.
- **Aspergillus antigen** test is only available at private labs.
- **Aspergillus antibody** is not available in South Africa.
- **Pneumocystis PCR** test is offered at NICD and private labs.
- **CD4 counts** are performed according to national HIV guidelines, and are available whenever requested.

## Country / Subsaharan Africa / SOUTH SUDAN

**Basic information**

- **Population:** 11.5 m (2022). 41.6% aged <15 years (2021).
- **Capital and largest city:** Juba (population 0.5 m).
- **Area:** 619,745 km<sup>2</sup>.
- **Official language:** English.
- **Major religions:** Christianity (60.5%); traditional faiths (32.9%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 170,000 (1.47%); *deaths from AIDS-related illness:* 8,000 (2021).
- **TB:** *total incidence:* 24,000 (0.21%); *mortality:* 3,910; *HIV-positive incidence:* 13.3% (2021).
- **Clinical asthma in adults:** no data.
- **Total cancer caseload:** *new cases:* 6,312; *deaths:* 4,633 (2020)

**Country health system**

- **GDP (PPP):** *total:* \$11.9 bn; *per capita:* \$839 (2021).
- **Health expenditure:** *total:* 9.8% of GDP; *of GDP; domestic public health expenditure:* 10.8% of total (2018)
- The public health system of South Sudan is a decentralised system of four tiers (community, primary, secondary and tertiary) connecting by a referral system. Apart from the tertiary level facilities, these are run at state or county level.
- Most of the government facilities are to some extent financially supported by NGOs; due to financial issues, employees on the government payroll sometimes wait up to 6 months to receive their wages. In general, the NGOs contribute costs such as maintenance of equipment and the patient pays the remainder. Health insurance is held by a large minority.
- The range of treatments provided in private facilities is wider than in public facilities, but is by no means comprehensive.
- Khartoum hosts the Mycetoma Research Centre, a WHO Collaborating Centre, with comprehensive diagnostic facilities for this condition.

**Clinical diagnostic procedures + radiology**

- **Chest X-rays** are performed regularly in specialist public hospitals.
- There are **CT scanners** in private hospitals; the public health service has a CT scanner but it is unused and still 'in its box' because its manual, software etc. are in Chinese.
- Only private facilities have access to a **radiologist** regularly reporting.
- **Corneal scrapings** are performed occasionally in specialist hospitals.
- **Lumbar punctures** are occasionally performed at regional hospitals for suspected meningitis, especially outbreaks.
- **Bronchoscopy** and **spirometry** are available in private facilities.
- There are no **MRI scanners** in South Sudan.
- **Skin biopsy** is not available in South Sudan but samples can be sent abroad.

**Lab tests**

- There are four medical laboratory training institutions, including one private.
- South Sudan has one **BSL-3** lab but no protocols for handling pathogenic fungi.
- South Sudan struggles with a major lack of qualified personnel.
- Many reagents are also in very short supply.
- **CSF** microscopy is only performed for possible cryptococcal meningitis and only in a few facilities.
- **Urine** and **Gram stain** microscopy are rarely performed in private facilities.
- It does not appear that any of these diagnostics are performed in the country at all: **skin, hair & nails** microscopy, **blood culture, histopathology** or **fungal culture**.
- **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are also all unavailable in South Sudan
- **CD4 counts** are only performed in a few facilities, having been mostly stopped in 2017.
- In new HIV patients, **viral load** tests are initially done every 6 months and subsequently annually.

Country / Subsaharan Africa / **SUDAN****Basic information**

- **Population:** 48.0 m (2022). 42.0% aged <15 years (2021).
- **Capital and largest city:** Khartoum (population 5.5 m).
- **Area:** 1,731,671 km<sup>2</sup>.
- **Official language:** Arabic.
- **Major religion:** Islam (90.7%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 41,000 (0.09%); *deaths from AIDS-related illness:* 1,900 (2021).
- **TB:** *total incidence:* 26,000 (0.05%); *mortality:* 4,180; *HIV-positive incidence:* 2.2% (2021).
- **Clinical asthma in adults:** 10%.
- **Total cancer caseload:** *new cases:* 27,382; *deaths:* 17,055 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$190 bn; *per capita:* \$4,173 (2021).
- **Health expenditure:** *total:* 4.5% of GDP; *of GDP; domestic public health expenditure:* 22.8% of total (2018).
- Almost all healthcare is paid for out-of-pocket, except for children under 5 and pregnant women, for whom healthcare is free. Very few people have private insurance.
- Some facilities (e.g. university labs) subsidise costs for poorer patients but this is not widespread.
- There are 438 hospitals in Sudan, including several National and teaching hospitals.
- There are major regional disparities in availability of healthcare; provision of most treatments and diagnostics is significantly better in Khartoum and the surrounding area than elsewhere.
- Khartoum hosts the Mycetoma Research Centre, a WHO Collaborating Centre, with comprehensive diagnostic facilities for this condition.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at teaching, specialist and district hospitals and at very few primary health centres.
- **CT scan** is performed occasionally at teaching/specialist hospitals.
- **MRI scan** is performed at a few teaching/specialist hospitals.
- **Radiologists** report often at teaching/specialist hospitals.
- **Bronchoscopy** and **corneal scraping** are performed occasionally at teaching/specialist hospitals.
- **Spirometry** is performed often at private facilities and rarely at teaching/specialist hospitals.
- **Lumbar puncture** is performed often at private facilities and rarely at teaching/specialist hospitals.
- **Skin biopsy** is performed often at teaching/specialist facilities and occasionally at district hospitals.

**Lab tests**

- There is a **BSL-3** lab but only for virology.
- Direct microscopy of **skin, hair, nails** and **vaginal samples** is performed occasionally at specialist labs.
- Direct microscopy of **CSF** and **BAL** is performed rarely at specialist labs.
- Direct microscopy of **urine** is performed often at specialist labs, district hospitals and primary health centres.
- **Blood culture** is performed rarely at specialist labs.
- **Histopathology** is performed occasionally at specialist labs and district hospitals.
- **Fungal culture** is rarely performed at specialist labs.
- **CrAg, Histoplasma antigen, Aspergillus antigen,** and **Pneumocystis PCR** are all unavailable in Sudan.
- **Aspergillus antibody** rapid test is unavailable in Sudan, although a qualitative CIE test for Aspergillus antibodies is used rarely in specialist labs.
- **CD4 counts** are taken very rarely, usually as a last resort.

Country / Subsaharan Africa / **TANZANIA** (United Republic of)**Basic information**

- **Population:** 63.9 m (2022) 42.7% aged <15 years (2021).
- **Capita:** Dodoma; **Largest city:** Dar es Salaam (population 6.4 m).
- **Area:** 947,300 km<sup>2</sup>.
- **Official languages:** Swahili, English, Arabic (Zanzibar)
- **Major religions:** Christianity (61.4%); Islam (35.2%)

**Key fungal health indicators**

- **HIV:** *total prevalence:* 1,700,000 (2.66%); *deaths from AIDS-related illness:* 29,000 (2021).
- **TB:** *total incidence:* 132,000 (0.21%); *mortality:* 25,800; *HIV-positive incidence:* 18.2% (2021).
- **Clinical asthma in adults:** (not known).
- **Total cancer caseload:** *new cases:* 40,464; *deaths:* 26,945 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$183 bn; *per capita:* \$3,062 (2021).
- **Health expenditure:** *total:* 3.63% of GDP; *of GDP;* *domestic public health expenditure:* 42.9% of total (2018).
- Approximately one-third of the population have some sort of health insurance. Most of the remainder of health expenditure is made up of out-of-pocket spending and external aid.
- Tanzania has one National hospital and 10 Zonal Referral hospitals, followed by 26 Regional Referral hospitals, 99 District hospitals and 87 basic hospitals, with over 200 hospitals in total.
- Availability of diagnostics vary widely; this profile incorporates responses from five regions/cities and two additional facilities across the country, taking an 'average' response where appropriate.

**Clinical diagnostic procedures + radiology**

- **Chest X-rays** are performed often at zonal, regional and district hospitals.
- **CT and MRI scans** are performed often at most national and zonal hospitals and rarely or never in lower hospitals.
- **Radiologists** report often at national, zonal and regional hospitals.
- **Bronchoscopy** and **spirometry** are performed rarely in most parts of the country.
- **Bronchoscopy** is more frequently undertaken in private facilities.
- **Lumbar puncture** is performed often in most parts of the country but rarely or never elsewhere.
- **Skin biopsy** is performed occasionally at national, zonal and most regional hospitals.

**Lab tests**

- There are several **BSL-3** labs in Tanzania but none have protocols for pathogenic fungi.
- Direct microscopy of **CSF, skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are each performed to some extent at most hospitals down to the district level.
- **Blood culture** is performed at most hospitals down to the regional level.
- **Histopathology** is performed at national and zonal hospitals but samples can also be taken from regional hospitals.
- **Fungal culture** is performed rarely at national, zonal and regional hospitals.
- **CrAg** test is performed often at national, zonal and regional hospitals, and has recently been rolled out to district hospitals.
- **Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are all unavailable in most of the country, but are sometimes used as part of a study.
- **CD4 counts** are taken for most patients including those with high viral load, usually using FACS analysis on site.

## Pays / Afrique subsaharienne / TOGO



### Informations de base

- **Population** : 8,5 m millions d'habitants (2022)  
39,7% âgés de moins de 15 ans (2021).
- **Capitale et plus grande ville** : Lomé  
(1,5 million d'habitants).
- **Superficie** : 56 785 km<sup>2</sup>.
- **Langue officielle** : Français.
- **Principales religions** : Christianisme (43,7 %) ; croyances traditionnelles (35,6 %) ; Islam (14,0 %).

### Indicateurs clés de la santé fongique

- **VIH**: *prévalence totale* : 110 000 (1,3%) ; décès dus à une maladie liée au sida : 2 600 (2021).
- **TB**: *incidence totale* : 2 900 (0,03 %) ; mortalité : 306 ; Incidence de la séropositivité : 13,4% (2021).
- **Asthme chez les adultes** : 2,13 % (non publié).
- **Nombre total de cas de cancer** : *nouveaux cas* : 5 208 ; décès : 3 468 (2020).

### Système de santé du pays

- **PIB (PPA)** : *total* : 20 milliards de dollars ; par habitant : 2 353 dollars (2021).
- **Dépenses de santé** : *total*: 6,2 % du PIB ; *dépenses publiques intérieures de santé* : 13,9 % du total (2018).
- Il existe trois hôpitaux universitaires : deux à Lomé (au sud) et un à Kara (au nord). Il existe également cinq hôpitaux régionaux et 30 hôpitaux préfectoraux, suivis de 51 centres médico-sociaux et 118 unités de soins périphériques.
- La plupart des tests et des traitements sont payés de leur poche, à l'exception de certains traitements contre le paludisme, la tuberculose et le VIH.

### Procédures de diagnostic clinique + radiologie\*

- La radiographie du thorax est effectuée systématiquement dans les hôpitaux universitaires, régionaux et de district.
- Le scanner est souvent réalisé dans les laboratoires centraux.
- L'IRM n'est disponible qu'à Lomé, où il y a deux scanners dans un hôpital universitaire. Il existe également quatre scanners dans le secteur privé à Lomé.
- Il y a 8 ou 10 radiologues qui font souvent des rapports dans les hôpitaux universitaires.
- La bronchoscopie est réalisée dans l'un des hôpitaux universitaires.
- La spirométrie n'est pas disponible au Togo.
- La ponction lombaire est souvent pratiquée au niveau des hôpitaux universitaires, régionaux et de district.
- Le grattage cornéen n'est pas disponible au Togo.
- La biopsie cutanée est souvent pratiquée dans les hôpitaux universitaires et occasionnellement dans les hôpitaux régionaux et de district.

### Tests de laboratoire

- Il n'y a pas de laboratoire BSL-3 au Togo.
- Il y a cinq laboratoires centraux dans le pays, dont trois dans les hôpitaux universitaires.
- La microscopie directe de la peau, des cheveux et des ongles est effectuée sporadiquement, en fonction de la disponibilité des réactifs et du milieu. La microscopie directe du LCR et d'autres types d'échantillons (par exemple urine, LBA, échantillons vaginaux) est souvent effectuée dans les laboratoires centraux, régionaux et de district ; les échantillons peuvent également être collectés dans les hôpitaux universitaires et régionaux.
- La culture fongique est souvent effectuée dans deux laboratoires centraux.
- L'hémoculture et l'histopathologie sont disponibles dans un laboratoire central au Togo.
- Ces tests rapides sont tous indisponibles au Togo : CrAg, *Histoplasma* antigen, *Aspergillus* antigen, *Aspergillus* antibody et *Pneumocystis* PCR.
- La numération des CD4 est effectuée sur tous les patients séropositifs, généralement par analyse FACS sur place dans tous les laboratoires centraux, régionaux et de district.



## Country / Subsaharan Africa / TOGO

**Basic information**

- **Population:** 8.5 m (2022). 39.7% aged <15 years (2021).
- **Capital and largest city:** Lomé (population 1.5 m).
- **Area:** 56,785 km<sup>2</sup>.
- **Official language:** French.
- **Major religions:** Christianity (43.7%); traditional faiths (35.6%); Islam (14.0%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 110,000 (1.3%); *deaths from AIDS-related illness:* 2,600 (2021).
- **TB:** *total incidence:* 2,900 (0.03%); *mortality:* 306; *HIV-positive incidence:* 13.4% (2021).
- **Clinical asthma in adults:** 2.13% (unpublished).
- **Total cancer caseload:** *new cases:* 5,208; *deaths:* 3,468 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$20 bn; *per capita:* \$2,353 (2021).
- **Health expenditure:** *total:* 6.2% of GDP; *of GDP; domestic public health expenditure:* 13.9% of total (2018).
- There are three university hospitals: two in Lomé (in the south) and one in Kara (in the north). There are also five regional hospitals and 30 prefectural hospitals, followed by 51 medico-social centres and 118 peripheral care units.
- Most tests and treatments are paid for out-of-pocket, except for some malaria, TB and HIV treatments.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed systematically at university, regional and district hospitals.
- **CT scan** is performed often at central labs.
- **MRI scan** is only available in Lomé, where there are two scanners in a teaching hospital. There are also four scanners in the private sector in Lomé.
- There are 8 or 10 **radiologists** who report often in university hospitals.
- **Bronchoscopy** is performed in one of the university hospitals.
- **Spirometry** is not available in Togo.
- **Lumbar puncture** is performed often at university, regional and district hospitals levels.
- **Corneal scraping** is not available in Togo.
- **Skin biopsy** is performed often at university hospitals and occasionally at regional and district hospitals.

**Lab tests**

- There is no **BSL-3** lab in Togo.
- There are five central labs in the country, including three in university hospitals.
- Direct microscopy of **skin, hair and nails** is performed sporadically, depending on availability of reagents and medium. Direct microscopy of **CSF** and other types (e.g. **urine, BAL, vaginal samples**) are done often at central, regional and district labs; samples can also be collected from university and regional hospitals.
- **Fungal culture** is performed often at two central labs.
- **Blood culture** and **histopathology** are available in one central lab in Togo.
- These rapid tests are all unavailable in Togo: **CrAg, Histoplasma antigen, Aspergillus antigen, Aspergillus antibody** and **Pneumocystis PCR**.
- **CD4 counts** are performed on all HIV patients, usually using FACS analysis on site in all central, regional and district labs.

Country / Subsaharan Africa / **UGANDA****Basic information**

- **Population:** 46.2 m (2022). 48.2% aged <15 years (2021).
- **Capital and largest city:** Kampala (population 1.7 m).
- **Area:** 241,038 km<sup>2</sup>.
- **Official languages:** English, Swahili.
- **Major religions:** Christianity (84.4%); Islam (13.7%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 1,400,000 (3.03%); *deaths from AIDS-related illness:* 17,000 (2021).
- **TB:** *total incidence:* 91,000 (0.2%); *mortality:* 12,500; *HIV-positive incidence:* 31.9% (2021).
- **Clinical asthma in adults:** 8.8% (>35 years old) (2019).
- **Total cancer caseload:** *new cases:* 34,008; *deaths:* 22,992 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$116 bn.; *per capita:* \$2,729 (2021).
- **Health expenditure:** *total:* 6.53% of GDP; *domestic public health expenditure:* 15.8% of total.
- The health hierarchy is split into national and district levels. The national level includes national referral hospitals, regional referral hospitals and several laboratory/research facilities.
- There are three national referral hospitals and three specialised government hospitals, all in Kampala.
- There are 14 regional referral hospitals and roughly 40 district hospitals, as well as a significant number of non-government hospitals, both for-profit and non-profit.
- The two major payment methods for medical care are patient payment and external aid; there are government subsidies for a limited number of treatments/tests.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at national and regional levels and rarely at district level.
- **CT and MRI scans** are performed occasionally at national hospitals and at some regional facilities, although broken equipment often means that patients must go to private facilities.
- **Radiologists** report regularly in national hospitals but rarely in regional hospitals.
- **Bronchoscopy** and **spirometry** are both occasionally performed at national hospitals.
- **Corneal scraping** and **lumbar puncture** are both performed often at national hospitals and occasionally at regional hospitals; government will pay for lumbar puncture when cryptococcal meningitis is suspected.
- **Skin biopsy** is performed often at national hospitals, occasionally at regional hospitals and rarely at district hospitals.

**Lab tests**

- There are several **BSL-3** labs with protocols for handling pathogenic fungi.
- Direct microscopy of **CSF** is performed often at national hospitals and rarely at regional hospitals.
- Direct microscopy of **skin, hair, nails** and other types (e.g. **urine, BAL, vaginal samples**) are performed rarely at national hospitals.
- **Blood culture** and **fungal culture** are regularly done at national level and less often at regional level.
- **Histopathology** is performed often at national hospitals.
- **CrAg** test is available for free at most government and non-government facilities at all levels.
- **Histoplasma antigen, Aspergillus antibody** and **Pneumocystis PCR** tests are performed but only in the context of research and not routine care; this is usually subsidised by charitable foundations. *Pneumocystis pneumonia* is also diagnosed using Giemsa staining.
- **Aspergillus antigen** test is not available, although a study may be occurring in the near future.
- **CD4 counts** are performed on nearly all HIV patients, mostly analysed on site using FACS (at national and regional hospitals) or Alere Pima (at district and community facilities).

## Country / Subsaharan Africa / ZAMBIA

**Basic information**

- **Population:** 19.6 m (2022). 45.7% aged <15 years (2021).
- **Capital and largest city:** Lusaka (population 2.2 m).
- **Area:** 752,618 km<sup>2</sup>.
- **Official language:** English.
- **Major religions:** Christianity (95.5%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 1,300,000 (6.62%); *deaths from AIDS-related illness:* 19,000 (2021).
- **TB:** *total incidence:* 60,000 (0.31%); *mortality:* 7,900; *HIV-positive incidence:* 33.3% (2021).
- **Clinical asthma in adults:** 2.96% (2012).
- **Total cancer caseload:** *new cases:* 13,831; *deaths:* 8,672 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$66.4 bn; *per capita:* \$3,410 (2021).
- **Health expenditure:** *total:* 4.93% of GDP; *domestic public health expenditure:* 39.1% of total.
- Health facilities are categorised into three levels: 1st level (community-level centres and district hospitals), 2nd level (provincial and general hospitals) and 3rd level (central and specialist hospitals).
- As of 2012, there were seven 3rd level hospitals and 19 2nd level hospitals.
- Zambia offers universal health insurance through the National Health Care Package (NHCP).

**Clinical diagnostic procedures + radiology\***

- **Chest X-ray** is performed often at 3rd and 2nd level facilities, and rarely at 1st level.
- **CT and MRI scans** are performed often at 3rd level facilities; CT is also rarely available at 2nd level. Neither CT nor MRI is available through NHCP, so is unaffordable for much of the population.
- **Radiologists** report regularly at 3rd level, occasionally at 2nd level and rarely at 1st level.
- **Bronchoscopy** is performed regularly at 3rd level hospitals and rarely at 2nd or 1st level facilities.
- **Spirometry** is performed regularly at 3rd level hospitals and rarely at 2nd level.
- **Corneal scraping and lumbar puncture** are performed often at 3rd level and occasionally at 2nd level; corneal scraping is also performed rarely at 1st level.
- **Skin biopsy** (unknown)

**Lab tests\***

- There are several **BSL-3** labs in Zambia but none has a protocol for handling pathogenic fungi.
- Direct microscopy of **CSF, skin, hair** and **nails** are performed occasionally at 3rd level hospitals.
- Other types of microscopy (e.g. **urine, BAL, vaginal samples**) are performed often at 3rd level.
- Microscopy samples can be taken at 2nd and 1st levels and referred to 3rd level facilities.
- **Blood culture** is performed often at 3rd level and rarely at 2nd and 1st level facilities.
- **Histopathology** is only available at 3rd level hospitals, where it is performed often.
- **Fungal culture** is not available for diagnosis; only in studies.
- **CrAg** test is performed often at 3rd level and rarely at 2nd and 1st levels.
- **Histoplasma antigen, Aspergillus** and **antigen Aspergillus antibody** tests are all unavailable in the public sector and rarely performed in the private sector.
- **Pneumocystis PCR** tests are unavailable except for some private centres which send samples abroad.
- **CD4 counts** are performed on nearly all patients, including new patients and those who are ill/admitted to hospital, using FACS analysis on site (some areas use FACS in centralised locations).

\* Not verified by Ministry of Health or another knowledgeable agency.



## Country / Subsaharan Africa / ZIMBABWE

**Basic information**

- **Population:** 15.1 m (2022). 38.3% aged <15 years (2021).
- **Capital and largest city:** Harare (population 3.1 m).
- **Area:** 390,757 km<sup>2</sup>.
- **Official languages:** 16, including Shona, Ndebele and English.
- **Major religions:** Christianity (87.0%).

**Key fungal health indicators**

- **HIV:** *total prevalence:* 1,300,000 (8.6%); *deaths from AIDS-related illness:* 20,000 (2021).
- **TB:** *total incidence:* 30,000 (0.2%); *mortality:* 7,300; *HIV-positive incidence:* 60% (2021).
- **Clinical asthma in adults:** 2.52% (2012).
- **Total cancer caseload:** *new cases:* 16,083; *deaths:* 10,676 (2020).

**Country health system**

- **GDP (PPP):** *total:* \$37.3 bn; *per capita:* \$2,408 (2021).
- **Health expenditure:** *total:* 4.73% of GDP; *domestic public health expenditure:* 28.0% of total (2018).
- Zimbabwe, in theory, provides free healthcare to qualifying groups (including those under 5 or over 60, and pregnant women). There is some government subsidy in other areas but this is somewhat ad hoc. A significant proportion of the population takes out private health insurance.
- Zimbabwe's hospitals include Central Hospitals (of which there are 6), Provincial Hospitals (8) and District Hospitals (47), with Rural Hospitals and various clinics providing a lower level of care.
- All diagnostics discussed in this profile are performed often in private facilities; none of them are available at the community level of the public sector.

**Clinical diagnostic procedures + radiology**

- **Chest X-ray** is performed often at central, provincial and district hospitals.
- **CT scan** is performed often at central hospitals.
- **MRI scan** is only available in the private sector.
- **Radiologists** routinely report at central hospitals only.
- **Bronchoscopy** and **corneal scraping** are both performed often but only at central hospitals.
- **Spirometry** is performed regularly at 3rd level hospitals, rarely at 2nd level and in the private sector.
- **Lumbar puncture** is performed often at central, provincial and district hospitals.
- **Skin biopsy** is often done at regional hospitals

**Lab tests**

- The National TB Reference Laboratory is the only **BSL-3** lab; it has protocols for handling pathogenic fungi.
- Direct microscopy of **CSF** is performed often at central, provincial and district hospitals.
- Direct microscopy of **BAL** is performed only at central hospitals.
- Other types of direct microscopy (e.g. **urine, vaginal samples**) are performed often at central hospitals and occasionally at provincial and district hospitals.
- **Blood culture** is performed often at central hospitals and rarely at provincial and district hospitals.
- **Histopathology** and **fungal culture** are both performed often at central hospitals but not at provincial or district hospitals.
- **CrAg** test is performed often at central, provincial and district hospitals.
- **Histoplasma antigen, Aspergillus antigen** and **Aspergillus antibody** are not available at all. **Pneumocystis PCR** testing is only available in private laboratories as a send out assay.
- **CD4 counts** are performed on nearly all HIV patients, using FACS analysis at centralised locations.