



Report on activities for 2020

95/95
BY 2025

March 2021

Summary

Fungi are silent killers, causing the death of over 2 million people every year - this makes fungal disease one of the top global causes of death ahead of TB and malaria. Vulnerable people from countries in the global south are disproportionately affected and those afflicted with fungal disease live in misery due to morbidity, the inability to work and stigma. Limited diagnosis and poor measurement of disease morbidity means that the true scale of the problem is unknown.

GAFFI has been almost the only global voice for fungal diseases in terms of public and global health since 2013. GAFFI estimates that with more widely available diagnosis and treatment, the number of deaths could go down to below 750,000.

GAFFI's strategy was revised with a new emphasis on strong partnerships to:

1. Actively advocate for Essential Diagnostics and Antifungals to be accessible in each country as part of Universal Healthcare;
 2. Empower and expand GAFFI's Ambassadors, starting in Africa and Latin America;
 3. Develop an open access data centre on the burden of the most serious fungal disease; and
 4. Facilitate development of AI support products for diagnosis in resource- and healthcare worker-poor countries.
- GAFFI organized and lead the world's first conference on **fungal diseases and health systems** in Lima, Peru with PAHO and CDC and the report was issued on July 1st 2020. This meeting, in Spanish, was attended by 18 Latin American and Caribbean countries and developed a 7-point plan to adopt the latest diagnostics for fungal diseases and integrate these within HIV/AIDS, TB and hospital programs. The meeting also addressed antifungal drug resistance (AMR) and the new GLASS program on collecting data on resistance in *Candida* spp.
 - **Burden of Serious Fungal Diseases:** Six more country burden of fungal disease papers were published including Republic of Congo, Cote d'Ivoire, Kuwait, Oman, Netherlands, and China. The first annual global incidence estimate of **fungal keratitis** was published - 1.05-1.40 million eyes affected, most that go blind. The first global estimate of **invasive aspergillosis incidence complicating chronic obstructive pulmonary disease** was published -750,000 – 2,200,000. An estimate of the number of children with hair fungal infection (tinea capitis) in Africa was published – 138 million affected.
 - The WHO accepted inclusion of ***Aspergillus* antigen, Aspergillus antibody** and **Pneumocystis PCR** as **Essential Diagnostics** onto the 3rd Model List of in vitro Diagnostics, following GAFFI's application.
 - **Diagnostic Laboratory Hub in Guatemala:** Among newly diagnosed HIV patients, 52.1% of the deaths were directly attributable to histoplasmosis, tuberculosis or cryptococcosis. At the Clínica Familiar Luis Angel Garcia (CFLAG), the biggest HIV health care facility in the network, a remarkable fall in mortality from 25% in 2017 to 16.6% in 2019 was shown. COVID-19 lead to a fall in diagnostic samples fell 38% between March and August 2020, coincident with a rise in mortality from opportunistic infections by 10.7% to 27.3% compared with 2019.
 - **Fungal NTDs:** New maps of mycetoma and endemic fungal infections were published.
 - **GAFFI's Ambassadors' activities:** Multiple educational programs and awareness have been delivered in Indonesia, India, Serbia, Hungary, France, Norway, Portugal, Nigeria, Cameroon, Ghana and South Africa.

GAFFI's Vision is 'a world free of suffering and death from fungal disease'

GAFFI revised its strategy in 2020 and reinforced its goals but added some quantifiable goals. GAFFI's high level objective is to ensure that WHO Essential Diagnostics and Antifungal drugs are accessible to all, aligned to Universal Health Coverage.

Key areas of advocacy will be on minimising cryptococcal meningitis deaths in AIDS and enabling the diagnosis of TB-like fungal lung diseases that are mistaken for TB, reducing unnecessary anti-TB therapy, enabling antifungal therapy or surgery, so reducing morbidity and avoidable deaths.

GAFFI's immediate priorities are to:

- Develop a generic advocacy toolkit and **empower GAFFI's Ambassadors** (burden, economics, disease and test specific argumentation, blueprint for laboratories and impact of mortality, mis-treatment and AMR control);
- Convene key experts and national government officials to support health systems development, with a focus on middle income countries, to include **Essential Diagnostics and Antifungals**;
- Develop an **open access data centre on the burden of the most serious fungal diseases**, to guide appropriate resource allocation in every country especially most needed diagnostics and antifungals;
- Facilitate **development of AI support products for diagnosis** in resource- and healthcare worker-poor countries.

To achieve these ends, GAFFI is **seeking strong partnerships** to further its mission, and make a genuine difference to the millions of people affected by fungal diseases.

GAFFI's goals are aligned with the Sustainable development Goals to reduce premature death and improve health (SDG3). Other SDGs are addressable by implementing improvements for fungal disease diagnosis and care. These include:

- SGD1 (Promoting the health needs of the poor) - especially HIV/AIDS, TB and NTDs.
- SGD4 (Supporting high-quality education for all to improve health and health-equity) – healthcare worker education in particular.
- SGD8 (Promoting health employment as a driver of inclusive economic growth) – directly with more laboratory personnel and expanded roles in pharmacy, radiology and information technology, and indirectly in supply chains for diagnostics and antifungal agents.
- SGD9 (Promoting national R&D capacity and manufacturing of affordable essential medical products) – notably epidemiology studies, surveillance and laboratory consumables and computers.
- SDG12 (Promoting responsible consumption of medicines to combat antimicrobial resistance) – notably widespread adoption of rapid and sensitive diagnostics, antifungal surveillance and antifungal stewardship programs.
- SGD16 (Empowering strong local institutions to develop, implement, monitor and account for ambitious national SDG responses) – notably development of critical mass in fungal disease diagnosis and management with surveillance networks.
- SGD17 (Mobilising partners to monitor and attain the health-related SDGs) – development of public health mycology, on a strong epidemiology and surveillance background.



GAFFI's organisation

GAFFI's Board is chaired by Professor Nigel Lightfoot (UK) and supported by Victor Rydgren (Vice-Chair) (Norway), Yasu Mori (Japan), Professor Michel Glauser (Switzerland), Professor Patrick Francioli (Switzerland), Oddi Aasheim (UK) and Professor Juan Luis Rodriguez Tudela (Switzerland) (newly appointed in 2020). Professor David Denning is Chief Executive, Ms Emma Orefuwa Chief Executive, African Programmes and Timothy Moss, Head of Finance and Administration. GAFFI and GAFFI UK have identical Board membership to facilitate achieving GAFFI's aims.

Goal 1 - Increase awareness of the impact of fungal disease

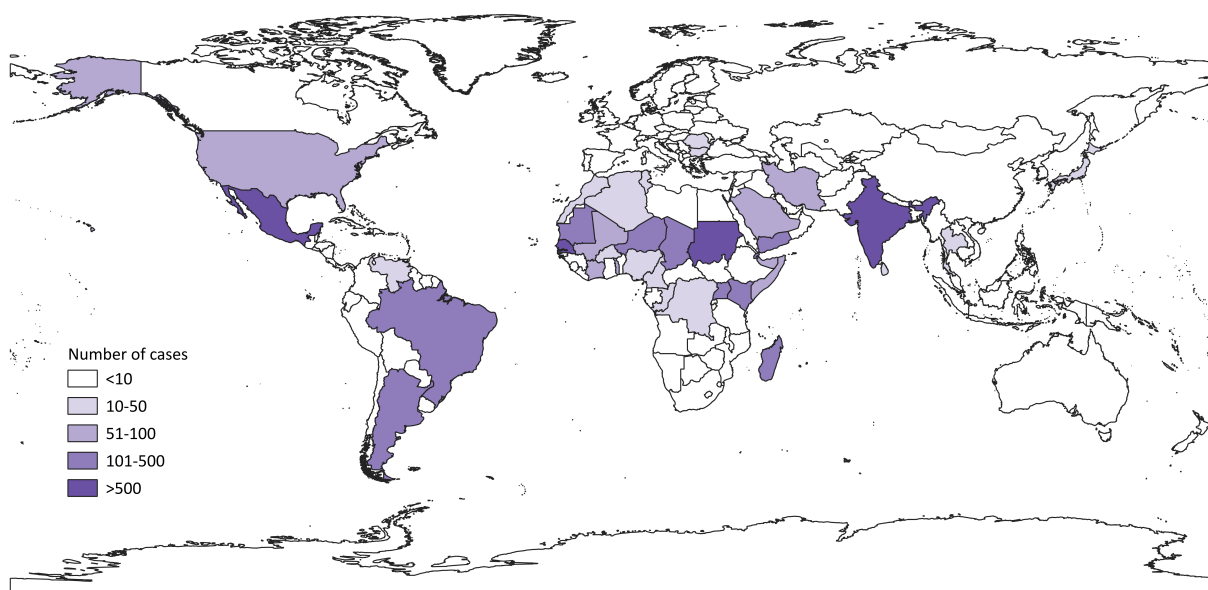
A major GAFFI goal is increase awareness of fungal disease globally, especially among global health agencies and country medical opinion leaders and decision-makers. GAFFI has approached this in part by estimating the burden of fungal diseases country-by-country, identifying and highlighting diagnostic and therapeutic gaps and supporting epidemiological studies to better define fungal disease locally.

1.1 Burden of fungal disease

In 2020, burden papers were published for a further 6 countries including Republic of Congo, Cote d'Ivoire, Kuwait, Oman, Netherlands, and China. The estimate for China that 1,179,000 people suffer from invasive aspergillosis, a remarkably high incidence, probably with a high mortality. Fungal disease estimates are now published for 74 countries as shown [here](#).

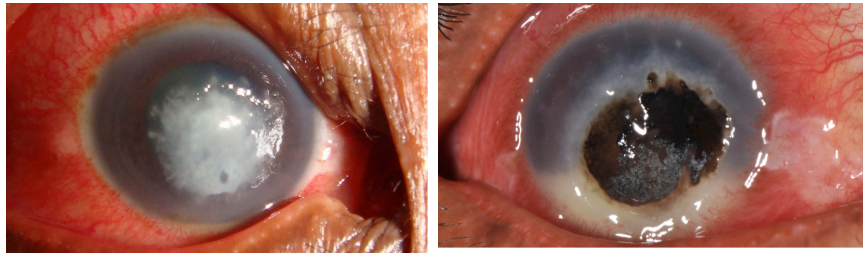
1.2 Mycetoma

The chronic and disabling condition mycetoma had a boost in activity with 3 papers published. An 18 year survey in Senegal was published By GAFFI's Ambassador for the country (Aida Badiane). In Uganda a 70-year pathology-based review of 249 cases was published by another of GAFFI's Ambassadors (Felix Bongomin) and colleagues. New global maps were also published with separation of cases into actinomycetoma (bacterial) and eumycetoma (fungal) (Darcy Emery). This literature review found cases in countries which had only seen imported cases previously, suggestive of an expanding range for the pathogens. Press release [here](#).



1.3 Fungal keratitis

As reported last year, GAFFI presented a poster on the annual incidence of fungal keratitis. This paper has now been published in [Lancet Infectious Diseases](#). From 117 published papers and county reports of keratitis in Kenya, we calculated a minimum annual incidence estimate of 1,051,787 cases (likely range 736,251 – 1,367,323), with the highest rates in Asia and Africa. If all culture-negative cases are assumed to be fungal, the annual incidence would be 1,480,916 cases. In three case series, 8–11% of patients had to have the eye removed, which represents an annual loss of 84,143 – 115,697 eyes.

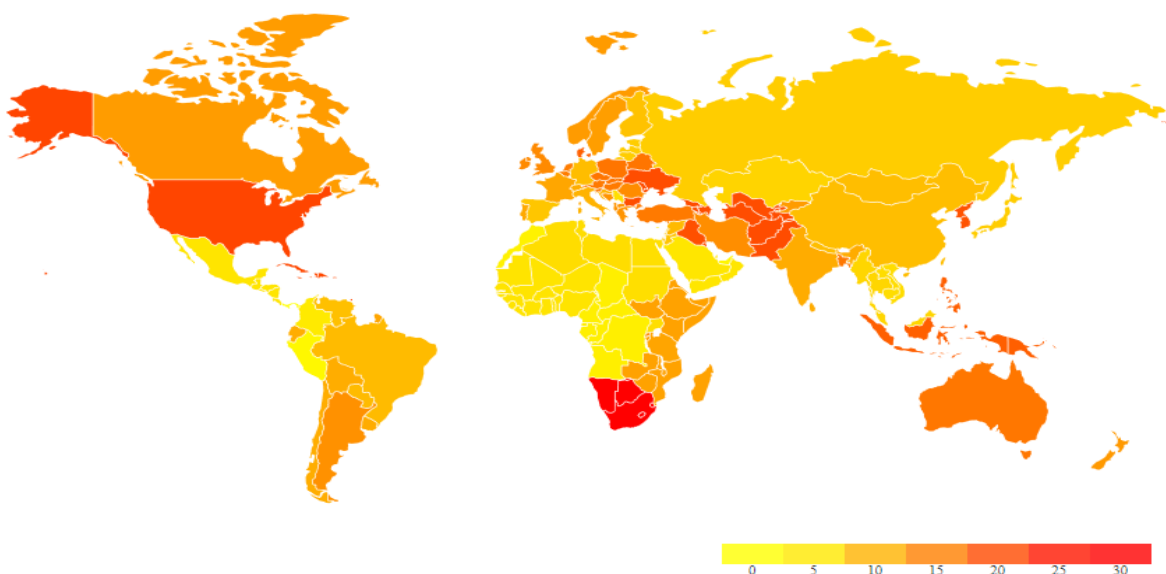


1.4 COPD and invasive aspergillosis

Invasive aspergillosis is an unusual complication of chronic obstructive pulmonary disease (COPD) a non-communicable disease, principally caused by smoking, cooking inside, pollution and mining exposures. A global re-estimate of the prevalence of COPD was published (550 million), combined with an estimate of the number of COPD sufferers admitted to hospital (58 million). There are 3 studies (Spain and 2 from China) that have estimated the proportion of those admitted to hospital with COPD who acquire invasive aspergillosis (1.3-3.9%) and so the annual incidence is an alarmingly high 750,000 to 2.2 million. The rates are highest in countries with older populations, high smoking rates and better survey data. The map below shows this graphically. The mortality in the studies quoted was 45-73%. The paper and its supplement with individual country data are [here](#).



Incidence of invasive aspergillosis complicating COPD per 100,000



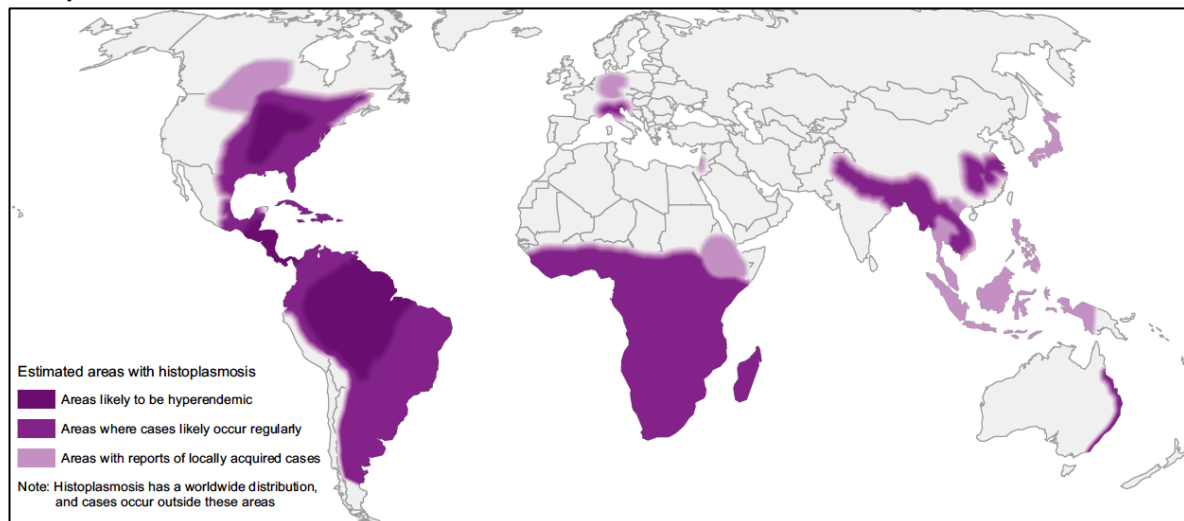
1.5 Chronic pulmonary histoplasmosis

Chronic pulmonary histoplasmosis (CPH) is an umbrella term embracing both chronic cavitary pulmonary histoplasmosis and *Histoplasma* nodules. These entities occur in nonimmunocompromised people. Very little is written about these entities outside of the USA, and even there, few papers have been published. In a [narrative literature review](#), Dr Jake Baker and colleagues from the UK and Indonesia found emphysema/COPD to be the main risk factor for cavitary CPH. Diagnosis is easy to miss because *Histoplasma* grows so slowly that most cultures are discarded before they can turn positive. A high index of suspicion and *Histoplasma* antibody testing are important for diagnosis. Fungal culture of respiratory samples need to be retained for 3-6 weeks. The most characteristic radiological features are not described. Treatment with itraconazole for at least 12 months is recommended. Substantial additional research on the topic is required.

1.6 New maps of endemic fungal diseases published

The endemic fungal diseases histoplasmosis, coccidioidomycosis and blastomycosis have seen changes to their ranges over the last 25 years, possibly due to global travel, soil and plant importation and climate change. Nida Ashraf and colleagues (Mycopathologia 2020;185:843) re-assessed the biogeography of these fungal diseases:

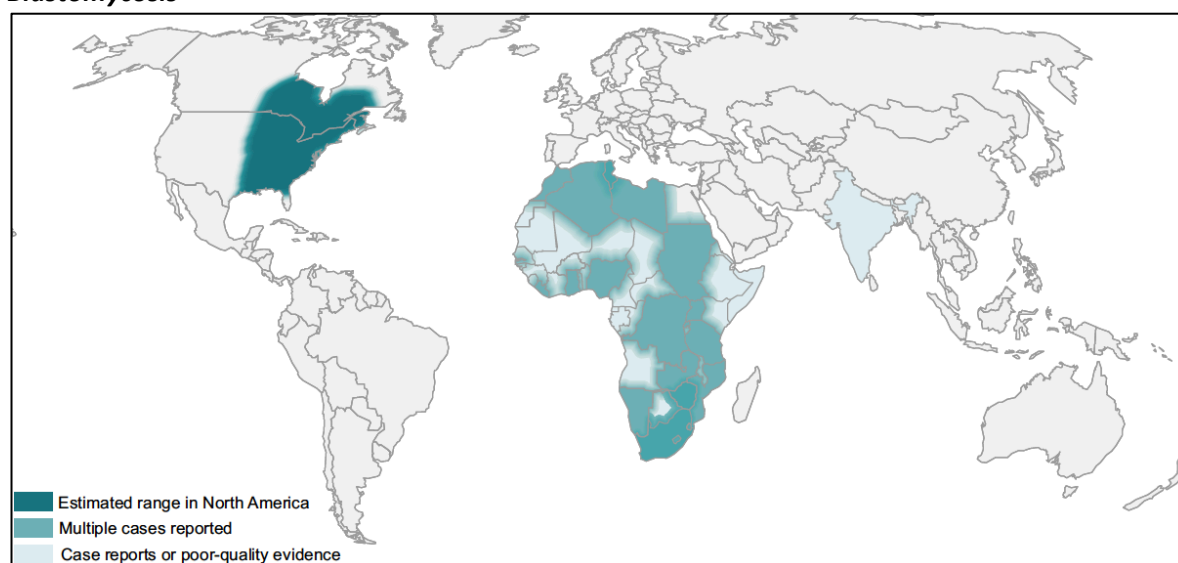
Histoplasmosis



Coccidioidomycosis



Blastomycosis



Goal 2 - Improve access to diagnostics for fungal disease

In the last 10 years, there has been a true revolution in fungal diagnostics shifting from ‘classical’ culture and microscopy to PCR, antigen and antibody detection. Improved access to sensitive and rapid diagnostics is a critically important GAFFI goal, especially in low- and middle-income countries. As fungal diseases are often clinically silent in their early stages and can mimic other infections, specific diagnostic tests are required for diagnosis. Many hospitals and countries have little or no diagnostic capability. Complex test formats, expense, inadequate laboratory infrastructure and a lack of training are all barriers to diagnostic testing.

2.1 Essential Diagnostics for fungal diseases and advanced HIV infection

Aspergillus antigen, *Aspergillus* IgG antibody and *Pneumocystis* PCR are now included on the [WHO Model List for in vitro Diagnostics](#) following GAFFI’s application.

There remains the need to standardise antibody tests for paracoccidioidomycosis, chronic and subacute histoplasmosis and sporotrichosis (possibly via commercialization).

2.3 Demonstration project in Guatemala (Contribution of Professor Juan Luis Rodriguez Tudela)

The results of the demonstration project in Guatemala “**Minimising HIV deaths through rapid fungal diagnosis and better care in Guatemala**” has shown that access to rapid diagnosis is an essential tool to reach the UNAIDS target of reducing annual AIDS deaths. In this program, rapid diagnostic testing has allowed earlier start of antiretroviral therapy for those who were eligible or to initiate life-saving treatment in those with an opportunistic infection. The analysis of the newly diagnosed HIV cohort of patients showed that 52.1% of the deaths were directly attributable to the infections screened (histoplasmosis, tuberculosis and cryptococcosis). Implementation of the program resulted in increased diagnosis (5.1%) at the same time as a reduction in mortality (7% in those with a life-threatening infection (between 2017 to 2018)) across the whole network. These results were described in the manuscript “A rapid screening program for histoplasmosis, tuberculosis and cryptococcosis reduces deaths in patients with HIV in Guatemala”, submitted for publication. This programme provides direct evidence of the importance of access to recommended treatments for fungal infections such as liposomal amphotericin B and flucytosine, still not currently in place in Guatemala.

Data analysis from the Clínica Familiar Luis Angel Garcia (CFLAG), the biggest HIV health care facility in the network showed a continuing downward trend in opportunistic infection mortality in 2019. It was 25% in 2017 and fell to 19.4% in 2018 and further to 16.6% in 2019. However, similar to other programmes around the world, access to healthcare services and medicines were severely impacted by the COVID-19 pandemic. In the manuscript “Impact of the COVID-19 pandemic for people living with HIV in Guatemala” also submitted for publication, we evaluated the impact of the COVID-19 on the screening of life-threatening infections. This analysis showed that the number of samples for investigating OIs fell 38% between March and August 2020. Unfortunately, mortality in CFLAG patients with opportunistic infections increased 10.7% compared with the 2019 (27.3%, in 2020 vs 16.6%, in 2019).

To minimize this impact, UNAIDS and WHO called on governments to provide multi-month dispensing for those PLWHIV who were stable. In Guatemala, a home delivery program for antiretroviral therapies has been functioning for the network since June 2020, which should ameliorate some of the interruptions.

2.3.1 Next steps

- Document the successes and challenges of the project in publications. A fellowship awarded to the Guatemala team member who is being trained at the Medical Mycology Reference Laboratory in Spain and her PhD thesis includes the complex data analysis of the project.
- Develop a cost analysis of the implementation for OIs in the central DLH in collaboration with the Manchester Centre for Health Economics
- Facilitate country and government ownership of the project
- Work with the government to ensure antifungal drug access and no cost to patients or affordable prices, including flucytosine and liposomal amphotericin B
- Assess the value of additional tests in the diagnostic portfolio, including LFA test for histoplasmosis, antigen detection for coccidioidomycosis and tuberculosis, *Aspergillus* IgG for chronic pulmonary aspergillosis, and probably *Toxoplasma* serology.

2.4 PAHO issues guidelines for disseminated histoplasmosis in HIV/AIDS

The Pan American Health Organization has issued its first guidelines on both diagnosis and management of disseminated histoplasmosis among people living with HIV. Disseminated histoplasmosis is under-diagnosed and as a result is the cause of death in up to 20% of people dying of AIDS. Antigen detection in urine (or serum) is more sensitive and faster than conventional diagnosis, usually based on culture, or histopathology of skin lesions or bone marrow.

The key recommendations in the guidelines are:

1. Diagnosis using antigen detection
2. Treat severe disease (which is now defined) with liposomal amphotericin B 3mg/Kg (or conventional amphotericin B, 0.7-1mg/kg) for 14 days.
3. Treat mild to moderate disease with itraconazole (loading doses then 200mg twice daily).
4. Continue 12 months of itraconazole as maintenance therapy.
5. Initiate antiretroviral therapy immediately on diagnosis, unless central nervous system histoplasmosis is present (<5%).
6. Co-infection with tuberculosis is frequent (but should not be presumed) and both infections need treating, avoiding rifampin and itraconazole combination.

2.5 Diagnostic capability and access in Africa

In South Africa, at the National Institute for Communicable Diseases in Johannesburg, *Histoplasma* antigen EIA and PCR and sequence-based ID of fungal cultures are now accredited.

GAFFI has embarked on a detailed survey of diagnostic practice for fungal disease in Africa. This includes documenting the availability of clinical procedures (such as skin biopsy, lumbar puncture, corneal scraping), radiology and laboratory tests. The survey is being conducted every African country, and involved both a detailed questionnaire and follow up calls with key people in each country. GAFFI will issue a comprehensive report on all procedures and tests and individual country summary reports.

2.6 State Mycology Reference Laboratories in India

The four laboratories set up in 2020 have been increasing their test portfolios over the last months. The Indian Council of Medical Research (ICMR) is planning to expand this network in 2021.

Goal 3 - Improve access to appropriate and affordable antifungal therapeutics with a focus on generic agents

Access to affordable antifungal agents remains a critical goal for GAFFI, with limited progress made in 2020.

3.1 Global mapping of current availability and price of antifungal drugs

Antifungal access [maps](#), have been continually updated and now include the 3 echinocandins: micafungin, caspofungin and anidulafungin. Gaps in coverage remain extensive, especially for flucytosine and natamycin eye drops. There has been limited progress on access:

- Additional formulations of flucytosine are available in the USA and Thailand.
- Flucytosine has been made more widely available in South Africa, but is not actually registered by the regulatory authority (pending).
- A UNITAID funded programme in 7 African countries is enabling some centres to treat with amphotericin B and/or flucytosine

3.2 Echinocandin antifungals (caspofungin, micafungin and anidulafungin)

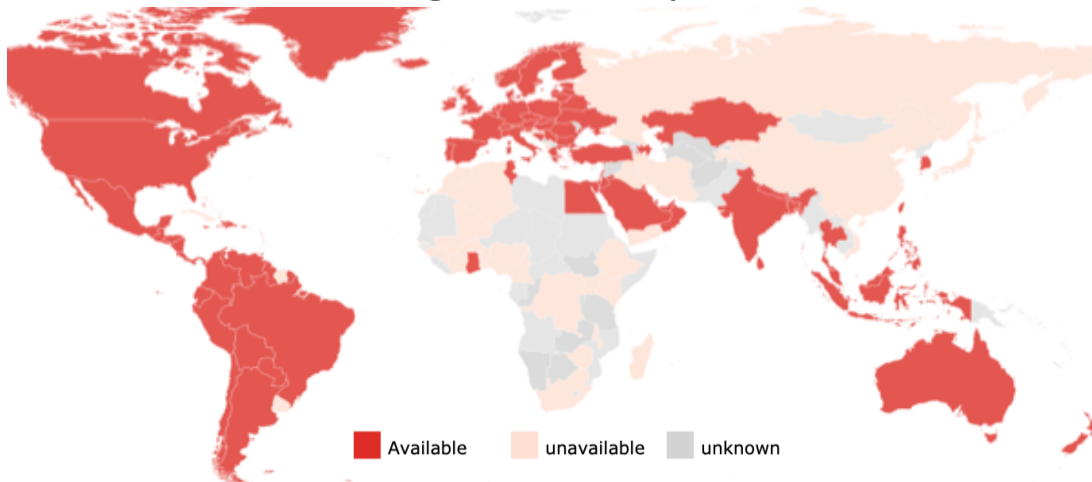
GAFFI has applied to the WHO for the echinocandins to be listed as Essential on the 22nd Essential Medicines List. GAFFI Ambassador Guillermo Garcia Efron from Argentina assembled the 107 page application. The echinocandins are most effective for *Candida* and *Aspergillus* infections. The latest clinical practice guidelines for the management of *Candida* spp. and *Aspergillus* spp. infections recommend echinocandins as first treatment option for invasive candidiasis, for empiric therapy for suspected candidiasis and for salvage treatment of invasive aspergillosis refractory to azole drugs. The emergence of multi-resistant *Candida auris* has made the need more acute.

GAFFI recommended in the application that the echinocandin class is considered essential therapy for:

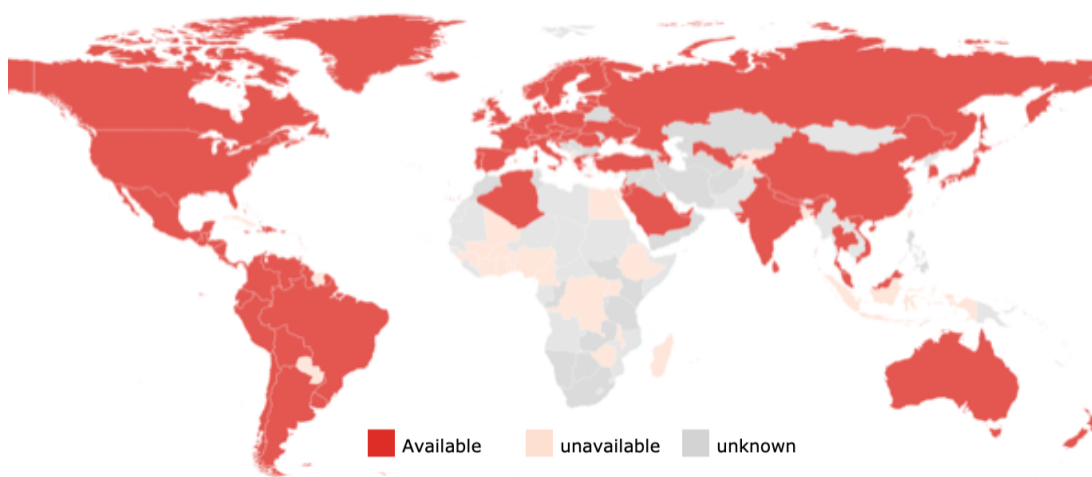
- Invasive candidiasis in adults and children
- Invasive candidiasis and candidaemia in neonates (micafungin only)
- Oesophageal candidiasis in patients unresponsive to azoles
- Invasive and chronic pulmonary aspergillosis in patients refractory to azole therapy, intolerant to azoles and in those with azole resistant infections
- As prophylaxis in neutropenic patients in whom azoles are contra-indicated.

Country access is shown on the following access [maps](#):

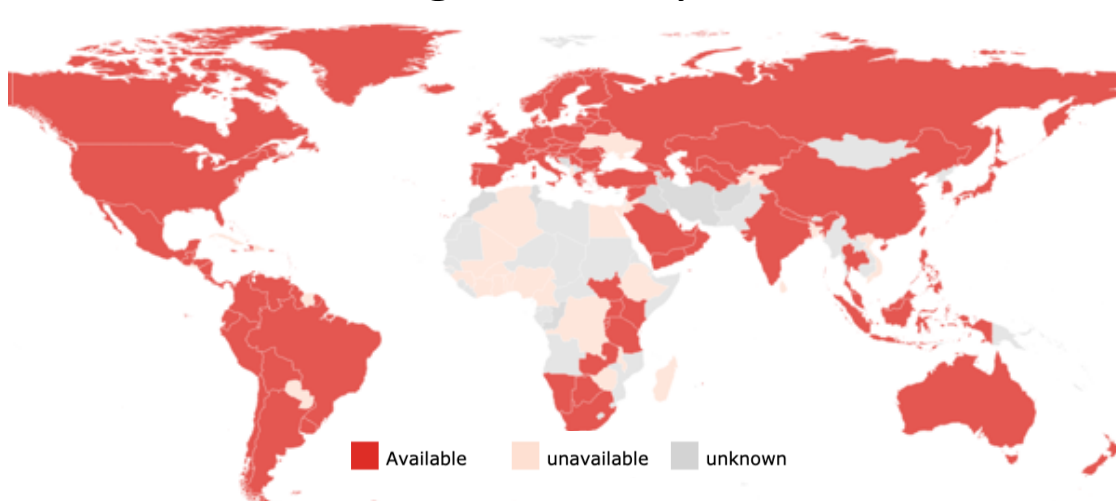
Anidulafungin country access



Caspofungin country access



Micafungin country access



Goal 4 - Improve education of health professionals about fungal disease

GAFFI has been reaching out to additional health professionals with interest in fungal disease and has made contact with key people in Democratic Republic of Congo, Sierra Leone, Guinea, Mauritania Botswana and Zambia in 2020. Improving laboratory capacity through training is critical for improved care. Antifungal prescribing can be complex, and pharmacists need to be aware of drug interactions and dose adjustments. GAFFI, in concert with many others, is committed to improving health professional competence related to fungal diseases. In addition to its [‘Fact sheets’](#): GAFFI also has a [twitter](#) account with >1,700 followers.

4.1 GAFFI Ambassadors

GAFFI’s Ambassadors network expanded in 2020 to include Amona Fructueux Modeste (Republic of Congo), Guillermo Garcia-Effron (Argentina), Doumbo Safiatou Niare (Mali) and Kamwiziku Guguy (Democratic Republic of Congo). All GAFFI’s [Ambassadors](#) are listed online. Their country reports for 2020 are found in the last section of this report.

GAFFI is extremely grateful to its Ambassadors for their continuing efforts related to raising the awareness of fungal diseases, direct advocacy, educational initiatives and providing information about their country.

4.2 Educational events

The alternate year Advances against Aspergillosis and Mucormycosis meeting was held in Lugano February 27-29th 2020, just before the world shut down with Covid-19. Held in a hybrid fashion, about half the attendees actually arrived and the remainder engaged online. The current burden of aspergillosis was summarised along with some key R&D objectives here:

https://www.youtube.com/watch?v=4EFZFij_9vA World Aspergillosis Day was also held at <https://www.latestly.com/lifestyle/health-wellness/world-aspergillosis-day-2020-date-significance-and-awareness-related-to-the-prevention-of-the-fungal-infection-1508243.html>

Our Ambassador network held multiple events to celebrate World Aspergillosis Day in February 2021 – in Ghana, Nigeria, Mali, Malawi, Indonesia, Vietnam, Paraguay and Brazil and distributed educational flyers in France, Austria, Iran, DRC and Cameroon.

4.3 Online lectures on fungal diseases

GAFFI’s educational partner LIFE-Worldwide has expanded its online educational videos on key fungal disease [topics](#), including many diagnostic tests and 3 videos on the radiology of fungal disease. Over 65 fungal diseases topics are covered, including antifungal chemotherapy. The LIFE Website is currently undergoing a complete redesign.

4.4 Online course on fungal microscopy and histology

The online free course www.microfungi.net is translated into 4 languages (Spanish, French, Portuguese and Chinese) and accredited by the UK Royal College of pathologists. Laboratory technicians and doctors can earn continuing professional education points (CPD and CME) while learning a critical skill. Over 3000 students have enrolled from across the world.

Dr Aiah Khateb (Saudi Ambassador)
wearing an *Aspergillus* decorated mask



Advocacy supporting the above 4 goals

Advocacy is a key continuing mission for GAFFI. Advocacy has and remains focused on the WHO and its regional offices but is broadening to include country ministries of health and related institutions.

5.1 Health Systems and Fungal Diseases – Latin America

The GAFFI report on Fungal Disease and Health Systems was released on July 1st 2020. In collaboration with the Pan American Health Organization (PAHO) and the US Centers for Disease Control (CDC), GAFFI assembled experts and Ministry of Health leaders to formulate new thinking on key health system questions:

- How can these new diagnostic tools best be used?
- Which level clinic, hospital and/or reference laboratory?
- How should this data be integrated into clinical care algorithms? Fungal disease management is often complex – how do we ensure top level clinical expertise accompanies the test results, whether positive or negative?
- Non-culture tests are faster and more sensitive but don't detect antifungal resistance. How should empiric antifungal therapy and antifungal stewardship be informed by non-culture based diagnostics
- How should these data be collected and integrated for public health surveillance?
- Who should pay for these diagnostic tests?
- How is a system of fungal disease care best coordinated? And by whom?

The [report](#) was launched online with a welcome from Ambassador Juan Carlos Gamarra (Peru). Over 60 fungal disease experts from Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela had convened in Lima, Peru in September 2019 to discuss the above questions.

2020 donors and supporters

GAFFI is indebted to its many donors in 2020 including:

- Jylag Fondation
- Foundation for Research in Infectious Diseases
- The International Society for Human and Animal Mycology
- Fungal Infection Trust
- The European Confederation for Medical Mycology
- Jolly Healthcare
- Pulmatrix
- LDBio
- Dynamiker
- Optimum Imaging Diagnostics
- MiraVista
- Immy
- Era Biology
- Next Level Diagnostics

Several private donors including Carmen Alvarez-Guerra, Juan Luis Rodriguez Tudela and David Denning also made contributions.

Donations in kind have also been made including:

- Office space (Haines Watts re GAFFI UK),
- Board members' and advisers' contribution of their time and skills in attending meetings and providing advice
- The Fungal Infection Trust (UK) support for maintaining the GAFFI website and news flow;
- The University Hospital of South Manchester for the provision of public relations and communications through The Goodwork Organisation

2021 plans and aspirations

GAFFI has increased its support of its African and LATAM and Caribbean Ambassadors and countries and will roll out its Ambassador toolkit as a component of support. GAFFI anticipates incremental improvements in awareness in many of these countries, completion of burden estimates for those not yet completed, and substantially increased usage of diagnostics. The success of the Diagnostic Laboratory Hub in Guatemala acts as a beacon for other countries.

GAFFI has applied to the WHO for the echinocandins micafungin, caspofungin and anidulafungin to be included as Essential Medicines.

The African Diagnostic survey is underway and expects to report its findings in Q2 2021, after engagement with Ministries of Health and Global Fund contact points and others, in each country. A similar survey in Latin America and the Caribbean will also be undertaken.

GAFFI anticipates moving some of its diagnostic support AI projects forward with the potential for launch of at least one such tool in 2021.

Glossary of terms, organisations and abbreviations:

AMR – Antimicrobial Resistance
 CDC – US Centers for Disease Control and Prevention
 EDL – Essential Diagnostics List
 LATAM – Latin American countries
 LIFE – Leading International Fungal Education
 PAHO – Pan-American Health Organization
 PCR – Polymerase chain reaction
 SDG – Sustainable Development Goals
 UNITAID – Agency hosted by WHO in Geneva.
 WHO – World Health Organisation

Publications

Burden of disease papers:

1. Amona FM, Denning DW, Moukassa D, Hennequin C. Current burden of serious fungal infections in Republic of Congo. *Mycoses* 2020;63:543-552.
2. Buil JB, Meijer EFJ, Denning DW, Verweij PW, Meis JF. Burden of serious fungal infections in the Netherlands. *Mycoses* 2020;63:543-552.
3. Badiane AS, Ndiaye M, Diongue K, Diallo MA, Seck MC, Ndiaye D. Geographical distribution of mycetoma cases in Senegal over a period of 18 years. *Mycoses* 2020;63(3):250-256.
4. Kwizera R, Bongomin F, Meya DB, Denning DW, Fahal AH, Lukande R. Mycetoma in Uganda: a neglected tropical disease. *PLoS NTD* 2020;14(4): e0008240.
5. Emery D, Denning DW. The global distribution of actinomycetoma and eumycetoma. *PLoS NTD* 2020;14: e0008397.
6. Zhou LH, Li RY, Denning DW, Zhu LP. Risk-based Estimate of Human Fungal Disease Burden, China: Old Pathogen, New Host, and New Patterns. *Emerg Infect Dis* 2020;26:2137-2147.
7. Hammond EE, McDonald CS, Vestbo J, Denning DW. The global impact of Aspergillus infection on COPD. *BMC Pulm Med* 2020;20:241.
8. Alfouzan W, Al-Wathiqi F, Altawalah H, Asadzadeh M, Khan Z, Denning DW. Human Fungal Infections in Kuwait-Burden and Diagnostic Gaps. *J Fungi (Basel)*. 2020;6(4):E306.
9. Al-Hatmi AMS, Al-Shuhoumi MA, Denning DW. Estimated Burden of Fungal Infections in Oman. *J Fungi* 2020;7:5.
10. Koffi D, Ira V. Bonouman IV, Toure AO, Kouadjo F, M'boh N'GRE, Sylla K, DossoM, Denning DW. Estimates of Serious Fungal Infection burden in Côte d'Ivoire and Country Health Profile. *J Mycol Med* 2020;31:101086.
11. Bongomin F, Olum R, Nsenga L, Namusobya M, Russell L, de Sousa E, Osaigbovo II, Kwizera R, Baluku JB. Estimation of the burden of tinea capitis among children in Africa. *Mycoses* 2020 Nov 29. doi: 10.1111/myc.13221.

Key papers, reviews and position papers

1. Bongomin F, Out A, Harris C, Foden P, Kosmidis C, Denning DW. Risk factors for relapse of chronic pulmonary aspergillosis after discontinuation of antifungal therapy. *Clin Infect Pract* 2020;5:100015.
2. Oladele RO, Akase IE, Fahal A, Govender N, Honigl M, Gangneux JP, Chiller TM, Denning DW, Cornely O and Chakrabarti A. Bridging the knowledge gap on mycoses in Africa; setting up a Pan-African Mycology Working Group. *Mycoses* 2020;63:244-49.
3. Ashraf N, Kubat RC, Poplin V, Adenis AA, Denning DW, Wright L, McCotter O, Schwartz IS, Jackson BR, Chiller TC, Bahr NC. Re-drawing the maps for endemic mycoses. *Mycopathologia* 2020;185:843-65.
4. Baker J, Kosmidis C, Rozaliyani A, Wahyuningsih R Denning DW. Chronic pulmonary histoplasmosis – a scoping literature review. *Open Forum Infect Dis* 2020 2020;7(5):ofaa119.
5. Bongomin F, Asio LG, Baluku JB, Kwizera R, Denning DW. Chronic pulmonary aspergillosis: Notes for a clinician in a resource-limited setting where there is no mycologist. *J Fungi (Basel)* 2020;6(2):E75.
6. Kwizera R, Wadda V, Mugenyi L, Aanyu-tukamuhebwa H, Nyalw G, Yimee G, Chakaya J, De jong C, Van der molen T, Denning DW, Gore R, Kirenga BJ. Skin prick reactivity among asthmatics in East Africa. *World Allergy Org J* 2020;3:100130.
7. Rodriguez Tudela JL, Cole DC, Ravasi G, Bruisma N, Chiller TC, Ford N, Denning DW. Integration of fungal diseases into health systems in Latin America. *Lancet Infect Dis* 2020;20:890-892.

8. Oladele RO, Jordan A, Akande P, Akanmu AS, Akase IE, Aliyu S, Denning DW, Chiller TC. Tackling cryptococcal meningitis in Nigeria, one-step at a time; the impact of training. *PLoS ONE* 2020;15:e0235577.
9. Setianingrum F, Rozaliyani A, Syam R, Adawiyah R, Tugiran M, Sari CYI, Burhan E, Wahyuningsih R, Rautemaa-Richardson R, Denning DW. Evaluation and comparison of automated and manual ELISA for diagnosis of chronic pulmonary aspergillosis (CPA) in Indonesia. *Diagn Microbiol Infect Dis* 2020;98:115124.
10. Medina N, Alastruey-Izquierdo A, Mercado D, Bonilla O, Pérez JC, Aguirre L, Samayoa B, Arathoon E, Denning DW, Rodriguez-Tudela JL. Comparative performance of the laboratory techniques used in a diagnostic laboratory hub to diagnose opportunistic infections in people with HIV in Guatemala. *AIDS* 2020 34:1625–1632.
11. Hunter ES, Page ID, Richardson MD, Denning DW. Evaluation of the LDBio *Aspergillus* ICT lateral flow assay for serodiagnosis of allergic bronchopulmonary aspergillosis. *PLoS ONE* 2020;15:e0238855.
12. Bongomin F, Asio LG, Olum R, Denning DW. Intravenous therapy for chronic pulmonary aspergillosis: A systematic review and meta-analysis. *Mycoses* 2020;63:921-927.
13. Rapeport WG, Ito K, Denning DW. The role of antifungals in the management of patients with severe asthma. *Clin Transl Allergy* 2020;10:46.
14. Oladele R, Otu AA, Olubamwo O, Makanjuola OB, Ochang EA, Ejembi J, Irurhe N, Ajanaku I, Ekundayo HA, Olayinka A, Atoyebi O, Denning D. Evaluation of knowledge and awareness of invasive fungal infections amongst resident doctors in Nigeria. *Pan Afr Med J* 2020;36:297.
15. Rozaliyani A, Rosianawati H, Handayani D, Agustin H, Zaini J, Syam R, Adawiyah R, Tugiran M, Setianingrum F, Burhan E, Kosmidis C, Wahyuningsih R. Chronic Pulmonary Aspergillosis in Post Tuberculosis Patients in Indonesia and the Role of LDBio *Aspergillus* ICT as Part of the Diagnosis Scheme. *J Fungi (Basel)*. 2020;6(4):318.

Press releases and GAFFI news items in 2020 (www.gaffi.org/media/news/)

January 6, 2020

[Candida bloodstream infection in the USA](#)

January 16, 2020

[World's first lateral flow assay for Histoplasma antigen launched](#)

February 26, 2020

[Neglected, market failures, public health failures](#)

March 24, 2020

[On World Tuberculosis Day, remember TB-like fungal infections and co-infection of TB and Aspergillus](#)

May 7, 2020

[How common is chronic pulmonary histoplasmosis? No one knows, but it is likely global and grossly under-diagnosed](#)

May 13, 2020

[GAFFI Ambassadors shine light on decades of mycetoma in Senegal and Uganda](#)

May 26, 2020

[2019 GAFFI Annual Report issued with major progress on health systems and major mycology diagnostic network in India](#)

June 22, 2020

[PAHO issues guidelines on disseminated histoplasmosis in HIV/AIDS](#)

June 30, 2020

[GAFFI convoca a un grupo de expertos en Lima para afrontar la enfermedad fúngica en Latinoamérica](#)

[GAFFI calls together experts in Lima to formulate new thinking on fungal disease management in Latin America](#)

August 5, 2020

[Over a million people in China suffer from life-threatening aspergillosis](#)

August 11, 2020

[Fungal disease experts call for antigen detection techniques to be implemented for AIDS globally based on extensive Guatemalan experience](#)

September 13, 2020

[New study finds Invasive aspergillosis \(IA\) affects up to 2 million people with chronic obstructive pulmonary disease \(COPD\) globally](#)

September 26, 2020

[Mycetoma more widespread than previously thought](#)

October 22, 2020

[Fungal eye infections leave over half a million people blinded each year, international research team says](#)

[Según una investigación internacional, anualmente las infecciones fúngicas oculares dejan mas de 500.000 de personas ciegas](#)

November 30, 2020

[Experts call for minimising deaths from cryptococcal meningitis in AIDS](#)

December 13, 2020

[38 million school age children in Africa have fungal scalp infection, affecting education and leading to social stigmas, medical experts say.](#)

GAFFI's Ambassadors' awareness and educational initiatives:

Indonesia (Professor Retno Wahyuningsih)

An ongoing study determining both acute disseminated and chronic pulmonary aspergillosis was ongoing in Indonesia during 2020. An evaluation of the new lateral flow assay for *Aspergillus* IgG and IgM antibody yielded a sensitivity of 80% and specificity of 70% (Rozaliyani et al). This is the first prospective evaluation in a LMIC.

- Speaker in Indoanesthesia, Jakarta: Laboratory Diagnosis of Fungal Infection in the ICU and Its Relations with Clinical Presentation
- Indonesia Society for Medical Mycology in collaboration with Indonesia Society for Clinical Parasitology conducted a capacity building about Mycology for Eastern Indonesia held in Faculty of Medicine Universitas Brawijaya, Malang, East Java
- Pulmonary Webinar series (PULSE): The role of medical mycologist in Indonesia: from basic science to clinical application, and several other presentation son aspergillosis
- Epidemiology & Diagnosis Kandidiasis Invasif di Rumah Sakit (talk in Perdalín)
- Perdalín – Perssi – Parki – PMKI Epidemiologi & Diagnosis Kandidiasis Invasif di Rumah Sakit
- Semarang, Central Java - Pengurus Gabungan Perpari – Ikki – Papdi: Pulmonary Fungal Infection in Immunocompromised Patients
- Virtual master class of Asia Fungal Working Group: Diagnosis of invasive fungal infections in the ICU: Using traditional & molecular methods
- New antifungal: Isavuconazole (for mucormycosis & aspergillosis) has been launched this year.



Histoplasmosis wet laboratory training session

Portugal (Dr Raquel Sabino)

Several clinicians (infectious diseases, pathology) visited the laboratory and received GAFFI leaflets and a tour of the GAFFI website.

Presentations in 3 meetings or courses were given:

- “*Aspergillus* e aspergilose: their relevance in the actual context.” 4th Advanced course on Host – Parasite Interactions and Virulence, Minho University, 5 and 15 de May 2020

- “Fungal infections in Portugal”, at the X CONGRESO LATINOAMERICANO DE MICOLOGÍA, 12 - 15 de December 2020, Santiago do Chile, Chile
- “Respiratory Fungal Infections – Main etiological agents and their laboratorial diagnosis” – Portuguese Society of Pneumology, 13 December 2020

Hungary (Dr Janos Sinko)

Limited activities because of Covid-19.

- 27.11.2020. Clinical relevance of *Candida* isolates from different anatomical localizations. 26th National Postgraduate Antibiotic Training Course. Online presentation. Budapest. Hungary
- 25.11. 2020: Management of invasive fungal diseases. Online discussion on regional challenges and solutions with the participation of Czech-Hungarian-Slovak experts.
- 29.10.2020. Diagnosis and management of invasive fungal diseases: can present outcomes and patient safety be improved? Presentation and online debate. Online conference of Hungarian Society for Hematology.
- 14.10.2020. Management strategies in invasive fungal infections. Online presentation and discussion with experts from the Medical University of Pécs, Hungary.
- 04.03.2020. *Candida auris*. Postgraduate session for residents in medicine and infections diseases. South Pest Central Hospital, Budapest, Hungary.
- 06.06.2020. Roundtable on fungal diagnostics: special interest in novel molecular methods. Medical University of Pécs, Hungary.
- National handbook on COVID-19 management 2020. An online guidance. Management of possible fungal complications included. (Co-author).

Saudi Arabia (Dr Aiah Khateb)

Several fungal surveillance projects are underway. Surveys of antifungal and diagnostic usage in multiple hospitals is also underway.



Ghana (Bright Ocansey)

On February 25th 2020, the Fungal Infection Kare Initiative (FIKI) Ghana organized its second fungal infections awareness seminar on World Aspergillosis Day #WAD2020 with talks from Prof Malcom Richardson (UK) and Dr Iriagbonse Osaigbovo (Nigeria). About 30 persons were in attendance. At the end of the meeting, the Ghana Medical Mycology Group (GMMG) was inaugurated. GMMG will bring together clinicians, scientists, researchers and other health workers with interest or working with fungal infections to collectively increase awareness and improve diagnosis and management.

A special article on the “Establishment of GMMG” has been submitted for publication in the Ghana Medical Journal.

On September 25th, 2020, GMMG held the first edition of its annual Serious Mycoses Symposium (SMS2020), themed “Highlighting the importance of recognising invasive fungal infections”. There were 108 attendees at this meeting.

Again, this year, leaflets from GAFFI, LIFE, FIT, UK and Aspergillus website were distributed to some selected facilities and health workers.

South Africa (Dr Nelesh Govender)

In addition to accrediting Histoplasma antigen EIA, PCR and sequence-based ID of fungal cultures, the NCID is also offering the following as research assays and/or formally validating them for accreditation:

1. RT-PCR assay for *Histoplasma*/ *Emergomyces* which can be performed directly on clinical specimens
2. Pan-fungal PCR assay on clinical specimens including formalin-fixed and paraffin-embedded tissue
3. Semi-quantitative CrAg assays – but unlikely that these will be introduced into our national programme until their clinical role is clearly defined in clinical trials
4. Aspergillus PCR and antigen EIA evaluations are planned.

Nigeria (Dr Rita Oladele and Dr Samuel Fayemiwo)

Several papers were published directly supporting GAFFI’s mission in Nigeria (full reference above):

- Bridging the knowledge gap on mycoses in Africa; setting up a Pan-African Mycology Working Group.
- Tackling cryptococcal meningitis in Nigeria, one-step at a time; the impact of training.
- Evaluation of knowledge and awareness of invasive fungal infections amongst resident doctors in Nigeria.

GHANA MEDICAL MYCOLOGY GROUP
PRESENTS
1ST SERIOUS MYCOSES SYMPOSIUM-SMS2020

THEME:
HIGHLIGHTING THE IMPORTANCE OF RECOGNIZING
INVASIVE FUNGAL INFECTIONS

DATE:
FRIDAY, 25TH SEPTEMBER, 2020
TIME: 1:30 - 3:45PM (GMT)

VENUE:
ZOOM MEETING

SPEAKERS

 PROF ARUNALOAKES CHAKRABARTI (INDIA) PRESIDENT, INTERNATIONAL SOCIETY OF HUMAN AND ANIMAL MYCOLOGY	 DR NEIL STONE (UK) CONSULTANT IN INFECTIOUS DISEASE AND MICROBIOLOGY UNIVERSITY COLLEGE LONDON HOSPITAL	 DR ISABELLA ASAMOAH (GHANA) INFECTIOUS DISEASE FELLOW (IWACF) KORLEBU TEACHING HOSPITAL
 DR SEAN BAUMAN (USA) PRESIDENT, IMMY	 DR RITA OLADELE (NIGERIA) PRESIDENT, MEDICAL MYCOLOGY SOCIETY OF NIGERIA CO-CHAIR, PAN AFRICAN MYCOLOGY WORKING GROUP	 MR BRIGHT OCANSEY (GHANA) DEPUTY LEAD, GMMG DOCTORAL RESEARCHER, UNIVERSITY OF MANCHESTER
 DR JOSEPH OLYER-COMMY (GHANA) INFECTIOUS DISEASE CONSULTANT, LERMA HOSPITAL	 MR ATO DADZIE EDMUND (GHANA) PROGRAMME OFFICER, GMMG COUNTRY LABORATORY SUPERVISOR, KARIKO (DERMATOLOGY) CLINICS	

CHAIRMAN **MODERATOR**

CERTIFICATE OF PARTICIPATION WILL BE PROVIDED

Registration link:
<https://us02web.zoom.us/join/ztZUqdumsqz4pHtyCPUL78-chZiJyVHxBv6hs>

For more information; enquiry.gmmg@gmail.com or 0542540790

SMS2020 is supported by IMMY, U.S.A

A 2 day online meeting was held July 203rd 2020 by the Medical Mycology Society of Nigeria “Maintaining the Focus on Mycoses during the COVID-19 Pandemic” was attended by 477 people on day 1 and 286 people on day 2.

4TH INVASIVE FUNGAL INFECTIONS FORUM
 THE MEDICAL MYCOLOGY SOCIETY OF NIGERIA
In Conjunction With
 THE NIGERIAN INFECTIOUS DISEASES SOCIETY

Presents
A 2-DAY MEETING
 INVASIVE FUNGAL INFECTIONS FORUM (IFIF 2020)

THEME:
MAINTAINING THE FOCUS ON MYCOSES DURING THE COVID-19 PANDEMIC

Thursday, 2nd - Friday, 3rd July 2020
1PM - 3PM (WAT)
VENUE: zoom Meeting

SPEAKERS, DAY 1

 Prof. Dimie Ogoina President, Nigerian Infectious Diseases Society	 Dr. Tom Chiller Chief, Mycotic Diseases Branch, CDC Associate Director of Global Programs, Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) Atlanta, GA United States of America	 Prof. Jean-Pierre Gangneux Secretary General European Confederation of Medical Mycology	 Dr. Nicholas Ijurhe Consultant Radiologist Lagos University Teaching Hospital
 Prof. Fatimata Ly Professor of Dermatology Cheikh Anta Diop University, Dakar	 Williams Eigege Clinton Health Access Initiative	 Dr. Iriagbonse Osaigbovo Consultant Clinical Microbiologist University of Benin Teaching Hospital	 Dr. Mark Okolo Consultant Clinical Microbiologist Jos University Teaching Hospital

PRACTICAL SESSION DAY 2

Mrs Augustina Nwosu
CMJL - ART Laboratory (APIN)

Partner:

A country wide survey of vaginal candidiasis is nearly concluded (Dr Fayemiwo). His research team here:



Uganda (Dr Felix Bongomin and Dr David Meya)

Some important papers emanated from Uganda, influencing the field.

- An estimate of the number of children with hair fungal infection (tinea capitis) in Africa was published – 138 million affected.
- Chronic pulmonary aspergillosis: Notes for a clinician in a resource-limited setting where there is no mycologist.

Many patients have been enrolled into the AMBITION study of shorter, higher doses of liposomal amphotericin B for cryptococcal meningitis, which should report in Q3 2021.

Cameroon

A one day webinar was scheduled on the 10th December 2020, with the support of GAFFI (Ms. Emma OREFUWAM), and the participation of clinicians, a medical mycologist and microbiologist, all them involved in fungal infections, and some GAFFI Ambassadors (Congo, Gabon). Some guests were invited to share their experience with fungal diseases. The aim was to build the Cameroon Medical Mycology Working Group.



Fungal Diseases in Cameroon A neglected area ?



WEBINAR

Thursday 10th December 2020 - 14:30-16:00 (Central Africa Time)

Venue: ZOOM Meeting



Pr. Guy-Pascal NGABA
Medical Mycologist
University of Douala

SPEAKERS



**Mr. Marius KUATÉ
NGOUANOM**
Microbiologist, PhD student
University of Buea



**Pr. Emmanuel Armand
KOUOTOU**
Dermatologist
University of Yaoundé I



**Ms. Emma
OREFUWA**
GAFFI



Dr. Christine MANDENGUE
Dermatologist
Université des Montagnes

GUESTS

Mrs Laura CIAFFI (ANRS, Yaoundé) – Dr Serge BILLONG (CNLS, Yaoundé) – Dr Charles KOUANFACK (HCY, Yaoundé)

Université des Montagnes -- Global Action Fund For Fungal Infections

A member of this new Working Group, Marius Kuate, won a second price at the Aspergillosis day organized by the Medical Mycology Society of Nigeria for his clinic case presentation on aspergillosis infection.