



How
**FIGHTING DISEASES
OF POVERTY**

contributes to Global Health Security

*“Universal health coverage
and health emergencies are cousins
—two sides of the same coin.*

*Strengthening health systems
is the best way to safeguard against
health crises.*

*Outbreaks are inevitable,
but epidemics are not.
Strong health systems are
our best defence to prevent
disease outbreaks from
becoming epidemics¹.”*

Dr Tedros Adhanom Ghebreyesus,

Director-General of the
World Health Organization

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ACKNOWLEDGEMENTS

This paper was commissioned by DSW to AVICENA Health & Social Projects. It is authored by Enric Grau, Thomas van der Starre and Marina Spriu. DSW thanks AVICENA for the thorough analysis and excellent work, and Mariana Becerra, Jenny Blair and Heather Ignatius from PATH for their valuable contributions. DSW would also like to thank the interviewees for the availability and their openness to share their insights.

ABOUT DSW

Deutsche Stiftung Weltbevölkerung (DSW) is a global development organisation that focuses on the needs and potential of the largest youth generation in history. We are committed to creating demand for and access to health information, services, supplies, and economic empowerment for youth. We achieve this by engaging in advocacy, capacity development, and reproductive health initiatives, so that young people are empowered to lead healthy and self-determined lives. With our headquarters in Hannover, Germany, DSW operates two liaison offices in Berlin and Brussels, as well as maintaining a strong presence in Ethiopia, Kenya, Tanzania, and Uganda. DSW also advocates for investment in research and innovation to fight poverty-related and neglected tropical diseases – diseases that continue to disproportionately affect women and girls.

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ABOUT AVICENA

AVICENA Health & Social Projects (www.avicenaproject.com) is a private limited company founded in 2013 as a specialised independent provider of consulting, technical assistance and project management services in the domains of global and public health and international cooperation. AVICENA has offices in Madrid (Spain) and Rabat (Morocco branch) and during recent years has developed its network of collaborators, evolving from a regional firm, to one operating internationally. AVICENA is supported by an in-house multidisciplinary team of specialists (global and public health, human rights, R&I in health, PRND, health economics, social sciences and politics, international cooperation, health systems) and external consultants in Europe, Maghreb, Sub-Saharan Africa, Central and South America.

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The opinions and views expressed in the document are the sole responsibility of the authors and do not necessarily reflect the views of DSW or partner organisations.

LIST OF ACRONYMS

ACT	Artemisinin-based combination therapy	Hib	Haemophilus influenzae type b infection
AIDS	Acquired immune deficiency syndrome	HICs	High income countries
AMR	Antimicrobial Resistance	HIV	Human immunodeficiency virus
ARV	Antiretroviral	HSS	Health systems strengthening
BMBF	Federal Ministry of Education and Research (Germany)	HZI	Helmholtz Centre for Infection Research
BMGF	Bill & Melinda Gates Foundation	ICU	Intensive care unit
BNITM	Bernhard-Nocht-Institut for Tropical Medicine	IHR	International Health Regulations
CDC	Centre of disease control	IMC	International Medical Corps
CQ	Antimalarials chloroquine	IPT	Intermittent preventive therapy
CORDIS	Community Research and Development Information Service	IRS	Indoor residual spraying
COVAX	COVID-19 Vaccines Global Access	ITM	Institute of Tropical Medicine Antwerp
COVID-19	2019-nCoV acute respiratory disease	JPIAMR	Joint Programming Initiative on Antimicrobial Resistance
CSO	Civil society organisations	KFW	Kreditanstalt für Wiederaufbau
DAH	Development assistance for health	LLINs	Long lasting insecticide nets
DALY	Disability-adjusted life years	LMICs	Low- and middle-income countries
DCI	Development cooperation instrument	MDA	Mass drug administration
DDT	Dichlorodiphenyltrichloroethane	MDR	Multidrug-resistant
DFID	UK Department for international development	MDR-TB	Multidrug-resistant tuberculosis
DRC	Democratic Republic of Congo	MSF	Médecins Sans Frontières International
DSW	Deutsche Stiftung Weltbevölkerung	NCIs	National Coordinating Institutions
DTP3	Diphtheria tetanus toxoid and pertussis	NCDC	Nigerian Centre for Disease Control
EAC	East African Community	NGO	Non-governmental organisation
EBOV	Ebola virus	NTDs	Neglected tropical diseases
EC	European Commission	NTNU	Norwegian University of Science and Technology
ECDC	European Centre for Disease Control	OECD	Organisation for Economic Co-operation and Development
ECOWAS	Economic Community of West African States	OIE	World Organization for animal health
EDF	European Development Framework	PCR	Polymerase chain reaction
EDCTP	European and Developing Countries Clinical Trials Partnership	PRNDs	Poverty-related and neglected diseases
EIB	European Investment Bank	R&D	Research and development
EID	Emerging Infectious Diseases	R&I	Research and innovation
EMLab	European Mobile Laboratory	RCSDC	Regional Centre for Disease Control
EOC	Emergency Operations Centre	RPPP	Regional program to support pandemic prevention
ER	Emergency Room	RPV	Rinderpest Virus
EU	European Union	RSV	Respiratory Syncytial Virus
FAO	The Food and Agriculture Organization of the United Nations	RTD	Rapid diagnostic test
FDA	Food and Drug Administration	RT-PCR	Real time PCR testing
FIND	Foundation for Innovative New Diagnostics	RVFV	Rift valley fever virus
FLUAV	Influenza Virus A	SARS	Severe Acute Respiratory Syndrome
FP6	Sixth Framework Programme	SDGs	Sustainable Development Goals
FP7	Seventh Framework Programme	SMC	Seasonal malaria chemo-prevention
GAVI	Global Alliance for Vaccines and Immunization	SORMAS	Surveillance, Outbreak response management and Analysis System
GBD	Global burden of disease	TB	Tuberculosis
GDF	Global drug facility	UHC	Universal Health Coverage
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria	UK	United Kingdom
GHSA	Global Health Security Agenda	UN	United Nations
GHPP	Global Health Protection Program	UNICEF	United Nations Children's Fund
GHS	Global health security	UNMEER	United Nations Mission for Ebola Emergency Response
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	USA	United States of America
GOARN	Global Outbreak Alert and Response Network	USAID	United States Agency for International Development
H2020	Horizon 2020	VARV	Variola Virus
HCQ	Hydroxychloroquine	WAHO	West African Health Organization
HCV	Hepatitis C virus	WHO	World Health Organization
HepB	Hepatitis B	ZIKV	Zika virus

GLOSSARY

Concept	Definition
Global health security (GHS)	Although there are some differences with regard to the interpretation of global health security (GHS), in general it entails the activities done concerning the prevention, detection and response to infectious disease threats of international concern, on the basis of collective and concerted action. It can also be seen as the protection of the health of persons and societies worldwide. GHS includes access to medicines, vaccines and health care, and global public health events that spread borders.
Research and innovation (R&I)	Research and innovation (R&I) is the process of exploring technological advancements with the objective of benefiting the diagnostic or therapeutic skills with regard to unexplored (health) topics. The development process begins with early-stage research, after this clinical trials, regulatory approval, registration and uptake by national health care systems. The process is vital for emerging health threats and topics like vaccines and antimicrobial resistance. R&I plays an important part in GHS, wherein it ensures to fill in the needed gaps that are needed to address global public health issues.
Poverty-related and neglected diseases (PRNDs)	Poverty-related and neglected diseases (PRNDs): or diseases of poverty, these are infectious diseases included in the Policy Cures Research R&D pipeline tracker such as HIV&AIDs, TB, malaria, neglected tropical diseases (NTDs) as defined by the World Health Organisation (WHO), and emerging infectious diseases such as Ebola or Zika (as defined in the WHO R&D blueprint). These diseases disproportionately burden low and middle-income countries in the Global South and vulnerable populations, and suffer from market failure. Diseases of poverty often lack incentive for the pharmaceutical industry to invest in. The WHO estimates that diseases associated with poverty account for 45 per cent of the disease burden in the poorest countries. Consequences of poverty, like environmental health issues, nutritional issues, lack of hygiene or health education make the burden of these diseases even greater.
Anti-microbial Resistance (AMR)	AMR occurs when microbes such as fungi, viruses, parasites, and bacteria start to develop resistance to antimicrobial drugs. Worldwide, this is a major obstacle in the treatment of infectious diseases, and therefore an immediate threat to GHS. In recent times, many efforts have been directed to enhance the R&I process with regard to AMR. From the European Union only, more than €55 million have been invested in the Joint Programme Initiative on Antimicrobial Resistance (JPIAMR), focussing on basic research, strategies for the use of existing antimicrobials, developing new antimicrobials, the development of point of care diagnostics and vaccines.
(Re) emerging diseases	Emerging infectious diseases can be considered outbreaks of known or unknown diseases that are spreading over geographical areas and are difficult to stop. The list of emerging diseases includes, among others, HIV & AIDS and SARS, but also dengue fever, the West Nile virus and the Zika virus. Re-emerging diseases are diseases that have been declining in numbers but are now making a comeback in terms of cases or public health threat. They consist of, among others, malaria, TB, cholera and influenza.
Epidemic	According to the WHO, it is the occurrence in a community or region of cases of an illness, specific health-related behaviour, or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely.
(Global) Pandemic	A pandemic is defined by the WHO as “an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people.”
Pandemic preparedness	Pandemic preparedness is as an integral part of preparedness to threats to human health caused by any emergency, e.g. outbreaks of any disease or the occurrence of natural disasters or chemical incidents.
Disability-adjusted life years (DALYs)	DALYs are a time-based measure that combines years of life lost due to premature mortality, and years of life lost due to time lived in states less than full health. One DALY represents the loss of the equivalent of one year of full health.
Health inequalities	Health inequities are systematic differences in the health status of different population groups. These inequities have significant social and economic costs both to individuals and societies.
Disease control	Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts. Continued interventions are required to sustain control.
Disease elimination	Interruption of local transmission (reduction to zero incidence of indigenous cases) of a specified parasite in a defined geographical area as a result of deliberate activities. Continued measures to prevent re-establishment of transmission are required.
Disease eradication	Permanent reduction to zero of the worldwide incidence of infection as a result of deliberate activities. Interventions are no longer required once eradication has been achieved.



Photo: Male health workers in Kenya. Courtesy of PATH/Eric Becker. All rights reserved.

BACKGROUND

1.1 STUDY OBJECTIVE

DSW commissioned AVICENA Health & Social Projects to analyse how fighting poverty-related and neglected diseases (PRNDs) contributes to global health security (GHS), and to propose policy recommendations to advocate in the field of GHS.

The research includes, on the one hand, an assessment of the risks and benefits analysis for DSW to use GHS as a central advocacy narrative. On the other, it includes a selection of success stories resulting from research and innovation (R&I) in PRNDs and antimicrobial resistance (AMR), carried out as part of global health cooperation initiatives between the European Union (EU), Germany and Africa, which contribute to GHS or have the potential to do so. The analysis highlights the benefits that PRND R&I has for GHS in terms of public and global health, scientific impact, international cooperation and stability.

1.1.1 Alterations to the ToR

In order to narrow down the scope of the study, the analysis of PRNDs has focussed on diseases representing a major epidemic challenge (essentially malaria, TB and HIV & AIDS). In addition, the study also includes an analysis of the response to the 2014 Ebola outbreak, one of the major African outbreaks threatening regional and global stability. Scientific knowledge, tools and strategies developed and applied to tackle Ebola in 2014 were used to address the 2019 Ebola outbreak in Democratic Republic of Congo (DRC) more effectively, and are now being used to address the COVID-19 pandemic and other outbreaks. Pneumonia in children, although not included under PRNDs, has also been considered, since it is a significant component of the burden of disease in several African countries, and is at the origin of a successful global delivery strategy for childhood immunisation.

1.2 METHODOLOGICAL APPROACH

The study was conducted from April 2020 to November 2020. The inception report and research matrix defined the scope and focus of the study and helped to guide and frame data collection and analysis. The research matrix was divided into three main areas: GHS concept, PRNDs (success stories in terms of GHS, potential response to COVID-19, and current and future pandemics – i.e. HIV, TB, malaria, NTDs) and AMR (success stories in reducing the threat of AMR as a major GHS challenge).

The report combines data and findings collected in interviews with key informants, with a summary of relevant evidence published in international journals and grey literature. Sources and authors are systematically referenced for all text and data extracted from published papers.

The study has mainly relied on qualitative data, drawing on primary and secondary sources. Qualitative tools for data collection consisted of document review, database analysis and interviews carried out remotely. Quantitative tools included compiling and analysing quantitative secondary data on PRNDs and AMR statistics, relevant monitoring reports and financial data.

Fig. 1 Data collection tools

Stakeholder mapping	Key informants in Europe and Africa have been selected jointly by DSW, PATH and the consultants, based on their relevance to the study. In order to safeguard the possibility of receiving inputs from a variety of stakeholders, a wide array of international organisations, universities and research centres, and government bodies have been contacted. To ensure the diversity of informants, stakeholders have been selected across several professional levels and countries.
Database search	<p>Several databases have been browsed in order to find relevant EU funded R&I grants that could be considered potential success stories. The CORDIS database was searched for projects funded by Horizon2020 (H2020) and Seventh Framework Programme (FP7), with the following key words: “pandemic preparedness” (6 results), “health security” (20 results), “poverty related and neglected diseases” (40 results), “antimicrobial resistance” (15 results), “neglected tropical diseases” (21 results) and “COVID-19” (22 results). A total of 53 projects were initially pre-selected as potential success stories.</p> <p>The EDCTP database was subjected to the same searches as the CORDIS database. The search terms, “pandemic preparedness” (0 results), “health security” (0 results), poverty related diseases (8 results), “antimicrobial resistance” (9 results), “neglected tropical diseases” (28 results) and “COVID-19” (1 result) were used. In this case, the search terms “HIV/AIDS” (116 results), “tuberculosis” (81 results), “malaria” (63 results) and “health system strengthening” (27 results) were added. After screening and identifying relevant projects, a total of 74 EDCTP grants were initially pre-selected as potential success stories.</p> <p>The GIZ database was also searched; projects were screened and identified under the category of “health” and “security” (40 results). Of these 40 projects, a total of 12 projects were assessed.</p>
Scientific literature review	Literature review of academic papers and grey literature on GHS, PRNDs and AMR using Cochrane, PubMed and Google Scholar.
Semi-structured interviews	<p>Semi-structured interviews were used to collect qualitative data from key informants. The interviewees were from Europe, North America and Africa. More than 90 stakeholders were contacted, from which a total of 30 key informants were interviewed, categorised as followed:</p> <ul style="list-style-type: none"> • Universities or research centres: 9 • NGOs, public-private partnerships and foundations: 13 • International organisations: 4 • Governments: 2 • International cooperation health programmes in Africa: 2

1.2.1 Limitations

COVID-19: The current exceptional circumstances may have influenced the course of the study. The timeframe in which the data collection phase took place coincided with national lockdowns of countries in Europe and Africa. 90 key informants were contacted but some of them (mainly in Europe) kindly informed of their inability to participate in the study due to high workload and operational pressure.



Photo: Health worker working with a piece of laboratory equipment. Launch of MenAfriVac. Burkina Faso. Courtesy of PATH/Gabe Biencycki. All rights reserved.

INTRODUCTION TO GHS

KEY MESSAGES

Core elements of the GHS definition are common but different “schools of thought” lead to disparate strategies and operational approaches and hinders broader international consensus around the concept.

Past outbreaks and the current COVID-19 pandemic reveal the glaring inadequacies of the International Health Regulations (IHR) to detect and react to global health threats, as well as the critical weaknesses in pandemic preparedness of national health systems worldwide.

Despite the emergence of more frequent and more intense outbreaks (SARS, H1N1 influenza, MERS-CoV, H7N9 influenza, Ebola) and warnings from scientists and experts, GHS has been neglected by the international community and governments, both politically and financially.

The instrumental role of health in achieving wellbeing and security is both collective and personal. As the world is experiencing right now with the COVID-19 pandemic, the sudden outbreak of a contagious disease can destabilise countries, regions, and the entire world. In times of crisis, effective public (and global) health actions are essential for minimising the impact on the lives and health of populations, calming fears and uncertainty, maintaining trust in institutions and ensuring the right conditions for the continuity of essential services and economic activity. **The Commission on Human Security² identified three global health challenges closely linked to human security: global infectious diseases, poverty-related threats, and violence and crises.** Although these three challenges are very closely interconnected, this study focuses on the risks and learnings emanating from the two first challenges.

GHS has been defined by different organisations like the [WHO](#), [The Lancet](#), or the [American CDC](#). GHS generally entails the activities carried out to prevent, detect and respond to infectious disease threats of international concern, on the basis of collective and concerted action. Furthermore, GHS focuses on reducing future pandemic risks through preparedness and contingency planning for a range of disease threats. Although core elements of the GHS definition are common to different “schools of thought”, the existence of several definitions results in disparate strategies and operational approaches, hindering broader international consensus.

“Global health security and global health are pretty complex definitions that can be seen from multiple viewpoints. Firstly, one might ask, what is global health? For instance, take a doctor in Nigeria who receives funding to perform research or work – for us that is global health, for that doctor, it is just health.”

Interviewee in Europe

In its origins, GHS is connected to the IHR³. Through IHR, countries have agreed not only to build their capacities to detect and assess public health events but also to report them, being accountable to one another for meeting a certain standard for epidemic preparedness and response. Much of the criticism of the IHR is that countries have not gone far enough in providing the health security that the regulations are intended to bring about. **In Europe, the IHR are legally binding for all EU countries, but officially the EU is not a party to this international treaty because public health largely remains the competence of EU member states.** Nonetheless, the European Commission (EC) plays an important role in liaising and exchanging information with the WHO and the WHO/Europe region, and in coordinating the position of the EU and its member states in emergencies included in the IHR and in relation to other GHS challenges⁴.

The adoption of the IHR, and the creation of the Global Health Security Agenda (GHS) in 2014 were positive steps towards preparing the world to tackle global health risks by strengthening the ability of health systems to prevent, detect and react to emerging pathogens. However, the current COVID-19 pandemic has shown once more that scarce progress has been made in the effective implementation of the IHR even in High Income Countries (HICs), or in pandemic preparedness around the world. European countries, which ranked best in the global WHO IHR Score per capacity, are amongst the countries hardest hit by the COVID-19 pandemic. It is striking, for instance, to see Médecins Sans Frontières (MSF) – a humanitarian organisation born to provide medical assistance and relief aid to the most vulnerable populations of the world– deploying emergency teams in Italy, Spain, Portugal, France, Belgium, and Switzerland to treat COVID-19 patients. In April 2020, for the first time ever, MSF engaged in healthcare activities in the United Kingdom⁵.

“We should rethink the models of preparedness that are focussed on core capacities. The global health security agenda is really a checklist that focussed on small case epidemics. We need to make our health systems much stronger. It is time for a new way of thinking. I also believe that the next problem or pandemic will not be a new virus, but an old one that is resistant to drugs. This is why we have to invest in a broader sense – not just more money, but new policies, new approaches. We have to generate ideas and look beyond politics.”

Academic in Africa

The COVID-19 pandemic has shown the world precisely how vulnerable we are, how interconnected our world is, and how powerful investing in reducing global health risks, particularly PRNDs and AMR, can be. Global trends like human population growth, urbanisation, increased living density and mobility, and climate change are all increasing the likelihood of dangerous pathogens emerging and causing serious damage. In addition, economic or social policy uncertainties may hold back any significant progress made in controlling major infectious diseases (e.g. malaria, TB, HIV).

The outbreaks and epidemics of the last decade have emphasised the need to invest in GHS, which has been dramatically exacerbated by the current COVID-19 pandemic. Politicians and nations worldwide have been confronted, abruptly, with a challenging pandemic never experienced before. The negative consequences experienced in terms of health of populations, socio-political disruption, and economy, have refocused the political and public attention on to initiatives that might prevent future pandemics. The costs associated with the response to COVID-19 are huge, and preventing or addressing pandemics at an early phase might significantly reduce the health impacts, as well as the economic burden of the response.

“Is COVID-19 a PRND? Probably, yes. The risk of getting sick and dying affects the poorest the most. It’s a PRND, but not exclusively.”

Interviewee in Europe

In the past, the 2014 West Africa Ebola outbreak served as an important warning of how unprepared countries, international organisations and global health actors were to deal with serious outbreaks. Failures in the response to Ebola revealed the critical need to strengthen the IHR and were catalytic for establishing new global initiatives like the GSHA.

Paradoxically, the analysis of health sector spending is also indicative of the little attention given by governments and policy-makers to global health risks, in terms of global health cooperation. **In 2019, only \$374 million in development assistance for health (DAH) was provided for pandemic preparedness, less than 1% of the total DAH⁶.** This figure is highly representative of the lack of political and institutional sensitivity in HICs to address critical global health challenges. In fact, the EC – one of the largest donors of DAH⁷ – has almost ignored the warning signs that SARS, Ebola, Middle East Respiratory Syndrome (MERS) or Zika have represented. Moreover, WHO reports (“Disease X” was included as a serious international epidemic risk caused by a pathogen currently unknown in 2018⁸) and experts’ voices worldwide have not been listened to⁹. COVID-19, the disease caused by the virus SARS-CoV-2, is the kind of threat that Disease X was meant to represent: a novel, highly infectious coronavirus with no existing treatment or prevention.

Once again, the COVID-19 pandemic should be a wake-up call for the international community. The human, social and economic costs of weak health systems, underinvestment in infectious disease R&I and epidemic preparedness, and a fragmented international global health cooperation should be beyond dispute. Regardless of any controversy regarding the definition and application of GHS, as described in section 5, greater efforts are required in programmes addressing global health risks to effectively tackle these issues now, and be better prepared for the future.

“We are all mobilised to raise funds for GAVI and we are running out of funds for measles, tetanus or polio. The next pandemics could be worse.”

Interviewee in Europe

“I hope that the narrative on GHS gets balanced out properly, or maybe this is [COVID] what the narrative of GHS needed, because this is a good moment to talk about strengthening health systems. Providing better health is no longer an option, it is a responsibility. We have seen that we certainly weren’t invincible, and that we were all interconnected”.

Interviewee in Europe

THE VALUE OF INVESTING IN PRND AND AMR R&I FOR GHS

KEY MESSAGES

The global burden of PRND-associated morbidity and mortality contributes to a vicious cycle of poverty and disease that dramatically affects Low Middle Income Countries (LMICs), with social and financial consequences worldwide. Some of these diseases are increasingly affecting the poorest and most marginalised populations of middle and high-income countries.

Financial investments in R&I in PRNDs and emerging diseases are not correlated with their global burden. Persistent imbalances between research needs and research investments in tackling PRNDs and emerging diseases are proof of the extent to which the R&I agenda is not consistently driven by global health priorities, health needs, sound scientific evidence, and lessons learned from past experiences.

Research on what has been done to fight PRNDs and outbreaks in the past is contributing decisively to the clinical and epidemiological understanding of COVID-19, and accelerating the development of new preventive and therapeutic tools.

One of the major threats to GHS is the likelihood of AMR being the starting point for a new epidemic or even a pandemic. There is still an urgent need for investment in R&I to develop vaccines and new drugs to combat resistant bacteria.

3.1 THE UNEVEN ALLOCATION OF R&I FUNDING FOR PRNDS AND EMERGING DISEASES



Photo: Examining slides for malaria parasites at the Institut National de Recherche Biologique (INRB). Courtesy of PATH/Georgina Goodwin. All rights reserved.

PRNDs carry a high burden of morbidity and mortality, disproportionately affecting people living in LMICs. Every year infectious diseases like HIV & AIDS, tuberculosis (TB), malaria or other parasitic diseases affect millions of lives. The global burden of PRND-associated morbidity and mortality contributes to a vicious cycle of poverty and disease that dramatically affects LMICs and has global social and financial consequences. The world has also seen a rise in other infectious diseases (e.g. severe acute respiratory syndrome virus (SARS), H1N1 pandemic influenza, Ebola virus, COVID-19) which have rapidly spread across the world and threatened GHS and social, political and economic stability. Despite progress made toward controlling infectious diseases (e.g. HIV & AIDS, malaria) and improving global surveillance of emerging diseases, the COVID-19 pandemic has revealed the extent to which health systems worldwide remain vulnerable to outbreaks.

Although the impact of PRNDs largely falls on Low Income Countries (LICs), some of these diseases are increasingly affecting the poorest and most marginalised populations of middle and HIC. For example, most NTDs occur in middle-income countries such as Brazil, China, and India. Moreover, local transmission of dengue and Zika viruses¹⁰ has been regularly reported¹¹ in the USA and, recently, also in Europe (France)¹². The outbreak event in France has implications far beyond the three people affected, and represents a new phase in the global Zika threat¹³. Although the ECDC describes the individual risk of infection in Europe as very low, the emergence of the Zika virus in Europe considerably increases the number of countries and territories where this unpredictable disease can occur to 177, potentially putting 4.6 billion people at risk¹⁴. These introductions also challenge the view that Zika is a tropical (and poverty) disease best dealt with by reactive outbreak response and containment. Zika is an increasingly cosmopolitan threat, more unpredictable than ever before. The Zika virus and other arboviruses continue their global expansion¹⁵.

There is growing evidence of the global threat posed by PRNDs. The rise of these diseases in wealthy nations has led global health researchers to coin the term “blue marble health”, referring to new and somewhat paradoxical findings that the poor living in the wealthy group of G20 nations—as well as Nigeria (richer than the bottom three or four G20 nations)—account for the majority of the world’s disease burden for PRNDs and NTDs¹⁶. These numbers include millions of people living in poverty in the US, Europe and Australia^{17, 18,19}. Moreover, climate change is modifying the “traditional” perception of PRNDs as diseases that only affect LMICs. Changes in ecosystems worldwide are at the root of the increase in arbovirus infections and other vector-borne diseases and, probably, the irruption of the COVID-19 pandemic.

In this context, global health experts have regularly called G20 leaders to action, asking for a stronger commitment not only to investing in treatments for their own vulnerable populations, but also to investing in R&I with a view to addressing knowledge gaps and developing new tools – a cost-effective investment to promote healthy societies and economic stability worldwide.

Significant efforts have been made in the two past decades to develop new drugs for some of the world’s leading infectious disease killers, such as HIV & AIDS, TB and malaria²⁰. However, there remains a significant unmet need for effective, affordable and safe treatments. For instance, TB alone killed around 1.4 million people in 2019, making it the leading cause of death by infectious disease, but it has been historically underfunded relative to its disease burden²¹. TB also threatens HIV progress and is considered a re-emerging infectious disease because new drug-resistant strains continue to develop, making it harder to treat. As several studies document, TB is a clear example of persistent critical gaps between the global burden of disease, insufficient attention paid to diseases that represent a risk for the health of populations worldwide, and the scarce funding allocation for R&I.

“Small epidemics are always a big part of our lives. Sometimes I wonder – we killed the world economy, for what? In these cases, you have to take some casualties, in order to save more lives. Then you come to the difficult question – how much is a human life worth? That is a decision nobody wants to make.”

Government official in Africa



Photo by National Cancer Institute on Unsplash

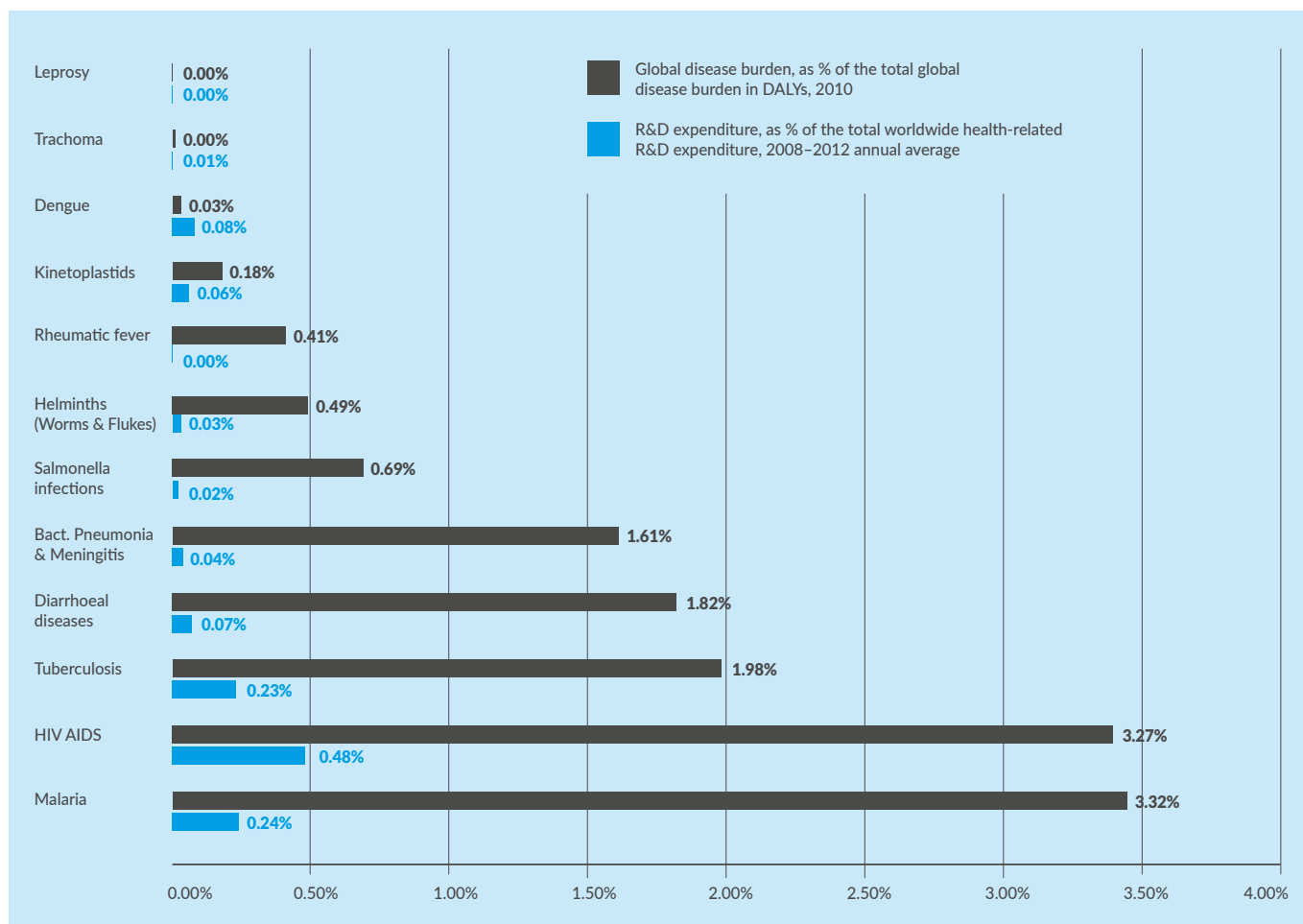
Global disease burden in DALYs (as % of total global disease burden, 2010) and R&D expenditure²³

The figure shows the acute imbalances between disease burden in DALYs (as % of total global disease burden, 2010) and R&I expenditure (as % of total global health R&D expenditure, annual average for 2008–2010) for 11 diseases and disease groups as defined by G-FINDER. Data clearly shows how financial investments in R&I in TB, HIV & AIDS and malaria are not correlated with their global burden of disease and reveals the inconsistencies in policy and budget allocation concerning major global health challenges.

Intensifying the efforts to address the gap between burden of disease and R&I expenditure on TB, HIV & AIDS and malaria, among other PRNDs and emerging diseases, is not only a political and social commitment to reducing global health inequities, promoting human development, contributing to stability or achieving Sustainable Development Goals (SDGs) by 2030. R&I plays a pivotal role in generating new scientific knowledge and developing more effective and affordable tools and technologies to prevent, diagnose, treat, control, eliminate and, eventually, eradicate threatening infectious diseases through comprehensive public health strategies with benefits worldwide.

Many of these public health interventions are highly cost-effective interventions, supported by global health actors in the past two decades, which have succeeded in controlling major infectious diseases and, therefore, reducing global health risks. Sound clinical and implementation research²³ has been the foundation of such effective public health interventions. For instance, comprehensive strategies reinforcing universal health coverage (UHC), integrating vector control, mass drug administration (MDA), distribution of bed nets, or community participation, among other actions, have allowed health systems to control or target the elimination of malaria in many African countries²⁵. However, advancing from malaria control to malaria elimination will require not only maintaining coverage of existing interventions but also developing new approaches and tools. Continued investments in R&I in malaria and other PRNDs is fundamental for developing vaccines, new drugs or rapid diagnostic tests, which will help to tackle resistances and residual transmission, and/or expand coverage to hard-to-reach populations.

Fig. 2 Global disease burden and R&D expenditure compared



Source: Philipsborn P, et al. (2015)

The Lancet recently published the latest study about funding from G20 countries for infectious disease research between 2000 and 2017 (94,074 awards amounting \$104.9 billion)²⁵. The paper tracks how research funding has been spent and identifies key drivers for the allocation of funds. Some findings are relevant under the current COVID-19 pandemic. The study points out that funding for coronavirus-related research was \$0.5 billion, of which 95.1% was for preclinical research. However, in 2020 there has been a huge reactive effort to support the response to the COVID-19 pandemic, which includes substantial financing for research. Paradoxically, viral respiratory infections, known to be one of the most likely causes of pandemics and causing high levels of mortality in young children and older people, do not receive appropriate research and advocacy support. When analysing investments in threatening pathogens such as the Ebola virus and the Zika virus, Ebola appears to be relatively well-funded in relation to their burden of disease. Outbreaks of this nature are not necessarily high-burden in terms of numbers of cases but they are high-risk given the potential for rapid spread to cause widespread outbreaks, an important factor that influences research investment decisions. As illustrated by the evolving COVID-19 pandemic, there is a public health need to support outbreak responses, and research should be an integral part of such a response. In fact, the integration of clinical, epidemiological and social research into the response to the 2014 Ebola outbreak is a key learning to be applied to current and future outbreaks, as mentioned in the success stories section of this report.

Such outbreaks create uncertainty and fear, with media promoting a need to do something and urging political circles to respond rapidly. Historical funding for coronavirus research has been very low, even after the high-profile outbreaks of SARS and considering the potential for the rapid spread of such infections.

These examples question how policy-makers have managed and made decisions about R&I investments in PRNDs and global health risks so far. The persistent imbalances between research needs and research investments to tackle PRNDs and emerging diseases show the extent to which the R&I agenda is not consistently driven by global health priorities, health needs, sound scientific evidence, and lessons learned from past experiences. Despite significant progress and achievements, there are factors that are hindering the potential to control infectious diseases and emerging pathogens, such as chronic underfunding for PRND R&I, unpredictable or volatile political commitment to addressing global health challenges, and conflicting interests among the public and private sectors, and civil society organisations.

In this context, the COVID-19 pandemic will probably be a turning point in the social, political and economic awareness of the risks posed by communicable diseases and pandemics, no matter their geographical origin. Reinforcing R&I to address PRNDs does not only mean reducing global inequalities and burden of disease in LMICs, but also developing a larger variety of preventive and therapeutic tools to cope with communicable and emerging diseases, and contributing to a healthier and safer world. Investments in PRNDs offer returns not only for LMICs but also for HICs. In 2003, for instance, a network of researchers in three continents, who studied known respiratory pathogens, were able to identify the first member of the coronavirus family that causes widespread pneumonia in humans, the SARS-CoV²⁶.

3.2 PRND TOOLS USED FOR FIGHTING PANDEMICS AND CONTRIBUTING TO GHS IN THE CONTEXT OF COVID-19

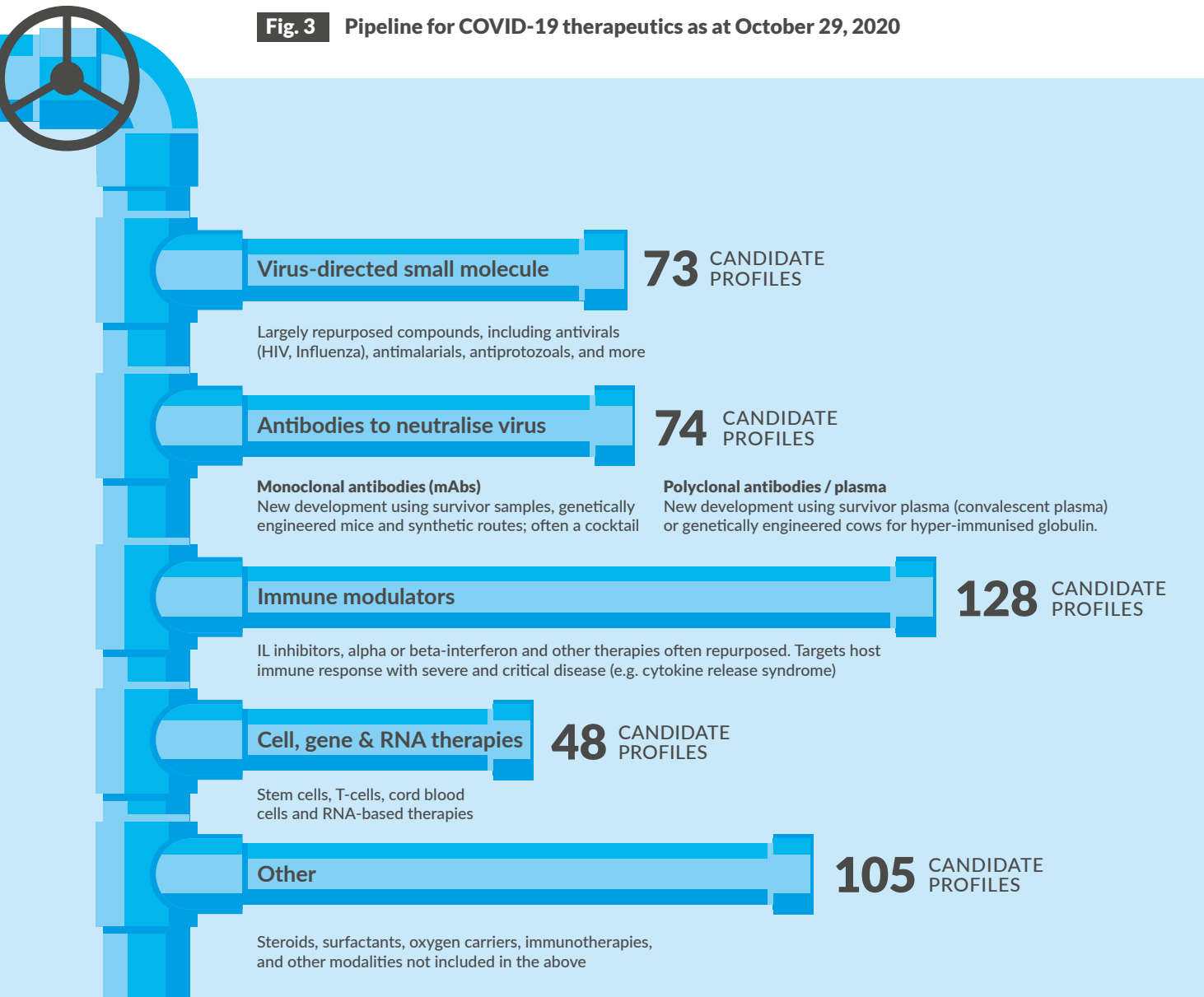
The COVID-19 pandemic provides a prime example of the return on investments made in R&I in PRNDs and emerging diseases in the past decades, and their crucial contribution to GHS. At present, in the race for COVID-19 cures, drugs and vaccines originally developed for PRNDs (e.g. malaria, HIV and Ebola treatments and vaccines) are being tested in clinical trials, and repurposed to explore their effectiveness and safety for COVID-19 patients, as described in the success stories section. Researchers interviewed in both continents have highlighted how years of scientific efforts to combat NTDs and outbreaks in the past are now decisively contributing to the clinical and epidemiological understanding of COVID-19, and accelerating the development of new preventive and therapeutic tools.

3.2.1

Is some PRND medication effective for treating COVID-19?

At present, there are over 425 candidates in the pipeline for COVID-19 therapeutics, across a range of modalities and use cases, and some of them are drugs developed and applied to combat PRNDs and emerging diseases. Antimalarials, antivirals, antiparasitic treatments, combination therapies or convalescent plasma are part of the pipeline of tools for COVID-19,

Fig. 3 Pipeline for COVID-19 therapeutics as at October 29, 2020



Source: McKinsey and Company. COVID-19: briefing materials. Global health and crisis response. Based on data from Milken Institute, BioCentury, FiercePharma, FierceBiotech

Malaria treatments have a relevant place in the research agenda to develop “against the clock” effective treatments for COVID-19. Another antimalaria treatment, Artemisinin-based combination therapies (ACTs), has been shown to be possibly effective on COVID-19, according to in vitro results²⁸. Several malaria treatments are included in the success stories described in chapter 4, since they are in the pipeline to repurpose existing antimalarials to treat COVID-19 cases and other emerging diseases²⁹.

A further observation regarding COVID-19 in relation to PRNDs is the unexpected under-representation of people living with HIV among severe COVID-19 cases³⁰. This has led to the investigation of the potential effect of HIV drugs on COVID-19 infection. The recovery time of hospitalised patients with COVID-19 and lung involvement who received Remdesivir was 31% faster than those on a placebo, therefore it was approved as an emergency treatment in various countries^{31,32,33}. Finally, the concept of combination therapy is a successful development in viral infections (see chapter 4 on success stories). It has become a standard of care for PRNDs, HIV and malaria, because it reduces and prevents drug resistance. This concept can have a global impact on new virus outbreaks like COVID-19 by saving time, costs and resources in the development of treatment for a new virus³⁴.

3.2.2

Could previous vaccine development for PRNDs (and emerging diseases) be the basis for a potential vaccine in a new pandemic?

The world is seeing an unprecedented momentum in pace and scale for the development of COVID-19 vaccines. At the time of writing this report, there are 275 vaccines in development, with more than 55 in clinical trials. The current development of vaccines is four times faster than any other prior vaccine development and more than \$17 billion has been mobilised in a few months for vaccine development and procurement of supply³⁵. This massive mobilisation is also benefiting from learnings and discoveries from the most recent Ebola epidemic in the DRC, as well as the 2009 H1N1 influenza, 2014 Ebola, and 2015-16 Zika outbreaks. Strategies in past outbreaks as well as vaccine development for infectious diseases have made a start for the next vaccine needed in a pandemic. **Currently, the Ebola vaccine development has been the starting point for a potential COVID-19 vaccine³⁶.**

Moreover, certain organisations such as IAVI and PATH have worked for decades on PRND programmes and have set up platforms for delivering prevention and care, and collecting scientific data. Platforms like MIMVaC and MultimalVAX project, both EU funded, are having an important role in the development of a malaria vaccine. Currently, a malaria vaccine is in pilot implementation and a novel TB vaccine has shown positive effects in reducing progression from latent infection to disease³⁷. These platforms can be helpful in providing operational and logistical support in the fight against a new virus such as COVID-19³⁸. Decades of experience in fighting PRNDs like HIV (e.g. the trust built with local communities and leaders during decades for HIV trials, especially with vulnerable population) could also prove valuable in ensuring swift health interventions and new vaccine trials in other epidemics. The central role played by local communities in research projects, particularly in clinical trials, has been repeatedly mentioned by interviewees who manage relevant research programmes in Africa. Published papers also show how the fight against the chronic HIV epidemic can serve as a guidepost to the current COVID-19 pandemic³⁹.

“If COVID has shown us anything important, it is certainly that the power of political leadership is very important, and we should also not forget about the communities, the power of the communities is extremely important.”

Interviewee in Africa

3.3 WHY R&I IN AMR IS IMPORTANT FOR INCREASING GHS

AMR is one of the most significant and complex public health issues of our time⁴⁰. Due its huge health and financial burden and risks on development for epidemics, it poses a significant threat to GHS. Drug-resistant pathogens are already a major challenge for all healthcare systems and will develop into a larger burden in the next decades if no action is taken. As a public health threat, approximately 33,000 patients die every year in the EU due to infections caused by resistant bacteria, and up to 700,000 patients die globally. If current infection and resistance trends are not reversed, it is projected that there will be 10 million deaths per year by 2050. Only 0.7 million of these additional deaths would occur in North America or Europe, with the majority occurring in Africa and Asia. The health burden of infections due to bacteria resistant to antibiotics on the EU population is comparable to that of influenza, TB and HIV & AIDS combined⁴¹. If antibiotics lose their effectiveness, it will not only have an impact on infectious diseases; key medical procedures (such as gut surgery, caesarean sections, joint replacements, and treatments that depress the immune system, such as chemotherapy for cancer) could become too dangerous to perform⁴². Aside from the health burden, there are huge financial consequences. AMR currently costs €1.5 billion each year due to extra healthcare costs and productivity losses as a result of Multiple drug resistance (MDR) bacteria in the EU, and by 2050 it is projected to reach €2.9 trillion in losses in Organisation for Economic Co-operation and Development (OECD) countries. Additional hospital cost per patient is \$10,00-40,000 in OECD countries, and the associated impact of lost economic outputs is likely to double this figure⁴³.

Another significant threat for GHS is the likelihood of AMR being the starting point of a new epidemic or even a pandemic. For instance, **multidrug resistant tuberculosis (MDR-TB) and Methicillin-resistant Staphylococcus aureus (MRSA) are currently hard or even impossible to treat with existing medicines⁴⁴, making them very difficult to fight once they start spreading and crossing borders faster than control measures are in place.**

Despite recent efforts, political initiatives and funding have not been enough. There is an urgent need for investment in R&I for vaccine development, given that vaccines can reduce the prevalence of resistance by preventing new infections, which reduces the need for antimicrobial use. There is also a need to develop new drugs to address resistant bacteria. The WHO warns that “without urgent, coordinated action by many stakeholders, the world is headed for a post-antibiotic era”.

SELECTED SUCCESS STORIES FROM R&I IN PRNDS AND AMR WITH A RELEVANT CONTRIBUTION FROM THE EU AND/OR GERMANY

4



Photo: Laboratory technician in regional hospital laboratory in Thies, Senegal. Courtesy of PATH/Gabe Biencycki. All rights reserved.

KEY MESSAGES

European (including German) support for PRND R&I in Africa has lacked visibility, despite the EU being the third largest public funder of R&I in PRNDs.

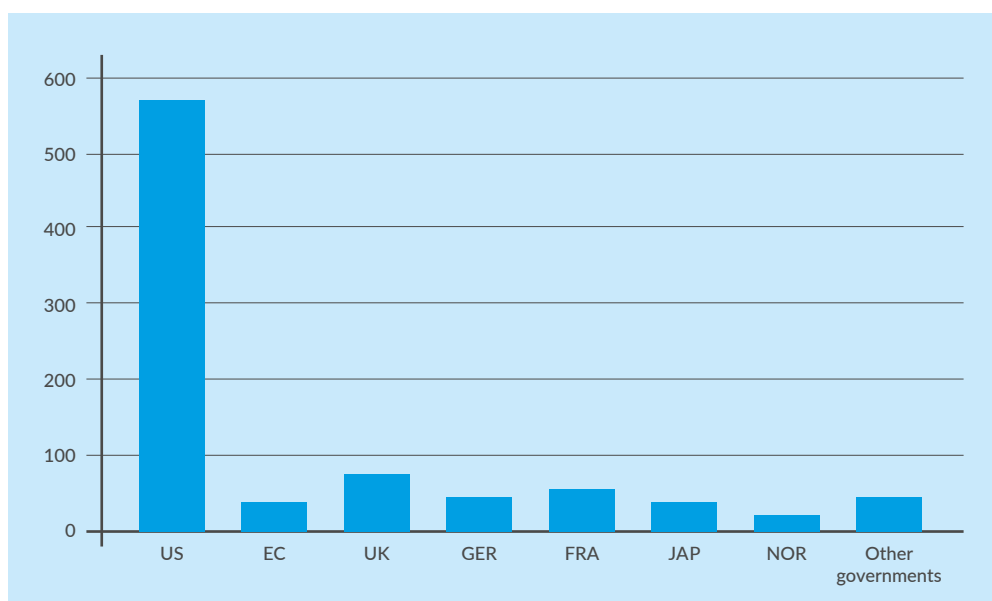
The selection of success stories is intended to highlight the key contributions made by the EU, and to a lesser extent by the German government, in the fight against PRNDs, emerging diseases and AMR, which are relevant to GHS. However, the majority of the success stories are the result of collective efforts by the international community to tackle major global health challenges.

The European and Developing Countries Clinical Trials Partnership (EDCTP) is, in itself, the most relevant success story, in terms of strengthening R&I capacities in Africa, developing new health products and tools to address health challenges associated with PRNDs, and boosting scientific cooperation between the two continents. At present, the role of the Innovative Medicines Initiative (IMI) in R&I in PRNDs seems to be in question.

The 18 selected success stories are representative of a broad portfolio of preventive, diagnostic and therapeutic tools, technologies and strategies, used to deal with PRNDs, AMR and GHS challenges (particularly outbreaks and epidemics). Success stories have improved effectiveness (prevention, surveillance, diagnosis, therapeutics or disease control), strengthened health systems capacities, and enhanced the delivery of health products or technologies.

According to the last G-FINDER survey 2019, the EU is third largest public funder of R&I in PRNDs, representing 5.2% (\$134 m) of total public funding, after the US (68%) and the UK (8.8%). EU investments increased by 7.1% from the previous year thanks to its largest ever disbursement to the EDCTP. The year 2018 also saw record-high levels of funding from the German government, which is the fourth largest public donor, representing 2.8% (\$73 m) of total public funding.

Fig. 4 National funding for EID R&D 2018 / US\$ (millions)



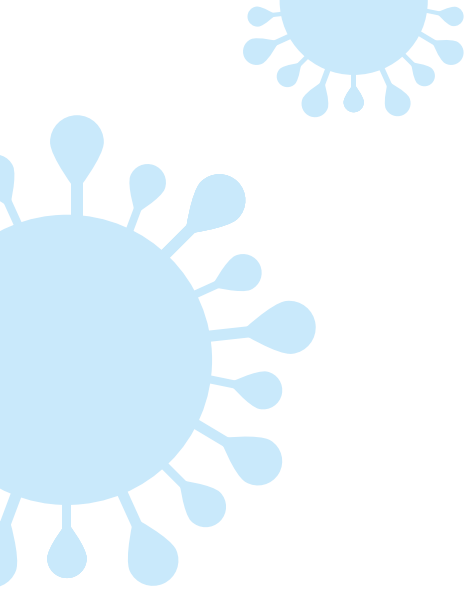
Source: G-Finder EID report
https://s3-ap-southeast-2.amazonaws.com/policy-ures-website-assets/app/uploads/2020/10/30095357/EID_Report.pdf

However, and despite relevant advances made, the weight of the EU in global health is well below its global geopolitical and economic weight⁴⁵, due to coordination challenges among Member States and the EC, slow mobilisation for a sustained global health strategy⁴⁶, and the coexistence of diverse global health frames within the EU⁴⁷. These shortcomings are hindering Europe’s strategic positioning in a highly diversified global health arena and limiting the capitalisation of African and European joint R&I initiatives on PRNDs. Global health experts interviewed during the study are hopeful that the COVID-19 pandemic will result in a renewed European global health vision and in stronger engagement to address global health disparities and challenges. EC President Ursula von der Leyen’s statements⁴⁸ and the letter signed by six Member States calling for better pandemic preparation are promising signs of a new European political commitment to a healthier and safer world.

So far, **European support to PRND R&I in Africa has lacked visibility, and under the COVID-19 pandemic the EU seems not be capitalising on investments made**, at least in terms of visibility. Years of European institutional, financial and technical support provided to health research in Africa have contributed not only to public health outcomes for national health systems in Africa but also to products, tools and strategies of major relevance in terms of global health (and GHS). There is broad consensus among the participants in the study regarding EDCTP’s pivotal role in strengthening African R&I capabilities and developing joint research consortia that are now working together to provide the scientific community with data and experiences being applied to tackle the COVID-19 pandemic globally. Additional support has been provided through the successive EC Framework

“Global health was declining as a priority [for the EC]. Now it is time to pay attention again to global health issues. Strong messages about UHC, or HSS, are the best contribution we can make to emerging global health challenges such as COVID-19. Undoubtedly, greater attention must be paid to infectious diseases.”

Interviewee in Europe



Programmes (FP6, FP7, H2020) and, to a lesser extent, the IMI. Moreover, EU support (essentially through ECHO) towards humanitarian organisations has been instrumental in tackling Ebola outbreaks in West Africa and DRC. Today, the response to the 2014 Ebola outbreak can be seen as a prime example of how tackling an emerging infectious disease, and integrating research into the humanitarian response, has provided global health organisations and health systems with a broad spectrum of lessons learned and new health products to combat epidemics.

Through DevCo, the EU has also funded a number of programmes to strengthen health systems in Africa. This study does not include a specific analysis of outcomes resulting from budget or sector support for national health systems. With the limited information available, the study has not identified any relevant results in terms of development of national R&I capacities or better preparation for health risks.

4.1 EUROPEAN & DEVELOPING COUNTRIES CLINICAL TRIALS PARTNERSHIP (EDCTP)

From a European perspective, EDCTP is in itself the most relevant success story, in terms of strengthening R&I capacities in Africa, developing new health products and tools to address health challenges associated to PRNDs, and boosting scientific cooperation between the two continents. Existing gaps and limitations in EDCTP strategy and programming should not overshadow its significant achievements and the fact that it has played a pivotal role in positioning the EU as an important investor in severely underfunded PRNDs. The external evaluations of EDCTP programmes and the EDCTP compilation of case studies on collaborative research and development highlight the scientific outputs of PRND projects and the achievements in research capacity building. EDCTP's publication of success stories highlights the major achievements in R&I in PRNDs, as [follows](#):

“EDCTP is a great tool, and many countries want to be involved in it. But it is important for us to involve more African funding, and COVID-19 makes this much harder.”

Official in Europe

This study has used EDCTP reports as reference but has put more emphasis on identifying success stories that complement EDCTP stocktaking exercises.

- **In terms of GHS**, two EDCTP-funded consortia (ALERRT, with 21 African and European partner organisations, and PANDORA-ID-NET, with 22) have contributed to epidemic-preparedness in sub-Saharan Africa, having responded to several disease outbreaks (e.g. Lassa fever, Ebola virus disease, plague and monkeypox).
- **For HIV**, EDCTP-funded studies made vital contributions to the development of antiretroviral drug formulations tailored to children, facilitating their broad introduction in Africa. Other landmark studies were carried out in prevention of mother-to-child transmission of HIV and in detection and treatment of opportunistic fungal infections, responsible for one in five HIV-related deaths.
- **For tuberculosis (TB)**, EDCTP-funded research played a pivotal role in the evaluation of the Xpert MTB/RIF diagnostic technology, now recommended by the WHO and widely implemented globally. Other studies have advanced the development of diagnostics for use in special groups, such as children and people with HIV infections. Landmark drug trials have identified possible ways to shorten TB drug treatment and have also been influential in shaping how TB drug trials should be carried out.
- **For malaria**, EDCTP-funded trials have generated key evidence on antimalarial use in pregnant women, who are particularly susceptible to malaria, which can harm both mothers and their babies. Other trials have had significant influence on the choice of antimalarial drugs for children.

4.2 INNOVATIVE MEDICINES INITIATIVE (IMI2)

The IMI2 is a joint technology initiative by the EU and the European Federation of Pharmaceutical Industries and Associations (EFPIA). In 2014, the IMI2 Strategic Research Agenda was aligned with the EU's health research priorities, and the WHO Priority Medicines for Europe and the World report. An important objective of IMI2 is to further develop R&I in areas of unmet medical need, and to fill important global and public health gaps that cannot be addressed by the pharmaceutical industry. The financial contribution of IMI2 to the fight against PRNDs amounts €117 million through 8 grants. IMI has also been supporting several projects to tackle critical outbreaks and, therefore, contributing to GHS through research. IMI has funded four clinical trials in African countries as part of the response to the Ebola outbreaks.

Under the current COVID-19 pandemic, IMI2 launched a call for €45 million to support a broad portfolio of interventions, including the development of therapeutics for present and future coronaviruses, the set-up of a platform to facilitate a rapid response to disease outbreaks (ZAPI project), the development a database of real world data on COVID-19 vaccines and treatments (EHDEN and ConcePTION project), and the use of mobile devices to assess the impact the COVID-19 lockdowns (RADAR-CNS project).

Despite relevant efforts, IMI's mission seems to be in question. A recent report about IMI published by Global Health Advocates (GHA) and the Corporate Europe Observatory (CEO), concludes that "IMI was failing to invest in areas where public funding is urgently needed, such as HIV & AIDS and PRNDs, yet investing heavily in high profit areas where the industry is already putting considerable resources. Public health topics where public funding is most needed have been side-lined⁴⁹."

4.3 APPROACH TO IDENTIFYING SUCCESS STORIES

A set of success stories have been identified to help illustrate the added value of EU-Africa cooperation on R&I in PRNDs and AMR for GHS. The review has focussed on "epidemic" PRNDs or diseases representing a current or future risk to GHS and stability (essentially malaria, HIV and TB).

The review has also included the response to the 2014–2016 West-African Ebola virus disease (EVD), as a major emerging threatening disease. The outbreak represented a turning point in the level of international awareness and reaction to tackling a major pathogen in one country, which could affect the region and the world at large, and highlighted critical gaps in leveraging existing knowledge and practices to facilitate outbreak response. Some lessons learned from the response to the 2014 Ebola outbreak were instrumental for a more timely and effective response to the 2019 outbreak in the DRC, and are now being applied to tackle the COVID-19 pandemic in other regions, including Europe.



Photo by Ron McClenny on Unsplash

Pneumonia has also been integrated into the scope of this study because it is the most serious outcome of acute respiratory infection (ARI) and kills more children than any other infectious disease, claiming the lives of more than 800,000 children under five every year, especially in LMICs. In comparison 437,000 children under five died due to diarrhoea and 272,000 due to malaria in 2018. Moreover, the incidence of severe pneumonia is higher in the African region (30% of the global burden of severe childhood pneumonia). A further factor for the inclusion of pneumonia is that it is commonly treated with antibiotics, despite most cases being caused by viruses. In these cases, antibiotics are ineffective, resulting in unnecessary side effects, and increasing antibiotic resistance in children. EDCTP has included the development of vaccines, the evaluation of the impact of introduced routine vaccines on the aetiology and severity of lower respiratory tract infections, and research on implementation models and on the scale-up of existing vaccines as part of its R&I priorities. In this context, the introduction of the Haemophilus influenzae type b infection (Hib) vaccine to prevent pneumonia in children in a large number of countries, with the support of GAVI and the EU among other donors, is a notable example of global delivery of a product addressing a major global health challenge.

The selection of success stories is intended to highlight the key financial contributions made by the EU and the German government, as well as relevant outcomes resulting from European efforts in the fight against PRNDs, emerging diseases and AMR, of relevance for GHS. Several success stories are mainly the result of European and German funding, such as Surveillance, Outbreak response management and Analysis System (SORMAS), Mobile Labs or regional programmes on pandemic preparedness in West Africa. In the rest of cases, success stories are the result of collective efforts by the international community to tackle major global health challenges, although the EU and Germany have made relevant financial contributions. For instance, controlling or eliminating malaria in African countries, tackling the AIDS epidemic, controlling Ebola outbreaks or developing new rapid diagnostic technologies, are all achievements that have benefited from the mobilisation and support of a large variety of stakeholders. Governments in HICs and LMICs (e.g. US, UK, African countries), international agencies, the private sector, public-private partnerships, philanthropic organisations, academia, local communities and civil society organisations worldwide have also been essential contributors to the advances made in global health as regards the fight against PRNDs and outbreaks.



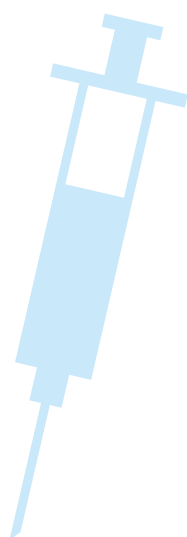
Photo: Lab workers use the Gene Xpert machine at the Centre de Sante Kasumbalesa Douane in DRC. Courtesy of PATH/Georgina Goodwin. All rights reserved

The selection of success stories is based on the analysis of EU databases (e.g. CORDIS, EDCTP), a review of the literature, and interviews with researchers, global health experts and some decision-makers in Europe, the US and Africa. This selection is not intended as an exhaustive compilation of major scientific achievements and public health outcomes in the fight against PRNDs or AMR in the past decade that involve research groups or health experts in both continents. Many other success stories could probably be derived from other global health cooperation programmes and experiences in the prevention and control of infectious and emerging diseases or regions of the world.

For the purpose of this study, the approach has been to select a set of **joint European-African initiatives of relevance for GHS that contribute to disease prevention, control, treatment, strategies, technologies, R&I capacity building, global delivery and/or cooperation in tackling epidemic diseases or global health threats.**

Fig. 5 Success stories

Success stories	Effectiveness	Health systems	Global delivery
Ebola vaccines (Zabdeno®, Mvabea®, Ervebo®)	●	●	
Ebola treatments - Convalescent plasma	●		
Ebola diagnostic - European Mobile Labs	●	●	
Research into epidemic response	●	●	
Malaria vaccines	●	●	
Malaria preventive chemotherapies	●		
Malaria Artemisinin-based combination therapy	●		
Malaria - Ivermectin	●		
Malaria - Indoor residual spraying	●		
Rapid Diagnostic Tests	●		
HIV vaccines	●	●	
Combination therapies	●		
TB - GENEXPERT®	●		
Research capacity in West Africa and pandemic prep.	●	●	
SORMAS	●	●	
RPPP IN THE ECOWAS	●	●	
PROALAB	●	●	
Haemophilus influenzae type B (Hib) vaccine – global delivery	●	●	●



In some cases, there is no dividing line between the aspects of analysis, given that health interventions are not implemented in silos. Disease-oriented programmes are increasingly integrating components of “health systems strengthening”, in order to reinforce local capacities, effectiveness and sustainability, and overcome the debate between “vertical” and “horizontal” programmes⁵⁰. In this respect, GAVI and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), originally highly disease-oriented organisations, opened “health systems strengthening” windows that enabled a share of their funds to go towards investments such as information systems or supply chain management. The table above shows how success stories – which are presented in detail in the next chapter – fit with the three dimensions of analysis.

Overall, the selected success stories are representative of a broad portfolio of preventive, diagnostic and therapeutic tools, technologies and strategies, used to deal with PRNDs, AMR and GHS challenges (particularly outbreaks and epidemics). Each success story needs to meet most of the criteria to be characterised as such, as follows:

- The EU and the German government have provided institutional support and funding and, in the case of Ebola, short-term technical assistance to African counterparts or implementing partners. Most success stories have received funding from other donors and, although an assessment of funding schemes per success story has not been carried out, the level of European and German financial commitment is considered a key contribution in achieving positive results. **Over the past decade, most success stories have been sustainably funded by the EU and the German government⁵¹**, which, at its core, reflects a firm commitment to supporting European-African R&I cooperation in tackling key challenges posed by PRNDs and AMR. SORMAS, European Mobile Labs, Regional program to support pandemic prevention (RPPP) and PROALAB programmes have mainly been funded by the EU and Germany.
- **The selected success stories have been applied against previous outbreaks or epidemics (e.g. malaria, HIV, Ebola), are being used now, or are showing promise for the fight against COVID-19 or other future outbreaks, especially of viral origin⁵²**. Some success stories have the potential to contribute to disease control or elimination. Several tools used to combat PRNDs are being assessed in clinical trials to determine their effectiveness, efficiency and safety to be eventually repurposed for COVID-19. In some cases, these tools are already being used. Other cooperation programmes and R&I initiatives have reinforced surveillance and diagnostic capacities in some African countries, which have allowed them to effectively respond to recent outbreaks (e.g. Lassa fever, Ebola in DRC) and will allow them to tackle future health risks.
- **The success stories have been replicated across multiple countries, scaled up from local to national or regional level, easily adapted and tailored to diverse local contexts.** For instance, disease prevention, control and elimination tools and strategies (e.g. malaria, HIV) have been applied in many different African settings. Key learnings, research outcomes and tools developed during the response to Ebola in West Africa have been applied in other African countries (e.g. DRC) and are now applied in Europe and globally.
- **The success stories are supported by scientific evidence** (e.g. publications in indexed journals, peer-reviewed reports) or have been evaluated by external experts (especially in the case of implementation programmes).
- **The success stories have been conceived and implemented by consortia of mainly European and African partners, involving multiple stakeholders.** The exception to these criteria is AMR, since the review has not been able to identify clear contributions of African actors in this field or any European-African initiatives showing relevant results.

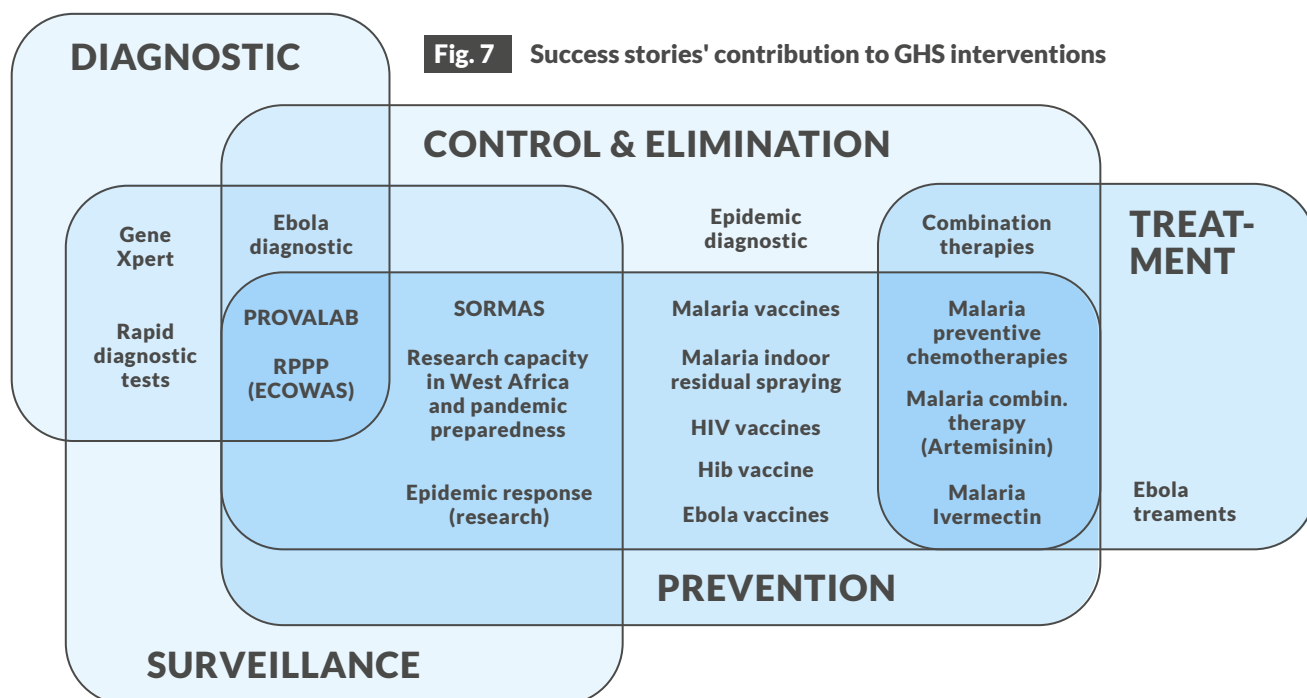


Photo: A lab worker handling samples at the Institut Pasteur de Dakar in Senegal, lab where suspected Ebola cases and others are tested. Courtesy of PATH/Lynn Heinisch. All rights reserved

Fig. 6 Criteria for success stories

Success stories	EU funding	German government funding	Applied in previous outbreaks or control strategies	Being applied or showing promise for COVID-19 (or other outbreaks)	Potential to contribute to disease control or elimination	Replicated or scaled up	Evidence	Consortia European-African partners
Ebola vaccines (Zabdeno®, Mvabea®, Ervebo®)	•	•	•	•	•	•	•	•
Ebola treatments - Convalescent plasma	•		•	•		•	•	•
Ebola diagnostic - European Mobile Labs	•	•	•	•	•	•	•	•
Research into epidemic response	•		•	•	•	•	•	•
Malaria vaccines	•	•			•		•	•
Malaria preventive chemotherapies	•		•	•	•	•	•	•
Malaria Artemisinin-based combination therapy	•		•	•	•	•	•	•
Malaria - Ivermectin	•		•	•	•	•	•	•
Malaria - Indoor residual spraying	•		•	•	•	•	•	•
Rapid Diagnostic Tests	•		•	•	•	•	•	•
HIV vaccines	•		•	•	•	•	•	•
Combination therapies	•		•	•	•	•	•	•
TB - GENEXPERT®	•	•	•	•	•	•	•	•
Research capacity in West Africa and pandemic prep.	•	•	•	•	•	•	•	•
SORMAS	•	•	•	•	•	•	•	•
RPPP IN THE ECOWAS	•	•	•	•	•	•	•	•
PROALAB	•	•	•	•	•	•	•	•
Haemophilus influenzae type B (Hib) vaccine - global delivery	•		•	•	•	•	•	•

Fig. 7 Success stories' contribution to GHS interventions



4.4 EBOLA

The EVD is one of the deadliest haemorrhagic fevers affecting humans and non-human primates. Thirty-four outbreaks have been reported in Africa since it was first recognised in 1976, affecting 34,356 cases and causing 14,823 reported deaths since 1976. Before 2013, EVD outbreaks consisted of relatively small numbers of cases, mostly in rural areas, and were effectively contained by basic public health, quarantine and containment measures. However, the most recent epidemics have fundamentally changed the perception and understanding of the epidemiology of EVD, affecting larger populations and extending to urban areas. The 2014 Ebola outbreak in West Africa was the most severe in history and was declared a public health emergency by the WHO. The potential for rapid spread of a pathogenic threat as deadly as Ebola highlighted the importance of setting global health security priorities.

The 2014 Ebola epidemic in West Africa prompted changes in the way the world responds to outbreaks and other health emergencies. Lessons from that outbreak were applied in the 2018-2020 Ebola response in the DRC, allowing for a faster and more effective response:

- **Integrating research at the heart of the response**, to fast-track the effectiveness of tests, vaccines and medicines that can be used to save lives and avert large scale crises.
- **Rapid laboratory testing which increases the chances of survival for confirmed patients.** A rapid diagnosis helps prevent the spread of the disease; the faster patient contacts are identified, the faster they can be vaccinated and protected from the disease. Quick testing is also critical for monitoring the effectiveness of outbreak control activities, for the work of burial teams, for the clinical management of patients, and for the Ebola survivors' programme. In the DRC, laboratory testing used GeneXpert and new labs were activated within 48 hours, meaning laboratories could move with the outbreak.
- **A licensed Ebola vaccine:** Trials of the rVSV-ZEBOV Ebola vaccine began in Guinea in 2016. These studies provided data on the effectiveness of this vaccine. When Ebola struck western DRC's Equateur province in early 2018, the vaccine was deployed immediately after national approvals were obtained. The use of the vaccine as part of an Ebola outbreak response was a major milestone for global public health. In eastern DRC, the vaccine was deployed just one week after the declaration of the outbreak in August 2018, helping save lives and slowing the spread of Ebola. Because the rVSV-ZEBOV vaccine was not licensed, it was used under "expanded access" or "compassionate use" research studies. The results from the DRC vaccine studies confirmed that the vaccine is very effective in preventing Ebola. The vaccine was licensed in Europe and the US in late 2019. After WHO prequalified the vaccine, it was licensed in DRC and five other African countries in early 2020.
- **Landmark advances in Ebola care and treatment:** in 2018 WHO and the DRC authorities agreed on protocols for using therapeutic treatments for Ebola not yet licensed on a compassionate basis. In August 2019 data from the trial showed two of the four Ebola treatments substantially decreased mortality, especially if people sought treatment early. The trial was a critical step towards finding an effective treatment for Ebola. It also demonstrated that it is possible to conduct ethically and scientifically sound research in the context of an infectious diseases outbreak, while simultaneously supporting the joint goals of saving lives and ending the outbreak.
- **Social science and community engagement integrated into the response:** Community feedback and information about the social science context was actively gathered and integrated since the beginning of the outbreak. A key lesson from DRC was that a "one size fits all" approach to community engagement is not effective.

4.4.1

Overview of EU response (including ECHO)

The EU has provided approximately €47 million in humanitarian funding to the WHO, UN agencies, the Red Cross movement and NGOs to support the Ebola response outbreaks in 2014 and 2018. EU humanitarian aid has supported different aspects of the response, such as access to healthcare, prevention and control of infections, epidemiological surveillance, contact tracing, community engagement, food and psychosocial support to survivors and families of Ebola patients, and coordination.

As from 2014, the EU also gave a significant contribution to Ebola research, including vaccines development, and provided over €230 million in funding for this purpose, including €6 million to support vaccine trials through the Coalition for Epidemic Preparedness Innovations (CEPI). In addition, research on Ebola treatments and diagnostic tests has received a total of €14 million in EU funding.

In October 2018, an additional €2.25 million was provided to support urgent research activities as a direct reaction to the last Ebola outbreak in the DRC through the EDCTP, while in 2019 the EDCTP funded the project [PREVAC](#) (Partnership for Research on Ebola vaccinations—extended follow-up and clinical research capacity build-up).

The EU is also implementing a development cooperation programme (with a total of €180 million from the 11th European Development Fund (EDF) 2014-2020) to support the health sector in the DRC. **In addition, the EU provided essential in-kind assistance on the ground through:**

- EU humanitarian health experts and European Centre for Disease Prevention and Control (ECDC) epidemiologists to support the international response.
- Logistics support to aid workers on the ground through the EU's humanitarian flight service (170 flights operated since May 2018).
- Support to training on medical evacuation of humanitarian workers through the EU Civil Protection Mechanism.
- Technical support (mainly short-term deployments) of ECDC experts to DRC.

Given the weak health system in the DRC, the EU has also been providing development funding, spanning over a number of years, to support the national health sector in the country (€180 million in total within the 11th EDF programme 2014–2020). In line with WHO guidelines, over 2018 and 2019, more than €6 million in EU humanitarian and development funds were allocated to help at-risk neighbouring countries (Uganda, South Sudan, Rwanda and Burundi), to strengthen their prevention and preparedness measures. Through its development programme, the EU is also supporting the national health systems of [Burundi and South Sudan](#).

The EU has also supported the IMI Ebola+ programme, launched in response to the Ebola virus disease outbreak that started in West Africa in 2014. The programme includes 12 projects and contributes to efforts to tackle a wide range of challenges in Ebola research, including vaccines development, clinical trials, storage and transport, and diagnostics. The IMI Ebola+ programme complements work being carried out with the support of other funding bodies, and might help to tackle current and future outbreaks, not only of Ebola but also of related diseases, such as Marburg.

4.4.2 Ebola vaccines

The technology used to develop the Ebola vaccine is being applied to develop new vaccines for other pathogens. For instance, IAVI is pursuing candidates against Lassa fever and Marburg, supported by the CEPI. The Ebola vaccine was the fastest-developed vaccine in history (five years), marking a turning point in vaccinology. By way of example, the polio vaccine was developed over a period of 20 years and the malaria vaccine has required 31 years to reach late-stage development. The scientific advances made with the Ebola vaccine are now enabling faster development of the vaccine against COVID-19.

Zabdeno® (Ad26.ZEBOV) and Mvabea® (MVA-BN-Filo) & COVID19

EDCTP has been supporting Ebola vaccine projects⁵³, with the aim of assessing a novel two-dose preventive vaccine regimen against Ebola Virus Disease. These projects have received funding from the Innovative Medicines Initiative 2 Joint Undertaking under grant agreement EBOVAC1, EBOVAC2, EBOVAC3, EBOMAN and EBODAC. This Joint Undertaking has received support from the EU's H2020 research and innovation programme and EFPIA.

In July 2020, the EU has granted Marketing Authorisation for its 2-dose Ebola vaccine regimen (Zabdeno® (Ad26.ZEBOV) and Mvabea® (MVA-BN-Filo)) to Janssen Pharmaceutical Companies, who will collaborate with the WHO on vaccine pre-qualification, in order to hasten registration in endemic countries and facilitate broader access⁵⁴.

This Ebola vaccine is the first approved vaccine to be developed using Janssen's AdVac technology, which is the same technology being used to develop vaccine candidates to protect against SARS-CoV-2, as well as Zika, RSV and HIV.

Zabdeno® (Ad26.ZEBOV) and Mvabea® (MVA-BN-Filo) & COVID19

In November 2019, the EC adopted the decision to grant marketing authorisation to Merck Sharp & Dohme B.V. for a vaccine against Ebola. This vaccine, called Ervebo, had been in development since the Ebola outbreak in West Africa in 2014. It is already used as part of a specific protocol to protect people at risk of infection, such as healthcare workers or people who have been exposed to infected persons. The clinical development of Ervebo was made possible through cooperation with public health stakeholders, which include national institutes and ministries of health in Africa (notably in Sierra Leone, Liberia, and Guinea), as well as the WHO, the Norwegian Institute of Public Health and MSF.

The development of the vaccine was supported by two projects from the IMI funded by the EU's research and innovation programme H2020: VSV-EBOVAC (March 2015-February 2019), led by Academisch Ziekenhuis Leiden (NL) with an EU contribution of €3.9 million, and VSV-EBOPLUS (April 2016-March 2021), led by Merck Sharp & Dohme, with an EU contribution of €8.5 million.

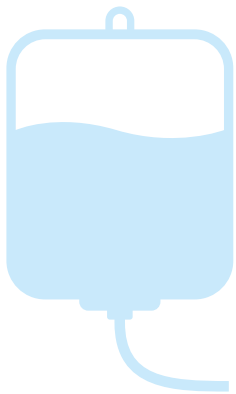


4.4.3

Ebola treatments

The development of Ebola treatments seems to have received less financial support from the EU than vaccine development. The response to the 2014 Ebola outbreak integrated not only emergency and relief actions but also implementation and clinical research on the ground to help better understand the disease. Following 2014 WHO recommendations, several research projects, including a H2020 grant, were conducted to evaluate the treatment with convalescent plasma derived from patients who have recovered from the disease.

In 2018, as part of a broader portfolio of grants supporting Ebola research, EDCTP funded a project through the emergency response mechanism aimed at enhancing Ebola preparedness in Uganda, which included a pharmacokinetic study on the use of Remdesivir. Although the EU contribution to the research about Remdesivir is limited, it is worth mentioning this case since Remdesivir is being tested as a treatment for COVID-19, and has been authorised for emergency use in the EU and other countries.



Convalescent plasma

The use of convalescent plasma collected from patients who had recovered from Ebola virus disease was recommended by the WHO as an empirical treatment during the 2014 outbreak. Although the treatment as given in the trial did not significantly improve the survival chances of Ebola patients, results provided crucial information about the role of convalescent plasma against the disease. Moreover, the project implemented in Guinea showed that clinical trials can be successfully conducted under the challenging conditions imposed by the Ebola outbreak.

The use of convalescent plasma has gained renewed interest as there is an urgent need to find effective alternative treatments for patients with COVID-19, until an effective vaccine or drug therapy is developed. Studies on convalescent plasma have shown some promise and have been endorsed by the Food and Drug Administration (FDA) via the emergency use authorisation procedure.

The EU has funded research projects to determine the efficacy, safety and feasibility of convalescent whole blood and convalescent plasma therapy, as a treatment for patients with Ebola Viral Disease to reduce the case fatality rate in the 2014 epidemic in West Africa. The EU funded the Ebola-Tx project through a H2020 grant⁵⁵, and additional financial support was provided by the Flemish government and the Bill & Melinda Gates Foundation (BMGF).

4.4.4

Ebola diagnostics



European Mobile Labs

In March 2014, the WHO's Global Outbreak Alert and Response Network (GOARN) asked for assistance from the European Mobile Laboratory (EMLab) Project to support the response to the Ebola outbreak in Guinea. The EMLab Consortium deploys state-of-the-art boxed field laboratories as well as trained scientists and technicians to epidemics and outbreaks of infectious diseases caused by pathogens up to risk group 4, to perform diagnostics and support clinical laboratory analysis on site. Mobile laboratories have been implemented in Nigeria, for instance responding to the 2019 Lassa fever outbreak⁵⁶.

Under the current pandemic, EMLab has deployed and set up a mobile lab unit in the general hospital of the City of Weiden (Klinikum Weiden Oberpfalz), Germany, to increase diagnostic capacity for COVID-19 suspected patients. Mobile labs are particularly useful in responding to epidemics such as COVID-19, because they can be mobilised quickly, can provide a flexible response which responds to local needs, and are cost-effective to deploy. They can also be easily integrated into local and regional systems (both in Africa and Europe), as is the case with the network of Pasteur institutes, for example.

The EMLab Consortium was established within the framework of the EC DG INTPA funded project "Establishment of Mobile Laboratories for Pathogens up to Risk Group 4 in Combination with CBRN Capacity Building in Sub-Saharan Africa". EMLab and its missions are also funded by DG-ECHO, the German Federal Ministry of Health, and the German Federal Foreign Office.

4.4.5

Ebola research

Integrating research into epidemic response and the role of humanitarian organisations

Clinical research responses to outbreaks, especially for unknown viruses, not only generate evidence to improve health outcomes and outbreak control, but also contribute to protecting from future threats. The Ebola 2014 outbreak was a turning point in terms of scientific mobilisation and involvement of humanitarian organisations and local communities in clinical research and clinical trials to improve patient management, understand the nature of the virus and develop new therapeutic tools.

“When the Ebola outbreak began, the limited knowledge about patient management and prevention made it nearly impossible to prioritize [the] limited available resources for those who might benefit the most, especially early in the response” (Roshania et al., 2016, p. 402).

This deficit at the start of the outbreak made the data collection efforts of humanitarian organisations like International Medical Corps (IMC) and MSF critical because this information fed back to develop standardised clinical protocols, identify at-risk groups, and determine other epidemiological factors for contracting Ebola [...] Through their logistical support, humanitarian organisations contributed greatly to the launch of clinical trials during the Ebola outbreak.

Trials were launched out of Ebola treatment units (ETUs) established and run by a multitude of international NGOs. For example, PREVAIL II (ZMapp) partnered with IMC at two sites in Sierra Leone; MSF collaborated with trial teams on the Guinea ring vaccination trial, brincidofovir, favipiravir (JIKI), and convalescent plasma trials (Ebola-Tx); and GOAL Global partnered with the RAPIDE-TKM trial team (MSF, 2016; NIAID, 2017; Wellcome Trust, 2015)⁵⁷.”

4.5 MALARIA

Despite huge progress in reducing malaria cases and deaths between 2000 and 2015, progress has stalled in the last five years. The world is not on track to meet the 2020 milestones that will lead to lower case incidence and a reduction in the mortality rate by 90% by 2030 (from 2015 levels). About half of the world's population risks contracting malaria which, despite effective treatments available globally, remains a life-threatening affliction. Effective drugs exist for malaria, and a vaccine is undergoing pilot implementation studies in African countries. However, the threat of drug resistance is real and, despite advances, vaccines offering greater efficacy are required. Malaria was responsible for approximately 228 million debilitating infections and 405,000 deaths at last count in 2018⁵⁸. Population at risk of contracting malaria might rise due to climate change and changing ecosystems, reduced vigilance, resistance to insecticides or treatments, and a relaxing of adherence to effective prevention programmes.

Moreover, when malaria-endemic countries have other infectious disease outbreaks, malaria risk can increase, particularly when health systems are overwhelmed and disrupted. This happened when the West Africa Ebola epidemic occurred during peak malaria transmission season in 2014 and seems to be happening again in some countries during the COVID-19 pandemic. Historically, malaria resurgence following complete elimination at national level has been rare, but this situation is highly dependent on ongoing investment in surveillance and response, and cross-border and regional collaboration with endemic neighbours. The risk of resurgence will no longer exist once malaria eradication is achieved, which would be a direct benefit to GHS⁵⁹.

“This report by The Lancet Commission on malaria eradication addresses a bold proposition: malaria, one of the most ancient and deadly diseases of humankind, can and should be eradicated before the middle of the 21st century.

The Commission (...) identifies solutions that will enable the global malaria community to bend the curve and achieve a world free of malaria within a generation.

The Commission also emphasises the substantial social and economic benefits of malaria eradication, together with its mutually reinforcing relationship with UHC and GHS.”

*The Lancet Commission
on malaria eradication (2017)*

The success stories presented in this section are part of the tools and strategies used to prevent, treat and control malaria and are being integrated in comprehensive public health interventions that aim for malaria elimination in several African countries. **The use of a variety of anti-malarial tools in Africa has been instrumental in controlling and eliminating malaria in African countries, notably the introduction of ACTs, long-lasting insecticidal-treated nets, indoor residual spraying, intermittent preventive treatment, and rapid diagnostic tests.** Taken as a whole, the tools against malaria presented below are some of the pillars of a broader strategy to accelerate efforts towards malaria elimination and attainment of malaria-free status in many African countries⁶⁰.

To date, the WHO has only declared 2 diseases as officially eradicated: smallpox caused by variola virus (VARV) and rinderpest caused by the rinderpest virus (RPV). Polio and dracunculiasis (Guinea worm disease) are in the last stages of long eradication campaigns, but success is not yet guaranteed. Eradication efforts are complex undertakings and malaria is no different. One area of focus prioritised by the Strategic Advisory Group on Malaria Eradication⁶¹ is research and innovation on vector control, chemotherapy and vaccines in order to develop the transformative tools and knowledge base necessary for achieving elimination in the highest burden areas.

Under the EU FP7 and H2020, a total of 86 malaria research projects have been funded in the last decade, having been granted funding of €160 million. **EU funding has contributed to the development of half of all new malaria drugs registered since 2000, and more than 1 in 10 of the most advanced candidates in the global PRND R&I pipeline are being developed with funding from the EU⁶².** Other malaria research projects concern diagnosis, vaccine development, vector control and treatment, as well as basic and operational research, research infrastructures and training⁶³. From 2014 to 2019, EDCTP invested €118.51 million in malaria research through 12 grants to support large-scale clinical trials and other clinical research activities.

In response to the COVID-19 epidemic, the European Investment Bank intends to use existing financial instruments that it shares with the EC, primarily the InnovFin Infectious Disease Finance Facility, to back projects that aim to control, cure and/or prevent coronavirus. In June 2020, the European Investment Bank (EIB), the EC and Investitionsbank Berlin (IBB) announced the first closing of their EU Malaria Fund. **The European Commission and the EIB are contributing an initial €64 million into the fund, which aims to bridge the gap between molecule and market for feasible and affordable innovative solutions to prevent and treat malaria.** A total of €6 million is being provided by various national and private investors, including IBB and the BMGF.

The major contributor to the EU Malaria Fund is the InnovFin EU programme funded by EU H2020 and jointly managed by the EC and the EIB. Part of the project is supported by the European Fund of Strategic Investments, the financial pillar of the Investment Plan for Europe. The first fund investment of €24.8 million will benefit two companies, whose malaria R&I could potentially lead to its secondary use against COVID-19. The EU Malaria Fund is a public-private partnership between the EU, International Organisations, corporations, and organised civil society, which provides a novel funding instrument to address market failures in infectious diseases with significant relevance to public health globally. It has been initiated by the KENUP Foundation.

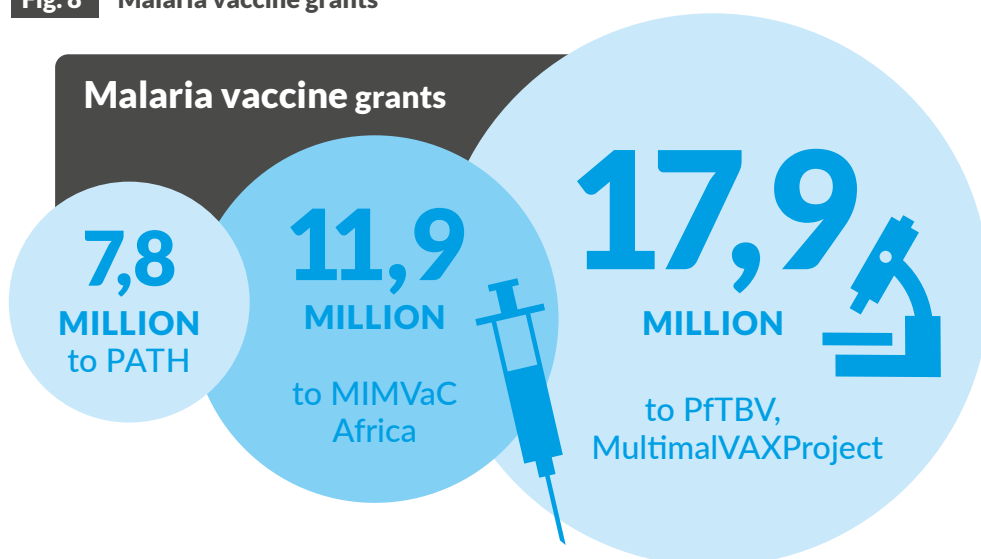
4.5.1

Malaria vaccines

In areas with high disease burden, the efficacy of malaria vaccines, although partial, could potentially result in substantial public health benefits and could help protect children when they are most vulnerable to malaria and its serious consequences. Although there are currently no commercial malaria vaccines available, there are more than 20 vaccines that are being tested⁶⁴.

The German government, through the Federal Ministry of Education and Research (BMBF), has supported the testing of a promising alternative regimen of RTS,S/AS01 vaccine, with a €7.8 million grant to PATH. In addition, the EDCTP has launched large-scale strategic actions (clinical research) to compare and select the most promising vaccine candidates and manage their progress through clinical development, such as MIMVaC Africa (supporting effective malaria vaccine candidates, 2020-2024, €11.9 million) and PfTBV (rapid evaluation of Plasmodium falciparum transmission-blocking vaccine candidates for integration into malaria control and elimination, 2019-2024, €17.9 million) or the MultimalVAX Project.

Fig. 8 Malaria vaccine grants



4.5.2

Malaria preventive chemotherapies

Preventive chemotherapies are key elements of the comprehensive package of malaria prevention and control measures recommended by the WHO. WHO-recommended preventive therapies include intermittent preventive treatment of pregnant women (IPTp), intermittent preventive treatment of infants (IPTi), and seasonal malaria chemoprevention (SMC). The objective of these interventions is to prevent malarial illness by maintaining therapeutic drug levels in the blood throughout the period of greatest malarial risk.

The EDCTP has funded several projects about preventive chemotherapies like MIPPAD (Malaria in Pregnancy Preventive Alternative Drugs), and seasonal malaria chemo-prevention (SMC), among others.

4.5.3

Malaria treatments

Artemisinin-based combination therapy

ACTs are the best anti-malarial drugs available at present, particularly for *P. falciparum* malaria in the context of resistance to chloroquine and other antimalarial drugs. Artemisinin enhances efficacy and has the potential of lowering the rate at which resistance emerges and spreads. ACTs have an additional public health benefit of reducing the overall malaria transmission. Despite being recommended by the WHO since 2001, overall deployment of ACT has been slow. Recent *in vitro* results reinforce the hypothesis that ACTs could be effective as an anti-COVID-19 treatment.

The EDCTP has granted different ACT-related grants and is funding studies such as the interaction between malaria and HIV in pregnant women with the EDCTP MAMAH grant 2018–2023, a clinical trial of an alternative use of dihydroartemisinin piperazine (DHA-PPQ) in this group.

Ivermectin

Ivermectin is a key anthelmintic for the control of NTDs. With regard to malaria, Ivermectin seems to have qualities that can introduce a new concept in the fight against malaria: drug-based vector control. This means that Ivermectin can effectively target 'outdoor' transmissions, and some studies suggest that it could become an effective and complementary intervention in the elimination and eradication of malaria. In addition to its anti-parasitic qualities, it has also proven to contain some antiviral therapeutic qualities, and *in vitro*, ivermectin has inhibited the duplication of the SARS-CoV-2 virus.

It also contains many other potential effects, including antimicrobial, antiviral and anti-cancerous. Because of this ability to play a role in several biological mechanisms, it is viewed by some as a potential candidate in the treatment of COVID-19⁶⁵.

During the last decade, EDCTP has been supporting clinical trials involving ivermectin such as MoxiMultiDoseMod⁶⁶, STOP project⁶⁷, or the Ivermectin plus Albendazole study⁶⁸.

4.5.4

Malaria prevention

Vector control: long-lasting insecticidal nets (LLINs) and Indoor residual spraying (IRS)

The number of malaria deaths in Africa has been halved due to mosquito vector control interventions that rely on the use of residual insecticides in the domestic environment. Wide scale implementation of tools such as IRS and LLINs have led to impressive decreases in malaria transmission in some regions and these interventions are the cornerstone of malaria control programmes in most African countries. However, these frontline interventions are being continuously eroded by the evolution of insecticide resistance in the mosquito vectors.

Literature shows successful IRS campaigns resulting in a huge decrease in malaria incidence. IRS mainly with DDT was the principal method by which malaria was eradicated or greatly reduced in many countries in the world between the 1940s and 1960s. Nowadays, there are still several programmes working with IRS and having significant success. However, funding and coverage of sprayed households continue to be challenging and may erode relevant progress made in the prevention and control of malaria. The EU-funded FP7 AVECNET (African vector control: new tools, 2011–2016, €11.9 million) project addressed the sustainability of African malaria vector control. The study invested in the design and evaluation of new control tools after studying mosquito behaviour, insecticide resistance and the impact of both on the performance of a portfolio of anti-malaria tools. The impact of this work includes the registration of new IRS products and the publication of normative guidance on the use of 'next generation' LLINs. New approaches to controlling outdoor biting showed promising efficacy and generated follow-on funding for further evaluation⁶⁹.

4.5.5

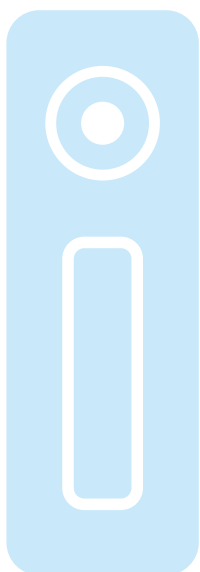
Malaria (and other diseases) rapid diagnostic tests (RDTs)

RDTs emerged in the early 1990s as a technology to facilitate preliminary or emergency medical screening in medical facilities with limited resources. They also allow point-of-care testing in primary care units. However, uncertain field performance was a major concern for the acceptance of tests for infectious disease case management. RDTs are relatively inexpensive and easier to use, develop, and manufacture than laboratory-based tests, but still require performance validation. The price for an RDT varies per disease, with the reference price per test from the GFATM pooled procurement mechanism for malaria RDT being the lowest at \$0.22 to \$0.40. In comparison, the price for a COVID-19 RDT ranges from \$4 to \$10⁷⁰.

RDTs were initially used as part of malaria diagnostic and control tools but have been progressively applied to HIV and influenza. In the 2018 Ebola outbreak in RDC, RDTs point-of-care rapid diagnostic tests were tested to screen patients flagged through contact tracing and case definition. By facilitating early detection and isolation, RDTs aimed to minimise the number of people exposed and enable early rehydration, which is key for improving survival^{71,72}. A smaller proportion of RDTs have received regulatory approval for emergency use by stringent regulatory authorities. Independent evaluation of these RDTs is slowly becoming available.

In the context of COVID-19, the WHO and ECDC recommend the use of RDTs under specific circumstances. Rapid antigen tests can contribute to the overall COVID-19 testing capacity, offering advantages in terms of shorter turnaround times and reduced costs, especially in situations in which RT-PCR testing capacity is limited, which is the case in many LMICs⁷³. New rapid diagnostic tests have been developed and affordable price guarantees secured for 120 million tests for LMICs, through the ACT-Accelerator. **Moreover on September 11, Foundation for Innovative New Diagnostics (FIND) and the Africa Centre of Disease Control (CDC) announced a new partnership to build capacity in readiness for the introduction of new, high-quality antigen RDTs for COVID-19 that are anticipated to become available soon.** Although not totally confirmed yet, Germany will allocate additional funding through BMZ.

EDCTP has funded projects to validate the clinical performance and/or implementation of new or improved diagnostic tools and technologies for the detection of any of the poverty-related diseases, including co-infections. In 2018, a total of 9 grants were awarded, amounting to €18 million. The German government has provided FIND with funds of €10 million to develop new diagnostics tools for COVID-19. German Development Bank (KfW) also supports the development of rapid tests and new drugs with BMBF funds to be used for COVID-19 in LMICs, and additional German funding is anticipated.



4.6 HIV

According to the WHO, 76 million people have been infected with the HIV virus and about 33 million people have died of HIV & AIDS since the beginning of the epidemic. Globally, 38.0 million people were living with HIV at the end of 2019. The WHO African region remains most severely affected, with nearly 1 in every 25 adults (3.7%) living with HIV and accounting for more than two-thirds of the people living with HIV worldwide⁷⁴. The US National Intelligence service has stated that HIV & AIDS remains one of the largest security threats of any of the infectious diseases currently present in the world. HIV & AIDS also has contributed to the resurgence of TB and the persistent infectious disease burden of HIV & AIDS is very likely to worsen, resulting in negative health impacts, economic decay, social fragmentation and political destabilisation of the hardest-hit LMICs.

EDCTP's strategic research agenda on HIV and associated infections addresses treatment, prevention, and product-focussed implementation research. By end of 2019, EDCTP invested in 84 grants (total investment €526.04 million) of which 16 were grants for HIV-related infections (total investment €96.74 million).

4.6.1 HIV vaccines

Decades of research on HIV have generated data about the immune system, and have created a worldwide infrastructure of clinical trial networks that can be pivoted from HIV to the pathogen that causes COVID-19, with vaccine technologies being repurposed against COVID-19. African research centres, which in some cases are funded by EDCTP and have been strategic partners for R&I in HIV, are now involved in COVID-19 R&I. Laboratories, testing sites and recruitment networks that were rushed into action against the coronavirus exist because of the enormous investments made to fight HIV⁷⁵. **Key HIV vaccine platforms are fast-tracking the development and testing of experimental vaccines for COVID-19 today. A critical lesson from HIV is taking numerous approaches to a vaccine at the same time. HIV vaccine experiments often tended to be staged one after another, with the entire community waiting for the results of the best candidates. In contrast, numerous COVID-19 trials are now occurring simultaneously.**

*“What we have learnt in 35 years against HIV is being repurposed for COVID-19. Our work is facilitating the understanding of COVID-19 immunology, vaccinology or virology. We see Johnson & Johnson, or Merck, repurposing vaccines and working with monoclonal antibodies. HIV knowledge and experience reduce the time and improve clinical trial capacity to fight COVID-19 (...)
Research platforms can be quickly repurposed timely to enable refocusing (...)
Antiviral agents (from PRNDs) have substantial potential.”*

Researcher in Africa

4.6.2 Combination therapies

Combination therapies have become a standard for the treatment of HIV (and Hepatitis C Virus (HCV) infections). They are advantageous over monotherapies due to better efficacy and reduced toxicity, as well as the ability to prevent the development of resistant viral strains and to treat viral co-infections, including emerging and re-emerging viruses, such as S-ARS-CoV-2, MERS-CoV, Zika virus (ZIKV), Ebola virus (EBOV), influenza A virus (FLUAV), and Rift Valley fever virus (RVFV). Many viruses, however, easily develop resistance to single drug use. Combination therapies can lower the evolution of drug-resistant viral variants by attacking the virus using multiple mechanisms. Such combinations could serve as a frontline therapeutic option against poorly characterised emerging viruses, re-emerging drug-resistant viral strains or viral co-infections. Thus, antiviral drug combinations may become a standard treatment for emerging and re-emerging viral infections, such as HIV and HCV⁷⁶. **Further development of combination therapies could save time and resources that are required for the development of alternative virus-specific drugs and vaccines. This could have a global impact by decreasing morbidity and mortality, improving the quality of life of infected patients and decreasing the costs of patient care, curtailing the impact of the current SARS-CoV-2 pandemic, as well as future viral outbreaks⁷⁷.**

From 2014 to 2019, EDCTP funded research protocols and clinical trials to assess different combination therapies to prevent HIV infection (e.g. CHAPS study, PrEPVacc trial), develop shorter, simpler and better treatments for TB (e.g. Pan-African Consortium for the Evaluation of Antituberculosis Antibiotics (PanACEA2)), and prevent malaria infections in pregnant women with HIV (e.g. MAMAH study)*.

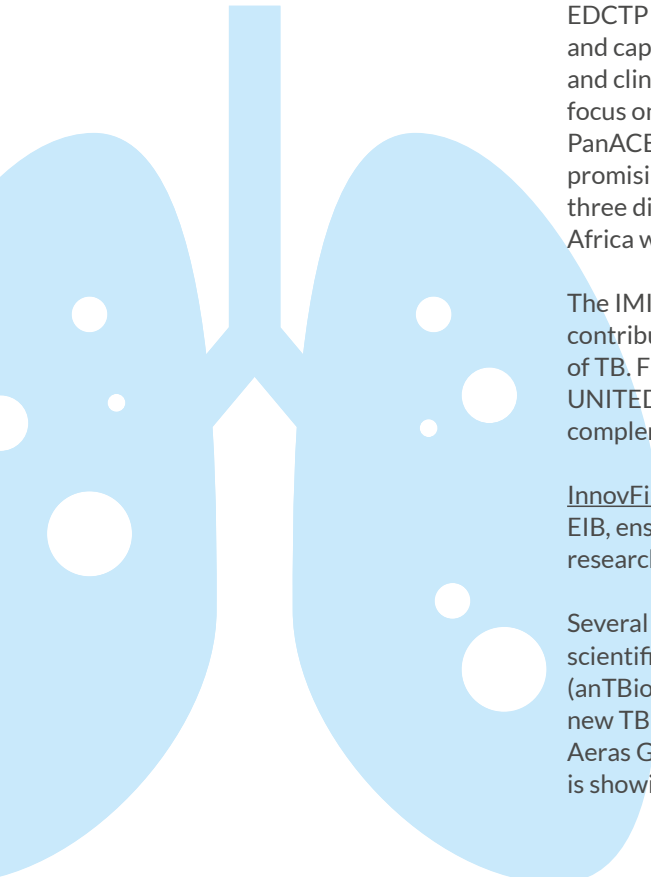
* For a more detailed account of the EDCTP projects, please see: CHAPS: <https://publications.edctp.org/international-partnerships-against-infectious-diseases/chaps>
PrEPVacc: <https://www.prepvacc.org> | PanACEA1: <http://panacea-tb.net> | PanACEA2: <http://www.edctp.org/news/panacea-2-new-tb-drug-tested-in-patients-for-the-first-time-in-south-africa> | MaMAH: <https://www.mamahproject.net>

4.7 TUBERCULOSIS (diagnostics)

Tuberculosis (TB) is a bacterial infection recognised as a global public health emergency by the WHO in 1993. Current estimations indicate that 10 million people suffer from TB and that the disease is responsible for more than 1 million deaths every year. Moreover, the emergence of drug-resistant TB increases the cost of all TB control programmes.

According to the WHO, drug-resistant TB is a major contributor to AMR worldwide and continues to be a public health threat. Drug resistance is a formidable obstacle to TB care and prevention globally, making it harder and longer to treat, often with poorer outcomes for patients. People with drug-resistant TB face significant economic and social costs and only 1 in 3 access quality care. Reaching the missing patients remains a significant public health challenge. The WHO and global health actors have been working with countries to strengthen drug resistance surveillance and to accelerate development of rapid diagnostics and treatments for drug-resistant TB. The current COVID-19 pandemic has had an enormous impact on TB, and estimations are that the restrictions that governments have put in place could cause an extra 6.3 million cases of TB in between 2020 and 2050, which in turn could constitute an additional 1.4 million deaths.

The EU has been sustainedly funding R&I in TB. Under the FP7, a total of 50 TB research projects were funded with total EU funding of €118 million. These projects focussed on basic and operational research, diagnosis, vaccine and drug development, as well as management of the rising threat of MDR-TB and extensively drug-resistant TB (XDR-TB). Under H2020, the EU is contributing to the WHO End TB Strategy to control TB by investing in the development of new tools against TB and delivery of healthcare solutions in countries with high disease burden. A total of €150 million has already been awarded for the development of diagnostics, vaccines and drugs, implementation of diagnostics in high burden settings, and for basic research to improve our understanding of the disease.



EDCTP has played an important role in TB research by supporting clinical trials and capacity-building in sub-Saharan Africa. Of the 84 collaborative clinical trials and clinical studies included in the EDCTP's portfolio, almost 30% (24 projects) focus on TB. One of the major investments of EDCTP in TB is the project PanACEA2. This is a drug development initiative, focusing on the selection of promising drug candidates and the design and conduct of clinical trials. In addition, three different TB vaccine candidates are in Phase II clinical trials in sub-Saharan Africa with EDCTP funding.

The IMIs AMR Accelerator programme is making a major contribution to the establishment of a new combination therapy to treat all forms of TB. Five different projects, RespiTB, TRIC-TB, PreDICT-TB, ERA4TB and UNITED4TB are addressing the development of the new pipeline and complementing each other.

InnovFin Infectious Diseases, a finance facility launched jointly by the EC and EIB, ensures that new drugs, vaccines and medical and diagnostic devices or research infrastructure for infectious diseases are made available faster.

Several consortia, funded through EDCTP and framework programmes, have scientifically contributed to the development of the next generation of TB drugs (anTBiotic project) and vaccines (TBVAC2020). At present, the clinical trial of a new TB vaccine candidate H56:IC31, developed by Statens Serum Institut, and Aeras Global TB Vaccine Foundation NPC (a South African affiliate of IAVI), is showing promise.

4.7.1

GeneXpert®

EDCTP investments in research into TB diagnostics (including studies from early-stage testing of biomarkers, evaluation of new and improved diagnostics, implementation of diagnostics in a real-life setting – projects TB-NET, TB-CHILD) have contributed to the development of GeneXpert®. Research on GeneXpert® has also been co-funded by the BMBF, among other donors.

The GeneXpert® test is a molecular test for TB, as well as testing for resistance to the drug Rifampicin. GeneXpert® has been developed by the FIND, which has partnered with Cepheid Corporation and the University of Medicine and Dentistry of New Jersey. In July 2020 Cepheid and FIND announced that a new test had been developed which could detect resistance to both first line and second line drugs. This development will mean that clinicians can find out in 90 minutes which drugs a patient is resistant to, and prescribe the correct treatment for both MDR-TB and XDR-TB. In March 2020, the Global Drug Facility (GDF) announced that it will include cartridges for rapid testing of COVID-19 in their catalogue of medicines available to the public sector. The cartridges can be used to detect COVID-19 in approximately 45 minutes in Cepheid's more than 23,000 automated GeneXpert® Systems worldwide. **Repurposing GeneXpert® illustrates how the global response to COVID-19 can be made by capitalising on the infrastructure being used to fight another disease, such as TB. In Africa, countries such as Benin or Niger are repurposing GeneXpert machines to test for COVID-19.**



4.8 SURVEILLANCE, PANDEMIC PREVENTION AND PREPAREDNESS

4.8.1

Research capacity in West Africa and pandemic preparedness

Following the Ebola outbreak in 2014, the EU (mainly through EDCTP grants)⁷⁸, the IMI Ebola+ programme and Germany (mainly through GIZ and KfW, often in cooperation with international and German NGOs), invested in a number of research consortia for epidemic preparedness and response, which have been effective in tackling subsequent outbreaks (e.g. cholera, yellow fever, Lassa fever).

Lessons learned from the Ebola 2014 outbreak and investments have allowed for a more effective response to the Ebola 2018 outbreak in DRC and to react to COVID-19 in a timely manner. In general, there has been a rapid response to the COVID-19 pandemic from African public health systems, well before any cases had been reported from the continent. Many African countries activated national emergency coordination bodies to manage the response and were prompt in implementing screening on arrivals, testing measures, or setting up quarantine facilities. In addition to enhanced epidemiological surveillance, laboratory capacities and standards, supported regional networks, and capacity development of health professionals in many countries, the establishment of the Africa CDC and European–African partnerships (e.g. PANDORA-ID-NET project) has decisively contributed to:

- integrating research during emergency infectious disease outbreaks, and
- better preparing African countries to respond to COVID-19 and other emerging outbreaks in the future^{79,80}.

4.8.2

SORMAS – a digital platform for disease surveillance and outbreak response, enhancing national epidemic preparedness and response capabilities

The SORMAS software, an initiative of the Helmholtz Centre for Infection Research (HZI) in cooperation with the Nigeria Centre for Disease Control (NCDC), grew directly out of the experience of tackling Ebola in Nigeria. It is one of few programmes to provide comprehensive disease surveillance and outbreak management functionalities in a single digital platform. SORMAS is a response to weak national capacities for disease surveillance and outbreak response that are threatening GHS in West Africa.

By early 2020, the platform had been introduced in two regions of Ghana and rolled out to 15 Nigerian states covering a population of some 75 million people. **To date, the platform covers more than 12 epidemic-prone, high-priority diseases, including COVID-19, and an ‘Emerging Disease X’ functionality allows for the immediate inclusion of new diseases as they emerge.** Strong national ownership and leadership of SORMAS has helped to leverage additional funding for the further scale-up of SORMAS from the Nigerian Federal Government, as well as from the EU, the American CDC, and the BMGF.

A specialised version for contact person management in the context of the SARS-CoV-2 pandemic has been developed, to support public health authorities in Germany⁸¹ and other countries in identifying and monitoring contact persons. At present, SORMAS-ÖGD is used by 14 health authorities in five federal states in Germany as well as in Nigeria, Ghana and Fiji, and will soon be used in Switzerland, Nepal and Côte d’Ivoire⁸².

4.8.3

Regional programme to support pandemic prevention (RPPP) in the ECOWAS region

RPPP supports the Economic Community of West African States (ECOWAS), in particular the West African Health Organisation (WAHO) and the Regional Centre for Disease Control (RCSDC) on pandemic prevention and control since 2017. The overall objective is to improve the functioning of country-specific monitoring and surveillance networks, detection and warning systems in the event of diseases of an epidemic nature within the ECOWAS region. RPPP supports ECOWAS Member States to better implement the IHR, including support to the National Coordinating Institutions (NCIs), connected to the RCSDC in the Member States. Since 2019, RPPP focuses on countries with an Emergency Operations Centre (EOC) and, during this year, additional funds for the response to the COVID-19 outbreak are addressing crucial needs. For instance, the drafting and implementation of national emergency, contingency and incident action plans for the COVID-19 outbreak are being supported in Nigeria, Togo, Liberia, Sierra Leone, and Guinea⁸³.

4.8.4

PROALAB programme – supporting a regional and cross-country approach to the strengthening of the epidemiological surveillance system in four countries in West Africa

In partnership with the WAHO and the KFW, the PROALAB project⁸⁴ contributes to improving the epidemiological surveillance network and laboratory systems in the ECOWAS region. It focuses on national and regional laboratories in four countries of the sub-region: Burkina Faso, Côte d’Ivoire, Nigeria and Niger. The PROALAB project is strengthening national and regional reference laboratories through needs-based financing of durable high-quality equipment that includes reagents, consumables and further capacity-building via cross-cutting themes towards ISO15189 accreditation. Through this work, a network of reference laboratories with trained laboratory experts was already operational when the new virus COVID-19 started to spread in the region.

4.9 HAEMOPHILUS INFLUENZAE TYPE B (HIB) VACCINE - GLOBAL DELIVERY



NEED FOR
14.000.000
DOSES

Hib is a leading cause of childhood bacterial meningitis, pneumonia, and other serious infections. Hib caused about 8.13 million serious illnesses worldwide in 2000 and can be almost completely eliminated through routine vaccination. Pneumonia is the single largest infectious cause of death in children worldwide: it killed 808,694 children under the age of 5 in 2017, accounting for 15% of all deaths of children under five years old. Pneumonia affects children and families everywhere, but is most prevalent in South Asia and sub-Saharan Africa. For the purposes of this study, Hib has been included due to its high mortality rate (especially among children under-five years of age) in LMICs and is preventable through existing vaccines. Pneumonia, on its part, is often treated with antibiotics, even when it is caused by a virus, and therefore antibiotics are ineffective – leading to increased AMR. GAVI support for vaccines to prevent causes of pneumonia (Hib and pneumococcal pneumonia) is estimated to have averted the need for up to 14 million doses of antibiotics from 2011–2015 and saved millions of lives.

The GAVI-funded Hib Initiative paved the way for low-income countries to introduce Haemophilus influenzae type b vaccines that protect against diseases like pneumonia and meningitis. The dedicated GAVI campaign for the Hib vaccine was launched in 2005, and involved the allocation of a four-year \$37 million grant, data collection, research and advocacy to help countries build a case for adopting the Hib vaccine. Coupled with the WHO recommendation in 2006 that Hib vaccines should be included in every national immunisation programme, the Hib Initiative was a rapid and widespread success. In 2000, only 3% of low-income countries administered the Hib vaccine; nowadays it is introduced in all of them. So far, 16 of these countries have started to fully self-finance their national vaccination programmes⁸⁵. A total of 28.3 million children are estimated to have been immunised against Hib by the GAVI initiative, with a significant direct contribution from the EU as funding member. GAVI's subsidisation of the combination pentavalent vaccine has also encouraged uptake by allowing low-income countries to introduce the Hib vaccine at the same time as protecting their children against four other diseases: diphtheria-tetanus-pertussis (DTP3) and hepatitis B (hepB).

The EC is a donor to GAVI since 2003, having provided €270 million from the Development Co-operation Instrument (DCI) and the intra-ACP envelope of the EDF for the period 2003 - 2020. In 2011, the EC funded GAVI with €20 million to respond to the increasing country demand for vaccines, which allowed close to 40 GAVI-eligible countries in the African, Caribbean and Pacific region to benefit from the pentavalent vaccine (Hib, DPT3 and hepB). The EC financial contributions to GAVI for the period 2016 – 2020 represent 3.4% of GAVI's total direct funding.

Germany contributes to GAVI since 2006 through direct contributions via both, the BMZ and KfW. The 2013 Vaccine Summit in Abu Dhabi marked Germany's first multi-year commitment to GAVI by a pledge of an additional EUR 90 million over 2013–2015. Part of this funding supported GAVI's programmes in the East African Community (EAC) and complemented KfW funding (on behalf of the BMZ) in Tanzania to introduce the pentavalent vaccine in the nation immunisation programme. In January 2015, Germany pledged EUR 600 million for GAVI over the 2016–2020 strategic period, a turning point in Germany's history of increasing its support for GAVI. German contribution to GAVI for the period 2016–2020 represents 9.6% of GAVI's total direct funding.

4.10 A NOTE ON ANTIMICROBIAL RESISTANCE (AMR)

7,496
PROJECTS

141
FUNDERS

\$ 5.6
BILLION

AMR is a neglected global crisis that requires urgent attention and action. AMR threatens a century of progress in health and achievement of the SDGs and is a major threat to GHS. AMR is a risk for developing new epidemics since resistance is the “silent menace”. Deaths caused by AMR are difficult to be attributed to AMR but are rather associated to infectious diseases, and especially in LMICs they are very often associated to PRNDs. In this regard, a better measurement of AMR-caused morbidity and mortality is needed. Since AMR is always linked to other infectious diseases, decreasing resistant bugs resulting from R&I in AMR will benefit the fight against other current or emerging bacteria or viruses. On the other hand, during the COVID-19 pandemic, there has been an overuse of antibiotics in the treatment of supposed pneumonia or mild symptoms, having an adverse impact on the fight against AMR. Due to the paucity of data, the burden of AMR and its full impact on African countries is unknown. Estimations suggest that countries in sub-Saharan Africa and other LMICs that already have a high burden of infectious diseases will be disproportionately affected by AMR. By 2050, the mortality rate in Africa due to AMR could be almost ten times higher than that in North America and Europe.

The sources of information for the identification of success stories include the EU R&I databases (EDCTP, CORDIS), the Joint Programming Initiative on Anti-microbial Resistance (JPIAMR projects from mapping database 2017) and the Global AMR R&D Hub. **The 2020 annual report of the Global AMR R&D Hub tracks a total of 7,496 projects from 141 funders with a total investment of \$5.6 billion. The analysis of the geographical distribution of international funding shows that, in Africa, only South Africa is receiving a certain level of funds.**

Several EDCTP2-funded projects focussed research on diagnostics and appropriate treatment for PRNDs, including strains of pathogens that are drug resistant, as well as on support for pharmacovigilance capacities. However, the review has not identified relevant success stories in the field of AMR involving European and African partners. Although the African Union and the African Academy of Sciences are promoting projects, and there are several African research teams working in this field, their participation in international AMR research networks or consortia still seems to be limited. The African Association for Research and Control of AMR does not seem to be associated to similar international networks. ReAct Africa, which is part of the global network ReAct, is providing technical assistance in the development and implementation of the National Action Plans in several African countries, as a result of the 2015 World Health Assembly endorsement of the Global Action Plan on AMR. ReAct could eventually serve as a reference to explore the development of further cooperation between African and European research centres. African presence in the 2019 Global AMR R&D Hub Workshop is reported to have been very limited.

The EU, through several funding mechanisms and initiatives, is supporting a large number of research projects, some of which are showing promising results. Although a review of ongoing European research projects on AMR is outside the scope of this study, it is worth highlighting the efforts to scale up rapid diagnostic tests of resistance in hospital settings (BLDETECTOOL), funded by EIT Health.

5



Photo: A laboratory technician looks up from a microscope as she works in a lab in DRC. Courtesy of PATH/Felix Masi. All rights reserved

GLOBAL HEALTH SECURITY NARRATIVE

KEY MESSAGES

The COVID-19 pandemic will radically modify the perceptions about health threats and what GHS means not only for policy-makers, international agencies and academics, but also for the general public across the globe.

Under the current pandemic, the political concern about health security has reached historic proportions. The GHS narrative is now at the forefront of domestic and global priorities, receiving the attention of policy- and decision-makers.

GHS is questioned in Europe because of the ambiguities in its definition, its link to security, defence and national interests, and military engagement in “global health operations”. The militarisation of global health is threatening the very concept of GHS.

In Africa, GHS is barely known and is interpreted as an attempt to protect Europe from African infectious diseases. The perception of what constitutes a health risk or a health threat differs between African and European actors. PRNDs are familiar diseases for African health systems, which tackle the challenges posed by PRNDs and regular outbreaks daily. In Europe, however, they are less known and are frequently perceived as “imported” pathogens.

In the search for prevention, diagnostics and treatment tools and strategies to fight against COVID-19, much of the research being done is building on the successes achieved in previous research carried out on PRNDs and emerging diseases over the last 30 years. Had there not been any investment in these areas over the last decades, the fight against the current pandemic would have been much harder and much longer.

During the COVID-19 crisis, existing global health partnerships have been able to swiftly react to limit the secondary impacts from COVID-19, and to develop new partnership modalities to respond to an unprecedented pandemic. Taking into consideration the controversies and debates around the GHS concept, One Health appears as a complementary approach to overcome some of the shortcomings of the GHS narrative. Evidence indicates that health systems adopting a One Health approach strengthen surveillance on zoonotic transmissions, and make the detection of an emerging zoonotic disease more likely and timelier, which results in interventions that are significantly more cost-effective.

5.1 BACKGROUND

The concept of GHS is becoming better known and accepted in public health literature and practice⁸⁶, yet there is no international agreement on its scope and content. This results in disparate interpretations and a lack of consensus in the academic literature about the concept of GHS. However, it can be expected that the COVID-19 pandemic will radically modify the perceptions about health threats and what GHS means not only for policy-makers, international agencies and academics, but also for the general public across the globe. Policy-makers and populations alike realise now that outbreaks represent a critical threat for the entire world, efforts to close borders to prevent spread have failed, and high-capacity health systems (which were meeting IHR standards) have fared no better than countries with weaker health systems. So far, it seems that some policy-makers in HICs have perceived infectious diseases that are killing most people today – HIV & AIDS, TB and malaria—as less of a threat and, therefore, these have been addressed for the most part in humanitarian terms rather than as health security issues.



Photo: Laboratory workers in Kenya. Courtesy of PATH/Eric Becker. All rights reserved.

“There have been gaps in GHS, because PRNDs were not in the agenda.”

Interviewee in Europe

Even if COVID-19 represents a turning point in global awareness regarding the threats posed by infectious diseases, GHS will certainly not work if actors in LMICs essentially perceive it as a strategy to protect the lives of people in HICs from threatening infectious diseases. **Most interviewees in Africa have expressed their concern about a Euro-centric interpretation of GHS and have highlighted that, at present, African actors are strategic partners in finding solutions to global health challenges that affect the whole world, rather than being part of the problem⁸⁷.**

“Global health is OK, but GHS is not a familiar concept here. Concepts mean different things for different people, and here people are worried for their day-to-day survival. The pandemic will have an impact on morbidity and mortality but (..) it’s our daily life”. Researcher in Africa

5.2 CRITICISM OF THE CONCEPT OF GHS (CONS)

5.2.1

Ambiguous definition and insufficient awareness

The responses of many interviewees made it clear that the definition of GHS is ambiguous, and there is not a broad consensus on the meaning of the concept. GHS has different meanings for different people in different places, and GHS is open to a variety of interpretations. Policy-makers in HICs emphasise the protection of their populations against external health threats, while health workers and policy-makers in LMICs understand the term in a broader public health context, frequently in relation to the IHR, or in terms of emerging diseases.

The issue in this case seems to be twofold. Firstly, the definition of GHS is an intersection of several fields that do not share a common theoretical approach or academic methodology. This creates confusion among academics and key players. Secondly, the ambiguity in the narrative also seems to occur on a geopolitical level. The term is perceived and interpreted differently across different countries, regions and even universities. Finally, it is worth mentioning that in both continents, African and European global health professionals are not necessarily familiar with the concept of GHS, nor do they have a clear understanding of it.

“As an African, GHS is a new term for me. We are used to talking about diseases and poverty, not about threats. Sick people do not think about international relations.” Interviewee in Africa

5.2.2

Securitisation of health

One of the main criticisms of the GHS concept is the fact that it contributes to the securitisation of health. This means that global health challenges (which require collective action and a sound understanding of root causes and effects, as defined in international frameworks) are mainly addressed by governments as external threats to national stability. Until recently, the securitisation of health simplified complex international health issues as highly virulent infectious diseases or bioterrorist threats.

The adoption of a “threat protection” mindset has resulted in the merging of global health with foreign policy, geopolitical interests or national defence agendas, and a stronger emphasis on “exported” infectious diseases by hostile States, “imported” by irregular migration, or biological weapons. Although the “defence”⁸⁸ and “national interest” interpretation of the GHS concept is predominant in the USA, it has also been ambiguously used by the UN in some circumstances⁸⁹, or adopted by the EU⁹⁰ and Member states as part of National Security Strategies⁹¹. **This interpretation of GHS disregards critical components of the broader concept of global health, such as health inequities, global burden of disease, universal health coverage, R&I in PRNDs or the right to health.** Also, it may result in a disconnection from fundamental existing human development frameworks like the SDGs or human rights.

An example of this approach is the reaction to the Ebola epidemics in 2014, which have shown diverse applications of the GHS concept by multilateral agencies. In 2014, the UN Security Council approved a resolution on the outbreak of Ebola fever in West Africa that explicitly described it as an infectious disease that threatened peace and security. The Security Council thus launched the first collective health mission of the UN (the United Nations Mission for Ebola Emergency Response, UNMEER). However, the protection of public health is a constitutional task of the WHO, and the Ebola Interim Assessment Committee advised against the establishment of a full UN mission in the event of future health crises, and strongly recommended that Member States further support the WHO’s health emergency response capacity, its role and cooperation with the wider health and humanitarian systems, as well as the implementation of IHR⁹².

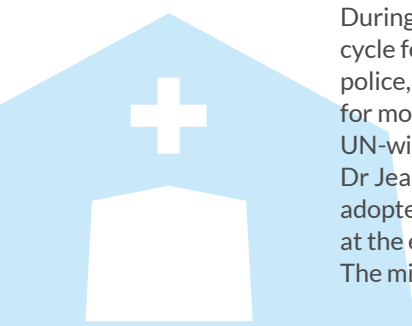
The securitisation of health has also resulted in an uneven distribution of funding for diseases that are politically perceived as critical national security risks, such as HIV & AIDS or Ebola. This distribution of international funds is not completely based upon global burden of disease or health equity perspectives, but more on the likelihood of a disease endangering national stability, global trade, finance or travel to HICs, reversing global health responses from their historic people-centred values to a narrow understanding of health as a national security risk. This lack of correlation between allocation of funds and global burden of disease has been described in the academic literature for years⁹³. Several studies highlight the “mismatch between the disease burden and allocated funds⁹⁴” and “a lack of alignment between disease burden (...) and funding⁹⁵”, as described in section 3.1.

5.2.3

Militarisation of health

The securitisation of global health has resulted in the militarisation of global health. The past two decades have seen a greater military engagement in global health [security] operations⁹⁶. A turning point in putting the national defence-GHS concept into practice was the deployment of military corps (USA, China, Canada, France, Germany, UK) to the 2014 West African Ebola outbreak. Increasing military “global health” operations have given the military a place at the table within the GHS regime: militaries have become key actors of the GHS Agenda⁹⁷. **The increasing militarisation of international aid, particularly global health programmes, has resulted in increasing attacks and deaths of health – and humanitarian – workers. It also jeopardises community acceptance of essential public health interventions (e.g. vaccines) which, paradoxically, are the central element of the GHS concept (disease prevention and control).**

During the last Ebola outbreak in DRC, MSF described how the Ebola response was caught in a vicious cycle for many months. Mistrust bred insecurity, which led to the deployment of more military and police, which in turn resulted in further mistrust. The proposal by the WHO and the government for more armed protection was another iteration in an endless cycle, and came at a time where the UN-wide Ebola emergency coordination was working to somehow “demilitarise” it. Only when Dr Jean-Jacques Muyembe was appointed to lead the efforts, and a community-based approach was adopted, did the outbreak gradually start to be brought under control. Until then, people suffering at the epidemic’s epicentre increasingly viewed the Ebola response as the enemy, not the solution⁹⁸. The militarisation of global health is threatening the very concept of GHS.



5.2.4

“Us versus them paradigm”

A nationalistic and “self-interest” approach to GHS contributes to weakening the idea of shared responsibilities for international global health actors, by creating an “us versus them” paradigm, and encouraging the concept of global health issues as external dangerous threats, rather than as emerging challenges that need to be solved collectively. The “us versus them paradigm” carries in its DNA the denial of the universality of human rights and the right to health, the rejection of the principle of equity, the deconstruction of the global health cooperation architecture, and the threat to global health achievements.

Moreover, the “us versus them paradigm” implies a sense of political, social, economic or technological superiority (in general, among HICs feeling “at risk”) which denies the possibility of learning from countries (in general LMICs) that have developed vast experience in responding to outbreaks (e.g. cholera, malaria, Ebola) and tackling infectious diseases. Interviewees in African countries associate the term GHS with the “us versus them” paradigm and consider it a European approach to protect Europe and keep PRNDs in Africa within Africa. LMICs seem more unlikely to accept a GHS justification for international agreements that are not perceived to fairly benefit all countries. Interviewees in Africa have highlighted their experience in the fight against infectious diseases and outbreaks, which still today remain a daily challenge for African health systems and programmes, in contrast with Europe, where infectious diseases are nowadays perceived as “imported” diseases. European and African priorities, and perceptions of health risks, differ significantly, as seen in the COVID-19 pandemic.

“We have worked on TB for a long time. In a highly globalised world, the nature of our work is also global, and we go beyond nationalistic approaches. We have to care about our neighbour’s problems.”

“We have here thousands of deaths by TB every year and we have never seen these measures taken here before.”

“This unprecedented focus on a single disease (COVID-19) has a huge impact on access to care, additional delays in TB diagnosis, and dropping of continuity of ARV treatment, which are our ongoing epidemics here.”

Researcher in Africa

5.2.5 Distorted risk

The current global health landscape is very fragmented and, frequently, nations and organisations pursue their own objectives while leaving aside other important global health issues. National interest is a driver of fragmentation, especially when countries claim their interest comes first. Criticisms have been raised about the way in which a predominantly North American and European interpretation of risk and susceptibility has been used to define the health security discourse internationally⁹⁹. With substantial financial and political power, many high-income countries are able to impose their own foreign policy priorities and state security interests on the design and implementation of large-scale global health and humanitarian programmes. The fact that the attention given to global health issues is parallel to their perceived danger by HICs is a theme that emerged from the interviews.

“We have been using it (GHS) mainly because we needed to receive funding, not for any other reason.”

Researcher in Africa

5.3 OPPORTUNITIES IN THE USE THE CONCEPT OF GHS (PROS)

5.3.1

Political and financial opportunity

Under the current pandemic, the political (and financial) mobilisation to respond to COVID-19 and the political concern about health security have reached historic proportions. In past years, North America and Europe have set up GHS units or bodies at different government levels. COVID-19 has reinforced their legitimacy and raison d'être – the GHS narrative is now at the forefront of domestic and global priorities, receiving attention of policy- and decision-makers.

Previous global health risks have mobilised relevant financial resources: USA disbursements in response to outbreaks have reached \$1.1 billion for Zika and \$5.4 for Ebola in West Africa. In the UK, the Department for international development (DFID) has committed considerable financing to the DRC Ebola outbreak. In the USA, the FY2021 budget request includes a small boost to United States Agency for International Development (USAID) GHS account—adding a further \$15 million to this account— while cutting more than \$3 billion in overall global health programmes¹⁰⁰.

Now, the massive global financial mobilisation not only to respond to the pandemic but also to mitigate the impact of the social and economic crisis and to invest in recovery is estimated in trillions. An analysis of the data available on the [Devex funding database](#) reveals \$20.5 trillion committed to the COVID-19 response between January 1 and October 18. Although it is not totally clear yet how COVID-19 funds will be channelled, pandemic preparedness and response to existing or emerging infectious diseases will probably be part of domestic and international priorities.



The Global Health Security Agenda

The launch in February 2014 of the GHSA was an effort to build countries' capacities to prevent, detect, and respond to infectious disease threats (whether they be due to accidental, natural, or intentional causes). The GHSA has grown to include 69 countries, international organisations, and non-governmental organisations (including the EU and some EU member states). In the USA, following a whole-of-government approach, Congress allocated \$1 billion for the GHSA until 2019. In FY2019, funding for GHS was \$504 million.

"It (GHS) would certainly resonate much better in Europe than before, if it is communicated as the right thing. I hope that the narrative on GHS gets balanced out properly, or maybe this is what the narrative of GHS needed, because this is a good moment to talk about health systems strengthening. Providing better health is no longer an option, it is a responsibility. We have seen that we certainly weren't invincible, and that we were all interconnected"

Programme manager USA Foundation

In the search for prevention, diagnostics and treatment tools and strategies to fight against COVID-19, much of the research being done is building on the successes from previous research on PRNDs and emerging diseases in the last 30 years. The section on success stories provides key examples of malaria, HIV, Ebola drugs, vaccines and tools being now repurposed and applied for COVID-19. Had there been no investments in these areas over past decades, the fight against the current pandemic would have been much harder and much longer.

5.3.2

Scientific opportunity

The scientific and financial investments currently made to repurpose drugs and vaccines used to combat PRNDs and emerging diseases for the fight against COVID-19 (as some of the previous success stories illustrate) demonstrate the critical importance of having kept a research agenda on infectious disease, emerging pathogens and supported health systems to be better prepared for outbreaks. From a European perspective, **EDCTP has played a central role and is now reinforcing its catalytic role thanks to the activation of its emergency funding mechanism to support 22 international partnerships that are helping countries in sub-Saharan Africa prepare for and manage the COVID-19 pandemic.** To some extent, the COVID-19 pandemic could represent an opportunity to justify the importance of investing in PRNDs. If results derived from R&I in PRNDs are finally effective in the fight against COVID-19, as previously presented, scientific efforts addressing infectious diseases and threatening pathogens should gain renewed attention and be at the top of the research agenda in the long term.



Photo: Ernesto Eslava on Pixabay

5.3.3

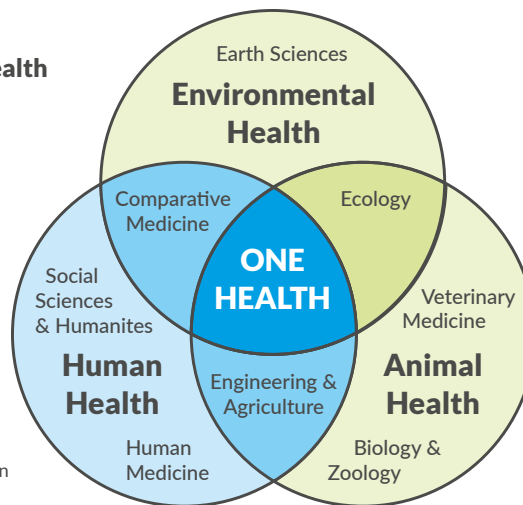
Renewed global health partnerships

One central challenge in these times of pandemic is building a system that, on the one hand, ensures the protection of individual citizens from emerging health threats and, on the other hand, assumes global responsibility to contribute to better health outcomes of the world population. To achieve this, international cooperation and partnerships are essential. There are many effective “traditional” global health partnerships that have been set up before COVID-19 – for instance, the GFATM or GAVI were put in place to make transformational changes in global health. During the COVID-19 crisis, these existing partnerships have been put to the test but have also been able to swiftly react to limit the secondary impacts from COVID-19 and to develop new partnership modalities to respond to an unprecedented pandemic. The WHO COVID-19 Response Fund, the COVID-19 Vaccines Global Access (COVAX) facility, or the Access to COVID-19 Tools (ACT) Accelerator are examples of new partnerships, built on years of previous cooperation, that play a critical role in developing new tools for COVID-19.

5.4 ONE HEALTH AS A COMPLEMENTARY APPROACH TO GHS

The term “One Health” was first used in 2003–2004, and was associated with the emergence of SARS in early 2003, and subsequently with the spread of highly pathogenic avian influenza H5N1, and with the series of strategic goals known as the “Manhattan Principles”. The One Health approach is based on a holistic view of the interface between human, animal and ecosystem health domains.

Fig. 9 One Health



Source: own elaboration

One Health is integrated in many international cooperation, development and global health frameworks and, with different modalities and intensities, has also been adopted by bilateral and multilateral institutions (UN, WHO, EU and the USA). The EU and the American CDC have been using the concept for years. The One Health concept has even been legally adopted in the EU Health Security framework. The EU makes use of zoonosis monitoring activities, which are presented in the “European Union One Health Zoonoses Report,”¹⁰¹ and in the past has funded One Health programmes mainly in Asia through DG INTPA.

The American CDC, One Health Office¹ leads One Health efforts in the USA and abroad. Parallel to this, the UN have incorporated One Health into the SDGs, stating that the SDGs embody a One Health strategy. The Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE), the WHO and the United Nations Children’s Fund (UNICEF), have collaborated with the World Bank to elaborate global action frameworks. As a result of COVID-19, Germany has recently put One Health as a key area of its international cooperation policy and the German government is currently elaborating a new One Health strategy involving research centres and NGOs. **In October 2020, Germany announced the creation of a new One Health priority area at the BMZ, with a preliminary investment of €30 million to set up the first One Health pandemic centre in Kenya, to promote knowledge sharing on human and animal health.**

However, despite broad international support, implementing One Health approaches in practice still proves challenging. Most countries lack formal mechanisms for coordinating and integrating activities across the human health, agricultural, and environmental sectors. As a result, practical applications of One Health approaches have largely been ad-hoc, resulting in delayed or incomplete prevention and control measures. There is also a need for formal standardised analyses showing the added benefits of One Health over conventional approaches in disease prevention and control. A growing body of research, including studies that reveal the financial benefits of One Health investments in addressing emerging zoonoses, is building the evidence base for One Health¹⁰².

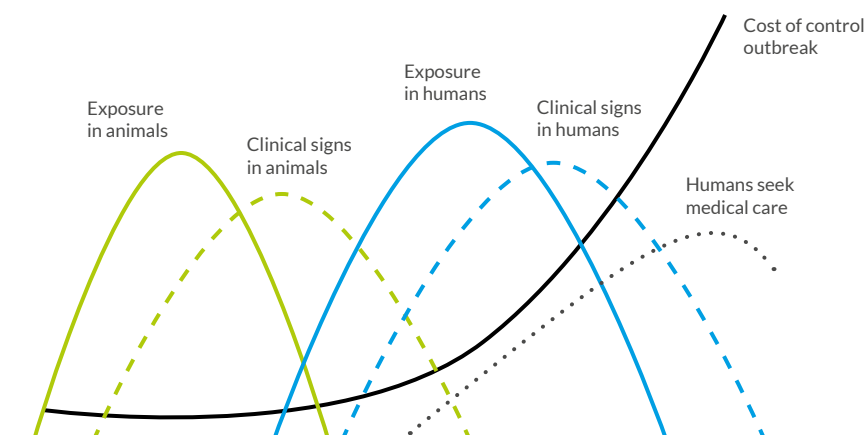
Taking into consideration the controversies and debates around the GHS concept, One Health appears as a complementary approach to overcome some of the GHS narrative shortcomings, although these terms are not interchangeable. Some strengths (and complementarities) of the One Health approach are presented below.

5.4.1

One Health and pandemic prevention

One of the advantages of consistently implementing the One Health approach is highlighted by the importance of early detection in animals for reducing the impact on human lives and the huge financial, social and political burden of pandemics (see figure below). Evidence provided by the World Bank¹⁰³ and the WHO¹⁰⁴ indicates that health systems adopting a One Health approach strengthen surveillance on zoonotic transmissions, and make the detection of an emerging zoonotic disease more likely and timelier, which results in interventions that are considerably more cost-effective.

Fig. 10 Cost of control outbreak



Source: World Bank

One Health represents a way of successfully preventing localised epidemics and continental pandemics, approaching human, animal, and environmental health as one unit. Cooperation between the health, agricultural, food, and climate-change-mitigation sectors is therefore essential to prevent further epidemics and pandemics¹⁰⁵.

“Funding schemes have essentially targeted human health. They should include animals, antibiotics, environment, farm settings.”

Interviewee in Europe

5.4.2

Emerging infectious diseases and zoonoses

With all the focus on human-to-human transmission and the health, social and political consequences of COVID-19, one could almost forget that the current pandemic most likely originated from a zoonotic transmission. The 13 top-ranked zoonoses were responsible for 2.2 million human deaths and 2.4 billion cases of illness every year¹⁰⁶, and through the continuing globalisation, growth of human population and uncontrolled increases in land use, the danger of new zoonotic transmissions increases the risks to the health security of countries around the world.

Emerging zoonoses with pandemic potential are a priority for the GHS agenda, but endemic zoonoses also have a major societal impact in low-resource settings. Many endemic zoonoses can be addressed locally, but timely diagnosis and appropriate clinical management of human cases are often challenging. Preventive “One Health” interventions (e.g. interventions in animal populations that generate human health benefits), may provide a useful approach to overcoming some of these challenges¹⁰⁷.

5.4.3

AMR

Addressing the rising threat of AMR requires a holistic and multisectoral approach which is embedded into One Health – because antimicrobials used to treat various infectious diseases in animals may be the same or similar to those used for humans. Resistant bacteria arising in humans, animals or the environment may spread from one to the other, and from one country to another. WHO, the FAO and the OIE speak with one voice and take collective action to minimize the emergence and spread of AMR.

CONCLUSIONS

The massive mobilisation of a large variety of actors to support COVID-19 R&I and raise funds (e.g. ACT-Accelerator) would not have been as effective without decades of global partnerships on PRNDs. International alliances, public-private partnerships, and product development partnerships, specifically developed in the field of global health, have now enabled new forms of cooperation between governments, international agencies, financial institutions, private sector, universities and research centres to more effectively address the challenges posed by COVID-19. In the past, public-private partnerships have been a powerful and effective approach to develop vaccines and drugs for PRNDs, and emerging and infectious diseases (e.g. Ebola¹⁰⁸). At present, new partnership modalities for tackling COVID-19 are at the heart of the response to the pandemic and are showing the critical importance of concerted mobilisation to find solutions, despite remaining underfunded.

European and African political efforts, as well as joint financial and scientific investments in PRNDs over the past three decades, have been essential in facilitating timely and effective research on COVID-19 and in developing tools to prevent, diagnose and treat COVID-19 (and other potential outbreaks). The EU and Germany have the opportunity to capitalise on investments made in PRND R&I and reinforce their position as major players in global health. One of the initial reactions of the international scientific community to rapidly develop new tools (e.g. drugs, vaccines, tests) and implement effective public health measures for COVID-19 (e.g. social distancing, test, track and trace) has been to draw on the results and progress made in Africa in the fight against infectious diseases in general and PRNDs in particular, as well as other emerging diseases (e.g. Ebola). Drugs and vaccines that were developed, tested, and implemented for PRNDs or Ebola in cooperation between African and European partners are currently being repurposed for COVID-19 and are reinforcing global capabilities to respond to future outbreaks.

Sustained EU and German investments to support health systems, research capacities and preparedness to outbreaks in Africa in past years, have allowed many African countries to react in an efficient and timely manner to the COVID-19 pandemic and become essential partners in the global response and mobilisation. Research and advances in the immunology, vaccinology or virology of HIV (and other viruses) made by African actors are facilitating the understanding of COVID-19. The experience gained in the response to previous epidemics (malaria, TB, HIV, Ebola) has provided examples and learnings on how to deal with COVID-19. African research platforms, laboratories, health professionals and facilities are responding to national needs, providing health care to COVID-19 patients and, at the same time, participating in international clinical trials to support the development of new tools as part of the global fight against COVID-19. Some rapid diagnostic tests developed to make them affordable and available in LICs for PRNDs, such as malaria, are now being adapted for COVID-19 and used globally.

Global health interventions and funding for PRND and AMR R&I have contributed, even in a context of chronic underfunding, to developing new diagnostic and therapeutic tools that are essential to keep epidemic diseases under control and save lives during outbreaks. In addition, support and funding for pandemic preparedness have been side-lined by the international community. It is crucial to further mobilise political, institutional and financial support to secure the achievements made so far, continue progressing in infectious disease control, and significantly reinforce prevention and preparedness for global health risks.

Massive political and financial mobilisation to respond urgently to pandemics (such as COVID-19) should not be at the expense of continuing to invest in PRNDs and AMR, as this jeopardises key achievements made in controlling other infectious diseases of epidemic nature that represent major threats in terms of GHS. A sudden reallocation of funds and resources to the emergency response to COVID-19 (or other pandemics) results in weakened health systems and programmes around the world, and particularly affects those countries that had made the most progress in controlling PRNDs and infectious diseases. Maintaining investments in PRNDs and AMR R&I is crucial not only to avoid increases in the HIV, malaria and TB global burden of disease but also because it has proved helpful in preventing and combating pandemics (e.g. COVID-19). Interviewees, especially in Africa, have expressed concern about the impact of COVID-19 on other infectious disease programmes, not only as regards excess deaths but also in terms of diversion or reallocation of resources. African countries that are not as severely impacted by COVID-19 as European countries have adopted similar strict protection measures (e.g. lockdowns, quarantine), which have negatively impacted on the capability of the health systems to continue providing universal health care and treating existing epidemics (malaria, HIV and TB).

CONCLUSIONS – PART II

Despite being the root causes of most recent epidemics, little attention and effort is being paid to tackling zoonoses and animal-human transmission of diseases. Funding and institutional support for multisectoral interventions (environmental, animal and human health) under the One Health approach (or comprehensive GHS interventions) seems to be much weaker than support for other global health challenges. Paradoxically, evidence clearly shows that investments in prevention, surveillance, detection and control of zoonotic infectious diseases, including environmental actions, are much more cost-effective than public health interventions, once the disease affects human populations.

Global cooperation, multisectoral partnerships and community participation are key pillars for effectively developing new tools and strategies to tackle the challenges posed by PRNDs, AMR and pandemics. The selection of success stories and the learnings from responses to outbreaks in Africa (including COVID-19) show the added value of developing comprehensive global health approaches involving European and African actors, putting people at the centre and building solid partnerships between international agencies, governments, communities, scientists, private sector, philanthropy and non-profits. Furthermore, it is important to realise that cooperation between a large variety of stakeholders is essential for a strong GHS – GHS will always be as strong as the weakest actor.

GHS allows for a powerful narrative to advocate for investments in AMR and PRNDs representing a major global threat, although reluctance among some African and European actors should be expected and addressed. UHC should be one of the pillars of GHS strategies, as clearly highlighted by the WHO and other global health actors. Access to essential health services, early detection, and proper and affordable health care are some of the most cost-effective interventions for detecting and reacting to potential outbreaks. GHS interventions will be instrumental to bridging certain gaps in pandemic prevention, preparedness and response. However, they will not be effective enough without decisively revamping R&I capabilities, strengthening health systems, supporting universal health coverage, involving affected communities and comprehensively addressing animal, human and environmental health. The way in which interviewees in Africa have previously been in contact with GHS has resulted in scepticism. Among European actors, especially researchers and CSOs, there is greater familiarity with the concept yet moderate support. On the one hand, ensuring the safety of citizens is the main priority of European governments under the current pandemic, and the notion of security is recognised as a key entry point to advocate and discuss with decision-makers and political actors. On the other hand, the geopolitical connotations and limitations of the GHS approach are questioned by global health professionals.

One Health is getting increased attention in the global health agenda, and Germany's renewed commitment and investments in this field might represent an opportunity to support more ambitious strategies for addressing health risks of zoonotic origin and preventing disease outbreaks. The elaboration of a German strategy on One Health (ongoing at the time of writing this report), in coordination with researchers and CSOs, is perceived as a new and consistent approach to positioning Germany as a global reference in this field. This move could be welcomed by many European actors, since the concept of One Health was more familiar and preferred by European interviewees.

The lack of relevant European-African partnerships or joint research initiatives in AMR should serve as a warning to reinforce cooperation in this field, putting AMR higher on the agenda of bilateral relations, and to increase funding for consortia involving research centres of both continents. The estimated burden of disease and high mortality associated with AMR in Africa deserve urgent attention both from African and European institutions. Understanding the magnitude of the problem in Africa should be the starting point to set up a R&I agenda, define key priorities and identify common areas of scientific and political convergence.

The introduction of more diverse and more complex medical innovations in African countries resulting from R&I on COVID-19 will probably require more efficient and nimble national regulations and public bodies. Health regulatory aspects in many African countries seem to be insufficiently developed, and little progress has been made to set up the African Medicines Agency in past years. European cooperation with African countries in this field is scarce and deserves further attention to grant equity of access to new health products, ethical standards, and patient safety in the region.

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 - Enhancing individual and institutional infectious disease outbreaks response capacities of healthcare professionals to mitigate infectious emergencies in the Northern Uganda region – EDCTP-CSA-Ebola-337
 - Enhancing capacity for phase 1 clinical trials in Uganda - EDCTP-CSA-Ebola-353
 - Building research capacity in clinical management of infectious diseases at two main adult government hospitals in Freetown, Sierra Leone – EDCTP-CSA-Ebola-360
 - Strengthening laboratory capacities in the St. Joseph's Catholic Hospital (Monrovia) for clinical trials on infectious diseases – EDCTP-CSA-Ebola-334
 - Institutional capacity development for multi-disciplinary health research to support the health system rebuilding phase in Sierra Leone – EDCTP-CSA-Ebola-355
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- 84 PROALAB was commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ)
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ANNEXES

ANNEX 1: OVERALL PERCEPTION ABOUT THE GHS CONCEPT AMONG INFORMANTS

The following table shows stakeholders' perceptions with regards to GHS, collected during the interviews. The table is only a way to visually depict overall impressions and has not any statistical significance.

The organisations with which the interviewees were affiliated have been categorized in five different "types" of organisations: International organisations, universities (including research centres), government officials (national but also supranational), non-profits and international health cooperation programmes. A total of nine were categorized under "University", 13 under "Non-profits" (consisting of NGOs, public-private partnerships and foundations), four under "International organisation", two under "government" and two under "International cooperation health programmes".

As depicted in the table, from the 30 stakeholders interviewed, 19 came from the EU, and from these 19 stakeholders, 5 came from Germany. 3 of the German interviewees were almost completely unaware of the GHS concept, whereas the remaining 2 German stakeholders expressed a negative opinion. A total of 8 stakeholders stated a clear negative opinion with regards to the usage of the global health security concept. These stakeholders were from Africa or from the EU including the two from Germany.

Six stakeholders came forth with a positive opinion on the usage of global health security, and five out of six of these stakeholders came from North America.

A total of 12 stakeholders made clear that they had a neutral opinion upon the usage of GHS, often combining negative and positive perceptions. Also, these stakeholders came from either Africa or the EU, but not Germany.

Four stakeholders, of which three were German, were almost completely unaware of the concept, and could not provide a well based opinion during the interviews.

It is clear that there were almost no African stakeholders positively supporting the usage of the GHS concept, and in the EU the opinions were mostly neutral, some negative, and only one positive.

Fig. 11 Author's analysis of stakeholders' views on the usage of global health security concept

Country	Type	Continent	GHS
Switzerland	Intern. organisation	Europe	A =
Uganda	University	Africa	A =
Uganda	University	Africa	A -
South-Africa	Government	Africa	A -
USA	Non-profit	America	A +
UK	Non-profit	Europe	A =
Netherlands	Non-profit	Europe	A =
Netherlands	University	Europe	A -
USA	Non-profit	America	A +
Germany	Program	Europe	U
Netherlands	University	Europe	A =
Spain	University	Europe	A =
Germany	Program	Europe	A -
Switzerland	Non-profit	Europe	A -
Germany	University	Europe	A +
Switzerland	Non-profit	Europe	A =
Germany	Non-profit	Europe	U
Germany	Non-profit	Europe	U
Belgium	Intern. organisation	Europe	U
USA	Non-profit	America	A +
South Africa	Non-profit	Africa	A =
Switzerland	Government	Europe	A =
Spain	Non-profit	Europe	A -
Spain	University	Europe	A =
USA	University	America	A +
Kenya	Intern. organisation	Africa	A =
Mozambique	University	Africa	A =
USA	Non-profit	America	A +
Belgium	Intern. organisation	Europe	A -
Germany	Non-profit	Europe	A -

A + Aware of the concept and a predominately **positive opinion**
A - Aware of the concept and has a predominantly **negative opinion**
A = Aware of the concept and has a **neutral opinion**
U **Unaware** of the concept, or does not use the concept

ANNEX 2: LIST OF INTERVIEWED ORGANISATIONS

African Academy of Sciences (AAS)

Amsterdam Institute for Global Health and Development (AIGHD)

Bill and Melinda Gates Foundation (BMGF)

Centre for Health Security: John Hopkins University

Christoffel-Blindenmission (CBM), Germany

Department of Science and Technology: South Africa

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) – funded programmes in West Africa

Drugs for Neglected Diseases initiative (DNDi)

Desmond Tutu HIV Foundation

DG INPA, DG SANTE

EDCTP

Foundation for Innovative New Diagnostics (FIND)

Global AMR Hub Germany

Health Action International

ISGlobal Barcelona

International AIDS Vaccine Initiative (IAVI)

German Development Bank (KfW) -
funded programmes in West Africa

Manhiça Foundation – Manhiça Health Research Centre

Makerere University School of Public Health

Médecins Sans Frontières (MSF)

PATH

Swiss tropical and public health institute

TB Alliance

TDR- World Health Organization

University of Maastricht

University of Tuebingen

ANNEX 3: CORDIS SEARCH FOR PRNDS

TBSUSGENT Sustaining research momentum over the coming decades: mentoring the next generation of researchers for tuberculosis **ID: 223340**
From: 1 November 2008 to: 31 October 2012

INYVAX Optimisation of the development of Poverty-Related-Diseases (PRD) vaccines by a transversal approach, addressing common gaps and challenges **ID: 223532**
From: 1 February 2009 to: 31 January 2012

IDEA Dissecting the Immunological Interplay between Poverty Related Diseases and Helminth Infections: An African-European Research Initiative **ID: 241642**
From: 1 March 2010 to: 31 August 2015

NIDIAG Syndromic approach to Neglected Infectious Diseases (NID) at primary health care level: an international collaboration on integrated diagnostic-treatment platforms **ID: 260260**
From: 1 November 2010 to: 30 April 2016

MALAREO Earth opservation in Malaria Vector Control and Management **ID: 262887**
From: 1 February 2011 to: 31 January 2013

VIBE-FGS-EUSAN Prevention and improved diagnosis of adolescent genital disease in schistosomiasis endemic KwaZulu-Natal, South Africa **ID: 269245**
From: 1 August 2011 to: 31 March 2016

ESAHIVCOINFRES European and South African HIV co-infection research consortium **ID: 295214**
From: 1 November 2011 to: 31 October 2015

EDCTP-PLUS Laying the foundations for the EDCTP-II programme **ID: 304786**
From: 1 January 2012 to: 31 December 2014

ADVANZ Advocacy for the fight against Neglected Zoonotic Diseases **ID: 312030**
From: 1 October 2012 to: 31 March 2015

AfricanBioServices Linking biodiversity, ecosystem functions and services in the Great Serengeti-Mara Ecosystem (GSME) - drivers of change, causalities and sustainable management strategies **ID: 641918**
From: 1 June 2015 to: 31 August 2019

EAVI2020 European AIDS Vaccine Initiative 2020 **ID: 681137** From: 1 November 2015 to: 31 October 2020

DEPRIVEDHOODS Socio-spatial inequality, deprived neighbourhoods, and neighbourhood effects **ID: 615159**
From: 1 August 2014 to: 31 July 2019

EUROLEISH-NET Control of leishmaniasis, from bench to bedside and community **ID: 642609**
From: 1 January 2015 to: 31 December 2018

MATIND Large scale innovative pro-poor programs focused on reducing maternal mortality in India: a proposal for impact evaluation **ID: 261304**
From: 1 April 2011 to: 30 September 2015

EHVA European HIV Vaccine Alliance (EHVA): a EU platform for the discovery and evaluation of novel prophylactic and therapeutic vaccine candidates **ID: 681032**
From: 1 January 2016 to: 31 December 2020

One Health EJP Promoting One Health in Europe through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards. **ID: 773830**
From: 1 January 2018 to: 31 December 2022

HBP SGA2 Human Brain Project Specific Grant Agreement 2 **ID: 785907**
From: 1 April 2018 to: 31 March 2020

ANNEX 4: RELEVANT CONSULTED DOCUMENTS

AFRICA CDC-EDCTP (2020)

Develop capacity for outbreak and epidemic response in sub-Saharan.

AU (2020)

AU Concept Note NTDs. Alfredo Yegros Yegros. (2020). Exploring why global health needs are in part by research efforts.

AMR Review (2014)

Tackling a crisis for the health and wealth of nations.

AUDA-NEPAD (2020)

COVID-19 and another epidemics.

BMC (2019)

Surveillance and monitoring of AMR.

Robert Bergquist (2020). BMC.

Containing neglected tropical diseases: extending efforts to reduce global impact.

Yibeltal Assefa et al. (2019). BMJ.

Global health security and universal health coverage.

Didier Wernli et al. (2017). BMJ.

Mapping global policy discourse on antimicrobial resistance.

Astrid Berner-Rodoreda et al. (2019). BMJ.

Where is the 'global' in the European Union's Health Research and Innovation Agenda?

Jeremy Hsu (2020). BMJ.

How covid-19 is accelerating the threat of antimicrobial resistance.

Victoria Simpkin et al. (2019). BMJ

Global Health. Investing in health R&D: where we are, what limits us, and how to make progress in Africa.

BNITM NTD (2018)

Research on Neglected Tropical Diseases.

Chatham House (2019)

Progress on Antimicrobial Resistance.

CIDRAP (2020)

COVID-19. View point.

CPC-DNTDs (2017)

Study integrated implementation in combatting neglected tropical diseases-the potential of Germany.

CSIS (2019)

Ending Cycle of crisis and Complacency GHSC.

David Molyneux (2020)

COVID-19 and NTDs: Implications for Sightsavers supported programmes

Terra Morel, et al. (2018)

Strengthening health research capacity in sub-Saharan Africa-Mapping 2012-2017.

Dermot Maher (2020)

External Funding strengthens capacity LMIC.

Dermot Maher (2020)

Strengthening the core health research capacity of national health systems.

DNDi (2019)

R&D Programmes Review-2019.

DSW (n.d.)

BMZ 2030 reform strategy.

DSW-HERA (2019)

Scoping Exercise, Advocacy Entry Points, Health Research in African Union.

ECDC (2017)

Towards One Health preparedness.

ECDPM (2019)

EU Development cooperation with sub-Saharan Africa 2013-2018.

ECDPM (2020)

Fit for Purpose: - EU's Role in Global Health in the Era of Covid-19.

ECFR (2020)

Health Sovereignty: How to build a resilient European response to Pandemics.

EDCTP (s.d.)

Strategic Business plan 2014-2024.

EU (2017)

Evaluation of the impact of the EU's research funding for poverty-related and neglected diseases.

EU (2020)

Comprehensive Strategy With Africa. European commission. (2017). A European One Health Action Plan against AMR.

EU (2015)

Evaluation of the 7th EU Framework Programme (2007-2013).

Genome Biology (2016)

Neglected tropical diseases in the genomics era.

Policy Cures Research (2013)

G-FINDER factsheet: Germany's Role in Neglected and Poverty Related Disease

Policy Cures Research (2019)

G-FINDER. Neglected disease research and development

GHPP (n.d.)

Global Health protection programme.

GHPC-bmz (n.d.)

Local production of pharmaceuticals and health system in Africa.

GHS (2019)

Index, Global Health Security.

GHSA (2019)

Results and Impact of US Government Investments.

GIZ (2020)

Working against epidemics.

Global health Advocates (n.d.)

More private than public: The ways Big Pharma dominates the Innovative Medicines Initiative.

GOAL Keepers (2020)

Covid-19 - A Global perspective.

GPMB (2019)

A world at Risk.

- GPMB (2020)**
A World in Disorder.
- Caitlin Rivers et al. (2020)**
The Johns Hopkins Center for Health Security
Resetting Our Response: Changes Needed in the US Approach to COVID-19.
- Amesh Adalja et al. (2018)**
Johns Hopkins Center
The Characteristics of Pandemic Pathogens.
- John Mackenzie and Martyn Jeggo (2019)**
MDPI Tropical Medicine.
The One Health Approach – Why Is It So Important?
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Potential Antiviral Options against SARS-CoV-2 Infection.
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Antimicrobial Resistance in times of COVID.
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Health research and innovation strategy for Africa (HRISA) 2018-2030.
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PLOS. Ten failings in global neglected tropical diseases control.
- Thomas Cullison (2019)**
The US Department of Defense's Role in Health.
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Global Health security-Threats and opportunities.
- Salma Daoudi (2020)**
Policy Center for the New South.
The War on COVID-19.
- Seek Development (n.d.)**
Assessing-EU-Funding-RD-PRND.
- The Brookings institution. (2017)**
Private sector investment in Global Health.
- GianLuca Quaglio et al. (2015). The Lancet**
Ebola: lessons learned and future challenges for Europe.
- The Lancet (2015)**
GHS: a flawed SDG Framework.
- David L Heymann et al. (2015). The Lancet**
Global health security: the wider lessons from the west African Ebola virus disease epidemic.
- Ruth Kelly et al. (2015)**
The Lancet Infect Dis.
Public funding for research on antibacterial resistance in the JPIAMR countries, the EC, and related EU agencies.
- Ilona Kickbusch et al. (2017)**
The Lancet
Germany's expanding role in global Health.
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Addressing the Fragmentation of Global Health, Vol 392.
- Long Chen et al (2020). The Lancet**
Convalescent Plasma as a potential therapy for COVID-19.
- Helen Lambert (2020). The Lancet**
COVID-19 as a global challenge.
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COVID-19 vaccins trial in Africa.
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Dexamethasone for Covid-19.
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Global collaboration for health: rethoric versus reality.
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HIV, tuberculosis, and malaria: How can the impact of COVID-19 be minimised?
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Leveraging the advances in HIV for COVID-19.
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SARS COV2-PCR testing of skin for Covid-19.
- Jennifer Prah Ruger (2020). The Lancet**
The injustice of COVID-19.
- Lawrence Gostin et al. (2020). The Lancet**
US withdrawal from WHO is unlawful and threatens global and US health and security.
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Global Code of Conduct.
- UNITING EFFORTS (2020)**
Landscape for funding and financing opportunities for access and delivery of health technologies for NTDs.
- WB (2012)**
People, pthogens ans our planet.
- WBG (2018)**
Diseases control priorities: improv Health and reducing poverty.
- WBG (2019)**
Pandemic Preparedness financing - Status update.
- WHO (2011)**
Accelerating work to overcome the global impact of neglected diseases.
- WHO (2013)**
Priority Medecines for Europe and the World 2013 Update.
- WHO (2015)**
Global Technical Strategy for Malaria 2016-2030.
- WHO (2018)**
Monotoring Global progress on adressing AMR.
- WHO (2019)**
A tripartite guide to adressing Zoonotic diseases in countries.
- WHO (2019)**
Evaluation of Global action plan on Antimicrobial resistance.
- WHO (2019)**
Monitoring and evaluation of global action plan on AMR.
- WHO (2020)**
COVID coordinated global research roadmap.
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Malaria eradication: benefits, future scenarios & feasibility.

