Africa CDC Database

Technical Handbook

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1 Introduction

This is a handbook created as a how-to manual for the development and maintenance of Africa CDC's Research Database for the African continent.

1.1 About the database

EcoHealth Alliance is supporting the creation of a database of active infectious disease research activities and research scientists in Africa. The database contains information about scientific research being conducted on the African continent that has particular relevance to understanding, detecting and responding to zoonotic pathogens. EHA is building a detailed, searchable, and visual database (e.g. via a dashboard) populated with information about major (e.g. multi-year) and active One Health research projects that includes subject matter, duration, geographical locations, key personnel, and links to publicly available reports, preprints and publications relevant to zoonoses. Examples of research areas may include epidemiological (syndrome based or disease specific), ecological (studies looking at potential reservoirs or animal hosts for zoonotic pathogens and spillover into humans or livestock); basic science (e.g. virology, bacteriology; serology); clinical (vaccine or therapeutic trials); or sociological (e.g. behavioral risk assessments or behavioral intervention studies) or any other preliminary public health findings. A particularly important view within the database includes a directory of subject matter experts associated with research across the continent. This roster view can be used by public health practitioners to engage expert consultations as needed to support training activities, surveillance or outbreak response, for example.

Part I

Tools

2 Dolt

Dolt is a SQL database you can fork, clone, branch, merge, push and pull just like a Git repository. Connect to Dolt just like any MySQL database to run SQL queries. Use the command line interface to import CSV files, commit your changes, push them to a remote, or merge your teammate's changes.

All the commands you know from Git work exactly the same in Dolt. Git versions files, Dolt versions tables. It's like Git and MySQL had a baby.

Dolt is a version controlled database. Dolt is Git for Data. Dolt is a Versioned MySQL Replica.

2.1 Version Controlled Database

Dolt is a version controlled SQL database. Connect to Dolt just like any MySQL database to run SQL queries. Use Dolt system tables, functions, or procedures to access version control information and features.

2.2 Git for Data

Dolt is Git for data. Dolt matches the Git CLI exactly. When you would have run git add, you run dolt add. When you would have run git commit, you run dolt commit.

2.3 Versioned MySQL Replica

Dolt can be deployed as a Versioned MySQL Replica. Because Dolt is MySQL compatible, Dolt can be configured just like any other MySQL replica. A Dolt replica gives you features of a version controlled database without migrating from MySQL.

2.4 Installing Dolt

Dolt is extremely simple to install. Dolt is a single ~ 100 megabyte program. To install it, you download or compile that program and put it on your PATH. To install in specific operating systems, follow the instructions below:

2.4.1 Windows

winget

```
winget install dolt
```

Chocolatey

```
choco install dolt
```

Both .msi files and .zip files are available.

Scoop

```
scoop install dolt
```

MSI Files

The easiest way to install Dolt on Windows is to use the MSI files that are provided with each release. They can be found in the Assets section of every release. Grab the latest here.

.zip Archive

For those preferring to install Dolt manually a zipped archive is provided with the requisite executables. It can be found in assets along with the latest release.

2.4.2 macOS

Install Script

The download script for Linux can be used, as OSX is a *nix system. It will download the appropriate binary, and place it in /usr/local/bin:

```
sudo bash -c 'curl -L https://github.com/dolthub/dolt/releases/latest/download/install.sh |
```

Homebrew

A Homebrew formula is available with with every release, so Mac users using Homebrew for package management can build Dolt from source with a single command:

```
$ brew install dolt
```

- ==> Downloading https://homebrew.bintray.com/bottles/dolt-0.18.3.catalina.bottle.tar.gz
- ==> Downloading from https://d29vzk4ow07wi7.cloudfront.net/c03cc532d5045fa090cb4e0f141883685

```
Pouring dolt-0.18.3.catalina.bottle.tar.gz
/usr/local/Cellar/dolt/0.18.3: 7 files, 56.9MB
```

Which will install Dolt as follows:

```
$ ls -ltr $(which dolt)
lrwxr-xr-x 1 oscarbatori admin 30 Aug 26 16:49 /usr/local/bin/dolt -> ../Cellar/dolt/0.18
```

MacPorts

On macOS, Dolt can also be installed via a community-managed port via MacPorts:

```
sudo port install dolt
```

2.4.3 Linux

For Linux users, an installation script is available that will detect your architecture, download the appropriate binary, and place in /usr/local/bin:

```
sudo bash -c 'curl -L https://github.com/dolthub/dolt/releases/latest/download/install.sh | ;
```

The use of sudo is required to ensure the binary lands in your path.

3 DoltHub

DoltHub is a place to share Dolt databases. We host public data for free! DoltHub adds a modern, secure, always on database management web GUI to the Dolt ecosystem. Edit your database on the web, have another person review it via a pull request, and have the production database pull it to deploy.

3.1 What is DoltHub

DoltHub is GitHub for Dolt. DoltHub acts as a Dolt remote you can clone, push, pull and fetch from. DoltHub adds permissions, pull requests, issues, and forks to the Dolt ecosystem. Additionally, DoltHub has a modern SQL workbench built in so you can explore and change databases on the web.

3.2 Getting Started

DoltHub has many uses. We recommend getting started by sharing a database.

This documentation will walk you through discovering data on DoltHub, cloning a copy locally, making a change on a fork, and submitting a pull request to the original database.

3.3 DoltHub API

DoltHub has an API you can script against. The documentation covers:

- 1. Authentication
- 2. SQL API Used to make read or write SQL queries to a DoltHub database
- 3. CSV API Used to download CSV format files of DoltHub tables
- 4. Database API Used to interact with DoltHub databases and pull requests
- 5. Hooks Used to receive change events to your DoltHub databases

4 R

R is a free and open-source programming language and software environment for statistical computing and graphics. It was first developed in the early 1990s by Ross Ihaka and Robert Gentleman at the University of Auckland, New Zealand, and is now widely used by statisticians, data analysts, and researchers across various fields.

R provides a wide range of statistical and graphical techniques, including linear and nonlinear modeling, classical statistical tests, time-series analysis, classification, clustering, and more. It also has a large and active community of users and developers who contribute to the development of new packages and extensions for the language.

R is popular in the field of data science, as it provides a powerful and flexible platform for analyzing and visualizing data. It can be used in conjuction with other tools such as Airtable through community-developed packages making it particularly well-suited for the current use-case of the RIG.

Part II Data Sources

5 Pandemic PACT

Following is an initial list of sources of information used for the RIG database.

The initial search performed was non-systematic and focused primarily on a known funder of global research related/relevant to the topics of interest for the database. The main aim of focusing first on this limited and focused search was to get a sense of what information is available from such bodies/organisations, and the limitations of the information available. This is based on an initial idea that research funders would tend to have a system of collecting/archiving information on research they have funded. The expectation was that at the minimum, the information available from funders would lead to identifying further sources of information relevant to the ACDC database specifically those of research groups/institutions particularly those based in countries/regions within Africa. This initial search will hopefully inform a more systematic and informed search strategy for the database information.

5.1 UKRI

UK Research and Innovation or UKRI is a non-departmental public body in the United Kingdom that was established in 2018. It brings together the seven UK Research Councils, Innovate UK, and Research England, which were previously separate organizations, to create a single body that oversees research and innovation funding and strategy in the UK.

The seven UK Research Councils are:

- 1. Arts and Humanities Research Council (AHRC)
- 2. Biotechnology and Biological Sciences Research Council (BBSRC)
- 3. Engineering and Physical Sciences Research Council (EPSRC)
- 4. Economic and Social Research Council (ESRC)
- 5. Medical Research Council (MRC)
- 6. Natural Environment Research Council (NERC)
- 7. Science and Technology Facilities Council (STFC)

Innovate UK is the UK's innovation agency, which provides funding and support for innovative businesses and projects.

Research England is responsible for funding and overseeing research in English universities and higher education institutions.

UKRI's main role is to drive innovation and research in the UK and to support research and development that benefits society and the economy. It funds research projects, provides support to researchers, promotes international collaboration, and works to ensure that research and innovation are integrated with government policies and priorities.

Of these various groups within UKRI, we further focused on the Biotechnology and Biological Sciences Research Council (BBSRC), Medical Research Council (MRC), Science and Technology Facilities Council (STFC), Innovate UK, and Research England.

5.2 Wellcome Trust

The Wellcome Trust is a global charitable foundation based in the UK. It was established in 1936 by Sir Henry Wellcome, a pharmaceutical entrepreneur and philanthropist. The Wellcome Trust is one of the largest charitable organizations in the world, with an endowment of over £29 billion.

The Trust's mission is to improve health by supporting scientists, researchers, and innovators in their work to understand, treat, and prevent disease. The Trust funds research in areas such as neuroscience, genetics, infectious diseases, and global health. It also provides support for public engagement with science, education and training for scientists, and the translation of research into practical applications that benefit patients and communities.

The Wellcome Trust is known for its long-term, strategic approach to funding research, and for its commitment to open science and data sharing. It also operates the Wellcome Collection, a public venue in London that hosts exhibitions and events related to health, medicine, and science.

5.3 National Institutes of Health

The National Institutes of Health (NIH) is a biomedical research agency of the United States federal government. It is the largest biomedical research institution in the world, with its main campus located in Bethesda, Maryland. The NIH is composed of 27 separate institutes and centers, each with a specific research focus, and is responsible for conducting and funding research in a wide range of areas, including cancer, genetics, infectious diseases, and neuroscience.

The NIH was founded in 1887 as the Hygienic Laboratory and was later renamed the National Institutes of Health in 1930. Today, it is one of the world's foremost centers for medical research, with a mission to seek fundamental knowledge about the nature and behavior of living systems and to apply that knowledge to enhance health, lengthen life, and reduce illness and disability. The NIH is funded by the U.S. government through the Department of Health and Human Services and operates under the direction of the Office of the Director.

5.4 National Science Foundation

The National Science Foundation (NSF) is an independent federal agency of the United States government that supports fundamental research and education across all fields of science and engineering. The NSF was established by the National Science Foundation Act of 1950 and has a budget of around \$8 billion.

The NSF funds research and education in areas such as mathematics, computer science, physics, chemistry, biology, social sciences, and engineering. It supports individual researchers, small teams, and large interdisciplinary research collaborations through a competitive, merit-based process of proposal submission and review. The NSF also supports the development of science, technology, engineering, and mathematics (STEM) education at all levels, from K-12 through graduate education.

The NSF operates through several directorates and offices, each with a specific research focus or mission, such as the Directorate for Biological Sciences, the Directorate for Social, Behavioral and Economic Sciences, and the Office of Polar Programs. The NSF works to advance scientific discovery, promote science education and outreach, and promote innovation and economic growth through its investments in research and education.

5.5 Defense Advanced Research Projects Agency

The Defense Advanced Research Projects Agency is a research and development agency of the United States Department of Defense that is responsible for the development of emerging technologies for use by the military.

DARPA was established in 1958 in response to the Soviet Union's launch of Sputnik, the first artificial satellite, and has been involved in a number of high-profile technological innovations, including the development of the Internet, GPS, and stealth technology.

DARPA's mission is to maintain the technological superiority of the U.S. military by sponsoring and conducting research in a wide range of fields, including artificial intelligence, robotics, biotechnology, materials science, and aerospace technology. DARPA works with academic researchers, private companies, and other government agencies to develop and test new technologies, and it is known for its high-risk, high-reward approach to research and development.

Some of DARPA's current research initiatives include the development of hypersonic weapons, the creation of autonomous drone swarms, and the development of brain-machine interfaces for use in treating neurological disorders. DARPA's work has had significant impacts on both military and civilian technology, and the agency is seen as a leader in cutting-edge research and development.

5.6 ClinicalTrials.gov

ClinicalTrials.gov is a publicly accessible database of clinical trials that are being conducted worldwide. It is maintained by the National Library of Medicine, a part of the National Institutes of Health (NIH) in the United States.

The database provides information on clinical trials for a wide range of diseases and conditions, including both interventional and observational studies. It includes information about the purpose of the trial, who may participate, where the trial is being conducted, and the status of the trial, such as whether it is recruiting participants or has been completed.

ClinicalTrials.gov was created in response to a 1997 law requiring the registration of clinical trials for certain serious or life-threatening diseases or conditions. Since then, the database has grown to include information on thousands of trials from around the world.

ClinicalTrials.gov is an important resource for researchers, healthcare professionals, and members of the public who are interested in clinical research. It can be used to identify ongoing or completed trials, learn about the purpose and design of a study, and find out how to participate in a trial. It also serves as a platform for researchers to share their results and comply with the requirements of various funding agencies and regulatory bodies.

5.7 GEPRIS

Geförderte Projekte in der Forschung und Entwicklung (Funded Projects in Research and Development) or GEPRIS is an online database of research projects funded by the German Research Foundation (DFG).

The DFG is the largest independent research funding organization in Germany and funds projects across all scientific disciplines, from the humanities and social sciences to the natural and life sciences. GEPRIS provides information about the projects that the DFG has funded, including their aims, methods, and outcomes, as well as the institutions and researchers involved.

Researchers and members of the public can use GEPRIS to search for projects that have been funded by the DFG, and to access information about these projects. The database includes information about ongoing and completed projects, and users can search by various criteria, such as by researcher name, institution, scientific discipline, or project title.

GEPRIS is a valuable tool for researchers to identify potential collaborators, explore research trends, and find information about the funding landscape in their field. It is also useful for members of the public who are interested in learning about the research being conducted in Germany and the impact of this research on society.

5.8 EDCTP

European and Developing Countries Clinical Trials Partnership or EDCTP is a public-public partnership between countries in Europe and sub-Saharan Africa, established in 2003, with the aim of accelerating the development of new clinical interventions to fight infectious diseases that disproportionately affect Africa.

The partnership's mission is to improve the health of people in Africa by supporting the development of new medicines, vaccines, and other health interventions to prevent and treat diseases such as HIV/AIDS, tuberculosis, malaria, and neglected infectious diseases. EDCTP supports collaborative research projects that bring together scientists, institutions, and countries from both regions to conduct clinical trials and other research activities.

EDCTP works with a range of partners, including national governments, research institutions, civil society organizations, and the private sector, to support research that is relevant and responsive to the needs of African communities. It also provides training and capacity-building opportunities to support the development of sustainable health research infrastructure and expertise in Africa.

The partnership is funded by the European Union, its member states, and other donors. Since its inception, EDCTP has supported over 100 collaborative research projects and played a key role in advancing the development of new interventions for infectious diseases that affect the people of Africa.

5.9 GLOPID-R

Global Research Collaboration for Infectious Disease Preparedness or GLOPID-R is an international partnership that aims to strengthen global research efforts in the field of infectious disease preparedness. The partnership was established in response to the 2014 Ebola outbreak in West Africa, which highlighted the need for improved global coordination and collaboration in research and development for emerging and re-emerging infectious diseases.

GLOPID-R brings together stakeholders from the global health community, including research funders, policy-makers, researchers, and public health organizations. The partnership aims to promote international cooperation and coordination in research to accelerate the development of new tools and approaches to prevent, detect, and respond to infectious disease outbreaks.

GLOPID-R's main objectives include identifying research priorities for infectious disease preparedness, coordinating research efforts across different regions and countries, and promoting capacity building and knowledge exchange to strengthen global health research infrastructure.

The partnership focuses on a range of infectious diseases, including those caused by emerging and re-emerging pathogens, neglected tropical diseases, and antimicrobial resistance. It works

to support research efforts across the entire spectrum of infectious disease preparedness, from basic research to clinical trials and implementation research.

GLOPID-R is supported by a range of funding agencies and partners from around the world and is seen as an important platform for promoting global cooperation and collaboration in infectious disease research and preparedness.

5.10 NRF South Africa

The National Research Foundation of South Africa (NRF) is an independent organization that promotes and supports research and innovation in all fields of science, engineering, technology, and social sciences in South Africa. The NRF was established in 1999 through the National Research Foundation Act and operates under the jurisdiction of the Department of Science and Innovation.

The NRF provides funding, develops policies, and manages research infrastructure to support South African researchers and institutions. It also fosters international collaboration in research, and supports the training and development of the next generation of researchers through various funding and fellowship schemes.

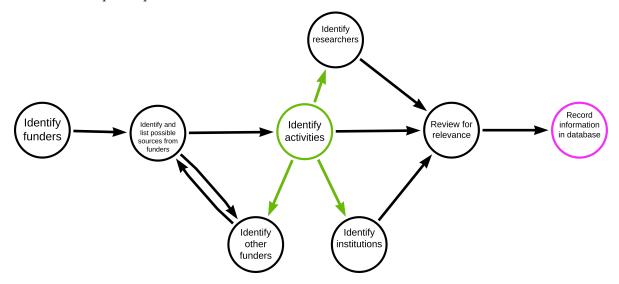
The NRF provides funding through a number of programs, including competitive grants, fellowships, and research chairs. It also supports the development of research infrastructure and the establishment of research centers of excellence.

In addition to providing funding and support for research, the NRF plays a key role in developing research policies and strategies at the national level. It advises the South African government on research priorities and is involved in various initiatives aimed at promoting science, technology, and innovation in the country.

The NRF is an important organization for the South African research community and has been instrumental in advancing the country's research and innovation capabilities. Its funding and support have contributed to numerous scientific discoveries and innovations in a wide range of fields, including health, energy, and the environment.

6 Updates

The current update process of the RIG database is summarised in this workflow:



Following are the source-specific process of updating or retrieving information for the RIG database.

6.1 Wellcome Trust Grant Funding Data

6.1.1 General Information

Using the downloadable spreadsheet of funds awarded between 01st of October 2005 and 4th of May 2022 found at https://cms.wellcome.org/sites/default/files/2022-05/Wellcome-grants-awarded-1-October-2005-to-04-05-2022.xlsx, the following steps were taken to retrieve relevant information for the database:

6.1.2 How to update

Please note that the steps below were done using the current available spreadsheet from the Wellcome Trust website and added the relevant projects to the RIG database. These steps

can therefore be used as a guide for how to update the database with new information in the future to when the Wellcome Trust publishes its most up-to-date spreadsheet.

- 1. Go to column J Recipient Org:Country -> deselect all and then select all the African countries in the list
- 2. Go to column N Planned end date -> select all the years in the future
- 3. These two steps reduced the list from 19,833 projects to 111 projects
- 4. Read the project title and decide if the project is relevant for our database or not
- 5. If unsure, read the abstract that also helps to identify the keywords to tag the project within our database
- 6. If the project is relevant transfer all the information into our database

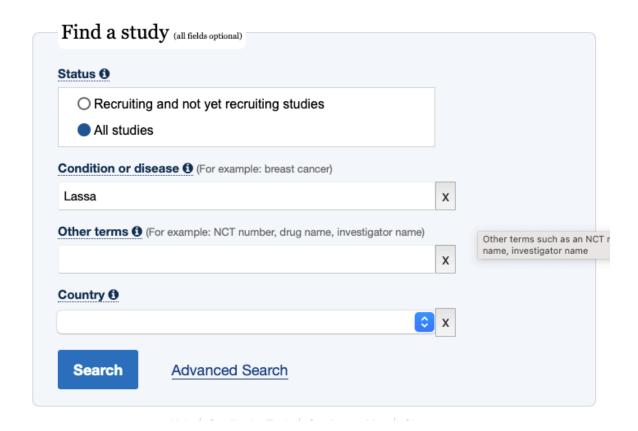
Note: This method is only able to detect projects/activities where an African organisation itself holds the grant. It does not detect projects where African researchers are involved as collaborators. The spreadsheet does not list collaborators on projects, so it's yet to be determined how we will identify projects on which African research institutes collaborate with international organisations being awarded the grant.

6.2 ClinicalTrials.gov

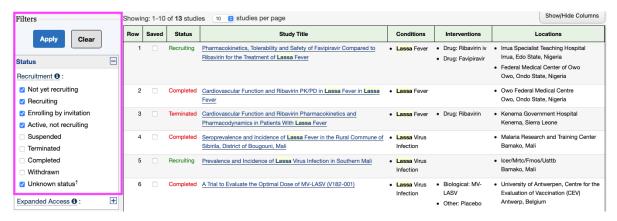
6.2.1 How to update

Following are steps taken to extract data from ClinicalTrials.gov.

1. Start with searching a disease/topic of interest



2. On the results page apply the following filters to look for active studies



3. Click on 'Apply' and then look manually through the column 'Locations' of the list of the results to find studies that take place in African countries

Row	Saved	Status	Study Title	Conditions	Interventions	Locations
1		Recruiting	Pharmacokinetics, Tolerability and Safety of Favipiravir Compared to Ribavirin for the Treatment of Lassa Fever	Lassa Fever	Drug: Ribavirin iv Drug: Favipiravir	Irrua Specialist Teaching Hospital Irrua, Edo State, Nigeria Federal Medical Center of Owo Owo, Ondo State, Nigeria
2		Recruiting	Prevalence and Incidence of Lassa Virus Infection in Southern Mali	 Lassa Virus Infection 		 Icer/Mrtc/Fmos/Usttb Bamako, Mali
3		Active, not recruiting	Dose-ranging Study: Safety, Tolerability and Immunogenicity of INO- 4500 in Healthy Volunteers in Ghana	• Lassa Fever	 Drug: INO-4500 Device: CELLECTRA™ 2000 Drug: Placebo 	Noguchi Memorial Institute for Medical Research, University of Ghana Legon, Accra, Ghana
4		Recruiting	A Clinical Trial to Evaluate the Safety and Immunogenicity of rVSVΔG-LASV-GPC Vaccine in Adults in Good General Heath	Lassa Fever Lassa Virus Infection	Drug: rVSV∆G- LASV-GPC Other: Placebo/Diluent	George Washington University Washington, District of Columbia, United States East-West Medical Research Institute Honolulu, Hawaii, United States Brigham and Women's Hospital Brookline, Massachusetts, United States Redemption Hospital New Kru Town, Greater Monrovia, Liberia
5		Recruiting	Lassa Fever Clinical Course and Prognostic Factors in Nigeria	Lassa FeverLassa Virus InfectionPregnancy	Other: Non interventional research	Owo Federal Medical Centre (Owo FMC) Owo, Ondo, Nigeria

- 4. Click on the first study to start working your way through the information available
- 5. The first information provided is the sponsor -> this information should be added to the Funder column in the Activities table
- 6. Information about collaborators can be added to Collaborators column



- 7. Staying in the 'Study Details'-tab, scroll down to 'Study Design'
- 8. This section contains the official title, which should be used as the name for the Activity

9. Additionally it contains information about the start and end date, which should be copied into the respective fields in the Activities table



- 10. Scroll further down to 'Contact and Locations'
- 11. The information given under contacts should be added to the Researcher column in Airtable
- 12. Switching into the Researcher-table within in Airtable the given contact details should be added to the newly created entries for the involved researchers
- 13. Also the affiliation to a certain institute can be added based on these information as well as the researcher's location -> is it possible to link the Location with the Affiliation so that the location is automatically added based on the information about the institution the researcher is affiliated with?
- 14. Switch back into the Activities table and add information about the Locations to the Activity Location and the Institutions columns

Locations

Nigeria

Irrua Specialist Teaching Hospital

Recruiting

Irrua, Edo State, Nigeria

Contact: Peter Akhideno, Dr +2348037048831 <u>ehideno@yahoo.co.uk</u>
Contact: Cyril Erameh, Dr +2348032413382 cyrilerameh@gmail.com

Federal Medical Center of Owo

Recruiting

Owo, Ondo State, Nigeria

Contact: Oluwafemi Ayodeji, Dr femiayodeji@yahoo.com

Sponsors and Collaborators

Bernhard Nocht Institute for Tropical Medicine

University of Hamburg-Eppendorf

Alliance for International Medical Action

Institut National de la Santé Et de la Recherche Médicale, France

University of Bordeaux

Federal Medical Centre, Owo

Irrua Specialist Teaching Hospital

Investigators

Principal Investigator: Peter Akhideno, Dr ISTH

Principal Investigator: Sylvanus Okogbenin, Prof ISTH

Principal Investigator: Oluwafemi Ayodeji, Dr FMCO

- 15. Scroll up again to the selection of tabs
- 16. Click on the Results tab -> it's worth checking this tab even when it's called No Results Posted as it might still contain links to publications that are affiliated with the study
- 17. These links can be copied into the Published Work column in the Activities table



18. I also copied the link of the study page on clinicaltrials.gov into the Activity Website column



19. to determine the Research Field, I had to use my own understanding of the study so I am not sure if this can be automated or rather needs to be done by a database librarian

6.3 Public journal/research databases

In order to aid in automation, maintain a list relevant search terms for each topic of interest (stored in the "Topics" table in Airtable). Even if the terms are not used for the purposes of developing a search strategy, they can be used by those who are not subject matter experts when collection information on a specific topic

6.3.1 Example of a successful search:

(zoonoses OR zoonotic disease OR zoonotic illness) and (africa*) and (surveillance OR tracki:

The majority of results from this search, when conducted in PubMed, appeared relevant to the database (based on title/abstract scanning)

6.3.2 Example of PubMed search for surveillance activities for Brucellosis:

("surveillance"[Title/Abstract] OR "prevalence"[Title/Abstract] OR "monitoring"[Title/Abstract]

This search yielded a large quantity of results, not all of which were relevant. Manual processes are required to validate results.

Including terms to filter the results based on location were helpful, but still included results not located on the African continent. Search term to filter for African countries:

(Djibouti[Title/Abstract] OR Seychelles[Title/Abstract] OR DR Congo[Title/Abstract] OR Comor

From publications, can extract researchers, institutions, funders, activities. Ideally, researchers, institutions, and funders can be extracted automatically as opposed to manually, but scripts would need to be customized for each journal.

6.3.3 Validation of results

Validation of results can be useful to better understand the overlap between publications and activities and determine the priority of searching through publications vs. navigating to institution sites directly (or other strategies).

After finding a relevant publication, look at the publication's authors and their respective institutions

Navigate to institutions' sites to search for publications or results from research

Are their activities listed on the site? Are those activities explicitly mentioned in the publications? Etc.

6.3.4 Some relevant journals/databases:

- $\bullet \ \ Zoonoses \& \ Public \ Health \ from \ Wiley \ Online \ Library: \ https://online library.wiley.com/action/doSearch? Solice \ Anti-Appendix \ Anti-Appe$
- Journal of Public Health in Africa: https://www.publichealthinafrica.org/jphia/issue/view/30
- PLoS Journal of Neglected Tropical Diseases: https://journals.plos.org/plosntds/search?filterJournals=PL

6.4 GEPRIS

6.4.1 General Information:

GEPRIS is a database listing all projects funded by the German Research Foundation (German: Deutsche Forschungsgemeinschaft; abbr. DFG) The DFG is a research funding organisation, which functions as a self-governing institution for the promotion of science and research in the Federal Republic Germany. In 2019, the DFG had a funding budget of €3.3 billion.

6.4.2 How to Use:

The database can be accessed here: https://gepris.dfg.de/gepris/OCTOPUS?language=en&task=showSearchSinThis link should directly lead to the English version of the website, otherwise the language

This link should directly lead to the English version of the website, otherwise the language can be changed by clicking on English in the top right corner.

- In the database one can search for Projects, People, or Institutions for our purpose the project option is the most relevant
- One can either search for keywords or filter for different criteria for a systematic approach I found using the filtering options easier than going through all our
- 1. On the search start site stay in the Projects tab.
- 2. Click on Show extended search.
- 3. Under Subject Area select one of the following:
 - Agriculture, Forestry and Veterinary Medicine
 - Basic Research in Biology and Medicine
 - Medicine
 - Microbiology, Virology, and Immunology
 - Social Sciences
 - Water Research

• Zoology

Note: After working through all these subject areas, any relevant project in the field of One Health should be picked up by the searches

- 4. Leave everything under DFG Programme as it is
- 5. Move on to Funding and change Status to Current
- 6. Move on to International and change Continent to Africa
- 7. Click on Find
- 8. Read through the project titles on the results page to identify relevant projects
- 9. Import all the relevant project information (as highlighted on the screenshots) into the Africa CDC database

Projekt		Ξ.
The potential of nonhur	nan primates as a reservoir for human yaws	
Applicants	→ Privatdozent Dr. Sascha Knauf, Ph.D., until 7/2019; → Professor Dr. Christian Roos	1
Subject Area Term	Parasitology and Biology of Tropical Infectious Disease Pathogens since 2014	
Project identifier	Deutsche Forschungsgemeinschaft (DFG) Project number 252488542	

Project Description

It has been propagated that human yaws caused by the bacterium Treponema pallidum subsp. pertenue (TPE) has no animal reservoir. Yet, reports of T. pallidum (TP) infection in nonhuman primates (NHPs) are accumulating. Several studies demonstrate simian infection with strains that are most closely related to human yaws-causing TPE strains. Our DFG funded study on NHP infection further supports the above mentioned findings. Data on simian TP strain diversity in Tanzania (TZ) are accumulating and reveal epidemiological insight into the spread of this conspicuous bacterium across the country. The phylogenetic branching pattern obtained from whole genome sequences of a greater number of simian strains (West and East Africa) suggests a rapid initial radiation of TPE across humans and NHPs and that at least ancestral TPE strains were most likely not host species specific. The East African Lake Manyara National Park simian strains reveals an overall gene synteny (including rRNA operons) with str. Gauthier with only 8.9% amino acid differences. A complete picture of TP infection in humans and NHPs including the definite answer to the NHP reservoir question will, however, only assemble when existing data on simian infection are compared to a greater number of circulating human TP(E) strains, which originate from areas with characterized simian infection. We hypothesize that humans and NHPs in TZ share the same TP(E) strains and also that NHPs in (Ghana) GH are infected with TP. While GH reports yaws until today, there is a chance of hidden TPE infections in humans in TZ, a country that currently does not report yaws, but harbors a great number of infected NHP species. DNA based assays (e.g. LAMP) are designed to fast-track identification on the subspecies level complementing the serological testing. This will

increase specificity of yaws diagnosis from atypical clinical manifestations followed by whole genome sequencing. Simian and human TP strains from Africa have not yet been investigated using an integrated approach, and the results obtained are crucial for the understanding of Treponema evolution and epidemiology as well as to answer the important question on inter-species transmission. New laboratory TP strains will allow advanced immunological research and the creation of translational animal models which could open new pathways for vaccine development and testing. The project combines basic research in the field of Treponema infection with continues One Health capacity building and early-career research training at the African locations. A South-South partnership is created to support scientific excellence in the field of infectious disease research, addressing an urgent need in TZ and GH. Research activities of this project are logically expanded towards a yaws endemic country (GH). The project is expected to improve local health care services in TZ and GH and has the potential to support public health initiatives in post-yaws MDA surveillance.

DFG Programme	Research Grants			
International	Ghana, Tanzania			
Connection				
Co-Investigators	→ Idrissa S. Chuma; → Dr. Julius D. Keyyu; → Inyasi A. V. Lejora			
International Co-	→ Professor Dr. Rudovick Kazwala; → Dr. Sayoki Mfinanga, Ph.D.; → Dr. Augustina			
Applicants	Sylverken			

10. To identify the research institutes that are involved in the project one has to click on the researchers names and extract that information from their profile (their affiliation with a research institute is listed there)

6.4.3 Positive aspects of this source:

The filtering options allow to filter for several criteria which are crucial for the relevance of a project to our database. That removes a lot of irrelevant projects from the results pages. The project pages list almost all the information we are interested in.

6.4.4 Downsides of this source:

The project page doesn't list the anticipated end date of a project.

One has to click on the link to the researcher's profile to identify the participating organisations.

Even using all the different filtering options not all resulting hits are relevant for our database, so I don't think the process can be fully automated or at least requires a subsequent manual validation or clean up step to remove irrelevant projects.

6.5 EDCTP

6.5.1 General Information

The European & Developing Countries Clinical Trials Partnership (EDCTP) is a non-profit organisation with a European office in The Hague, The Netherlands and an African office in Cape Town, South Africa. EDCTP is a partnership between European Union (EU), Norway, Switzerland, and African countries to accelerate the development of new clinical interventions such as drugs, vaccines, microbicides, and diagnostics against poverty-related diseases in Africa. The organisation supports clinical trials, capacity strengthening and networking in Africa and Europe. Funding comes from the EU, member states, pharmaceutical industry and private organisations and charities like The Wellcome Trust and The Bill & Melinda Gates foundation.

Note: Since funding comes from several sources that we also list as sources for populating the database such as the European Union (European Commission), The Wellcome Trust and The Bill & Melinda Gates Foundation, there is the possibility that downloading project information from all these sources into our database could lead to duplicate entries. I created a column in the Activities table for the Project ID, as this might be helpful to identify duplicates and remove them automatically.

6.5.2 How to use:

The database of funded project can be accessed here: https://www.edctp.org/edctp2-project-portal/

There is the option to download the list of projects as a PDF, CSV or XLXS file. Personally, I did not find that helpful for manually adding projects to the database, but it might be useful for an automated process.

- 1. Go to Status of Project and select the filter Active
- 2. Go to Classification and select one of the following filters:
 - Co-Infections
 - COVID-19
 - Cysticercosis/Taeniasis
 - Diagnostics
 - Diarrhoeal Diseases
 - Drugs
 - Emerging Infections, incl. Ebola, Lassa
 - Epidemiology
 - HIV

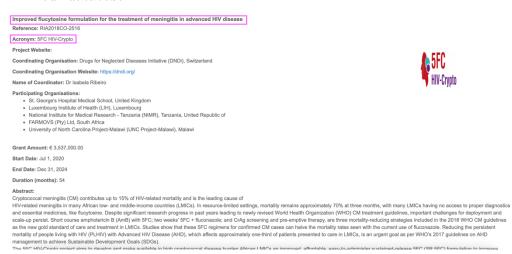
- Human African trypanosomiasis (sleeping sickness)
- Implementation Research
- Leishmaniases
- Leprosy (Hansen disease)
- Lower respiratory infections
- Lymphatic filariasis
- Malaria
- Microbicides
- Onchocerciasis (river blindness)
- Rabies
- Schistosomiasis
- Soil-transmitted helminthiasis
- Social Science
- Tuberculosis
- Vaccines
- Yaws
- Yellow Fever

Note: Only one Classification at a time can be selected

- 3. Once one Classification was selected click on search
- 4. Change from Show Map to Show List -> this makes it easier to systematically look through the projects
- 5. On the results list you can see the location of the coordinating organisation, but even if it is not in an African country, it is worth checking the project details for the Participating Organisations. So read the project title and decide whether this could be a relevant project, if so, click on View details



6. Check the Participating Organisations first to decide whether the project is relevant to our database:



- 7. If the project is relevant use the Project Name + Acronym for the Activity Column
- 8. Transfer all the relevant information to our database, including Project ID, Start and End date, Participating Organisations and corresponding locations, Project Website, Coordinating Organisation and Coordinating Researcher
- 9. Tag the project with the correct keywords in the Activity Type, Activity Outputs, Target Species, Topic, and Research Field columns based on your understanding of the project abstract

6.5.3 Benefits of this Source:

The projects can be easily filtered for currently active projects.

The EDCTP is specifically focused on projects in Africa or Europe with African collaborators so most projects fulfil at least one of our selection criteria

A lot of the projects (not all) are also topic-wise relevant for our database

The database lists most of the information that we are interested in for our database

6.5.4 Shortcomings of this source:

Only one disease/topic can be selected at a time so sequential searches are necessary

Project details only list the Coordinating researcher but no other lead researchers at the participating organisations

Part III Database

7 Database - DoltHub

Part IV

Exporting the Database - 07-data-export.qmd

Part V Appendix

8 Pandemic PACT

Following is an initial list of sources of information used for the RIG database.

The initial search performed was non-systematic and focused primarily on a known funder of global research related/relevant to the topics of interest for the database. The main aim of focusing first on this limited and focused search was to get a sense of what information is available from such bodies/organisations, and the limitations of the information available. This is based on an initial idea that research funders would tend to have a system of collecting/archiving information on research they have funded. The expectation was that at the minimum, the information available from funders would lead to identifying further sources of information relevant to the ACDC database specifically those of research groups/institutions particularly those based in countries/regions within Africa. This initial search will hopefully inform a more systematic and informed search strategy for the database information.

8.1 UKRI

UK Research and Innovation or UKRI is a non-departmental public body in the United Kingdom that was established in 2018. It brings together the seven UK Research Councils, Innovate UK, and Research England, which were previously separate organizations, to create a single body that oversees research and innovation funding and strategy in the UK.

The seven UK Research Councils are:

- 1. Arts and Humanities Research Council (AHRC)
- 2. Biotechnology and Biological Sciences Research Council (BBSRC)
- 3. Engineering and Physical Sciences Research Council (EPSRC)
- 4. Economic and Social Research Council (ESRC)
- 5. Medical Research Council (MRC)
- 6. Natural Environment Research Council (NERC)
- 7. Science and Technology Facilities Council (STFC)

Innovate UK is the UK's innovation agency, which provides funding and support for innovative businesses and projects.

Research England is responsible for funding and overseeing research in English universities and higher education institutions.

UKRI's main role is to drive innovation and research in the UK and to support research and development that benefits society and the economy. It funds research projects, provides support to researchers, promotes international collaboration, and works to ensure that research and innovation are integrated with government policies and priorities.

Of these various groups within UKRI, we further focused on the Biotechnology and Biological Sciences Research Council (BBSRC), Medical Research Council (MRC), Science and Technology Facilities Council (STFC), Innovate UK, and Research England.

8.2 Wellcome Trust

The Wellcome Trust is a global charitable foundation based in the UK. It was established in 1936 by Sir Henry Wellcome, a pharmaceutical entrepreneur and philanthropist. The Wellcome Trust is one of the largest charitable organizations in the world, with an endowment of over £29 billion.

The Trust's mission is to improve health by supporting scientists, researchers, and innovators in their work to understand, treat, and prevent disease. The Trust funds research in areas such as neuroscience, genetics, infectious diseases, and global health. It also provides support for public engagement with science, education and training for scientists, and the translation of research into practical applications that benefit patients and communities.

The Wellcome Trust is known for its long-term, strategic approach to funding research, and for its commitment to open science and data sharing. It also operates the Wellcome Collection, a public venue in London that hosts exhibitions and events related to health, medicine, and science.

8.3 National Institutes of Health

The National Institutes of Health (NIH) is a biomedical research agency of the United States federal government. It is the largest biomedical research institution in the world, with its main campus located in Bethesda, Maryland. The NIH is composed of 27 separate institutes and centers, each with a specific research focus, and is responsible for conducting and funding research in a wide range of areas, including cancer, genetics, infectious diseases, and neuroscience.

The NIH was founded in 1887 as the Hygienic Laboratory and was later renamed the National Institutes of Health in 1930. Today, it is one of the world's foremost centers for medical research, with a mission to seek fundamental knowledge about the nature and behavior of living systems and to apply that knowledge to enhance health, lengthen life, and reduce illness and disability. The NIH is funded by the U.S. government through the Department of Health and Human Services and operates under the direction of the Office of the Director.

8.4 National Science Foundation

The National Science Foundation (NSF) is an independent federal agency of the United States government that supports fundamental research and education across all fields of science and engineering. The NSF was established by the National Science Foundation Act of 1950 and has a budget of around \$8 billion.

The NSF funds research and education in areas such as mathematics, computer science, physics, chemistry, biology, social sciences, and engineering. It supports individual researchers, small teams, and large interdisciplinary research collaborations through a competitive, merit-based process of proposal submission and review. The NSF also supports the development of science, technology, engineering, and mathematics (STEM) education at all levels, from K-12 through graduate education.

The NSF operates through several directorates and offices, each with a specific research focus or mission, such as the Directorate for Biological Sciences, the Directorate for Social, Behavioral and Economic Sciences, and the Office of Polar Programs. The NSF works to advance scientific discovery, promote science education and outreach, and promote innovation and economic growth through its investments in research and education.

8.5 Defense Advanced Research Projects Agency

The Defense Advanced Research Projects Agency is a research and development agency of the United States Department of Defense that is responsible for the development of emerging technologies for use by the military.

DARPA was established in 1958 in response to the Soviet Union's launch of Sputnik, the first artificial satellite, and has been involved in a number of high-profile technological innovations, including the development of the Internet, GPS, and stealth technology.

DARPA's mission is to maintain the technological superiority of the U.S. military by sponsoring and conducting research in a wide range of fields, including artificial intelligence, robotics, biotechnology, materials science, and aerospace technology. DARPA works with academic researchers, private companies, and other government agencies to develop and test new technologies, and it is known for its high-risk, high-reward approach to research and development.

Some of DARPA's current research initiatives include the development of hypersonic weapons, the creation of autonomous drone swarms, and the development of brain-machine interfaces for use in treating neurological disorders. DARPA's work has had significant impacts on both military and civilian technology, and the agency is seen as a leader in cutting-edge research and development.

8.6 ClinicalTrials.gov

ClinicalTrials.gov is a publicly accessible database of clinical trials that are being conducted worldwide. It is maintained by the National Library of Medicine, a part of the National Institutes of Health (NIH) in the United States.

The database provides information on clinical trials for a wide range of diseases and conditions, including both interventional and observational studies. It includes information about the purpose of the trial, who may participate, where the trial is being conducted, and the status of the trial, such as whether it is recruiting participants or has been completed.

ClinicalTrials.gov was created in response to a 1997 law requiring the registration of clinical trials for certain serious or life-threatening diseases or conditions. Since then, the database has grown to include information on thousands of trials from around the world.

ClinicalTrials.gov is an important resource for researchers, healthcare professionals, and members of the public who are interested in clinical research. It can be used to identify ongoing or completed trials, learn about the purpose and design of a study, and find out how to participate in a trial. It also serves as a platform for researchers to share their results and comply with the requirements of various funding agencies and regulatory bodies.

8.7 GEPRIS

Geförderte Projekte in der Forschung und Entwicklung (Funded Projects in Research and Development) or GEPRIS is an online database of research projects funded by the German Research Foundation (DFG).

The DFG is the largest independent research funding organization in Germany and funds projects across all scientific disciplines, from the humanities and social sciences to the natural and life sciences. GEPRIS provides information about the projects that the DFG has funded, including their aims, methods, and outcomes, as well as the institutions and researchers involved.

Researchers and members of the public can use GEPRIS to search for projects that have been funded by the DFG, and to access information about these projects. The database includes information about ongoing and completed projects, and users can search by various criteria, such as by researcher name, institution, scientific discipline, or project title.

GEPRIS is a valuable tool for researchers to identify potential collaborators, explore research trends, and find information about the funding landscape in their field. It is also useful for members of the public who are interested in learning about the research being conducted in Germany and the impact of this research on society.

8.8 EDCTP

European and Developing Countries Clinical Trials Partnership or EDCTP is a public-public partnership between countries in Europe and sub-Saharan Africa, established in 2003, with the aim of accelerating the development of new clinical interventions to fight infectious diseases that disproportionately affect Africa.

The partnership's mission is to improve the health of people in Africa by supporting the development of new medicines, vaccines, and other health interventions to prevent and treat diseases such as HIV/AIDS, tuberculosis, malaria, and neglected infectious diseases. EDCTP supports collaborative research projects that bring together scientists, institutions, and countries from both regions to conduct clinical trials and other research activities.

EDCTP works with a range of partners, including national governments, research institutions, civil society organizations, and the private sector, to support research that is relevant and responsive to the needs of African communities. It also provides training and capacity-building opportunities to support the development of sustainable health research infrastructure and expertise in Africa.

The partnership is funded by the European Union, its member states, and other donors. Since its inception, EDCTP has supported over 100 collaborative research projects and played a key role in advancing the development of new interventions for infectious diseases that affect the people of Africa.

8.9 GLOPID-R

Global Research Collaboration for Infectious Disease Preparedness or GLOPID-R is an international partnership that aims to strengthen global research efforts in the field of infectious disease preparedness. The partnership was established in response to the 2014 Ebola outbreak in West Africa, which highlighted the need for improved global coordination and collaboration in research and development for emerging and re-emerging infectious diseases.

GLOPID-R brings together stakeholders from the global health community, including research funders, policy-makers, researchers, and public health organizations. The partnership aims to promote international cooperation and coordination in research to accelerate the development of new tools and approaches to prevent, detect, and respond to infectious disease outbreaks.

GLOPID-R's main objectives include identifying research priorities for infectious disease preparedness, coordinating research efforts across different regions and countries, and promoting capacity building and knowledge exchange to strengthen global health research infrastructure.

The partnership focuses on a range of infectious diseases, including those caused by emerging and re-emerging pathogens, neglected tropical diseases, and antimicrobial resistance. It works

to support research efforts across the entire spectrum of infectious disease preparedness, from basic research to clinical trials and implementation research.

GLOPID-R is supported by a range of funding agencies and partners from around the world and is seen as an important platform for promoting global cooperation and collaboration in infectious disease research and preparedness.

8.10 NRF South Africa

The National Research Foundation of South Africa (NRF) is an independent organization that promotes and supports research and innovation in all fields of science, engineering, technology, and social sciences in South Africa. The NRF was established in 1999 through the National Research Foundation Act and operates under the jurisdiction of the Department of Science and Innovation.

The NRF provides funding, develops policies, and manages research infrastructure to support South African researchers and institutions. It also fosters international collaboration in research, and supports the training and development of the next generation of researchers through various funding and fellowship schemes.

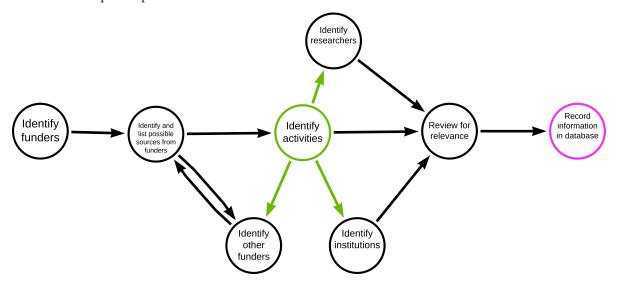
The NRF provides funding through a number of programs, including competitive grants, fellowships, and research chairs. It also supports the development of research infrastructure and the establishment of research centers of excellence.

In addition to providing funding and support for research, the NRF plays a key role in developing research policies and strategies at the national level. It advises the South African government on research priorities and is involved in various initiatives aimed at promoting science, technology, and innovation in the country.

The NRF is an important organization for the South African research community and has been instrumental in advancing the country's research and innovation capabilities. Its funding and support have contributed to numerous scientific discoveries and innovations in a wide range of fields, including health, energy, and the environment.

9 Updates

The current update process of the RIG database is summarised in this workflow:



Following are the source-specific process of updating or retrieving information for the RIG database.

9.1 Wellcome Trust Grant Funding Data

9.1.1 General Information

Using the downloadable spreadsheet of funds awarded between 01st of October 2005 and 4th of May 2022 found at https://cms.wellcome.org/sites/default/files/2022-05/Wellcome-grants-awarded-1-October-2005-to-04-05-2022.xlsx, the following steps were taken to retrieve relevant information for the database:

9.1.2 How to update

Please note that the steps below were done using the current available spreadsheet from the Wellcome Trust website and added the relevant projects to the RIG database. These steps

can therefore be used as a guide for how to update the database with new information in the future to when the Wellcome Trust publishes its most up-to-date spreadsheet.

- 1. Go to column J Recipient Org:Country -> deselect all and then select all the African countries in the list
- 2. Go to column N Planned end date -> select all the years in the future
- 3. These two steps reduced the list from 19,833 projects to 111 projects
- 4. Read the project title and decide if the project is relevant for our database or not
- 5. If unsure, read the abstract that also helps to identify the keywords to tag the project within our database
- 6. If the project is relevant transfer all the information into our database

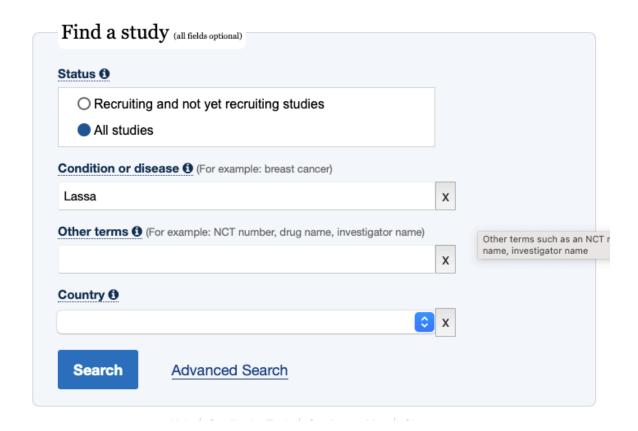
Note: This method is only able to detect projects/activities where an African organisation itself holds the grant. It does not detect projects where African researchers are involved as collaborators. The spreadsheet does not list collaborators on projects, so it's yet to be determined how we will identify projects on which African research institutes collaborate with international organisations being awarded the grant.

9.2 ClinicalTrials.gov

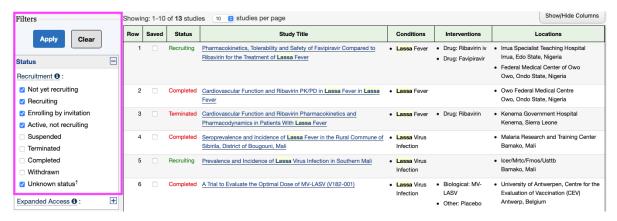
9.2.1 How to update

Following are steps taken to extract data from ClinicalTrials.gov.

1. Start with searching a disease/topic of interest



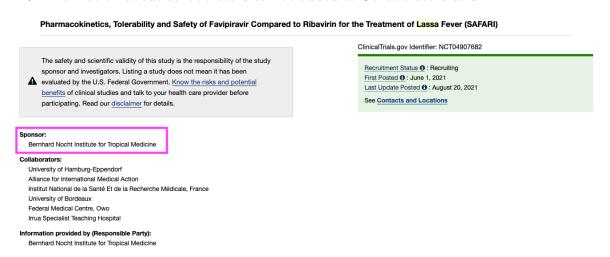
2. On the results page apply the following filters to look for active studies



3. Click on 'Apply' and then look manually through the column 'Locations' of the list of the results to find studies that take place in African countries

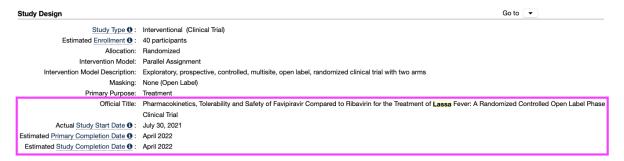
Row	Saved	Status	Study Title	Conditions	Interventions	Locations
1		Recruiting	Pharmacokinetics, Tolerability and Safety of Favipiravir Compared to Ribavirin for the Treatment of Lassa Fever	Lassa Fever	Drug: Ribavirin iv Drug: Favipiravir	Irrua Specialist Teaching Hospital Irrua, Edo State, Nigeria Federal Medical Center of Owo Owo, Ondo State, Nigeria
2		Recruiting	Prevalence and Incidence of Lassa Virus Infection in Southern Mali	 Lassa Virus Infection 		 Icer/Mrtc/Fmos/Usttb Bamako, Mali
3		Active, not recruiting	Dose-ranging Study: Safety, Tolerability and Immunogenicity of INO- 4500 in Healthy Volunteers in Ghana	• Lassa Fever	 Drug: INO-4500 Device: CELLECTRA™ 2000 Drug: Placebo 	Noguchi Memorial Institute for Medical Research, University of Ghana Legon, Accra, Ghana
4		Recruiting	A Clinical Trial to Evaluate the Safety and Immunogenicity of rVSVΔG- LASV-GPC Vaccine in Adults in Good General Heath	Lassa Fever Lassa Virus Infection	Drug: rVSV∆G- LASV-GPC Other: Placebo/Diluent	George Washington University Washington, District of Columbia, United States East-West Medical Research Institute Honolulu, Hawaii, United States Brigham and Women's Hospital Brookline, Massachusetts, United States Redemption Hospital New Kru Town, Greater Monrovia, Liberia
5		Recruiting	Lassa Fever Clinical Course and Prognostic Factors in Nigeria	Lassa FeverLassa Virus InfectionPregnancy	Other: Non interventional research	Owo Federal Medical Centre (Owo FMC) Owo, Ondo, Nigeria

- 4. Click on the first study to start working your way through the information available
- 5. The first information provided is the sponsor -> this information should be added to the Funder column in the Activities table
- 6. Information about collaborators can be added to Collaborators column



- 7. Staying in the 'Study Details'-tab, scroll down to 'Study Design'
- 8. This section contains the official title, which should be used as the name for the Activity

9. Additionally it contains information about the start and end date, which should be copied into the respective fields in the Activities table



- 10. Scroll further down to 'Contact and Locations'
- 11. The information given under contacts should be added to the Researcher column in Airtable
- 12. Switching into the Researcher-table within in Airtable the given contact details should be added to the newly created entries for the involved researchers
- 13. Also the affiliation to a certain institute can be added based on these information as well as the researcher's location -> is it possible to link the Location with the Affiliation so that the location is automatically added based on the information about the institution the researcher is affiliated with?
- 14. Switch back into the Activities table and add information about the Locations to the Activity Location and the Institutions columns

Locations

Nigeria

Irrua Specialist Teaching Hospital

Recruiting

Irrua, Edo State, Nigeria

Contact: Peter Akhideno, Dr +2348037048831 <u>ehideno@yahoo.co.uk</u>
Contact: Cyril Erameh, Dr +2348032413382 cyrilerameh@gmail.com

Federal Medical Center of Owo

Recruiting

Owo, Ondo State, Nigeria

Contact: Oluwafemi Ayodeji, Dr femiayodeji@yahoo.com

Sponsors and Collaborators

Bernhard Nocht Institute for Tropical Medicine

University of Hamburg-Eppendorf

Alliance for International Medical Action

Institut National de la Santé Et de la Recherche Médicale, France

University of Bordeaux

Federal Medical Centre, Owo

Irrua Specialist Teaching Hospital

Investigators

Principal Investigator: Peter Akhideno, Dr ISTH

Principal Investigator: Sylvanus Okogbenin, Prof ISTH

Principal Investigator: Oluwafemi Ayodeji, Dr FMCO

- 15. Scroll up again to the selection of tabs
- 16. Click on the Results tab -> it's worth checking this tab even when it's called No Results Posted as it might still contain links to publications that are affiliated with the study
- 17. These links can be copied into the Published Work column in the Activities table



18. I also copied the link of the study page on clinicaltrials.gov into the Activity Website column



19. to determine the Research Field, I had to use my own understanding of the study so I am not sure if this can be automated or rather needs to be done by a database librarian

9.3 Public journal/research databases

In order to aid in automation, maintain a list relevant search terms for each topic of interest (stored in the "Topics" table in Airtable). Even if the terms are not used for the purposes of developing a search strategy, they can be used by those who are not subject matter experts when collection information on a specific topic

9.3.1 Example of a successful search:

(zoonoses OR zoonotic disease OR zoonotic illness) and (africa*) and (surveillance OR tracki:

The majority of results from this search, when conducted in PubMed, appeared relevant to the database (based on title/abstract scanning)

9.3.2 Example of PubMed search for surveillance activities for Brucellosis:

("surveillance"[Title/Abstract] OR "prevalence"[Title/Abstract] OR "monitoring"[Title/Abstract]

This search yielded a large quantity of results, not all of which were relevant. Manual processes are required to validate results.

Including terms to filter the results based on location were helpful, but still included results not located on the African continent. Search term to filter for African countries:

(Djibouti[Title/Abstract] OR Seychelles[Title/Abstract] OR DR Congo[Title/Abstract] OR Comor

From publications, can extract researchers, institutions, funders, activities. Ideally, researchers, institutions, and funders can be extracted automatically as opposed to manually, but scripts would need to be customized for each journal.

9.3.3 Validation of results

Validation of results can be useful to better understand the overlap between publications and activities and determine the priority of searching through publications vs. navigating to institution sites directly (or other strategies).

After finding a relevant publication, look at the publication's authors and their respective institutions

Navigate to institutions' sites to search for publications or results from research

Are their activities listed on the site? Are those activities explicitly mentioned in the publications? Etc.

9.3.4 Some relevant journals/databases:

- $\bullet \ \ Zoonoses \& \ Public \ Health \ from \ Wiley \ Online \ Library: \ https://online library.wiley.com/action/doSearch? Solice \ Anti-Appendix \ Anti-Appe$
- Journal of Public Health in Africa: https://www.publichealthinafrica.org/jphia/issue/view/30
- PLoS Journal of Neglected Tropical Diseases: https://journals.plos.org/plosntds/search?filterJournals=PL

9.4 GEPRIS

9.4.1 General Information:

GEPRIS is a database listing all projects funded by the German Research Foundation (German: Deutsche Forschungsgemeinschaft; abbr. DFG) The DFG is a research funding organisation, which functions as a self-governing institution for the promotion of science and research in the Federal Republic Germany. In 2019, the DFG had a funding budget of €3.3 billion.

9.4.2 How to Use:

The database can be accessed here: https://gepris.dfg.de/gepris/OCTOPUS?language=en&task=showSearchSinThis link should directly lead to the English version of the website, otherwise the language

This link should directly lead to the English version of the website, otherwise the language can be changed by clicking on English in the top right corner.

- In the database one can search for Projects, People, or Institutions for our purpose the project option is the most relevant
- One can either search for keywords or filter for different criteria for a systematic approach I found using the filtering options easier than going through all our
- 1. On the search start site stay in the Projects tab.
- 2. Click on Show extended search.
- 3. Under Subject Area select one of the following:
 - Agriculture, Forestry and Veterinary Medicine
 - Basic Research in Biology and Medicine
 - Medicine
 - Microbiology, Virology, and Immunology
 - Social Sciences
 - Water Research

• Zoology

Note: After working through all these subject areas, any relevant project in the field of One Health should be picked up by the searches

- 4. Leave everything under DFG Programme as it is
- 5. Move on to Funding and change Status to Current
- 6. Move on to International and change Continent to Africa
- 7. Click on Find
- 8. Read through the project titles on the results page to identify relevant projects
- 9. Import all the relevant project information (as highlighted on the screenshots) into the Africa CDC database

Projekt		且			
The potential of nonhuman primates as a reservoir for human yaws					
Applicants	→ Privatdozent Dr. Sascha Knauf, Ph.D., until 7/2019; → Professor Dr. Christian Roos	1			
Subject Area Term	Parasitology and Biology of Tropical Infectious Disease Pathogens since 2014				
Project identifier	Deutsche Forschungsgemeinschaft (DFG) Project number 252488542				

Project Description

It has been propagated that human yaws caused by the bacterium Treponema pallidum subsp. pertenue (TPE) has no animal reservoir. Yet, reports of T. pallidum (TP) infection in nonhuman primates (NHPs) are accumulating. Several studies demonstrate simian infection with strains that are most closely related to human yaws-causing TPE strains. Our DFG funded study on NHP infection further supports the above mentioned findings. Data on simian TP strain diversity in Tanzania (TZ) are accumulating and reveal epidemiological insight into the spread of this conspicuous bacterium across the country. The phylogenetic branching pattern obtained from whole genome sequences of a greater number of simian strains (West and East Africa) suggests a rapid initial radiation of TPE across humans and NHPs and that at least ancestral TPE strains were most likely not host species specific. The East African Lake Manyara National Park simian strains reveals an overall gene synteny (including rRNA operons) with str. Gauthier with only 8.9% amino acid differences. A complete picture of TP infection in humans and NHPs including the definite answer to the NHP reservoir question will, however, only assemble when existing data on simian infection are compared to a greater number of circulating human TP(E) strains, which originate from areas with characterized simian infection. We hypothesize that humans and NHPs in TZ share the same TP(E) strains and also that NHPs in (Ghana) GH are infected with TP. While GH reports yaws until today, there is a chance of hidden TPE infections in humans in TZ, a country that currently does not report yaws, but harbors a great number of infected NHP species. DNA based assays (e.g. LAMP) are designed to fast-track identification on the subspecies level complementing the serological testing. This will

increase specificity of yaws diagnosis from atypical clinical manifestations followed by whole genome sequencing. Simian and human TP strains from Africa have not yet been investigated using an integrated approach, and the results obtained are crucial for the understanding of Treponema evolution and epidemiology as well as to answer the important question on inter-species transmission. New laboratory TP strains will allow advanced immunological research and the creation of translational animal models which could open new pathways for vaccine development and testing. The project combines basic research in the field of Treponema infection with continues One Health capacity building and early-career research training at the African locations. A South-South partnership is created to support scientific excellence in the field of infectious disease research, addressing an urgent need in TZ and GH. Research activities of this project are logically expanded towards a yaws endemic country (GH). The project is expected to improve local health care services in TZ and GH and has the potential to support public health initiatives in post-yaws MDA surveillance.

DFG Programme	Research Grants			
International	Ghana, Tanzania			
Connection				
Co-Investigators	→ Idrissa S. Chuma; → Dr. Julius D. Keyyu; → Inyasi A. V. Lejora			
International Co-	→ Professor Dr. Rudovick Kazwala; → Dr. Sayoki Mfinanga, Ph.D.; → Dr. Augustina			
Applicants	Sylverken			

10. To identify the research institutes that are involved in the project one has to click on the researchers names and extract that information from their profile (their affiliation with a research institute is listed there)

9.4.3 Positive aspects of this source:

The filtering options allow to filter for several criteria which are crucial for the relevance of a project to our database. That removes a lot of irrelevant projects from the results pages. The project pages list almost all the information we are interested in.

9.4.4 Downsides of this source:

The project page doesn't list the anticipated end date of a project.

One has to click on the link to the researcher's profile to identify the participating organisations.

Even using all the different filtering options not all resulting hits are relevant for our database, so I don't think the process can be fully automated or at least requires a subsequent manual validation or clean up step to remove irrelevant projects.

9.5 EDCTP

9.5.1 General Information

The European & Developing Countries Clinical Trials Partnership (EDCTP) is a non-profit organisation with a European office in The Hague, The Netherlands and an African office in Cape Town, South Africa. EDCTP is a partnership between European Union (EU), Norway, Switzerland, and African countries to accelerate the development of new clinical interventions such as drugs, vaccines, microbicides, and diagnostics against poverty-related diseases in Africa. The organisation supports clinical trials, capacity strengthening and networking in Africa and Europe. Funding comes from the EU, member states, pharmaceutical industry and private organisations and charities like The Wellcome Trust and The Bill & Melinda Gates foundation.

Note: Since funding comes from several sources that we also list as sources for populating the database such as the European Union (European Commission), The Wellcome Trust and The Bill & Melinda Gates Foundation, there is the possibility that downloading project information from all these sources into our database could lead to duplicate entries. I created a column in the Activities table for the Project ID, as this might be helpful to identify duplicates and remove them automatically.

9.5.2 How to use:

The database of funded project can be accessed here: https://www.edctp.org/edctp2-project-portal/

There is the option to download the list of projects as a PDF, CSV or XLXS file. Personally, I did not find that helpful for manually adding projects to the database, but it might be useful for an automated process.

- 1. Go to Status of Project and select the filter Active
- 2. Go to Classification and select one of the following filters:
 - Co-Infections
 - COVID-19
 - Cysticercosis/Taeniasis
 - Diagnostics
 - Diarrhoeal Diseases
 - Drugs
 - Emerging Infections, incl. Ebola, Lassa
 - Epidemiology
 - HIV

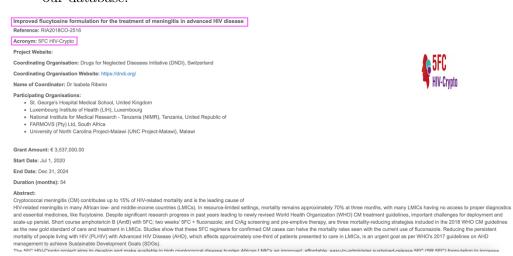
- Human African trypanosomiasis (sleeping sickness)
- Implementation Research
- Leishmaniases
- Leprosy (Hansen disease)
- Lower respiratory infections
- Lymphatic filariasis
- Malaria
- Microbicides
- Onchocerciasis (river blindness)
- Rabies
- Schistosomiasis
- Soil-transmitted helminthiasis
- Social Science
- Tuberculosis
- Vaccines
- Yaws
- Yellow Fever

Note: Only one Classification at a time can be selected

- 3. Once one Classification was selected click on search
- 4. Change from Show Map to Show List -> this makes it easier to systematically look through the projects
- 5. On the results list you can see the location of the coordinating organisation, but even if it is not in an African country, it is worth checking the project details for the Participating Organisations. So read the project title and decide whether this could be a relevant project, if so, click on View details



6. Check the Participating Organisations first to decide whether the project is relevant to our database:



- 7. If the project is relevant use the Project Name + Acronym for the Activity Column
- 8. Transfer all the relevant information to our database, including Project ID, Start and End date, Participating Organisations and corresponding locations, Project Website, Coordinating Organisation and Coordinating Researcher
- Tag the project with the correct keywords in the Activity Type, Activity Outputs, Target Species, Topic, and Research Field columns based on your understanding of the project abstract

9.5.3 Benefits of this Source:

The projects can be easily filtered for currently active projects.

The EDCTP is specifically focused on projects in Africa or Europe with African collaborators so most projects fulfil at least one of our selection criteria

A lot of the projects (not all) are also topic-wise relevant for our database

The database lists most of the information that we are interested in for our database

9.5.4 Shortcomings of this source:

Only one disease/topic can be selected at a time so sequential searches are necessary

Project details only list the Coordinating researcher but no other lead researchers at the participating organisations