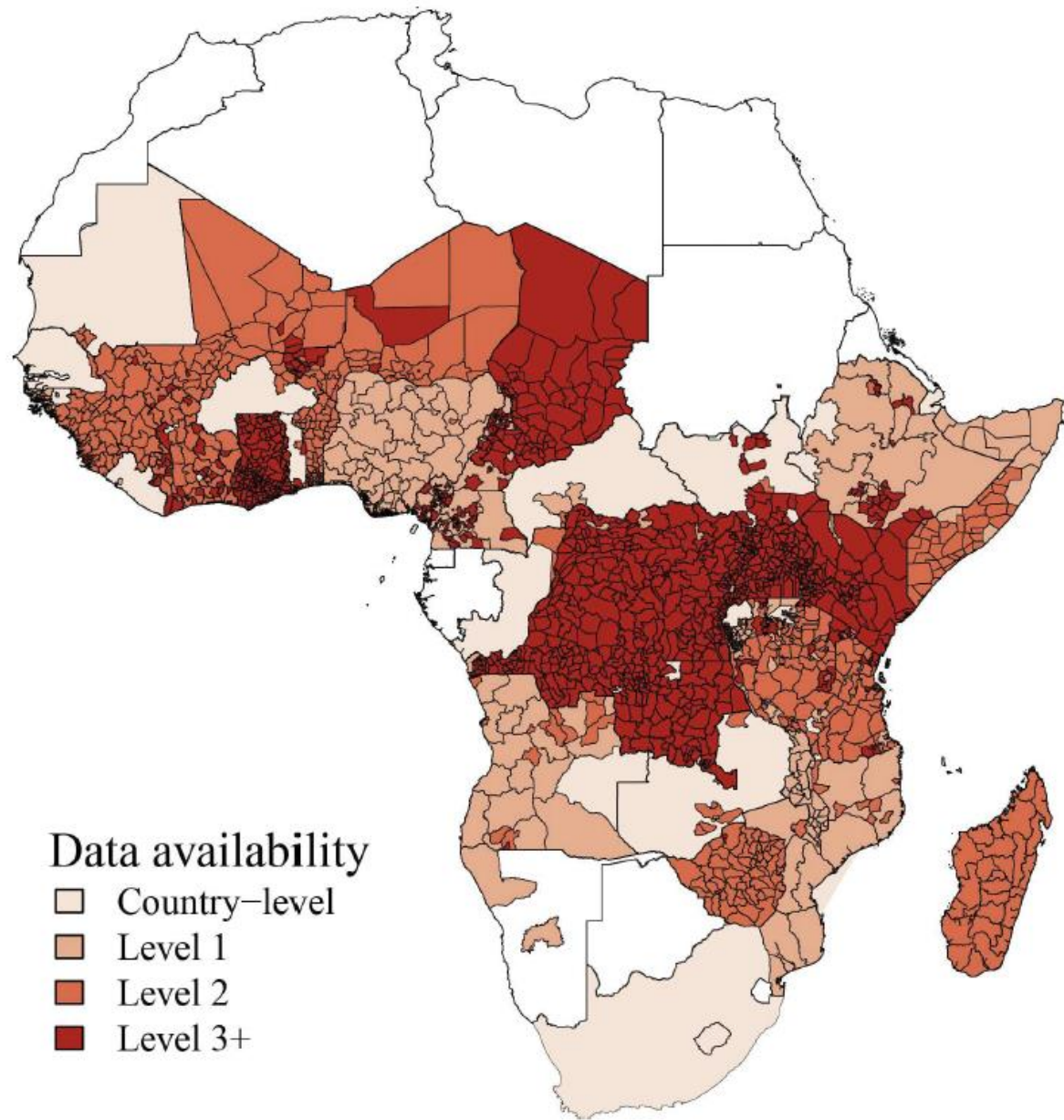
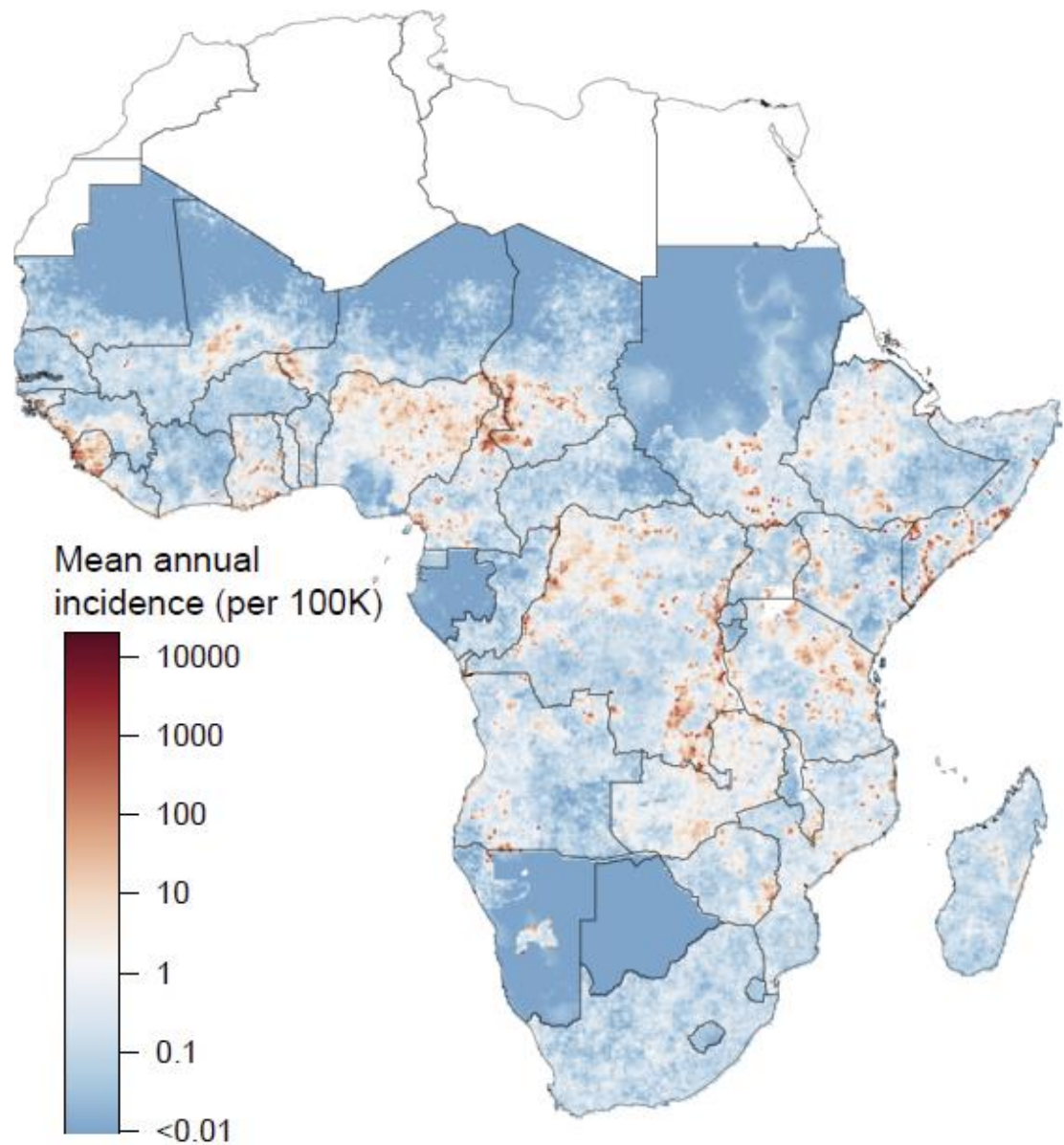
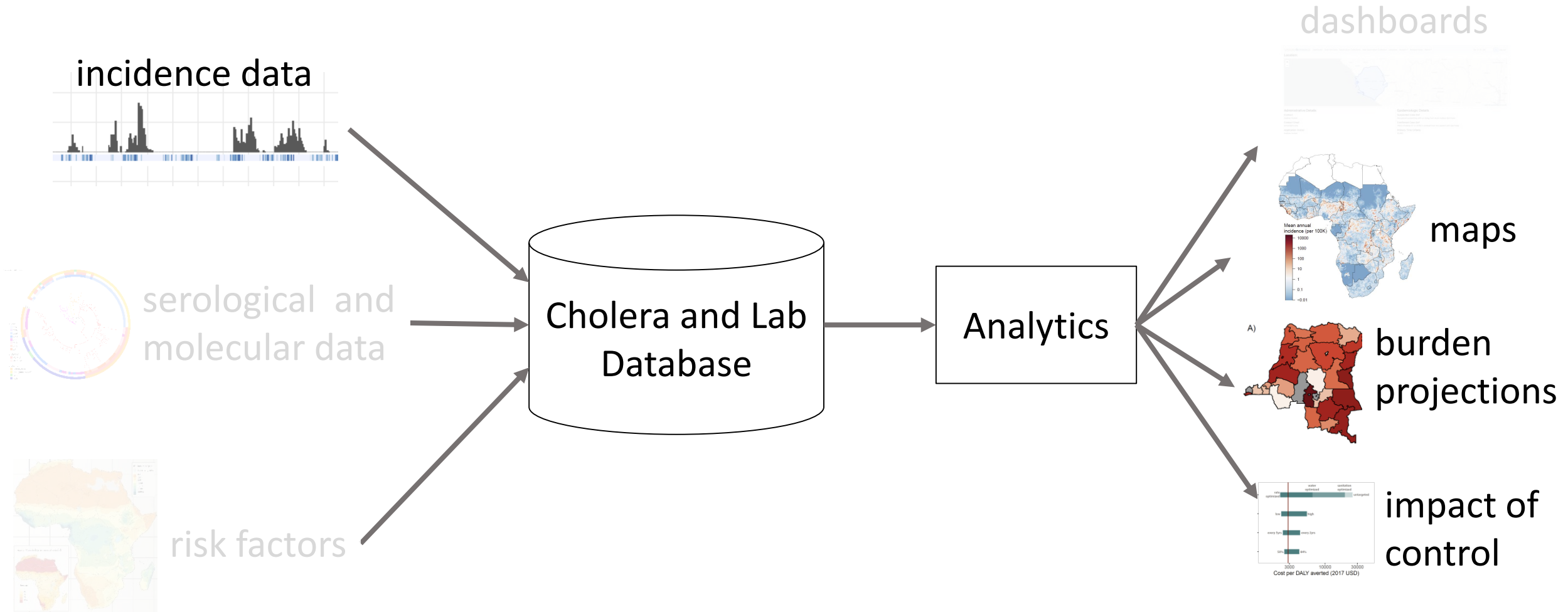


Tracking progress: global database for epi and lab data

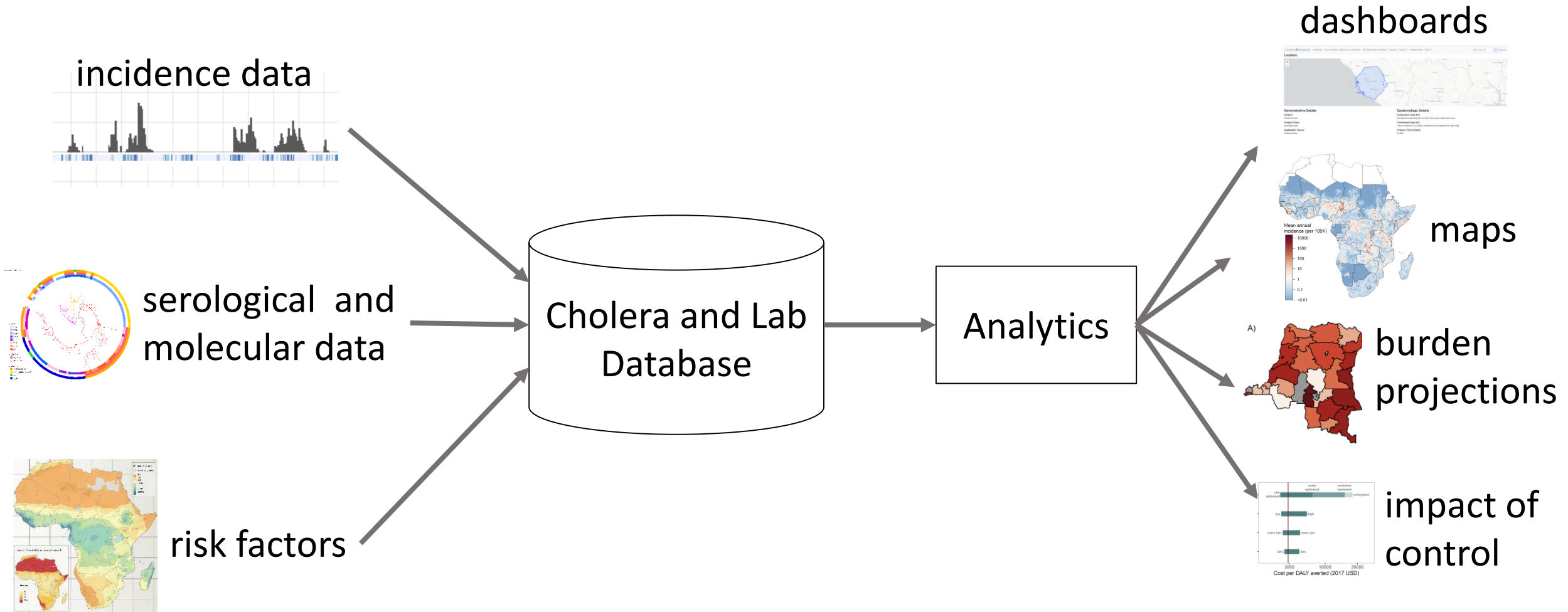
Justin Lessler and Elizabeth Lee for the
JHU Cholera Dynamics Team



Role of the Database



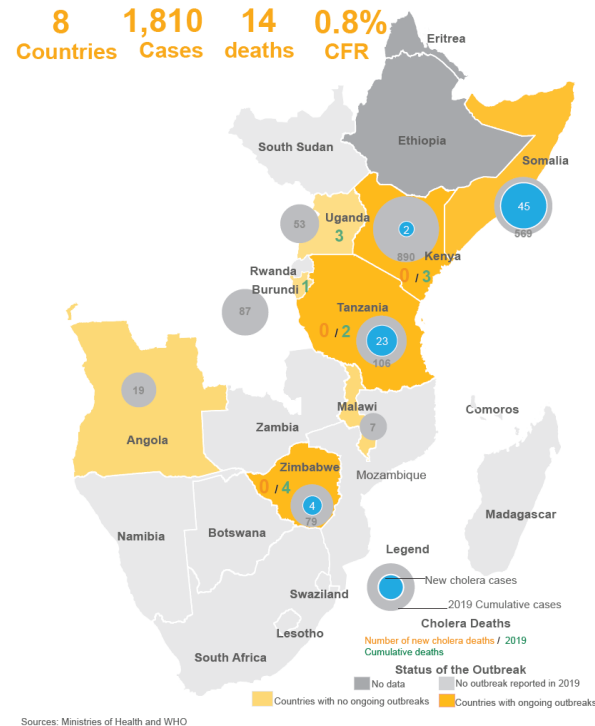
Role of the Database



Sources of clinical surveillance data

- Ministries of Health (e.g., situation reports, linelists, DHIS, press releases, etc)
- Scientific research studies
- Media
- Regional summaries
- Reports from WHO, UNICEF, and others

Data come in many shapes and sizes



Published Date: 2019-05-09 12:55:05
 Subject: PRO/EDR> Cholera, diarrhea & dysentery update (12): Africa, Asia
 Archive Number: 20190509.6460944

CHOLERA, DIARRHEA AND DYSENTERY UPDATE (12): AFRICA, ASIA

A ProMED-mail post
<http://www.promedmail.org>
 ProMED-mail is a program of the International Society for Infectious Diseases
<http://www.isid.org>

In this update:

Africa

- [1] Cholera - Somalia: WHO
 - [2] Cholera - Zimbabwe
 - [3] Cholera - Mozambique (northern)
 - [4] Cholera - Kenya (Mandera County)
 - [5] Cholera - Kenya (Embu County)
- Asia
- [6] Cholera - Nepal (Kathmandu)

Africa

- [1] Cholera - Somalia: WHO
- Date: Tue 7 May 2019
 Source: WHO Emergencies preparedness, response, Disease Outbreak News (DONs) [edited]
<http://www.emro.who.int/pandemic-epidemic-diseases/cholera/outbreak-update-cholera-in-somalia-28-april-2019.html>

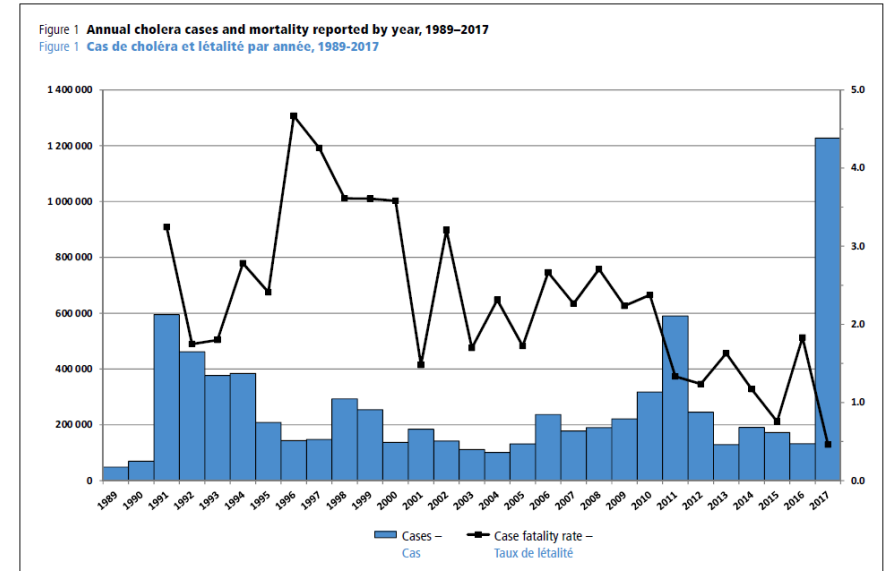
Outbreak update - Cholera in Somalia, 28 Apr 2019

The Ministry of Health (MoH) of Somalia has announced 36 new suspected cases of cholera, with no deaths, for epidemiological weeks 1 and 7 due to closure of the main cholera treatment center, from which data is collected the beginning of this outbreak in December 2017.

During the reporting period, cases occurred in 11 out of 17 districts in Banadir region, the worst affected district are Hodan (728) the cases (24) are children below 5 years of age.

WHO, MoH, and partners have contained the cholera outbreak in the districts of Jubaland, Hirshabelle, and South West states following (OCV) campaigns and other health interventions. However, active transmission is ongoing in 11 districts in Banadir -- Darkenly, D Bondere, Kahda, Kaaran, Waberi, and Warta nabada).

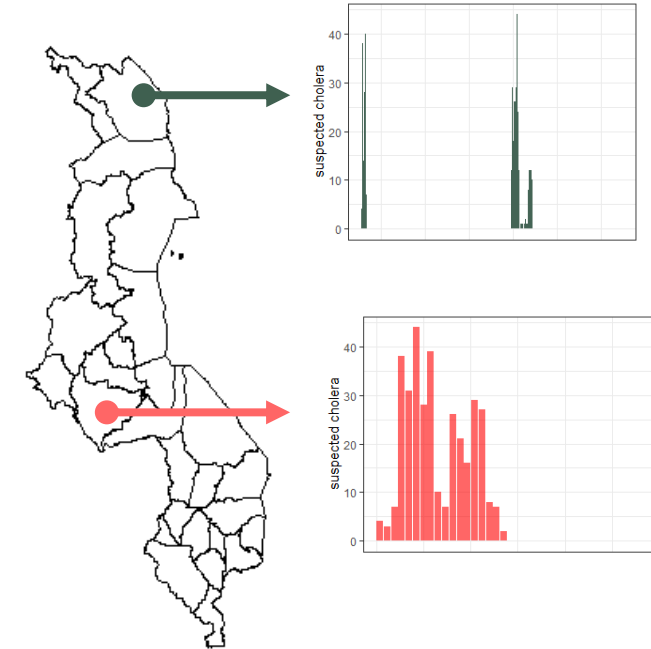
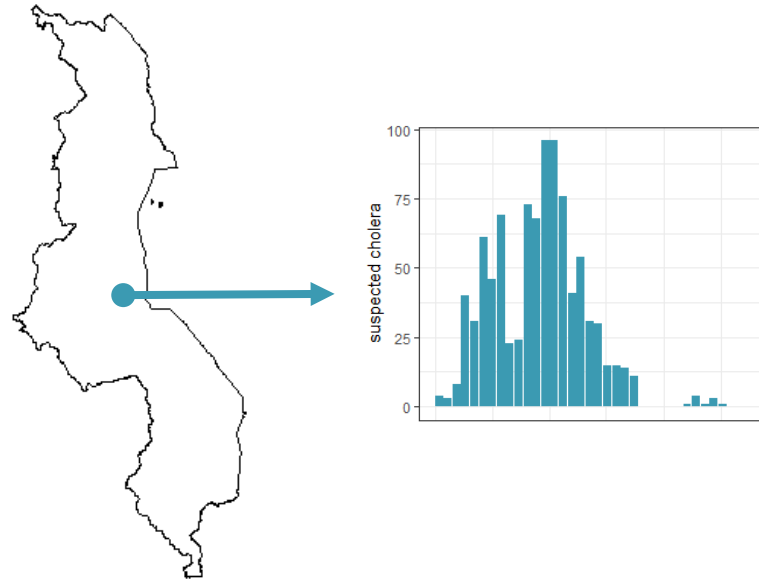
| Region – Région | Country – Pays | Total no. of cases, including imported cases/deaths – Nombre total de cas (incluant cas importés et décès) | Imported cases – Cas importés | Deaths – Décès | Case fatality rate (%)* – Taux de létalité (%)* |
|------------------|---|--|-------------------------------|----------------|---|
| Africa – Afrique | Angola | 828 | | 43 | 5.2 |
| | Benin – Bénin | 11 | | 0 | 0.0 |
| | Burundi | 399 | | 0 | 0.0 |
| | Chad – Tchad | 1 266 | | 86 | 6.8 |
| | Democratic Republic of the Congo – République Démocratique du Congo | 56 190 | | 1 190 | 2.2 |
| | Kenya | 4 288 | | 82 | 1.9 |
| | Malawi | 344 | | 5 | 1.4 |



| | A | B | C | D | E |
|---|------------|--------|--------|--------|--------|
| 1 | Country | Week 1 | | Week 2 | |
| 2 | | Cases | Deaths | Cases | Deaths |
| 3 | Mozambique | 0 | 0 | 0 | 0 |
| 4 | Kenya | | | 115 | 2 |
| 5 | Somalia | 87 | 0 | 87 | 0 |

Data are linked to locations and time periods

Locations

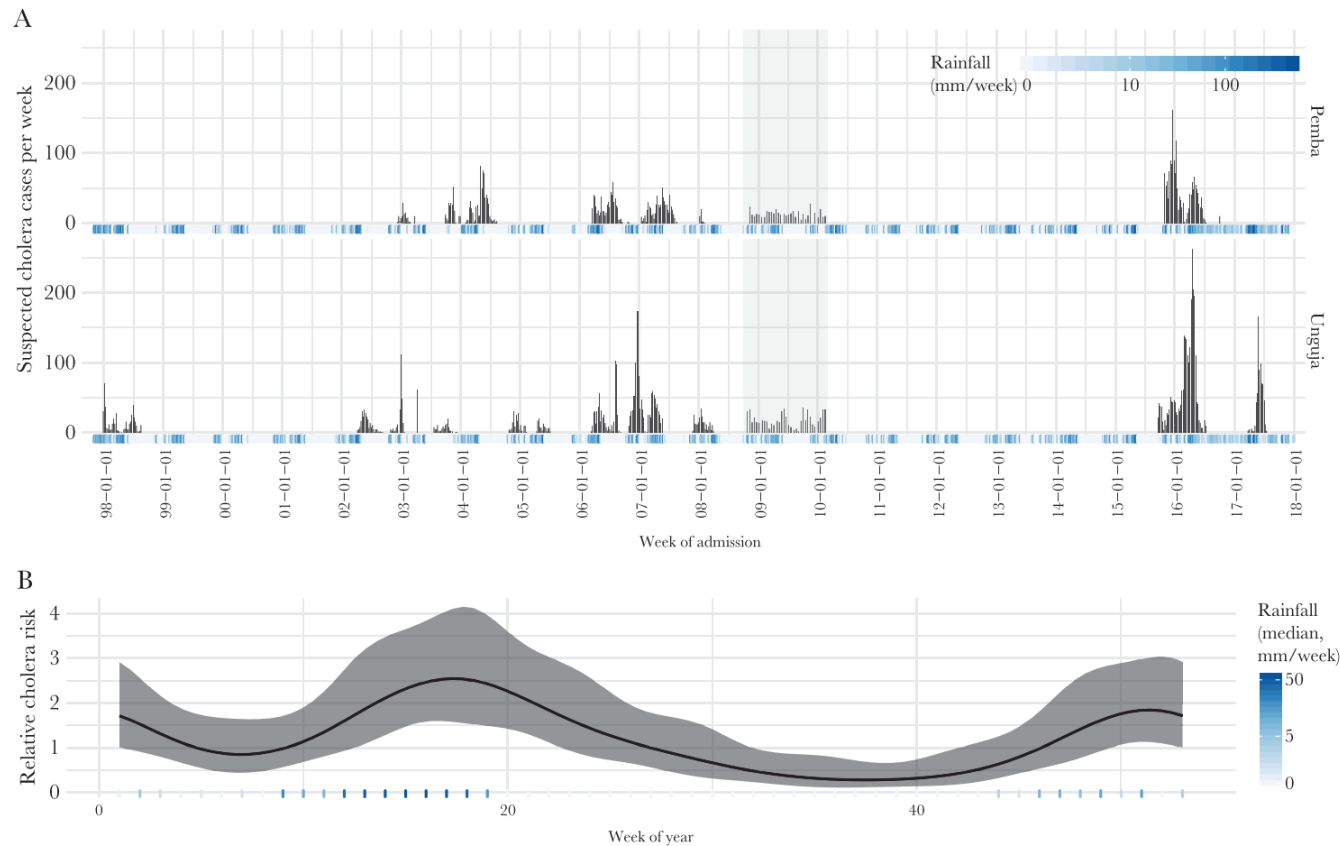


Time Periods

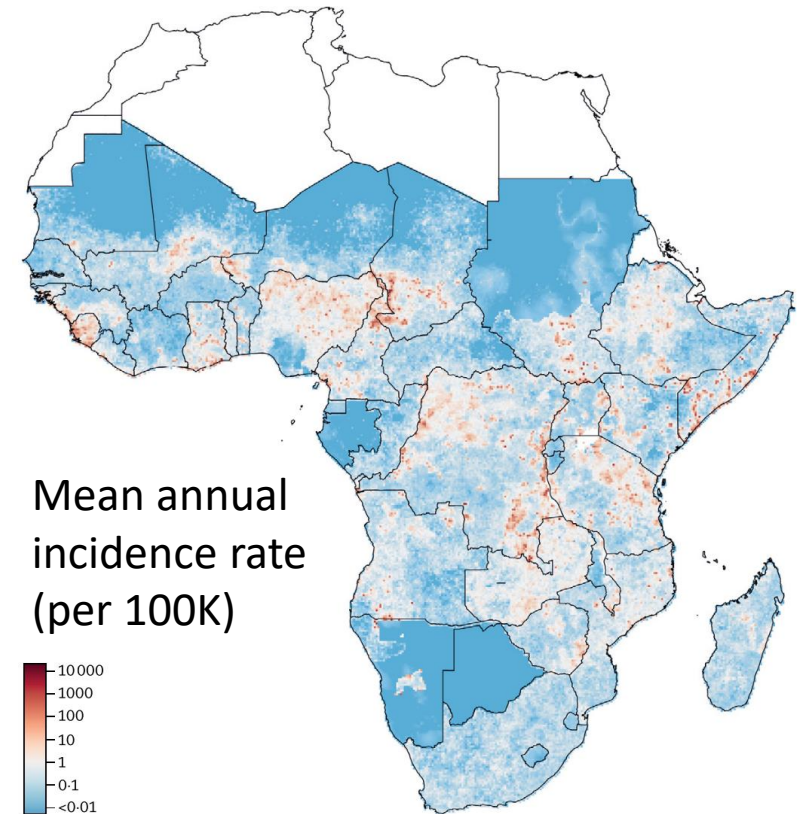


Standardized descriptions of cholera epidemiology

Temporal patterns



Spatial patterns



A look at the
current state of
the database

View information
about a single
location

CHOLERA DYNAMICS Dashboard Overview Observation Add Observation Workspace Locations Account Release Admin Go to OC UID Log out
Data Collections Collection Notes

AFR::MWI.Malawi [Edit Location](#) [Add Location Period](#)

Name
Malawi

Latitude
-13.5

Longitude
34

Observation Collections

- 38
- 39
- 329
- 489
- 3017
- 3019
- 3020
- 3021
- 3024
- 3025
- 3026
- 3028**
- 3029
- 3030
- 3031
- 3032
- 3182
- 5100
- 5122
- 20350
- 20360


Parent Location
[AFR](#)

Child Locations

- [AFR::MWI::MW-BA.Balaka](#)
- [AFR::MWI::MW-BL.Blantyre](#)
- [AFR::MWI::MW-CK.Chikwawa](#)
- [AFR::MWI::MW-CR.Chiradzulu](#)
- [AFR::MWI::MW-CT.Chitipa](#)
- [AFR::MWI::MW-DE.Dedza](#)
- [AFR::MWI::MW-DO.Dowa](#)
- [AFR::MWI::MW_KR](#)
- [AFR::MWI::MW-KR.Karonga](#)
- [AFR::MWI::MW-KS.Kasungu](#)
- [AFR::MWI::MW-LI.Lilongwe](#)
- [AFR::MWI::MW-LK.Likoma](#)
- [AFR::MWI::MW-MC.Mchinji](#)
- [AFR::MWI::MW-MG.Mangochi](#)
- [AFR::MWI::MW-MH.Machinga](#)
- [AFR::MWI::MW-MU.Mulanje](#)
- [AFR::MWI::MW-MW.Mwanza](#)
- [AFR::MWI::MW-MZ.Mzimba](#)
- [AFR::MWI::MW-NB.Nkhata Bay](#)
- [AFR::MWI::MW-NE.Neno](#)
- [AFR::MWI::MW-NI.Ntchisi](#)
- [AFR::MWI::MW-NK.Nkhotakota](#)
- [AFR::MWI::MW-NS.Nsanje](#)
- [AFR::MWI::MW-NU.Ntcheu](#)
- [AFR::MWI::MW-PH.Phalombe](#)
- [AFR::MWI::MW-RU.Rumphi](#)
- [AFR::MWI::MW-S](#)
- [AFR::MWI::MW-SA.Salima](#)
- [AFR::MWI::MW-TH.Thyolo](#)
- [AFR::MWI::MW-ZO.Zomba](#)
- [AFR::MWI::RefugeeCamps.Refugee Camps](#)

AFR::MWI:: [Add Location](#)

Location Periods
6892 - 01/01/1800 - 12/31/2030



Map showing Malawi and surrounding regions (ZAMBIA, Lusaka, Lilongwe, Nacala). The map includes a zoom control and attribution to Leaflet, OpenStreetMap, and CartoDB.


View information
about a single source
document

CHOLERA DYNAMICS Dashboard Overview Data Observation Collections Add Observation Collection Workspace Locations Account Release Notes Admin

Go to OC UID Go Log out

Observation Collection 329 **Initial Data Entry Complete** [Edit Observation Collection](#) [Delete Observation Collection](#)

Location: AFR::MWI



Administrative Details

Contact
Sean Moore

Contact Email
smoore15@nd.edu

Application Owner
Elizabeth Lee

Public?
Yes

IRB Protocol

Owner

Owner Email

MOU DSA Notes

Source
WHO Annual Cholera Reports

Source URL
<http://apps.who.int/globalatlas/dataQuery/default.asp>

Source Notes

Source Documents

| Document Name | Created |
|-------------------------------------|--------------------|
| mwi_who_gho_wer.zip | 04/10/2019 4:36 PM |

Notes
Annual cases and deaths reported to WHO, excludes imported cases. Updated by Elizabeth Lee (elee154@jhu.edu). Added 2017 cases. Edited by Elizabeth Lee elee154@jhu.edu April 2019 2017 data comes from WER9338

Observation Properties

Start
1973-01-01

End
2017-12-31

Deaths
3469

Suspected Cases
143279

Epidemiologic Details

Suspected Case Def
UNKNOWN

Confirmed Case Def

Primary Time Criteria
CLINIC

Strains

Humanitarian Crisis?
No

Reactive vaccination?
Yes

Previous vaccination?
Yes

View data from a single source document

CHOLERA DYNAMICS Dashboard Overview Data Observation Collections Add Observation Collection Workspace Locations Account Release Notes Admin Go to OC UID Go Log out

Observation Fields

TL TR Primary Phantom deaths sCh

> Uploaded Observation Files

Observations

Upload Observations Edit Observations Download Observations Delete All Observations

| Location | TL | TR | Primary | Phantom | deaths | sCh |
|-----------------|------------|------------|---------|---------|--------|-------|
| AFR::MWI.Malawi | 2016-01-01 | 2016-12-31 | ✓ | | 46 | 1792 |
| AFR::MWI.Malawi | 2015-01-01 | 2015-12-31 | ✓ | | 11 | 693 |
| AFR::MWI.Malawi | 2012-01-01 | 2012-12-31 | ✓ | | 2 | 187 |
| AFR::MWI.Malawi | 2011-01-01 | 2011-12-31 | ✓ | | 4 | 120 |
| AFR::MWI.Malawi | 2010-01-01 | 2010-12-31 | ✓ | | 17 | 1155 |
| AFR::MWI.Malawi | 2009-01-01 | 2009-12-31 | ✓ | | 125 | 5751 |
| AFR::MWI.Malawi | 2008-01-01 | 2008-12-31 | ✓ | | 26 | 831 |
| AFR::MWI.Malawi | 2007-01-01 | 2007-12-31 | ✓ | | 5 | 475 |
| AFR::MWI.Malawi | 2006-01-01 | 2006-12-31 | ✓ | | 55 | 4148 |
| AFR::MWI.Malawi | 2005-01-01 | 2005-12-31 | ✓ | | 11 | 1105 |
| AFR::MWI.Malawi | 2004-01-01 | 2004-12-31 | ✓ | | 4 | 675 |
| AFR::MWI.Malawi | 2003-01-01 | 2003-12-31 | ✓ | | 34 | 2736 |
| AFR::MWI.Malawi | 2002-01-01 | 2002-12-31 | ✓ | | 911 | 32618 |
| AFR::MWI.Malawi | 2001-01-01 | 2001-12-31 | ✓ | | 42 | 2395 |
| AFR::MWI.Malawi | 2000-01-01 | 2000-12-31 | ✓ | | 56 | 2391 |
| AFR::MWI.Malawi | 1999-01-01 | 1999-12-31 | ✓ | | 648 | 26508 |
| AFR::MWI.Malawi | 1998-01-01 | 1998-12-31 | ✓ | | 74 | 1745 |
| AFR::MWI.Malawi | 1997-01-01 | 1997-12-31 | ✓ | | 15 | 130 |
| AFR::MWI.Malawi | 1996-01-01 | 1996-12-31 | ✓ | | 0 | 1 |
| AFR::MWI.Malawi | 1995-01-01 | 1995-12-31 | ✓ | | 0 | 1 |
| AFR::MWI.Malawi | 1994-01-01 | 1994-12-31 | ✓ | | 11 | 107 |
| AFR::MWI.Malawi | 1993-01-01 | 1993-12-31 | ✓ | | 524 | 25193 |
| AFR::MWI.Malawi | 1992-01-01 | 1992-12-31 | ✓ | | 8 | 298 |
| AFR::MWI.Malawi | 1991-01-01 | 1991-12-31 | ✓ | | 245 | 8088 |
| AFR::MWI.Malawi | 1990-01-01 | 1990-12-31 | ✓ | | 481 | 13457 |

← Previous 1 2 Next →

12

View information about all data available for a specific location and time period

CHOLERA DYNAMICS Dashboard Overview Observation Data Collections Add Observation Collection Workspace Locations Account Release Notes Admin Go to OC UID Log out

Observation Collections

Note: When multiple pages of results are present column sorting only affects the current page.

| UID | Location | Observation Count | Observation Range | Created Date | Updated Date |
|-------|----------|-------------------|-------------------------|--------------|--------------|
| 329 | AFR::MWI | 34 | 1973-01-01 - 2017-12-31 | 01/25/2019 | 05/04/2019 |
| 3182 | AFR::MWI | 325 | 2000-11-01 - 2016-10-31 | 01/25/2019 | 02/22/2019 |
| 5100 | AFR::MWI | 1446 | 2015-02-01 - 2017-03-17 | 01/25/2019 | 02/22/2019 |
| 5122 | AFR::MWI | 1289 | 2000-11-01 - 2016-12-31 | 01/25/2019 | 04/08/2019 |
| 20350 | AFR::MWI | 997 | 2012-07-15 - 2018-07-07 | 02/05/2019 | 05/13/2019 |
| 20360 | AFR::MWI | 504 | 2017-11-20 - 2018-07-29 | 03/18/2019 | 05/08/2019 |

Displaying all 6 Observation collection

Filters

WHO Region
AFR

ISO-A1
MWI

ISO-A2_L1

Application Owner

Contact

Minimum # of observations

Maximum # of observations

Earliest observation
01/01/2012

Latest observation

Sort Order

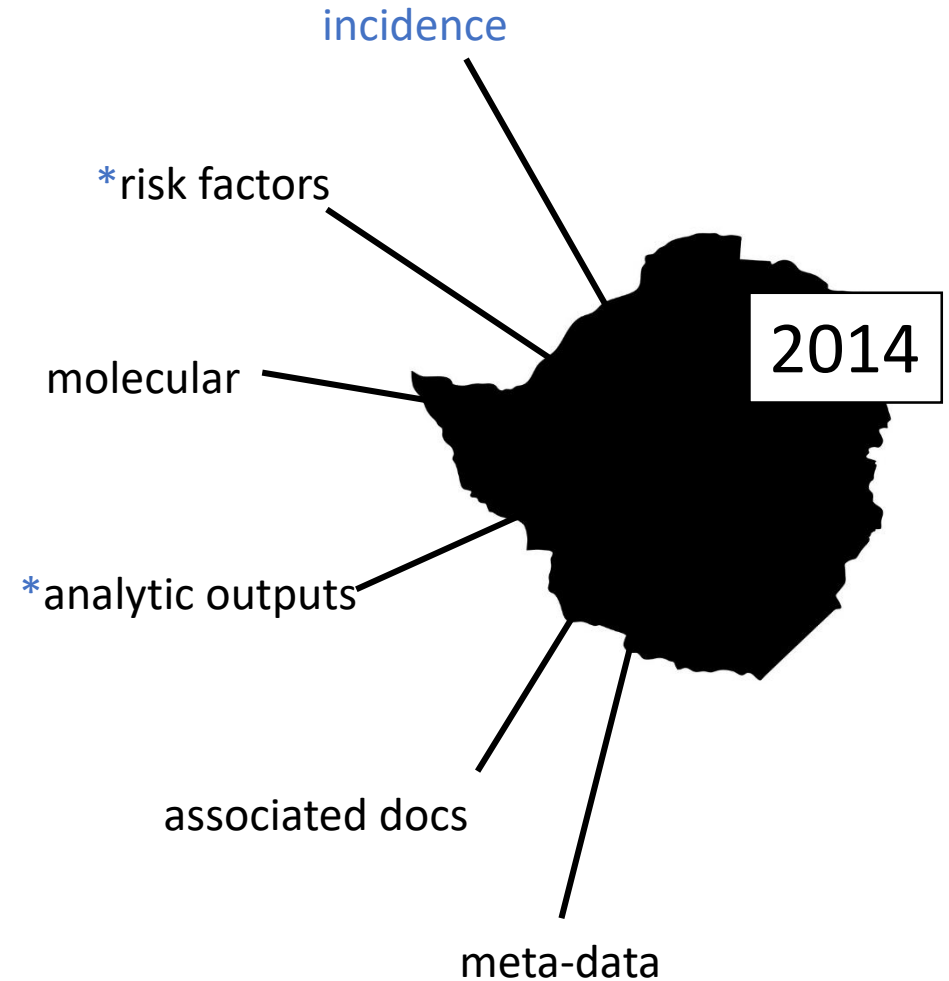
Status

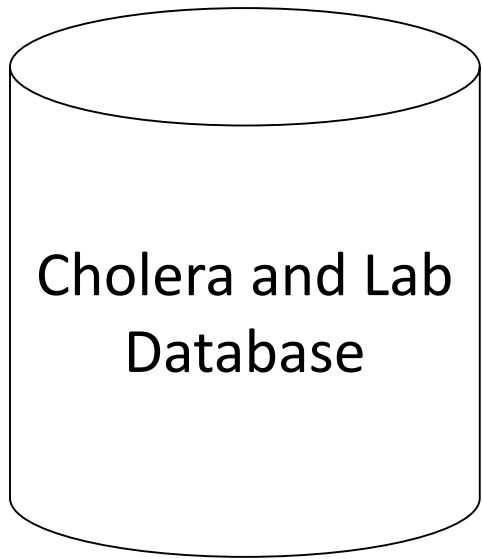
Options
 Display Source
 Display Contact

Update 13 Clear Filters

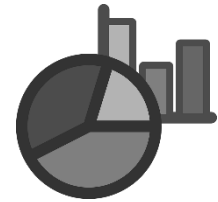
Organizing principles

- All data is indexed by location periods.
 - A location (which may contain other locations)
 - A defined period of time
- Database is “weakly typed”
 - Few restrictions on the types of data that can be associated with location periods.
- Flexible access





data entry



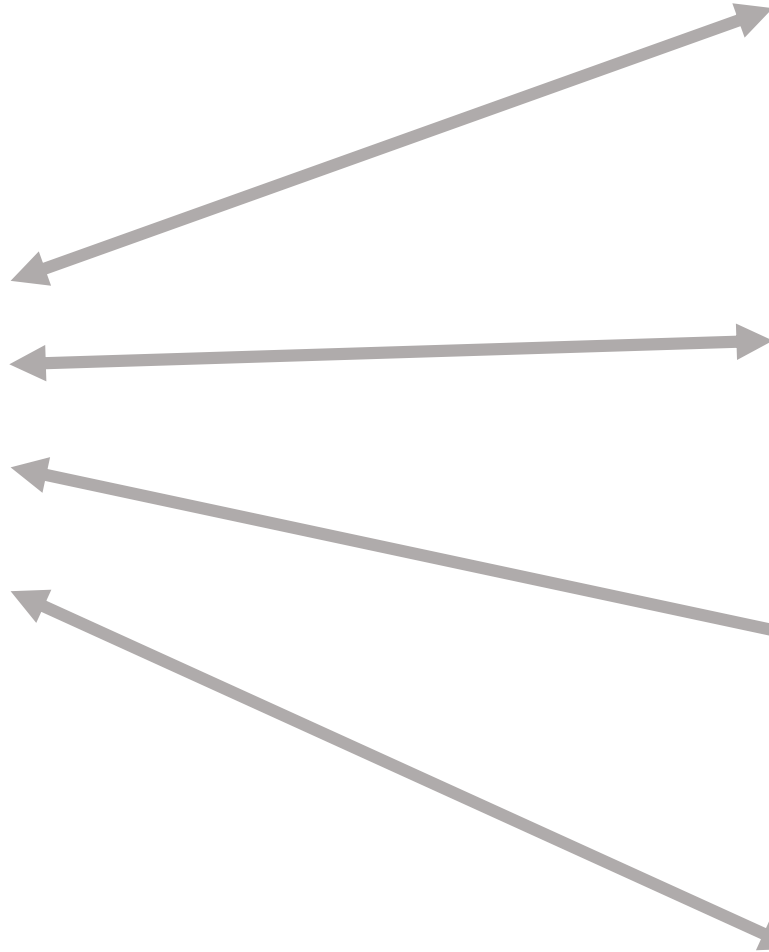
data analysis

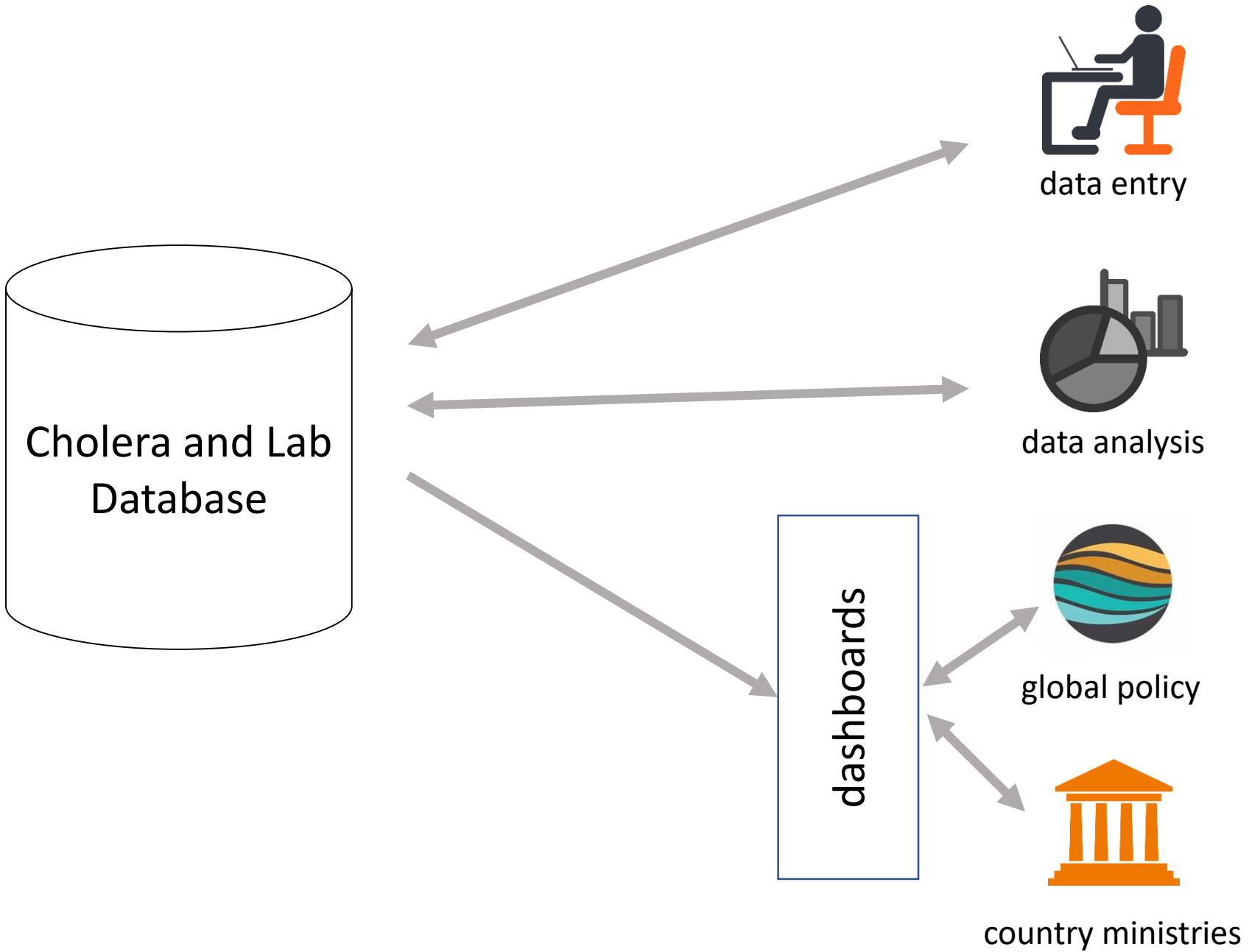


global policy



country ministries





Data Entry Users



CHOLERA DYNAMICS Dashboard Overview Data Observation Collections Add Observation Collection Workspace Locations Account Release Notes Admin

Go to OC UID

Edit Observations

Back to Observation Collection

Set All Displayed Observations:

| OC Location | Area | TL | TR | Primary? | Phantom? | deaths | sCh | Delete |
|-------------|--------------------------|--------------|--------------|-------------------------------------|--------------------------|--------|--------|--------|
| AFR::MWI | <input type="text"/> Add | 2016-01-01 ✓ | 2016-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 46 ✓ | 1792 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2015-01-01 ✓ | 2015-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 11 ✓ | 693 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2012-01-01 ✓ | 2012-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2 ✓ | 187 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2011-01-01 ✓ | 2011-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 ✓ | 120 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2010-01-01 ✓ | 2010-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 17 ✓ | 1155 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2009-01-01 ✓ | 2009-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 125 ✓ | 5751 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2008-01-01 ✓ | 2008-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 26 ✓ | 831 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2007-01-01 ✓ | 2007-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5 ✓ | 475 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2006-01-01 ✓ | 2006-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 55 ✓ | 4148 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2005-01-01 ✓ | 2005-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 11 ✓ | 1105 ✓ | Delete |
| AFR::MWI | <input type="text"/> Add | 2004-01-01 ✓ | 2004-12-31 ✓ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4 ✓ | 675 ✓ | Delete |

Analysts



```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help

analyst_page.R
1 library(taxdat)
2 library(tidyverse)
3
4 indat <- read_taxonomy_data_database(username = "elee154@jhu.edu", api_key = "XXXXXXXXXXXXXXXXXXXX
XXXXXXXX", locations = c("AFR::MWI"), time_left = "2012-01-01", time_right = "2019-07-01")
5
6 pltdat <- indat %>%
7   dplyr::mutate(TL = as.Date(attributes.time_left), TR = as.Date(attributes.time_right)) %>%
8   dplyr::rename(suspected_cases = attributes.fields.suspected_cases, location_period = attributes
9     .location_period_id) %>%
10  dplyr::filter(TR-TL==6 & location_period != "6892" & !is.na(location_period))
11
12 plt <- ggplot(pltdat, aes(x = TL, y = suspected_cases, group = location_period)) +
13   geom_col(aes(fill = location_period)) +
14   theme_bw() +

```

Environment History Connections

Global Environment

Data

| | |
|--------|--------------------------------|
| indat | 3539 obs. of 20 variables |
| plt | Large gg (9 elements, 66.5 Mb) |
| pltdat | 1391 obs. of 22 variables |

```

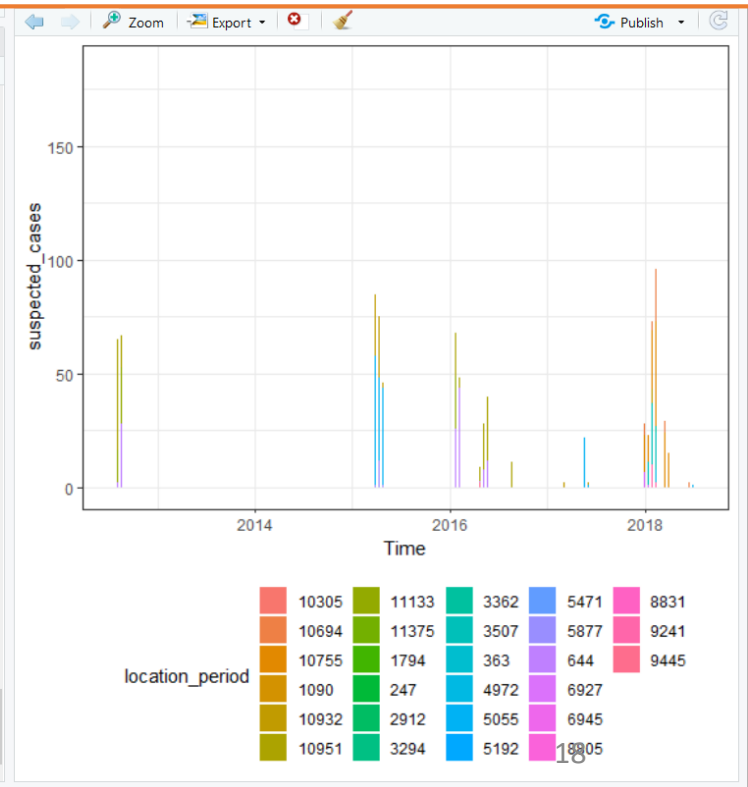
indat <- read_taxonomy_data_database(username = "analyst@gtfcc.org", api_key = "XXXXXXXX
XXXXXXXXXXXXXXXXXXXX", locations = c("AFR::MWI"), time_left = "2012-01-01", time_right =
"2019-06-01")|

```

```

Console Terminal
C:/Users/eclee/Dropbox (Bansal Lab)/IDDynamics/JHU/svn/cholera-taxonomy/trunk/
+ dplyr::mutate(location_OC = paste(attributes.id, sf_id, sep = "-"))
> unique(pltdat$attributes.location_period_id)
[1] "5877" "5055" "4972" "8831" "3507" "363" "10755" "9241" "8805" "6927" "10932" "3362" "10
694" "6892" "1090" "247" "5192"
[18] "5471" NA "10305" "6945" "10951" "9445" "11375" "1794" "11133" "2912" "644" "3294"
> pltdat <- indat %>%
+ dplyr::mutate(TL = as.Date(attributes.time_left), TR = as.Date(attributes.time_right)) %>%
+ dplyr::rename(suspected_cases = attributes.fields.suspected_cases, location_period = attributes.loca
tion_period_id) %>%
+ dplyr::filter(TR-TL==6)
> plt <- ggplot(pltdat, aes(x = TL, y = suspected_cases, group = )) +
+ geom_col(aes(fill = location_OC)) +
+ theme_bw() +
+ theme(legend.position = "bottom") +
+ scale_x_date("Time")
> print(plt)
Error in FUN(X[[i]], ...) : object 'location_OC' not found
> plt <- ggplot(pltdat, aes(x = TL, y = suspected_cases, group = location_period)) +
+ geom_col(aes(fill = location_period)) +
+ theme_bw() +
+ theme(legend.position = "bottom") +
+ scale_x_date("Time")
> print(plt)
> pltdat <- indat %>%
+ dplyr::mutate(TL = as.Date(attributes.time_left), TR = as.Date(attributes.time_right)) %>%
+ dplyr::rename(suspected_cases = attributes.fields.suspected_cases, location_period = attributes.loca
tion_period_id) %>%
+ dplyr::filter(TR-TL==6 & location_period != "6892" & !is.na(location_period))
> plt <- ggplot(pltdat, aes(x = TL, y = suspected_cases, group = location_period)) +
+ geom_col(aes(fill = location_period)) +
+ theme_bw() +
+ theme(legend.position = "bottom") +
+ scale_x_date("Time")
> print(plt)
>

```



Global Context Users [mockup]



CHOLERA DYNAMICS Dashboard Overview Observation Collections Add Observation Collection Workspace Locations Account Release Notes Admin Log out

Mean annual incidence (per 100K)

10000
1000
100
10
1
0.1
-0.01

Available Data and Outputs

Observation Collections

10, 22, 52, 45, 124, 1100, 543, 35, 23, 1245, 234, 225, 234, 5432, 605, 345

Other Data

WGS results, 10 sequences collected ZMB 2020 serosurvey results, AGO 2020 ...[\(more\)](#)

Analytic Outputs

DRC Demand Forecast 2020-2025 (produced 2020)
AGO 1km x 1km resolution burden map
AGO Demand Forecast 2020-2025 (produced 2020) ... [\(more\)](#)

Administrative Details

Contact

Sean Moore

Epidemiologic Details

Suspected Case Def

Patients over 5 yo with severe dehydration, or death from acute watery diarrhoea

Country Context Users [mockup]

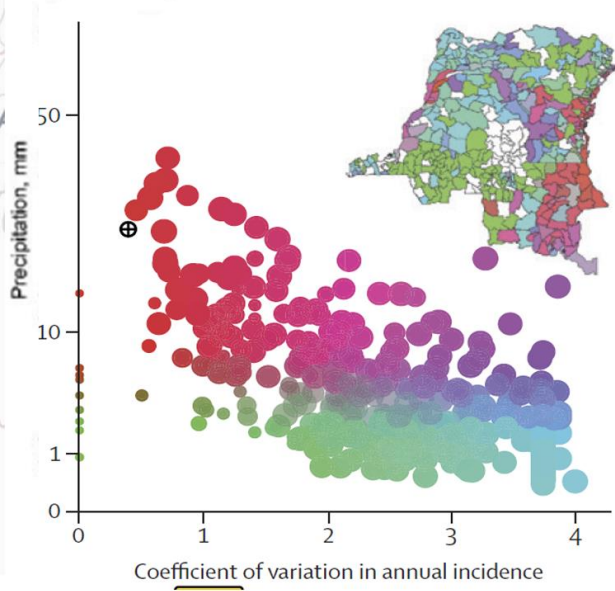


CHOLERA DYNAMICS Dashboard Overview Observation Add Observation Workspace Locations Account Release Admin Log out
Data Collections Collection Notes

Democratic Republic of Congo - Country View



Administrative Details
Contact



Epidemiologic Details
Suspected Case Def

Available Data and Outputs

- Observation Collections**
10, 22, 52, 45, 124, 1100, 543, 35, 23, 1245, 234, 225, 234, 5432, 605, 345
- Private Observation Collections**
2567, 456, 352, 51252
- Other Data**
WGS results, 10 sequences collected COD 2020
serosurvey results, COD 2020
...(more)
- Private Data**
Cholera Treatment Center Map
- Analytic Outputs**
DRC Demand Forecast 2020-2025 (produced 2020)
DRC 1km x 1km resolution burden map
...(more)

External Portals and Dashboards



Dashboard: International Coordinating Group (ICG) on Vaccine Provision on cholera

2019 2018 2017 2016

ICG request record 2016-2019 : Dash-cholera2019

ICG Dashboard

Cholera

2019

Doses shipped by year

2018 2019
6,323,410 3,513,611

Target population*
2,122,142

No. of doses, 2019

Requested 8,515,383

Shipped 3,513,611

Quick glance

| Country | Request Number | ICG request receipt date | Status | Context | Doses shipped | Confirmed delivery date | Vaccination implemented |
|------------|----------------|--------------------------|--------------------|---------------------|---------------|-------------------------|-------------------------|
| Mozambique | #1, 2019 | MOH | Approved | Humanitarian crisis | 884,975 | 2 April | 3 April |
| Zimbabwe | #2, 2019 | MOH | Approved | Humanitarian crisis | 975,646 | | |
| Cameroon | #3, 2019 | WHO on behalf of MOH | Approved | Outbreak response | 680,950 | | |
| DRC | #4, 2019 | MOH | Not approved | Outbreak response | 0 | NA | |
| DRC | #5, 2019 | MOH | Partially approved | Outbreak response | 835,190 | 24 April | |

CholeraPlatform

HOME WESTERN AND CENTRAL AFRICA PLATFORM EASTERN AND SOUTHERN AFRICA PLATFORM MIDDLE EAST AND NORTH AFRICA PLATFORM

Find address or place

Weekly Reported Cholera Cases

Cholera Outbreaks in Central and West Africa : 2019 Regional Update - Week 19

For more information, read the [bi-monthly Cholera Regional Updates](#).

Notes:
Zoom on the map to see cholera cases locations & use the legend widget to display information for other weeks & years.
Suspected and confirmed cholera cases from weekly epidemiological reports (Ministries of health)
The data set is retrospectively updated as new information is provided.
The data set is aggregated at health units level 2, except for Nigeria at health unit level 1.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the Regional Cholera Platform & partners.

400mi
-29.478 6.724 Degrees

POWERED BY esri

About cholera in WCA region

- Cholera Fact Sheets
- Regional Updates (Cholera Bulletin)
- Webmap - Current outbreaks
- Cholera Hotspots

Global Strategy (GTFFCC)

- Operational Steps
- Technical Working Groups (WGs)

Coordination & capacity building

- Meetings
- Workshops
- Trainings

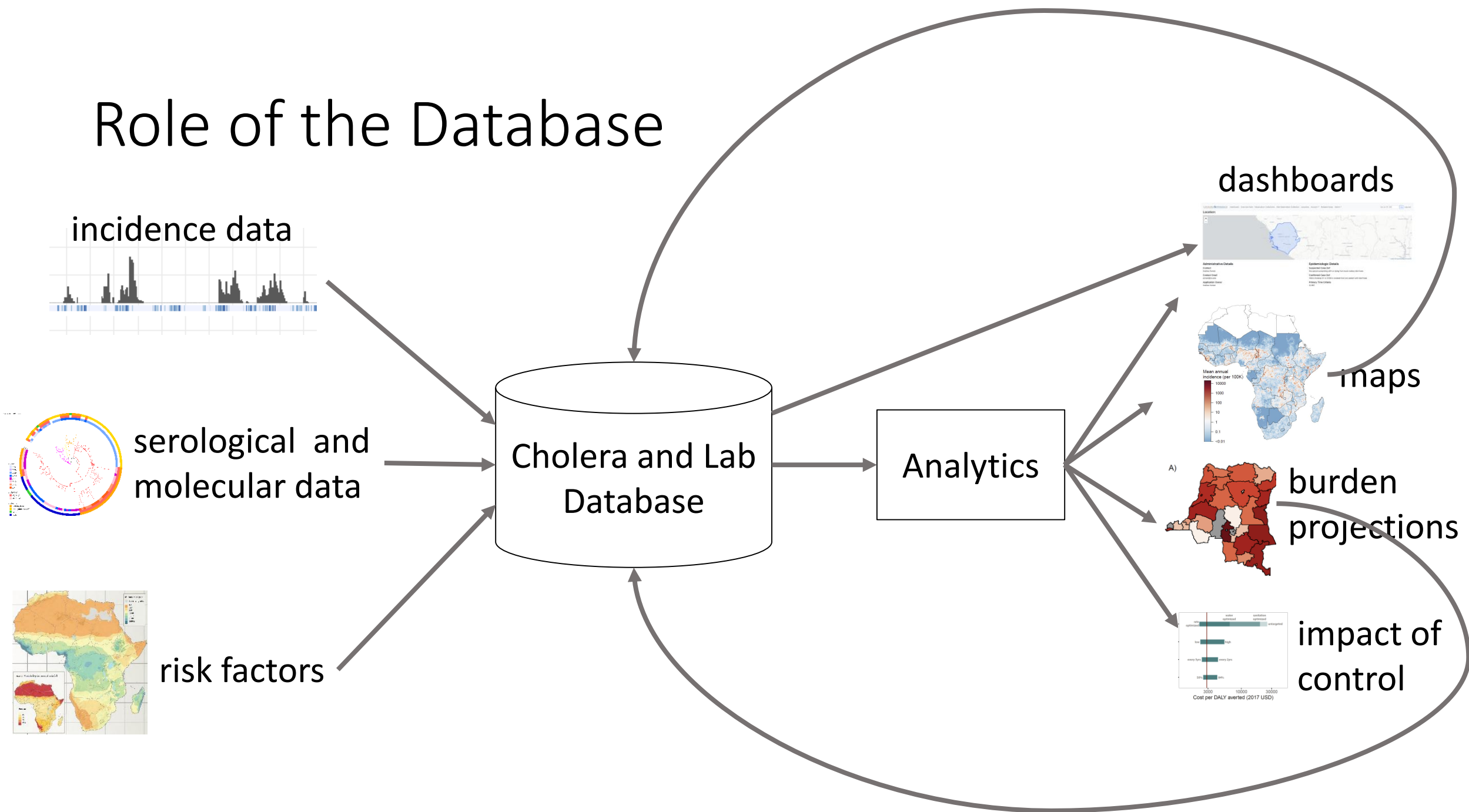
Country monitoring & progress

- DRC
- Nigeria
- Cameroon
- Search others countries

Resources

- Maps and Infographics
- Tools
- Technical references
- Practical Tools - IEC material
- Publications
- Regional Studies
- Global Cholera Studies

Role of the Database



Summary

- Currently the database...
 - ...contains incidence data from a variety of spatial scales
 - ...is targeted to support data entry and analytics
- Can be easily opened to *trusted* non JHU users
- Plans to extend to contain additional datatypes
 - lab data
 - risk-factors
- With GTFCC endorsement we can make interfaces for particular users
- Programmatic interface can allow database to provide information to independent dashboards, etc.