

---

# Global cholera surveillance

*What we are doing at WHO HQ*

3 May 2023  
Craig Schultz



World Health  
Organization



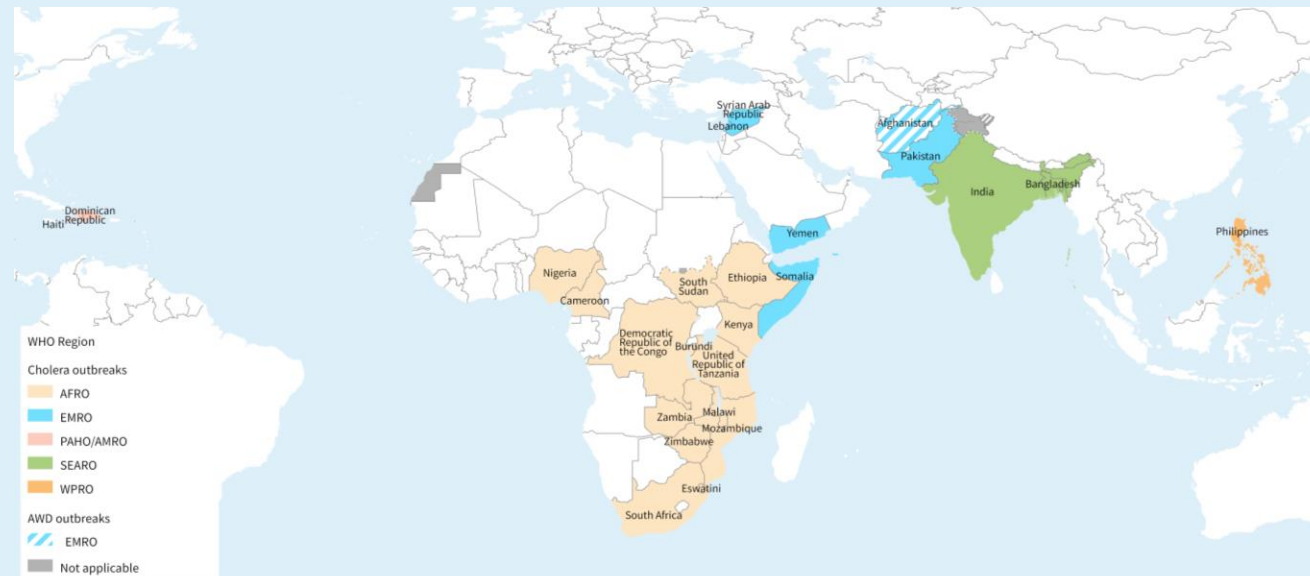
GLOBAL TASK FORCE ON  
**CHOLERA CONTROL**



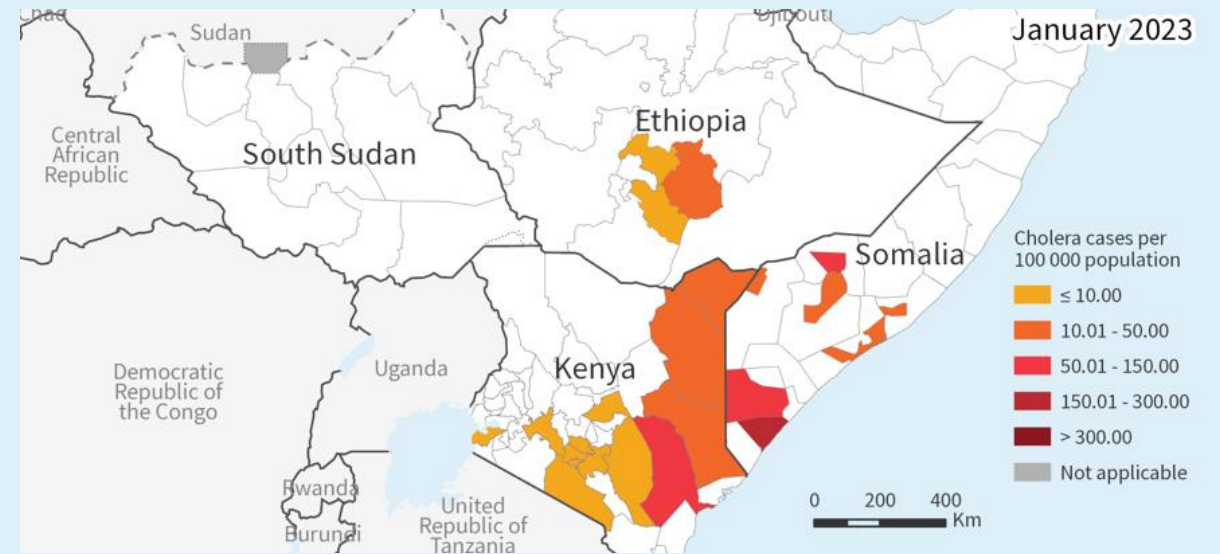
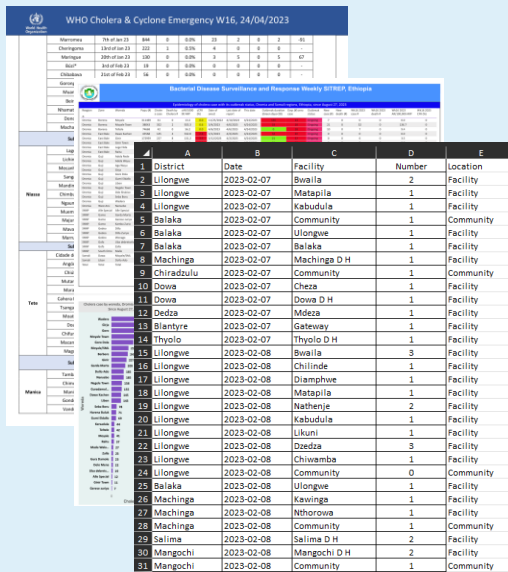
# Global cholera surveillance

- **Development of a global cholera database**
  - Consolidate cholera data from different regions
  - Build historical cholera data set
  - Harmonize cholera data across regions
  - One central source of cholera data for global and regional reports
- **Development of cholera analytical outputs**
  - Week-to-week epidemiological updates
  - Epi curves, attack rate maps, severity, forecasting
  - District level to regional level
  - Identify trends and geographical spread
    - Areas with risk for cross-border transmission

*How can we do this quickly and effectively?*



# Data management - overview



---

# Data management - data collection & entry

- **Combination of data sources**
  - Sitreps
  - Country presentation PPTs
  - Press releases
  - Weekly aggregated Excel files
  - Line list Excel files
- **Data entry effort**
  - Manual scraping
  - Automated storage
- **Global cholera data entry form**
  - Online validated Excel on WHO SharePoint
  - 2023 GTFCC guidance for regional & global surveillance
  - Minimum cholera outbreak indicators
    - New & cumulative suspected cases/deaths
  - Sub-national data down to district level

# Data management - data entry

Example of one epi week of data entry for Mozambique

COUNTRY	ADM1	ADM2	ADM3	DATEREP	EPI_WEEK	NEW_SUS_CASI	NEW_CONF_CASI	NEW_SUS_DEATH	CUM_SUS_CASES	CUM_CONF_CASI	CUM_SUS_DEATH
MOZAMBIQUE	SOFALA	MARROMEU		2023-04-23	16	2			844		0
MOZAMBIQUE	SOFALA	CHERINGOMA		2023-04-23	16	0			222		1
MOZAMBIQUE	SOFALA	MARÍNGUE		2023-04-23	16	5			130		0
MOZAMBIQUE	SOFALA	BÚZI		2023-04-23	16	0			19		0
MOZAMBIQUE	SOFALA	CHIBABAVA		2023-04-23	16	0			56		0
MOZAMBIQUE	SOFALA	GORONGOSA		2023-04-23	16	1			144		0
MOZAMBIQUE	SOFALA	MUANZA		2023-04-23	16	4			81		0
MOZAMBIQUE	SOFALA	CIDADE DA BEIRA		2023-04-23	16	74		1	2406		23
MOZAMBIQUE	SOFALA	NHAMATANDA		2023-04-23	16	143			767		2
MOZAMBIQUE	SOFALA	DONDO		2023-04-23	16	60			521		0
MOZAMBIQUE	SOFALA	MACHANGA		2023-04-23	16	30			65		0
MOZAMBIQUE	NIASSA	LAGO		2023-04-23	16	3			799		7
MOZAMBIQUE	NIASSA	DISTRITO DE LICHINGA		2023-04-23	16	0			1719		8
MOZAMBIQUE	NIASSA	MECANHELAS		2023-04-23	16	0			388		1
MOZAMBIQUE	NIASSA	SANGA		2023-04-23	16	0			167		1
MOZAMBIQUE	NIASSA	MANDIMBA		2023-04-23	16	0			11		0
MOZAMBIQUE	NIASSA	CHIMBONILA		2023-04-23	16	0			138		2
MOZAMBIQUE	NIASSA	NGAÚMA		2023-04-23	16	0			7		0
MOZAMBIQUE	NIASSA	MUEMBE		2023-04-23	16	0			2		0
MOZAMBIQUE	NIASSA	MAJUNE		2023-04-23	16	0			90		1
MOZAMBIQUE	NIASSA	MAVAGO		2023-04-23	16	34			101		2
MOZAMBIQUE	NIASSA	MARRUPA		2023-04-23	16	5			57		1
MOZAMBIQUE	TETE	CIDADE DE TETE		2023-04-23	16	0			652		1
MOZAMBIQUE	TETE	ANGÓNIA		2023-04-23	16	2			339		5
MOZAMBIQUE	TETE	CHIUTA		2023-04-23	16	0			253		2
MOZAMBIQUE	TETE	MUTARARA		2023-04-23	16	7			277		2
MOZAMBIQUE	TETE	MARARA		2023-04-23	16	0			102		1
MOZAMBIQUE	TETE	CAHORA BASSA		2023-04-23	16	2			125		1
MOZAMBIQUE	TETE	TSANGANO		2023-04-23	16	0			248		0
MOZAMBIQUE	TETE	MOATIZE		2023-04-23	16	0			136		1
MOZAMBIQUE	TETE	DOA		2023-04-23	16	0			236		0
MOZAMBIQUE	TETE	CHIFUNDE		2023-04-23	16	0			407		1
MOZAMBIQUE	TETE	MACANGA		2023-04-23	16	0			32		0
MOZAMBIQUE	TETE	MÁGOË		2023-04-23	16	1			124		2
MOZAMBIQUE	MANICA	TAMBARA		2023-04-23	16	17			86		2
MOZAMBIQUE	MANICA	CIDADE DE CHIMOIO		2023-04-23	16	12			905		7
MOZAMBIQUE	MANICA	MANICA		2023-04-23	16	17			356		0
MOZAMBIQUE	MANICA	GONDOLA		2023-04-23	16	2			142		0
MOZAMBIQUE	MANICA	VANDUZI		2023-04-23	16	33			155		0
MOZAMBIQUE	MANICA	Macate		2023-04-23	16	2			2		0
MOZAMBIQUE	INHAMBANE	GOVURO		2023-04-23	16	38			241		8
MOZAMBIQUE	ZAMBEZIA	MILANGE		2023-04-23	16	0			14		0
MOZAMBIQUE	ZAMBEZIA	CIDADE DE QUELIMANE		2023-04-23	16	161		1	11989		33
MOZAMBIQUE	ZAMBEZIA	NICOADALA		2023-04-23	16	25			145		1


---

# Data management - data storage & cleaning


- **Consolidated database in xMart**
  - xMart platform is a WHO in-house data harmonization and warehousing solution
- **Pipeline directly to global data entry form**
  - Connection of global data entry form in SharePoint
  - Automatic pulling of new data at specific times
- **Pipeline to pull PAHO cholera data**
  - Upload of aggregated Excel file
- **Generation of validated tables and views**
  - Summary statistics
  - Cleaned data ready for analysis

# Data management - data storage

Example of one epi week of data storage for Mozambique


Cholera

Home
Data
Load
Pipelines
Model
Forms
Notif
Admin

 DAY\_AGG

25 columns selected
 Empty columns
 System columns

Country	Admin 1 region	Admin 2 region	Admin 3...	Date ...	New sus...	New co...	New sus...	Cumulat...	Cumulat...	Cumulat...
MOZAMBIQUEo	MOZAMBIQUE1TETE	MOZAMBIQUE2TETEANGOI		2023-04-23	2	-	-	339	-	5
MOZAMBIQUEo	MOZAMBIQUE1TETE	MOZAMBIQUE2TETECIDAD		2023-04-23	0	-	-	652	-	1
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMAF		2023-04-23	5	-	-	57	-	1
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMA		2023-04-23	34	-	-	101	-	2
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMA		2023-04-23	0	-	-	90	-	1
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMU		2023-04-23	0	-	-	2	-	0
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSANGA		2023-04-23	0	-	-	7	-	0
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSACHII		2023-04-23	0	-	-	138	-	2
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMA		2023-04-23	0	-	-	11	-	0
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSASAN		2023-04-23	0	-	-	167	-	1
MOZAMBIQUEo	MOZAMBIQUE1NIASSA	MOZAMBIQUE2NIASSAMEC		2023-04-23	0	-	-	388	-	1
MOZAMBIQUEo	MOZAMBIQUE1CIDADE DE	MOZAMBIQUE2CIDADE DE		2023-04-23	1	-	-	1	-	0
MOZAMBIQUEo	MOZAMBIQUE1CIDADE DE	MOZAMBIQUE2CIDADE DE		2023-04-23	3	-	-	5	-	0
MOZAMBIQUEo	MOZAMBIQUE1NAMPULA	MOZAMBIQUE2NAMPULAN		2023-04-23	22	-	-	204	-	0
MOZAMBIQUEo	MOZAMBIQUE1NAMPULA	MOZAMBIQUE2NAMPULAC		2023-04-23	124	-	-	67	-	0
MOZAMBIQUEo	MOZAMBIQUE1NAMPULA	MOZAMBIQUE2NAMPULAN		2023-04-23	198	-	-	856	-	2
MOZAMBIQUEo	MOZAMBIQUE1CABO DELG	MOZAMBIQUE2CABO DELG		2023-04-23	42	-	-	45	-	0
MOZAMBIQUEo	MOZAMBIQUE1CABO DELG	MOZAMBIQUE2CABO DELG		2023-04-23	0	-	-	22	-	0
MOZAMBIQUEo	MOZAMBIQUE1CABO DELG	MOZAMBIQUE2CABO DELG		2023-04-23	97	-	2	509	-	3
MOZAMBIQUEo	MOZAMBIQUE1GAZA	MOZAMBIQUE2GAZAMASS		2023-04-23	0	-	-	11	-	0

<< < 1 2 3 > >>
20

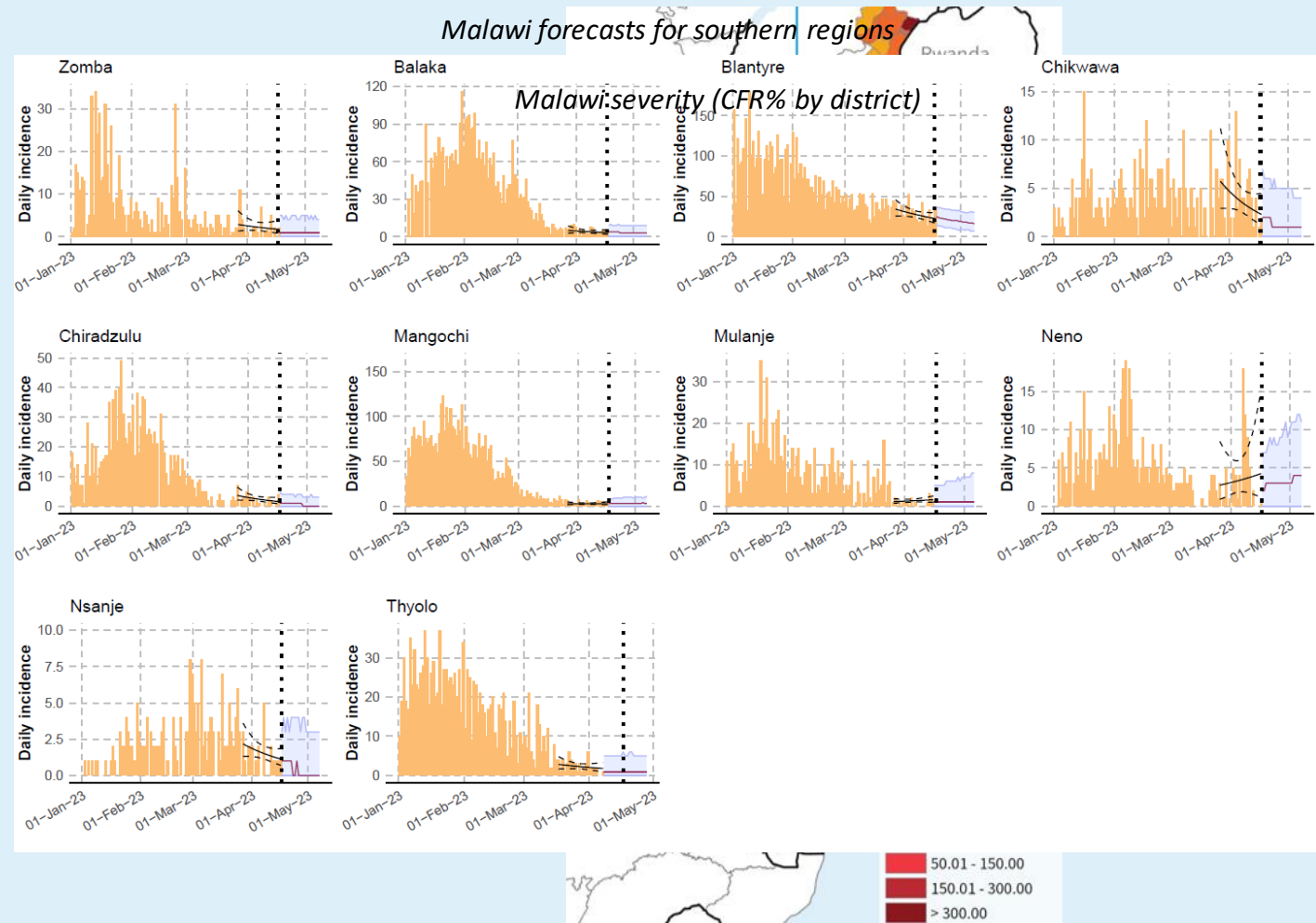
58 rows



# Data management - data analysis & outputs

- **Connection to R**
  - Pipeline from online Excel to R script
    - xMart to R in development
  - GitHub version control
  - Code sharing between HQ/RO/CO
    - Also available for external partners
- **Analysis and outputs within R environment**
  - Various geographical levels
    - Global, regional, national, sub-national
  - Epi curves
  - Maps
    - Highlighting geographical spread
    - Visualizing attack rates
  - Severity from CFR
  - Daily incidence projections

Southeast Africa attack rate between January 2023 and April 2023





---

# Achievements

- **HQ info products**
  - Weekly global cholera data pack
    - Shared in confidence with operational partners
  - Monthly global cholera sitrep
    - [Report #1 publicly available here](#)
- **Support to AFRO info products**
  - Weekly regional cholera data pack & bulletin
  - Daily cholera report
- **HQ working together with RO/COs**
  - Deployments
    - Craig to AFRO emergency hub in Kenya
    - Natalie to Mozambique
    - Rocio to Equatorial Guinea
  - Remote training sessions
    - Grace working with Malawi, DRC, Somalia on forecast modeling training
- **Data sharing**
  - Relationship building between HQ/RO/COs
  - PAHO sharing aggregated cholera data directly to xMart
    - Haiti
    - Dominican Republic
  - Direct cholera line list data from country offices
    - DRC
    - Malawi
    - Somalia

---

# Challenges

- **Data collection**
  - Heterogeneity of sitreps from country to country
    - Case definitions
    - Variables included
  - Incompleteness
  - Reporting delays
  - Retrospective corrections
  - Difficulties of data collection tools in the field
- **Data sharing**
  - Bottlenecks between MOH/CO/RO
  - Starts at provincial and national country levels
- **Data entry**
  - Due to HR limitations, unsustainable to continuously manually extract data from sitreps

---

# Next steps

- **More engagement with country offices**
  - Smoother flow of data between MOH/CO/RO/HQ
  - Consistent daily/weekly data
  - Shift time allocation from data entry to analysis
  - Continue to share knowledge between HQ/RO/CO
- **Development of version 2 of global data entry template**
  - Fostering harmonized reporting consistent with GTFCC recommendations
- **Automation of data flows**
  - Generate outputs in the blink of an eye
    - Less effort to create data packs, daily reports, weekly bulletins
      - National, regional, and global level
- **Setup of global cholera dashboard**

*Data for response action across borders and regions!*

---

# Obrigado!



World Health  
Organization



GLOBAL TASK FORCE ON  
**CHOLERA CONTROL**

