Epidemiology in Humanitarian Medical Operations

The need to help medical data speak

27-09-2024

World Epidemiology Congress 2024, Cape Town, South Africa

Dr. Amrish Y. Baidjoe
Director MSF-LuxOR
Medical Department Operational Centre Brussels

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LuxOR
EPIDEMIOLOGY SUPPORT UNIT
Luxembourg Operational Research

Setting the stage

Our line of work:

Medical aid where it's needed most—independent, neutral, impartial

Acting and speaking, treating and witnessing were acts fundamental to the creation of MSF. Today, they are still at the core of what we do.

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50 YEARS OF HUMANITY

2021 was the 50th anniversary of Médecins Sans Frontières.

1971

- MSF was **founded in 1971** in the wake of war and famine **in Biafra, Nigeria**.
- **300 volunteers** made up the organisation when it was founded: doctors, nurses and other staff, including the **13 founding doctors and journalists.**

2024

- Today, MSF has become a **global movement**.
- In 2023 over **60 000 staff members** worked for MSF representing **169 nationalities**.
- MSF had **operations in 70 countries** in 2023.
- In 2023, **82%** of our financial resources are allocated to **humanitarian programs.**

MSF projects

Individual map edition

Legend

- OCA — OCA
- OCB — OCB
- OCBA — OCBA
- OCG — OCG
- OCP — OCP
- ODW — ODW
- INT — INT
- Reference hospital
- Hospital
- Clinic
- Reference health centre
- Health centre
- Other health structure
- Health administrative boundaries 1

Sources

Basemap provided by ESRI
Catalogue data gathered by MSF

Dec 2022

Ebola and Marburg

Sleeping Sickness

Neclected Diseases

Hepatitis E

Tuberculosis

Mental Health

Vaccination

Safe Abortion care

Snakebites

Measles

Kala azar

Child Health

Yellow fever

Surgery/Trauma Care

Malnutrition

Womans Health

Cholera

Women's Health

Sexual Violence

Hepatitis C

Meningitis

Antibiotic resistance

Non-Communicable diseases

Coronavirus

Malaria

HIV/AIDS

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HTTPS://WWW.MSF.ORG/MEDICAL-ACTIVITIES

Changing trends in humanitarian Response

Fragile and conflict-affected areas are growing faster (increasingly due to climate change and amplified by the ongoing pandemic)

More people are being displaced by conflicts, forced displacement increasing

Duration of responses is longer

Financial support and attention not growing accordingly

More complex responses

Our capacity to respond to emergencies, to assist those affected is radically tested

The global humanitarian overview 2023

UN Office for the Coordination of Humanitarian Affairs (UN-OCHA)

Focusing more on the known ‘old enemies’

- Neglected tropical diseases (snakebites, malaria, visceral leishmaniasis (noma)
- Increase in Vaccine Preventable Disease: Measles, diphtheria
- Increase in TB (more complex infections), Malaria, increase risks resistance, increasing spread and intensity
- Cholera (Record numbers of outbreaks, 29 countries, vaccine shortages)
- Non-communicable diseases (diabetes, insulin, cardiovascular disease)

Tough dilemmas in our day-to-day work

Lot of grey: Balance between

safety

access

political waves

impact

humanity

Ethical

Morality

human fallibility

Legislation (national/International)

The ‘right’ Leadership

Decision-making in humanitarian crises: politics, and not only evidence, is the problem

Colombo, Checchi 2018

Abstract

Accurate, relevant and timely public health information is paramount in a humanitarian crisis: it can help to identify needs and priorities, guide decisions on interventions and resource allocation, monitor trends, evaluate the effectiveness of the response, support advocacy for human rights, and extract lessons that could be relevant in similar contexts. The present review shows, however, that the public health information available in humanitarian crises is, in general, inadequate and that its application is secondary to reasoning and incentives of a political nature, thus contributing to the recurrent failings of humanitarian action. This article reviews the causes of this state of affairs - cultural, political/institutional/methodological and ethical - that hinder the production, dissemination, and use of information for determining which interventions should be implemented or modified. Traditional epidemiological skills and methods are poorly suited to humanitarian contexts. The approaches and tools that have been introduced in crisis contexts require validation and improvement. There is a need for more field "barefoot epidemiologists" who are able to collaborate with anthropologists, demographers, and sociologists to better understand the priorities to be addressed in a crisis. Evidence, however, is not enough per se: it is political will that is the key factor ir the use, or not, of information in decision-making concerning humanitarian resources and interventions.

The humanitarian system: Politics can’t be avoided

(Lancet correspondence, 2024)

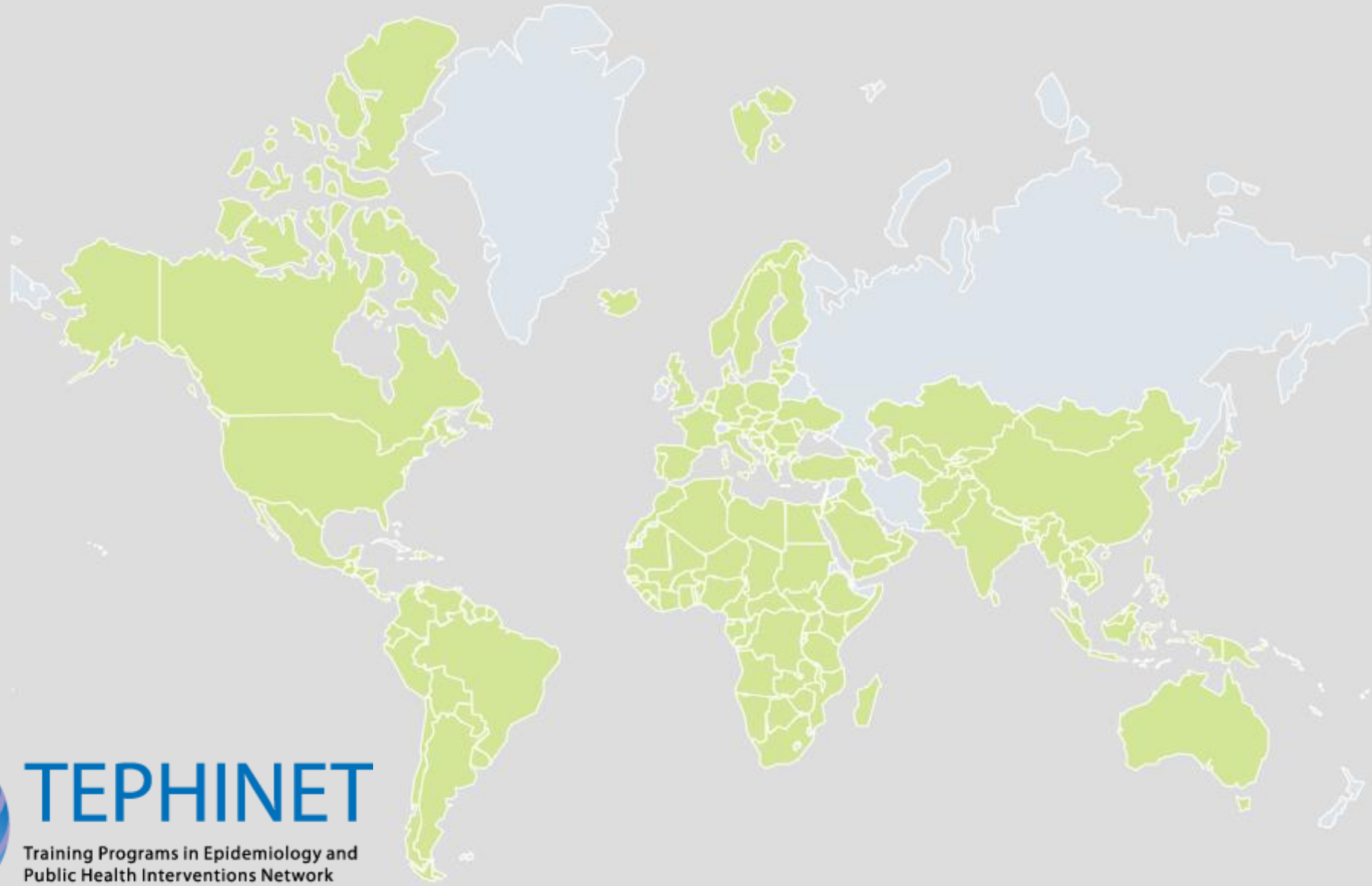
In introducing the new CHH–*Lancet* Commission on Health, Conflict, and Forced Displacement, Paul B Spiegel and colleagues argue that the humanitarian system to date requires systemic change.[1] We agree, but believe that the Commission's efforts will fall short without a fundamental rejection of apolitical humanitarianism. Historical and contemporary crises, such as the ongoing genocide in Gaza, illustrate that apolitical humanitarianism undermines the field's effectiveness and its ability to respond to those most affected. Avoiding engagement with politics in humanitarian action maintains a broken system that prioritises powerful interests over the needs of individuals in humanitarian crises.

Shatha Elnakib [a] ✉ · Sarah Aly [c] · Yara M Asi [d] · Yusra Ribhi Shawar [a,b]

Different type of epidemiologists….

- Hospital epidemiologist....
- Academic research epidemiologist (methodologist)....
- Veterinary epidemiologist....
- Epidemiology statistician....
- Molecular epidemiologist....
- Infectious disease epidemiologist....
- Medical epidemiologist....
- Field/Intervention epidemiologist….

Sorry if I forgot you!



TEPHINET

Training Programs in Epidemiology and Public Health Interventions Network

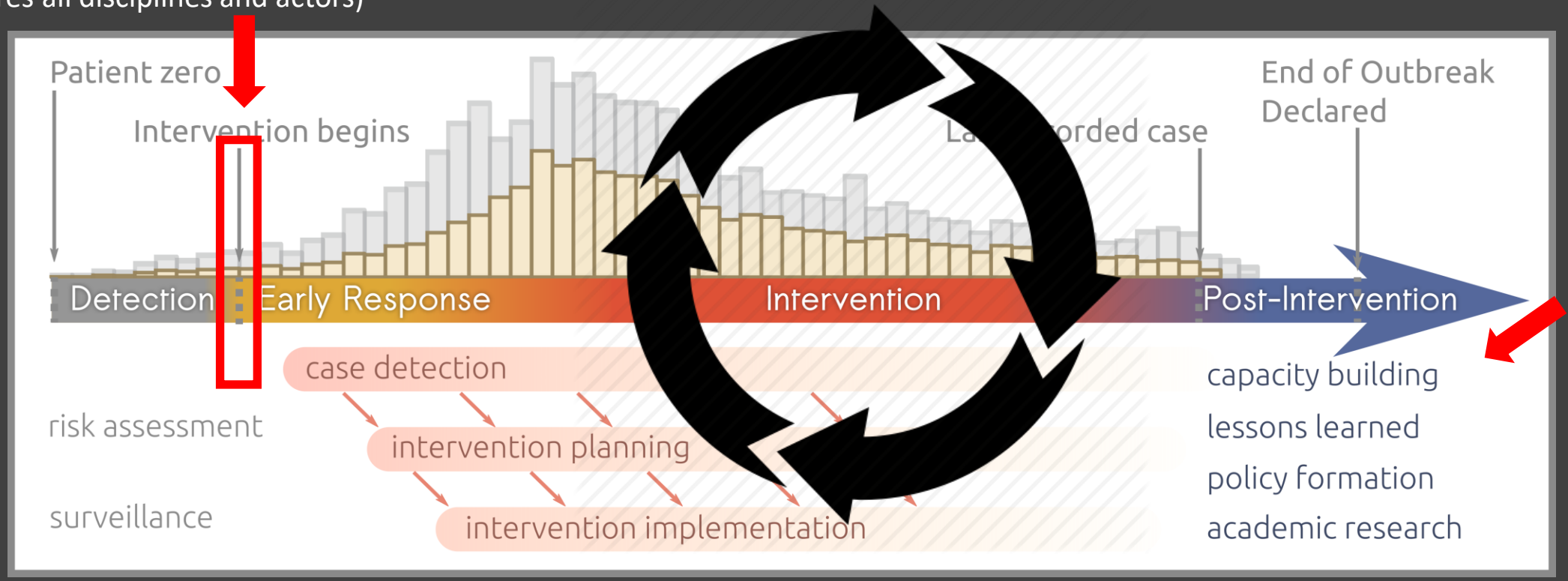
Use all sources of data?

- A good Epidemiologist; disease detective
- Consults all sources (not only the data set), understands the bias
- Tries to construct and test hypothesis based on input from other sources (communities/colleagues/data/MoH)
- Understands the limits of data
- Pushes for action based on data
  - Not for everybody

Outbreaks/humanitarian (health) emergencies

"Increasingly aware that we need to approach this in a more **holistic/inclusive** way rather than vertical" (all pillars of discipline can play a role)

"More often acute and protracted nature requires us to learn whilst doing" (and that a successful response requires all disciplines and actors)

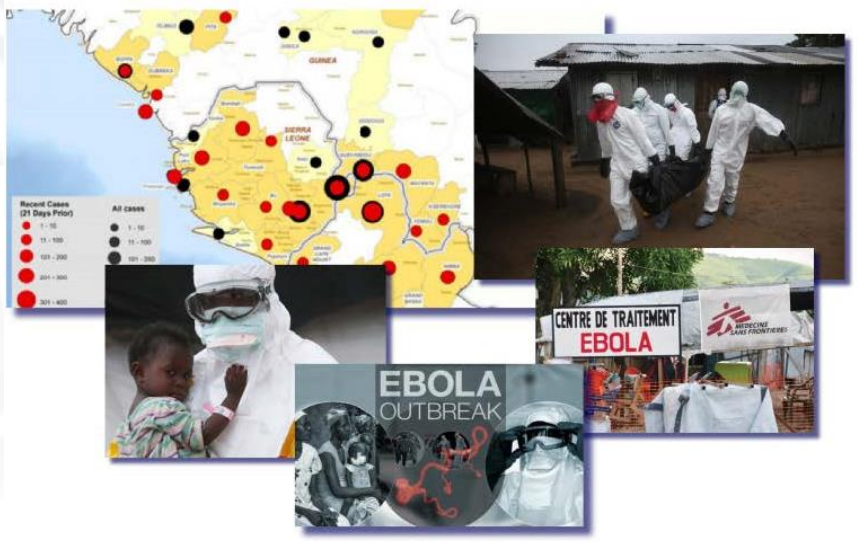


"Outbreak analytics: a developing data science for informing the response to emerging pathogens"

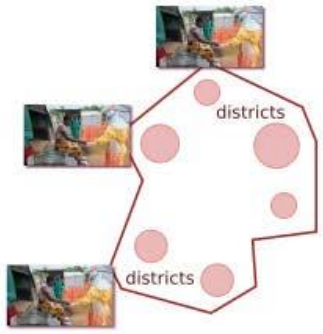
From: Baidjoe, Polonsky et al. Phil Trans R Soc B 2019

Delays in Data Collection Analyses Reporting

Lessons learned from the 2014-2016 Ebola outbreak



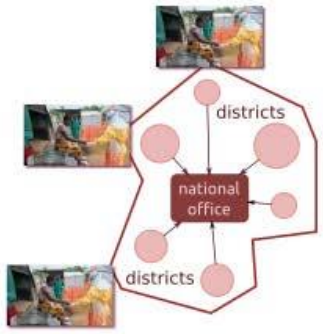
Delays in Data Analyses



Affected countries

- data collection

At the country level

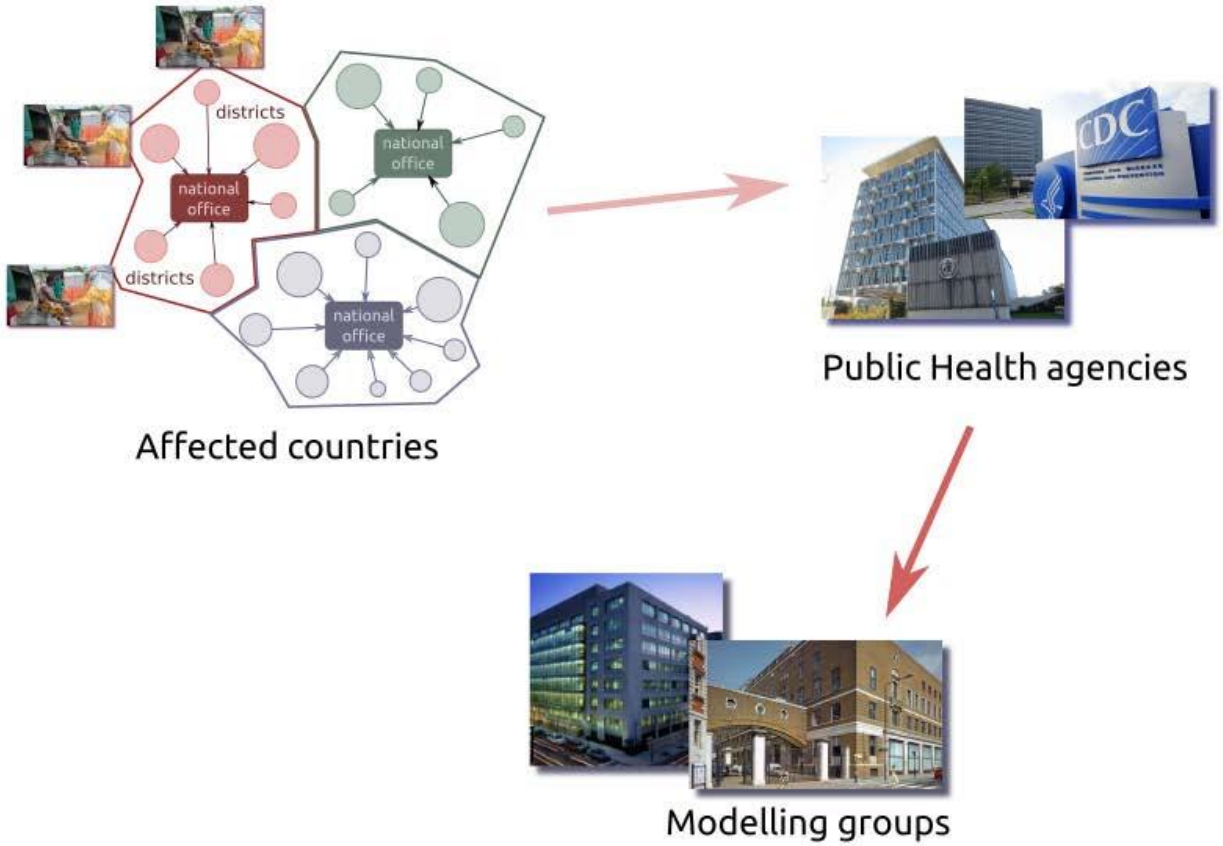


Affected countries

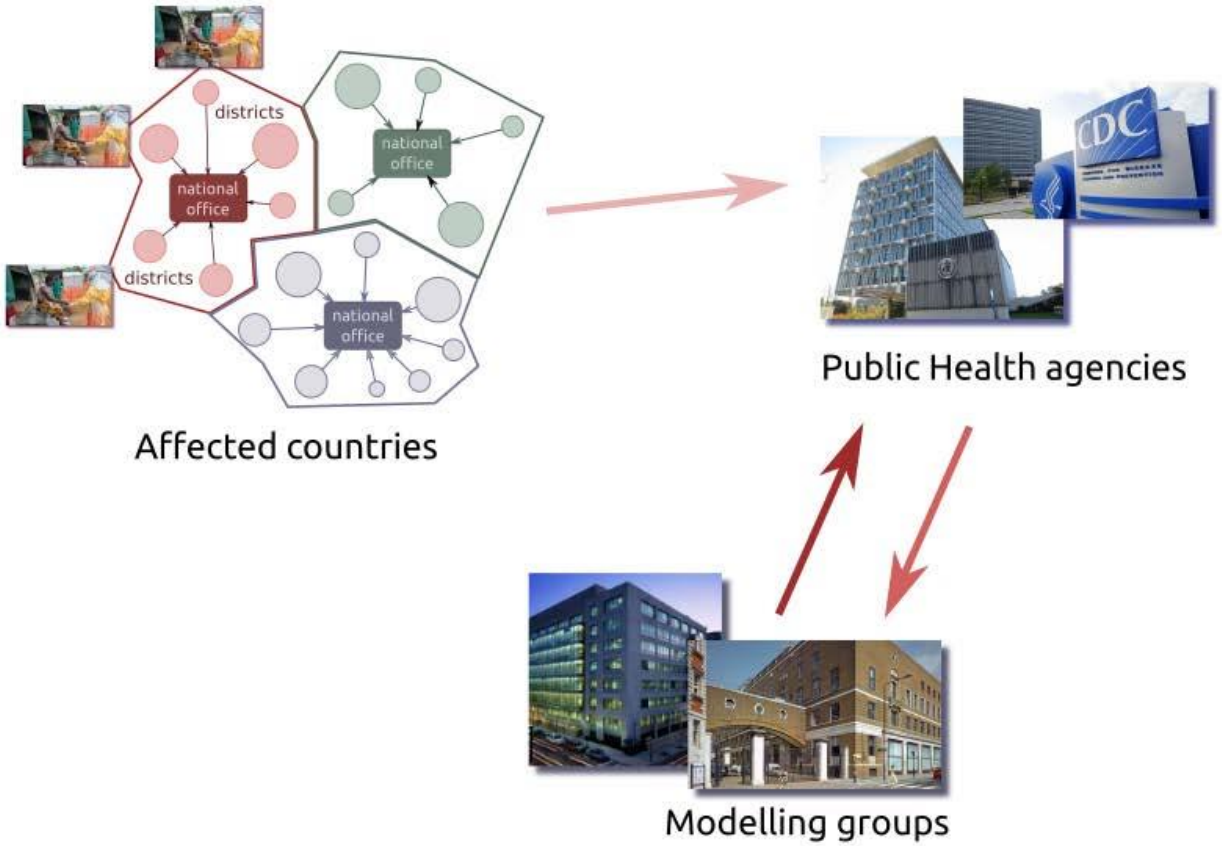
time (block = day)

data collection

To expert groups



And feeding results back



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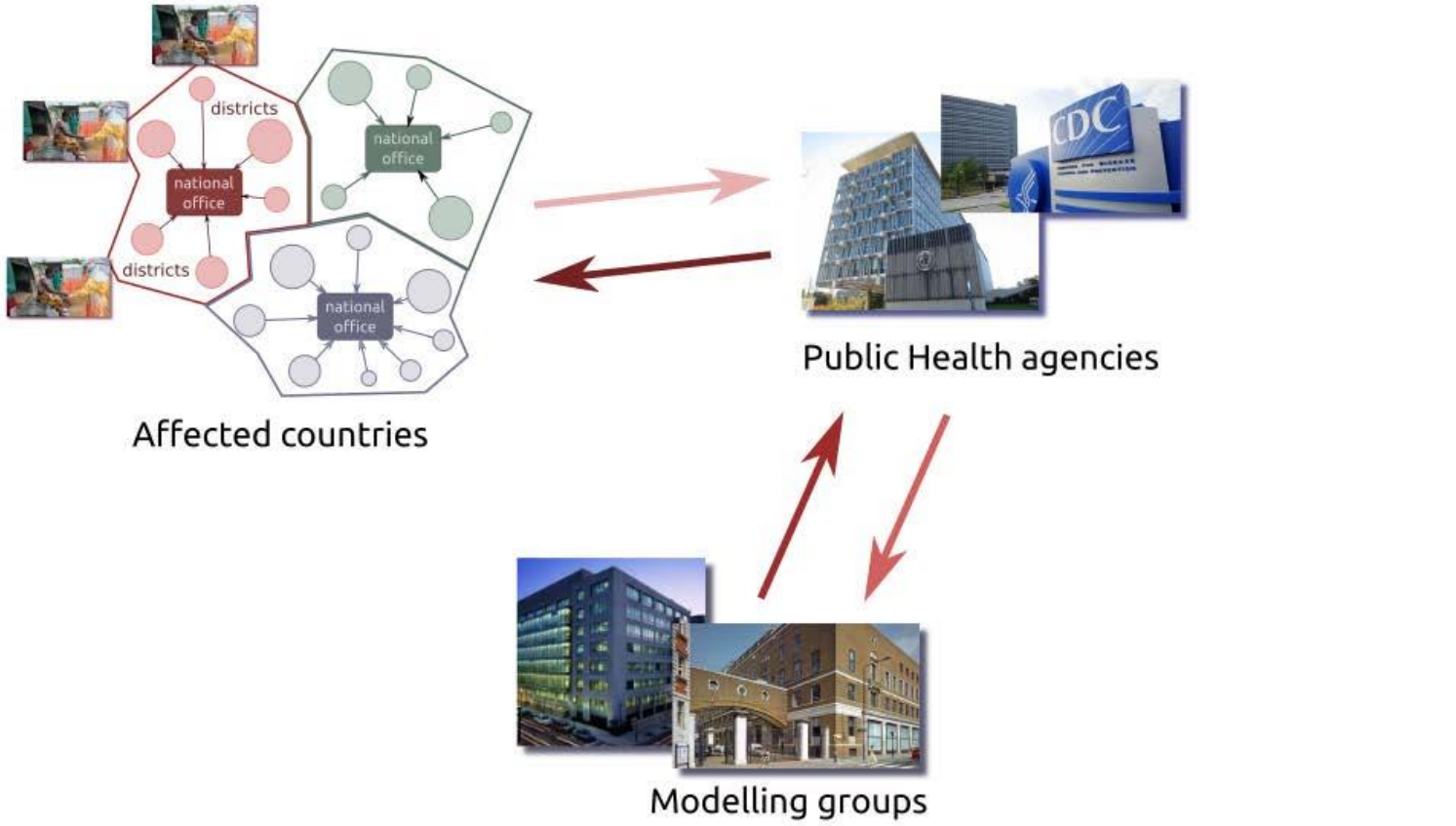
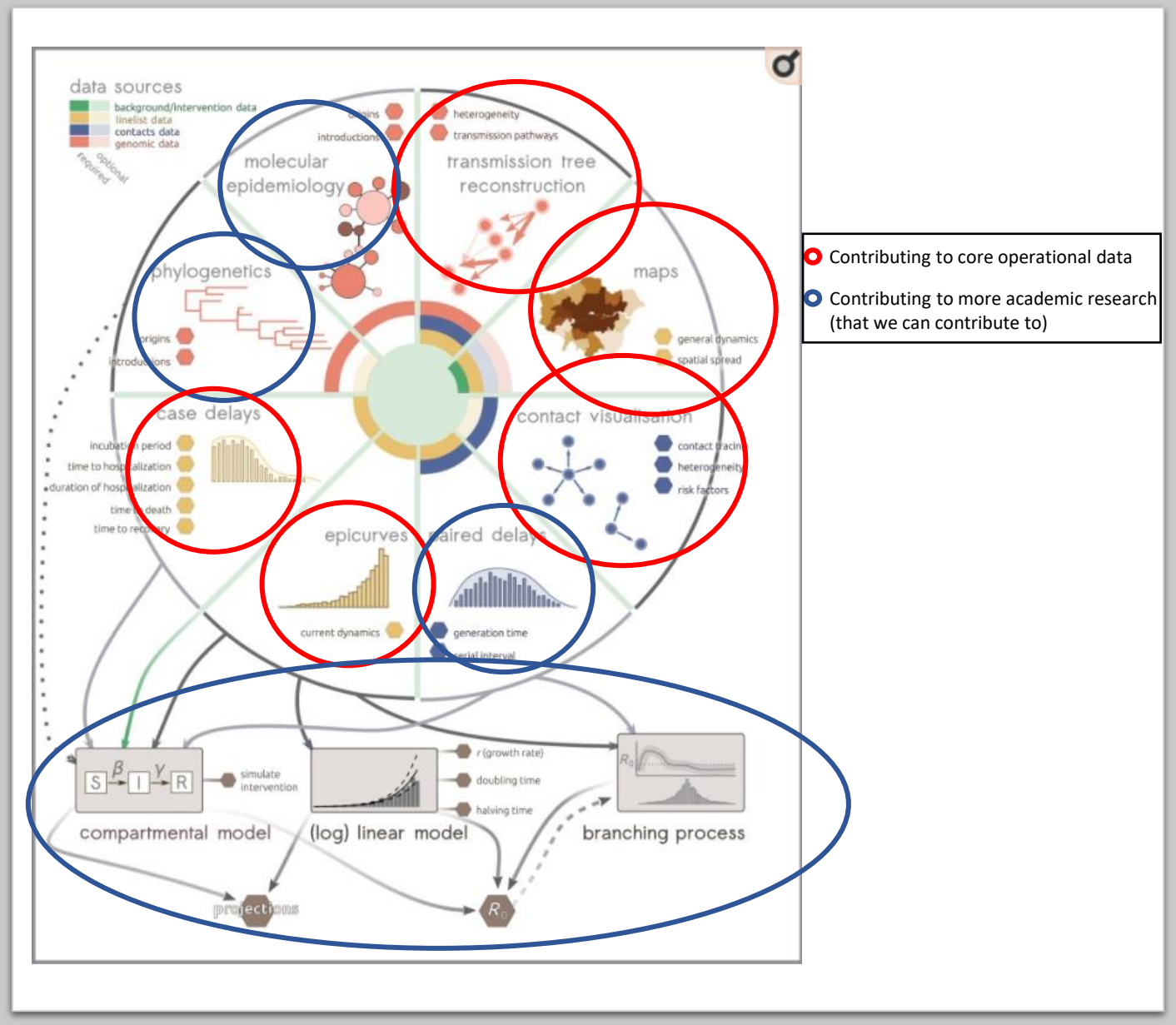


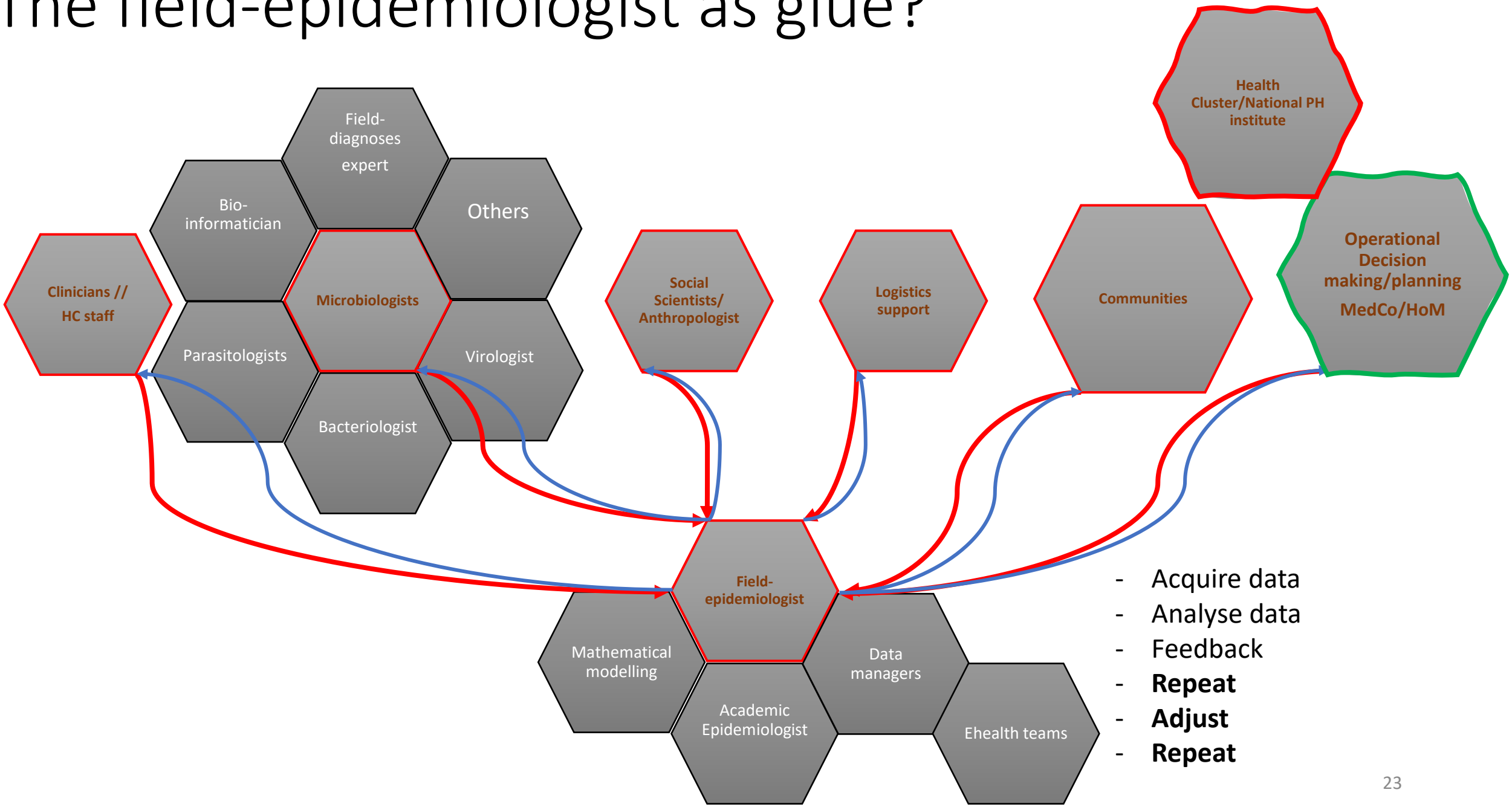
More data sources available (e.g. outbreaks)

- Epidemiological
  - Indicator data from projects (Routine monitoring and Surveillance)
  - Dedicated assessments and surveys
- Open data sources (Humanitarian street maps)
- More possibilities with analyses; with less user dependency
- More advanced clinical data
  - as lab diagnoses tools advance
- Still a lot of issues around standardization of data, quality and continuity



From: Example of data: Baidjoe, Polonsky et al. Phil Trans R Soc B 2019

The field-epidemiologist as glue?



- Acquire data
- Analyse data
- Feedback
- **Repeat**
- **Adjust**
- **Repeat**

In the cycle from data to action

Data cleaning

dictionaries, entry matching/merging

Graphics

Epicurves, case incidence in space and time, contact tracing

Parameter estimation

key delays, transmissibility

Good descriptive tools

Maps, easy to use

Predictions

case incidence, mortality, evaluate interventions

Consistent reporting

(semi-) automated situation reports

What do we need?

- Good bases of our work lies in solid, descriptive epidemiology
  - Good background data (denominators)
- Lot is inherent to:
  - Ways we collect data (surveillance capacity and development)
    - Always a limiting factor in areas of our operations
  - Having good tools that help with:
    - Data collection, cleaning, Data visualization, Parameter estimations, pattern estimations, Consistent Reporting all on the spot

- The role of advanced analytics in the humanitarian sphere of field-epidemiology has been limited so far

Why is this relevant?

Better practices around data will:

- Will generate more time to work on our actual job
  - Identifying the right bottlenecks
  - Treating patients appropriately
  - Will make data more comparable/consistent
    - Across time
    - Across sites

    } **Fortify science** -> optimizing methodologies
  - Communicating with stakeholders
  - Increase awareness
  - Interact with affected communities
  - **Advocate based on solid evidence**

R4epis: Improving data analytics and developing capacity within MSF

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Total	72	191	37.7	(31.13–44.75)

CFR by age group among inpatients with known outcomes

Age group	Deaths	Cases	CFR (%)	95%CI
0-2	0	2	0.0	(0.00–65.76)
3-14	3	17	17.6	(6.19–41.03)
15-29	11	27	40.7	(24.51–59.27)
30-44	8	15	53.3	(30.12–75.19)
45+	50	130	38.5	(30.54–47.04)
Total	72	191	37.7	(31.13–44.75)

Attack rate

The attack rate per 10,000 population is below (based on available populati… available for the catchment area/region of interest).

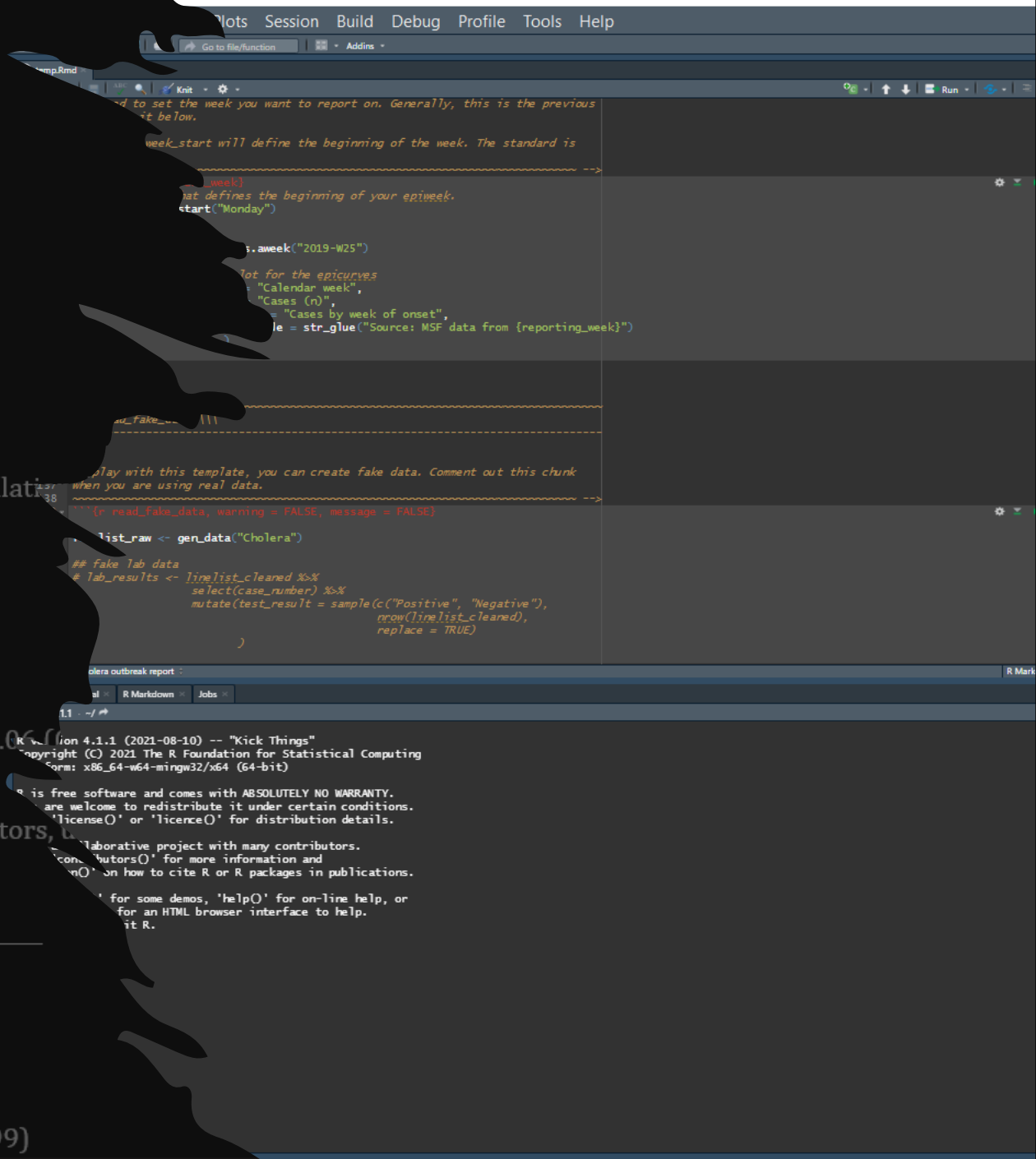
Below gives the attack rate per 10,000 population (N = 4,999.5)

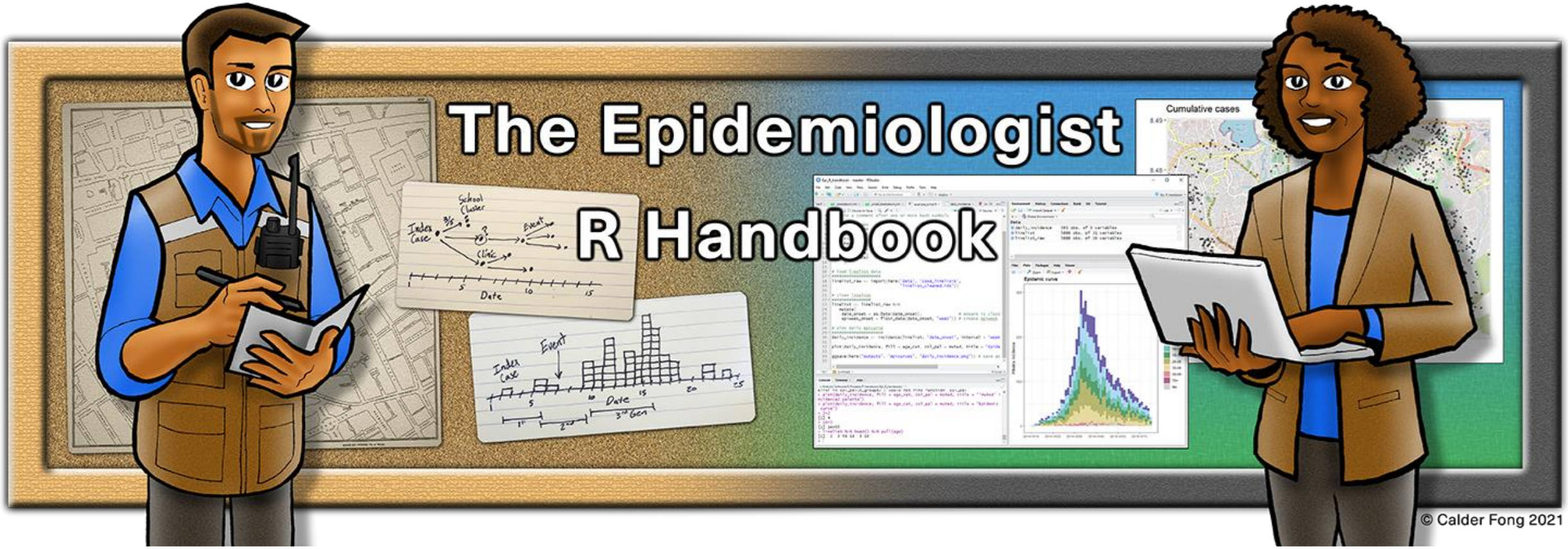
Cases (n)	AR (per 10,000)	95%CI
300	600.1	(537.54–669.33)

Here, we can see that the attack rate for a population of 4,999.5 was 600.06 (… 669.33).

To give attack rate by age group, with appropriate population denominators, t… following code.

Age group	Cases (n)	Population	AR (per 10,000)	95%CI
0-2	4	340.0	117.6	(45.84–298.54)
3-14	26	1,811.0	143.6	(98.16–209.53)
15-29	40	1,380.0	289.9	(213.58–392.28)
30-44	30	808.0	371.3	(261.30–525.08)
45+	200	660.5	3,028.0	(2689.84–3388.99)





The Epidemiologist R Handbook
A new resource for public health practitioners (and everyone else!)

www.epiRhandbook.com

Neale Batra, MSc, Editor
Alex Spina, MSc. Core team

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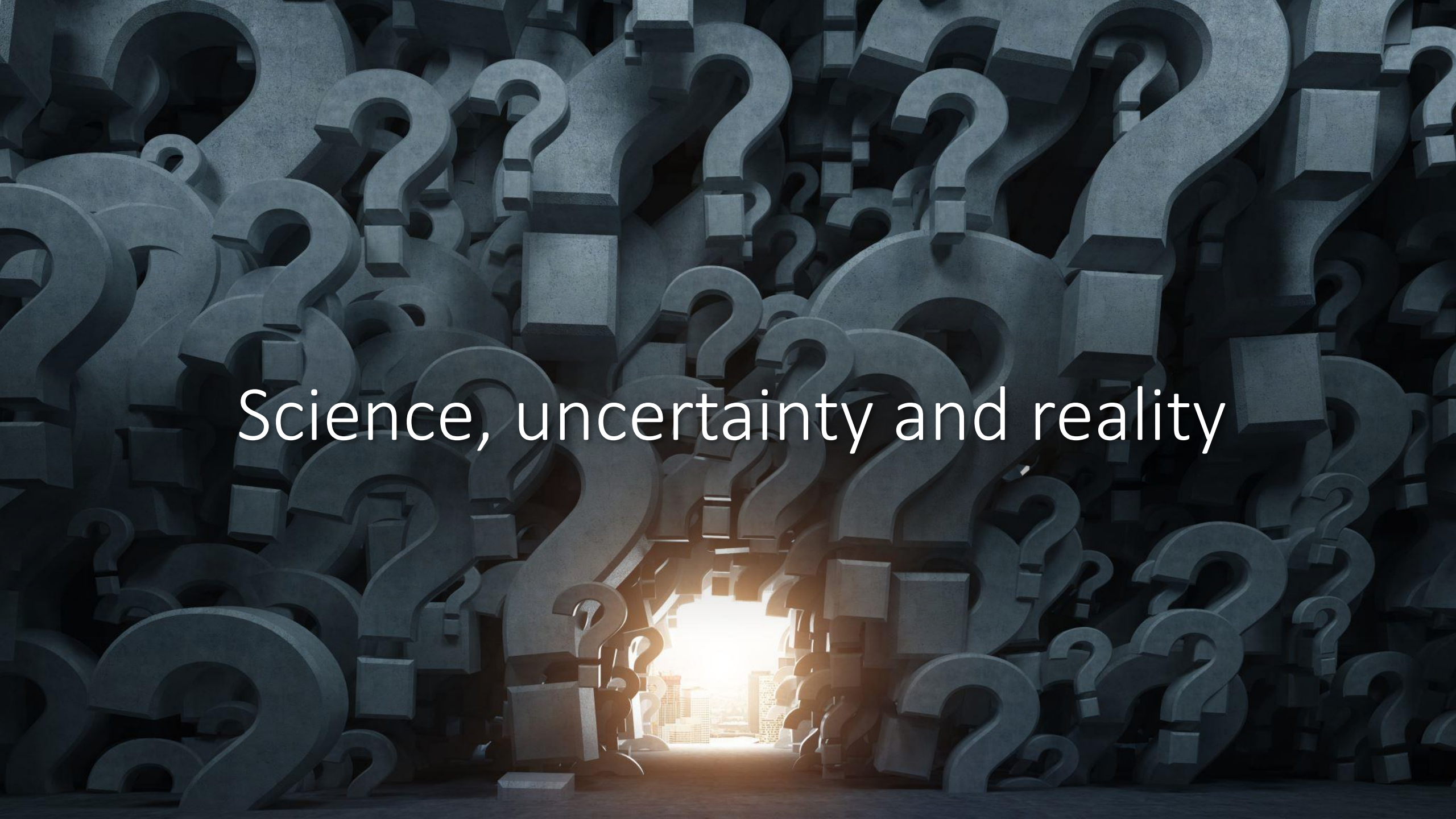
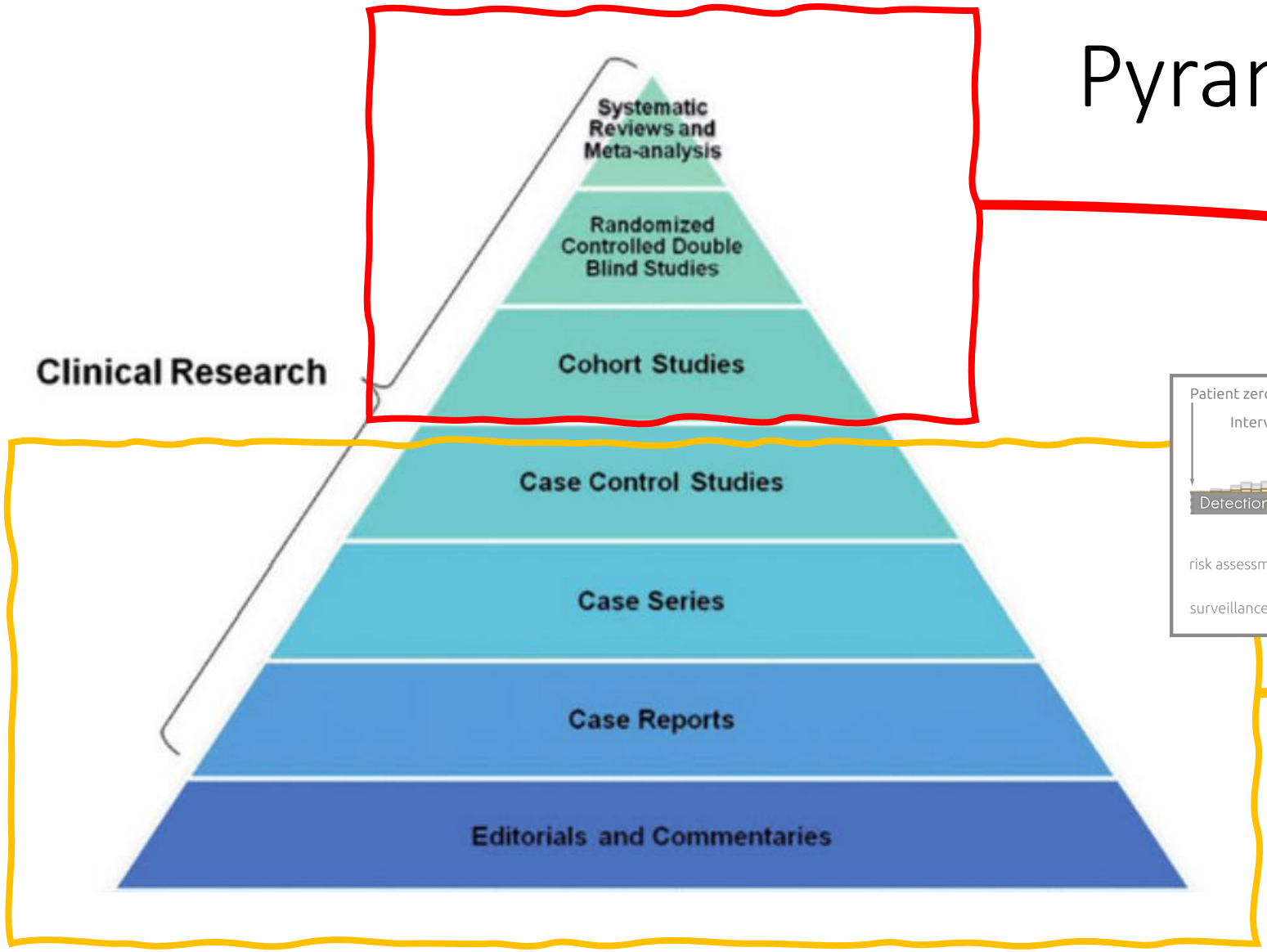


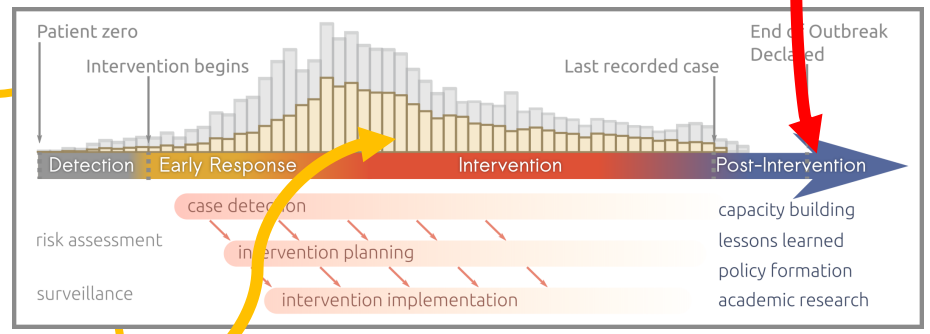
Science, uncertainty and reality

Act in uncertainty

- Routes of transmission?
- Observed scope, real scope?
- Intervening early?
- What indicator(s) do you use to steer a response?
- Intervention measures
- Do you apply a no regret policy? (risk vs…)
- Who sits at the table of decision making

Pyramid of quality of evidence



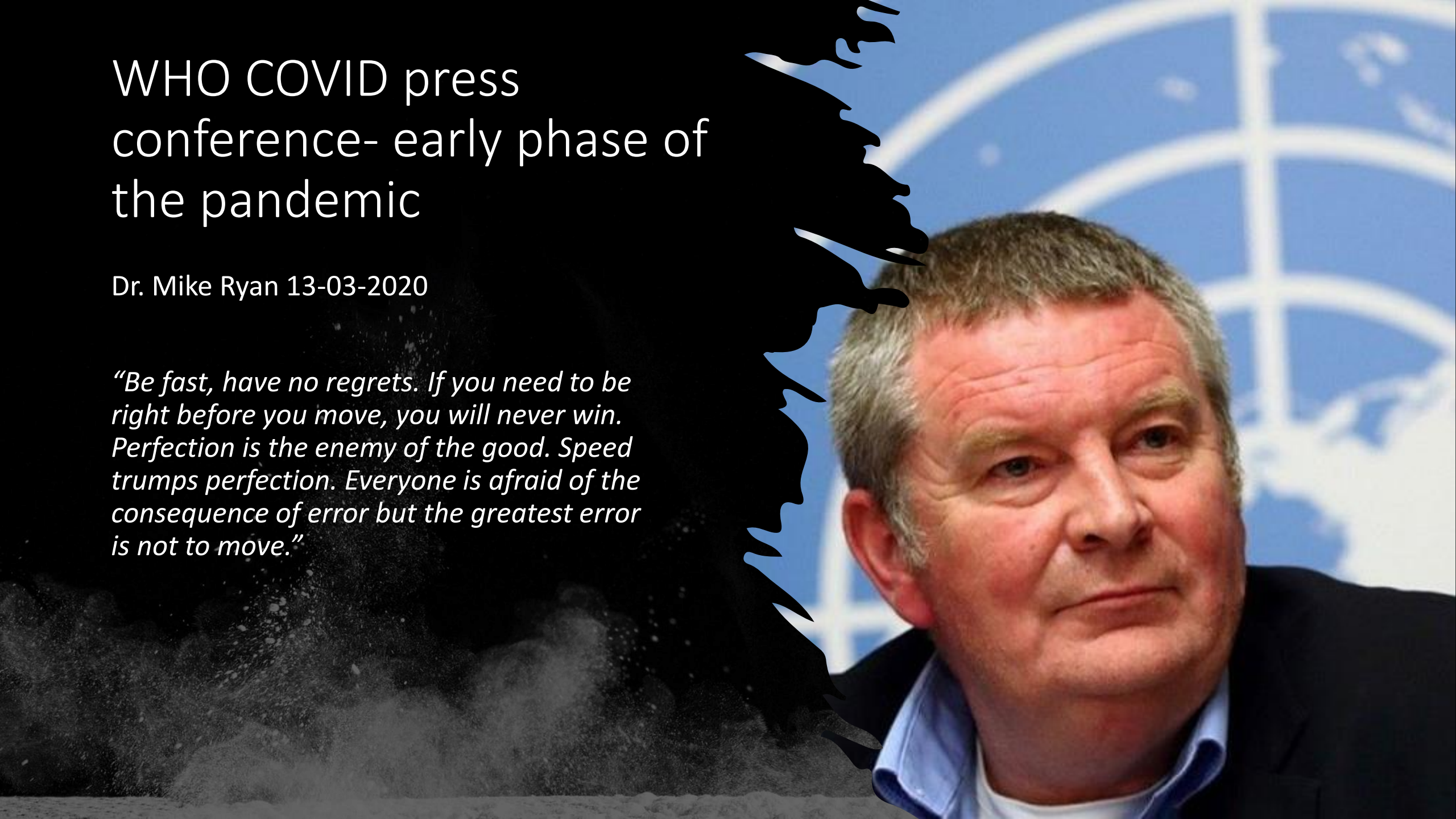



World Health Organization
Dr Michael J. Ryan
EXECUTIVE DIRECTOR
WHO Health Emergencies Programme
Dr Tedros Adhanom Ghebreyesus
WHO DIRECTOR-GENERAL
Dr Maria Van Kerkhove
TECHNICAL LEAD
WHO Health Emergencies Programme
zoom
WHO Studio

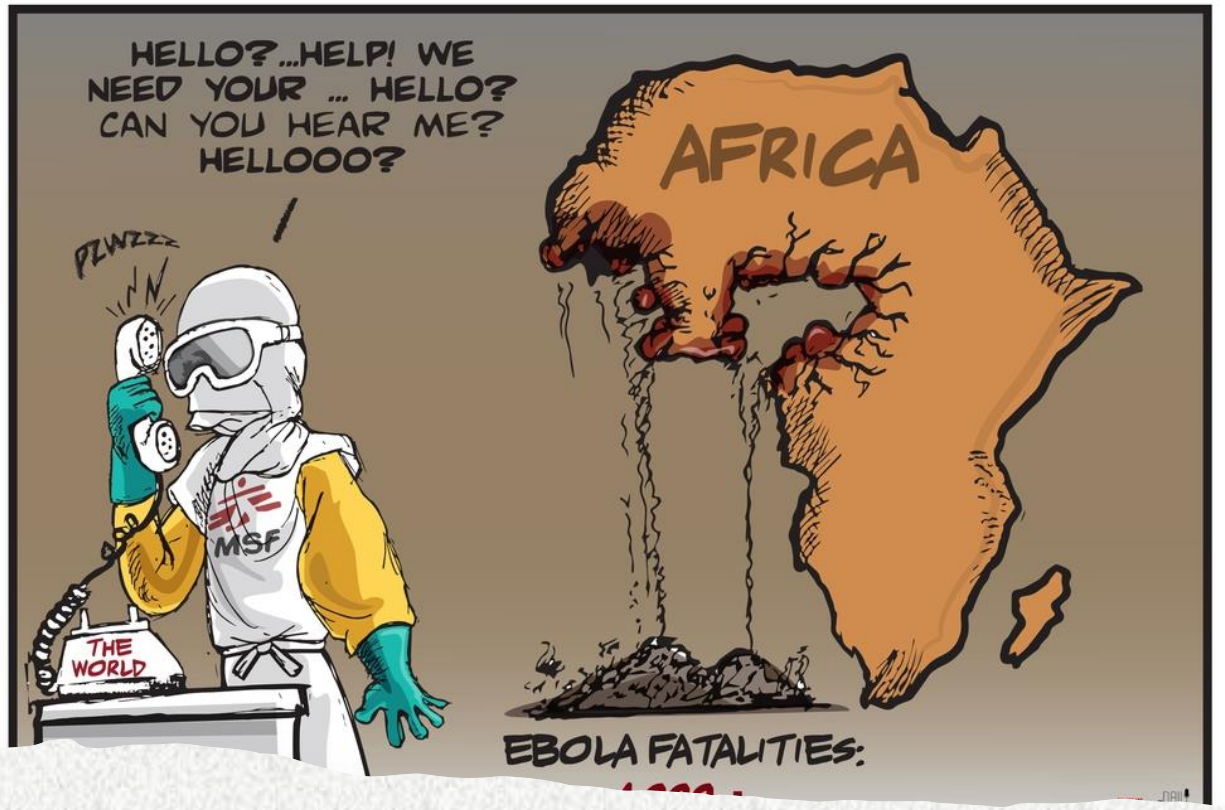
WHO COVID press conference- early phase of the pandemic

Dr. Mike Ryan 13-03-2020

“Be fast, have no regrets. If you need to be right before you move, you will never win. Perfection is the enemy of the good. Speed trumps perfection. Everyone is afraid of the consequence of error but the greatest error is not to move.”



Public health is more than medical science



There is an emergency unfolding

When to we start to care?

Working against a clock

- 11.300 people died
- Large part of Western Countries only engaged when escalation was full, nobody cared for a long time
- When expats were running into risks to come back
- Expensive initiatives (like evac planes/BSL4 labs for the West)
- Hit hard on already fragile health systems
  - Massive increase mortality HIV/AIDS/TB/Malaria
- Expensive treatments only available for West
- Vaccine candidates were there, but shelfed

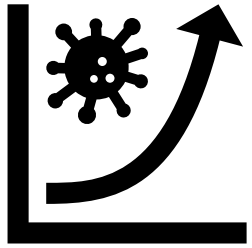
https://www.msf.org/ebola-failures-international-outbreak-response

This article is more than **8 years old**

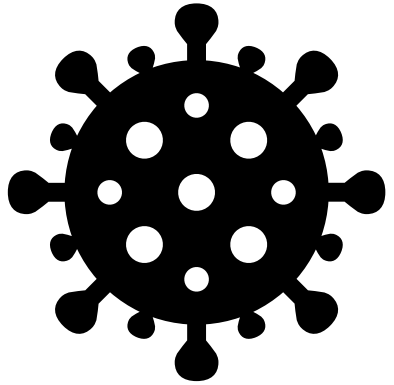
World's Ebola response slow, patchy and inadequate, Médecins sans Frontières says

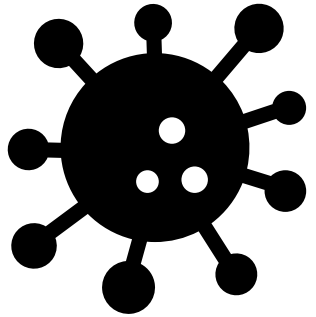
Medical NGO MSF says response by foreign countries is ill-adapted to tackling the spread of Ebola in west Africa, warning the outbreak is far from over

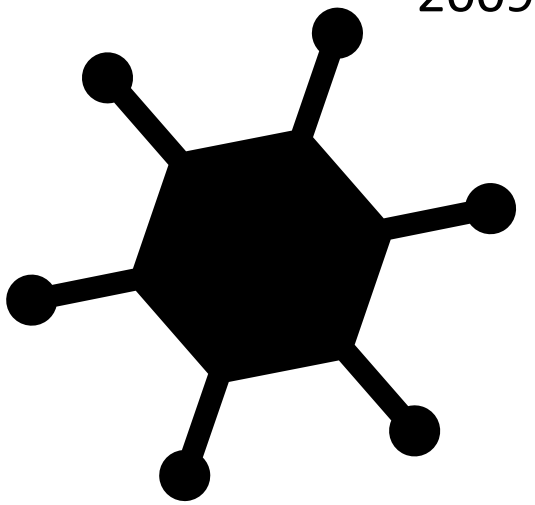
Children stand outside a Médecins sans Frontières Ebola centre in Macenta, Guinea, a country 'long overlooked by international efforts'. Photograph: Patrick Fort/AFP/Getty Images



The Public Health Emergencies of International Concern







2009 – 2010: H1N1 (Swine Flu)

2014 - : the ongoing 2014 Polio declaration

2013-2016: Ebola in Western Africa

2015-2016: Zika Virus Epidemic

2018 – 2020: Kivu Ebola Epidemic

2020 - 2024 :COVID

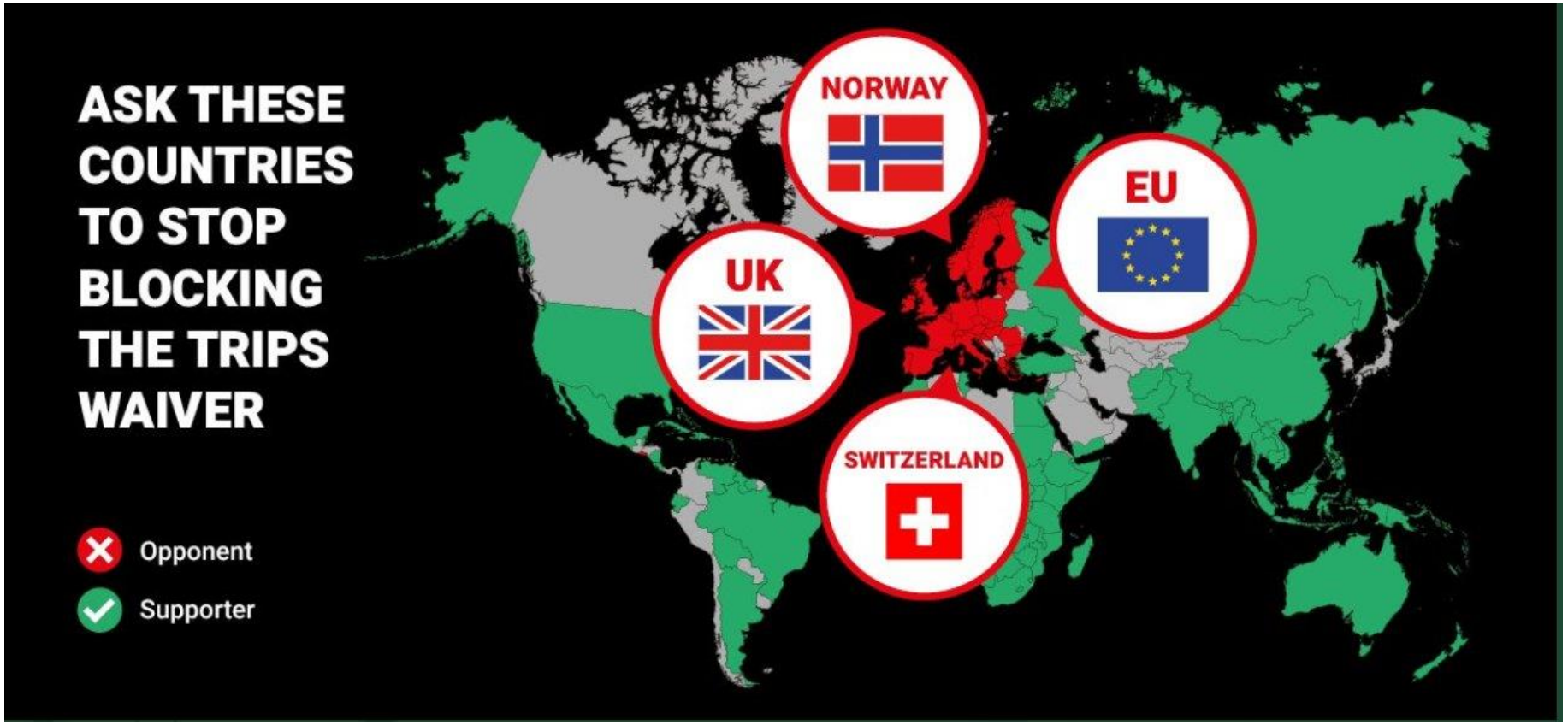
2022 - 2023 – Mpox

2024 - ….: Mpox

The lack of equity in access

Bold move by South Africa and India at the WTO

India and South Africa initiated a “TRIPS Waiver” proposal in October 2020 calling for blanket suspension of intellectual property rights on COVID-19 medical tools until the pandemic would be declared over



Massive support and momentum

We need new momentum of radical ideas and initiatives

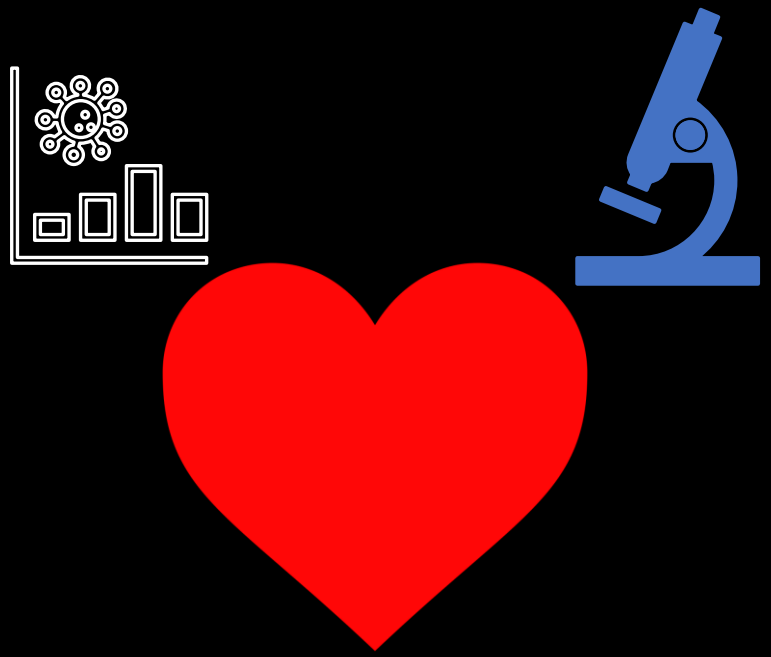
HEALTH

How Public Health Took Part in Its Own Downfall

The field's future lies in reclaiming parts of its past that it willingly abandoned.

By Ed Yong

We need science more then ever



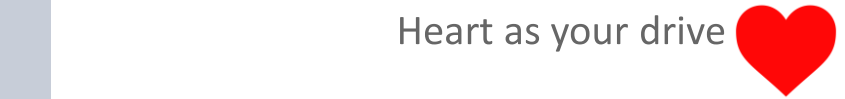
- Kind science, that is able to descent down to where the ‘context is’, to listen – to understand the people, the situation, the needs. To co-produce solutions.
- More value-based science, that is not worried too that also takes pride in science driven activism
- We need to ensure we keep young scientists motivated and show what science can do: beyond publications, how do we accredit, acknowledge and value scientists and health professionals (working in crisis times).
- We need to go back to core values of what science is (more then a body of knowledge)
- Science that is brave and bold and can challenge the ‘status quo’ in a safe way

We need a new generation of rebels

- Problems in Public Health around the globe, the current and the rapidly approaching ones are real
- It is not just about the technical solutions, it is very much how we got there, who participates and who can use what we collective develop
- In some parts of the world a lot of political paralyses and ‘greenwashing’, the infinite loop of ‘lessons learned?’ meetings and presentations, expert fora
- Change doesn’t come free and by itself, it is hard work, very hard, not a side job
- How do we enable and support each other?

We need a new (and current) generation of (Global) public health activists

Science as your fundament

Heart as your drive 

“better to light a candle than to curse the darkness”

- Chinese proverb

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MSF Science Portal
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