



# ***Digital respiratory medicine in the global health context: the case of TB***

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WHO Global TB Programme, Switzerland

*“Digital respiratory medicine – realism v futurism”*

*A digital health summit of the ERS”- Friday 4 June 2021*



# Declaration of Interests

The speaker is a staff member of the Global TB Programme of the World Health Organization (WHO)

Between 2014 and 2020 the Global TB Programme received funds from the ERS to work on digital technologies and lung health

He has no other interests to declare

# The global TB situation

*A quarter of the world's population is infected with TB bacilli.*

	Estimated incidence, 2019	Estimated number of deaths, 2019
All forms of TB	10.0 million (8.9–11.0 million) 12% children <15y   56% men   32% women	1.2 million* (1.1–1.3 million)
HIV-associated TB	815,000 (729,000–906,000)	208,000 (177,000–242,000)
Multidrug- / rifampicin-resistant TB (MDR/RR-TB)	465,000 (400,000–535,000)	182,000 (113,000–250,000)

GLOBAL  
TUBERCULOSIS  
REPORT

2020

World Health  
Organization



# Digital health : some definitions

**eHealth** The use of information and communications technology (ICT) in support of health and health-related fields, including health care services, health surveillance, health literature, and health education, knowledge and research.

**mHealth** The use of mobile and wireless technologies to support health objectives. mHealth is a component of eHealth

**Digital health** An overarching term that comprises eHealth (which includes mHealth), and emerging areas, such as the use of computing sciences in the fields of artificial intelligence, big data and genomics

# Long history ...

VOL. 19, No. 6. JUNE, 1973.

## A simple computerised Tuberculosis register with data collection in the field (suitable for a developing country)

BY

R. W. DOY

*Tuberculosis Officer (Matabeleland) Bulawayo.*

An earlier communication<sup>1</sup> described the organisation of the tuberculosis service in Matabeleland, and how the simple card index register enables us to keep track of patients and control their treatment. This paper discusses the second major role of a tuberculosis register, that is as a repository of clinical and epidemiological information from which material can be extracted for statistical analysis; and how we have been able to introduce this second function at little extra cost and within our existing slender manpower resources.

There is sufficient tuberculosis in the province for any organised assault upon it to produce a demonstrable effect, and that the inception of

JUNE, 1973.

### A COMPUTERISED T.B. REGISTER

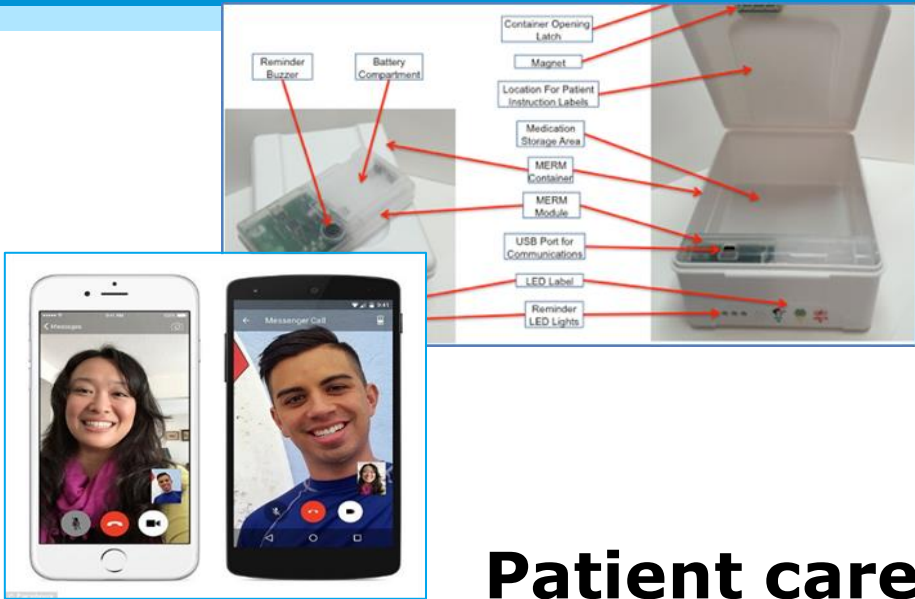
THE CENTRAL AFRICAN JOURNAL OF MEDICINE

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SEX		ASSOCIATED DISEASES	
21		21	
RACE		COMPLICATIONS	
22		23	
YEAR OF BIRTH		OPERATIONS	
23		25	
ADDRESS 1		CURRENT TREATMENT	
25		27	
ADDRESS 2		PATIENT INTOL.	
28		33	
ADDRESS 3		ORGANISM RESIST.	
31		39	
TYPE OF DISEASE		SENSITIVE TO 1 <sup>st</sup> DRUGS	
34		45	
NO. OF ZONES AFFECTED		NO OF WEEKS MISSED	
37		46	
UNILAT OR BILAT		DATE OF TREATMENT CHANGE	
38		48	
CAVITATION!		REASON FOR CHANGE	
39		52	
UNILAT OR BILAT		DATE OF DESIGNATION	
40		53	
HOW DIAGNOSED		EFFECTIVE DATE	
41		54	
DATE OF NOTIFICATION		PRESENT STATUS	
42		58	
DATE TREATMENT STARTED		X-RAY STATUS	
46		60	
B.C.G.		SPUTUM STATUS	
50		61	
HEAF TEST		62	
51			
MANTOUX TEST			
52			
SPUTUM SLIDE POS./NEG.			
53			
DATE COLLECTED			
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58			
DATE COLLECTED			
59			
CONTACTS LISTED			
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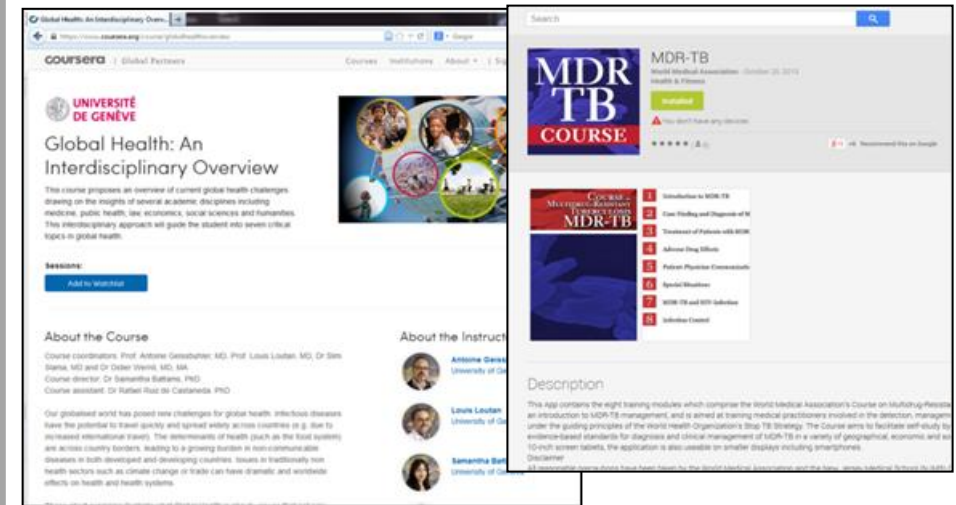
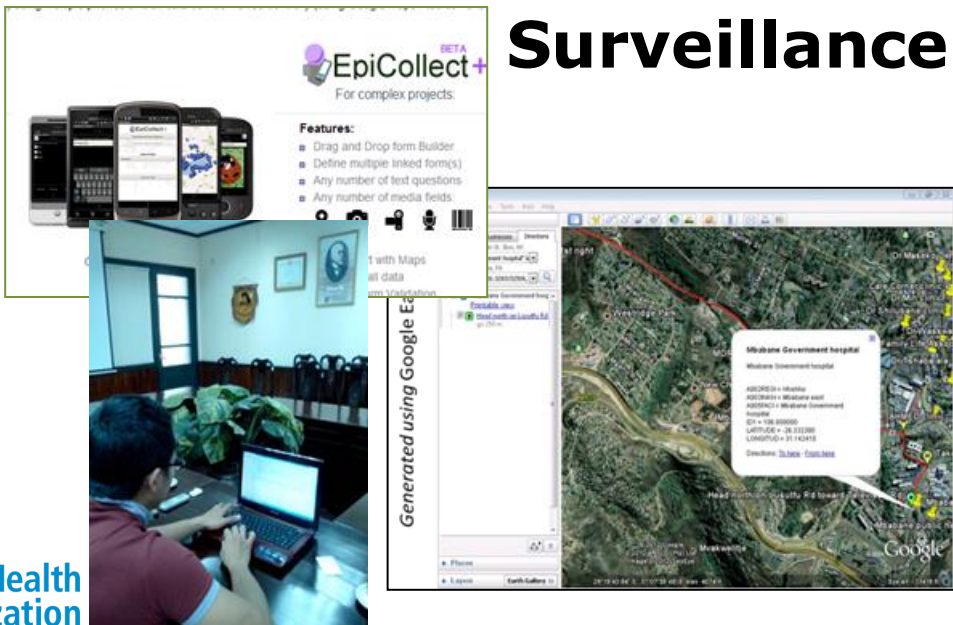
# A conceptual framework



**Patient care**  
**Surveillance**



**Programme management**  
**eLearning**



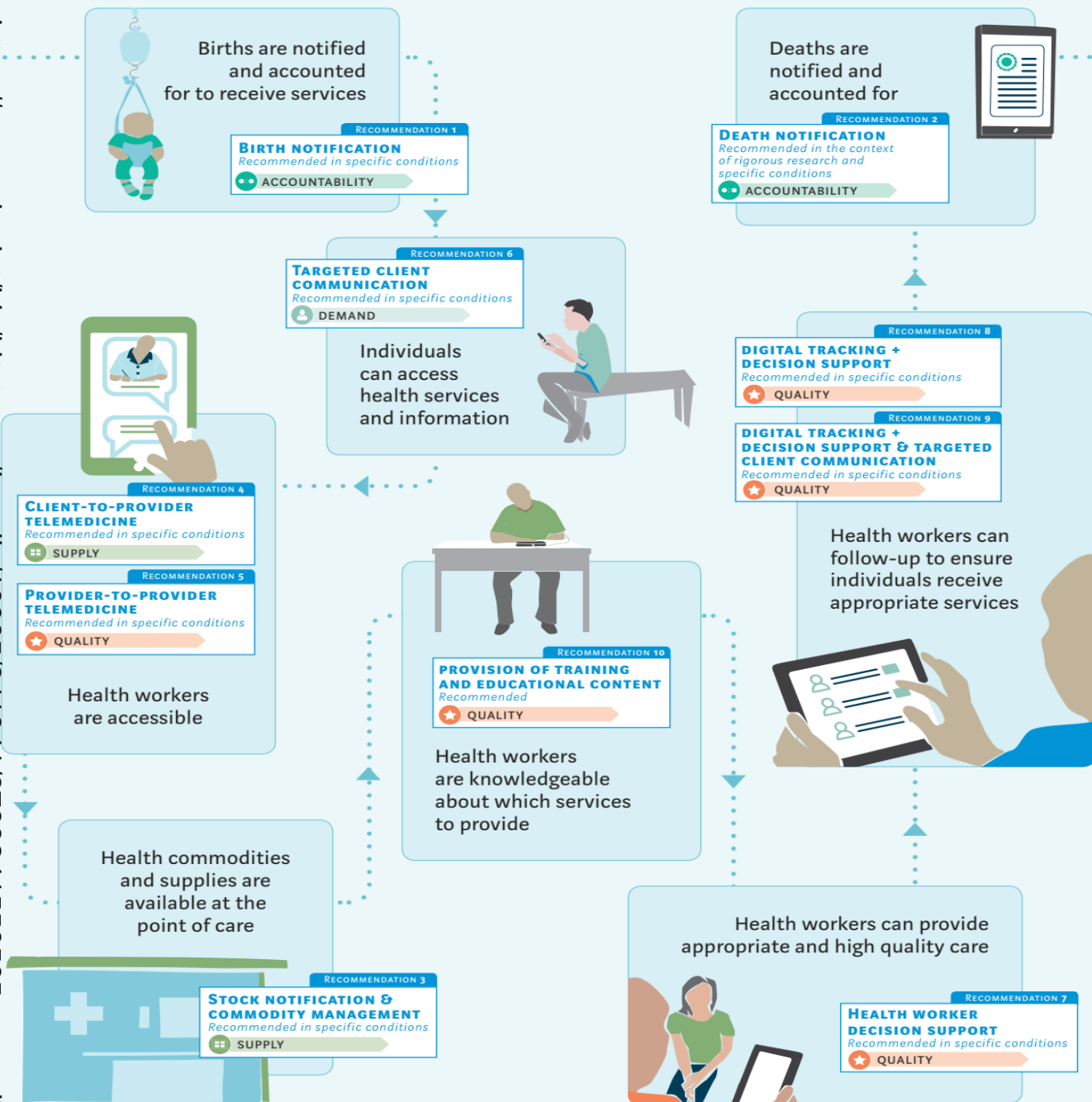


# WHO GUIDELINE RECOMMENDATIONS ON DIGITAL INTERVENTIONS FOR HEALTH SYSTEM STRENGTHENING

World Health Organization

**FIGURE 4 LINKAGES OF THE RECOMMENDATIONS ACROSS THE HEALTH SYSTEM**

<https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf>

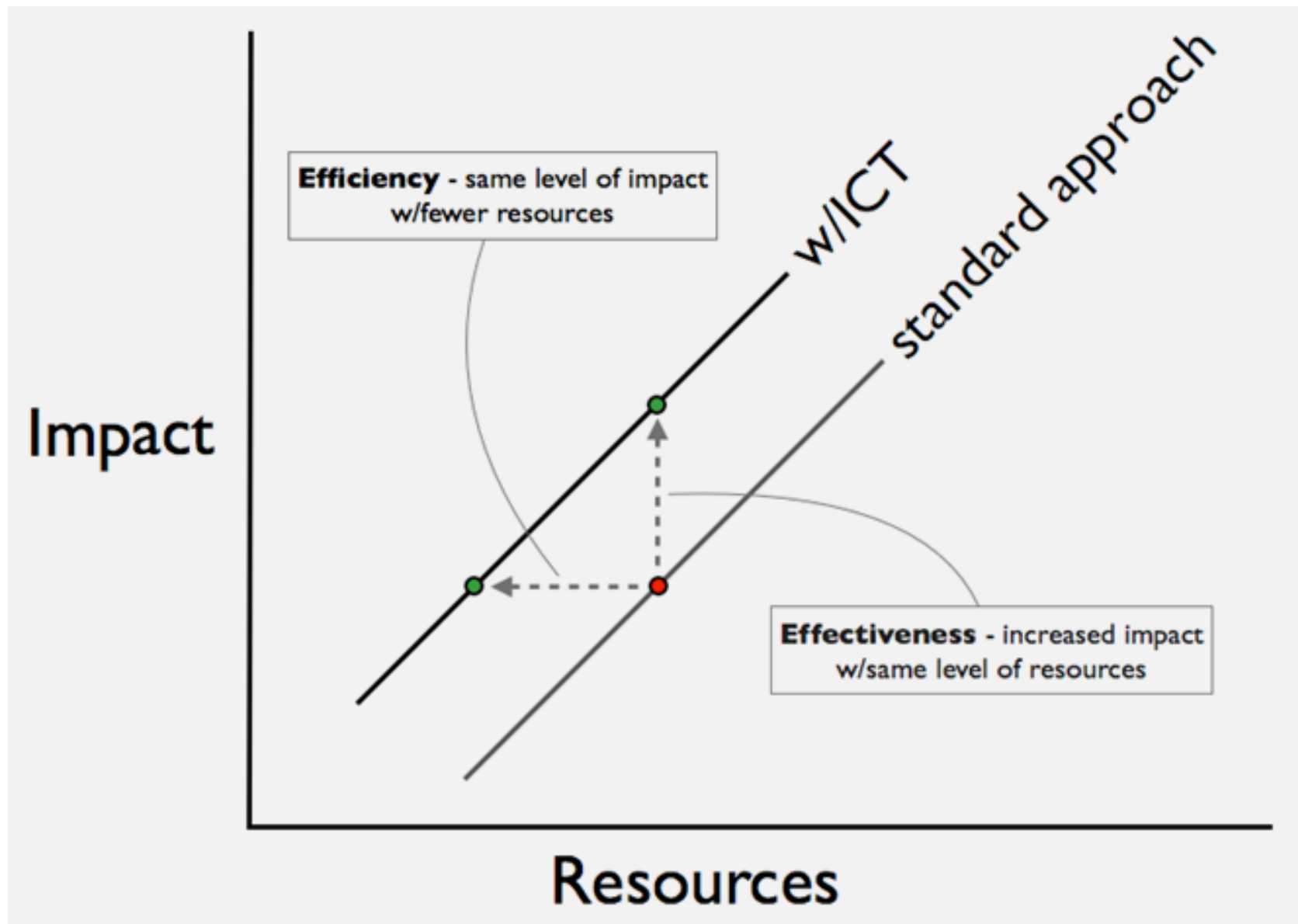


# Common premises for digitizing health care

- Communication is critical to behaviour change and healthier choices
- Better data management can inform decisions, improve performance, and lower costs
- Computerization facilitates data transfer
- Increased global access to equipment, software, connectivity can improve health care



“... if your initiative isn't increasing effectiveness or efficiency (or both) then you shouldn't be doing it.”



# GRADE : evidence to decision

## considerations when formulating evidence-based recommendations

- Is the problem a **priority**?
- How substantial are the **desirable** anticipated effects?
- How substantial are the **undesirable** anticipated effects?
- What is the overall **certainty** of the evidence of effects?
- Is there important uncertainty about or variability in how much people **value** the main outcomes?
- Do the desirable effects **outweigh** the undesirable effects?
- How large are the **resource** requirements?
- What is the certainty of the **evidence of resource** requirements?
- Are the net benefits worth the incremental **cost**?
- What would be the impact on health **equity**?
- Is the intervention **acceptable** to key stakeholders?
- Is the intervention **feasible** to implement?

Adapted from Moberg J et al. 2018

<https://health-policy-systems.biomedcentral.com/articles/10.1186/s12961-018-0320-2>

# Certainty in the estimates of effect

<b><i>Certainty</i></b>	<b><i>Definition</i></b>
<b>High</b>	Further research is very unlikely to change our confidence in the estimate of effect.
<b>Moderate</b>	Further research is likely to have an important impact on our confidence in the effect and may change the estimate.
<b>Low</b>	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
<b>Very low</b>	Any estimate of effect is very uncertain.



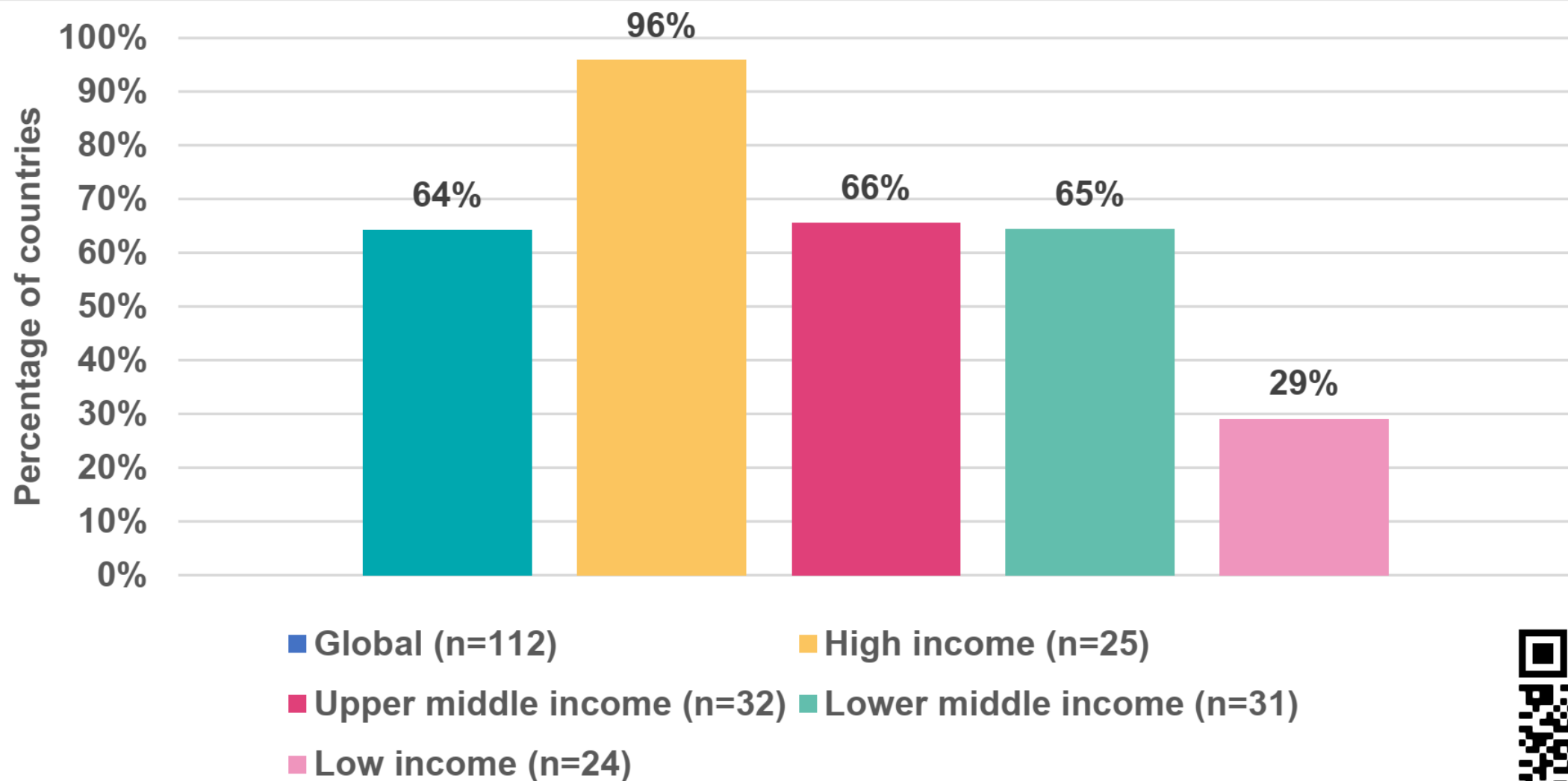
# Coronavirus has exposed the digital divide like never before



Fewer than 1 in 10 households in less economically developed countries world are connected. Image: REUTERS/Amanda Perobelli

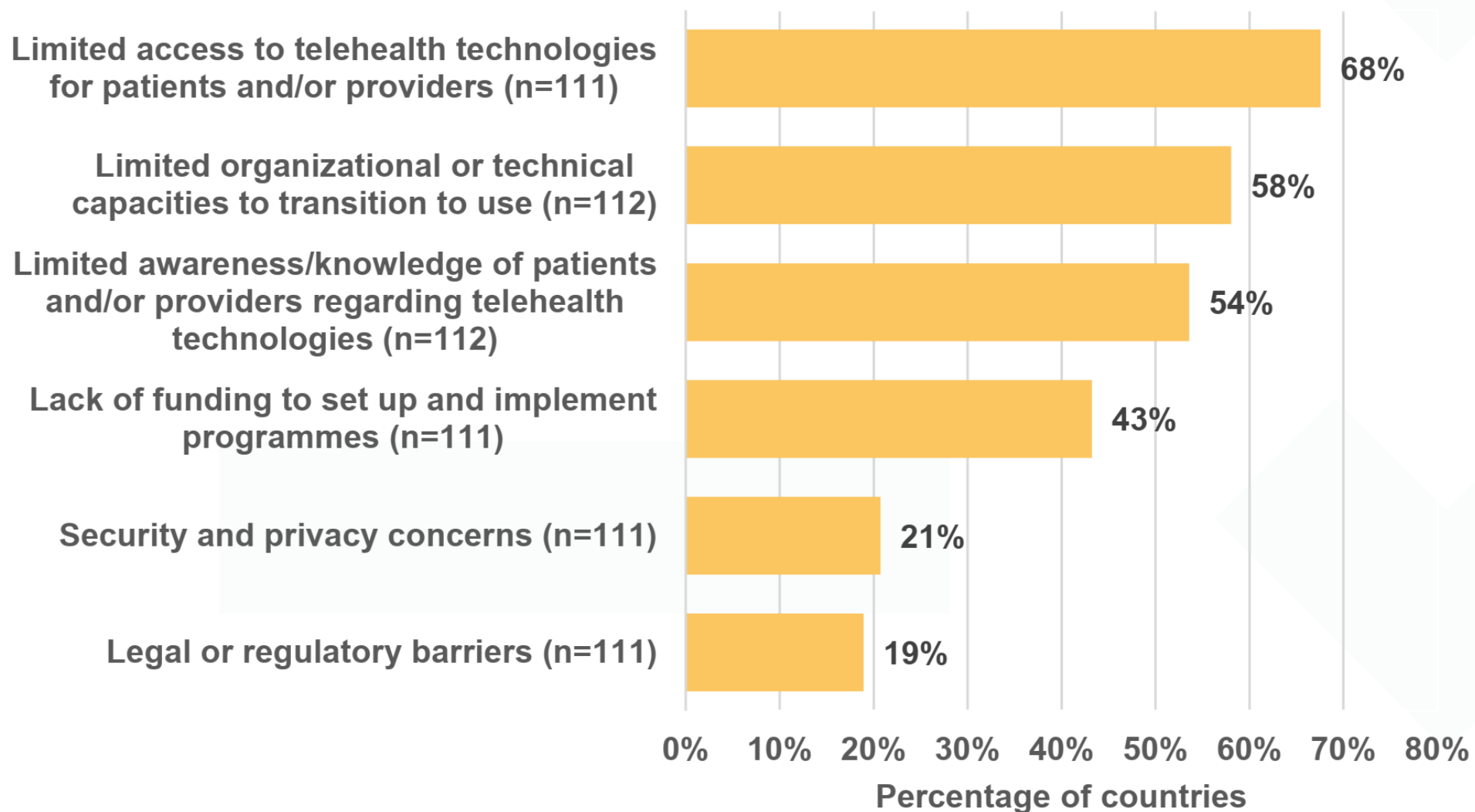


# % countries reporting use of telehealth technologies to support service delivery (January – March 2021)



# % countries reporting barriers to use telehealth

## technologies to support service delivery (January – March 2021)



# Rapid data for advocacy



Search by Country, Territory, or Area



Covid-19 Response Fund

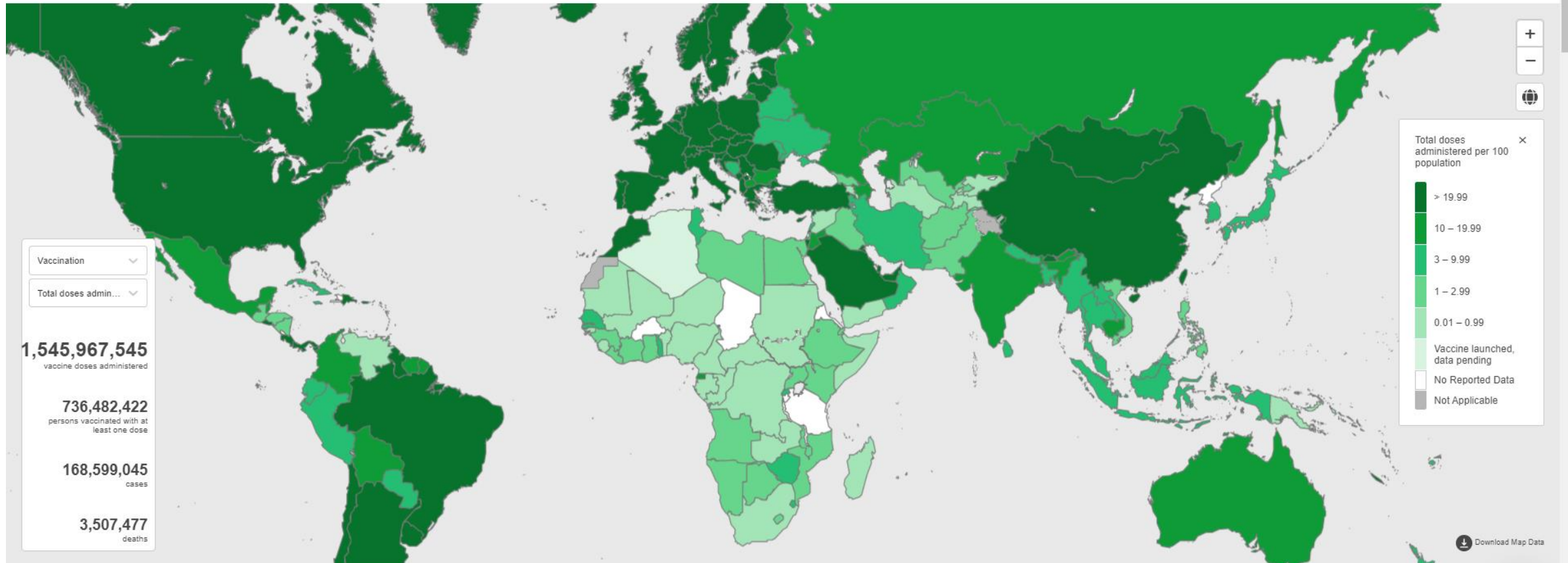
Donate

WHO Coronavirus (COVID-19) Dashboard

Overview

Data Table

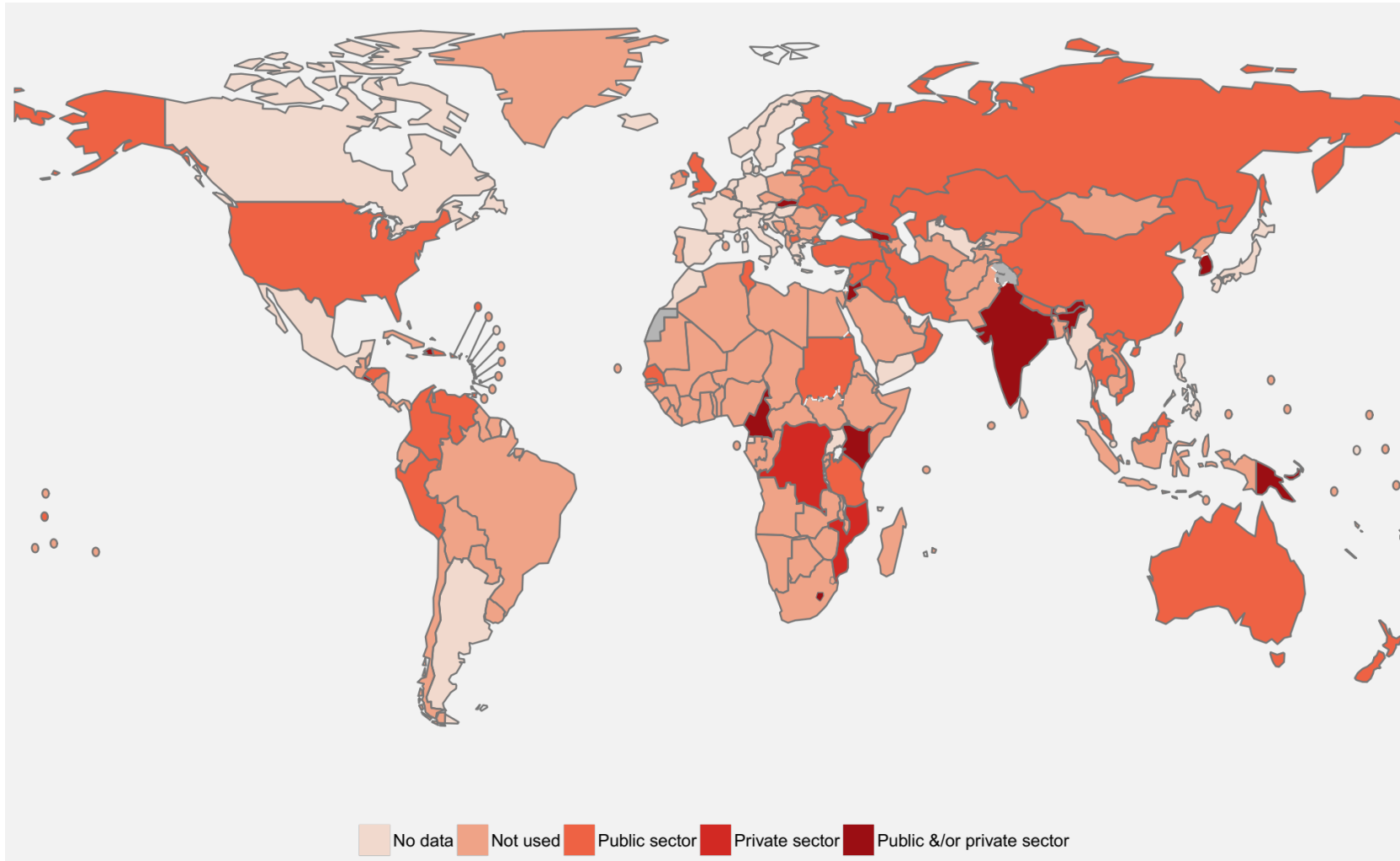
Explore



Globally, as of 5:03pm CEST, 28 May 2021, there have been 168,599,045 confirmed cases of COVID-19, including 3,507,477 deaths, reported to WHO. As of 26 May 2021, a total of 1,545,967,545 vaccine doses have been administered.

<https://covid19.who.int/>

# Are SMS, video, electronic medication monitors or other digital technologies in use to support patients at risk of interrupting TB treatment?



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

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# Communication & capacity building (1)

Paperless teaching has been extensively employed since the early days of computing and Internet. Many training curricula for healthcare professionals now incorporate at least some degree of **eLearning**, aspiring to blend virtual with classroom style teaching. Creative interactive methods and gaming approaches are being used.

<https://www.ers-education.org>

e-learning resources > Home

COVID-19 ▾ EVENTS ▾ PUBLICATIONS ▾ GUIDELINES ▾ TOPICS ▾ E-LEARNING ▾ VALUE-Dx ▾ LOGIN

ERS e-Learning Resources

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Short video statements on COVID-19

NEW:

How to manage patients with arterial hypertension in the era of COVID-19  
Kostas Tsioufis (Athens, Greece)  
COVID-19 video statement: Tuesday, 17 April 2020  
Open

<https://openwho.org/>

World Health Organization

Home About Channels Courses News

Welcome to OpenWHO

OpenWHO is WHO's new interactive, web-based, knowledge-transfer platform offering online courses to improve the response to health emergencies. OpenWHO enables the Organization and its key partners to transfer life-saving knowledge to large numbers of frontline responders.

Trainings for current outbreaks

Novel coronavirus (COVID-19) Ebola Cholera Polio

Join now Find a course Search courses

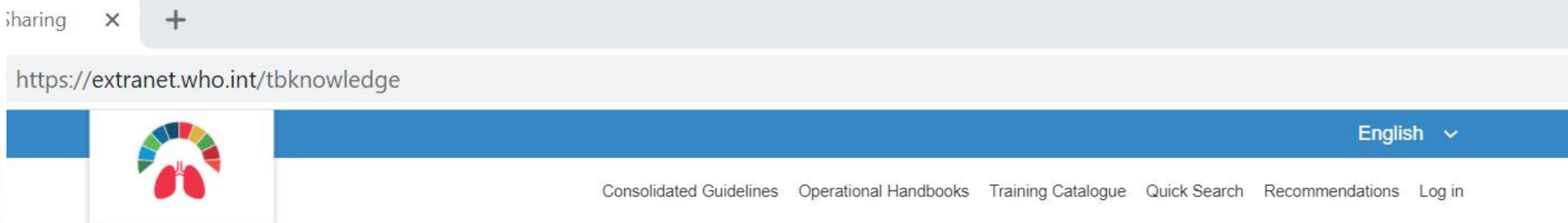
COVID-19

Standard precautions: Hand hygiene

COVID-19: How to put on and remove personal protective equipment (PPE)

Introduction to Go.Data - Field data collection, chains of transmission and contact...

https://extranet.who.int/tbknowledge




# WHO TB KNOWLEDGE SHARING PLATFORM

Access the modular WHO guidelines on tuberculosis, with corresponding handbooks and training materials.




**Consolidated Guidelines**



WHO guidelines provide the latest evidence-informed recommendations on TB prevention and care to help countries achieve the Sustainable Development Goals (SDGs) and the targets of the

**Operational Handbooks**



The WHO Operational Handbooks on tuberculosis provide users with practical "how to" guidance, with details essential for the proper implementation of the corresponding WHO guidance.

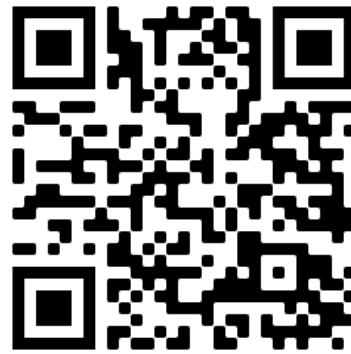
**Training Catalogue**



The WHO Training Catalogue on tuberculosis consists of online eLearning courses and other training materials to help users implement the corresponding WHO guidance.



# Communication & capacity building (2)

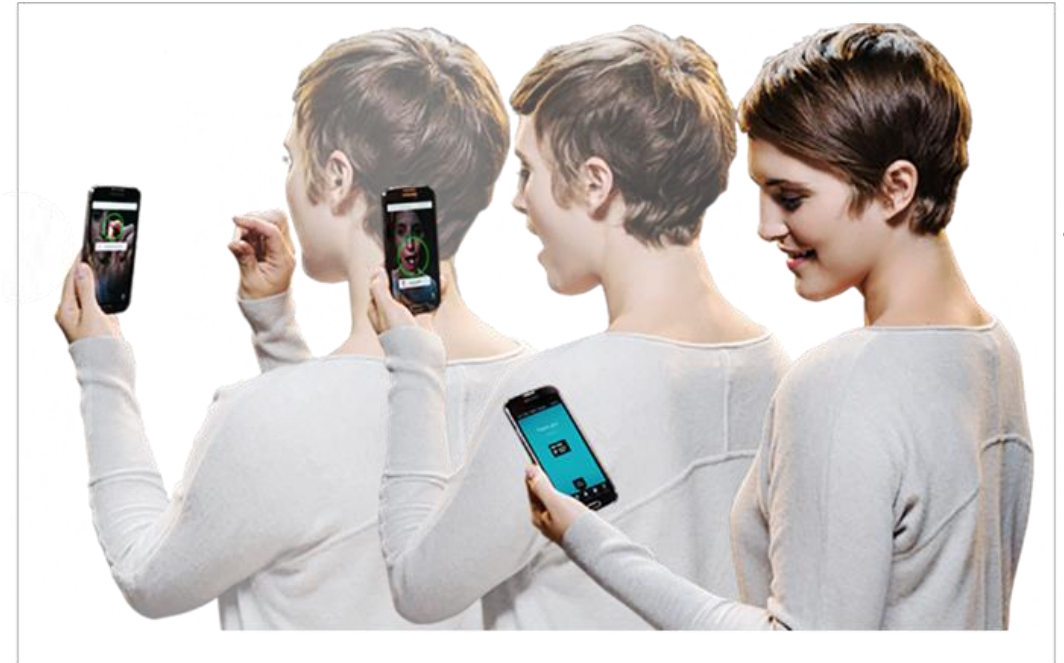
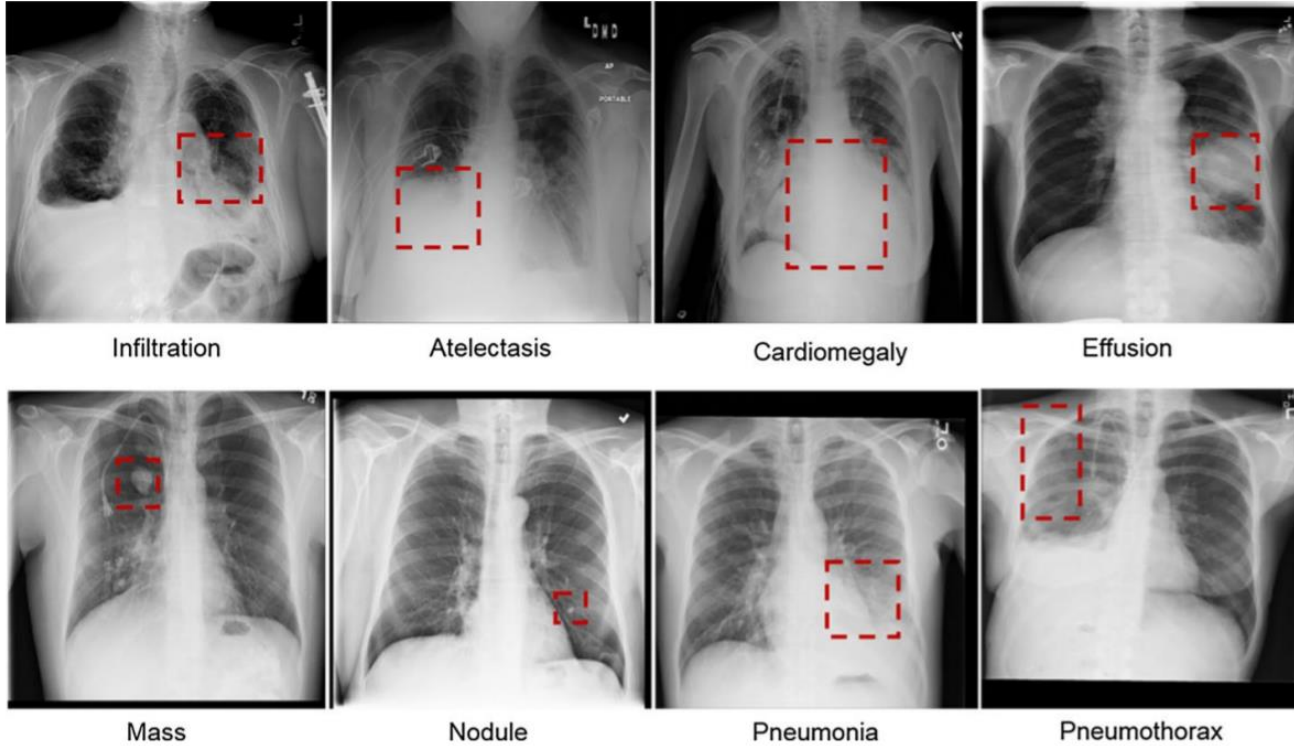


**Chatbots** are automated programmes that provide callers with information in a manner that simulates human interaction. They can reply to set FAQs or even free text or speech inputs.

The screenshot shows the WHO Hr-TB guidelines Chatbot interface. On the left, there is a welcome message: "Welcome to the Hr-TB guidelines Chatbot, a project developed to help Health Care Workers (HCWs) to answer questions about WHO treatment guidelines for isoniazid-resistant tuberculosis. The advice in this Chatbot has been prepared by the WHO Global TB Programme and is a complement to the WHO treatment guidelines for isoniazid-resistant tuberculosis and its online annexes. We are continuously updating the Chatbot so it can help HCWs in the field as much as possible." Below this, there are two buttons with paper plane icons: "You can use the Hr-TB Guidelines chatbot on Telegram" and "Try out also the WHO TB Facts chatbot on Telegram". On the right, a chat window titled "HR-TB TREATMENT GUIDELINES" is open. It contains the following text: "The Hr-TB treatment regimen is started in one of two situations:" followed by a message with a blue circle containing the number "12". Below that is another message with a blue circle containing the number "11": "This function is still in development and no answer is currently available. For more information use the inbuilt menu-driven functions or access the WHO website:". A link "WHO Global TB Programme" is provided. At the bottom of the chat window, there is a WHO logo and the text "World Health Organization". A "SEND" button is visible at the bottom right of the chat window.

# Applications of AI in TB care

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6103992/>



<https://aicure.com/>

## Implementation Research for Digital Technologies and TB (IR4DTB)

A toolkit for evaluating the implementation and scale-up of digital innovations across the TB continuum of care. Learn more...

Introduction

1  
Preparing for implementation research

2  
Developing IR objectives and questions

1  
Preparing for implementation research

2  
Developing IR objectives and questions

3  
Research methods

4  
Data management and analysis

5  
Planning and conducting IR

6  
Knowledge translation

# Implementation research

# Moving forward

- New opportunities to improve TB prevention and care as digital innovations evolve
- Technologies developed for one health condition may benefit other emergent challenges
- Evidence for improved effectiveness, quality of care and efficiency at large scale remains critical. Data need to be collected alongside all investment in innovation

# Acknowledgements

Many patients

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ERS, technical agencies and advocates

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