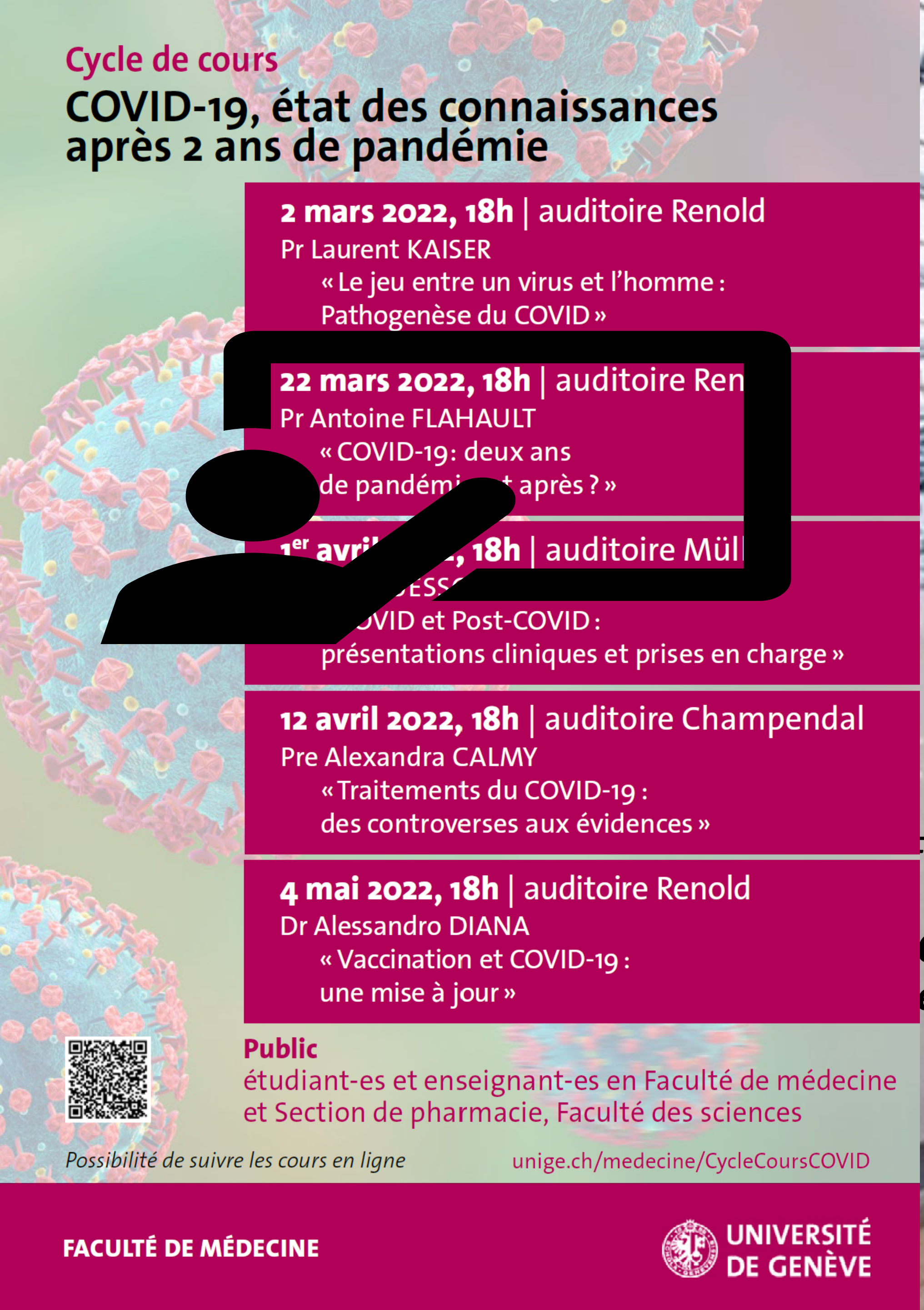
Cycle de cours
COVID-19, état des connaissances après 2 ans de pandémie
2 mars 2022, 18h | auditoire Renold
Pr Laurent KAISER
« Le jeu entre un virus et l'homme : Pathogenèse du COVID »
22 mars 2022, 18h | auditoire Ren
Pr Antoine FLAHAULT
« COVID-19: deux ans
de pandémi t après ? »
1er avri , 18h | auditoire Mül
ESS
VID et Post-COVID :
présentations cliniques et prises en charge »
12 avril 2022, 18h | auditoire Champendal
Pre Alexandra CALMY
« Traitements du COVID-19 : des controverses aux évidences »
4 mai 2022, 18h | auditoire Renold
Dr Alessandro DIANA
« Vaccination et COVID-19 : une mise à jour »
Public
étudiant-es et enseignant-es en Faculté de médecine et Section de pharmacie, Faculté des sciences
Possibilité de suivre les cours en ligne
unige.ch/medecine/CycleCoursCOVID
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campus biotech
lahault
COVID-19: deux ans
e pandémie et après?

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MÉDECINE TROPICALE ET HUMANITAIRE

1. **Situation épidémiologique**
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COVID-19: situation dans le monde

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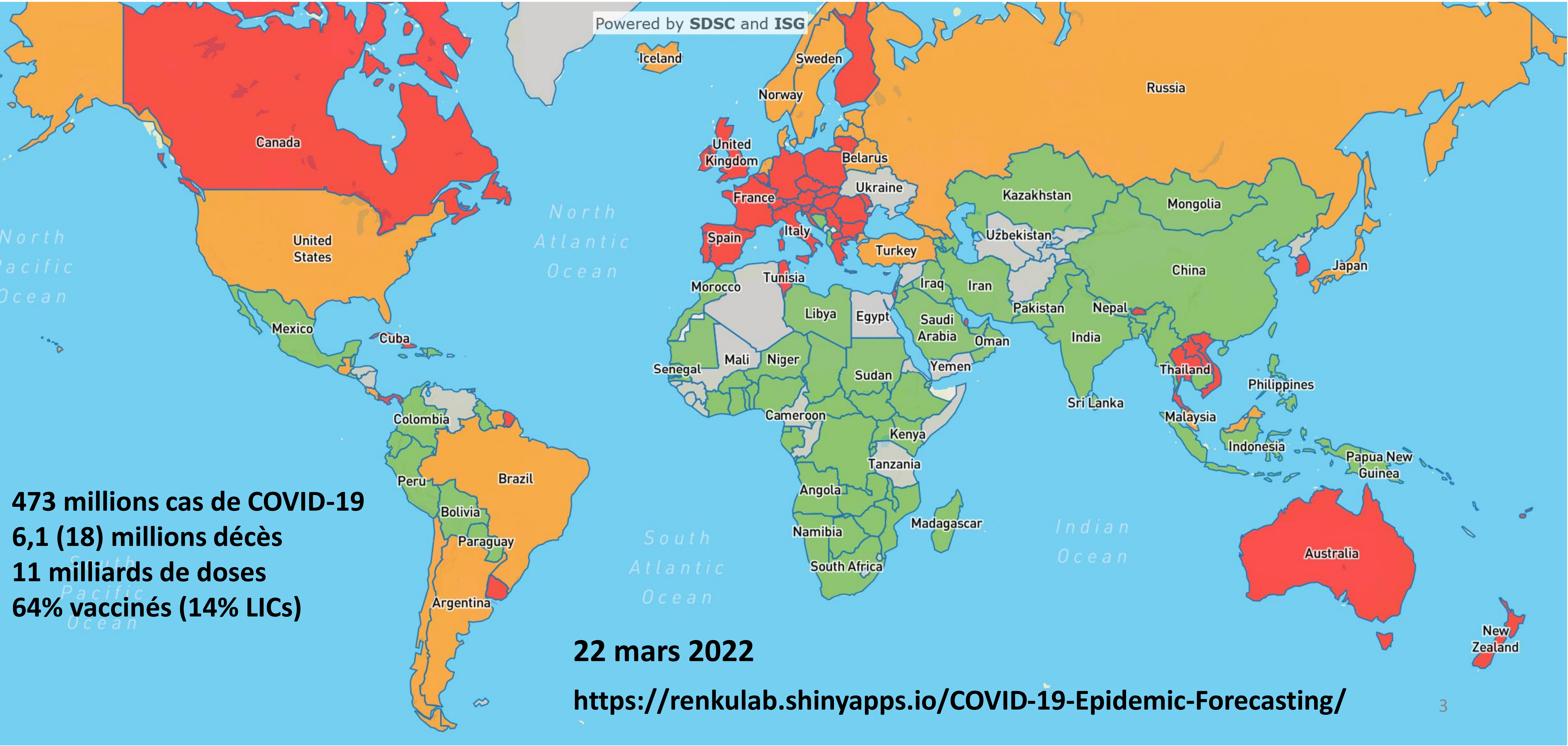
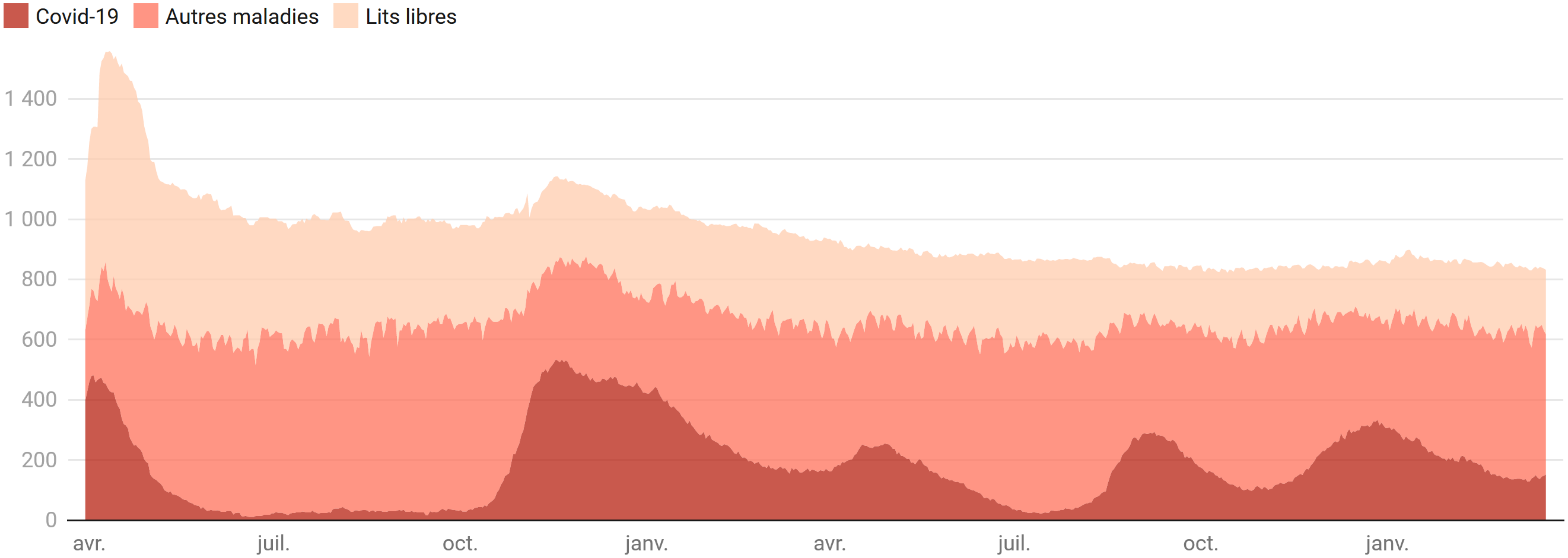


473 millions cas de COVID-19
6,1 (18) millions décès
11 milliards de doses
64% vaccinés (14% LICs)

22 mars 2022

https://renkulab.shinyapps.io/COVID-19-Epidemic-Forecasting/

Occupation des soins intensifs en Suisse

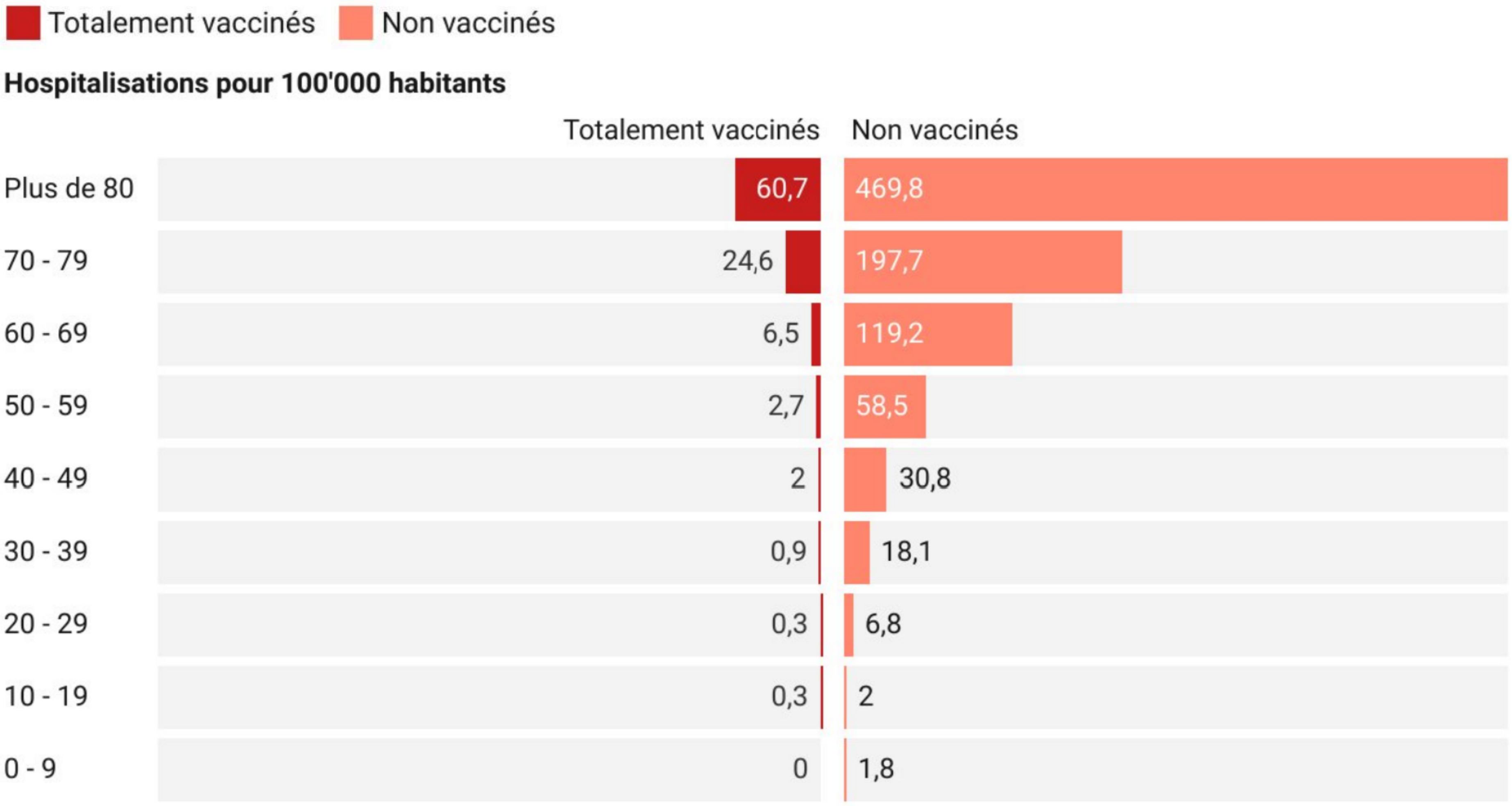


Données mises à jour quotidiennement du lundi au vendredi.

Graphique: RTSinfo • Source: icumonitoring.ch • Récupérer les données • Créé avec Datawrapper

Covid-19: hospitalisations en Suisse selon le statut vaccinal

Admissions à l'hôpital en Suisse entre le 1er et le 28 novembre. Les personnes partiellement vaccinées ont été comptées parmi les non vaccinés. A noter que le statut vaccinal n'est pas connu pour environ 15% des hospitalisations.



Graphique: RTSinfo • Source: OFSP • Créé avec Datawrapper

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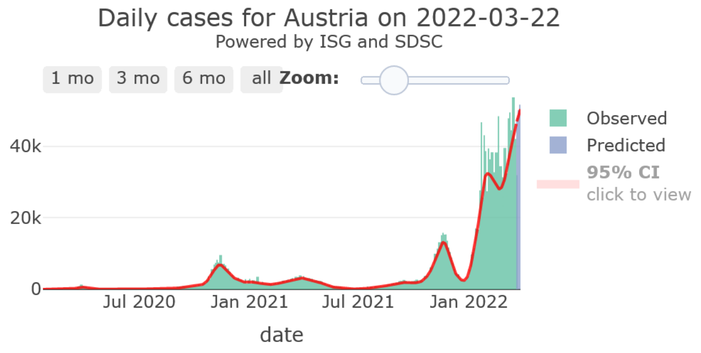
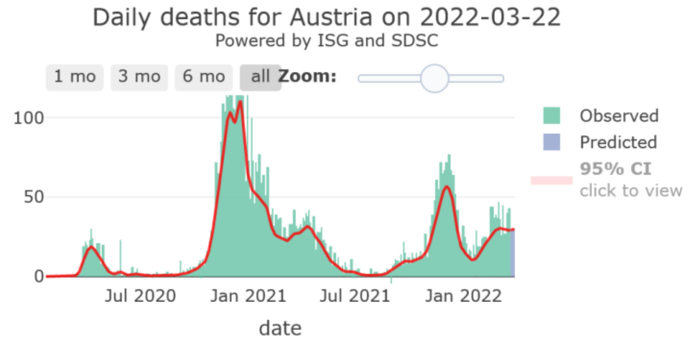
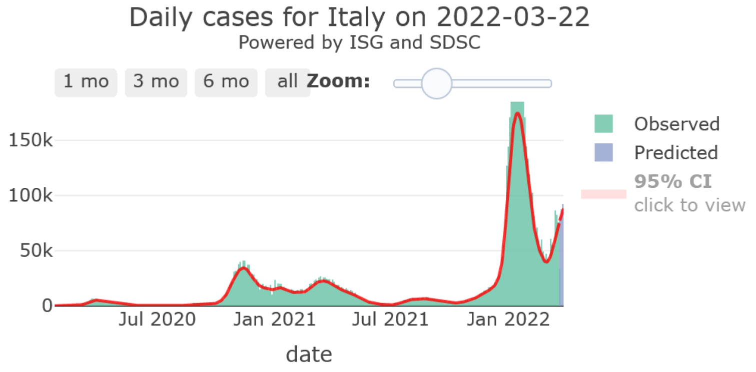
Europe : trois profils

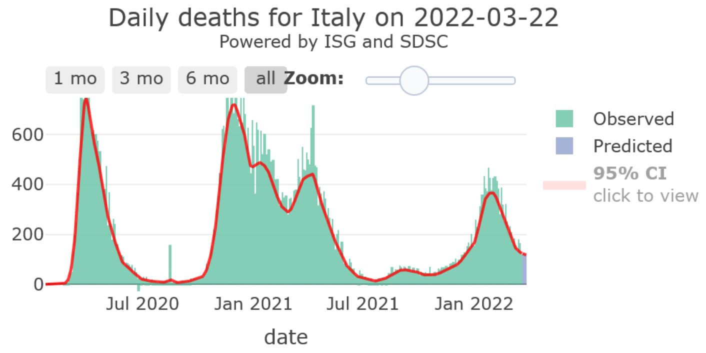
Autriche



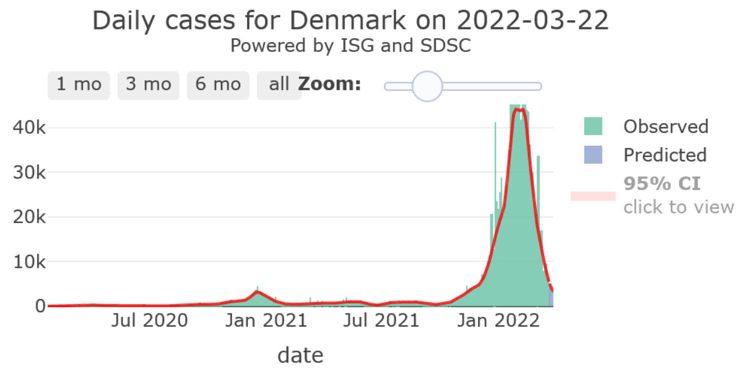


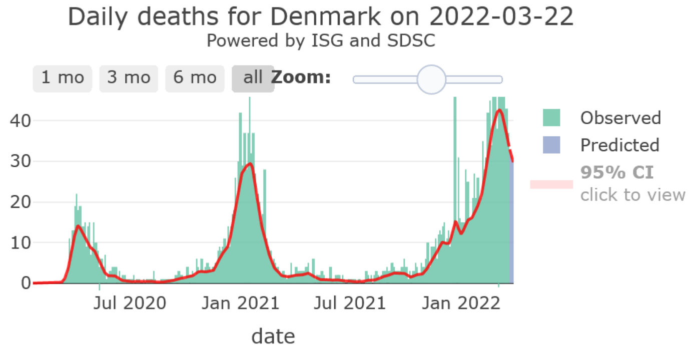
Italie





Danemark





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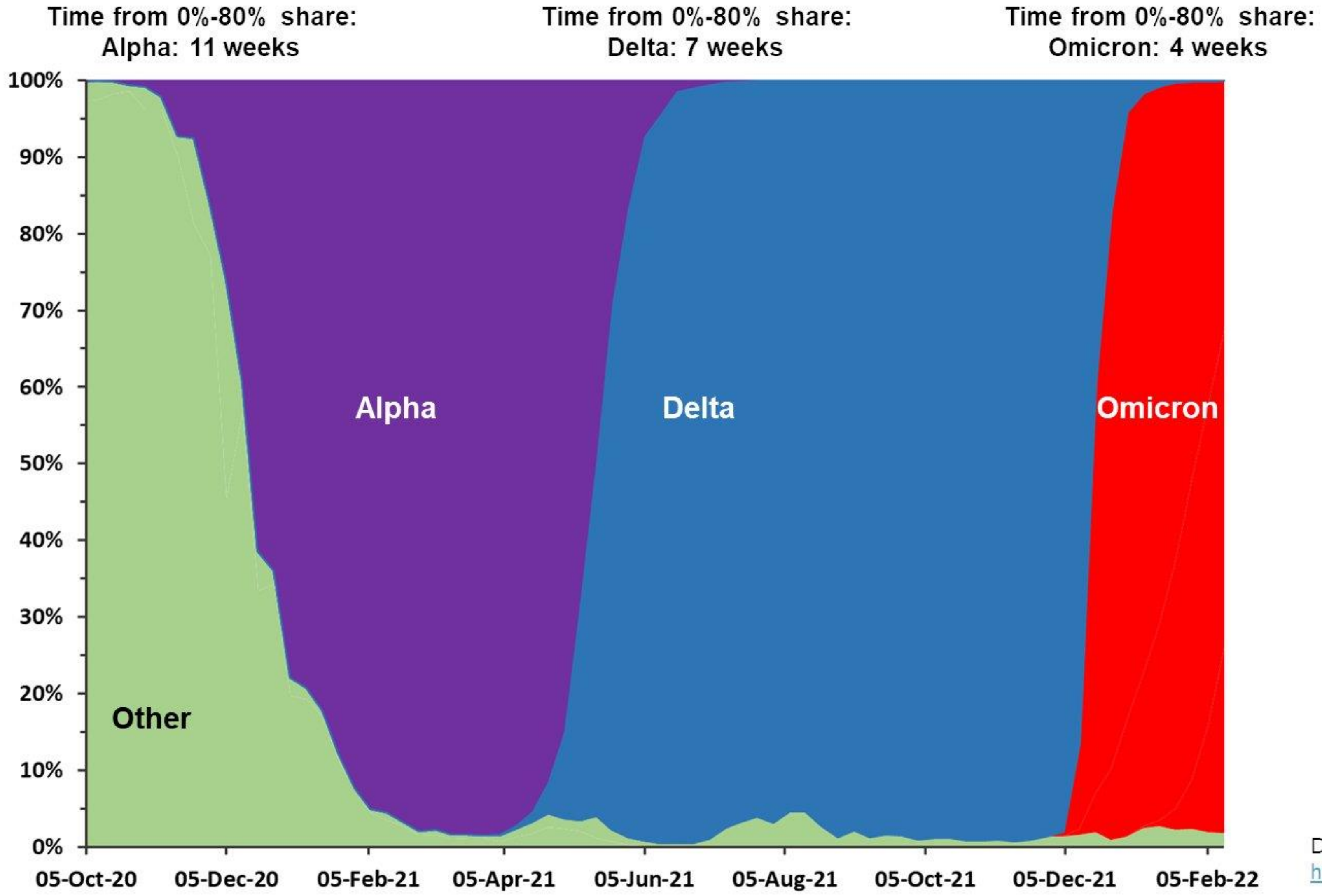
Main variants over last 18 months in England



Data from
https://covid19.sanger.ac.uk/downloads

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Main variants over last 18 months in England

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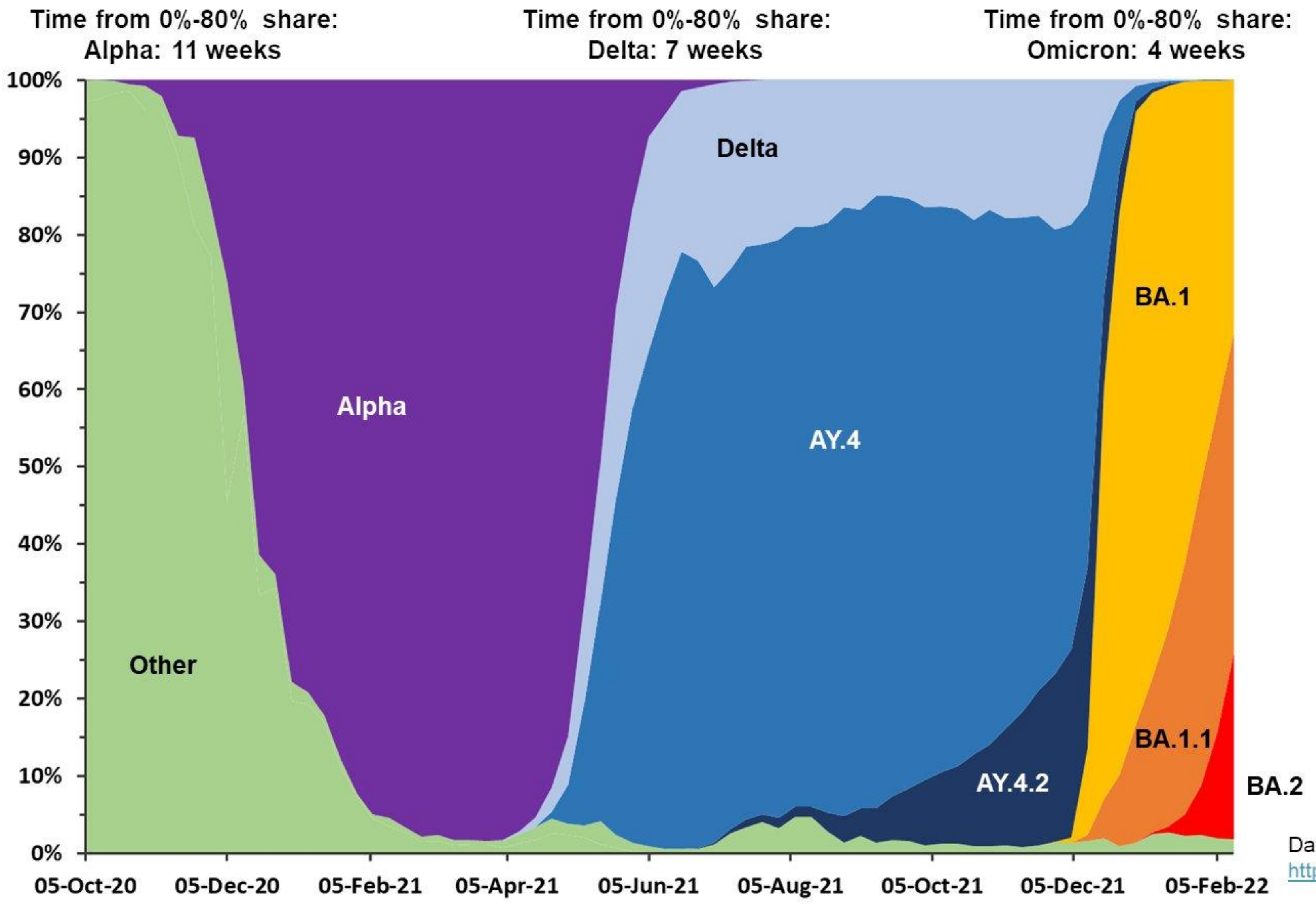
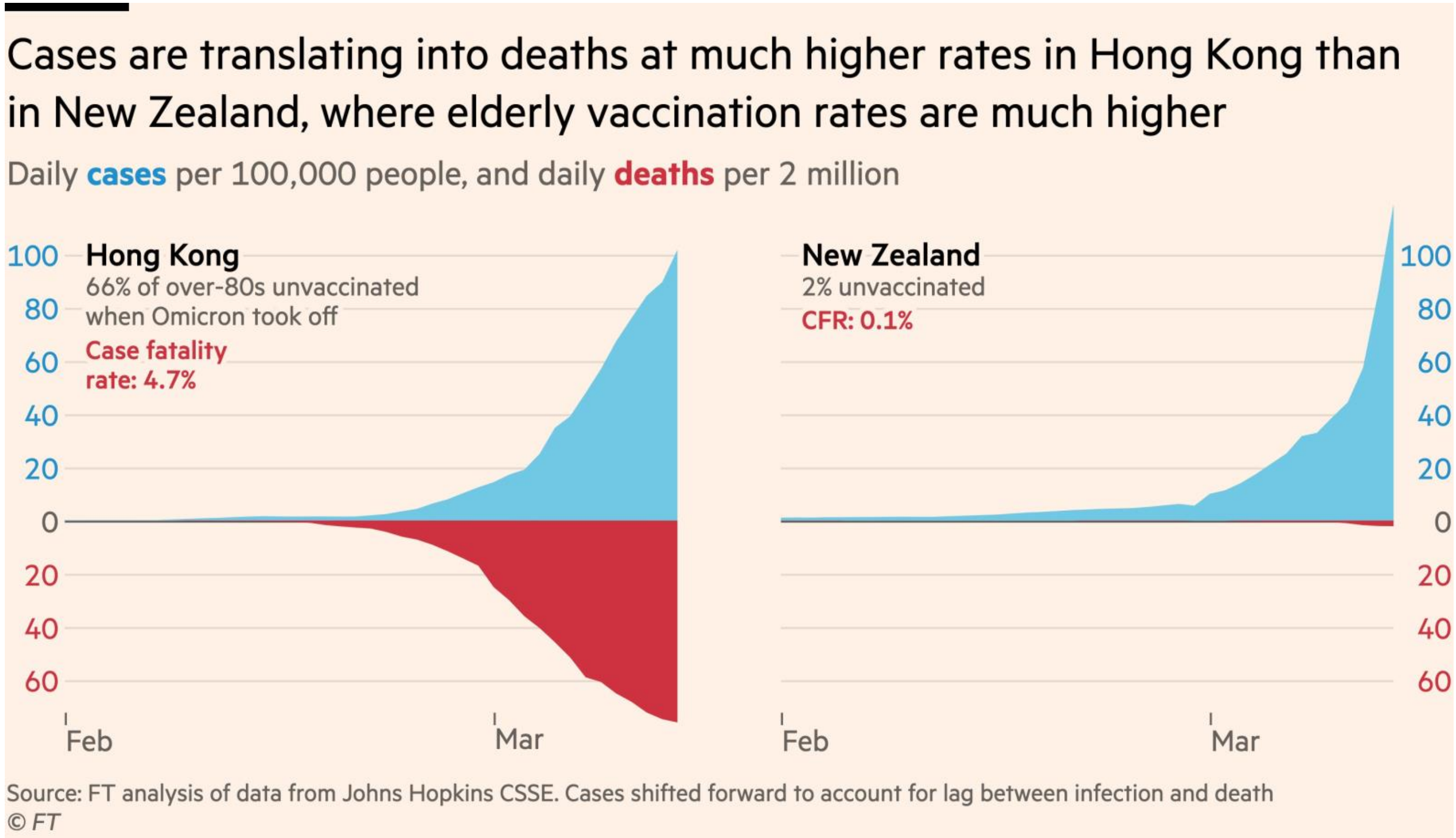


Data from
https://covid19.sanger.ac.uk/downloads

Virulence

Fauci says effects of Omicron may be less severe



Efficacité vaccinale (Omicron)

Waning immunity

Summary from UK Health Security Agency (UKHSA) on vaccine effectiveness against Omicron over time

	Dose 2			Dose 3		
	0-3 months	4-6 months	6+ months	0-3 months	4-6 months	6+ months
Infection	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Symptomatic disease	25-70%	5-30%	0-10%	50-75%	40-50%	Insufficient data
Hospitalisation	65-85%	55-65%	30-35%	80-95%	75-85%	Insufficient data
Mortality	Insufficient data	Insufficient data	40-70%	85-99%	Insufficient data	Insufficient data

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1055620/Vaccine_surveillance_report_-_week_7.pdf

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Les options pour la riposte ?

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$$R_0 = \beta.c.d$$

- Probability of Transmission
- Contact Number
- Generation Interval

L'objectif est de réduire le taux de reproduction effectif (Re) au-dessous de 1

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Quatre freins disponibles

1. Gestes barrières

$R_0 = \beta.c.d$

Probability of Transmission | Contact Number | Generation Interval

Masques = - 10% R0?

Ventilation = - 40%?

2. Mesures de confinement

$R_0 = \beta.c.d$

Probability of Transmission | Contact Number | Generation Interval

Lockdowns = - 60% R0?

3. Frein estival/Environnement

$R_0 = \beta.c.d$

Probability of Transmission | Contact Number | Generation Interval

Frein estival = -40%?

4. Immunité-Vaccins-Traitements

Immunité = - 40%?

Enfants < 12 ans = -10%

$R_0 = \beta.c.d$

Probability of Transmission | Contact Number | Generation Interval

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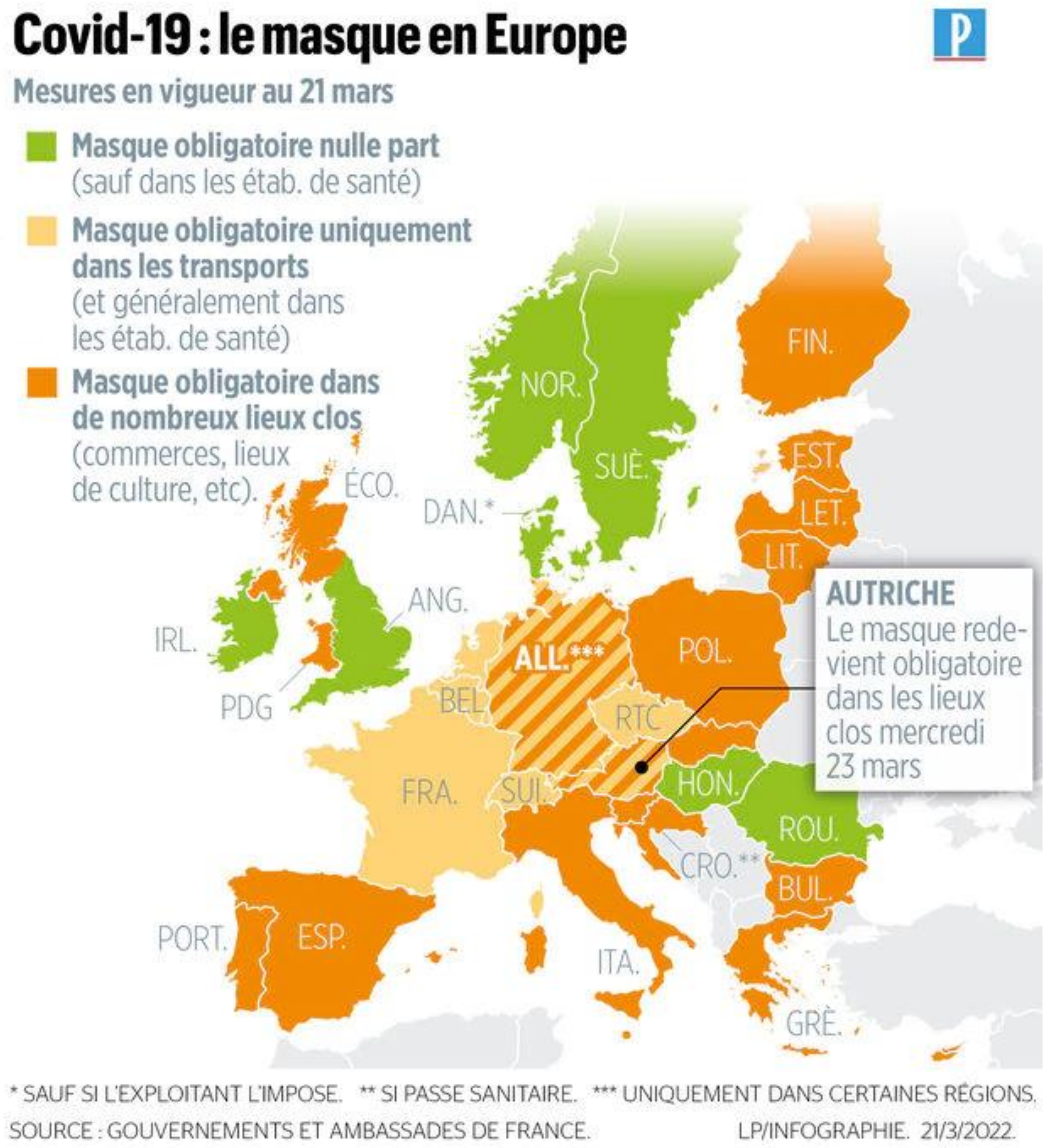
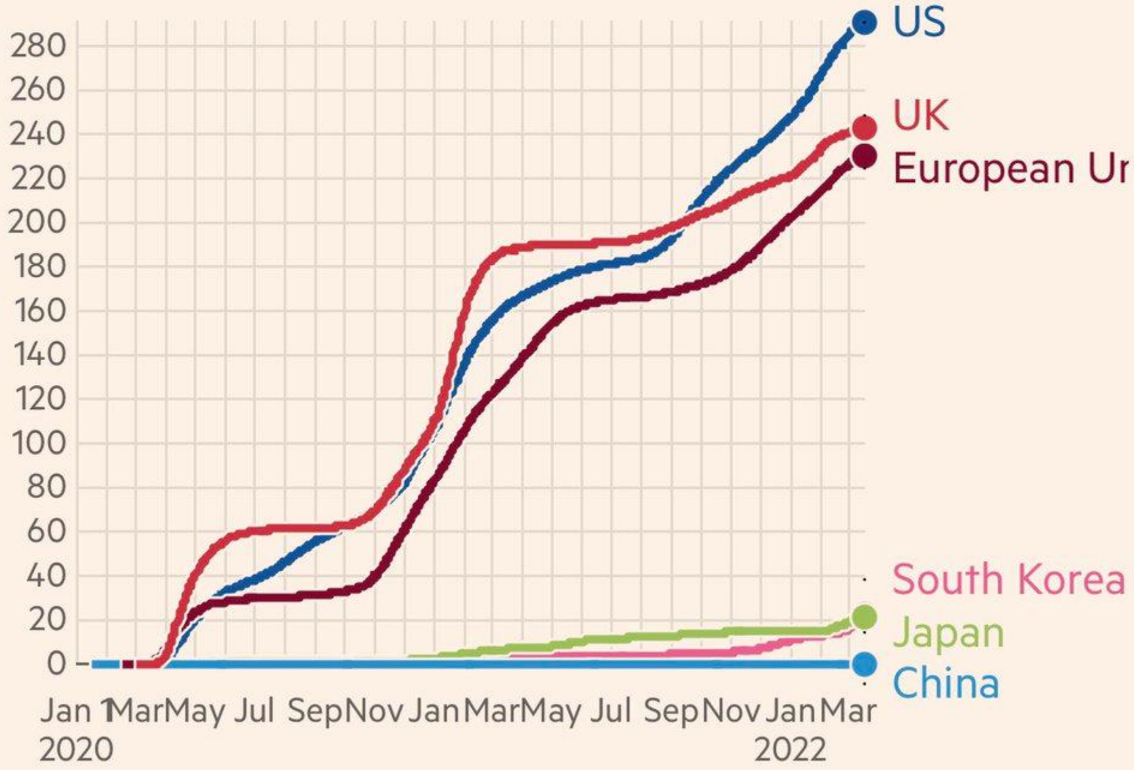


Cumulative deaths attributed to Covid-19 in US, South Korea, Japan, China, European Union and UK

Cumulative deaths (per 100k)



Source: Financial Times analysis of data from Johns Hopkins CSSE, World Health Organization, UK Government coronavirus dashboard, Government of Peru, Public Health France, Israeli Health Ministry, Slovenian Ministry of Health, Finnish Institute for Health and Welfare and the Swedish Public Health Agency.
Data updated March 17 2022 3.10pm GMT. Interactive version: ft.com/covid19

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5 stabilisateurs clés (Europe, décembre 2021)

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I – La vaccination du plus grand nombre

II – La 3ème dose comprise comme le schéma vaccinal complet

III – Le port du masque à l'intérieur (FFP2 en situations à risque)

IV – La ventilation monitorée par capteurs de CO_2 (< 800 ppm), avec éventuels purificateurs d'air

V – Les nouveaux médicaments du COVID

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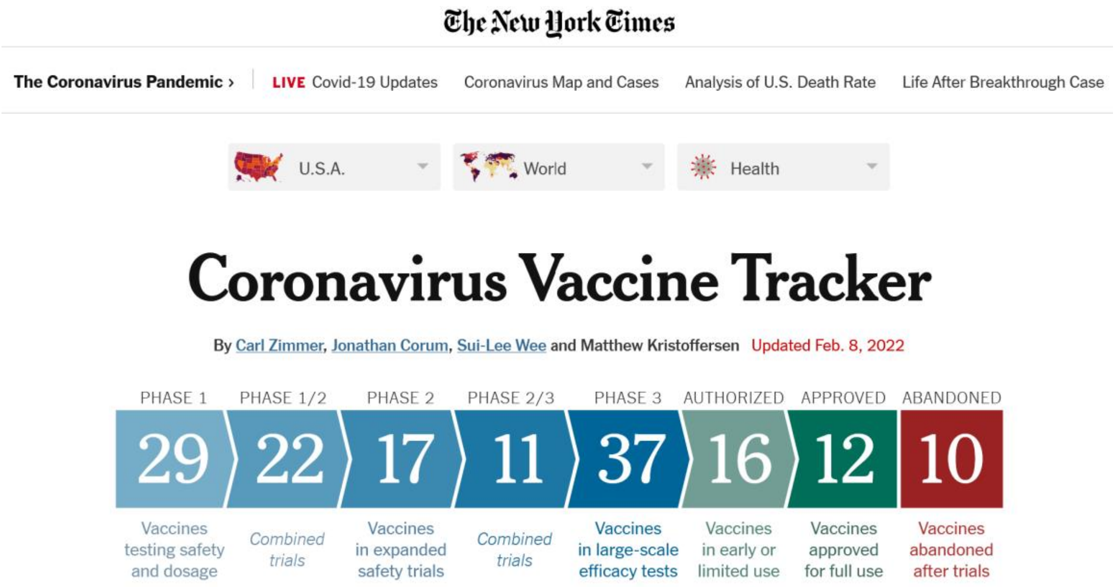
Quatre types de vaccins



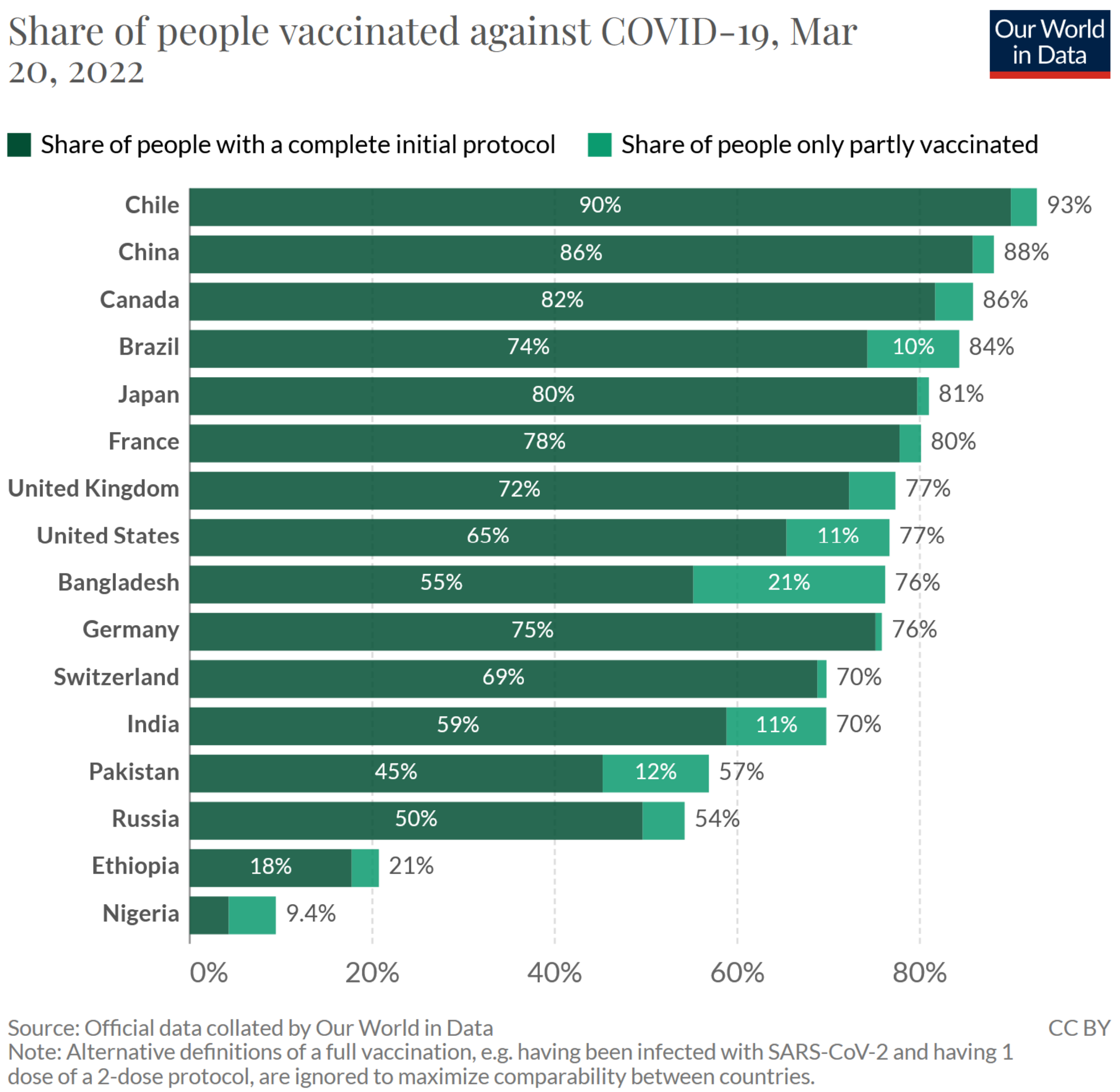
116 en RCTs

28 approuvés

- **Vaccins inactivés** : Sinopharm (Chine), Sinovac (Chine), Bharat (Inde), Valneva (France)
- **Protéine purifiée** : Novavax, Bektop (Russie), ZFSW, (Chine), Soberana (Cuba)
- **Vecteur viral** : AstraZeneca, CanSinoBio, Sputnik V, Johnson&Johnson
- **Vaccin génétique** (ARNm): Biontech-Pfizer , Moderna; ADN: Zydus (Inde)

Vaccins
De grandes inégalités géographiques

21 mars 2022



Typologie de l'hésitation vaccinale

I – Noirs Américains, régions ultra-périphériques d'Europe

II – Pays de l'ex-bloc soviétique, incluant la Saxe (ex-RDA, Roumanie, Russie)

III – Sympathisants des «médecines alternatives» des pays riches, à haut niveau d'éducation (ex. Bavière, Suisse, Autriche)

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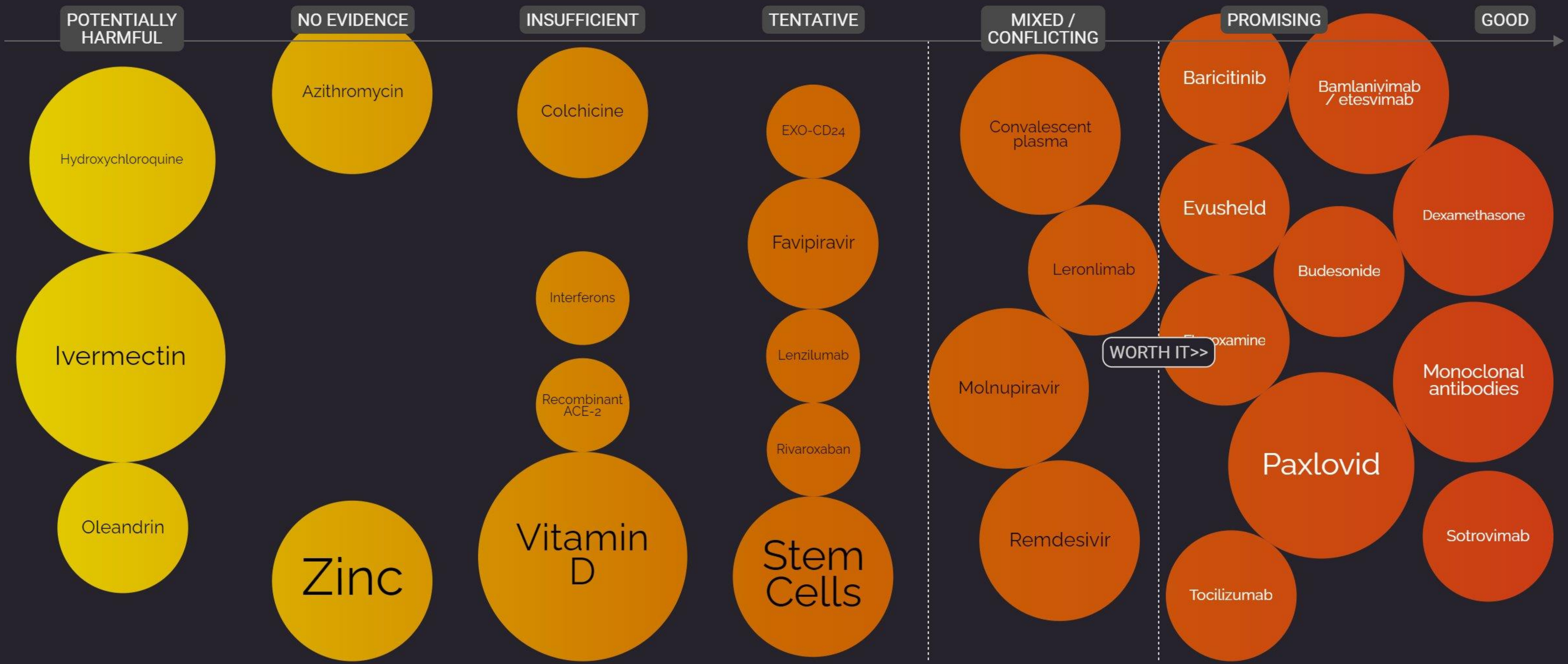
COVID Treatments size = media attention, roll over bubbles for more info

BY EVIDENCE LEVEL...



filter

show only effective for omicron | not | reduced | unknown

Information is Beautiful
David McCandless, Tom Evans, Paul Barton

updated 12th Jan 2022 // data here
sources New York Times, The Lancet, Johns Hopkins

Quel positionnement des nouveaux médicaments

Positionnement médical et/ou positionnement de santé publique ?

- **Prophylaxie (Evusheld),** administrés en IM chez les immunodéprimés
- **Anticorps monoclonaux à visée antivirale (Ronaprève et Sotrovimab)**, administrés dans les 5 jours après les premiers symptômes : onéreux mais baisse du risque d'hospitalisation de 70%
  - Réservés aux patients à très haut risque
  - Extension d'indication aux plus de 50/65 ans ?
  - Efficacité sur Omicron ? Sur BA.2 ?
- **Antiviraux par voie orale (Paxlovid et Remdesivir)**, administrés dans les 5 jours, réduiraient le risque d'hospitalisation de >80% ?
  - En monothérapie, risque d'acquisition de résistances ?
- **Anti-inflammatoires (dexaméthasone)** et **anti-IL6 (tocilizumab)** pour réduire la mortalité hospitalière

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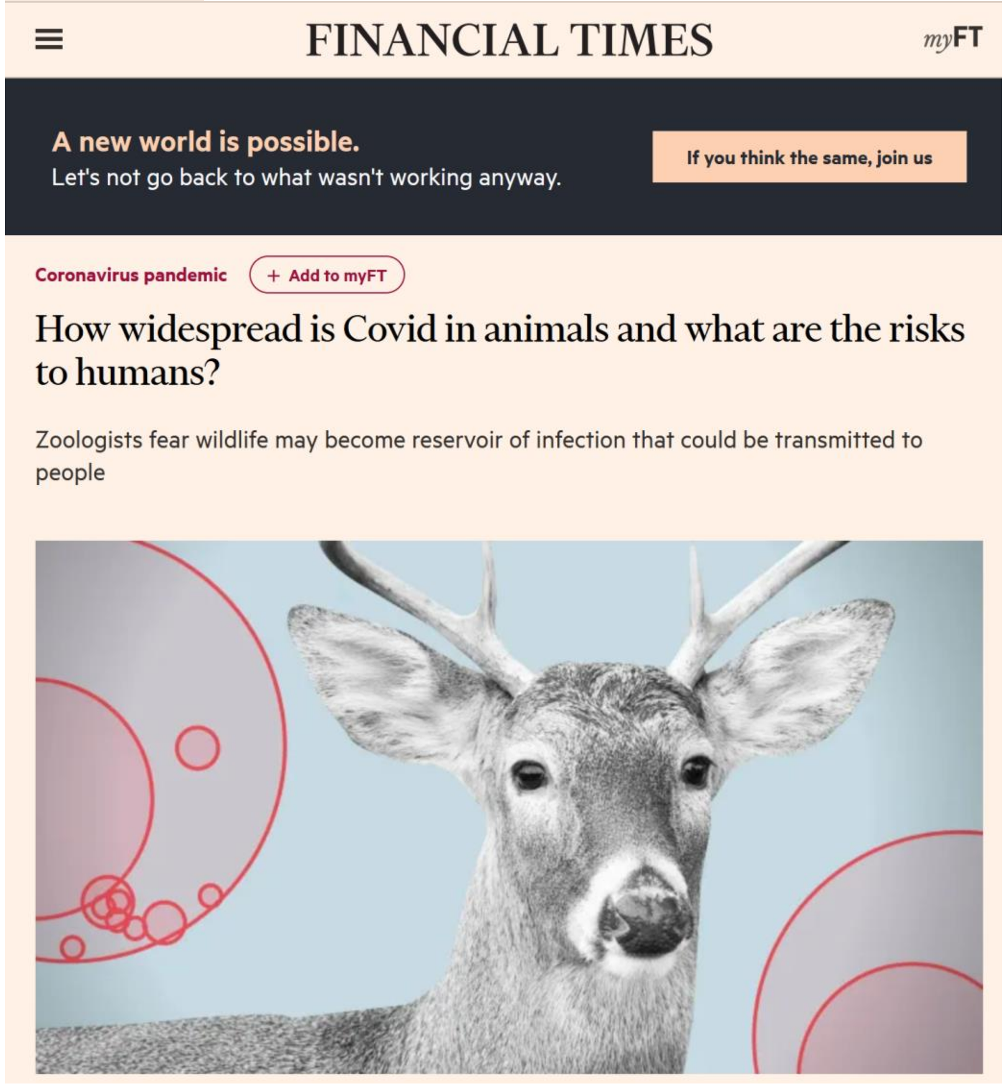
Le règne animal non épargné



- **663 épizooties rapportées à l'OIE, avec 19 espèces sur 35 pays**
- **Fermes de visons au Danemark**
- **40% des cerfs positifs aux USA (30 millions d'individus)**
- **La plupart des mammifères (pas les oiseaux)**
- **Très peu les animaux de la ferme (vache, cochons, moutons)**
- **Davantage les chats que les chiens**

OIE, 28 février 2022

Distinguer
hôte amplificateur # reservoir animal

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Quelle est l'origine de la pandémie ?

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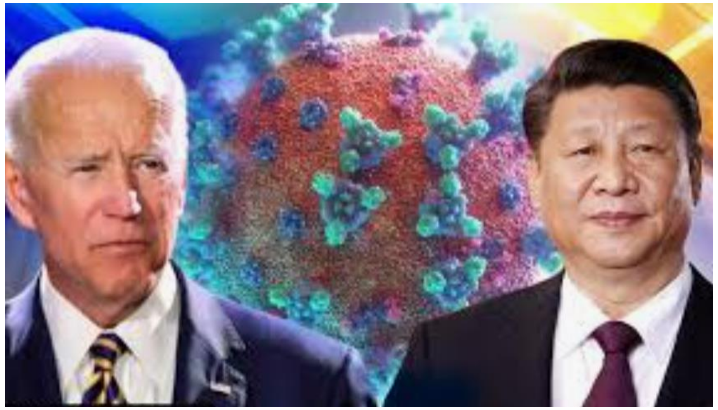

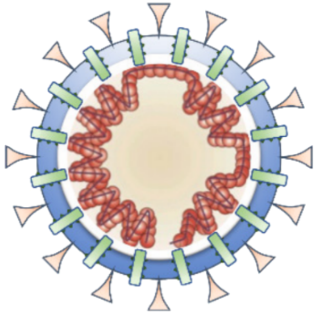

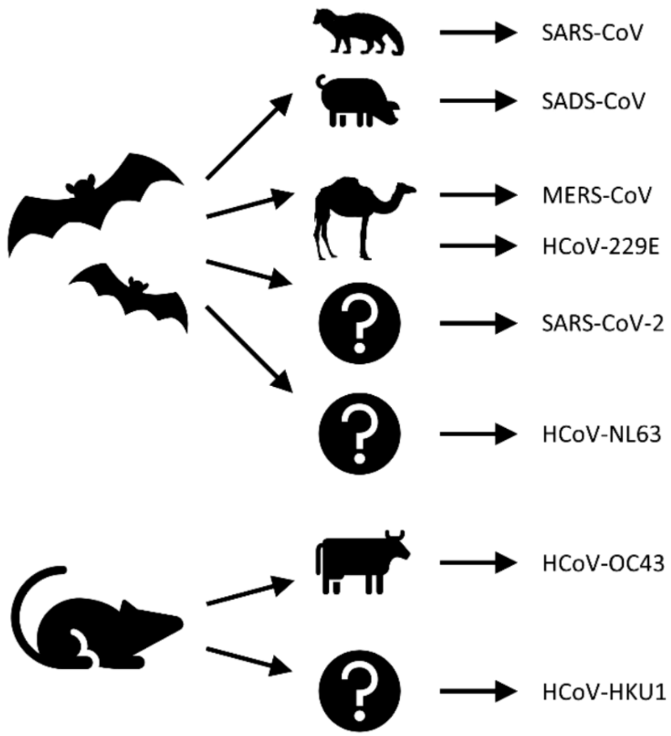

Origine du SARS-CoV-2 : Hypothèses

- Origine : Pangolin (faune sauvage) ?

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Origine du SARS-CoV-2 : Hypothèses

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- Origine : Marchés aux poissons de Wuhan?

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Origine du SARS-CoV-2 : Hypothèses

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- Origine : Visons (faune d’élevage) ?

Origine du SARS-CoV-2 : Hypothèses

- Origine : WIV (labo P4) ?
  - Fuite accidentelle
  - Contamination de personnels
    - Dans le laboratoire
    - Lors de captures de chauve-souris

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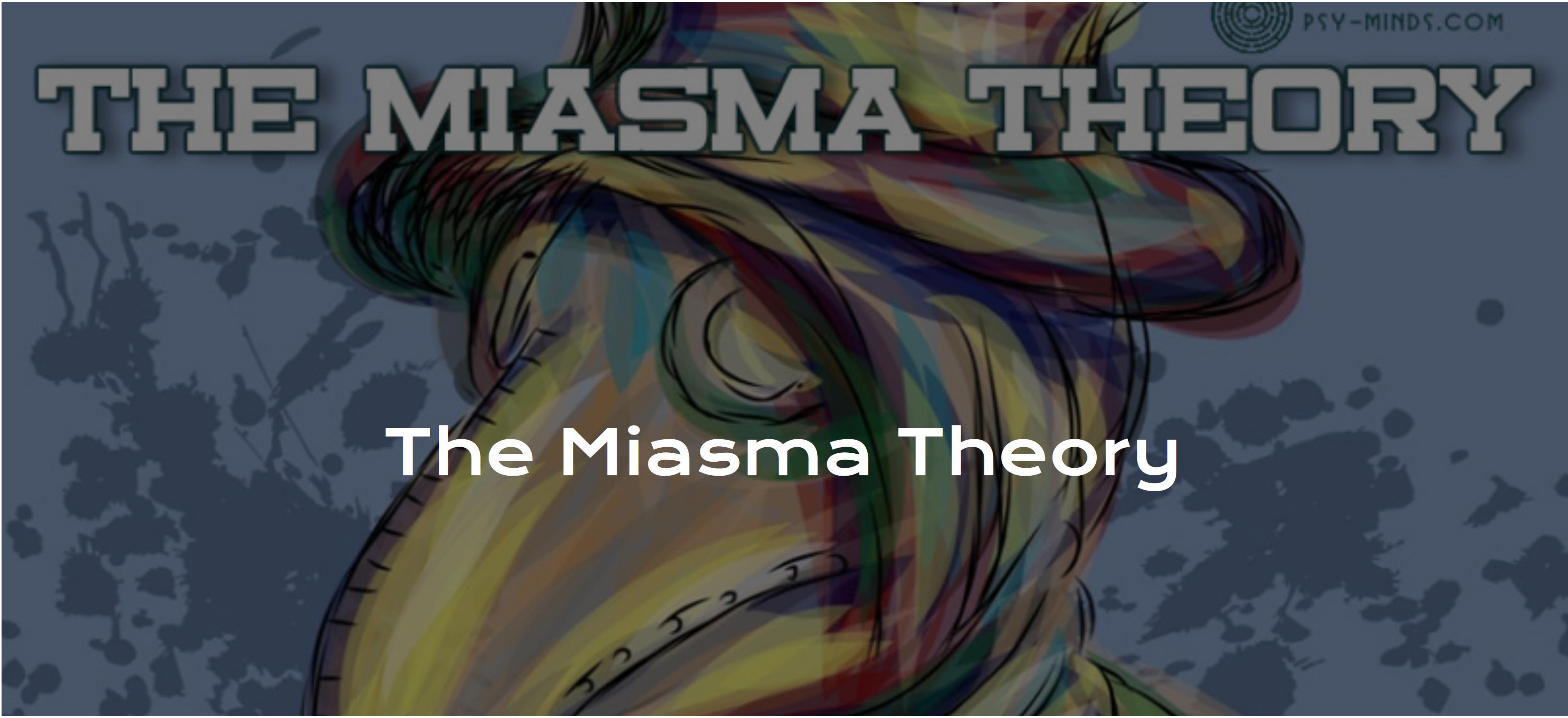
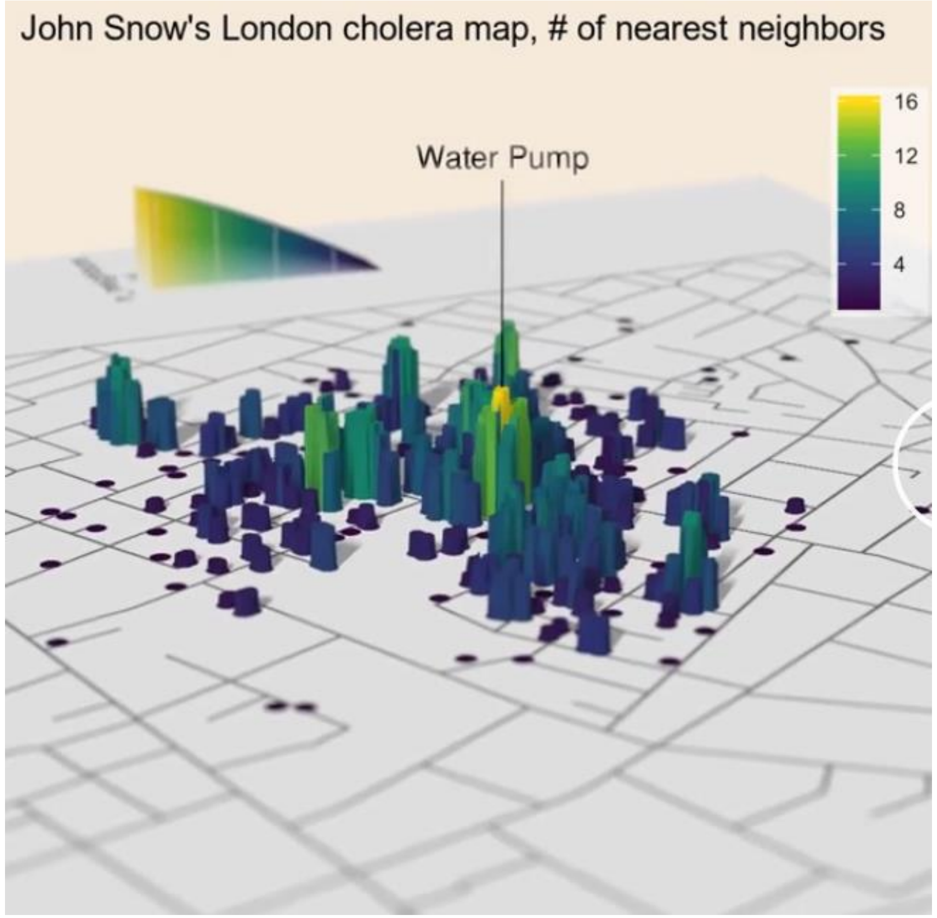
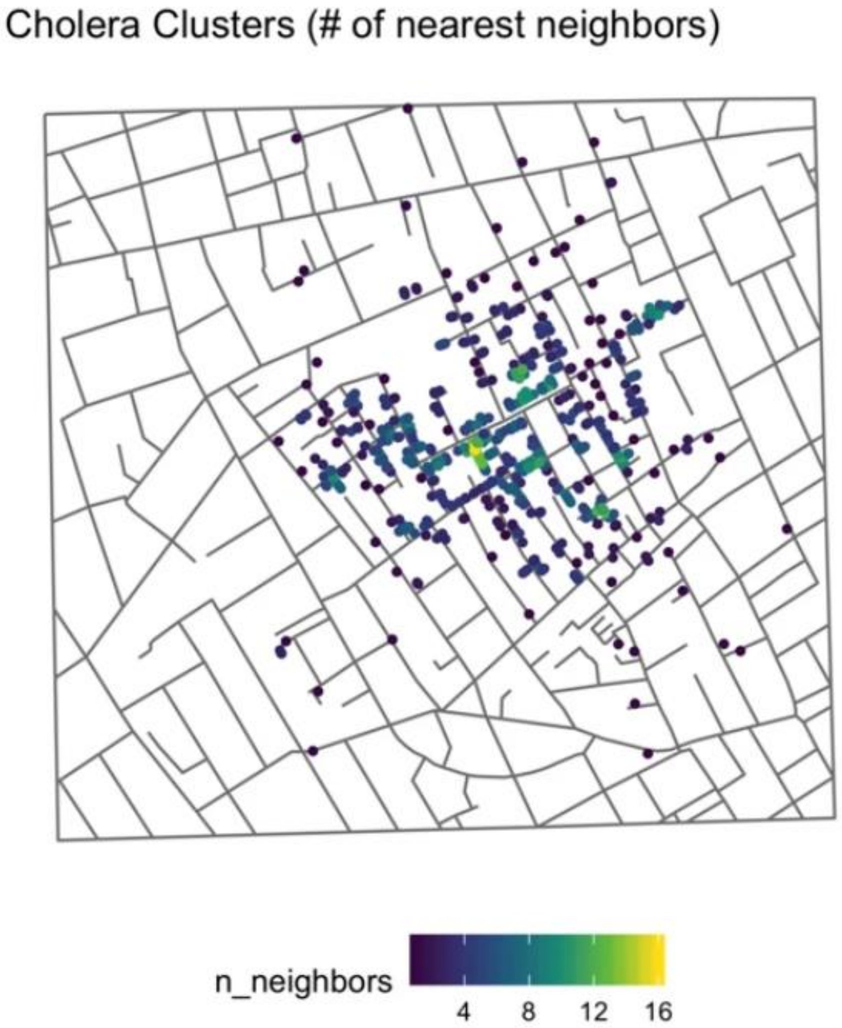
Petit détour par l'histoire du choléra



The Miasma Theory

Epidémie de choléra à Londres, 1854





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Source de contamination: Pompe de Broad Street

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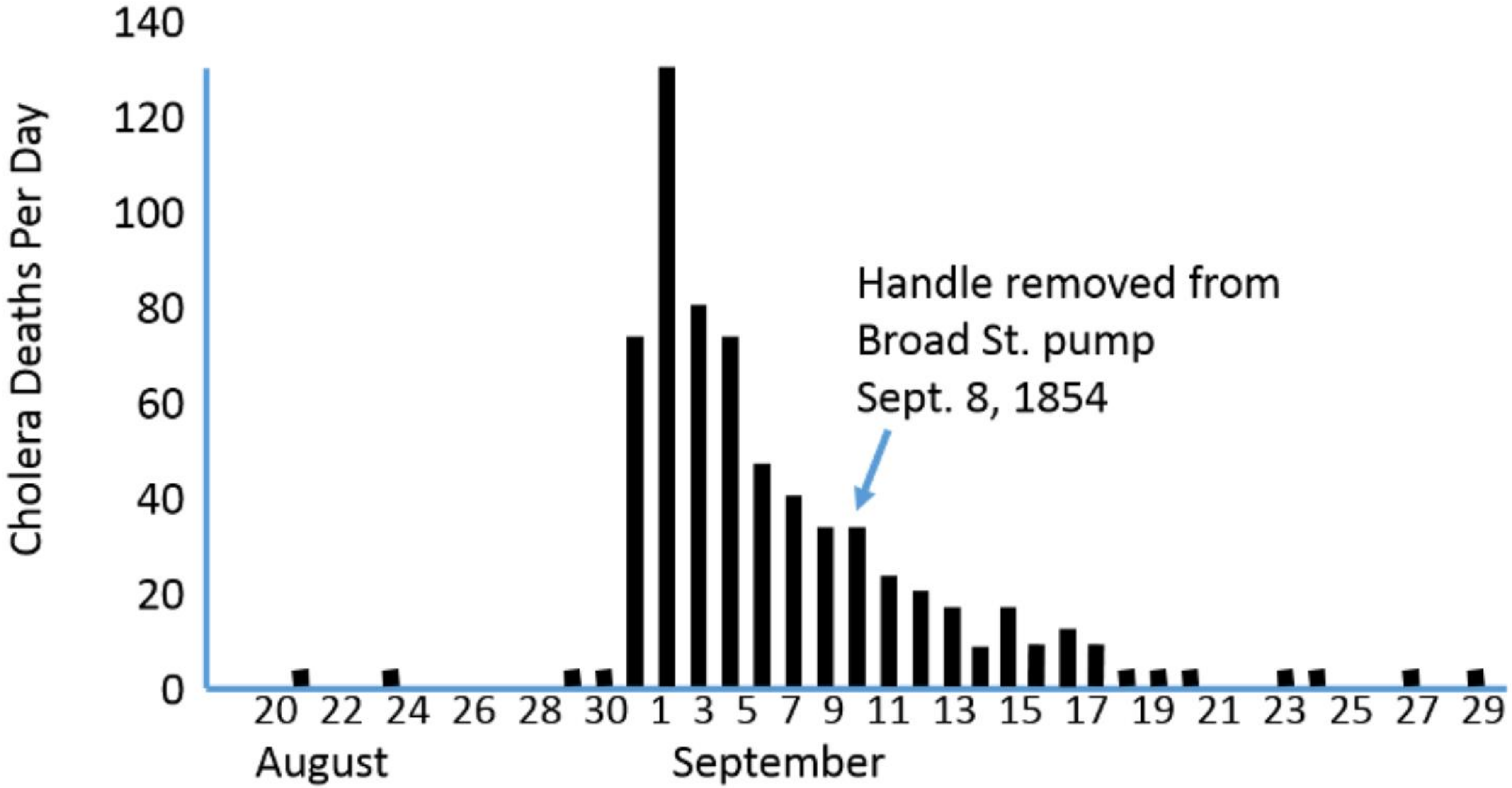
Suppression de la manivelle de la pompe de Broad Street



https://sphweb.bumc.bu.edu/otlt/mph-modules/ph/publichealthhistory/publichealthhistory6.html

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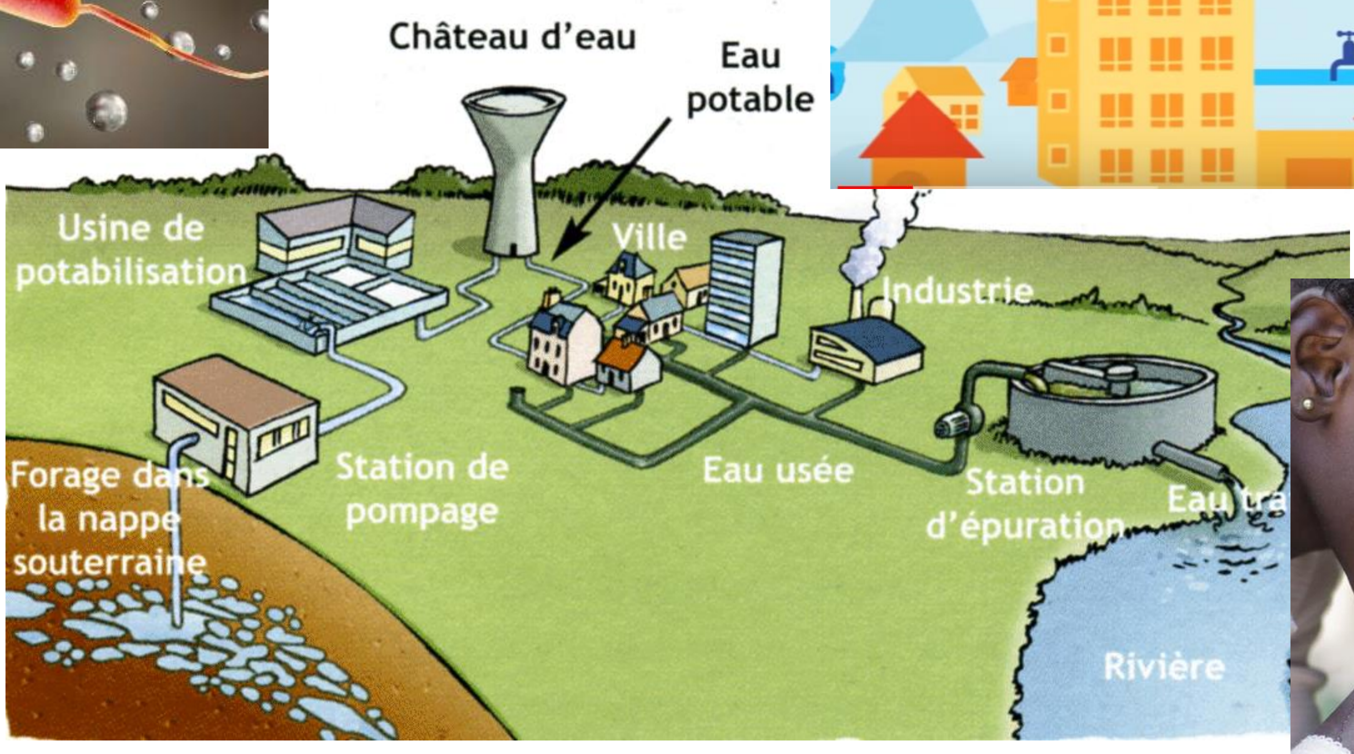
De l'identification de la source à l'eau potable



World Health Organization

COVID-19

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Home / Emergencies / Diseases / Novel Coronavirus 2019


HAND WASHING
PREVENT CORONAVIRUS
Coronavirus/COVID19 spreads quickly and is dangerous. Protect yourself and your family by following some simple rules: wash hands well and often; don't touch your eyes, nose and mouth with your hands; stay away from others; keep your home and environment very clean; follow the most updated advice of government and personal health care professionals.
WASH YOUR HANDS WELL & OFTEN
Pay special attention to cleaning the parts of the hand that we usually forget about (in yellow below): fingertips, thumb, between the fingers and the wrist.
USE SOAP AND WATER!
SCRUB YOUR PALMS
TWIST YOUR THUMBS
SCRATCH YOUR FINGERNAILS
WASH YOUR WRISTS, TOO!
DON'T FORGET TO RUB BETWEEN EVERY FINGER
FRONT AND BACK!

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Source de contaminations: bars, restaurants, transports publics, open spaces, écoles,…

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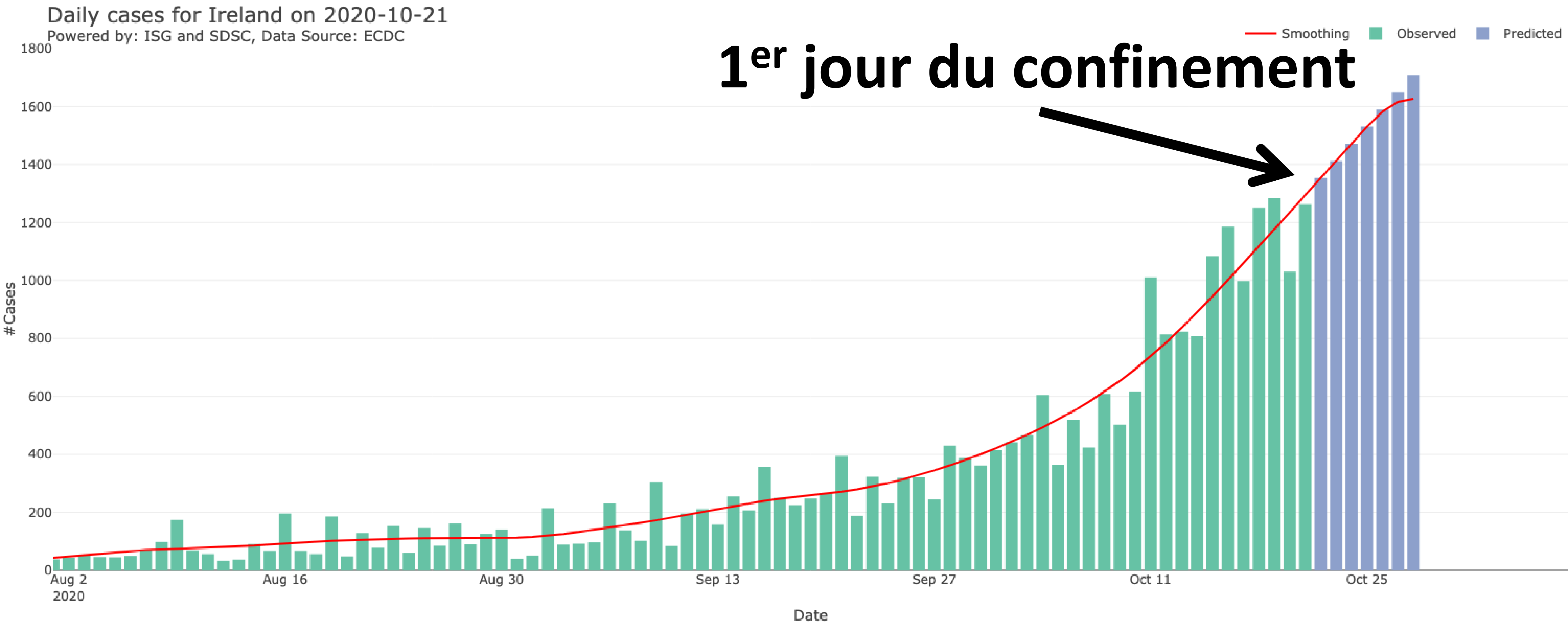
Irlande: 21 octobre 2020



https://renkulab.shinyapps.io/COVID-19-Epidemic-Forecasting/

Irlande, 21 oct. 20: suppression de la manivelle de “la pompe sociale”

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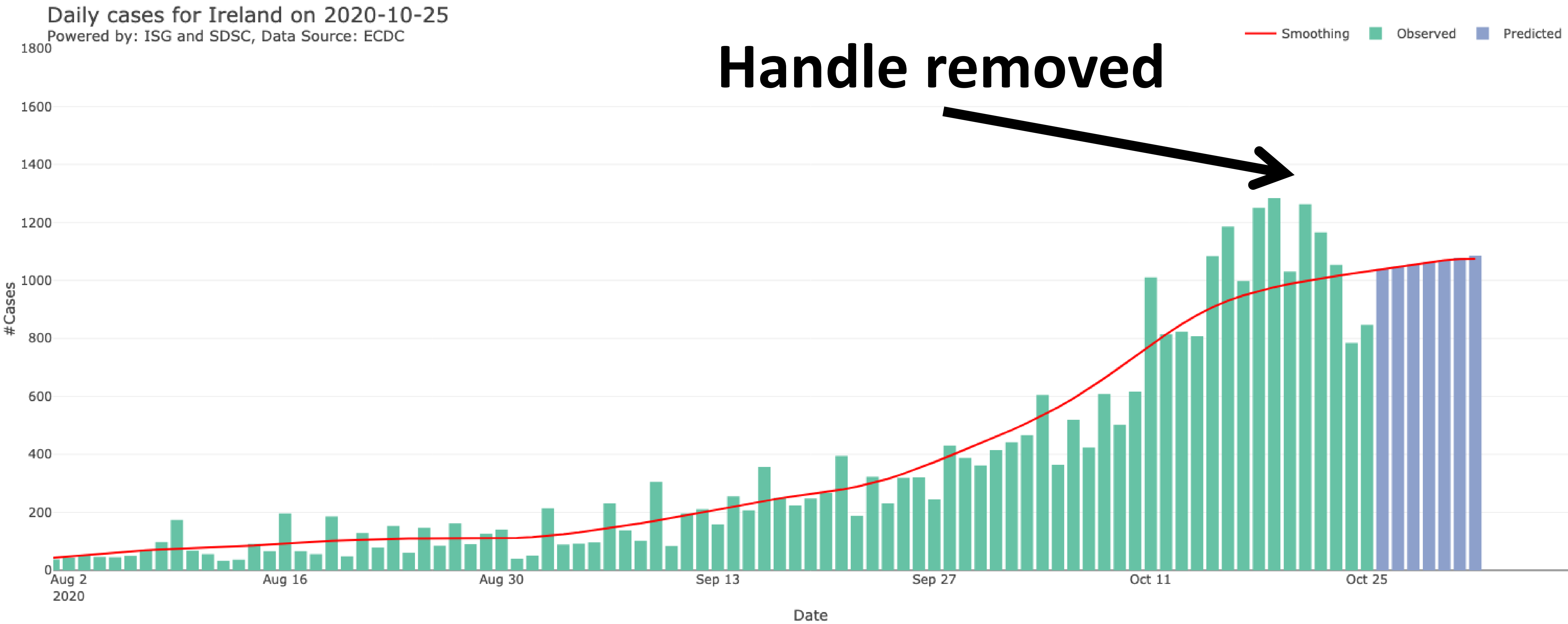
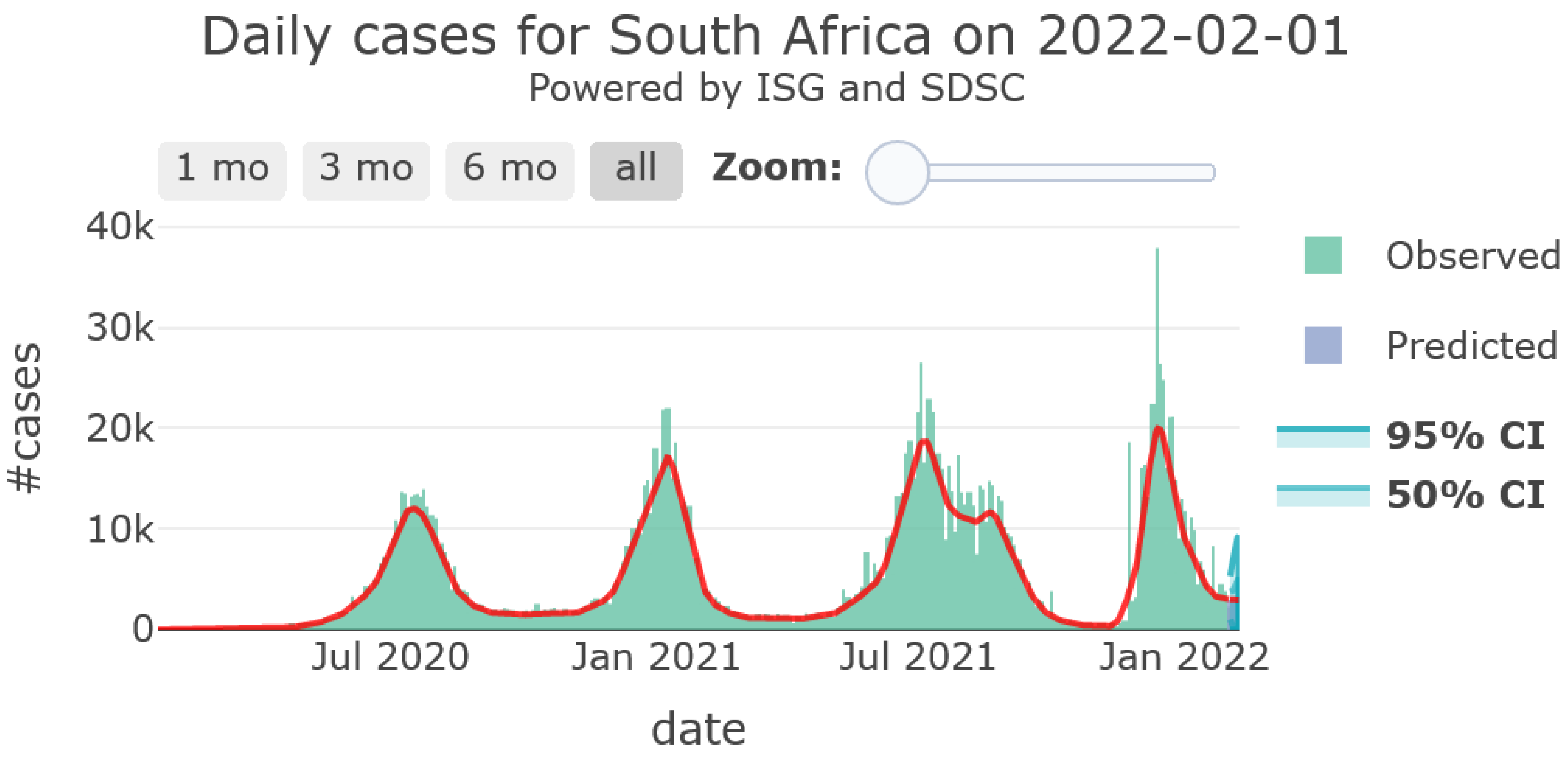


https://renkulab.shinyapps.io/COVID-19-Epidemic-Forecasting/

COVID-19 : après combien de vagues encore, nous déciderons-nous à agir préventivement ?



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De l'identification de la source à un air intérieur respirable ?

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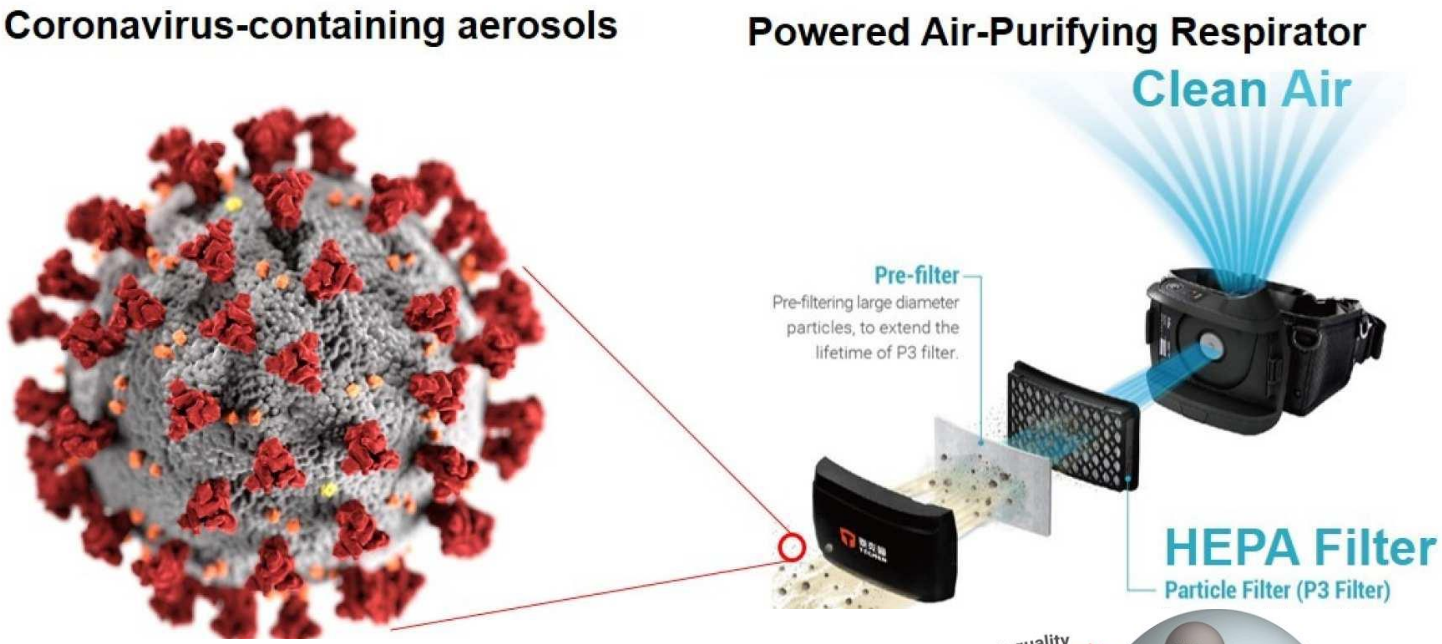
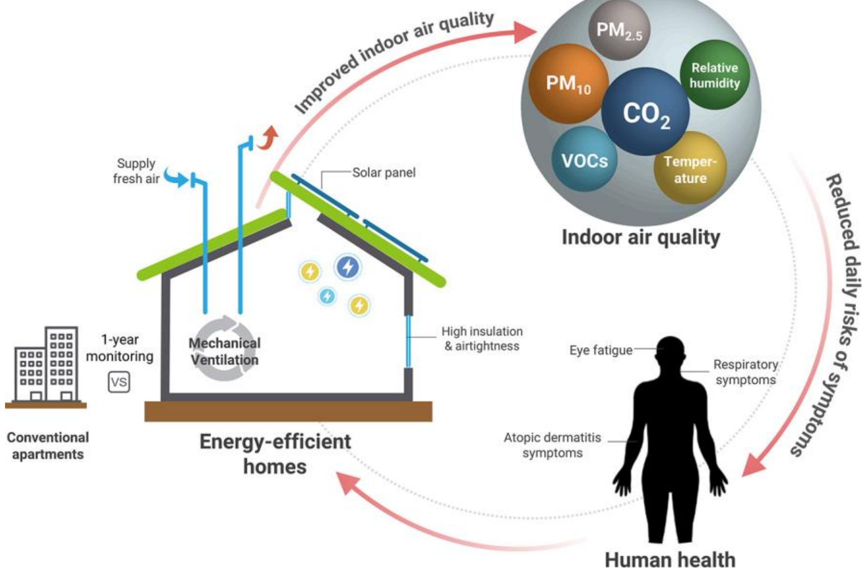
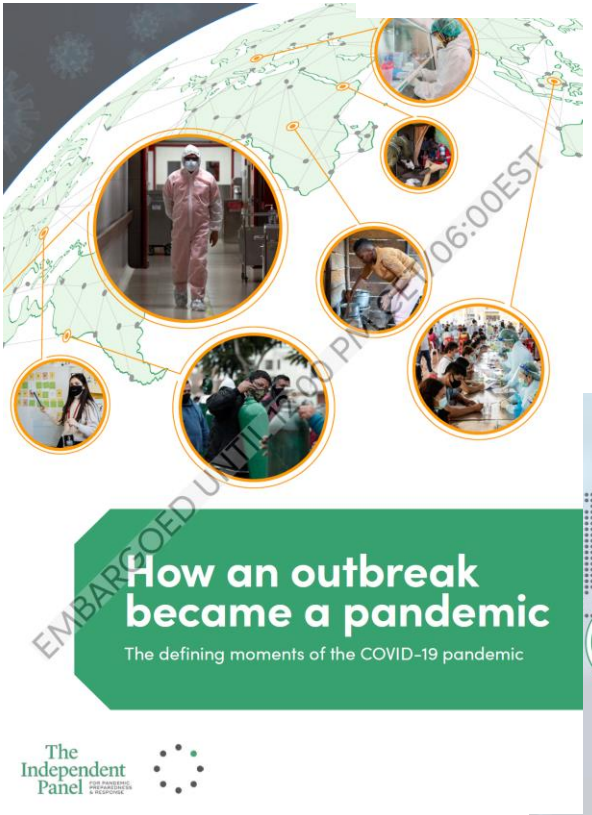


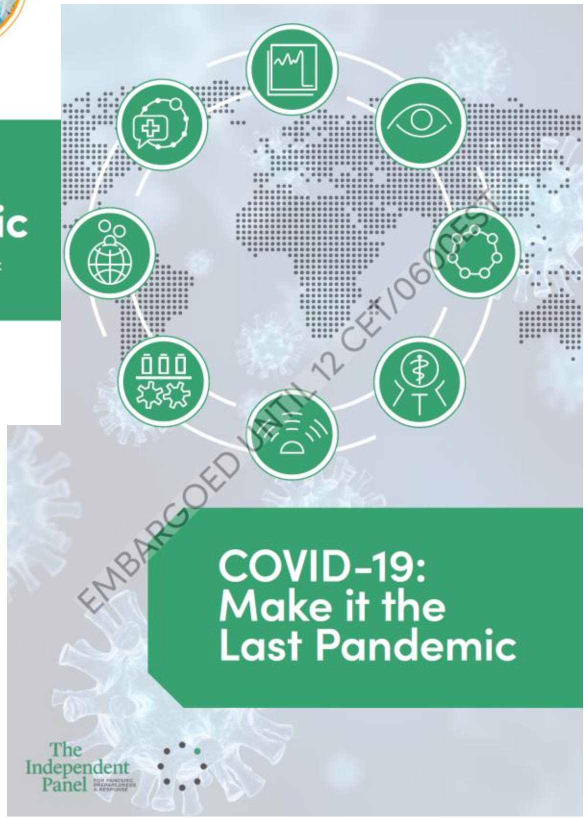


8. Conclusion (1/2): et après ?

- Il aura fallu 50 ans entre les travaux de John Snow - i.e. preuve de la contamination par l'eau dans le choléra – et l'amélioration de la qualité de l'eau potable
- Combien nous faudra-t-il de temps pour le COVID-19 – i.e. preuve de la contamination par les microgouttelettes de respiratoirs dans la COVID-19 – et l'amélioration de la qualité de l'air intérieur ?
  - 95-99% des transmissions par SARS-CoV-2 surviennent en milieu clos, mal ventilés, souvent bondés
  - 90% de nos vies se passent en lieux clos
  - L'amélioration de la qualité de l'air intérieur peut viser à réduire de 99% le risque de COVID-19, grippe, tuberculose,…

8. Conclusions (2/2): et après ?





4 juin 2021

1. **Inspections sur site conduites par l'OMS**
2. **Transfert de technologie pour les tests, médicaments et vaccins : production sur chaque continent**
3. **Amélioration des prévisions épidémiologiques**
4. **Approche «One Health» (interface homme/animal/environnement)**

Lectures

REVIEWS

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Transmissibility and transmission of respiratory viruses

Nancy H. L. Leung

Abstract | Human respiratory virus infections lead to a spectrum of respiratory symptoms and disease severity, contributing to substantial morbidity, mortality and economic losses worldwide, as seen in the COVID-19 pandemic. Belonging to diverse families, respiratory viruses differ in how easy they spread (transmissibility) and the mechanism (modes) of transmission. Transmissibility as estimated by the basic reproduction number (R_0) or secondary attack rate is heterogeneous for the same virus. Respiratory viruses can be transmitted via four major modes of transmission: direct (physical) contact, indirect contact (fomite), (large) droplets and (fine) aerosols. We know little about the relative contribution of each mode to the transmission of a particular virus in different settings, and how its variation affects transmissibility and transmission dynamics. Discussion on the particle size threshold between droplets and aerosols and the importance of aerosol transmission for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and influenza virus is ongoing. Mechanistic evidence supports the efficacies of non-pharmaceutical interventions with regard to virus reduction; however, more data are needed on their effectiveness in reducing transmission. Understanding the relative contribution of different modes to transmission is crucial to inform the effectiveness of non-pharmaceutical interventions in the population. Intervening against multiple modes of transmission should be more effective than acting on a single mode.

Human respiratory viruses include a broad range of viruses that infect cells of the respiratory tract, elicit respiratory and other symptoms, and are transmitted mainly by respiratory secretions of infected persons. Respiratory virus infections often cannot be differentiated clinically. Respiratory viruses belong to diverse virus families that differ in viral and genomic structures, populations susceptible to infection, disease severity, seasonality of circulation, transmissibility and modes of transmission. Together, they contribute to substantial morbidity[1], mortality[2] and concomitant economic losses[3] annually worldwide. In addition, occasional pandemics cause extreme disruption to societies and economies as exemplified by the current COVID-19 pandemic. Until effective treatments or vaccines for COVID-19 are available, we have to rely heavily on population-based and individual-based public health measures to mitigate transmission. The effectiveness and the suitability of a non-pharmaceutical intervention (NPI) to mitigate transmission depends substantially on the ease of transmission (transmissibility) and the mechanism of transmission (modes of transmission) specific to that virus, as these interventions can target some but not all potential modes of transmission. Therefore, understanding how to evaluate the transmissibility and evidence supporting different modes of transmission will aid in the control of respiratory virus transmission.

Previous reviews and commentaries discussed the transmissibility of influenza virus[4,5]; methods for studying transmission, including animal models[4–7], human models[6,8] and epidemiological studies[9]; the mechanism and evidence for different modes of transmission[4,6,7,9–12]; factors affecting transmission[4,5,11,13]; controversies regarding the relative importance of different modes of transmission[14,15]; pharmaceutical interventions[4] and NPIs[11,16–18] for mitigating transmission[16–19]; and guidelines from public health agencies on infection prevention and control recommendations for respiratory viruses[9,15]. These various aspects of transmissibility and transmission have been more comprehensively studied for influenza virus[4–7,10,14,17,19] than for other respiratory viruses[9,11,12,15,16,18]. In this Review, I will bring these discussions together to provide a broad overview of the transmissibility and modes of transmission of respiratory viruses, the approaches used to make these assessments, the viral, host and environmental determinants of transmission, and common NPIs for mitigating respiratory virus transmission, in the hope of illustrating the common approaches for studying respiratory virus transmission as well as the interconnection and

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A personal take on science and society

World view

By Natalie Dean

Tracking COVID-19 infections: time for change

To manage the pandemic effectively, channel the power of random sampling.

One of the best ways the world has to get a clear view of COVID-19 is going underused. It's time to exploit the power of random sampling.

Last September, the US Centers for Disease Control and Prevention estimated that only one in four SARS-CoV-2 infections in the United States had been reported. Across Africa, the average is closer to one in seven. Why? Many people who are quite ill, or worried about their symptoms, can't get tested. Those with mild or no symptoms often don't seek testing.

And undercounts are getting worse. Reinfections and breakthrough infections are rising, but they are often mild, so people go untested. The onslaught of Omicron cases has far outstripped many countries' testing capacities. Last December, a testing site near me in Atlanta, Georgia, had a wait of three to four hours. In the United States, at-home lateral flow tests are finally becoming more readily available, so fewer people will seek PCR confirmation.

All this undercounting renders many important questions unanswerable. For example, if a surge in cases slows, is transmission down, or is testing maxed out? Waiting to find out means that hospitals can't prepare and policymakers are two to four weeks behind. Who can drive looking only in their rear-view mirror?

Wastewater surveillance is an innovative part of the solution. It shows whether virus levels are increasing or decreasing across a community, and does not depend on people seeking or reporting test results. In my home state of Massachusetts, waste water was one of the earliest reliable indicators that infections were declining last month.

But waste water can't pinpoint who in a community is getting infected and who is getting sick. With Omicron, hospitalizations in children have reached record highs. Yet infections in this age group are frequently missed. It's clear there are more infections, but are those infections more severe? Knowing that is important for risk–benefit calculations around schooling, vaccinations and much more.

Random sampling can answer those sorts of question. As long as participants are selected randomly, they will on average mimic characteristics of the wider population. Roughly speaking, testing fewer than 1,000 people can yield crucial information about 10 million, or even more.

Shining examples of random sampling are the Coronavirus (COVID-19) Infection Survey run throughout the United Kingdom by the Office of National Statistics (ONS), and Imperial College London's REACT-1 study. The ONS initiative aims to obtain swab test results at least fortnightly from around 180,000 people across the United Kingdom, and blood tests monthly from around 150,000 people. In late January, one in 20 people tested positive for current infection. But age really mattered: one in 10 of the youngest children tested positive, as did one in 15 of the older children. The results signalled an enormous pool of infections, and were quickly made available to guide policy and family decisions.

> **"Without random sampling, there's a vicious cycle of guesswork."**

Forecasting the course of the pandemic demands reliable estimates of current infection levels. Without accurate knowledge of these levels, epidemiologists must make many assumptions (on the likelihood that, for example, infected people will develop symptoms, or be tested). That guesswork informs mathematical models and, consequently, public discussions about the trajectory of the pandemic. Models that overestimate how many infections have been missed overestimate population immunity, and can underestimate the risk of resurgence. Those estimates are used for decisions about everything from opening schools to planning policies and targeting vaccination campaigns. Without random sampling, there's a vicious cycle of guesswork.

The UK data are informative elsewhere, but generalizing too much from one country's data is perilous. In the United States, a few random-sampling surveys have been conducted by health departments and academic partners, for example, in Indiana, Georgia and California. These have bolstered local understanding of disparities across racial and ethnic groups. At a national level, researchers at Emory University in Atlanta (where I also work), carried out a representative household survey (P. S. Sullivan *et al.* *Clin. Infect. Dis.* https://doi.org/hfvm; 2021). A new round of antibody and nasal-swab testing is conducted every four to nine months. But a situation that's evolving quickly requires more frequent samples.

Why isn't random-sampling for infection happening more widely? These studies require sustained resources and coordinated effort. The patchwork US public-health system makes collaboration across states challenging. The studies also require a public that's willing and able to participate. Low participation rates in surveys are a major challenge. As an incentive to take part in the ONS survey, the UK government has offered more than £200 million (US$270 million) of shopping vouchers.

More than two years into the COVID-19 pandemic, it is clear that the virus SARS-CoV-2 will be circulating for a long time to come. Millions of people are being infected daily, and the threat of new variants looms. Investing in random sampling can better prepare governments for the future. A single sampling framework can be used for multiple pathogens, such as influenza and other respiratory viruses. For infectious diseases, failing to see the whole picture will mean poor decisions. Yes, random sampling will cost, but bad information is expensive, too.

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22 mars 2022, 18h | auditoire Renold
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« COVID-19 : deux ans de pandémie, et après ? »

1er avril 2022, 18h | auditoire Müller
Pr Idris GUESSOUS
« COVID et Post-COVID : présentations cliniques et prises en charge »

12 avril 2022, 18h | auditoire Champendal
Pre Alexandra CALMY
« Traitements du COVID-19 : des controverses aux évidences »

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