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The Potential Effectiveness of Non-Pharmaceutical Interventions (NPIs)

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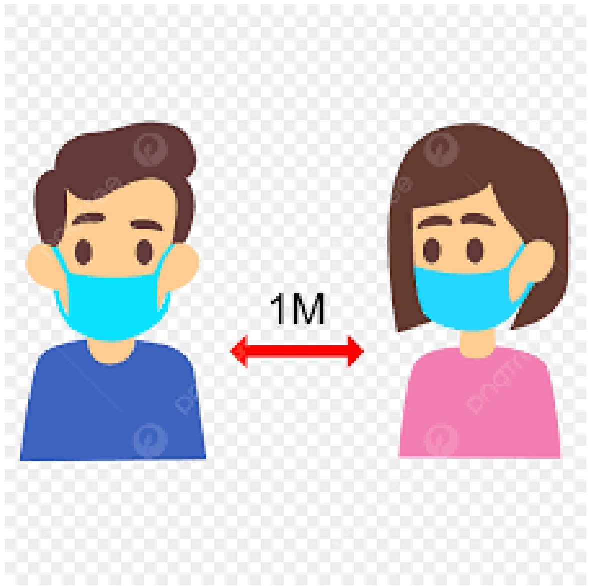
Preparing for containment and mitigation of pandemic H5N1 influenza

Options for the control of influenza pandemics

Vaccines

Antivirals



Public health and social measures (NPIs)

WHO pandemic influenza NPI guidelines

Update underway of our previous 2019 guidelines to incorporate latest evidence on influenza and experiences from COVID-19 pandemic

Personal protective measures
- Hand hygiene
- Respiratory etiquette
- Face masks
- Face shields

Environmental measures
- Surface and object cleaning
- UV light
- Increasing ventilation
- Modifying humidity

Community-wide measures
- School closure
- School measures
- Workplace closure
- Workplace measures
- Catering and fitness measures
- Stay-at-home order
- Restrictions on gatherings

Targeted measures
- Isolation of sick individuals
- Contact tracing
- Quarantine of exposed individuals
- Mass rapid antigen testing

Travel related measures
- Travel advice
- Entry and exit screening
- Travel restrictions and border closures
- On-arrival quarantine

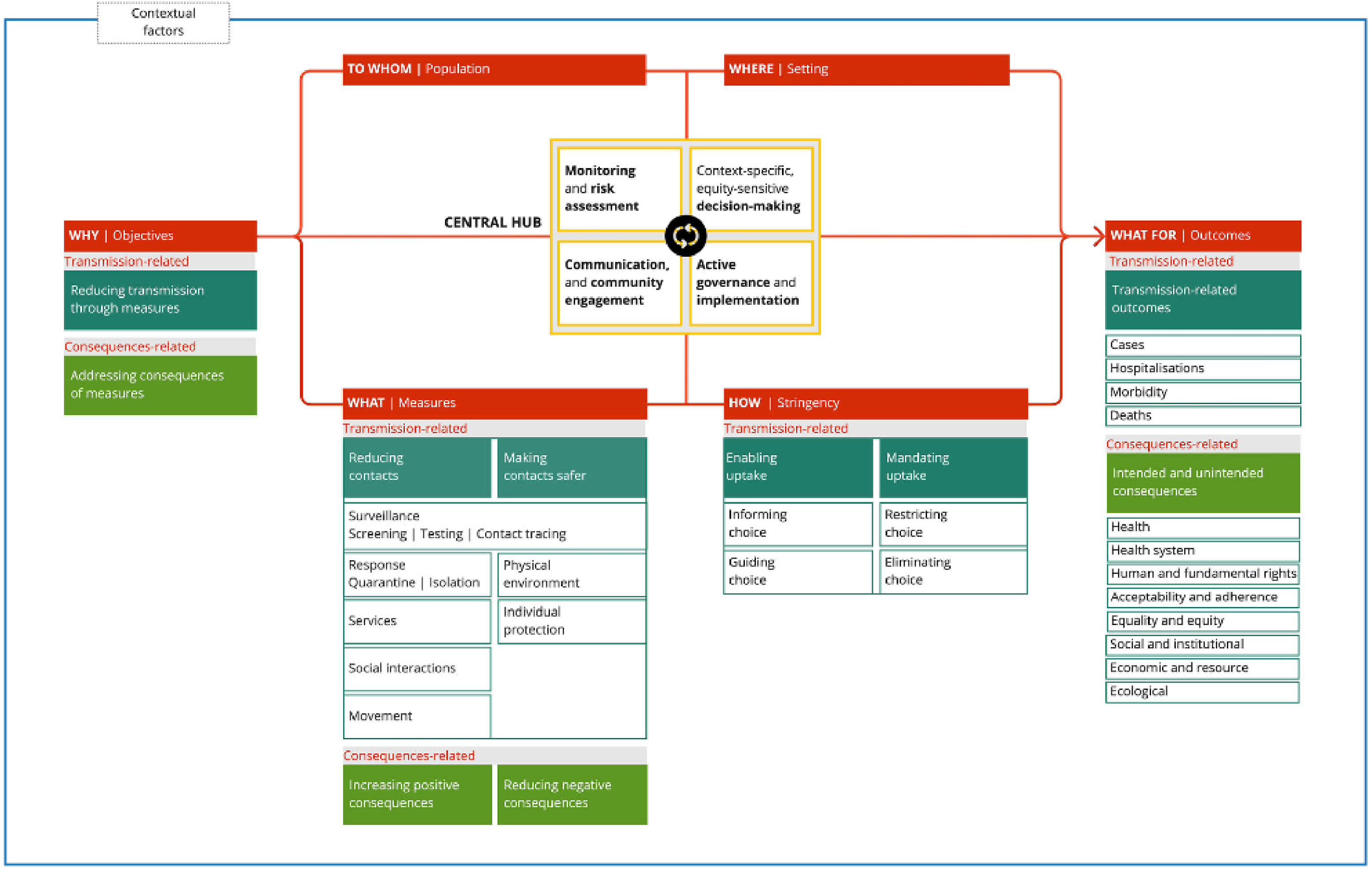
2019 version

Framework to conceptualize and classify NPIs

Two categories of NPIs:

1. Reducing person-to-person contacts (reducing opportunities for transmission)

2. Making person-to-person contacts safer when they do occur



Rehfuess et al. 2023 Influenza Other Respir Viruses

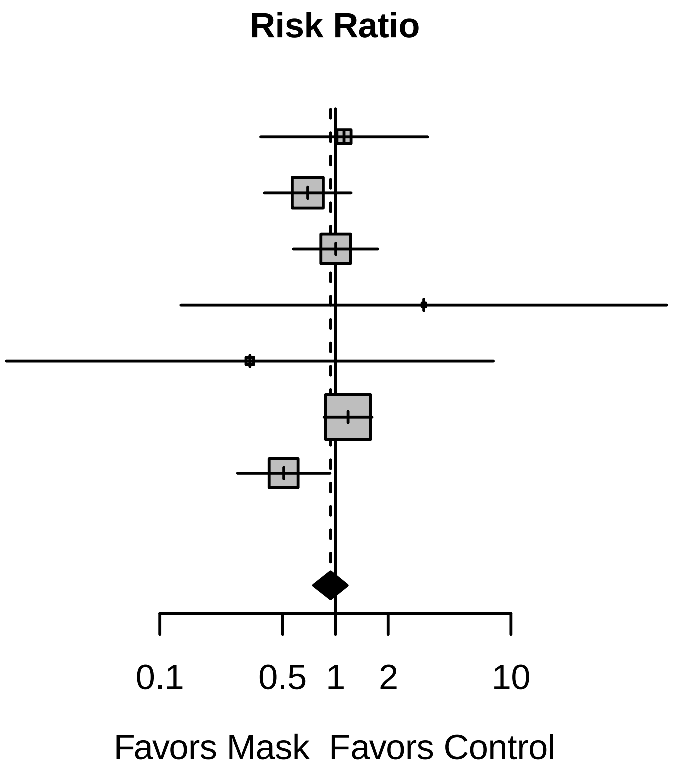
Face masks for influenza in households

Systematic review of trials which used face masks (with or without hand hygiene intervention) to prevent influenza transmission in households

	Mask use		Control				
Author (Year)	**Events**	**Total**	**Events**	**Total**	**Weight**	**Risk Ratio**	**95% C.I.**
Cowling (2008)	4	61	12	205	3.9%	1.12	[0.37; 3.35]
Cowling (2009)	18	258	28	279	19.3%	0.70	[0.39; 1.23]
Larson (2010)	25	938	24	904	17.5%	1.00	[0.58; 1.74]
MacIntyre (2009)	1	94	0	100	0.3%	3.19	[0.13; 77.36]
MacIntyre (2016)	0	302	1	295	1.1%	0.33	[0.01; 7.96]
Simmerman (2011)	66	291	58	302	40.8%	1.18	[0.86; 1.62]
Suess (2012)	16	136	19	82	17.0%	0.51	[0.28; 0.93]
Fixed effect model		**2080**		**2167**	**100.0%**	**0.94**	**[0.75; 1.17]**

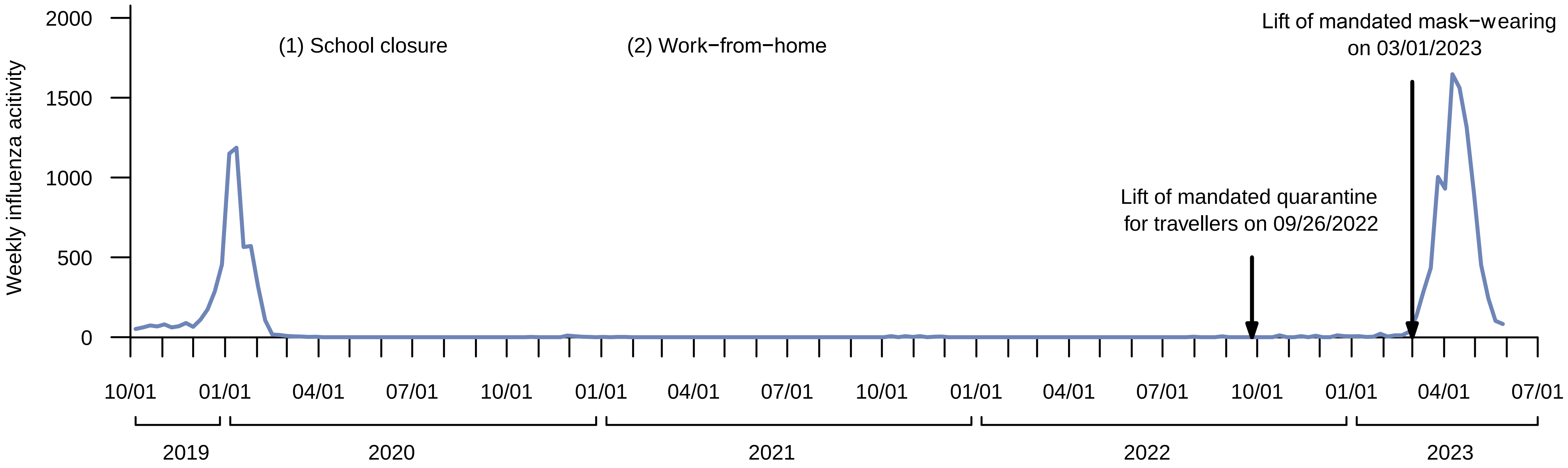
Heterogeneity: $I^2 = 27\%$, $\tau^2 = 0.0640$, $p = 0.22$

Test for overall effect: $z = -0.58$ ($p = 0.56$)



Wong et al. 2024 Int J Infect Dis

Return of influenza in Hong Kong after 3 years

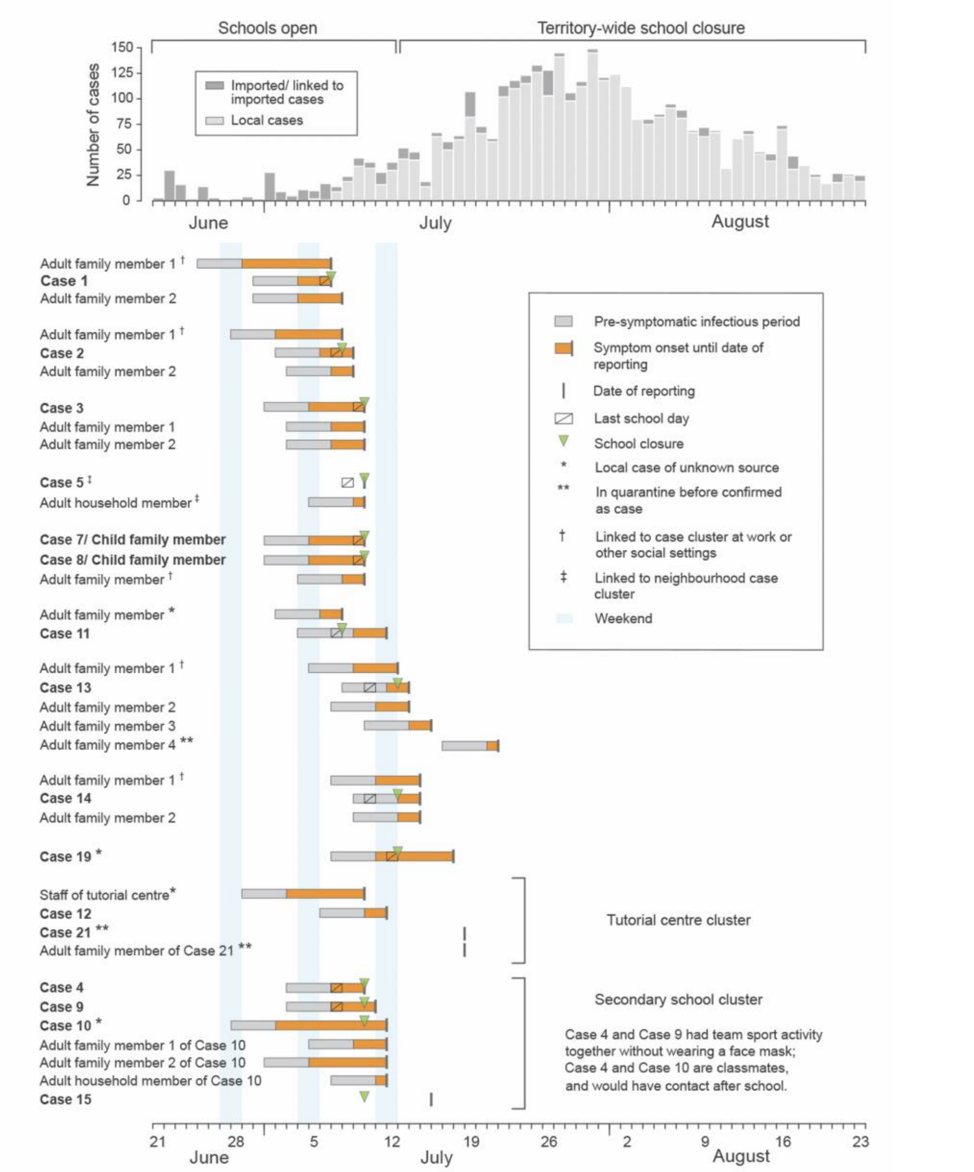


The mask mandate was the last COVID NPI to be relaxed in Hong Kong

In an ecological analysis, the mask mandate was estimated to be associated with 25% reduction (95% CI: 1% to 43%) in influenza transmission, after accounting for other preventive measures.

Xiong et al. 2023 Emerg Infect Dis

School measures in Hong Kong in Jun-Jul 2020



- Schools were closed between February and May 2020 but reopened for a period of around 4-6 weeks (depending on age group) in June and July while community incidence of COVID-19 was at a low level. Various measures were implemented to protect against transmission:
  - Daily temperature checks
  - Universal masking
  - All schools switched from full-day to half-day, omitting lunch hours
  - Arrival and dismissal times staggered or spread
  - Increased desk spacing and use of partitions. Group work and contact sports were limited as much as possible. Assemblies, extra-curricular and after-school activities were cancelled.
- We identified 15 cases in children where there could have been opportunities for transmission in schools, but transmission did not occur, perhaps because children could be less efficient spreaders of COVID-19, and perhaps because of the precautionary measures in place.

Fong MW et al. 2020 Euro Surveill

Contact tracing

Article

The epidemiological impact of the NHS COVID-19 app

Table 2 | Scenarios for improvements

	Per cent reduction in total case burden in phase 2 (in addition to reductions observed for the current implementation of the app)	
Analysis	**Modelling**	**Statistical extrapolation**
Increase uptake to 35.9%—current 90th percentile—for all LTLAs (improve equity)	11% (5–15%)	21.0% (14.5–26.8%)
Increase uptake across the board by 20 percentage points (mass improvement)	24% (10–34%)	41.5% (29.5–51.5%)
Switch to opt-out notification (5% drop-off)[a]	6.6% (2.5–11%)	Not applicable with this method
Improve adherence to quarantine by 20 percentage points	6.8% (5–8.7%)	Not applicable with this method
Reduce time to test result by one day[b]	3.6% (0.6–6.7%)	Not applicable with this method

Results are the per cent reduction in total case burden that would have occurred during phase 2. This is the further reduction relative to the cases that actually occurred, not relative to cases inferred in the absence of the app. Ranges shown are 95% confidence intervals for regressions, 2.5–97.5% sensitivity intervals for modelling.

[a]Currently, the app requires consent after the receipt of a positive test for contact tracing to be initiated, which is provided by 72% of users. We assume that changing to opt-out consent, for example, by consent at registration, would increase this to 95%.

[b]Reducing test turnaround time has many benefits not modelled here; we consider only faster digital tracing.

A “de-centralized” digital contact tracing app reduced COVID-19 transmission in the UK.

Limitation – high frequency of exposure alerts when community prevalence increases

Wymant et al. 2021 Nature

Article

Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe

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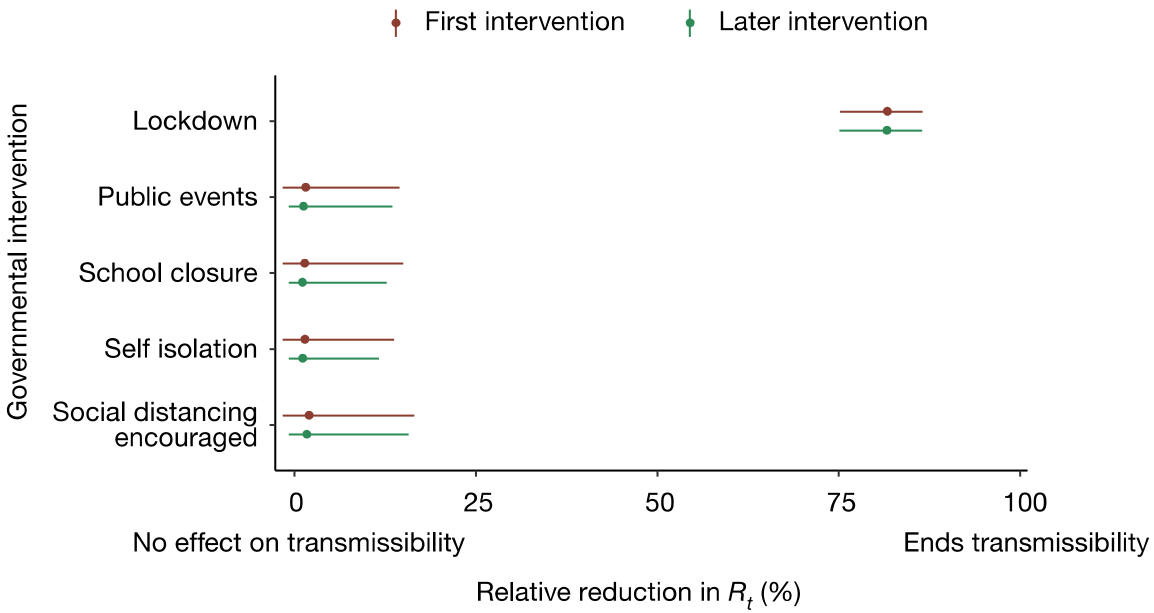
Seth Flaxman[1,7], Swapnil Mishra[2,7], Axel Gandy[1,7], H. Juliette T. Unwin[2], Thomas A. Mellan[2], Helen Coupland[2], Charles Whittaker[2], Harrison Zhu[1], Tresnia Berah[1], Jeffrey W. Eaton[2], Mélodie Monod[1], Imperial College COVID-19 Response Team*, Azra C. Ghani[2], Christl A. Donnelly[2,3], Steven Riley[2], Michaela A. C. Vollmer[2], Neil M. Ferguson[2], Lucy C. Okell[2] & Samir Bhatt[2,7]✉



nature COMMUNICATIONS

ARTICLE

https://doi.org/10.1038/s41467-021-26013-4 OPEN

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Understanding the effectiveness of government interventions against the resurgence of COVID-19 in Europe

Mrinank Sharma[1,2,3,22]✉, Sören Mindermann[4,22]✉, Charlie Rogers-Smith[5], Gavin Leech[6], Benedict Snodin[3], Janvi Ahuja[3,7], Jonas B. Sandbrink[3,7], Joshua Teperowski Monrad[3,8,9], George Altman[10], Gurpreet Dhaliwal[11,12], Lukas Finnveden[3], Alexander John Norman[13], Sebastian B. Oehm[14,15], Julia Fabienne Sandkühler[16], Laurence Aitchison[6], Tomáš Gavenčiak[17], Thomas Mellan[18], Jan Kulveit[3], Leonid Chindelevitch[18], Seth Flaxman[19], Yarin Gal[4], Swapnil Mishra[18,20,23]✉, Samir Bhatt[18,20,21,23]✉ & Jan Markus Brauner[3,4,22,23]✉

Impact of COVID-19 on influenza pandemic plans

- Many lessons to learn about the implementation of NPIs
  - Best measures or combination of measures to achieve particular objectives?
  - When is the right time to implement a measure? And the right time to relax?
  - Recommendations versus mandates (and fines)?
  - School-based measures versus school closures
  - How to mitigate the negative social and economic consequences of NPIs?
  - Optimal uses of lateral flow tests (right)
- Many knowledge gaps remain
- How to manage not only anti-vaccination sentiments but also to anti-NPI sentiments now?
- Any differences in transmission of H5N1 specifically?