COVID-19 글로벌 대응 정책/전략

::::::::::::

보건사회연구원 국제보건 세미나 PART II

2022. 9.29-

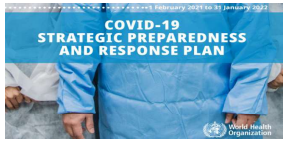
Dr. Dong-il AHN

Visiting professor
Yonsei Univ.
Graduate School of Public Health
(International health dept.)

POLICY FRAMEWORKS & TOOLS

GLOBAL PANDEMIC STRATEGY

WHO, Feb, 2021



STRATEGIC PREPAREDNESS AND RESPONSE PLAN

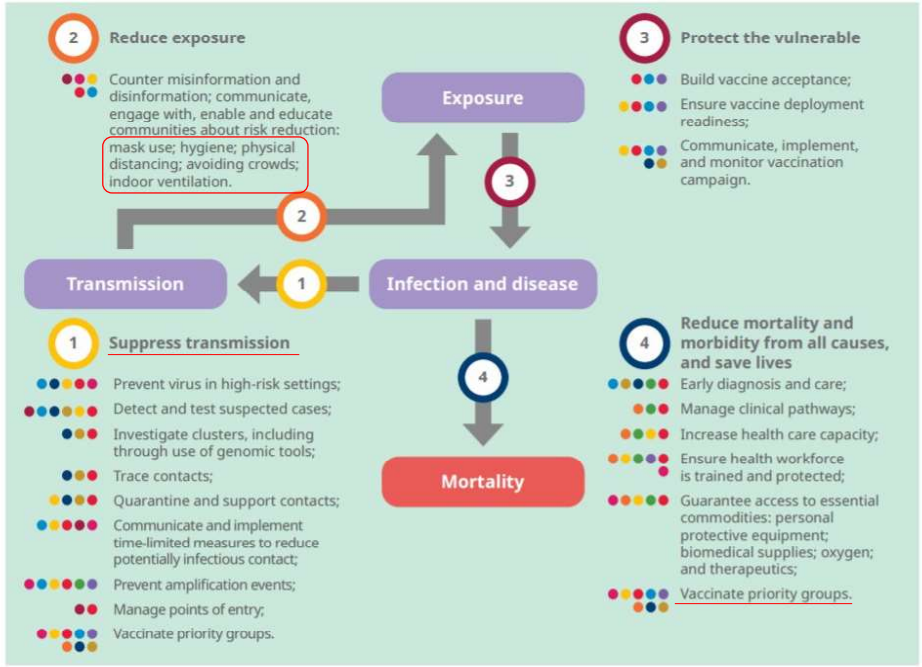
Goal: End the COVID-19 pandemic, and build resilience and readiness for the future.

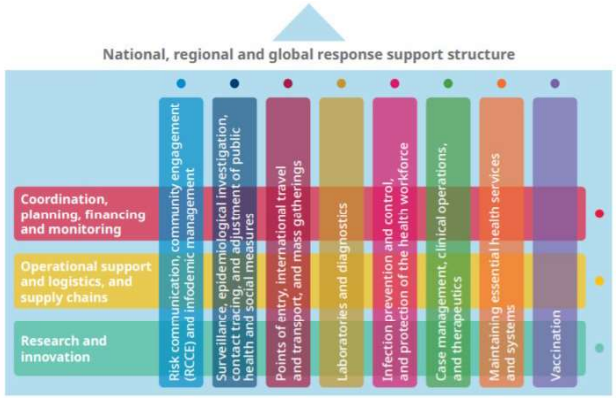
Strategic objectives

We collectively know much more now than we did one year ago. We have developed operational and scientific solutions, but the majority of countries have not yet applied that knowledge and those solutions comprehensively or consistently. In 2021 we must redouble our efforts and adapt our response and capacities to achieve six key strategic public health objectives:

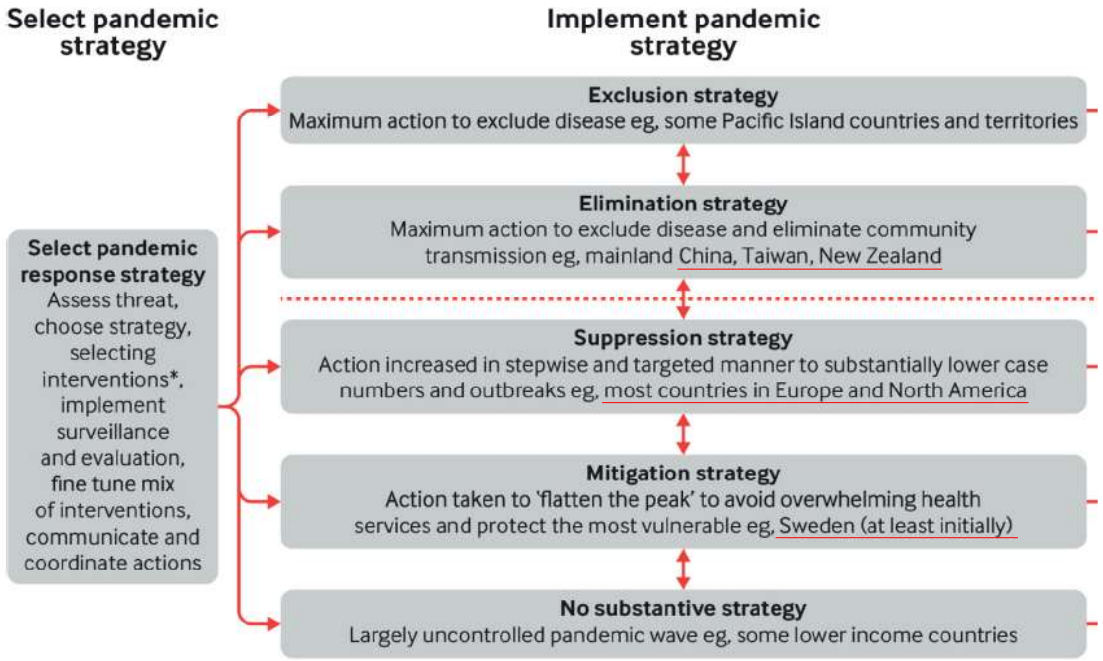
- **Suppress transmission** through the implementation of effective and evidence-based public health and social measures, and infection prevention and control measures, including detecting and testing suspected cases; investigating clusters of cases; tracing contacts; supported quarantine of contacts; isolating probable and confirmed cases; measures to protect high-risk groups; and vaccination.
- **Reduce exposure** by enabling communities to adopt risk-reducing behaviours and practice infection prevention and control, including avoiding crowds and maintaining physical distance from others; practicing proper hand hygiene; through the use of masks; and improving indoor ventilation.
- **Counter misinformation** and disinformation by building resilience through managing the infodemic, communicating with, engaging, and empowering communities, enriching the information eco-system online and offline through high-quality health guidance, and by communicate risk and distilling science in a way that is accessible and appropriate to every community.
- **Protect the vulnerable** through vaccination, ensuring vaccine deployment readiness in all countries and all populations, by communicating, implementing, and monitoring COVID-19 vaccination campaigns, by engaging health workers, and by building vaccine acceptance and demand based on priority groups, taking into account gender and equity perspectives to leave no one behind.
- **Reduce mortality and morbidity from all causes** by ensuring that patients with COVID-19 are diagnosed early and given quality care; that health systems can surge to maintain and meet the increasing demand for both COVID-19 care and other essential health services; that core health systems are strengthened; that demand-side barriers to care are addressed; and by ensuring that all priority groups in every country are vaccinated.
- **Accelerate equitable access to new COVID-19 tools** including vaccines, diagnostics and therapeutics, and support safe and rational allocation and implementation in all countries.

Figure 5 Public health and social measures are supported by multiple response pillars





POLICY FRAMEWORK FOR PANDEMIC



감염 확산억제 (R<1)
South Korea (**3차 커브 이전**, <50 cases / day)

피해 완화 (치사율 감소 Ex. 2%→0.2%)
South Korea (**3차 커브 이후**, R>1 often)

Public health and welfare interventions

- Border controls
- Physical distancing measures
- School and workplace measures
- Mask mandates
- Social and economic supports
- Pharmaceutical interventions
- Monitoring and evaluation

*** Pandemic interventions:** Border controls to "keep it out"; testing, contact tracing, case isolation and contact quarantine to "stamp it out"; improved hygiene behaviours and use of masks; physical distancing; movement restrictions; combinations including "lockdown"; vaccines; antimicrobials

NB. There are multiple other interventions to reduce harm, including protecting vulnerable populations, reorienting health services, social and economic support

NPIs (Nonpharmaceutical interventions)

ANALYSIS

COVID-19 PREPAREDNESS AND RESPONSE: IMPLICATIONS FOR FUTURE PANDEMICS

National responses to covid-19: drivers, complexities, and uncertainties in the first year of the pandemic

Elimination could be the optimal response strategy for covid-19 and other emerging pandemic diseases

Michael Baker and colleagues argue that aiming for elimination of community transmission of the SARS-CoV-2 virus could offer important advantages over a suppression or mitigation strategy with ongoing transmission

Michael G Baker, Nick Wilson, Tony Blakely

PANDEMIC STRATEGY: MITIGATION & DELAYING

ECDC, 2009

TABLE 3

Mitigation, containment and delaying – the definitions

Mitigation is a collective term recommended by WHO for actions in affected countries in phases 5 and 6 of pandemic alert, essentially reducing the impact of a pandemic.

In the health sector, the aims of mitigation include:

- reducing the overall number of people affected;
- reducing transmission;
- ensuring healthcare for those who may be infected;
- maximising care for those with disease;
- protecting the most vulnerable; and
- more general interventions.

Containment

Containment means preventing spread of a infection in a defined areas or areas by:

- case-finding: detecting imported infections and first generation transmissions; and
- taking actions to prevent their turning into chains of transmission and outbreaks, notably through vigorous contact tracing, treatment and/or quarantine of contacts.

The objective is to stop as many transmissions as possible and eventually the outbreak 'burns out'.
The term 'containment' is not recommended in this context by WHO or ECDC as it raises expectations that a pandemic virus can be contained once it has got beyond the initial outbreak, as was the case with the 2009 virus because, when it was discovered, transmission was already well beyond a delimited area.

Delaying is a less complete form of containment where the aim is not to contain the pandemic but rather to simply slow down transmission.

Differences

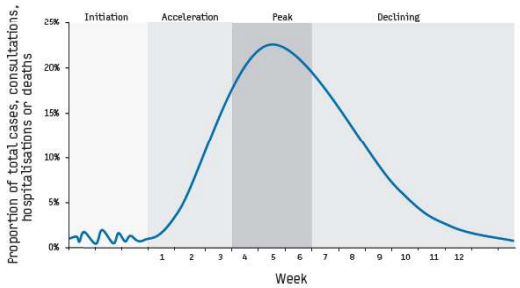
It is important to note that many of the actions and messages being undertaken or promulgated are **the same for delaying and mitigation strategies**.

What is different between the two is that in delaying there is special emphasis put on:

1. Vigorous case-finding and tracing of contact-persons and giving antivirals or alerting them to watch for symptoms;
2. Putting contact-persons or even all travellers from areas with community transmission under quarantine.

FIGURE

Idealised national curve for planning, Europe 2009 (reality is never so smooth and simple)



Europe's initial experience with pandemic (H1N1) 2009 - mitigation and delaying policies and practices

Article in Eurosurveillance · February 2009
DOI: 10.2807/ese.14.29.19279-en · Source: PubMed

TRADITIONAL PUBLIC HEALTH MEASURES

Feb 2020

Table 1. Non-pharmaceutical public health interventions to control infectious disease outbreaks, adapted from Cetron and Simone[5]

	Definition	Objective	Setting	Challenges	Remarks
Isolation	Separation of ill persons with contagious diseases from non-infected persons	To interrupt transmission to non-infected persons	Effective for infectious diseases with high person-to-person transmission where peak transmission occurs when patients have symptoms	Early case detection is paramount	Largely ineffective for infectious diseases where asymptomatic or pre-symptomatic infections contribute to transmission
Quarantine	Restriction of persons who are presumed to have been exposed to a contagious disease but are not ill, either because they did not become infected or because they are still in the incubation period	To reduce potential transmission from exposed persons before symptoms occur	Quarantining is most successful in settings where detection of cases is prompt, contacts can be traced within a short time frame with prompt issuance of quarantine	Quarantined persons will need psychological support, food and water, and household and medical supplies	Financial compensation for work days lost should be considered Voluntary is preferred over mandatory quarantine, but law enforcement may need to be considered if quarantine violations occur frequently
Community containment	Intervention applied to an entire community, city or region, designed to reduce personal interactions and movements. Such interventions range from social distancing among (such as cancellation of public gatherings, school closures; working from home) to community-use of face masks to locking down entire cities or areas (cordon sanitaire)	To reduce intermixing of unidentified infected persons with non-infected community members.	Social distancing is particularly useful in settings where community transmission is substantial	Ethical principles and codes are needed to guide community containment practice and policy Community containment to protect the population's health potentially conflicts with individual rights of liberty and self-determination	Law enforcement is needed in most settings. Therefore such restrictive interventions should be limited to the actual level of risk to the community

Journal of Travel Medicine, 2020, 1–4
doi: 10.1093/jtm/taaa020
Perspective

Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak

A. Wilder-Smith MD[1,2] and D.O. Freedman MD[3]

Active case finding with case management: the key to tackling the COVID-19 pandemic

Zhongjie Li*, Qiulan Chen*, Luzhao Feng, Lance Rodewald, Yinyin Xia, Haidong Yu, Ruochen Zhang, Zhijie An, Wenwen Yin, Wei Chen, Ying Qin, Zhibin Peng, Ting Zhang, Dexin Ni, Jinzhao Cai, Qing Wang, Xiaokui Yang, Mu'ji Zhang, Xiang Ren, Dan Wu, Xiaojie Sun, Yuanqiu Li, Lei Zhao, Xiaoping Qi, Tie Song, George F Gao†, Zijian Feng†, and the China CDC COVID-19 Emergency Response Strategy Team

CHINESE VERSION OF COVID-19 STRATEGY

July 4 2020

	Containment	Suppression	Mitigation
Aim	Stop virus transmission and spread	Decrease or stop community transmission	Lower and delay the epidemic surge to reduce health-care demand
Scenario	Early stage of epidemic in well defined areas	Ongoing community transmission in which containment is not feasible	Extensive community transmission, impossible to suppress
Case detection and management	Active case detection; managed isolation and care; quarantine of close contacts	Case detection; managed isolation and care; testing of close contacts	Detection of severe cases; managed isolation and care; limited contact tracing
Lockdown and intercity travel prohibition	Lockdown of endemic areas; restrict travel from those areas to other low epidemic areas	Few, based on risk	None
Other physical distancing*	Strict stay-at-home orders; school closure; cancellation of mass gatherings	Stay-at-home orders; school closure; cancellation of mass gatherings; adjustable to conditions	Cancellation of mass gatherings; school closure when and where necessary; ask vulnerable population to stay at home
Personal protection	Hand hygiene; respiratory etiquette; face mask use	Hand hygiene; respiratory etiquette; face mask use	Hand hygiene; respiratory etiquette; face mask use
Duration	Short term, followed by maintenance of elimination of transmission	Long term, adjusting suppression measures based on epidemic situation (relax or strengthen periodically)	Long term
Endpoint	Vaccine response to immunise the population to achieve community protection	Vaccine response to protect the vulnerable, stop community transmission, and achieve community protection	Vaccine response to protect the vulnerable, stop endemic transmission, and immunise the population to achieve community protection
Pros	Early, proactive, and strict implementation can be effective, largely preventing infection and death	Early, proactive, and strict implementation can be effective, largely preventing infection and death	Less short-term socioeconomic effect; necessary medical care able to be provided
Cons	Major short-term effect on daily life and social and economic costs; continued moderate socioeconomic effects during elimination period	Major short-term effect on daily life and social and economic costs; premature relaxing of interventions can lead to rebound of the epidemic	Medical system capacity can still be exceeded; substantial risk of high morbidity, mortality, and economic damage

*Physical distancing represents minimisation of physical contact between potentially infected individuals and healthy individuals, or between population groups with different levels of transmission, to decrease or interrupt transmission of COVID-19, by various means.[28,29]

Table 2: Comparison between strategies

Mitigation: Treatment of severe cases and implementing NPIs rather than optimizing detection and management of every cases and contact tracing

1. 'Suppression logically follows successful containment to prevent spread from imported cases and re-establishment of community transmission'

D.I AHN

2. Challenges for suppression: balancing epidemic risk vs. social life & choosing epidemic risk vs. appropriate timing to

PANDEMIC STRATEGIES (B4 VACCINATION)

BMJ Nov 2021

Aggressive containment	Suppression	Mitigation
aimed to eliminate community transmission & achieved elimination status for 28 consecutive days	aimed to suppress and minimize community infections	aimed to avoid overwhelming health systems by flattening the curve (or achieving herd immunity) focused on protecting high risk groups (while allowing transmission among low risk groups)

COVID-19 PREPAREDNESS AND RESPONSE: IMPLICATIONS FOR FUTURE PANDEMICS

Aggressive containment, suppression, and mitigation of covid-19: lessons learnt from eight countries

Shishi Wu and colleagues examine three distinct response strategies for covid-19 in eight countries and argue that aggressive containment is the optimal approach to limiting loss of lives and livelihoods and achievable in the absence of vaccines and effective therapies

Shishi Wu, [1] Rachel Neill, [2] Chuan De Foo, [3] Alvin Qijia Chua, [1] Anne-Sophie Jung, [1] Victoria Haldane, [3] Salma M Abdalla, [4 5] Wei-Jie Guan, [6 7] Sudhvir Singh, [8 9] Anders Nordström, [1] Helena Legido-Quigley [1 4 6]


16 March 2020 Imperial College COVID-19 Response Team

Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand

Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani.

On behalf of the Imperial College COVID-19 Response Team

WHO Collaborating Centre for Infectious Disease Modelling
MRC Centre for Global Infectious Disease Analysis
Abdul Latif Jameel Institute for Disease and Emergency Analytics
Imperial College London

Correspondence: neil.ferguson@imperial.ac.uk

억제 (suppression) vs 완화(mitigation)

임 페 리 얼 대 학

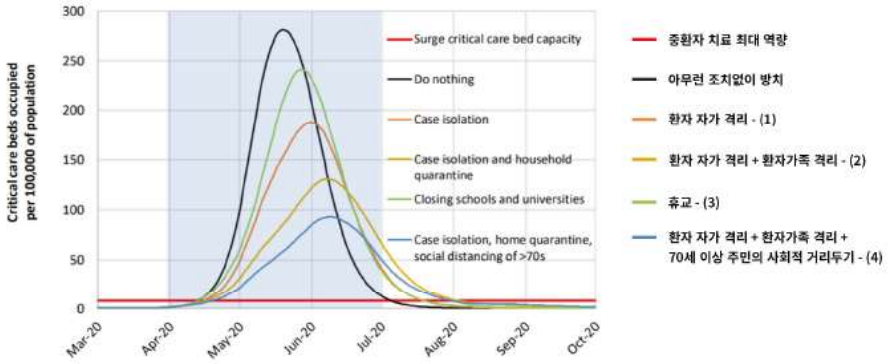


그림 6: 완화 모델: y축은 4가지의 서로 다른 완화모델시 필요하다고 예측되는 인구 10만명당의 중환자 병상 수. (4)번(파란색)처럼 환자 격리, 환자 가족 격리, 70세 이상 주민의 사회적 거리두기를 동시에 시행하는 경우가 완화 정책 중 가장 효과가 높긴 하지만 이 경우도 중환자 수용 최대 역량의 8배로 엄청난 과부하가 걸림(출처: 임페리얼 대학 코로나 리포트).

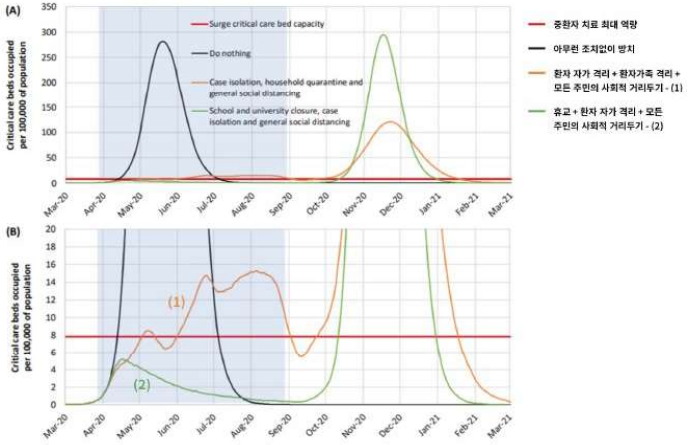


그림 7. 억제 모델: y축은 두가지의 억제 모델 정책 시행 시 필요하다고 예측되는 인구 10만명당의 중환자 병상수이다. B에서처럼 두가지 (1), (2) 경우 모두 중환자 수용 최대 역량 이내에 있거나 약 2배 정도만의 과부하가 예상됨(출처: 임페리얼 대학 코로나 리포트).

완화 모델: 사회경제적 부담 다소 적으나 여전히 의료시스템에 과부하 걸려 높은 사망률

- R>1
- 고령 인구의 사회적 거리두기
- 수주간

억제 모델: 의료시스템 과부하 거의 없어 사망률 낮으나 막대한 사회 경제적 비용 발생

- R<1
- 전인구의 사회적 거리두기
- 수개월간


글로벌케어 특집 리포트

'세계화 시대의 감염병, 감염병의 세계화'

2. 코로나 대응 전략과 향후 시나리오

2020년 4월 2일

안동일 (글로벌케어 시니어 컨설턴트 / 전세대학교 보건대학원 객원 교수)


글로벌케어 특집 리포트

'세계화 시대의 감염병, 감염병의 세계화'

2. 코로나 대응 전략과 향후 시나리오

2020년 4월 2일

안동일

SUPPRESSION vs MITIGATION

	억제(suppression)	완화(mitigation)
목표	- 감염 재생산수(R)를 1.0 이하로 낮춤으로 감염의 확산속도가 (상당히) 지연되고, 환자 수는 시간이 지나면서 감소됨. - 의료시스템의 과부하를 현저히 줄여서, 중환자 사망자를 상당히 줄이게 됨	- 감염 재생산수(R)를 낮추되, 1.0 이하까지는 못 미치게 되고 따라서 확산속도는 다소 감소되나 환자수는 시간이 지나면서 증가됨 - 의료시스템의 과부하를 일부 줄이며(영국의 경우 중환자 치료 역량의 8배에 해당하는 환자 발생을 예측), 중환자 사망자도 다소 줄게 됨
내용	[표 1]의 여러 조치들을 복합적으로 동시에 시행 [그림 7]	[표 1]의 조치들 중 일부를 부분적으로 시행 [그림 6]
사회적 거리두기	나이에 관계없이 전주민에게 반드시 시행하는 것이 억제조치의 핵심 사안 중 하나	70세 이상의 주민만을 대상으로 시행함
사회적 거리두기의 기간	최소 5개월, 그 후 필요에 따라 해제와 강화를 반복	수주 혹은 그 이상이나 억압보다는 짧은 기간

표 2: 억제와 완화 정책 비교 (출처: 임페리얼 대학 코로나 리포트)

16 March 2020 Imperial College COVID-19 Response Team

Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand

Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani.

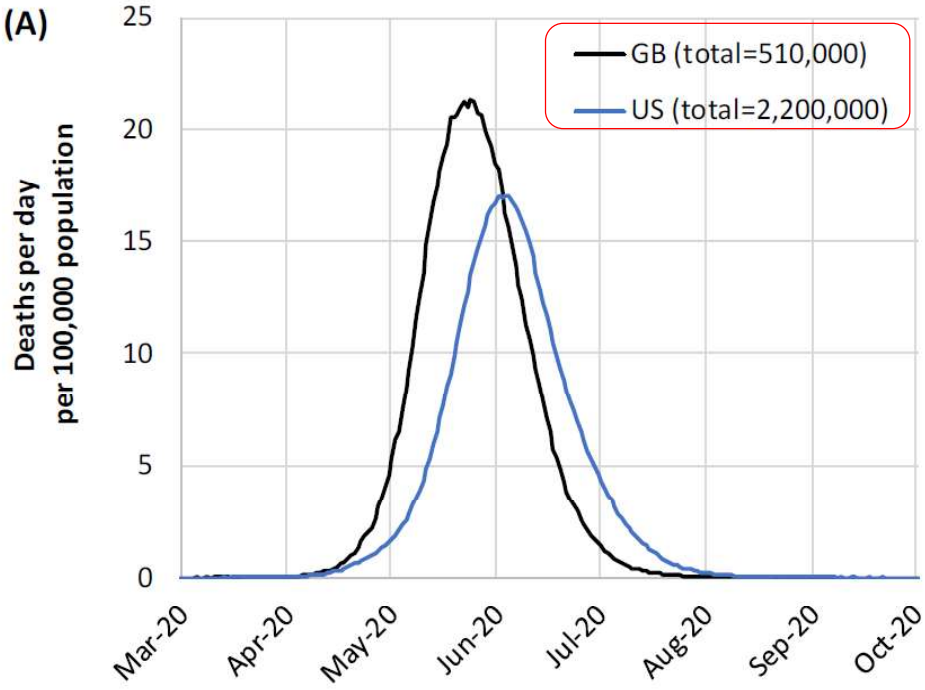
On behalf of the Imperial College COVID-19 Response Team

WHO Collaborating Centre for Infectious Disease Modelling
MRC Centre for Global Infectious Disease Analysis
Abdul Latif Jameel Institute for Disease and Emergency Analytics
Imperial College London

Correspondence: neil.ferguson@imperial.ac.uk

PROJECTED DEATH IN US & UK

UNMITIGATED SCENARIOS



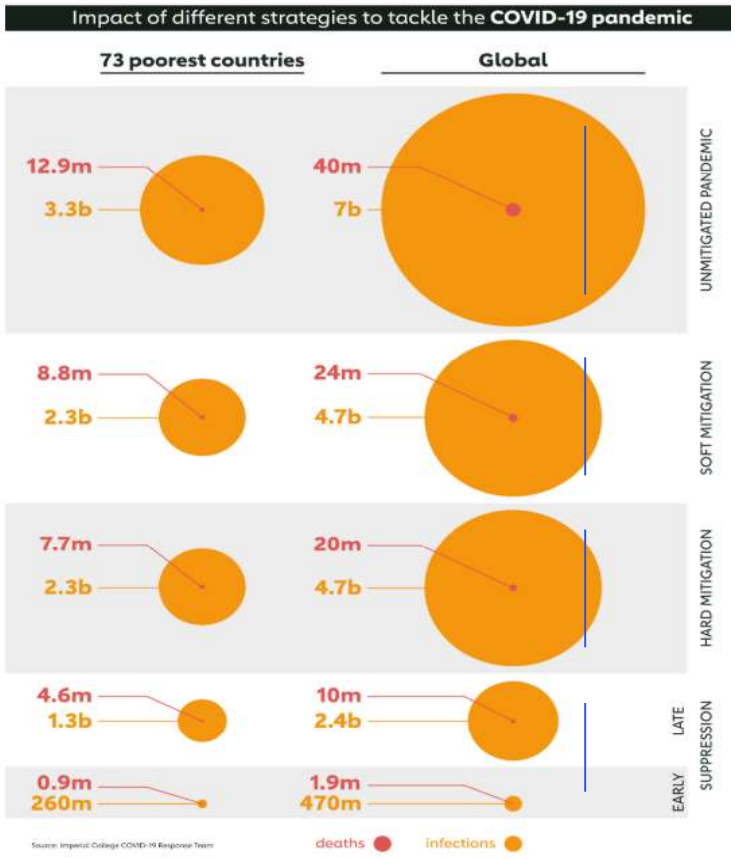
In the (unlikely) absence of any control measures or spontaneous changes in individual behaviour, we would expect a peak in mortality (daily deaths) to occur after approximately 3 months (Figure 1A). In such scenarios, given an estimated R_0 of 2.4, we predict **81% of the GB and US populations** would be infected over the course of the epidemic.

Figure 1: Unmitigated epidemic scenarios for GB and the US.
(A) Projected deaths per day per 100,000 population in GB and US.

IMPACT OF DIFFERENT STRATEGIES

(Estimated death)

GAVI / Imperial college, 16 Mar 2020



ELIMNATION, NOT MITIGATION CREATES
BEST OUTCOMES FOR HEALTH, ECONOMY & CIVIL LIBERTIES
Lancet, Apr 2021

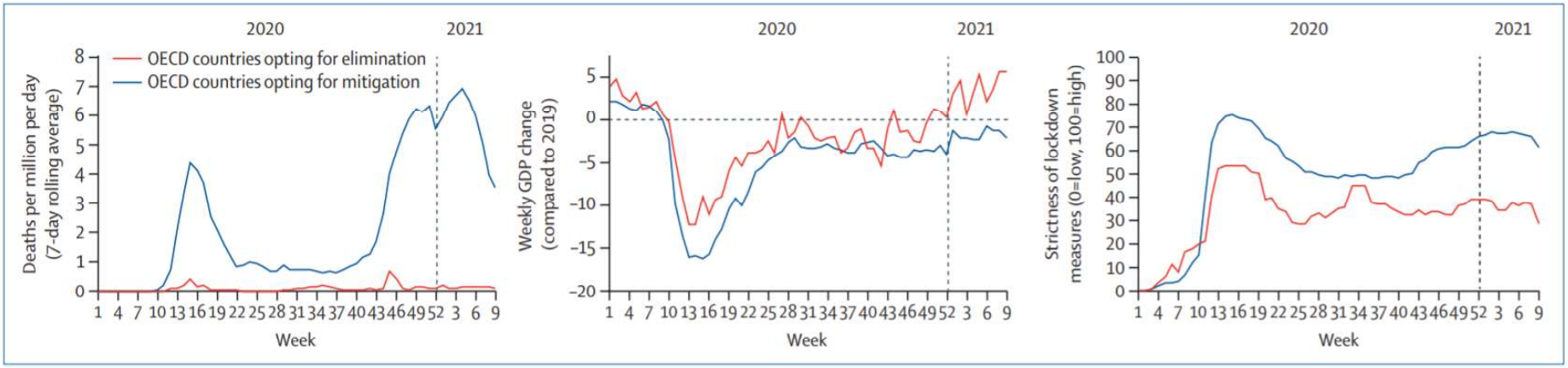


Figure: **COVID-19 deaths, GDP growth, and strictness of lockdown measures for OECD countries choosing SARS-CoV-2 elimination versus mitigation**

Elimination: maximum action to control Corona-19 & stop community transmission as quickly as possible
Mitigation: action increased in a stepwise, targeted way to reduce cases so as not to overwhelm health care system

Death: 25 times lower than mitigation countries
Economy: return to pre-pandemic levels early 2021
Civil liberties: less strict and shorter duration

] Elimination countries

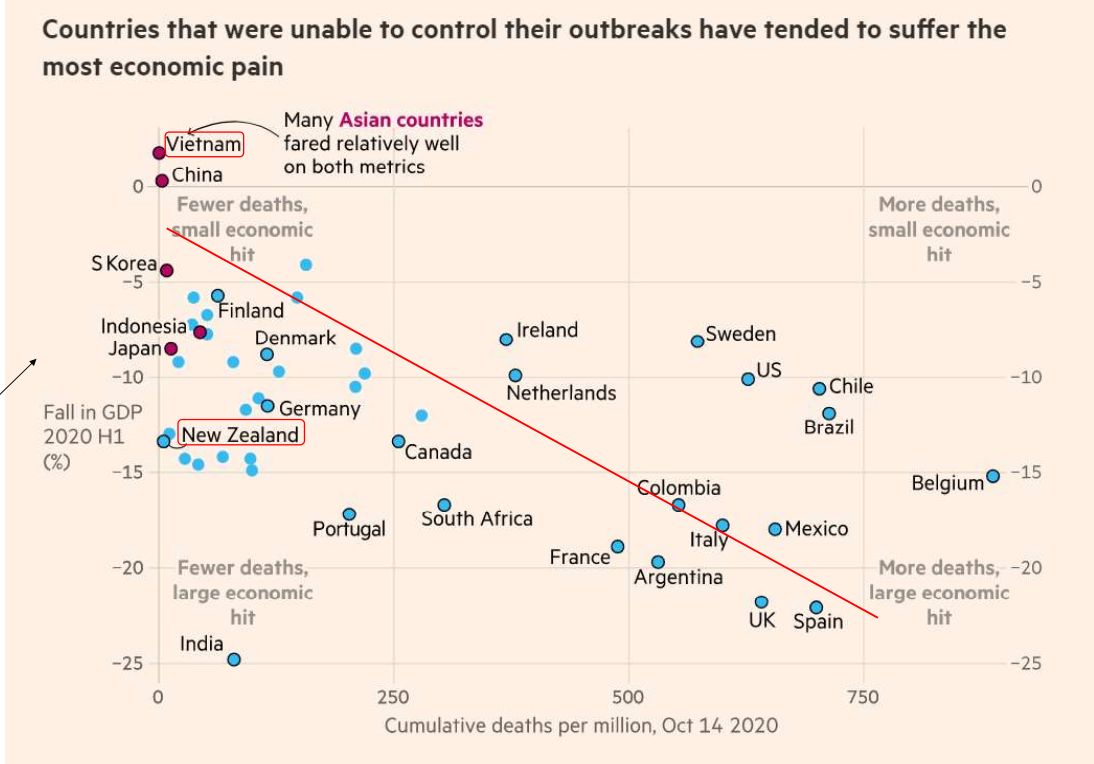
SARS-CoV-2 elimination, not mitigation, creates best outcomes for health, the economy, and civil liberties

OECD countries opting for **elimination** are Australia, Iceland, Japan, New Zealand, and South Korea.
OECD countries opting for **mitigation** are Austria, Belgium, Canada, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the UK, and the USA.

코로나로 인한 사망과 경제손실

Financial Times, Aug 2021

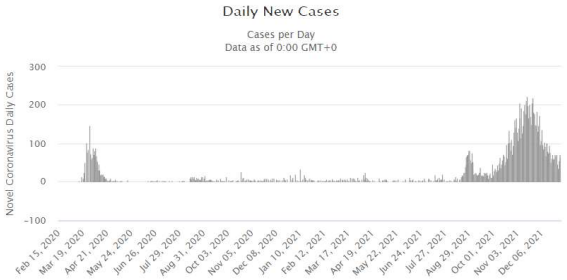
North Korea ?
btwn Vietnam & NZ



POLICY SHIFT

FROM ELIMINATION TO SUPPRESSION/MITIGATION

Daily New Cases in New Zealand

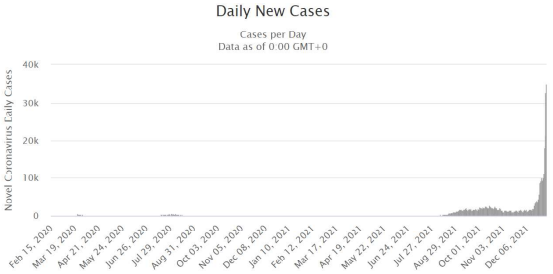


HEALTH AND SCIENCE CNBC

'Zero Covid' strategies are being abandoned as the highly infectious delta variant dominates

PUBLISHED TUE, OCT 5 2021·3:25 AM EDT | UPDATED WED, OCT 6 2021·4:31 AM EDT

Daily New Cases in Australia

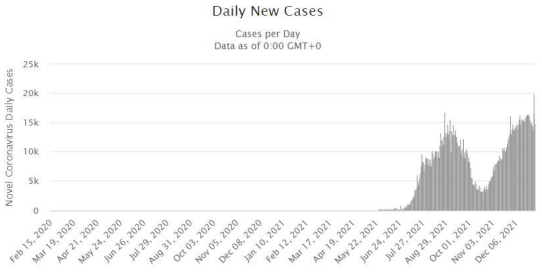


CNN World Africa Americas Asia Australia China Europe India Middle East United Kingdom

Covid-19 cases rise in Australian state of Victoria despite lengthy lockdown

By Ben Westcott and Reuters
Updated 0433 GMT (1233 HKT) September 1, 2021

Daily New Cases in Vietnam

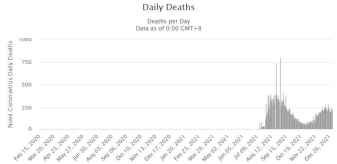


ASIA

COVID: How the delta variant has shattered Vietnam's success 10.09.2021

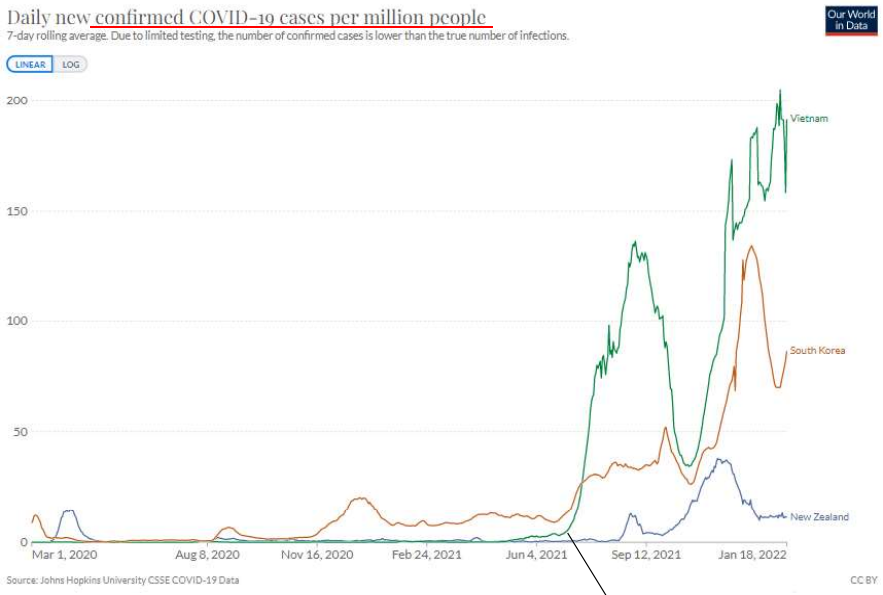
Small businesses and residents in Vietnam are struggling under the weight of harsh lockdown restrictions. Despite the virus' resurgence, just 3.9% of the population has been vaccinated so far.

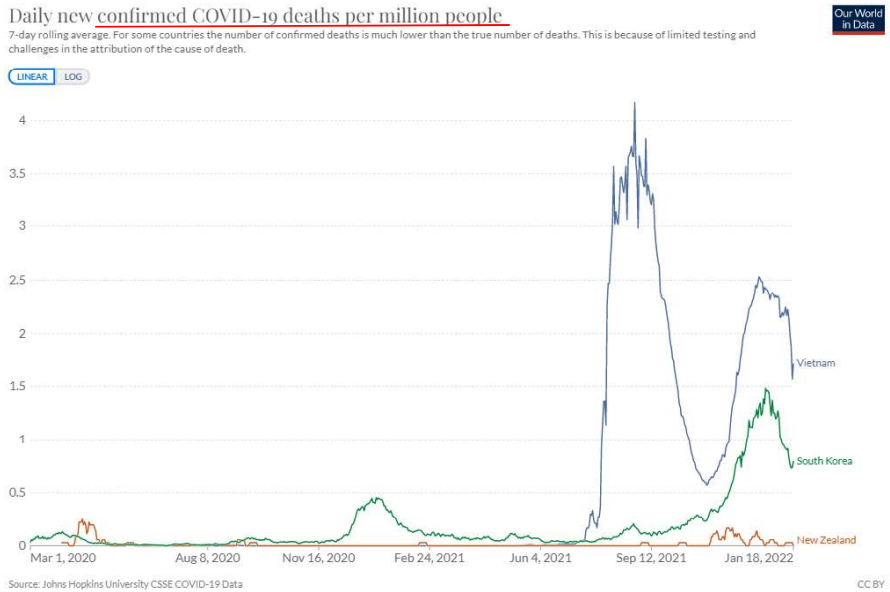
Daily New Deaths in Vietnam



POLICY SHIFT

FROM ELIMINATION TO SUPPRESSION/MITIGATION





VIETNAM: Vaccine coverage on 1st July: 3.7% only (1 or 2 doses)

PANDEMIC STRATEGIES: Key messages

BMJ Nov 2021

Aggressive containment of community transmission:

- **optimal** strategy in emerging pandemics to save lives and protect the economy and achievable **in the absence of vaccines and treatments**

- requires immediate action in response to emerging outbreaks

- requires comprehensive package of public health interventions

- trust to government, community engagement, strong political commitment, well prepared public health systems, and scientific input into policy making requires

- **not sustainable in the long term**: more sustainable approach which amalgamates i) acceptable levels of community transmission and ii) high vaccination rates may be the best way forward (‘**with corona**’)

COVID-19 PREPAREDNESS AND RESPONSE: IMPLICATIONS FOR FUTURE PANDEMICS

Aggressive containment, suppression, and mitigation of covid-19: lessons learnt from eight countries

Shishi Wu and colleagues examine three distinct response strategies for covid-19 in eight countries and argue that aggressive containment is the optimal approach to limiting loss of lives and livelihoods and achievable in the absence of vaccines and effective therapies

Shishi Wu, [1] Rachel Neill, [2] Chuan De Foo, [3] Alvin Qijia Chua, [1] Anne-Sophie Jung, [1] Victoria Haldane, [3] Salma M Abdalla, [4 5] Wei-Jie Guan, [6 7] Sudhvir Singh, [8 9] Anders Nordström, [10] Helena Legido-Quigley [1 4]

ESTIMATED DEATH BY OMICRON WITHOUT LOCKDOWN: China

Nature, Received 22 Mar 2022

*‘ We find that the level of immunity induced by the March 2022 vaccination campaign would be insufficient to prevent an Omicron wave that would result in exceeding critical care capacity with a projected intensive care unit peak demand of **15.6 times** the existing capacity and causing approximately **1.55 million deaths**.’*

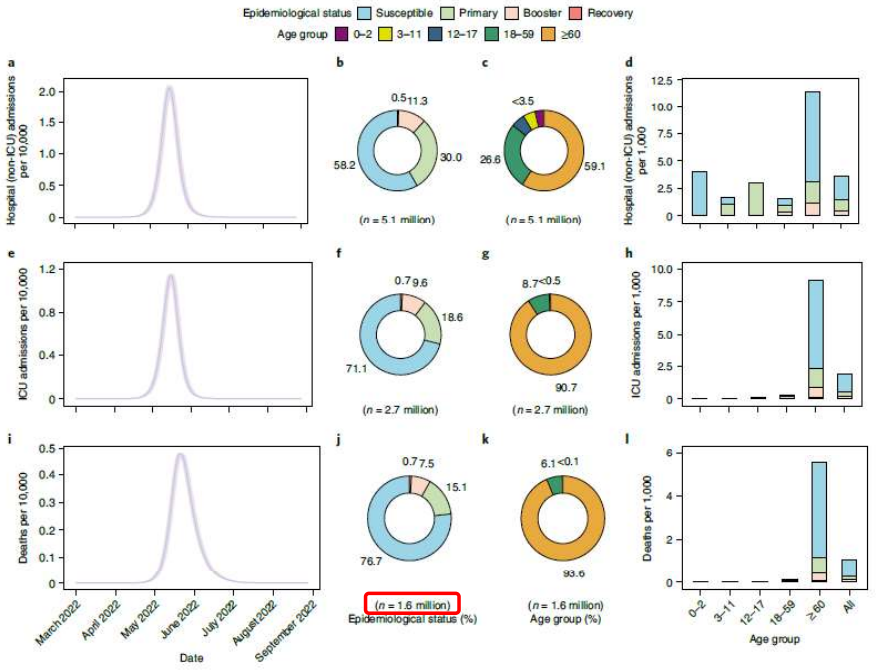


Fig. 1 | Projected SARS-CoV-2 Omicron burden in China for baseline scenario from March 2022 to September 2022

ARTICLES nature medicine

OPEN

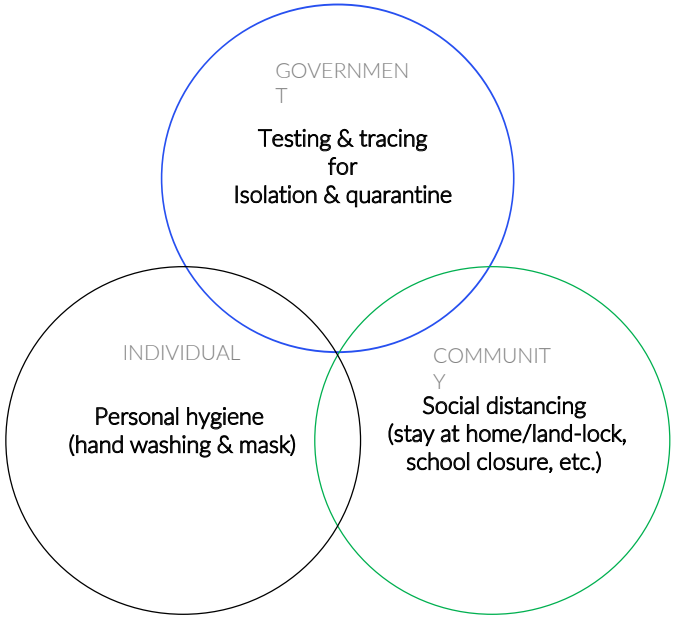
Modeling transmission of SARS-CoV-2 Omicron in China

NPIs(Non-pharmaceutical interventions)

HOW TO FLATTEN THE CURVE

DI AHN

Border Control



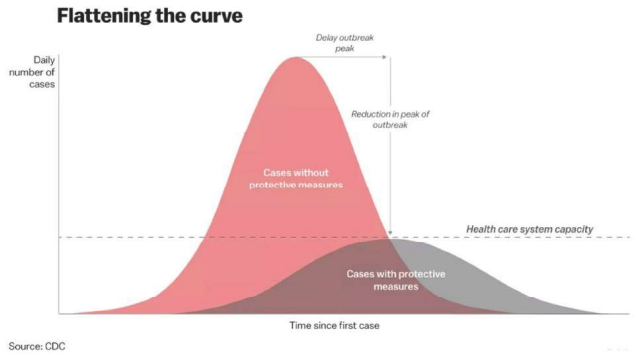


그림 3: 역학 웨이브 낮추기 - x축은 첫 환자 발생 이후의 시간이고, y축은 일일 신환자 발생 수를 뜻한다(출처 미국 질병관리 센터, CDC).

Which intervention is more efficient ?

CASES & DEATHS IN SELECTIVE COUNTRIES

Table 1. Coronavirus disease 2019 pandemic epidemiological indicators, 1st Jan–30th Jun 2020 (Source: Our world in data)

Country/polity	Total confirmed cases[a]	Total confirmed cases per 1 million population	Total confirmed death per 1 million population
China	84,785	58.9	3.2
Hong Kong	1,206	160.8	0.9
New Zealand	1,528	316.9	4.6
South Korea	12,850	250.6	5.5
Taiwan	447	18.8	0.3
Thailand	3,171	45.4	0.8
Vietnam	355	3.7	0
US	2,640,000	7,982.4	385.4
Germany	195,418	2,332.4	107.3
Italy	240,578	3,979.0	575.0
Sweden	67,924	6,725.6	528.1
UK	285,216	4,201.4	596.3
World	10,460,000	1,342.7	65.2

[a]Cumulative cases by 30th June 2020.

Special Article
Lessons from non-pharmaceutical interventions on the first wave of COVID-19 in the Asia Pacific region
Dongil Ahn

VARIOUS NPIs*

Table 2. Various non-pharmaceutical interventions and its characteristics

Intervention/ policy	Examples/description	Key actors (led by)	Epidemic control efficiency	Traditional vs. new approaches	Remarks
1. Isolation & quarantine	- Isolation of confirmed cases - Quarantine of close contact/suspect	Government	High	Traditional public health approach	- Vigorous testing & contact tracing are needed to contain or suppress epidemics
2. Community containment	- Locking-down entire cities/ areas (cordon sanitaire) - Physical distancing - School closing - Limited public gathering - Work from home, etc.	Community	Low	Traditional approach except lockdown of whole cities/country which is unprecedented	Full lockdown (cordon sanitaire) means people must stay where they are (usually at home) and is the most strict measure (among various community containment interventions) led to negative socio-economic impact
3. Border control	Flights cancellation	Government	Low	Traditional approach	
4. Personal hygiene	- Mask wearing - Hand washing	Individual	High	Traditional approaches but role/importance of mask wearing newly recognized	Universal mask wearing is important due to high proportion of transmission of disease by asymptomatic/pre-symptomatic cases
5. Digital surveillance	QR health code system	Government	High	New approach as a part of digital public health measures	- People are given QR health code which indicates the individual level of risk for infection by COVID-19 - Strong & effective surveillance tool - Legislative process is needed to address/ avoid the issue of data privacy/human rights in most settings

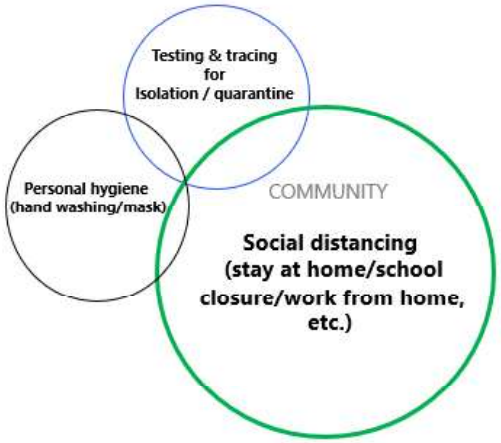
Special Article
Lessons from non-pharmaceutical interventions on the first wave of COVID-19 in the Asia Pacific region
Dongil Ahn

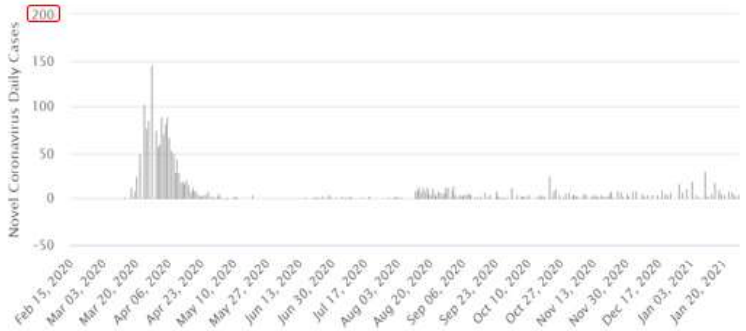
* Non-pharmaceutical interventions

BEST PRACTICE - NEW ZELAND

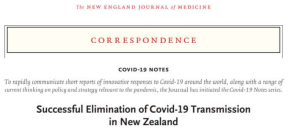
DI AHN

Border Control





ELIMINATING COVID-19 IN NEW ZELAND

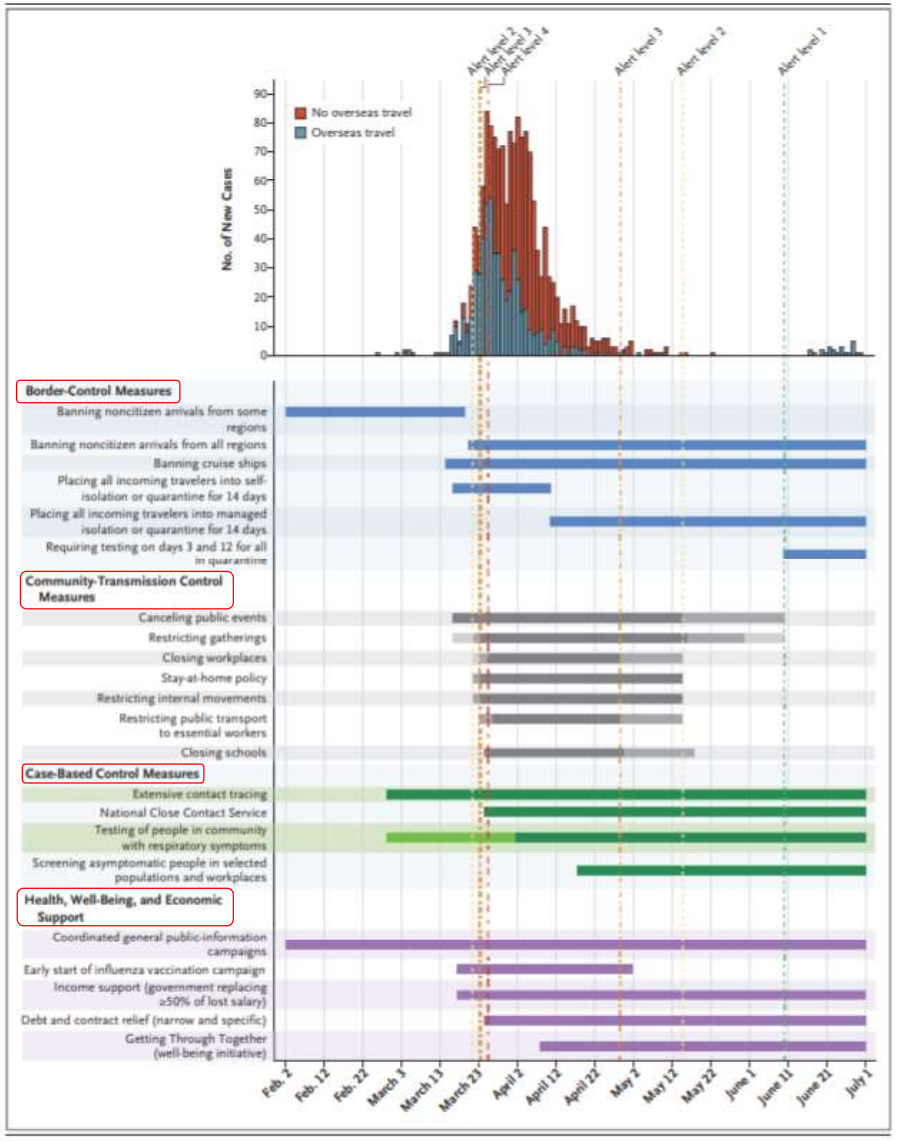

The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE

COVID-19 NOTES

To rapidly communicate short reports of innovative responses to Covid-19 around the world, along with a range of current thinking on policy and strategy relevant to the pandemic, the Journal has initiated the Covid-19 Notes series.

Successful Elimination of Covid-19 Transmission in New Zealand



New Zealand's elimination strategy for the COVID-19 pandemic and what is required to make it work

Michael G Baker, Amanda Kvalsvig, Ayesha J Verrall, Lucy Telfar-Barnard, Nick Wilson

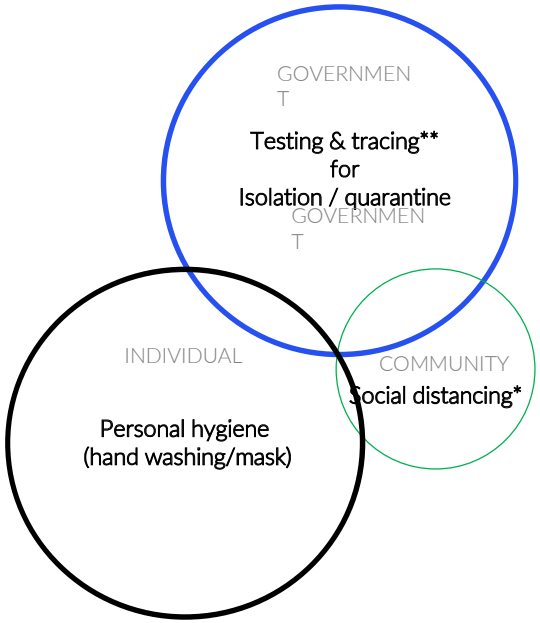
The essential elements of an elimination strategy include:

1. **Border controls** (quarantine of incoming travelers);
2. Rapid case detection for isolation by **testing with swift contact tracing** and quarantine for contacts;
3. Intensive hygiene promotion (cough etiquette and **hand washing**);
4. Intensive physical distancing (currently implemented as a **lockdown**)
5. A well-coordinated **communication** strategy to inform the public about control measures

BEST PRACTICE – Hongkong

DI AHN

Border Control



* No lock-down during Covid-19
** Integration of medical and travel history available to surveillance officer

INTERVETION FOR COVID-19 IN HONG KONG

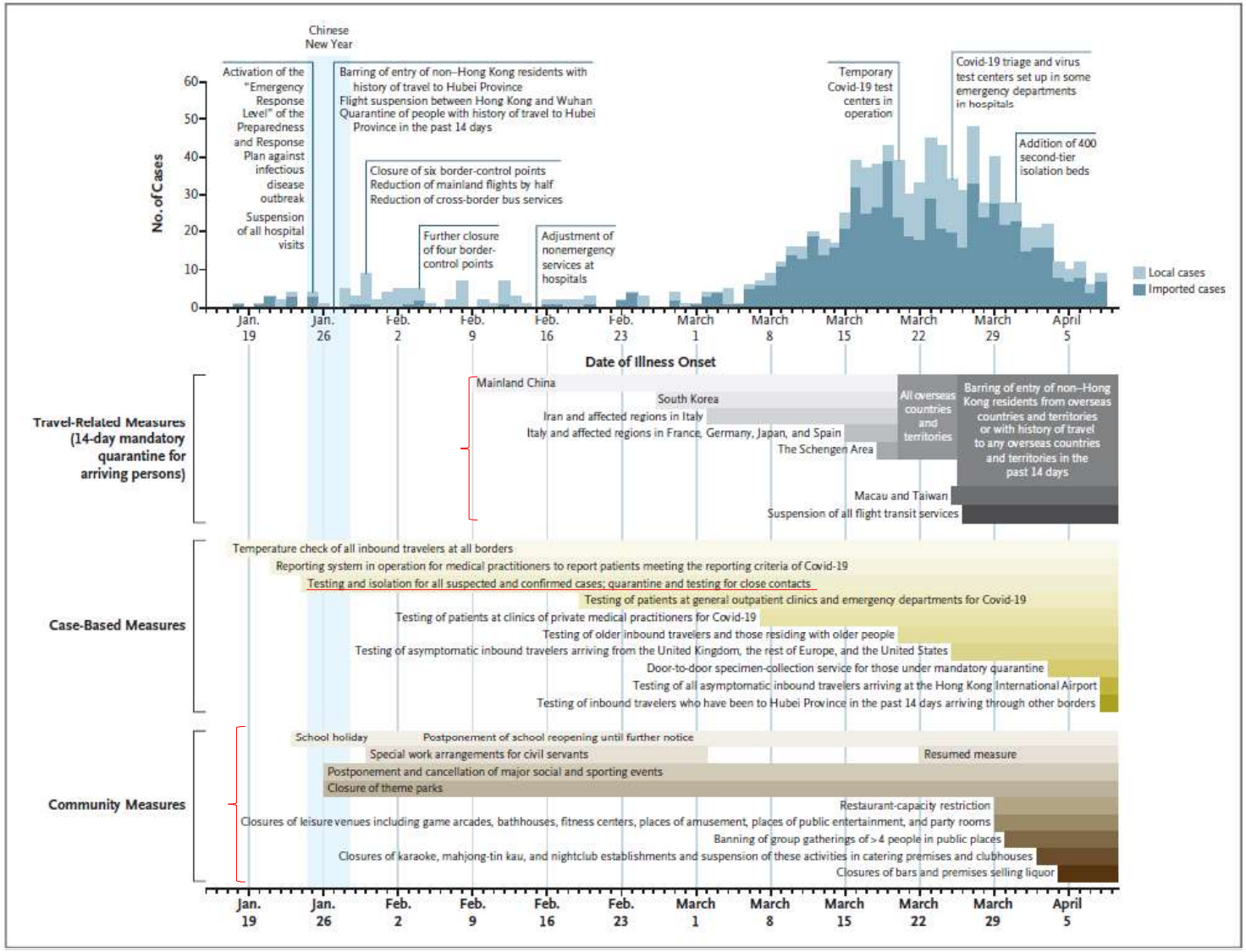
The NEW ENGLAND JOURNAL of MEDICINE

CORRESPONDENCE

COVID-19 NOTES

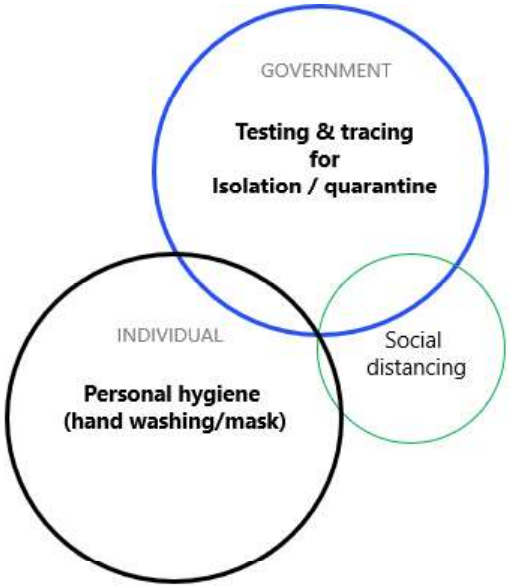
To rapidly communicate short reports of innovative responses to Covid-19 around the world, along with a range of current thinking on policy and strategy relevant to the pandemic, the Journal has initiated the Covid-19 Notes series.

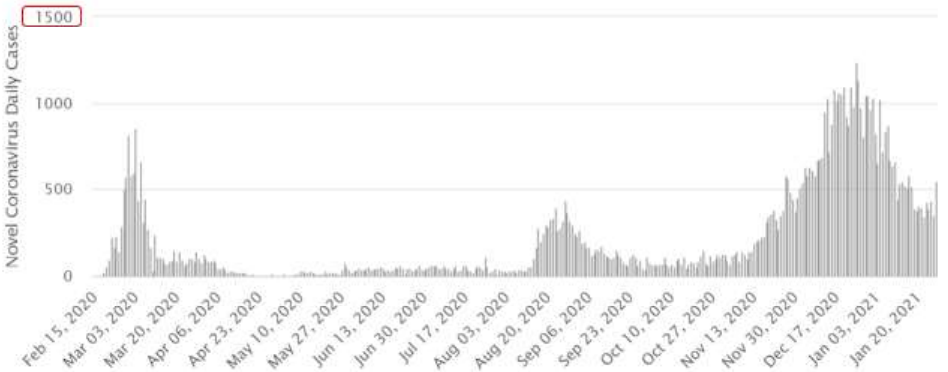
From a Sprint to a Marathon in Hong Kong



BEST PRACTICE – SOUTH KOREA

DI AHN





Population in Kores: 52 millions

D.I AHN

SELECTIVE vs COMPREHENSIVE APPROACHES

Table 3. COVID-19 policy packages in seven countries in Asia Pacific region

Types	Key policies/interventions (and subtypes)	Supplementary policies/interventions	Countries	Remarks
A. Selective approach (key interventions limited to two)	A1. Full lockdown + strict border control	Other community containment measures such as school closure, limited public gatherings	- New Zealand - Vietnam	- Testing capacity in New Zealand and Vietnam was limited initially, but improved later on - Wearing face mask was not common in New Zealand
	A2. Vigorous Isolation/quarantine + universal mask wearing	Various community containment measures such as school closure & limited public gatherings	South Korea	- Lockdown never applied in South Korea
	A3. Full lockdown + universal mask wearing	Other community containment measures such as school closure & limited public gatherings	Thailand	- Thailand is known as an early adapter for universal mask wearing - Border control in Thailand was not very strict due to importance of tourism - Testing/tracing capacity was moderate initially, and improved later on
B. Comprehensive approach (more than three key interventions applied)	B1. A2+strict border control (i.e., Vigorous isolation/quarantine + universal mask wearing + strict border control)	Various community containment measures such as school closure & limited public gathering	- Taiwan - Hong Kong	- Taiwan and Hong Kong never gone into full lockdown in 2020
	B2. A1+A2+QR health code system (All 5 components in Table 2, i.e., full lockdown + strict border control + vigorous isolation/quarantine + universal mask wearing + QR health code system)		China	- While COVID-19 crisis in Wuhan and Hubei was overcome by A1, 'A2+QR health code system' were important measures for the rest of Hubei province in China to prevent resurgence of outbreak after lift of lockdown in Wuhan - QR health code is a sort of digital surveillance system to identify high risk individuals for COVID-19 infection

J Glob Health Sci. 2020 Jun;2(1):e3
https://doi.org/10.35500/jghs.2020.2.e3
pISSN 2671-6925 eISSN 2671-6933

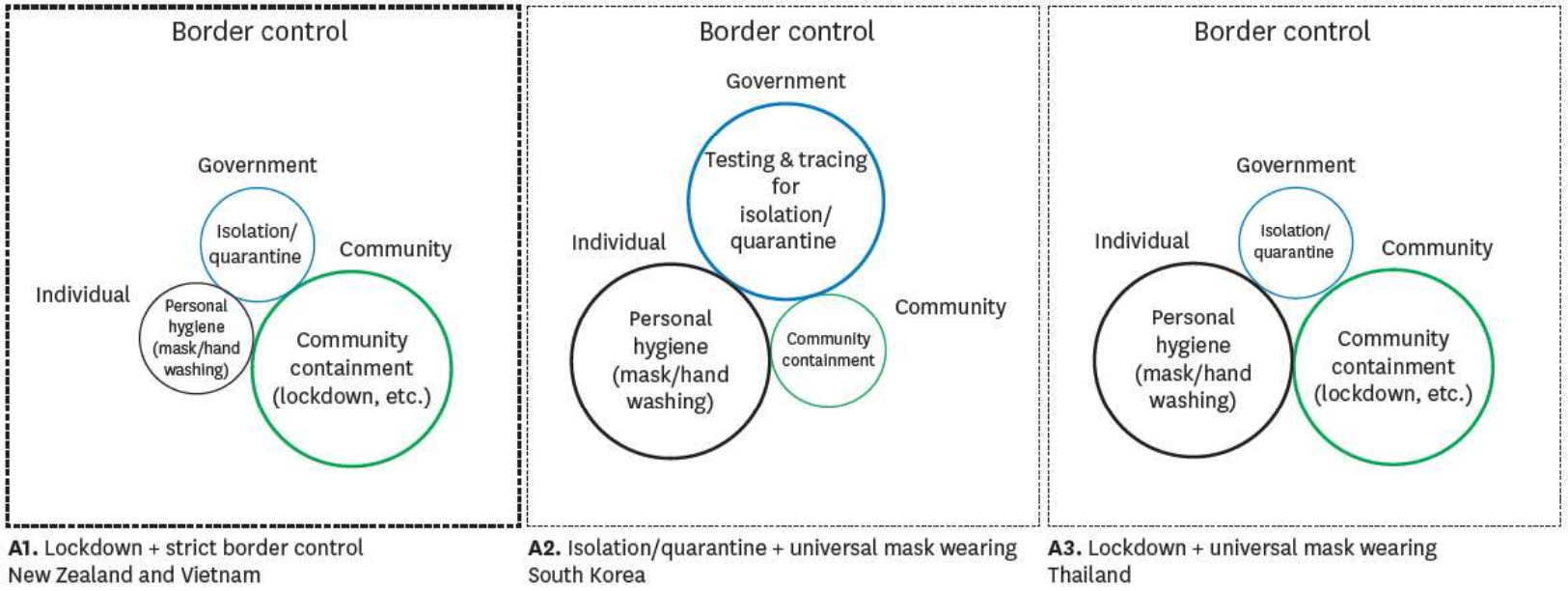
JGHS Journal of Global Health Science

Special Article

Lessons from non-pharmaceutical interventions on the first wave of COVID-19 in the Asia Pacific region

Dongil Ahn

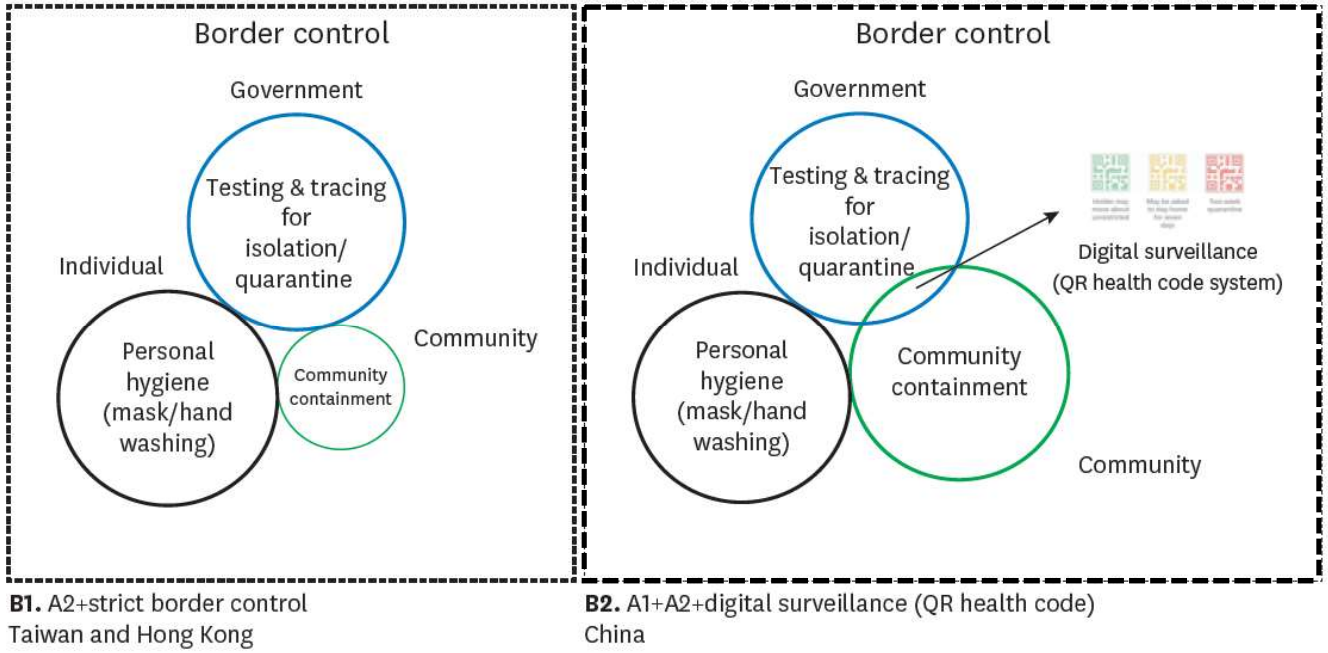
SELECTIVE NPIs*



JGHS
Special Article
Lessons from non-pharmaceutical interventions on the first wave of COVID-19 in the Asia Pacific region
Dongil Ahn

Fig. 1. Coronavirus disease 2019 policy packages in seven countries in the Asia Pacific region. Figure is developed based on the **Table 3**. Bigger circle indicates that the importance of the intervention/policy is higher than the other one. The thickness in square or rectangle box indicates the intensity of border control (i.e., thick line means strict border control, while thin one implies loose border control).

COMPREHENSIVE NPIs*



B1. A2+strict border control
Taiwan and Hong Kong

B2. A1+A2+digital surveillance (QR health code)
China

J Glob Health Sci. 2020 Jun;2(1):e3
https://doi.org/10.35500/jghs.2020.2.e3
eISSN 2671-6925 eISSN 2671-6933

Journal of Global Health Science JGHS

Special Article

Lessons from non-pharmaceutical interventions on the first wave of COVID-19 in the Asia Pacific region

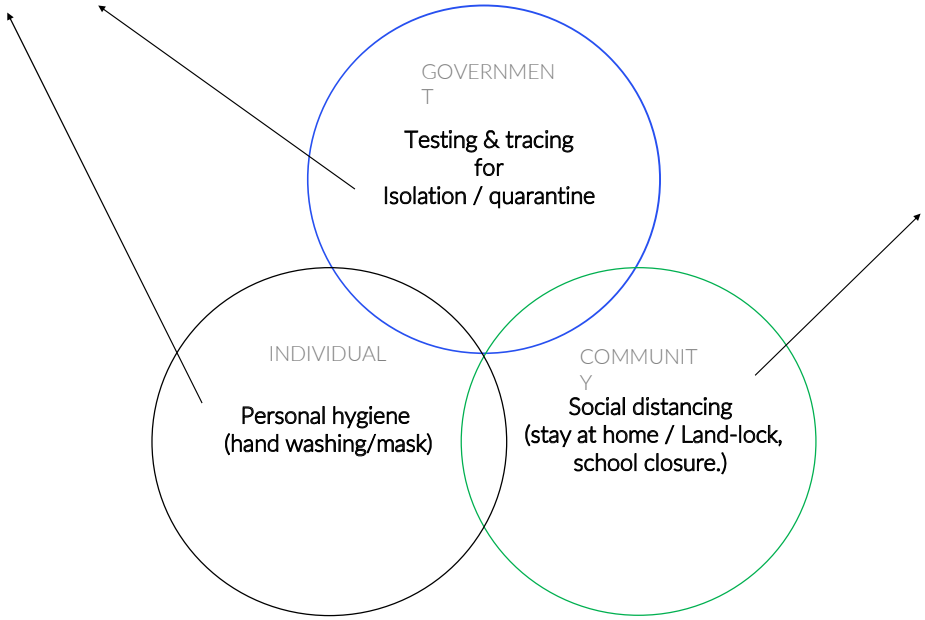
Dongil Ahn

Fig. 1. Coronavirus disease 2019 policy packages in seven countries in the Asia Pacific region. Figure is developed based on the **Table 3**. Bigger circle indicates that the importance of the intervention/policy is higher than the other one. The thickness in square or rectangle box indicates the intensity of border control (i.e., thick line means strict border control, while thin one implies loose border control).

HOW TO FLATTEN THE CURVE

SDG Report 2020 / DI AHN

Epidemic control efficiency: high



Epidemic control efficiency: low
Mitigating the impact of economy: poor

COVID-19 PERFORMANCE IN OECD COUNTRIES

UN, June 2020

Table 1

Covid-19 pilot Index and performance indicators for the OECD countries

Rank	Country	Covid Index	Deaths Per Million	Effective Reproduction Rate (ERR)	Epidemic Control Efficiency (ECE)	ERR Decline	Mobility Decline
1	South Korea	0.90	5.00	0.76	0.63	0.36	0.10
2	Latvia	0.78	9.34	0.95	0.29	0.63	0.24
3	Australia	0.76	3.88	1.06	0.27	0.67	0.24
4	Lithuania	0.75	17.85	0.90	0.15	0.61	0.36
5	Estonia	0.75	46.14	0.94	0.21	0.73	0.31
6	Japan	0.73	5.08	1.25	0.29	0.70	0.16
7	Slovenia	0.72	49.18	0.83	0.07	0.78	0.46
8	Slovak Republic	0.72	4.77	0.96	0.07	0.74	0.42
9	New Zealand	0.71	4.34	0.80	-0.03	0.86	0.44
10	Norway	0.71	42.17	1.13	0.18	0.72	0.30
11	Greece	0.71	14.07	0.99	0.07	0.62	0.43
12	Denmark	0.70	92.00	1.11	0.19	0.73	0.29
13	Czech Republic	0.70	26.53	1.11	0.11	0.67	0.33
14	Finland	0.69	49.13	1.18	0.12	0.65	0.32
15	Hungary	0.68	43.48	1.14	0.06	0.63	0.32
16	Austria	0.65	70.13	1.16	0.00	0.58	0.44
17	Israel	0.64	29.04	1.22	-0.06	0.82	0.42
18	Luxembourg	0.64	166.13	0.95	-0.07	0.78	0.50
19	Germany	0.63	90.86	1.38	0.07	0.70	0.31
20	Switzerland	0.63	181.13	1.23	0.06	0.78	0.37
21	Poland	0.63	21.36	1.34	-0.05	0.52	0.38
22	Sweden	0.61	319.99	1.36	0.21	0.60	0.19
23	Netherlands	0.58	316.63	1.30	0.08	0.72	0.32
24	Canada	0.56	134.74	1.51	-0.10	0.63	0.37
25	Portugal	0.55	111.24	1.39	-0.21	0.65	0.49
26	Turkey	0.53	46.66	1.56	-0.25	0.65	0.38
27	Ireland	0.53	301.40	1.31	-0.14	0.73	0.44
28	United States	0.51	246.98	1.73	-0.05	0.63	0.27
29	Italy	0.49	508.74	1.19	-0.15	0.69	0.62
30	France	0.46	397.79	1.50	-0.21	0.68	0.54
31	United Kingdom	0.43	482.47	1.60	-0.15	0.60	0.43
32	Belgium	0.40	761.55	1.39	-0.10	0.67	0.45
33	Spain	0.39	575.26	1.50	-0.28	0.64	0.60

Source: Authors' analysis.
Deaths per million are for May 12, 2020. The effective reproduction rate (ERR), epidemic control efficiency (ECE), and mobility decline are all calculated for the period March 4 to May 12, 2020. ERR decline is calculated as (2.4 – ERR)/2.4, assuming R0 = 2.4.

EFFECTS OF NPIs

DURING THE FIRST WAVE IN EUROPE

Imperial College, Feb-4 May* 2020

3.1 M death averted during the first lock-down in 11 countries w/total of 375 M population

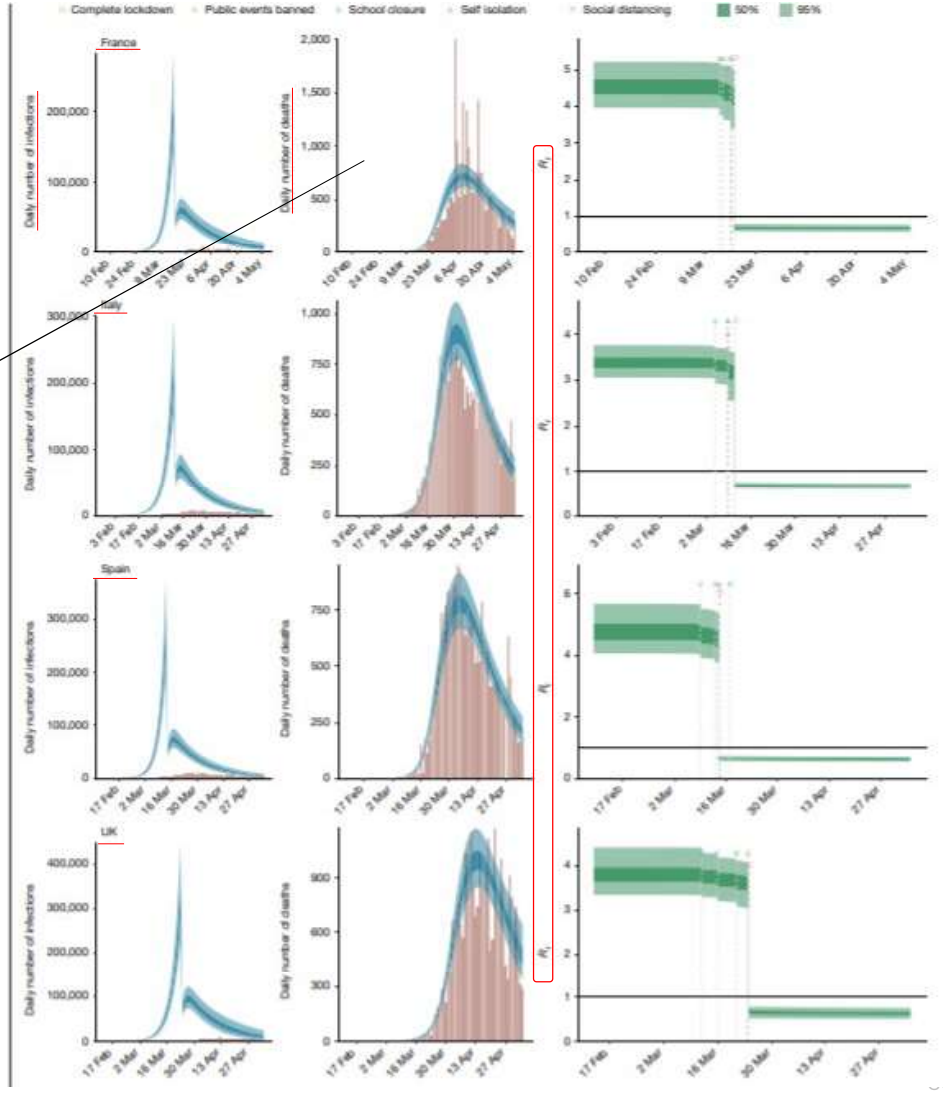


Fig. 1 | Country-level estimates of infections, deaths and Rt for France, Italy, Spain and the UK.
Left, daily number of infections.
Brown bars are reported infections; blue bands are predicted infections;
Brown bars are reported deaths; blue bands are predicted deaths.

Article

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

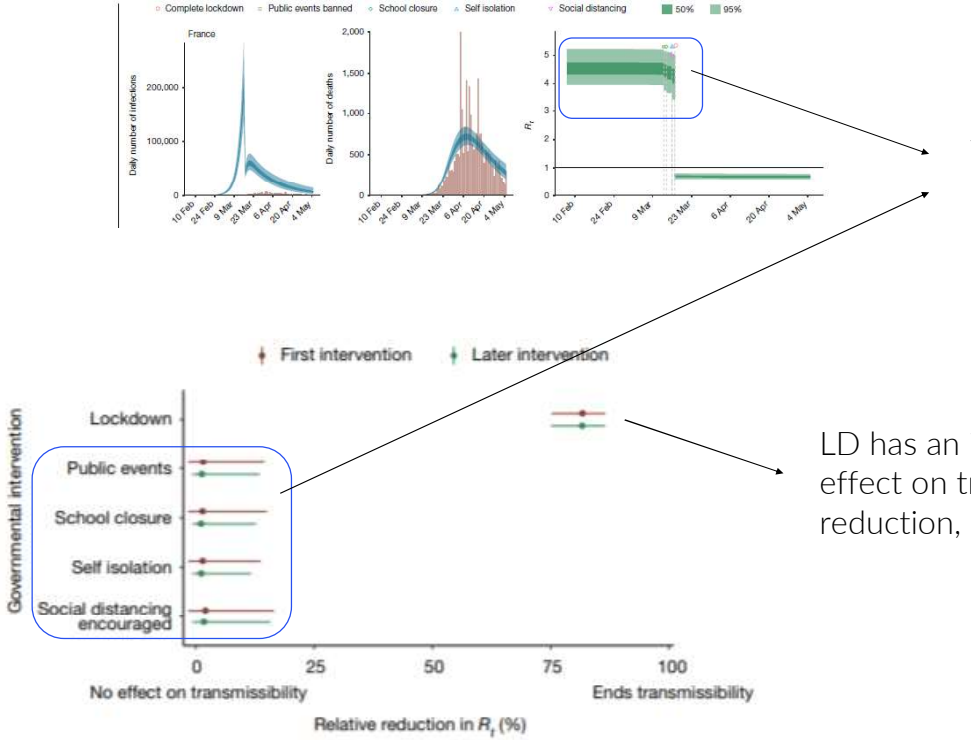
CHANGES OF Rt BY NPIs: Europe, First wave

Imperial College, Mar 2020

Table 1 | Total population infected by country

Country	Percentage of total population infected (mean (95% credible interval))
Austria	0.76% (0.59–0.98%)
Belgium	8% (6.1–11%)
Denmark	1.0% (0.81–1.4%)
France	3.4% (2.7–4.3%)
Germany	0.85% (0.66–1.1%)
Italy	4.6% (3.6–5.8%)
Norway	0.46% (0.34–0.61%)
Spain	5.5% (4.4–7.0%)
Sweden	3.7% (2.8–5.1%)
Switzerland	1.9% (1.5–2.4%)
UK	5.1% (4.0–6.5%)

Posterior model estimates of the attack rate by country (percentage of total population infected) as of 4 May 2020. Results are derived from a model representing 11 countries with a total population of 375 million and 128,928 reported COVID-19-related deaths up to 4 May 2020.



Very limited
Impact except LD

LD has an identifiable large effect on transmission reduction, i.e 81%

Fig. 2 | Effectiveness of interventions on Rt.
Our model includes five covariates for governmental interventions, adjusting for whether the intervention was the first one undertaken by the government in response to COVID-19 (red) or was subsequent to other interventions (green).
Lockdown is significantly different from the other interventions; the other interventions are not significantly different from each other, probably owing to the fact that many interventions occurred on the same day or within days of each other.
Results are derived from a model that represents 11 countries with a total population of 375 million and 128,928 reported COVID-19-related deaths up to 4 May 2020.

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

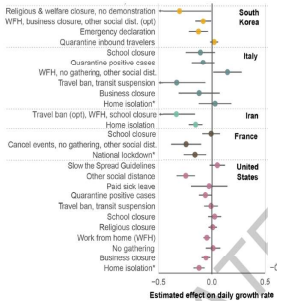
nature

Accelerated Article Preview

The effect of large-scale anti-contagion policies on the COVID-19 pandemic

EFFECT OF ANTI-CONTAGIOUS POLICIES

Berkley Univ, June 2020



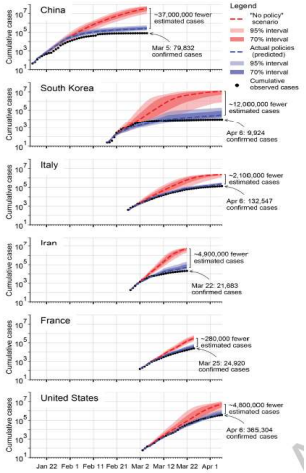


Fig. 4 | Estimated cumulative confirmed COVID-19 infections with and without anti-contagion policies. The predicted cumulative number of

Averted Millions Of COVID-19 Cases

Actual cases are shown as a dark bar, compared to the lighter bar representing projected cases if precautions had not been taken. For example, the study estimates that China may have seen 489 times as many cases without its efforts to curb the spread of the coronavirus.

COUNTRY	CASES	AS OF	PROJECTED	CASES VS. PROJECTED	RATIO
China	74,473	March 5	36,395,576		488.7x
South Korea	9,924	April 6	11,557,091		1,164.6x
United States	365,304	April 6	5,154,685		14.1x
Iran	21,683	March 22	4,921,398		227.0x
Italy	125,614	April 5	2,248,041		17.9x
France	24,920	March 25	304,093		12.2x

Source: Global Policy Lab

Credit: Thomas Wilburn / NPR

FAILURE OF LOCKDOWN WITH UNNESSESARY DEATH: INDIA

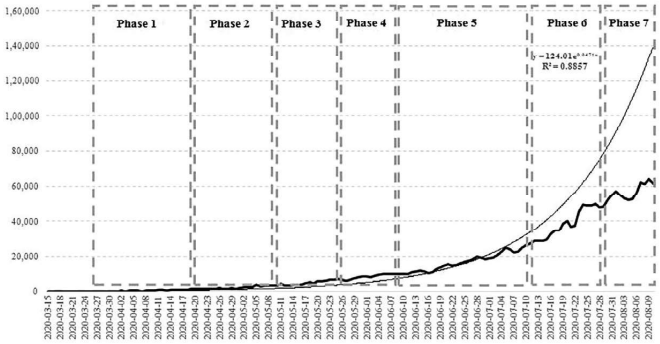
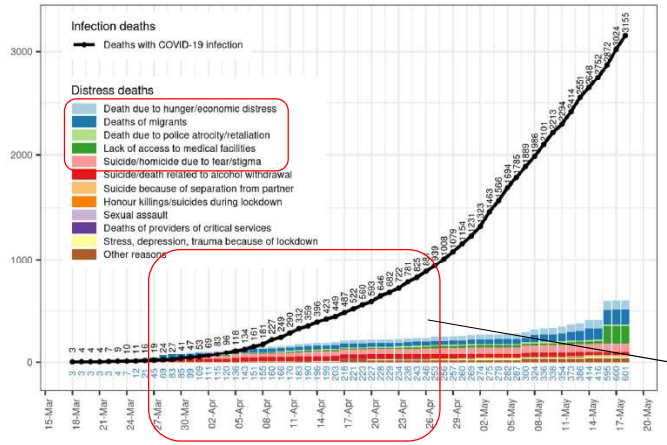


Fig. 2. New cases of COVID-19 in India during 2020.



Source: http://coronapolicyimpact.org, last accessed on 27 May 2020

Fig. 1 Deaths from COVID-19 and from distress related to containment policies (15 March to 18 May 2020)

High proportion of unnecessary death during the 1st one month of lockdown

Original Article/Research

Effects of the COVID-19 pandemic in India: An analysis of policy and technological interventions

Isha Goel[a,c], Seema Sharma[b], Smita Kashiramka[b]

[a]Economics Indian Institute of Technology, New Delhi, India
[b]Indian Institute of Technology, New Delhi, India

A critique of the Indian government's response to the COVID-19 pandemic

Jayati Ghosh[1]

Received: 30 May 2020 / Revised: 2 July 2020 / Accepted: 3 July 2020 / Published online: 11 July 2020

FAILURE OF LOCKDOWN WITH UNNCESSARY DEATH: INDIA

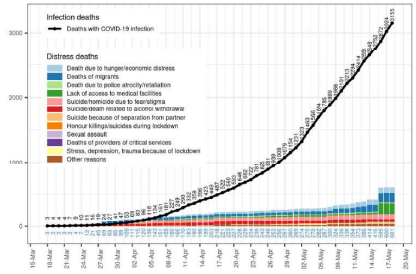
1. Very stringent version of lockdown as the only containment strategy: 95% of workers: informal micro-enterprises(half of them: self-employed) / extremely congested living condition(4-5 people living in one room)

2. No planning and preparation before lockdown:

Only 4 hrs notice / confusion on interstate movements of trains and buses → many migrants workers from states traveled by foot over long distance to villages

3. Very little social support:

Fiscal centralization → almost no budget for States to provide social support



Source: http://coronapolicyimpact.org, last accessed on 27 May 2020

Fig. 1 Deaths from COVID-19 and from distress related to containment policies (15 March to 18 May 2020)

Original Article/Research

Effects of the COVID-19 pandemic in India: An analysis of policy and technological interventions

Isha Goel[a,c], Seema Sharma[b], Smita Kashiramka[b]

[a]Economics Indian Institute of Technology, New Delhi, India
[b]Indian Institute of Technology, New Delhi, India

A critique of the Indian government's response to the COVID-19 pandemic

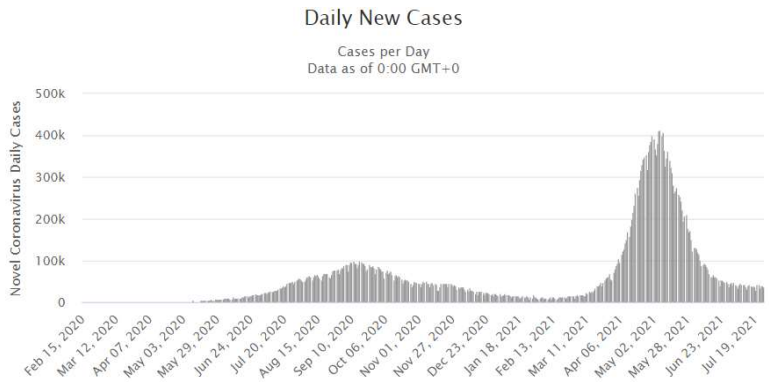
Jayati Ghosh[1]

Received: 30 May 2020 / Revised: 2 July 2020 / Accepted: 3 July 2020 / Published online: 11 July 2020

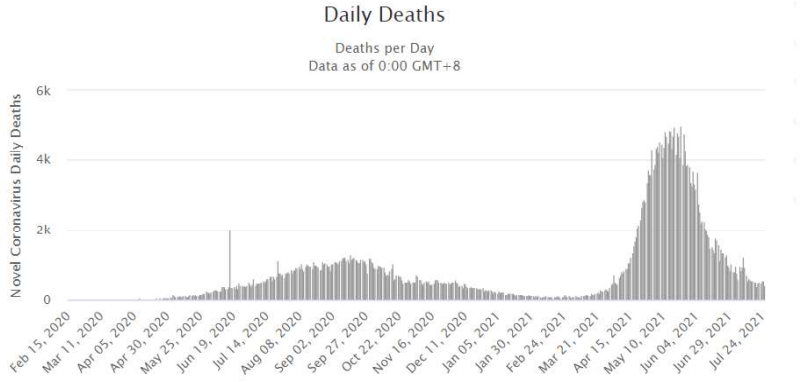
CASES & DEATHS IN INDIA

27 July 2021

Daily New Cases in India



Daily New Deaths in India



India

Coronavirus Cases:

31,439,764

Deaths:

421,411

worldometer

ESTIMATED EXCESS MORTALITY IN INDIA

Table 1. Comparing Alternative Estimates of All-Cause Excess Mortality (millions)

	Wave 1 (April 2020-March 2021)	*Wave 2 (April - June 2021)*	*Total*
1. States' Civil Registration Systems (CRS)	2 [0.1-2.3]	1.4 [1-2]	3.4 [1.1-4]
2. International age-specific infection fatality rates applied to Indian demography and seroprevalence	1.5	2.4	4.0
3. Consumer Pyramid Household Survey (CPHS)	3.4 [2-4.8]	1.5 [0.8-2.3]	4.9
Official	*0.16*	*0.24*	*0.4*

Age	IFR
(1)	(2)
10-59	0.08%
60-69	1.38%
70-79	4.62%
80+	15.46%
All	**0.54%**

Notes: Strictly speaking, our second estimate is a Covid-caused one because it is based on Covid infections and Covid-related IFRs.

FINANCIAL SUPPORT DURING LOCK-DOWN

Table 5.2 *Countries implemented a variety of approaches to support people to stay at home*

	Income support for people self-isolating	Accommodation/supplies provided?
Belgium	70% of average earnings (capped at €2755 month) plus nominal allowance of €150 per month	No
Canada	$500 a week for up to 16 weeks (statutory sick pay of 55% of regular earnings thereafter)	Yes – for those unable to isolate at home (only available in some regions)
Finland	100% of lost income suffered during isolation	Yes – for those unable to isolate at home
France	90% of gross salary + daily allowance (50% of daily basic wage) for 30 days	Yes – for those unable to isolate at home
Germany	100% of average annual salary for 6 weeks, (statutory sick pay of 70% of regular earnings thereafter)	No
Norway	Covered by statutory sick pay, which is 80% of salary (capped at NOK 60 000 per year)	Yes – for those unable to isolate at home
Ireland	€350 per week; Separate illness benefit for those not currently working	No
Italy	Covered by statutory sick pay, which is 50% of average daily pay (excludes self-employed)	Yes – for those unable to isolate at home
The Republic of Korea	Rates depend on household size (KRW 454 900 per month for individuals living alone); the Republic of Korea has no national paid sick leave system for non-COVID-19 illness	Yes – daily necessity kits provided to all in home isolation; quarantine facilities provided for severe symptoms or people without individual room
United Kingdom	£500 support payment for eligible lower earners (England, Wales, Scotland). Financial support grants available to eligible individuals in Northern Ireland. Statutory sick pay: £95.85/week	No

Source: Reed & Palmer (2021).