

International Horizon Scanning and Learning to Inform Wales' COVID-19 Public Health Response and Recovery

Report 23, 04/02/2021



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World Health Organization
Collaborating Centre on
Investment for Health and Well-being



Overview

The International Horizon Scanning and Learning work stream was initiated following and informing the evolving coronavirus (COVID-19) public health response and recovery plans in Wales. It focuses on COVID-19 international evidence, experience, measures, transition and recovery approaches, to understand and explore solutions for addressing the on-going and emerging health, wellbeing, social and economic impacts (potential harms and benefits).

The learning and intelligence is summarised in weekly reports to inform decision-making. These may vary in focus and scope, depending on the evolving COVID-19 situation and public health / policy needs.

This work is aligned with and feeding into the Welsh Government Office for Science and into Public Health Wales Gold Command. It is part of a wider Public Health Wales' systematic approach to intelligence gathering to inform comprehensive, coherent, inclusive and evidence-informed policy action, which supports the Wellbeing of Future Generations (Wales) Act and the Prosperity for All national strategy towards a healthier, more equal, resilient, prosperous and globally responsible Wales.

Disclaimer: The reports provide high-level summary of emerging evidence from country experience and epidemiology; research papers (peer-reviewed/not); and key organisations' guidance / reports, including sources of information to allow further exploration. The reports don't provide detailed or in-depth data/evidence analysis. Due to the novelty of COVID-19 virus/disease, and dynamic change in situation, studies and evidence can be conflicting, inconclusive or depending on country/other context.

In focus this week

-  **Genomic sequencing for COVID-19 (*follow up from Report 22*)**
-  **Psychological impact of COVID-19 and lockdown fatigue**
-  **Country insights: Israel, Taiwan and South Korea**

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At a glance: summary of international learning on COVID-19

“The pandemic has stretched the capacity of country health information systems around the world, as they must track both the disease and other critical health trends”

Dr Tedros Adhanom Ghebreyesus, WHO Director-General

Genomic Sequencing for COVID-19

- ✚ **49 countries** have published **more than a 100 genome sequences globally**, with limited or no genomic screening reported in other countries
- ✚ The **number of genomic sequences per reported COVID-19 case varies widely**
- ✚ The global **genomic data sets for SARS-CoV-2 are too large** for many current analytic tools, which impedes emergency response; and requires increased level of automation
- ✚ Efficient response to the pandemic and the VOC is challenged by the **limited reusability of the available primary genomic data**, due to providing limited metadata
- ✚ **Better reporting and presentation of genomic sequencing** would improve its practical application for public health and emergency response
- ✚ A **predefined, widely adopted multidimensional approach to organize critical genomic data** is critical to be prepared for the next pandemic
- ✚ Countries across the world have **tightened cross-border restrictions** and **WHO has recommended** that countries:
 - ✓ Should **not require proof of vaccination** from incoming travellers
 - ✓ Should take a **coordinated evidence-based approach**
 - ✓ Ensure **health authorities work closely with the transport and travel sector**
 - ✓ **Prioritise essential travellers** and **avoid all non-essential travel**

More information is summarised **on pp.4-9**

Psychological impact of COVID-19 and lockdown fatigue

- ✚ COVID-19 pandemic and measures have resulted in **short and long-term psychological consequences**, associated with **negative health outcomes**, including suicidal behavior
- ✚ Psychological effects are **exacerbated with the escalation of new cases** together with **inadequate, anxiety-provoking information by the media**
- ✚ **Public health measures may be compromised** by abnormally elevated anxiety
- ✚ **Inadequate public health information may be a significant stressor** and could lead to confusion about the purpose or the importance of measures
- ✚ **Older adults, especially those with mental health issues**, may become more anxious, angry, stressed, agitated and withdrawn
- ✚ **Health and social care (frontline) workers** have experienced substantial mental health impact and trauma as a result of the pandemic
- ✚ **Long-term behavioral changes**, such as vigilant handwashing, and delayed return to normality, can be observed **many months after lockdown**
- ✚ “Pandemic fatigue” or “response fatigue” **is growing across countries globally**
- ✚ Pandemic fatigue evolves gradually over time, **affected by cultural, social, structural and legislative context**, and **influencing emotions, experiences and perceptions**
- ✚ **Increasing individual resilience and enhanced social support** are protective factors that may help with lifestyle changes and re-adaptation mechanisms

More information is summarised **on pp.10-13**

Genomic sequencing for COVID-19

This report provides additional information and update on genomic sequencing, following up from the International Horizon Scanning [Report 22 published on the 21 January 2021](#)¹

Overview²³

- Genomic sequencing is a **vital rapidly-developing tool in the diagnosis, surveillance and control** of the COVID-19 virus (SARS-CoV-2)
- Identifying, tracking and understanding the impact of **new genetic variants (mutations)** is key, as they can have significant effect on the course of infection, speed of transmission, severity of disease, the effectiveness of control measures and vaccine efficacy
- The COVID-19 pandemic has highlighted the **lack of data worldwide** - even the most advanced health and surveillance systems struggle to provide data in near real-time to inform timely response and planning
- The **GISAID Initiative**⁴ provides open free-of-charge platform for sharing data on SARS-CoV-2 and influenza viruses, including genetic, clinical, epidemiological and geographical
- **The World Health Organization (WHO) routinely assesses variants** of SARS-CoV-2 for changes in **transmissibility, severity, clinical presentation** and monitors the potential impacts on measures, such as **diagnostics, therapeutics and vaccines**⁵

SARS-CoV-2 variations of concern⁶⁷⁸⁹¹⁰¹¹

- COVID-19 genomic sequencing has enabled the identification of **several variations of concern (VOC)**, including (*Table 1*):
 - 1) 'UK variant' - VUI202012/01
 - 2) 'South African variant' - 501Y.V2 (named due to a N501Y mutation)
 - 3) Two variants identified in Brazil - P.1 and 20B/S.484K.V2
- Current evidence suggests that **UK and the South Africa variants are more transmissible**
- Currently there is **not enough evidence** to suggest that **VOC VUI202012/01** is associated with any **change in severity of disease, immune response or vaccine efficacy**
- There are **concerns that VOC 501Y.V2 may increase the risk of reinfection or reduce vaccine efficacy**
- Currently there is **not enough evidence to suggest any change in the transmissibility of P.1 or 20J/501Y.V3**
- Results from the clinical trials (phase 3) of the **vaccine NOVAVAX (UK) show the vaccine is 89.3% efficient against VUI202012/01**
- The speed at which new variants are spreading demonstrates their **potential to increase the number of cases (incidence rates) globally**¹²¹³ (*Figure 1*). As of 2 February 2021:

¹ https://ihcc.publichealthnetwork.cymru/files/7716/1131/1335/PHW_COVID19_IntHorizonScan_Report_22_21Jan2021.pdf

² <https://genomebiology.biomedcentral.com/articles/10.1186/s13059-019-1846-5>

³ <https://www.aerzteblatt.de/nachrichten/120085/Labore-bereiten-sich-auf-Sequenzierungen-vor>

⁴ <https://www.gisaid.org/>

⁵ <https://www.who.int/csr/don/31-december-2020-sars-cov-2-variants/en/>

⁶ <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.26.1.2002106>

⁷ <https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-risk-related-to-spread-of-new-SARS-CoV-2-variants-EU-EEA-first-update.pdf>

⁸ <https://khub.net/documents/135939561/338928724/SARS-CoV-2+variant+under+investigation%2C+meeting+minutes.pdf/962e866b-161f-2d5-1030-32b6ab467896>

⁹ <https://ir.novavax.com/node/15506/pdf>

¹⁰ <https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-risk-related-to-spread-of-new-SARS-CoV-2-variants-EU-EEA.pdf>

¹¹ https://cmid.qihub.io/topics/covid19/reports/sa-novel-variant/2021_01_11_Transmissibility_and_severity_of_501Y_V2_in_SA.pdf

¹² <https://www.thinkglobalhealth.org/article/spread-covid-19-variants-adds-urgency-disease-control-efforts>

¹³ https://cov-lineages.org/global_report_B.1.1.7.html

- ✓ VOC 202012/01 (UK variant) has been reported in 80 countries across all six WHO regions (either imported cases or community transmission)
- ✓ VOC 501Y.V2 (South African variant) has been reported in 40 countries across four of the six WHO regions
- ✓ VOC P.1 (Brazil variant) has been reported in 10 countries across four WHO regions

Table 1. COVID-19 VOC and impact on disease severity, transmissibility and vaccine efficacy¹⁴¹⁵¹⁶¹⁷¹⁸¹⁹

Variant name	Prevalence	Mutations	Severity	Transmissibility	Vaccine Concern
VUI202012/01 Alternative names UK variant 20I/501Y.V1 B.1.1.7	Identified in many countries including Australia, Denmark, Italy, Iceland and the Netherlands As of 19 January 2021, approximately 16 800 cases have been identified in the UK	Multiple spike protein changes (deletion 69-70, deletion 144, amino acid change N501Y, A570D, D614G, P681H, T716I, S982A, D1118H) as well as mutations in other genomic regions	There is no evidence that this variant is associated with a significantly different disease severity or that it disproportionately affects certain age groups more than the previous circulating variants	Data analyses indicate that this variant could be 75% (70–80%) more transmissible than previously circulating variants	UK Phase 3 Results of NOVAVAX show the vaccine is 89.3% efficient against this variant
501Y.V2 Alternative names South African variant	As of 19 January 2021, approximately 570 cases have been identified in 23 countries	Multiple changes in the spike protein, including amino-acid modification N501Y which is also present in VOC 202012/01	There is currently uncertainty as to whether this variant causes a change in disease severity, due to carrying spike protein changes associated with reduced neutralisation by antibodies (the immune system)	It is estimated that 501Y.V2 is 50% more transmissible than previously circulating variants	There is a concern that this variant can reduce vaccine efficacy, e.g. increase the risk of reinfection or vaccine breakthrough infections
P.1 Alternative names Brazilian Variant 20J/501Y.V3	On 18 January 2021, South Korea reported one case in a returning traveller from Brazil As of 19 January 2021, no European (EU/EEA) countries have reported identifying this variant	The variant has 11 amino acid changes in the spike protein (L18F, T20N, P26S, D138Y, R190S, K417T, E484K, N501Y, H655Y, T1027I, and V1176F)	Nothing is known yet about potential changes in disease severity	There is currently no microbiological or epidemiological evidence indicating change in transmissibility, though this is plausible, due to similar mutations with the UK variant	Unclear
20B/S.484K.V2 Alternative names Brazil variant 2	As of 18 January 2021, this variant was identified also in the UK, Japan, Canada, USA, Argentina, Norway, Denmark, Ireland and Singapore	Carries spike mutation 484K	Unclear	Unclear	Unclear

¹⁴ <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.26.1.2002106>

¹⁵ <https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-risk-related-to-spread-of-new-SARS-CoV-2-variants-EU-EEA-first-update.pdf>

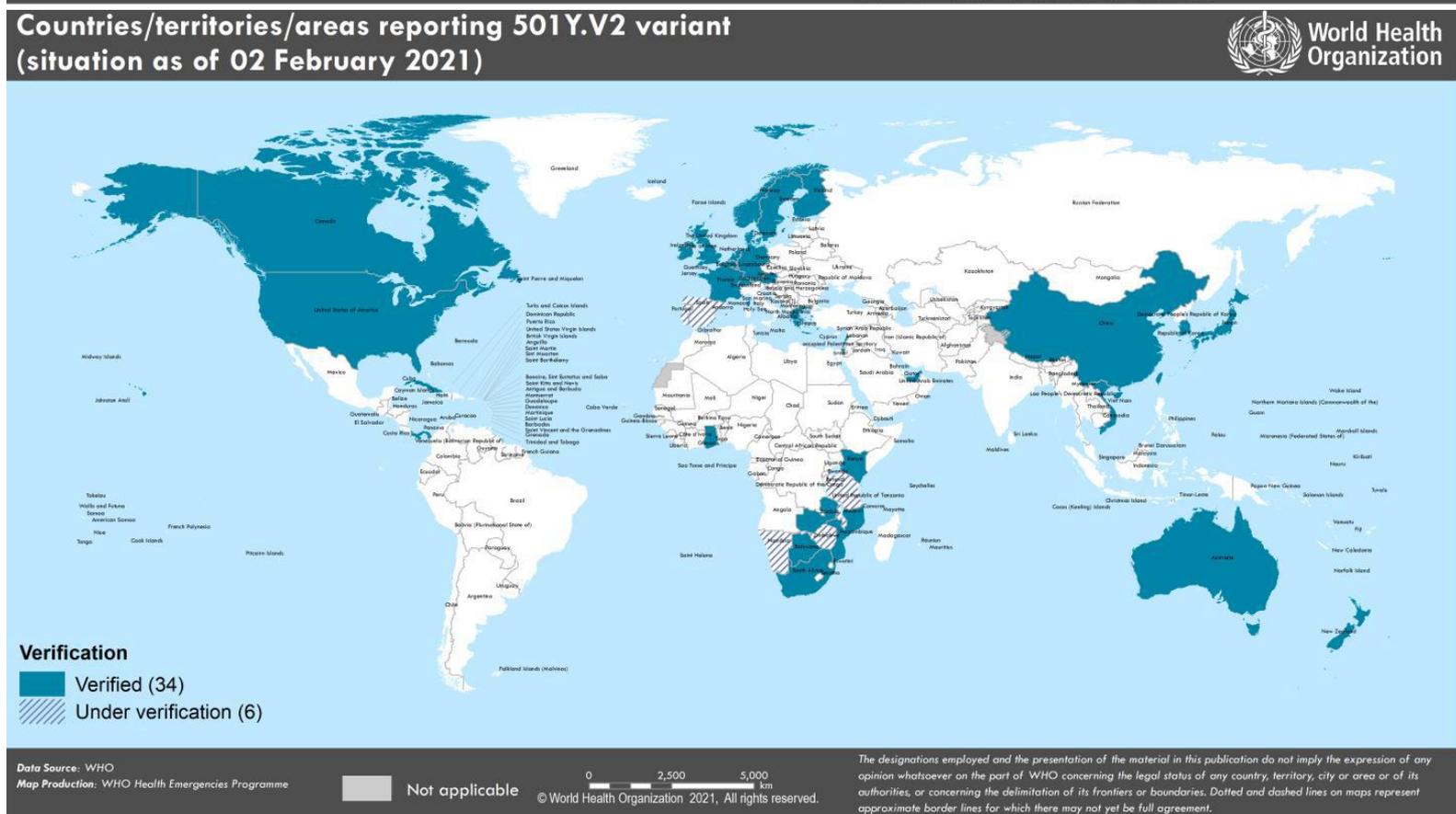
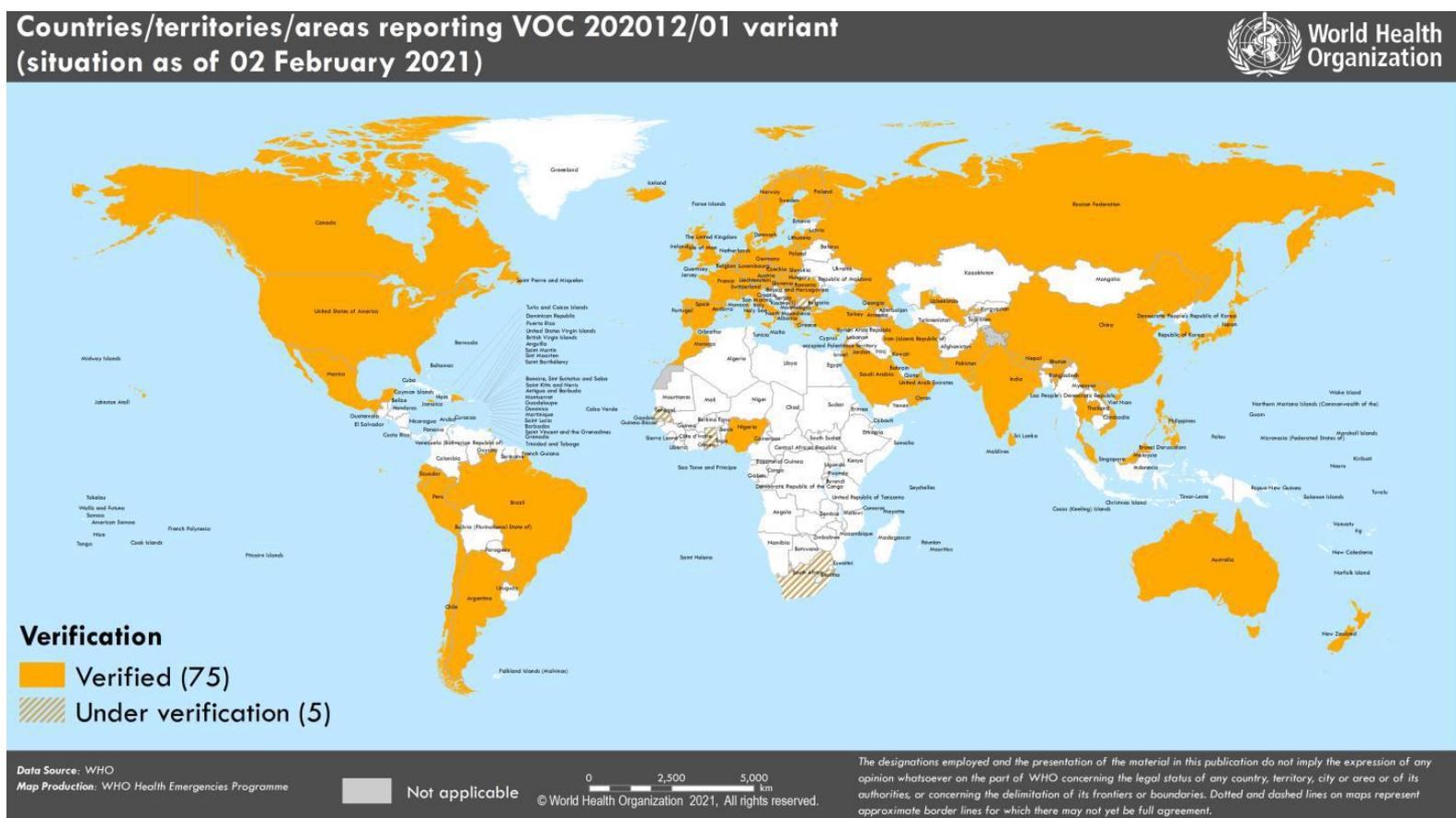
¹⁶ <https://khub.net/documents/135939561/338928724/SARS-CoV-2+variant+under+investigation%2C+meeting+minutes.pdf/962e866b-161f-2fd5-1030-32b6ab467896>

¹⁷ <https://ir.novavax.com/node/15506/pdf>

¹⁸ <https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-risk-related-to-spread-of-new-SARS-CoV-2-variants-EU-EEA.pdf>

¹⁹ https://cmid.github.io/topics/covid19/reports/sa-novel-variant/2021_01_11_Transmissibility_and_severity_of_501Y_V2_in_SA.pdf

Figure 1. Transmission of the UK and South African VOC across the world (as of 2 February 2021)



Recording and analysing genomic sequencing globally²⁰²¹²²²³

- **49 countries** have published **more than a 100 genome sequences globally**, with limited or no genomic screening reported in other countries (*as of September 2020*)
- The **number of genomic sequences per reported COVID-19 case varies widely**
- A number of **global and European databases** have been created to share genomic data for analysis and research, including COVID-19, such as:
 - ✓ **GISAID EpiCov database**²⁴
 - ✓ **COVID-19 data portal**²⁵
 - ✓ **The European Surveillance System (TESSy)**²⁶
- The global **genomic data sets for SARS-CoV-2 are too large** for many current analytic tools, which impedes emergency response; and requires increased level of automation
- Efficient response to the pandemic and the VOC is challenged by the **limited reusability of the available primary genomic data, due to providing limited metadata** (i.e. comprehensive description of the data)
- **Loss of critical genomics data reduces the near and long term utility of the data** and hinders clinical advancements in risk prediction, diagnosis, treatment and outcomes
- **Metadata reporting standards are vital**, ensuring the description of WHO, WHAT, HOW, WHERE, and WHEN of genomic data, for enabling comparative analysis and monitoring
- The **MlxS (Minimum Information about any (x) Sequence) checklists**²⁷ provides a standard for minimal and expanded sets of metadata across different types of genome studies, ensuring **genomic data FAIRness**²⁸
- Responsible sharing of genomic and health-related data must recognize that **genomic data are highly sensitive and identifiable**
- **Better reporting and presentation of genomic sequencing** would improve its practical application for public health/emergency response
- **A predefined, widely adopted multidimensional approach to organize critical genomic data** is critical to be prepared for the next pandemic
- WHO European Region reference laboratories and their technological capacity are listed in *Figure 2*

Limitations of genomic sequencing²⁰

- Genome sequencing of SARS-CoV-2 can help to determine whether infections have resulted from local transmission or have been imported, however:
 - ✓ Under-sampling of virus genomes can lead to underestimates of the number of introductions/imported and overestimates of the extent of community transmission
 - ✓ Sampling only certain areas of an outbreak can result in inaccurate reconstructions of dispersal history and speed of transmission
 - ✓ Phylogenetic information cannot be used to confirm direct virus transmission between two patients or transmission from a single source to several patients
- Genomic sequencing could be used to support surveillance for variants that may confer antiviral resistance or allow vaccine escape, however:

²⁰ <https://www.who.int/publications/i/item/9789240018440>

²¹ <https://www.ecdc.europa.eu/sites/default/files/documents/sequencing-of-SARS-CoV-2.pdf>

²² <https://www.nature.com/articles/s41597-020-0524-5>

²³ www.gensc.org

²⁴ <https://www.gisaid.org/>

²⁵ www.covid19dataportal.org

²⁶ <https://www.ecdc.europa.eu/en/publications-data/european-surveillance-system-nessy>

²⁷ <https://fairsharing.org/FAIRsharing.9aa0zp>

²⁸ Wilkinson, M. et al. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018 (2016).

- ✓ Such studies are extremely complex and require targeted and detailed investigation of viruses from patients with a known vaccination history and clinical outcomes
- ✓ While sequence data from viruses, cultured under drug selection pressure, may reveal possible antiviral resistance markers, these markers should always be validated by reverse genetics to determine their phenotypic characteristics

Figure 2. WHO European reference laboratories and technological capacity

WHO Reference Laboratory	Available Technology	WHO Reference Laboratory	Available Technology
National Institute for Infectious Diseases L. Spallanzani, Italy	Illumina MiSeq Ion Torrent GenStudio S5 Prime Oxford Nanopore MinION Acquisition ongoing: Illumina Nexseq550 Ion Torrent Genexus	Institute of Virology, Charite - Universitätsmedizin Berlin, Germany	Illumina MiSeq Illumina <u>NexSeq</u> Illumina <u>NovaSeq</u> Oxford Nanopore MinION Oxford Nanopore GridION
Federal Budgetary Research Institution – State Research Center of Virology and Biotechnology VECTOR, Federal Service for Surveillance on Consumer Rights Protection and Human Well-being, Russia	Illumina MiSeq Illumina NexSeq Oxford Nanopore MinION	Robert Koch Institute (RKI), Germany	Illumina MiSeq Oxford Nanopore MinION
Institut Pasteur, Molecular genetics of RNA viruses, National Reference Center for Respiratory viruses, France	Illumina MiSeq Illumina NexSeq Oxford Nanopore MinION	PHE Colindale, England, the UK	Illumina HiSeq 2500 Illumina NextSeq 550/500 Illumina MiSeq Acquisition ongoing: Illumina NextSeq 1000 Oxford Nanopore GridION
RIVM, the Netherlands	Illumina MiSeq Illumina NextSeq Oxford Nanopore MinION Oxford Nanopore GridION	Geneva University Hospitals (HUG), Switzerland	Illumina MiSeq Illumina HiSeq (4000)
ErasmusMC, the Netherlands	Oxford Nanopore Gridion Oxford Nanopore MinION Illumina MiSeq Illumina NovaSeq		

International travel and SARS-CoV-2 variants²⁹³⁰³¹

- ✚ Countries across the world have **tightened cross-border restrictions** to prevent the new COVID-19 VOC from spreading, affecting international travel
- ✚ **Potential use of vaccination and testing certificates** has been considered
- ✚ Due to the uncertainty regarding vaccination, the **WHO has recommended** that countries:
 - ✓ Should **not require proof of vaccination** from incoming travellers
 - ✓ Need to take a **coordinated evidence-based approach and adjust measures** to counteract the spread of variants
 - ✓ Ensure **health authorities work with the transport and travel sector** to provide travellers with necessary information
 - ✓ **Prioritise essential travellers** such as emergency responders and public health technical support; and **avoid all non-essential travel**

²⁹ <https://www.who.int/news/item/15-01-2021-emergency-committee-on-covid-19-advises-on-variants-vaccines>

³⁰ <https://www.who.int/csr/don/31-december-2020-sars-cov-2-variants/en/>

³¹ <https://www.ecdc.europa.eu/en/publications-data/covid-19-risk-assessment-spread-new-sars-cov-2-variants-eueea>

Country insight

Africa / South Africa

- COVID-19 cases and deaths are surging in Africa currently as new, more contagious variants of the virus is spreading to more countries³²
- Over 175 000 new COVID-19 cases and more than 6200 deaths were reported in Africa the week, commencing 18th January 2021
- The COVID-19 infections increased by 50% between 29 December 2020 and 25 January 2021 when compared with the previous four weeks
- In the past week, there has been a small dip in cases in South Africa, but 22 countries continue to see their case numbers surge
- Deaths rose two-fold in the same four-week period, with over 15 000 concentrated in 10 African nations
- Until recently, South African researchers were unable to access affordable platforms capable of human whole genome sequencing locally and DNA samples had to be exported
- More recently, the South African Medical Research Council's Genomics Centre³³ and the Kwazulu-Natal Research Innovation and Sequencing Platform (KRISP)³⁴ have started providing output of high quality, comparable to data generated internationally

Germany

- ✚ Germany is aiming to sequence 5% of all positive COVID-19 individuals
- ✚ Germany had no nationwide sequencing capacity in place until recently, increasing pressure on the allocation resource³⁵
- ✚ After the rapid spread of the new VOC, originated in the UK and South Africa, criticism among experts became stronger, advocating for Germany to allocate more financial resources to genome sequencing, to understand outbreaks and inform governmental decision-making processes³⁶
- ✚ The Federal Ministry of Health regulated a uniform processes for comprehensive 'molecular surveillance' of SARS-CoV2 to be initiated³⁷
- ✚ More than 3,000 SARS-CoV-2 sequences have been entered into the international genome databases from Germany, as of 12 January 2021
- ✚ The samples were mostly decrypted at the Charité, Berlin and the Robert Koch Institute laboratories³⁸
- Sequencing is carried out by 25 reference or consulting laboratories, resident specialist laboratories and university institutes³⁹

³² <https://worldhealthorganization.email19.com/t/ViewEmail/d/D9D742B1A306DAE72540EF23F30FEDED/7799BF2D54969A2E27D1E72AD0FD8334>

³³ <https://www.biorxiv.org/content/10.1101/2020.06.10.144402v3.full>

³⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6524403/>

³⁵ <https://www.tagesschau.de/wirtschaft/technologie/sequenzierung-bioscientia-corona-mutante-101.html>

³⁶ https://www.focus.de/gesundheits/news/virus-mutationen-entdecken-deutschland-hat- genomsequenzierung-verpennt- jetzt-soll-alles-ganz-schnell- gehen_id_12896105.html

³⁷ <https://www.corona-diagnostik-insights.de/f-a-q/>

³⁸ <https://www.aerzteblatt.de/nachrichten/120085/Labore-bereiten-sich-auf-Sequenzierungen-vor>

³⁹ <https://www.corona-diagnostik-insights.de/vollgenomsequenzierungslabore/>

Psychological impact of COVID-19 and lockdown fatigue

Pandemic fatigue⁴⁰⁴¹⁴²⁴³

- “Pandemic fatigue” or “response fatigue” to COVID-19 measures is **growing across countries globally**
- **Pandemic fatigue** as a natural expected reaction to sustained and unresolved adversity in people’s lives, resulting in a demotivation to engage in protective behaviours and to seek information, as well as in feelings of complacency, alienation and hopelessness
- Pandemic fatigue evolves gradually over time, **affected by cultural, social, structural and legislative context**, and influencing emotions, experiences and perceptions
- More information on the pandemic fatigue is available in the [International Horizon Scanning Report 21 published on the 17 December 2020⁴⁴](#)

Psychological impact of the COVID-19 pandemic⁴⁰⁴¹⁴⁵

- Evidence shows that the COVID-19 pandemic and lockdowns have resulted in **important short and long-term psychological consequences**, including: increased feelings of frustration, uncertainty, fear, anger, confusion, grief, numbness, irritability; as well as stress, anxiety, depression, emotional disturbance, mood alterations, emotional exhaustion, insomnia, post-traumatic stress disorder (PTSD)
- **Common psychological reactions** associated with disease outbreaks, and related to mass quarantine (lockdown), include generalized fear and pervasive community anxiety
- Psychological effects are **exacerbated with the escalation of new cases together with inadequate, anxiety-provoking information by the media**
- Psychological reactions to COVID-19 pandemic **may vary from a panic behavior or collective hysteria to pervasive feelings of hopelessness and desperation**, which are associated with **negative outcomes including suicidal behavior**
- **Public health measures may be compromised** by abnormally elevated anxiety
- **Inadequate public health information may be a significant stressor** and could lead to confusion about the purpose or the importance of measures
- **Older adults, especially those with mental health issues**, may become more anxious, angry, stressed, agitated and withdrawn
- **Health and social care (frontline) workers** have experienced substantial mental health impact and trauma as a result of the pandemic
- **Long-term behavioral changes**, such as vigilant handwashing and avoidance of crowds, as well as a delayed return to normality, can be observed **many months after lockdown**
- **Increasing individual resilience and enhanced social support are protective factors** that may help with regard to lifestyle changes and re-adaptation mechanisms
- The **most relevant and profound psychological impact of disease outbreaks on the general population** is shown on *Figure 3*
- Many studies (surveys) have examined the **impact of the first COVID-19 lockdown, showing the short-term psychological effects** (*Table 2*)

⁴⁰ <https://academic.oup.com/qjmed/article/113/8/531/5860841?login=true>

⁴¹ <https://www.who.int/publications/item/WHO-2019-nCoV-MentalHealth-2020.1>

⁴² <https://apps.who.int/iris/bitstream/handle/10665/335820/WHO-EURO-2020-1160-40906-55390-eng.pdf>

⁴³ <https://www.euro.who.int/en/health-topics/health-determinants/behavioural-and-cultural-insights-for-health/news2/news2020/10/how-to-counter-pandemic-fatigue-and-refresh-public-commitment-to-covid-19-prevention-measures>

⁴⁴ <https://hcc.publichealthnetwork.cymru/en/news/covid-19-international-horizon-scanning-and-learning/>

⁴⁵ <https://academic.oup.com/occmed/article/70/5/327/5843740>

Table 2. Long-term psychological effects of COVID-19 across countries

Geographical Area	Study description	Results
Wales⁴⁶	A survey carried out by Mind Cymru: with adults (over 18) from 9 April to 18 May 2020; with under 18's from 9 April to 1 June 2020	60% of those over 25 and 74% of those 13 to 24 reported that their mental health has worsened during the period of lockdown restrictions
Global⁴⁷	A survey observed the psychological health of 4283 surgeons from 101 countries	32.8% of respondents screened positive for depression; 30.8% for anxiety; 25.9% for stress; and 24% for Post-Traumatic Stress Disorder (PTSD). Respondents who knew someone who died of COVID-19 were more likely to screen positive for depression, anxiety, stress and PTSD
Germany⁴⁸	Cross sectional survey among 15704 adults (over 18) to identify prevalent psychological issues	44.9% of the surveyed reported generalised anxiety; 14.3% reported depression; and 65.2% reported psychological distress
Netherlands⁴⁹	A study examined the mental health impact of the pandemic on people with (1181) and without (336) depressive, anxiety, or obsessive-compulsive disorders between 1 April and 13 May 2020	People without underlying mental health disorders showed a greater increase in symptoms during the COVID-19 pandemic; individuals with the greatest burden on their mental health tended to show a slight symptom decrease
Norway⁵⁰	24,968 Norwegians participated in an electronic questionnaire with structured questions on dietary habits, emotional eating, psychological distress symptoms, and COVID-19-related worries, during April 2020	Emotional eating was reported in 54% of the population and was markedly more frequent in female participants
Spain⁵¹	Study exploring the psychological impact of the COVID-19 pandemic in the general adult population (3055) during the first stages of the outbreak in Spain, as well as their anxiety, stress and depression levels	36% of the participants reported moderate to severe psychological impact; 25% reported mild to severe levels of anxiety; 41% reported depressive symptoms, and 41% felt stressed. Women, young people, and those who had lost their job during the health crisis showed the highest level of negative psychological impact (symptoms)
Belgium, France and Canada⁵²	2871 adults (79% women) completed an online survey about major implications of COVID-19 lockdown measures on mental health and alcohol use behaviours	26.4% reported an increase in consumption of alcohol. Individuals who increased their alcohol consumption during lockdown often had higher levels of anxiety and depression
Singapore⁵³	Health care workers from two major tertiary (specialised) hospitals in Singapore, who were caring for patients with COVID-19, were invited to participate with a self-administered questionnaire (19 February to 13 March 2020)	14.5% of participants screened positive for anxiety, 8.9% for depression, 6.6% for stress and 7.7% for clinical concern of PTSD
Bangladesh⁵⁴	A cross-sectional study examined 370 frontline doctors who were involved in the treatment of COVID-19 patients (1 April - 30th May 2020)	36.5% had anxiety, 38.4% had depression The supply of sufficient resources in the workplace and mental health counselling were identified as measures to mitigate and address the mental health impact

⁴⁶ <https://www.mind.org.uk/media-a/6176/the-mental-health-emergency-wales-summary-report-english-1.pdf>

⁴⁷ <https://pubmed.ncbi.nlm.nih.gov/33491983/>

⁴⁸ <https://academic.oup.com/jpubhealth/article/42/4/672/5869903>

⁴⁹ [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(20\)30491-0/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(20)30491-0/fulltext)

⁵⁰ <https://dx.doi.org/10.3390/ijerph18010130>

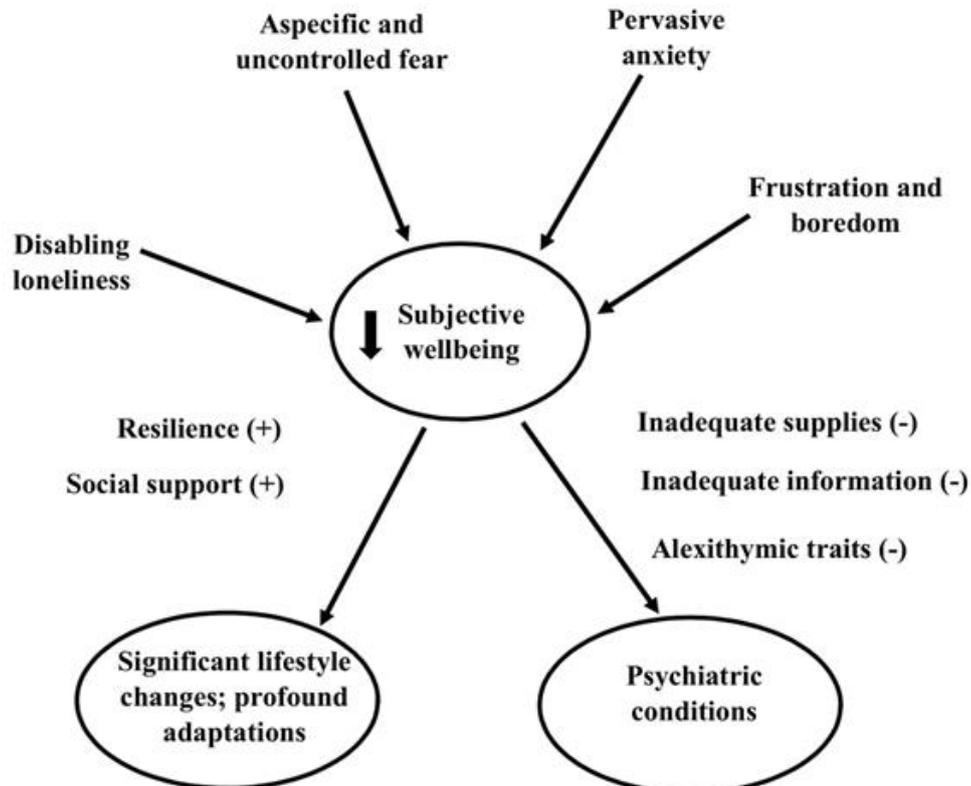
⁵¹ <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01540/full?report=reader>

⁵² <https://pubmed.ncbi.nlm.nih.gov/33424513/>

⁵³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7143149/>

⁵⁴ <https://pubmed.ncbi.nlm.nih.gov/33447383/>

Figure 3. Summary of the most relevant psychological reactions in the general population, related to COVID-19 and lockdown measures⁵⁵



Measures to address psychological and mental health issues⁵⁶⁵⁷⁵⁸⁵⁹

- Mitigate consequences of the crisis through comprehensive long-term strategies
- Promote basic social rights and invest in economic protection
- Tackle stigma and discrimination by investing in mental health literacy
- Promote cross-sectoral collaboration
- Promote and support community-based services

Supporting frontline healthcare workers:

- Provide social and peer support to reduce feelings of guilt or being a burden to others
- Managers and team leaders to initiate a caring and cohesive team approach
- Special attention for staff who may be particularly vulnerable due to pre-existing experiences or mental health issues, previous traumas or bereavements, their own physical health, or concurrent pressures and loss
- Continue to actively monitor and support staff after the crisis begins to recede

⁵⁵ QJM: An International Journal of Medicine, Volume 113, Issue 8, August 2020, Pages 531–537. <https://academic.oup.com/qjmed/article/113/8/531/5860841?login=true>

⁵⁶ <https://academic.oup.com/qjmed/article/113/8/531/5860841?login=true>

⁵⁷ <https://www.who.int/publications/i/item/WHO-2019-nCoV-MentalHealth-2020.1>

⁵⁸ <https://academic.oup.com/qjmed/article/113/8/531/5860841?login=true>

⁵⁹ <https://academic.oup.com/ocmed/article/70/5/327/5843740>

Addressing lockdown fatigue⁶⁰

- The WHO has proposed multi-faceted strategy for governments to maintain and reinvigorate public support for protective behaviours, including:
 - ✓ **Understand people.** Collect and use evidence for targeted, tailored and effective policies, interventions and communication
 - ✓ **Engage people as part of the solution.** Find ways to meaningfully involve individuals and communities at every level.
 - ✓ **Allow people to live their lives, but reduce risk.** Wide-ranging restrictions may not be feasible for everyone in the long run.
 - ✓ **Acknowledge and address** the hardship people experience and the profound impact the pandemic has had on their lives
- Action must be based on the **barriers and drivers experienced by people**, and must be **implemented in an integrated way** across all levels of society (*Table 3*)

Table 3: Addressing lockdown fatigue: country examples⁶⁰⁶¹

Country	Example mitigation measure
Denmark	One municipality invited young students to work with them to determine the most appropriate way to preserve the student experience while protecting communities as universities reopened.
Germany	The government has consulted philosophers, historians, theologians, and behavioural and social scientists, who provided valuable input on the educational progress of children from disadvantaged families, the legitimacy of restrictions, and the balance between public support and moral norms versus coercive state action.
Norway	Kindergarten staff were engaged to develop sustainable and reasonable guidance for re-opening kindergartens in a way that counteracts fatigue of staff, children and parents through flexible attendance.
Romania	The Government of Romania used findings from a behavioural insights survey conducted in the country to inform their strategy, helping to identify developments over time, new issues as they emerge, and the positive and negative effects of restrictions, messages or actions. The study confirmed high support for reopening schools from both younger and older children.
Turkey	Social media polls are being used to connect with the community and better understand non-compliance with protective measures to inform and evolve COVID-19 policy and introduce supportive communication or services to reinvigorate positive public response.
Ukraine	Behavioural insights surveys in Ukraine identified men with low education as a group with low adherence and low risk perception related to COVID-19. To tailor communication to this critical group and enhance impact and relevance, new COVID-19 messages and visuals were tested in focus groups.

⁶⁰ <https://apps.who.int/iris/bitstream/handle/10665/337574/WHO-EURO-2020-1573-41324-56242-eng.pdf?sequence=1&isAllowed=y>

⁶¹ <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-rising-covid-19-fatigue-and-a-pan-regional-response>

Country insights: Israel, Taiwan and South Korea

Israel

Epidemiology trends⁶² (Figure 4)

- Israel has experienced **four peaks in the incidence (new cases) rate**, occurring in mid-April to late July 2020; September 2020; and mid-January 2021)
- The latest peak is subject to change as more data becomes available
- Israel has experienced **three peaks in the death rate**, occurring in late-April 2020, early October 2020 and mid-January 2021
- The highest number of cases and deaths was observed during week two of 2021 with:
 - ✓ Over 6,000 cases per 1million population
 - ✓ Approximately 30 deaths per 1million population
 - ✓ In total there have been 569,152 cases and 4,158 deaths

Testing strategy (Figure 5)

- Israel has implemented an **adaptive testing strategy**, alternating to one of three approaches depending on which is the most relevant for the situation (Figure 5):
 - 1) **Strategy 1**: testing those with symptoms and other criteria (adopted during January - May 2020 and a 3-week period in October 2020), shown in **light green**
 - 2) **Strategy 2**: testing anyone showing symptoms (adopted from mid-May to October 2020), shown in **light blue**
 - 3) **Strategy 3**: open public testing (adopted since early November 2020), shown in **dark blue**
- In January 2021, the highest weekly testing rate was recorded with approximately 88 tests per 1,000 population
- The rate of recorded positive tests was particularly low throughout weeks 20 – 23 (May – June 2020), and it peaked during week 39 (late September)

COVID-19 VOC and mitigation measures^{63,64}

- VOC originating from the UK, South Africa and Los Angeles have been identified
- On 23 December 2020, four cases of the **UK variant** were reported:
 - ✓ Three of the cases returned from the UK and were put into isolation in quarantine motels and the fourth case remained under investigation⁶⁵
 - ✓ Since the initial announcement more cases have been identified
- On 9 January 2021, 15 cases of the **South African variant** were reported:
 - ✓ Four cases were identified from two chains of infection, related to returned travellers⁶⁶
 - ✓ Additional cases of the South African variant have since been identified
- **A new variant from Los Angeles has been identified in four people and investigation is still ongoing** (announced by the Ministry of Health on 24 January 2021)

⁶² <https://worldhealthorg.shinyapps.io/covid/>

⁶³ <https://www.gov.il/en/departments/news/24012021-04>

⁶⁴ <https://www.gov.il/en/departments/news/24012021-03>

⁶⁵ <https://www.gov.il/en/departments/news/23122020-07>

⁶⁶ <https://www.gov.il/en/departments/news/09012021-01>

- The Government imposed a **halt on inbound and outbound international air travel** between 25th and 31st January 2021, including:
 - ✓ Air travel of **foreign aircrafts to Israel is banned**, except cargo, firefighting or urgent medical evacuation aircrafts
 - ✓ Temporary suspension of the **operation of Israeli airlines**
 - ✓ **Outbound international air travel is permitted** only for a medical treatment, legal proceedings, and the funeral of a family relative

Figure 4. COVID-19 cases and deaths (per 1 million people) in Israel, by week, since January 2020

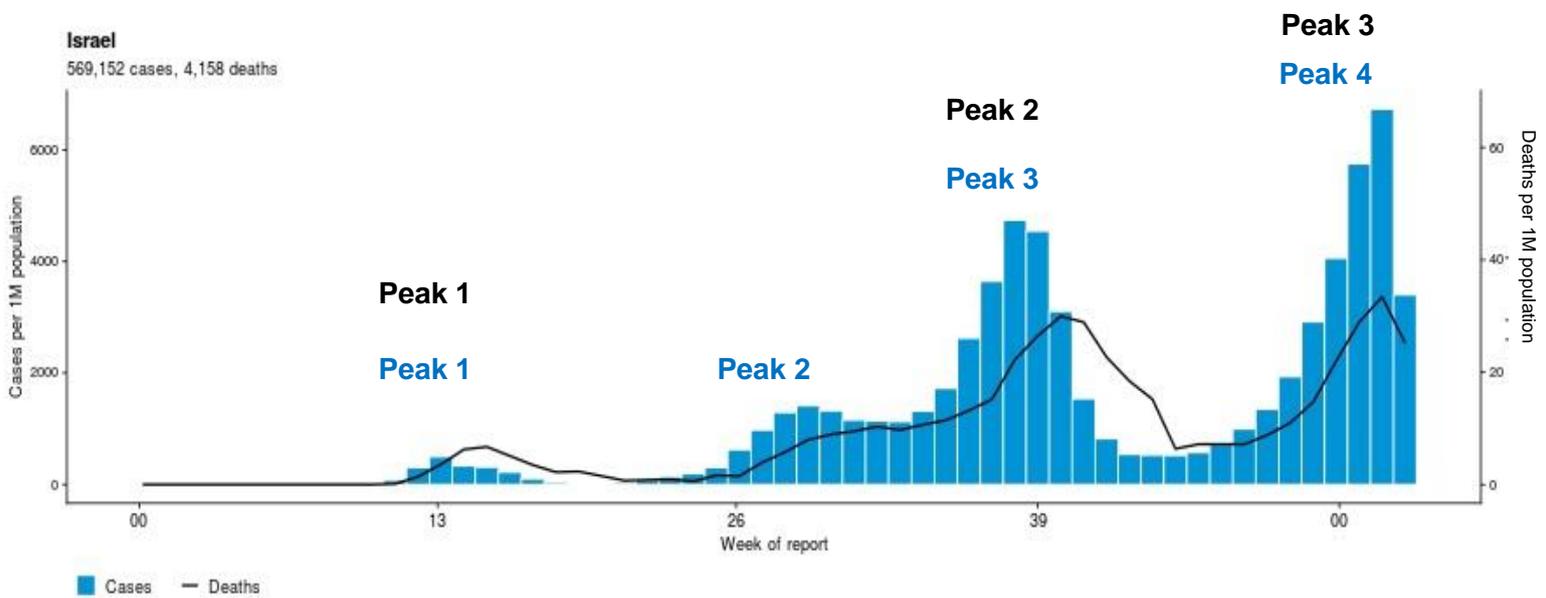
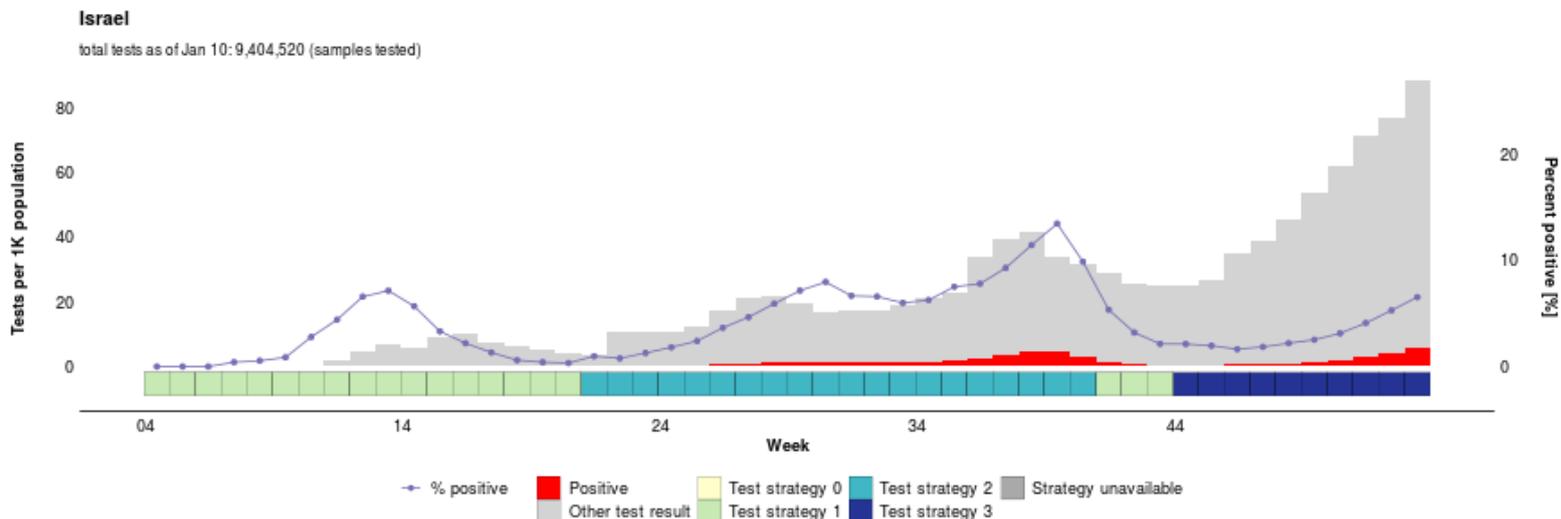


Figure 5. COVID-19 testing rate (per 1,000 population) and test positivity rate (%) in Israel, since January 2020



COVID-19 vaccine delivery in Israel⁶⁷

- Israel has **vaccinated more than 75% of its older people with at least one dose**, as of 22 January 2021
- Early reports from the vaccine rollout have suggested that the **first vaccine dose led to a 33% reduction in COVID-19 cases** after 14-17 days of vaccination - compared to a control group who were not vaccinated; and compared with an efficacy of at least 52%, reported in clinical trials

Country Insight: Taiwan and South Korea

Overview⁶⁸⁶⁹

- **Effective test, trace, and isolate (TTI) systems** have featured alongside other measures in a number of high-income countries, such as Taiwan and South Korea
- An effective test and trace system needs to **prioritise groups and settings where the virus can spread quickly**⁷⁰
- Evidence suggests that if 80% of cases and contacts are identified with an immediate testing following symptom onset followed by quarantine of contacts within 24 hours, then the reproductive number (R) could be potentially reduced by up to 26%⁷¹

Taiwan

- Taiwan was **the first nation to implement proactive measures** against COVID-19
- As a result of its experience with SARS, Taiwan has **dramatically strengthened its pandemic control measures** by:
 - ✓ Developing hospital standard operating procedures to address highly contagious diseases
 - ✓ National Health Insurance Administration technological advances

South Korea

- The **rapid and innovative response** taken in South Korea is believed to be due to the experience of MERS in 2015
- In the early stage of the pandemic, South Korea was one of the most-affected countries
- South Korea has had a high volume of testing and low number of deaths, suggesting that it has experience a small epidemic of infections relative to other countries
- Caution is needed in attempting to duplicate the South Korean response in settings with larger more generalised epidemics

Examples of prevention and mitigation measures in Taiwan and South Korea are presented in *Table 4*.

⁶⁷ <https://www.bmj.com/content/bmj/372/bmj.n217.full.pdf>

⁶⁸ <https://www.cqdev.org/publication/using-covid-19-test-trace-and-isolate-systems-effectively-middle-income-countries>

⁶⁹ <https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-25-south-korea/>

⁷⁰ <https://www.bmj.com/content/bmj/370/bmj.m3553.full.pdf>

⁷¹ [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30630-7/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30630-7/fulltext)

Table 4. Example prevention and mitigation measures in Taiwan and South Korea

Country	Example prevention and mitigation measures
Taiwan ⁷²⁷³	<p>Taiwan Centres for Disease Control (TCDC) developed a national contact tracing platform named TRACE in 2017</p> <p>The National Health Insurance Administration (NHIA) developed the NHI Smart Card and the MediCloud system in 2018</p> <ul style="list-style-type: none"> ✓ The NHI Smart Card allows all providers real-time access to upload patient records and claims ✓ The MediCloud system provides real-time access to patient's health records, including diagnostic imaging and prescriptions <p>The Central Epidemic Command Centre (CECC), established in 2003, was activated on 20 January 2020, before Taiwan had its first case of COVID-19</p> <ul style="list-style-type: none"> ✓ From 5th April 2020, the CECC collaborated with telecommunication companies via TRACE to send automatic two-way text messages and receive responses ✓ Providers were able to obtain patients' travel history, occupation, contact history, and clustering at mass gatherings in real-time, enabling efficient triage and rapid and accurate diagnoses while keeping them safe ✓ CECC also set up a real time locating system to track contacts' phone signals and alert local authorities if anyone left their designated location or switched off their phone ✓ Authorities would contact or visit those who triggered an alert within 15 minutes <p>The Intelligent Electronic Fences System (IEFS) is a GPS-based information system developed in early February 2020</p> <ul style="list-style-type: none"> ✓ The system monitors the nation's entire quarantined population and any potential people that they may come into contact with ✓ It tracks them in real time and retrospectively for up to a month
South Korea ⁷⁴⁷⁵⁷⁶	<p>Widespread digital surveillance enabled rapid responses to emerging clusters of infection, through:</p> <ul style="list-style-type: none"> ✓ The travel history of patients were traced using data such as credit card usage, CCTV, and mobile GPS to identify contacts ✓ The contacts identified had to be self-isolated under monitoring by local governments ✓ During self-quarantine, if a new symptom was developed, a notification was sent to a public officer ✓ If those under self-quarantine were found at any place other than their home or a quarantine facility, they would face a fine of up to 10 million won (£6600) or a year in prison ✓ South Korea did not implement travel restrictions except for arrivals from Wuhan, China <p>Other measures include:</p> <ul style="list-style-type: none"> ✓ Transparent risk communication, civil society mobilisation, improvement of accessibility and affordability of the treatment and test, consistent public messages on the potential benefit of wearing a mask, and innovation approaches and technology ✓ Government action to control the supply and distribution of masks and imposed penalties on the hoarding of masks, leading to shortages

⁷² <https://blogs.bmj.com/bmj/2020/07/21/what-we-can-learn-from-taiwans-response-to-the-covid-19-epidemic/>

⁷³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7537669/pdf/main.pdf>

⁷⁴ <https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-25-south-korea/>

⁷⁵ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7766828/pdf/ijerph-17-09571.pdf>

⁷⁶ <https://www.bmj.com/content/bmj/369/bmj.m2084.full.pdf>

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