Public Health Implications of SARS-CoV-2 VOC, updated October 22, 2021

Supplementary Table 1. Summary of studies (n=126)

Author, date	Date of publication	Date of data collection	Source	Study design	Country	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
INCLUDED STUDIES FROM AUGUST 25 TO OCTOBER 4, 2021 (N=42)											
Abu-Raddad 2021[1]	28-May-21	Feb 1st to Mar 31st 2021	Journal of Travel Medicine	Case control	QAT	Community	333,764	Vaccine effectiveness	Document Pfizer-BioNtech vaccine protection on weekly basis after first dose	Alpha, Beta	75% protection reached after 15-21 days since initial dose. Protection increased most rapidly against hospitalization and death, and slowest against B.1.351 infection.
Adamoski 2021[2]	17-Sept-21	Oct 10th 2020 to May 24th 2021	Emerging Infectious Diseases	Cross Sectional	BRA	University	7,249	Positive test sample, genotype	Implement large screening campaign to provide safer environment for individuals on-site of university	Gamma	Analyzing saliva samples provides a cheap and easy asymptomatic screening strategy.
Antonini 2021[3]	17-Aug-21	Sep 1st 2020 to May 1st 2021	Vaccines	Modelling	ITA	Community	N/A	Disease severity, hospitalizations, ICU admissions, deaths	Explore the dynamics of COVID-19 with different vaccination paces and a policy of gradual reopening	Alpha, Gamma	The control of COVID-19 can be accomplished by a multi-strategy approach combining highly effective vaccines, social distancing, and isolation of positive cases.
Avila 2021[4]	26-Sep-21	Dec 20th 2020 to Aug 17th 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Infections, asymptomatic vs. symptomatic infections, deaths, vaccination rates	Model virus spread in unvaccinated and vaccinated subpopulations with parameters associated with delta variant, two-dose vaccination, and the variant's partial vaccine resistance	Delta	Combination of strengthening vaccine induced immunity, and preventative behaviour measures will decrease the rise of variants.
Bauer 2021[5]	02-Sep-21	May 2021 to Fall 2021	PLOS Computational Biology	Modelling	EUR	Community	N/A	Rate of NPI relaxation	Study how planned vaccine rollout in EU allows for restriction relaxation.	Alpha, Beta, Gamma, Delta	Keeping moderate preventative measures such as improved hygiene, use of face masks and moderate contact reduction is recommend to control virus spread.
Chen 2021[6]	27-Sep-21	N/A	medRxiv [preprint]	Modelling	CHN	Community	N/A	Infections, symptomatic COVID-19,	Evaluate long-term dynamics of neutralizing antibody	Delta	Timely boosting with vaccines can provide protection against Delta variant. Better performance

								severe COVID-19	and predict time-varying efficacy against Delta variant by vaccine, age group and clinical severity		associated with mRNA vaccines rather than protein and inactivated vaccines.
Cipriano 2021[7]	05-Sep-21	Aug to Dec 2021	medRxiv [preprint]	Modell-ing	CAD	Community	N/A	Infections, hospitalizations, time to reinstate public health measures, vaccine coverage, level of contact reduction	Project number of COVID-19 cases and demand for hospital resources for Fall 2021. Evaluate if current levels of vaccine coverage and contact reduction could mitigate 4th wave, or if public health measures should be reinstated	Alpha, Delta	High vaccination coverage and mask wearing in public will not be sufficient to prevent a resurgence of COVID-19 in Fall 2021. Immediate moderate public health measures can prevent the need for more intense measures to be implemented later.
Cowley 2021[8]	08-Sep-21	Nov 2020 to Apr 2021	Nature Microbiology	Bayesian time-scaled phylo-genetic analysis	BGD	Community	152	Infections, COVID-19 lineages, population mobility	Track the spread of COVID-19 lineages and identify outbreak dynamics.	Alpha, Beta	Repeated international importations until late March were followed by a period of sustained community transmission. Stay-at-home orders can exacerbate transmission.
Cuesta-Lazaro 2021[9]	23-Sep-21	July 10th, 2021, to Feb 1st, 2022 (simulations)	medRxiv [preprint]	Modell-ing	UK	Schools	N/A	Infections, deaths	Simulate the spread of COVID-19 infections after reopening of schools and compare the influence of three different vaccination campaigns, as well as the impact of continuing NPIs in schools.	Delta	The primary result from the comparison of vaccine scenarios is that vaccinating 80% of 12−17 year olds prior to July 2021 would have had a major effect on the epidemic progression — significantly more than just vaccinating those 16 and older or adults alone.
De-Leon 2021[10]	20-Sep-21	July 2020 to June 2021	medRxiv [preprint]	Modell-ing	ISR	Community	N/A	Confirmed cases, severe hospitalizations, vaccine effectiveness	Examine the extent of the impact of the Delta variant on morbidity and whether it can solely explain the outbreak, or if waning vaccine	Delta	Both Delta infectiousness and waning vaccine effectiveness could have been able to push Israel below the herd immunity threshold (HIT) independently; thus, to mitigate the outbreak, effective NPIs are required.

									effectiveness also played a role.		
Doyle 2021[11]	03-Sep-21	March 15 to May 3, 2021	Morbidity and Mortality Weekly Report (MMWR)	Case series	USA	Schools	158	Infections	Evaluate the role of travel and social connections, as well as the potential impact of SARS-CoV-2 variants, on transmission among a cluster of students with COVID-19 at an urban university.	Alpha	Student travel by unvaccinated students during a university break and subsequent on-campus gatherings drove introduction and transmission of several lineages.
Eyre 2021[12]	01-Oct-21	January 1 to July 31, 2021	medRxiv [preprint]	Retrospective cohort	UK	Community	146,243	Infections, SARS-CoV-2 lineages, transmission, index case and contact vaccination	Investigate associations between transmission and index case and contact vaccination, and how these vary with Alpha and Delta variants and time since second vaccination.	Alpha, Delta	Vaccination reduces transmission of Delta, but by less than the Alpha variant. The impact of vaccination decreased over time. Factors other than PCR Ct values at diagnosis are important in understanding vaccine-associated transmission reductions. Booster vaccinations may help control transmission together with preventing infections.
Fiori 2021[13]	21-Sep-21	January to June 2021	medRxiv [preprint]	Time series analysis/ modeling	ARG, BRA, CHL, PRY, URY	Community	N/A	Infections (incidence data), viral transmissions (reproduction rate), deaths, vaccinations, population mobility	Investigate the impact of national vaccination programs and natural infection on viral transmission in select South American countries.	Gamma	Populations from the South American Southern cone probably achieved the conditional herd immunity threshold to contain the spread of regional SARS-CoV-2 variants.
Gollier 2021[14]	09-Jun-21	Not reported	Journal of Benefit-Cost Analysis	Modelling	FRA	Community	N/A	Infections, ICU admissions, deaths, rate of vaccination, economic/GDP loss	To measure the welfare benefit for France of the optimal vaccination campaign (of prioritizing older people, together with people with co-morbidities), by combining its wealth	Alpha	Three-quarters of the welfare benefit of the vaccine can be achieved with a speed of 100,000 full vaccination per day. A 1-week delay in the vaccination campaign raises the death toll by approximately 2,500 and reduces wealth by 8 billion euros. Prioritizing the allocation of vaccines to the most vulnerable people saves 70,000

									and health impacts; and to measure the welfare cost of the misallocation of the vaccine.		seniors, but it also increases the death toll of younger people by 14,000. If the production country vaccinates its entire population before exporting to another, the global death toll would be increased by 20%.
Hagan 2021[15]	24-Sep-21	July 12th to Aug 14th, 2021	Morbidity and Mortality Weekly Report (MMWR)	Case study	USA	Prison	172	Positive COVID cases	Describe an outbreak involving the Delta variant in a highly vaccinated incarcerated population	Delta	Widespread vaccination among incarcerated persons and staff members in coordination with other prevention strategies remain critical to limiting SARS-CoV-2 transmission and COVID-19–related illness and death in congregate settings, including correctional and detention facilities.
Kost 2021[16]	22-Sep-21	Not reported	Archives of Pathology & Laboratory medicine	Modelling	USA	Community	N/A	Tiered sensitivity/specificity	Use original mathematics and visual logistics for interpreting COVID-19 rapid antigen test performance patterns, gauge the influence of prevalence, and evaluate repeated testing	Delta	Performance of self- and home-antigen tests with Food and Drug Administration Emergency Use Authorization peaks in low prevalence. Fall-off in performance appears with increasing prevalence because suboptimal sensitivity creates false negatives.
Lam-Hine 2021[17]	03-Sep-21	May 23rd to June 12th, 2021	Morbidity and Mortality Weekly Report (MMWR)	Case study	USA	School	26	Positive COVID cases	To describe the case of an outbreak in an elementary school.	Delta	Due to the delta variant's high transmissibility, masking is highly recommended in schools. Other NPIs are also very important in protecting the vulnerable school children, as they are ineligible for vaccination.
Lasser 2021[18]	29-Sep-21	Not reported	medRxiv [preprint]	Modelling	AUT	School	616 clusters; 3,498 cases	Effectiveness of mitigation measure to reducing cluster size	Quantify how many transmissions can be expected for different scenarios/school types, in a way that is appropriate to derive evidence-based policies for keeping schools open at a controllable infection transmission risk.	Delta	Different types of schools require different combinations of preventive measures. The ideal mix of mitigation measures needs to be more stringent in secondary schools than in primary schools, and needs to preferentially focus on teachers as sources of infection.

Levine-Tiefenbrun 2021[19]	01-Sep-21	June 28th to Aug 24th, 2021	medRxiv [preprint]	Retrospective cohort	ISR	Community	11,889	Positive COVID cases	Analyze viral loads in over 11,000 infections during the current wave of the Delta variant to compare viral load amongst various vaccination statuses.	Delta	The vaccine is initially effective in reducing infectiousness of breakthrough infections even with the Delta variant, and that while this protectiveness effect declines with time it can be restored, at least temporarily, with a booster vaccine.
Li 2021[20]	31-Aug-21	June 1st, 2020 to Feb 13th, 2021	The Lancet	Modelling	UK	Community	N/A	Data on community mobility; reproduction number (R) of SARS-CoV-2 across UK local authorities	Determine association between community mobility and COVID-19 transmission.	Alpha	Increased visits to retail and recreation places, workplaces, and transit stations in cities are important drivers of increased SARS-CoV-2 transmission; the increasing trend in the effects of these drivers in the first 6 weeks of 2021 was possibly associated with the emerging alpha (B.1.1.7) variant.
MacIntyre 2021[21]	16-Sep-21	March 1st, 2020 to June 29th, 2021	Vaccine	Modelling	USA	Community	N/A	Number of cases, number of deaths, mask usage and efficacy	Estimate the impact of community face mask use, at varying levels of mask uptake and mask effectiveness during the roll out of vaccination in NYC	Delta	The epidemic curve is suppressed by 50% with mask wearing but surges when mask usage drops below 30%. NPIs are needed during vaccine rollout, and the ongoing need is contingent upon waning of vaccine immunity, VOCs and use of boosters.
Majeed 2021[22]	20-Sep-2021	Not reported	Mathematical Biosciences	Modelling	CAD	Community	N/A	Infections, impact of variability in COVID-19 and whole genome testing capacity on spread	Examine the impact of NPIs, including test capacity and contact tracing and quarantine strength, on the VOC-induced epidemic wave.	Alpha, Beta, Gamma, Delta	A combination of large COVID-19 clinical test capacity, a short delay in both the clinical test and WGS test and the subsequent contact-tracing and quarantine, and moderate level of additional strain-specific quarantine is a feasible and optimal approach to prevent or mitigate a VOC-driven outbreak.
Mathiot 2021[23]	01-Sep-21	December 2019 to July 2021	medRxiv [preprint]	Modelling	FRA, DEU, ITA	Community	N/A	Virus spread of initial strain, Alpha variant, and Delta variant	Examine density and intensity of social relationships to further understanding of epidemic propagation	Alpha, Delta	Variant spread is determined by escape from vaccine protection/or COVID infected non-vaccinated, and no continuity of vaccine strategy such as third doses to extend immunity.

									via the respiratory tract.		
McBryde 2021[24]	03-Sep-21	Not reported	The Medical Journal of Australia	Modelling	AUS	Community	N/A	Number of infections, hospitalizations, deaths; number of years of life lost	Analyse outcomes of COVID-19 vaccination by type of vaccine, age, eligibility, vaccination strategy and coverage	Delta	Vaccinating vulnerable population first is important when overall vaccine coverage is low; vaccinating more socially active groups becomes more important as R(eff) declines and vaccination coverage increases. Based on an R(eff) of 5, herd immunity only likely to occur if 85% of population aged 5+ are vaccinated.
McPeck 2021[25]	20-Sep-21	Not reported	medRxiv [preprint]	Modelling	USA	Schools	N/A	Total number in infectious and recovered classes, representing total disease burden	To test the effects of vaccination and masking in a scenario containing a quantity of agents representing double occupancy of the 20 dorm rooms on the map (40 agents).	Delta	Universal masking with N95 masks and 100% vaccination of susceptible people resulted in significantly lower prevalence after 3 weeks compared to all other scenarios, but still led to a substantial number of infections. Increased vaccination levels from 52% to 100% by itself did not result in a significant difference in prevalence due to symptomatic and asymptomatic breakthrough infections. These results suggest that universal masking is the best way forward.
Mele 2021[26]	15-Sep-21	Not reported	medRxiv [preprint]	Modelling	USA	Schools	N/A	Infections, hospitalizations, deaths, reinfections	To project the impact of school-masking on the community, which can inform policy decisions, and support healthcare system planning.	Delta	The implementation of masking policies in school settings can reduce additional infections post-school opening by 23-36% for fully-open schools, with an additional 11-13% reduction for hybrid schooling, depending on mask quality and fit. Masking policies and hybrid schooling can also reduce peak hospitalization need by 71% and result in the fewest additional deaths post-school opening.
Milne 2021[27]	02-09-21	Not reported	Preprints with The Lancet [preprint]	Modelling	AUS	Community	N/A	Infections, hospitalizations, deaths	To model a range of COVID-19 vaccination strategies to determine their effectiveness in	Delta	High vaccine efficacy and extremely high vaccination coverage (90%) was shown to be required to mitigate highly transmissible variants such as Delta without activation of strong

									preventing local epidemics of the B1.617.2 Delta variant.		lockdown measures, in contrast to the Alpha variant. Greater than 70% vaccine coverage in those 12+ years, together with a vaccine boosting regimen, would be sufficient to halt a Delta outbreak if coupled with early, moderate lockdown measures.
Patalon 2021[28]	31-08-21	Jan to Aug 21st , 2021	medRxiv [preprint]	A test-negative design and a matched case-control design	ISR	Community	153,753	Positive Covid-19 PCR (test negative analysis)	To evaluate initial short-term marginal effectiveness of the third dose of the BNT162b2 vaccine against the Delta variant compared to a two-dose regimen.	Delta	We found that 7-13 days after the booster shot there is a 48-68% reduction in the odds of testing positive for SARS-CoV-2 infection and that 14-20 days after the booster the marginal effectiveness increases to 70-84%.
Pettit 2021[29]	21-09-21	N/A	medRxiv [preprint]	Scenario-based modelling	USA	Workplace	Modelling	Community acquired infections (CAI), number of workplace-acquired infections (WAI), number of acquired infections (TAI, of CAI + WAI)	To test the rates of WAI and CAI based on applied isolation strategies, community infection rates (CIR), scales of testing, NPIs, variant predominance and testing strategies, vaccination coverages, and vaccination efficacies	Delta	The study identified different thresholds at which NPI can be changed - for example, when the CIR is 5 new confirmed cases per 100,000 or fewer, and at 50% of the workforce is vaccinated with a 95% efficacious vaccine, then testing daily with an antigen-based or PCR-based test in only unvaccinated workers will result in less than one infection through 4,800 person weeks.
Reingruber 2021[30]	21-02-21	Jan 20 to Feb 21, 2021	medRxiv [preprint]	Modelling	FRA	Community /hospital modeling	586 patients' clinical data	Number of new infected per age group	To develop a data-driven modelling framework with the aim to provide reliable near-future predictions under constantly evolving social and pandemic conditions	Delta	Reproduction numbers and herd immunity levels are not universal but depend on the underlying social dynamics, and in the presence of the delta variant should be above 90%. Finally, we conclude that vaccination of the young generation should be pursued before all social restrictions are relieved.
Rose 2021[31]	02-02-21	Not reported	medRxiv [preprint]	Laboratory	DEU	Laboratory	N/A	Immunoglobulin G and neutralizing capacities	To compare immunoglobulin G response after heterologous	Alpha, Delta	The heterologous SARS-CoV-2 vaccination leads to a strong antibody response with anti-SARS-CoV-2 IgG and VNA titres at a level comparable

								against VOC after vector vaccine followed by mRNA boost compared to double immunizatio n with mRNA	immunization with that elicited by homologous vaccination schedules; to assess various methods to investigate the development of VNA against two prevalent VOCs		to that of a homologous BNT162b2 vaccination scheme. The observed reduction in the VNA titre against VOC B.1.617.2 is remarkable and may be attributed to a partial immune escape of the Delta variant.
Sarkar 2021[32]	21-09-21	March 2020–February 2021 and March 2021–first week of April 2021	Pathogens Journal	Epidemiol ogical	IND	Community	N/A	Descriptive, analytical comparison of two waves	To comprehensively analyze the key factors responsible for the sharp rising of confirmed COVID-19 cases in India in the second wave of infection as compared to the first wave.	Delta	Lineage analysis in India showed the emergence of new SARS-CoV-2 variants, i.e., B.1.617.1 and B.1.617.2, during April–May 2021, which might be one of the key reasons for the sudden upsurge of confirmed cases/day. Furthermore, the emergence of the new variants contributed to the shift in infection spread by the G clade of SARS-CoV-2 from 46% in period II to 82.34% by the end of May 2021.
Šmíd 2021[33]	29-09-21	June 4, 2020 to Apr 7, 2021	medRxiv [preprint]	Modelling	CZE	Schools	4,235 + model ling	In-cohort growth rates of infection	To assess impact of school opening with various mitigation measures (masks, rotations, mass testing) on growth rate of new cases in child cohorts	Alpha	The estimates of in-cohort growth rates were significantly higher for normally opened schools compared to closed schools. For secondary education, mitigation measures reduce school-related growth 2-6 times.
Tauzin 2021[34]	21-09-21	Not reported	medRxiv [preprint]	Laborator y	Not repo rted	Laboratory	43 (22 SARS-CoV-2 naive, 21 previo usly infect ed)	Presence of SARS-CoV-2-specific antibodies (Abs) (IgG, IgM, IgA) recognizing the receptor-binding domain	To characterize vaccine-elicited humoral responses in a cohort of SARS-CoV-2 naïve and previously infected individuals that received the two doses with an extended interval of sixteen weeks	Alpha, Beta, Gamm a, Delta	Despite initial concerns, the long interval between doses did not result in poor immune responses. Delayed second vaccine boost in naïve individuals significantly enhances several immune responses and tightens the network of linear correlations among those. Previously infected individuals who received one dose had better responses 19 weeks after their dose.

Truelove 2021[35]	02-09-21	9 different models using data available through July 3, 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Weekly reported cases, hospitalizations, and deaths	To project weekly reported cases, hospitalizations, and deaths, both nationally and by jurisdiction (50 states and the District of Columbia), for four different epidemiological scenarios	Delta	Increased vaccination uptake is critical to limiting transmission and disease, particularly in states with lower current vaccination coverage. Higher vaccination can potentially avert 1.5 million cases and 21,000 deaths and improve the ability to safely resume social, educational and business activities. Continued or renewed NPIs can limit transmission, particularly as schools and businesses reopen.
Urbanowicz 2021[36]	01-09-21	Beginning in January 2021, up to 14 and 21 days after participants had received second dose	Science Translational Medicine	Cohort study	UK	Community (cohort of healthcare workers [HCWs])	45 HCWs	Presence of spike-reactive or virus-neutralizing antibodies against lineage A and B.1.351 virus	To evaluate antibody reactivity and neutralization potency in serum samples collected from individuals who received the BNT162b2 SARS-CoV-2 vaccine with or without a prior history of infection	Beta, Gamma	Regardless of prior infection status, vaccination elicited antibodies that bound to SARS-CoV-2 spike proteins, including spike proteins from variants of concern. However, prior infection further enhanced anti-spike protein antibody responses against variants.
Vignals 2021[37]	30-Aug-21	Aug - Dec 2021	medRxiv [preprint]	Modelling	FRA	Community	N/A	Number of cases, severe infections, ICU hospitalizations	To estimate if barrier gestures (i.e., public health measures) can be relaxed without causing a resurgence of severe infections	Alpha, Beta, Gamma, Delta	Maintaining application of barrier gestures appears essential to avoid a resurgence of severe infections that would exceed health care capacities, while surmounting vaccine hesitancy represents the key to consider their relaxation.
Wang 2021[38]	05-09-21	N/A	medRxiv [preprint]	Laboratory	CHN	Community	66	Level of humoral immune response	To evaluate the nature of humoral immune response elicited by a booster dose of CoronaVac and to compare humoral immune responses elicited against circulating SARS-CoV-2 variants	Alpha, Beta, Gamma, Delta	A third-dose booster of inactivated vaccine can elicit an expeditious, robust and long-lasting recall humoral response which continues to evolve with ongoing accumulation of somatic mutations, emergence of new clones and increasing affinities of antibodies to antigens, conferring enhanced neutralizing potency and breadth.
Woodhouse 2021[39]	02-09-21	Used data from fall 2020 to model	medRxiv [preprint]	Modelling	UK	Schools	N/A	Infection prevalence and	To compare the effects of different mitigation strategies	Delta	Testing-based surveillance of infections in the classroom population with isolation of positive cases is a

		outcomes for fall 2021						incidence rate	on infection transmission rates within schools		more effective mitigation measure than bubble quarantine both for reducing transmission in schools and for avoiding pupil absence. Maintaining reduced contact rate has a major beneficial impact for managing Covid-19 in school settings.
Wu 2021[40]	27-09-21	Not reported	medRxiv [preprint]	Modelling	CAD	Community	N/A	Attack ratio	To estimate the attack ratio of COVID-19 among children (0-11 years) when a large proportion of eligible population is vaccinated (age 12+) and other NPIs are in place	Delta	With the increased transmissibility of the Delta variant, a reduction from 12.73 to 10 contacts per day within the vaccine-eligible population in Ontario is necessary to avoid an outbreak sustained by the vaccine-eligible population due to lower vaccine coverage or vaccine efficiency against infection.
Yinon 2021[41]	31-08-21	July 30 to August 22, 2021	medRxiv [preprint]	Cohort study	ISR	Community	No booster = 4,018,929 person days; booster = 3,351,598 person days	Infection (confirmed, i.e., PCR positivity), severe illness	To estimate the reduction in relative risk for confirmed infection and severe COVID-19 provided by the booster dose.	Delta	The booster dose of the BNT162b2 (Pfizer) vaccine is highly effective in reducing the risk of both confirmed infection and severe illness.
Yorsaeng 2021[42]	21-09-21	June and July 2021	medRxiv [preprint]	Cohort study	THA	Community	549	Immunological (humoral) response to vaccination, and neutralizing activity against the wild type and all VOC	To characterize the increase in immune response and neutralizing antibody induced by heterologous vaccination with AZD1222 in HCWs who were previously fully vaccinated with CoronaVac.	Alpha, Beta, Delta	A three-dose heterologous regimen, two initial CoronaVac followed with a third AZD1222 vaccine, indicated a strong immunological response. Sera samples from booster dose vaccine recipients elicited higher neutralizing activity against the wild type and all variants of concern than those in the recipients of the two-dose CoronaVac and AZD1222 vaccines.

INCLUDED STUDIES FROM JULY 14 TO AUGUST 25, 2021 (N=32)											
Adenaiye 2021[43]	13-Aug-21	May 2020 to Apr 2021	medRxiv [preprint]	Observ-ational	USA	Community	61	Amount of RNA exhaled in alpha variant infection; face mask efficacy	Examine impact alpha variant has on aerosol shedding and the efficacy of face masks as a source of control	Alpha	Face masks provided significant protection against infectious aerosols, indicating importance of community wide masking in the prevention of virus transmission.
Amirth-alingam 2021[44]	28-Jul-21	Jan to May 2021	medRxiv [preprint]	Observ-ational	UK	Primary care networks	750	Antibody responses	Compare serological response to vaccination with different intervals in between doses	Alpha & Delta	Prioritizing the first dose of vaccine was supported, as the evidence suggested that there was higher protection on extended vaccination schedules.
Aruffo 2021[45]	13-Aug-21	Dec 28th 2020 to May 19th 2021	medRxiv [preprint]	Modell-ing	CAD	Community	N/A	Impact of lifting NPIs on dates of cases, hospitalizations, and deaths	Determine the optimal strategy to lifting NPIs	Alpha	Efforts should be directed towards individuals ages 20-59. NPIs should be considered when reopening, as a complete reopening lacking NPIs would result in substantial spread of the virus, regardless of vaccination coverage.
Arumuru 2021[46]	21-Jul-21	NR	Physics of Fluids	Labor-atory	IND	Community	NR	Leakage of droplets from various masks and mask combinations	Determine optimal masking strategies	Alpha, Beta & Gamma	Double masking is effective in improving mask fitment and protection. The most effective combination was cotton mask with N95 mask.
Bablani 2021[47]	21-Aug-21	NR	medRxiv [preprint]	Modell-ing	AUS	Community	N/A	Determine number of cases, hospitaliz-tions and deaths 100 days after Aug 1	Estimate length of time for cases to reach less than five per day, under various lockdown strategies	Delta	Accelerating vaccine rollout is important to making the population more resilient to outbreaks. Until vaccination coverage is at an effective level, the strength of lockdowns, public health and social measures which will have the largest impact on preventing COVID-19 hospitalizations and deaths.
Cazelles 2021[48]	03-Aug-21	June 2020 to March 25th 2021	BMC Infect-	Modell-ing	IRL	Community	N/A	Observed daily infections,	Examine the dynamics of COVID-	Alpha	Sharp decline of cases seems to be the result of mitigation measures, when in the presence of the Alpha variant.

			ious Diseases					hospital and ICU admissions, daily deaths, and hospital discharges and cases	19 in Ireland using public data		
Chang 2021[49]	10-Aug-21	June to July 2021	Research Square [preprint]	Modell-ing	AUS	Community	N/A	Agent based modelled tested the adequacy of outbreak control measures	Calibrate R0 of the Delta variant, and using the model, NPIs are investigated for feasibility in virus control. Outbreak suppression conditions are quantified.	Delta	Current social distancing requirements are not adequate for control. With 80% compliance, and month will be needed to control case numbers.
Colosi 2021[50]	21-Aug-21	Mar 8th – Jun 7th 2021	medRxiv [preprint]	Modell-ing	FRA	Schools	683 school s	Empirical contact data: examination of screening protocols was used to perform a cost-benefit analysis for varying scenarios	Model transmission of COVID-19 in schools	Delta	COVID-19 will still pose a risk to the safe opening of schools. Vaccination coverage of adolescents should be increased, and regular testing should be prioritized.
Contreras 2020[51]	25-Aug-21	Feb 2021	medRxiv [preprint]	Modell-ing	EU	Community	N/A	Effectivenes s of NPIs, spreading dynamics	Model a stable equilibrium at low case numbers, where test-trace-and-isolate policies compensate for local spreading events and only moderate restrictions remain	Alpha	A lockdown and regain control over the spread of COVID-19, vaccination helps mitigate VOCs. In the future, immunization, large scale testing and international coordination will further facilitate virus control.
Dick 2021[52]	24-Aug-21	Data up to Jun 27th, 2021, projections to Mar 2022	medRxiv [preprint]	Modell-ing	CAD	Community	N/A	Distribution of immunity in the Canadian	Estimate the distribution of immunity to COVID-19 in the Canadian	Delta	Model predicts 60-80% of population will have some immunity to COVID-19 by the end of the vaccination campaign. Population is vulnerable to

								population, by age, from infection and from vaccination.	population, and determine the risk of resurgence in Fall 2021-Winter 2022.		resurgence of virus because of the relaxation of NPIs and the reopening of schools.
Enright 2021[53]	04-Aug-21	Sep 2020 to Dec 2020	Royal Society Open Science	Modell-ing	UK	Universities	N/A	Contributing factors to within-institution spread	Summarize the understanding of COVID-19 patterns from Fall 2020 and explore strategies for the safe return of students in the future	Alpha	Residences with higher populations posed a greater risk of higher transmission. The proposal of staggering the return of students was not successful in reducing transmission. Adherence to testing and self-isolation is modelled to be much more effective in reducing transmission.
España 2021[54]	07-Sep-21	NR	medRxiv [preprint]	Modell-ing	COL	Community	N/A	Time-varying trends of cases and deaths; population based seroprevalence data	Explore the impact of circulating VOCs	Alpha, Beta & Gamma	COVID-19 in the city could be explained by higher mobility and higher number of social contacts. A preferred strategy to mitigation is maintaining moderate levels of social mixing, combined with a rapid increase in vaccination rates.
Giardina 2021[55]	07-Aug-21	N/A	medRxiv [preprint]	Modell-ing	USA	Schools	N/A	Agent-based dynamic transmission model	Evaluate the probability of in-school transmission and the increase of infections	Alpha & Delta	The risk of transmission between students and their households remains high. Mitigation measures and student vaccinations can reduce these risks significantly.
Gorji 2021[56]	16-Jul-21	Feb to Mar 2021	medRxiv [preprint]	Observ-ational	CHE	Community	27514 employees	Mass testing campaign relying on voluntary repetitive testing	Provide empirical evidence that repetitive mass testing can be effective in preventing the spread of COVID-19	Alpha & Beta	Applying a mass testing strategy can prevent the spread of COVID-19. Program should consider and try to control for the population outside of the program.
Head 2021[57]	23-Aug-21	Feb to Apr 2021	medRxiv [preprint]	Modell-ing	USA	Schools	N/A	Individual based transmission model to simulate Delta	Characterize the risks to students and teachers in schools under various scenarios (varying	Delta	Vaccination of adult community members can protect unvaccinated elementary school students. Schools can have low risks with high community vaccination levels and universal masking. If schools support

								variant transmission, to examine school reopening policies	NPIs and vaccination coverage)		additional measures such as cohorts and testing, they should consider doing so.
Hillus 2021[58]	13-Aug-21	Dec 27, 2020 - June 14, 2021	The Lancet Respiratory Medicine	Observ-ational	DEU	Community (population: healthcare workers)	380 participants	Reactogenicity (by use of electronic questionnaires); immunogenicity (by the presence of SARS-CoV-2-specific antibodies, an RBD–ACE2 binding inhibition assay, a pseudovirus neutralisation assay and anti-S1-IgG avidity); T-cell reactivity (by IFN-γ release assay)	To assess the reactogenicity and immunogenicity of heterologous immunizations with homologous ChAdOx1 nCov-19 or heterologous ChAdOx1 nCov-19–BNT162b2 vaccination with a 10–12-week vaccine interval or homologous BNT162b2 vaccination with a 3-week vaccine interval	Alpha & Beta	The heterologous ChAdOx1 nCov-19–BNT162b2 immunization with 10–12-week interval, recommended in Germany, is well tolerated and improves immunogenicity compared with homologous ChAdOx1 nCov-19 vaccination with 10–12-week interval and BNT162b2 vaccination with 3-week interval. Heterologous prime-boost immunization strategies for COVID-19 might be generally applicable.
Karaba 2021[59]	14-Aug-21	Blood samples submitted 0-4 weeks before third dose and 2 weeks after	medRxiv [preprint]	Observ-ational	USA	Community (particularly solid organ transplant recipients [SOTRs])	31 SOTRs	Pre and post-third dose samples of recipients were compared for	Investigate the efficacy of third-dose vaccinations in organ transplant recipients	Delta	A third dose of the vaccine showed an increase of antibody levels as well as neutralizing abilities against VOCs in some organ transplant recipients.

								immunogenicity			
Koslow 2021[60]	14-Jul-21	June to August 2021 (90-day period beginning June 6, 2021)	medRxiv [preprint]	Modelling	DEU	Community	N/A	Effects of non-pharmaceutical interventions in Germany, age-dependent factors and commuting activities between regions; vaccination process; timing of return to pre-pandemic contacts and suspension of mask wearing and testing	To analyze different strategies for removing the restrictions of non pharmaceutical interventions that were in effect during the SARS-CoV-2 pandemic, while accounting for the new Delta variant and the ongoing vaccination process	Alpha & Delta	At the current rate of vaccination, there is still a great risk of another wave of infections if NPIs are lifted too early. The severity of these infections will be significantly reduced compared to previous waves due to the prioritization of the older population during the vaccination process. In all scenarios, rising infection numbers will hit school children the hardest. A key role will be played by the duration of immunity conferred by the licensed vaccines.
Krueger 2021[61]	18-Jul-21	Not reported	medRxiv [preprint]	Modelling	FRA, UK	Community	N/A	Vaccine effectiveness, re-vaccination rate, waning immunity	To illustrate vaccination dynamics and possible different restrictions for VP holders in relation to the Alpha & Delta variants	Alpha & Delta	Risk of virus resurgence is higher with the introduction of vaccine passports and exempting holders from wearing masks and testing. Resurgence (particularly Delta-driven) can be mediated with high restrictions for the general population and small-moderate restrictions for holders. Public health measures flexibility is favored in a model where there is high vaccine effectiveness, low number of never-vaccinated, high re-vaccination rate, slowly waning immunity, and proportional social mixing

Layton 2021[62]	12-Aug-21	January 1, 2020, to December 31, 2021 (projections)	Research Square [preprint]	Modelling	CAD	Community	N/A	Dynamics and interactions of 3 SARS-CoV-2 strains, including (i) asymptomatic and symptomatic infections, (ii) two-dose vaccinations with variable dosing intervals, (iii) effects of NPI	To develop and apply a much expanded Susceptible-Infection-Recovered-type model to better understand to what extent the competition and interaction of VOC impact the spread of SARS-CoV-2	Alpha & Delta	In addition to infectivity, the extent of the NPI, and vaccination rate, factors that determine how fast COVID-19 spreads include: the prevalence of asymptomatic infections; enhanced infectivity of asymptomatic patients; fraction of the population who are vaccinated; types of vaccines distributed; and contextual differences between countries/regions. Both simultaneous and rapid deployment of pharmaceutical and NPI are needed to combat a dangerous VOC.
Liu 2021[63]	23-Jul-21	Vaccination capacity data up to May 23, 2021	medRxiv [preprint]	Modelling	CHN	Community	N/A	Herd immunity under three scenarios	To evaluate the feasibility of reaching herd immunity against SARS-CoV-2 through vaccination, considering heterogeneity in population age, age-specific patterns, vaccine efficacy and virus plus variants characteristics	Alpha, Beta, Gamma, Delta	Reaching herd immunity is challenging; authorizing vaccines for children is essential; highly efficacious vaccines in particular against the variants is necessary; despite all, vaccination is paramount to pandemic control.
Marziano 2021[64]	19-May-21	Daily vaccination supply estimates cover each quarter of 2021 and first half of 2022	medRxiv [preprint]	Modelling	ITA	Community	N/A	Fraction of individuals recovered (and immune) from SARS-CoV-2 infection; age-specific vaccination	To simulate the effect of a vaccine rollout assuming that governments will be capable to maintain an approximately constant incidence by adjusting physical distancing restrictions	Alpha	The combination of vaccine roll-out and effective mitigation strategies is expected to prevent a large proportion of deaths while at the same time allowing a progressive lifting of physical distancing restrictions. A complete return to a pre-pandemic lifestyle can be expected between 9 and 15 months since the start of vaccination, only if a

								rates over time; COVID-19-related deaths; alternative prioritization orders for vaccination; vaccine coverage; duration of vaccine protection; incidence level of reported cases; vaccine efficacy	as immunity accumulates.		number of conditions are simultaneously met.
Paassen 2021[65]	22/Jul/21	Not reported	medRxiv [preprint]	Modelling	DEU	Community (Workplace)	N/A	Testing strategies, isolation and quarantine management; these are combined to develop a novel risk strategy	To develop and present epidemiologic modelling that calculates infection risks and the expected success of the measures across virus generations and that allows for a differentiated risk analysis for contact persons based on the day-dependent infectivity	Alpha	Public health measures implemented in workplaces can be effective, particularly combined measures (isolation, quarantine, symptom monitoring, testing) compared to single measures. It is imperative to implement measures early.
Panovska-Griffiths 2021[66]	22/Jul/21	Model was calibrated until January 25, 2021, to simulate the impact of a full national	medRxiv [preprint]	Modelling	UK	Community	N/A	Cumulative diagnoses, cumulative deaths and cumulative hospital admissions	To use mathematical modelling to simulate the impact of a full national lockdown (FNL) in England from January 4, 2021 compared to partial	Alpha	The strict social distancing measures, i.e. national lockdown, imposed from January 2021 with schools closed was likely to have been successful in suppressing the wave of COVID-19 cases that emerged towards the end of 2020. Continued epidemic control

		lockdown with schools closed until April 19, 2021						under various partial and full lockdown scenarios, accompanied by social distancing and ongoing Test, Trace and Isolate intervention	national lockdowns (PNL) in which some elements of in-person schooling remained open		was achievable even with cautious reopening of schools from March 8, 2021 whilst continuing the vaccination efforts initiated from December 2020. It is important to effectively roll out a mass vaccination strategy during lockdowns.
Payne 2021[67]	21-Jul-21	Dec 7, 2020 - Mar 12, 2021	Cell [preprint]	Observ-ational	UK	Community	503 participants	Effectiveness of the BNT162b2 vaccine against PCR-confirmed infection (asymptomatic and symptomatic) was estimated in SIREN participants by comparing time to infection in vaccinated and unvaccinated participants	To describe the dynamics of T cell and Ab responses after the first dose of BNT162b2 mRNA vaccine over an extended dosing interval, and to compare the magnitude of Ab and T cell responses 4 weeks after dose 2 between short and long vaccination regimens	Alpha	Extension of the dosing interval is an effective, immunogenic protocol (even against Alpha) and antiviral T cell responses are a potential mechanism of protection
Plan 2021[68]	5-Aug-21	From beginning of pandemic until June 27, 2021	medRxiv [preprint]	Modelling	VNM	Community	N/A	Total number of confirmed cases; rate of transmissio	To examine the temporal aspects of the lockdown in Ho Chi Minh City and predict the progress of the outbreak in	Delta	An earlier lockdown is always advised as this avoids the exponential increase in the number of cases. Moreover, a lockdown duration of at least 3 weeks is ideal as there are noticeable improvements compared to a 15-day

								n (as a function of the mobility of people) and infection; effects of containment measures such as lockdown severity and temporal aspects of lockdown and isolation and testing strategies	terms of the total number of confirmed cases		lockdown - there could be half as many cases had the inevitable lockdown started a week earlier.
Si 2021[69]	21-Jul-21	Mar 1 - 21, 2021	Frontiers in Public Health - Health Economics	Observ-ational	CHN	Community	4,540 participants	Participants' health-protective measures, that is, wearing masks, handwashing, and keeping physical distance	To analyze the impact of vaccination against COVID-19 on participants' attitudes toward protective countermeasures	Alpha, Beta, Gamma, Delta	Vaccination lessened participants' frequency of hand washing by 1.75 times and their compliance frequency intensity of observing physical distancing by 1.24 times. However, the rate of mask-wearing did not reduce significantly. A reduction in the frequency of hand washing and observing physical distance could cause a resurgence of COVID-19. Participants' gender, age, education level, individual health risk perception, public health risk perception, social responsibility, peer effect, and government supervision are the main factors affecting their vaccination choice. However, cultural roots and accessibility to health-protection products do not significantly influence participants' vaccination intention.
Sonabend 2021[70]	18-Aug-21	Datasets used were "up to 8 March 2021"	medRxiv [preprint]	Modelling	UK	Community	N/A	Lifting of NPIs on deaths,	To assess each step of UK's roadmap out of lockdown in relation	Alpha, Delta	The phased lifting of NPIs in England, coordinated with vaccine roll-out, has been largely successful at keeping

		and "8 March to 31 July" 2021. Projections made for June 2021 - June 2022.						hospital admissions and bed occupancy, serological data and PCR testing data	to Delta, and potential epidemic magnitude		hospitalisation and deaths at low levels since March 2021. However, the high transmissibility of Delta, imperfect VE, and future increases in contact rates are likely to lead to a substantial wave of transmission in the autumn, albeit of highly uncertain magnitude. Finally, vaccination alone in the absence of NPIs may not be sufficient to control Delta even with high vaccination coverage.
Susswein 2021[71]	10-Aug-21	Not reported	medRxiv [preprint]	Modelling	USA	Community	N/A	Transmission dynamics and spatial mobility data	To demonstrate the roles of within-community contact versus between-community mobility in transmission risk, the role of natural versus vaccine-induced immunity in structuring the susceptibility landscape, the variable impact of potential variant mutations on disease dynamics, and the influence of altering each of these mechanisms in the effectiveness of public health intervention	Alpha, Delta	Regional mobility networks drive patterns of COVID-19 transmission throughout the United States. The COVID-19 pandemic in the US is characterized by a geographically localized mosaic of transmission along an urban-rural gradient, with many outbreaks sustained by between-county transmission. There is a dynamic tension between the spatial scale of public health interventions and population susceptibility as pre-pandemic contact is resumed. Due to spatial connectivity, certain regions are rendered particularly at risk from invasion by variants of concern.
Tran Kiem 2021[72]	14-Jul-21	September 1st, 2021, to April 1st, 2022	EClinicalMedicine	Modelling	FRA	Community	N/A	Risk of severe disease by age and comorbidity and transmission dynamics	To understand how vaccine characteristics, levels of vaccine coverage and heterogeneities in individual risks may affect the impact of vaccination in the short and medium	Alpha	Prioritizing at-risk individuals reduces morbi-mortality the most if vaccines only reduce severity, but is of less importance if vaccines also substantially reduce infectivity or susceptibility. Age is the most important factor to consider for prioritization; additionally accounting for comorbidities increases the

									term, using France as a case study		performance of the campaign in a context of scarce resources.
Vie 2021[73]	26-Mar-21	Not reported	arXiv [preprint]	Modelling	Globally	Community	N/A	Emergence of more contagious variants using genetic algorithms (GAs); policy measures aiming at minimizing infection rates in the population; how they competitively evolve	To examine the phenomenon of coevolution with COVID-19 variants and evaluate the impact of policy interventions over the evolution of the viruses	Alpha	Under coevolution, virus adaptation towards more infectious variants is considerably faster than when the virus evolves against a static policy. More contagious strains become dominant much faster in the virus population under coevolution. Seeing more infectious virus variants becoming dominant may signify that the policy measures are effective. Seeing more infectious virus variants becoming dominant may signify that the policy measures are effective.
Zhang 2021[74]	3-Sep-21	Not reported	medRxiv [preprint]	Modelling	USA	Schools (K - 12)	N/A	Number of infections	To estimate the number of new infections during one semester among a student population under different assumptions about mask usage, routine testing, and levels of incoming protection.	Delta	Without interventions in place (testing & masking), the vast majority of susceptible students (≥75%) will become infected through the semester. Universal masking can reduce student infections by 26-78% (dependent upon incoming protection), and biweekly testing along with masking reduces infections by another 50%.
INCLUDED STUDIES FROM MAY 11 TO JULY 14, 2021 (N=31)											
Adeyinka 2021[75]	05-Jul-21	Jan 3rd to Feb 6th 2020 & Jan 1st to Jun 15th 2021	medRxiv [preprint]	Modelling	CAD	Community	NR	Prevalence of VOC, vaccination data & public health measures	Examine clustering patterns of COVID-19 public health efforts & cluster differences in prevalence of VOC in Canada	Alpha, Beta, Gamma & Delta	Public health measures varied greatly across provinces, indicating the importance for increasing the number of fully vaccinated individuals
Aubrey 2021[76]	21-Jun-21	July 15th 2020 to Feb 15th 2021	medRxiv [preprint]	Surveillance	PYF	Community	59,490 individual	Number of positive SARS-CoV-2 cases	Reduce the importation of SARS COV-2 into French	Alpha	Self-collection & pooling proved to be a low resource-intensive approach to testing, while still effectively detecting VOC

							self-collected samples		Polynesia through travel		
Berec 2021[77]	05-Jul-21	Aug 31st 2020 to Jun 30th 2021	medRxiv [preprint]	Modelling	CZE	Community	N/A	COVID-19 related deaths	Determine whether delaying the 2nd vaccine dose from 21 to 42 days is advantageous	Alpha	A 2nd dose at 21 days is advantageous when vaccine supply is sufficient & epidemic is mild, while a 2nd dose at 42 days is advantageous when vaccine supply is insufficient & epidemic is severe
Betti 2021[78]	03-Jun-21	Dec 12th 2020 to May 7th 2021	Vaccines	Modelling	CAD	Community	N/A	Number of positive SARS-CoV-2 cases	Predict when new variants overtake the wildtype during an outbreak	Alpha	Due to current underreporting of COVID-19 cases, it is estimated that a VOC wouldn't become dominant until March/April 2021. Therefore, NPIs should be maintained in ON along with vaccination to prevent further outbreaks.
Bilinski 2021[79]	10-Aug-21	N/A	medRxiv [preprint]	Modelling	USA	Schools	N/A	30-day cumulative incidence of SARS-CoV-2 infection; proportion of cases detected; proportion of planned and unplanned days out of school; cost of testing programs and childcare costs	Identify the costs and benefits of testing strategies to reduce the infection risks of full-time in-person K-8 education at different levels of community incidence	Delta	"Test to stay" policies and/or screening tests can facilitate consistent in-person school attendance with low transmission risk across a range of community incidence. Surveillance may be a useful reduced-cost option for detecting outbreaks and identifying school environments that may benefit from increased mitigation.
Borchering 2021[80]	14-May-21	Mar 27th 2021	CDC MMWR	Modelling	USA	Community	n/a	Weekly reported cases, hospitalizati	Provide COVID-19 projections in the US over 6 months	Alpha	High vaccination coverage & moderate NPI adherence would allow hospitalizations & deaths to remain low, with a projected decline in cases by July 2021. Lower NPI adherence

								ons & deaths			would lead to increases in severe COVID-19 outcomes, even with enhanced vaccination coverage.
Bowie 2021[81]	10-Jun-21	Jun 1st 2021	medRxiv [preprint]	Modell-ing	UK	Community	n/a	Incidence, death rate & reproductive ratio	Determine whether an effective find, test, trace, isolate & support (FTTIS) system would be helpful in the UK with low case numbers, moderate immunization levels & a circulating VOC	Delta	An improved FTTIS system could help prevent a 3rd wave caused by VOC
Braun 2021[82]	15-Jun-21	Jan to Mar 2021	International Journal of Clinical Pharmacology & Therapeutics	Modell-ing	DEU	Community	N/A	Daily number of newly infectious persons, total number of infected persons & occupancy of ICU	Model the epidemiological effect of vaccination in relation to the presence of Alpha in Germany	Alpha	Daily number of new infections, total number of infections & ICU occupancy is directly related to the speed of vaccine rollout amongst the population
Chen 2021[83]	15-Jun-21	Nov 1st 2020 to Jan 20th 2021	SSRN The Lancet [preprint]	Observ-ational	UK	Community	41,341 type 1 groups comprising 160,600 backward events available for analysis	SGTF prev-alence (proxy for Alpha)	Estimate COVID-19 transmission risk, including Alpha, across comm-unity settings in Engl&	Alpha	Highest risk of transmission associated with personal services (e.g. hairdressers), visiting friends/relatives & daycare/educational settings. Transmission risk depends on environmental factors with higher risk in certain settings likely associated with single source transmission or indoor environments.
Conn 2021[84]	22-May-21	3 data-sets: Jun 12th to	medRxiv [preprint]	Modell-ing	UK	Community	N/A	Reproduction number,	Estimate reproduction	Alpha	Number of daily cases are predicted to increase as NPIs are lifted in May &

		Nov 13th 2020; Nov 14th 2020 to Mar 24th 2021; & Mar 2020 to May 12th 2021						daily infections & daily deaths	numbers & transmission rate of Alpha to assess the UK's re-opening plan in relation to vaccine rollout		Jun 2021. A further significant increase in cases is predicted with a reduced uptake of vaccination by eligible individuals.
Domenico 2021[85]	16-May-21	Mar 2020 to Apr 2021	medRxiv [preprint]	Modell-ing	FRA	Community	N/A	Number of cases of SARS-CoV-2	Compare various intervention scenarios to examine adherence to & sustainability of epidemic control	Alpha	An estimated increase in cases predicted for May & Jun 2021 as NPIs are lifted. Moderate NPIs should be in place for extended time to achieve similar results as high intensity lockdowns. Short & strict lockdowns perform better than longer moderate lockdowns due to waning adherence of lockdown measures.
Dimeglio 2021[48]	12-May-21	Feb 5th to 12th 2021 & Mar 5th to 12th 2021	Viruses	Modell-ing	FRA	Community	N/A	Number of new daily SARS-CoV-2 cases	Estimate transmission dynamics of SARS-CoV-2 in Toulouse, France in the presence of VOC & in relation to public health measures, including vaccination rollout .	Alpha	Alpha became dominant in Feb 2021, which indicates its capacity to adapt to new hosts. Its transmission dynamics suggest that the public health measures are effective against Alpha in contrast to some reports
Du 2021[87]	01-Jul-21	NA	SSRN The Lancet [preprint]	Modell-ing	USA	Community	N/A	Testing strategies & number of positive SARS-CoV-2 cases	Assess the economic impact of proactive testing strategies versus different transmission scenarios of SARS-CoV-2	Alpha, Beta, Gam-ma & Delta	Modell-ing suggests daily testing is needed for confirmed cases when population immunity is low & weekly testing when immunity is high. As transmission rate increases in the population, testing becomes more economical.
Jaya-sundara 2021[88]	07-Jul-21	N/A	medRxiv [preprint]	Modell-ing	MYS	Community	N/A	Number of SARS-CoV-2 cases	Predict the impact of vaccine rollout on controlling the spread of SARS-CoV-2 in relation to various public health response scenarios in Malaysia	Alpha, Beta & Delta	Under current vaccination rollout, lifting all NPIs would lead to a surge in cases. VOC are estimated to be responsible for the current resurgence in case numbers & therefore, rapid vaccine rollout is necessary to mitigate the spread of SARS-CoV-2, along with continuation of NPIs

Lane 2021[89]	09-Jul-21	Jan 25th 2020 to Jan 31st 2021	Lancet Public Health	Observational	AUS	Community	20 451 cases of COVID-19	Genomic analyses & associated case clusters	Explore the role of genomic epidemiology in mitigating COVID-19 outbreaks in Australia	Alpha	Swift & comprehensive quarantine & public health measures are effective at mitigating COVID-19 outbreaks, even with high viral growth rates. Real-time genomic analysis surveillance is a useful public health tool
Li 2021[90]	27-Jun-21	Mar 1st 2020 to May 31st 2021 & Dec 13th 2020 to May 31st 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Number of wildtype & Alpha cases	Estimate the transmission dynamics of wildtype & VOC SARS-CoV-2 in relation to vaccine coverage in the US	Alpha	Current vaccines are effective against the alpha variant, & 70% coverage would be sufficient protection, to allow for social activities to resume
Loenenbach 2021[91]	2027-05-21	Jan to Feb 2021	Euro-surveillance	Observational	DEU	Childcare centres	3 outbreaks	Secondary attack rate	Investigate childcare center outbreaks & assess secondary attack rate within centers & associated households	Alpha	Evidence supports a higher transmissibility rate of alpha variant, & there are indications that it affects children at a higher rate. This highlights the need for NPIs
Maison 2021[92]	09-Jun-21	Apr 2nd 2021	Research Square [preprint]	Observational	USA	Community	Alpha & Beta	Prev-alence & origin of VOC in Hawai'i	Demonstrate a method to defining COVID-19 variants' lineages	Alpha, Beta, Gamma	Quarantine prevented VOC from entering Hawai'i. There would be benefit from a collective quarantine across various states rather than individual state quarantines
Mancuso 2021[93]	13-Jul-21	Jan 22nd, 2020 to Mar 6th, 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Vaccine effectiveness	Assess the impact of vaccination & vaccine-induced cross-protection against COVID-19 & the alpha variant	Alpha	Wide-scale vaccination & vaccine-induced cross protection is imperative to slowing the spread of COVID-19
Moghadas 2021[94]	08-Jul-21	Dec 12th 2020 to Jun 28th 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Case data in areas with different vaccination progress	Quantify impact of vaccination on cases	Alpha, Gamma & Delta	Vaccination program is highly effective in preventing COVID-19 cases. The speed of vaccination can have a very large impact on outbreak prevention, & increasing vaccination rates in areas which are underserved should be a priority
Neuberger 2021[95]	03-Jul-21	Aug 31st 2020 to May 31st 2021 & Ongoing	medRxiv [preprint]	Observational	DEU	Childcare centres	8,500 ECEC managers	Reported infections	Define risk determinants & underst& difference	Alpha	Centers with children with lower socioeconomic status have a higher risk of infection, strict contact

									in risk between children & adults		restrictions have shown to prevent infection
Nielson 2021[96]	06-Jul-21	NR	medRxiv [preprint]	Modell-ing	N/A	Community	N/A	Overdispersion & mean infectiousness of variants	Determine how overdispersion will affect the variant	Alpha	Overdispersion is evolutionarily unstable, & variants could become dominant
Quilty 2021[97]	14-Jun-21	NR	medRxiv [preprint]	Modell-ing	Global	Community	N/A	Proportion of infected travelers	Assess the effectiveness of quarantine & testing strategies for travelers	Alpha	Quarantine & strategic testing are effective methods in preventing transmission due to traveling
Quinonez 2021[98]	17-May-21	Dec 2019 to Apr 2021	Viruses	Modell-ing	NA	Community	N/A	Estimates of VOC infection	Forecast the variant behaviour due to selective pressure	Alpha, Beta, Gam-ma & Delta	B.1.351, B.1.617, & P.1 variants have shown to escape vaccine induced immunity, indicating the potential need for a third dose of vaccination
Sachak-Patwa 2021[99]	02-Jun-21	Mar 12th to Apr 11th 2021 & Mar 22nd to April 21st 2021	Research Square [preprint]	Modell-ing	IMN & ISR	Community	N/A	Viral transmission	Assess the risk of virus outbreak upon the removal of NPIs & travel restrictions	Alpha	Upon lifting travel restrictions, surveillance of incoming passengers will be crucial to preventing outbreaks
Salvatore 2021[100]	30-June-21	March & April 2021	medRxiv [preprint]	Modell-ing	IND	Community	N/A	Number of deaths and case counts	To compare the second and first waves, nationally and across states and union territories, in terms of public health metric. Then, to investigate the extent to which the emergence and altered epidemiological properties of the SARS-CoV-2 Delta variant might have driven the surge in the observed case and death counts in the 2nd wave in India. Finally, to estimate the number of deaths	Delta	Using an extended SIR model accounting for reinfections and waning immunity, we produce evidence in support of how early public interventions in March 2021 would have helped to control transmission in the country. We argue that enhanced genomic surveillance along with constant assessment of risk associated with increased transmission is critical for pandemic responsiveness. […] To summarize, had action taken place at any time in March, it is plausible that more than 90% of observed cases and deaths between March 1-May 15 could potentially be avoided under both strong and moderate intervention scenarios.

									that could have been averted through an early nationwide intervention (like a lockdown) at various time points in March and April 2021 during the onset of the second wave.		
Sanz-Leon 2021[101]	08-Jul-21	Mar to May 2020 & Feb to Mar 2021	medRxiv [preprint]	Modell-ing	AUS	Community	N/A	Estimated transmissio n of COVID-19	Assess the risk of continued transmission with the presence more transmissible variants	Alpha	A small group of people infected with variants with increased transmissibility could result in larger & longer comm-unity transmission outbreaks
Turner 2021[102]	Jun-2021	Jan 2020 to May 2021	CESifo Working Papers	Modell-ing	OEC D cou nt-ries	Community	N/A	Reproductio n number	Analyze the impact of a set of policies, & the importance of vaccination in relation to variants	Alpha, Beta, Gam-ma, Delta	Increased vaccination rates would provide economic relief due to fewer containment policies & lower infection rates
Van Egeren 2021[103]	18-May-21	N/A	medRxiv [preprint]	Modell-ing	USA	Community	N/A	Estimated transmissio n rates of VOC in presence of vaccines	To model the impact of vaccine-evading variants on the course of the COVID-19 pandemic in the presence of vaccines	Alpha, Beta, Gam-ma	Variants that are already present within the population may be capable of quickly defeating the vaccines as a public health intervention, a fatal flaw in strategies that emphasize rapid reopening before achieving control of SARS-CoV-2
Yang 2021[104]	25-Jun-21	Mar 2020 to May 2021	medRxiv [preprint]	Modell-ing	IND	Community	N/A	Number of infections, reported cases, & reported deaths	Understand the epidemiological characteristics & impact of the Delta variant	Delta	Case decline was most likely due to NPIs & weather conditions which negatively impacted SARS-CoV-2 transmission, rather than high population immunity
Zou 2021[105]	07-Jul-21	Jan 25th 2020 to Mar 12th 2021	medRxiv [preprint]	Modell-ing	AUS	Community	N/A	Effective reproductio n number	Create a model to inform decision makers on suitable timing for public health measure implementation	Alpha, Delta	The number of cases which were reported on the day of public health measure implementation predicted the size of case outbreaks
INCLUDED STUDIES FROM EARLIER RAPID REVIEW[106] **(N=21)**											

Ahn 2021[107]	05-May-21	N/A	SSRN The Lancet [preprint]	Modelling	USA	Community	Not reported	Policies	To propose a multi-model optimization (MMO) framework that identifies policies that perform well across structurally distinct models, and we apply this to design 12-month COVID-19 containment strategies	Alpha	Considering the heterogeneity across states, we have determined the MMO policies for all 50 US states over a one-year period and estimated the associated outcomes. Under our optimal policy, we show that some states can be on the trajectory to the halfway normal or minimal response policies for most 2021, while we recommend a few states to spend a significant portion of the year in more restrictive interventions. We also find that the prevalence of highly infectious variants (e.g., Alpha) can significantly increase the 12- month cost, which strongly supports the case for aggressive work to contain variants.
Borges 2021[108]	11-Mar-21	Dec 2020 to Feb 5, 2021	Eurosurveillance	Modelling	PRT	Community	3367 positive SGTF tests (proxy for Alpha) from Portuguese National Institute of Health	SGTF & SGTL test	To investigate the proportion of SGTF cases to gain insight on Alpha frequency and spread in Portugal	Alpha	After implementing public health measures, a decelerating trend was observed in proportion of SGTF/SGTL remaining below 50% in week 7 of 2021
Bosetti 2021[109]	23-Feb-21	N/A	HAL Archives	Modelling	FRA	Community	N/A	Hospitalization	To develop mathematical models and explore scenarios that help understand how the interplay of the key drivers of the pandemic (the variants, the vaccines	Alpha	The current curfew and conditions appear sufficient to control the spread of the historical virus but not that of Alpha. With vaccination targeting those at higher risk of hospitalization, the burden on hospitals could quickly be alleviated. However, our assessment suggests that this effect

									and the control measures) will shape its dynamics for the coming months		may not be sufficient to compensate for the increased transmissibility of Alpha.
Buchan 2021[110]	05-Apr-21	Feb 7-27, 2021	medRxiv [preprint]	Observational	CAD	Community	5617 index cases and 3397 secondary cases	Household secondary attack rate 1-14 days after index case	To compare household secondary attack rates in those with VOC versus non-VOC index cases in Ontario	Alpha	Secondary attack rate 1.31 higher in VOC vs non-VOC in same household, further accentuated in asymptomatic (RR=1.91) and pre-symptomatic (RR=3.41) cases. Findings suggest need for aggressive public health measures physical distancing, masking, testing and contact tracing
Chudasama 2021[111]	10-May-21	Oct 1 to Dec 15, 2020	Journal of Infection	Observational	UK	Community	57,382	Household outbreak	A comparative analysis of household clustering to provide a rapid assessment of transmissibility of this variant against other sequenced cases	Alpha	Analysis of national data has shown that Alpha cases were almost twice as likely to give rise to household clusters compared with wild type cases. Household exposures are high risk with passive surveillance demonstrating high attack rates, providing an important indicator of transmissibility as household exposures are unlikely to differ between cases infected with different variants and their contacts.
Domenico 2021[112]	14-Apr-21	Jan 7-8, 2021	medRxiv [preprint]	Modelling	FRA	Community	N/A	Estimated # cases of historical strain and VOC based on various social distancing measures using data from a large-scale genome sequencing initiative conducted in France	To assess the impact of implemented measures on two COVID strains (i.e., Alpha and wild type) through modeling	Alpha	Social distancing implemented in Jan 2021 would bring down the R of historical strain, however VOC would continue to increase. School holidays also slowed down dynamics. Accelerating vaccinations will help but won't be sufficient to stop the spread of the VOC, even with optimistic vaccination rates

Giordano 2021[113]	16-Apr-21	February 24, 2020, through March 26, 2021	Nature Medicine	Modelling	ITA	Community	N/A	Health care costs, death	To compare different vaccines campaign scenarios, varying SARS-CoV-2 profiles and NPI restriction	Alpha, Beta	Findings strongly advocate for NPI to remain in place during vaccine roll out until sufficient population immunity is reached. Pre-emptive NPI actions (close then open at low case #s) could drastically reduce hospitalizations and deaths
Gurbaxani 2021[114]	27-Apr-21	N/A	medRxiv [preprint]	Modelling	USA	Community	N/A	Effectiveness of mask wearing	To extend the model of Worby and Chang to use age-stratified social contact patterns for the general U.S. population, and we analyzed the model both employing the measured face mask efficacy parameters for a variety of specific types of masks and for efficacy estimates that can act as benchmarks for evaluating these products	Alpha	Showed the potential for substantial reduction in SARS-CoV-2 transmission, even with moderately effective masks, when they are worn consistently correctly (over the chin and covering nose and mouth) and/or per manufacturers' specifications by a large portion of the population.
Kim 2021[115]	13-Apr-21	Dec 14, 2020, to Mar 2, 2021	medRxiv [preprint]	Modelling	USA	Community	N/A	Evaluate the impact of each vaccine type using infection attack rate (IAR) as the main health outcome	To evaluate the trade-offs between speed of distribution vs. efficacy of multiple vaccines when variants emerge	Alpha, Beta	The speed of the vaccine distribution is a key factor to achieve low IAR levels, even though the vaccine may have high efficacy both before and after the variants emerge.
Kühn 2021[116]	26-Apr-21	N/A	medRxiv [preprint]	Modelling	DEU	Community	N/A	Effectiveness of lockdowns, measured by number	To provide viable strategies of careful opening of facilities in low-incidence regions without being affected by	Alpha	In order to keep the spread of the virus under control, strict regional lockdowns with minimum delay and commuter testing of at least twice a week are advisable.

								of new cases	neighboring regions of substantially higher incidence.		
Linka 2021[117]	27-Apr-21	N/A	medRxiv [preprint]	Modelling	USA	University campus	N/A	Effective reproduction number	To perform a retrospective study to evaluate the risks that would have been associated with the reopening of Stanford University in the spring, summer, and fall of 2020, and winter of 2021; and to explore the possible effect of variants on the overall disease dynamics	Alpha, Beta	With no additional countermeasures, during the most affected quarter, the fall of 2020, there would have been 203 cases under baseline reproduction, compared to 4727 and 4256 cases for the Alpha and Beta variants. The results suggest that population mixing presents an increased risk for local outbreaks, especially with new and more infectious variants emerging across the globe. Tight outbreak control through mandatory quarantine and test-trace-isolate strategies will be critical in successfully managing these local outbreak dynamics
Meister 2021[118]	16-May-21	N/A	Journal of Infectious Diseases	Laboratory	DEU	Community	N/A	Viral stability over 48hr (for testing different surfaces); viral infectivity (for testing effect of soap/ethanol); reduction of viral titers by end point dilution to calculate TCID50 values (to test susceptibility to heat)	To compare the surface stability of 3 SARS-CoV-2 strains, the preexisting variant (wild type) and the currently emerging Alpha and Beta variants on different surfaces and their sensitivity to heat, soap and ethanol	Alpha, Beta	The currently circulating VOC did not exhibit enhanced surface stability or differences in disinfection profiles indicating that current hygiene measures are sufficient and appropriate...Overall, our data support the application of currently recommended hygiene concepts to minimize the risk of Alpha and Beta transmission

Munitz 2021[119]	18-May-21	Dec 6, 2020, to Feb 10, 2021	Cell Reports Medicine	Modelling	ISR	Community; Nursing homes	N/A	SGTF data, reproduction number (Rt) & cycle threshold	To explore the transmission dynamics of the variant B.1.1.7 and to estimate the success of the above operations to mitigate the risk in the general population and in the elderly	Alpha	Israel's national vaccine program which initially targeted the elderly (60+ years) resulted in containment of Alpha in that population. By Jan 14th, 2021 when 50% of the 60+ were 2 weeks beyond their first dose of Pfizer vaccine, a striking decline was observed in the incidence of Alpha in the 60+ age group compared with 0-19 or 20-59 years of age (r=0.075, p=0.74; r=-0.005, p=0.98, respectively)
Pageaud 2021[120]	20-Mar-21	Santé publique France data from Jan 8 to 27, 2021, and Feb 18, 2021	medRxiv [preprint]	Modelling	FRA	Community	N/A	# of individuals recovered, # of in hospital deaths, ICU resource use	To model the expected dynamics of COVID-19 with variant strains applying protective measures and several vaccine strategies	Alpha, Beta, Gamma	While rapid vaccination of the whole population within 6 months provides the best outcome, a one-year vaccination campaign with extended non-pharmaceutical interventions (i.e., public health measures) would limit the number of deaths and avoid ICU resource saturation
Piantham 2021[121]	30-Mar-21	Sep 1, 2020 to Feb 19, 2021	medRxiv [preprint]	Modelling	UK	Community	71692 Alpha strains and 65850 non-Alpha strains	Time from illness onset in a primary case to illness onset in secondary case (using serial interval distribution)	To propose a method to estimate selective advantage of mutant strain over previous strains	Alpha	Alpha has an estimated reproduction advantage of 33.7% over non-VOC, suggesting control measures need to be strengthened by 33.7%
Sah 2021[122]	07-Apr-21	N/A	Eclinical Medicine	Modelling	USA	Community	N/A	Transmission probability; Hospitalization (non-ICU and ICU)	To evaluate the impact of accelerated vaccine distribution on curbing the disease burden of novel SARS-CoV-2 variants	Alpha	The current pace of vaccine rollout is insufficient to prevent the exacerbation of the pandemic that will be attributable to the novel, more contagious SARS-CoV-2 variants. Accelerating the vaccination rate should be a public health priority for averting the expected surge in COVID-19 hospitalizations and deaths that would be associated with widespread dissemination of the SGTF variants.

Scherbina 2021[123]	20-Feb-21	N/A	SSRN The Lancet [preprint]	Modelling	USA	Community	N/A	Estimated future monetary cost of the pandemic	To estimate the benefits of a lockdown in the US similar to those imposed in Europe	Alpha	Modeling suggests strict lockdown could reduce R by 76%, or R0: 0.933. A less restrictive lockdown would lead to R0:1.66. Optimal lockdown time of 6-7 weeks is needed to achieve high-dQALY outcomes, or 4-5 weeks to meet low-dQALY outcomes
Tokuda 2021[124]	07-May-21	Jan 14 to Apr 20, 2021	medRxiv [preprint]	Modelling	JPN	Community	N/A	Number of new infections per day	To construct the COVID-19 epidemic curve to examine effect of vaccination schedules and need for restrictions (lockdown)	Alpha	If the vaccination pace could not be quadrupled from the current pace, Japan could not achieve Zero Covid status, which is reflected by a low COVID-19 death rate and less economic damage.
Victora 2021[125]	30-Apr-21	Weeks 1-14, 2021	medRxiv [preprint]	Observational	BRA	Community	370,000 registered deaths in Brazil	Mortality rate ratios over two-weekly periods in between Jan 3rd, 2021 and Apr 22nd, 2021 for individuals aged 80+ and 90+ years	To evaluate the real-life effectiveness of the vaccination campaign among the elderly in Brazil	Gamma	Rapid scale up of vaccination among elderly Brazilians in early 2021 was associated with a decline in relative mortality compared to younger individuals
Wells 2021[126]	07-May-21	N/A	medRxiv [preprint]	Modelling	USA	Community	N/A	Length of quarantine for origin-destination pairs of European countries	Use modeling travel between pairs of European countries to identify travel quarantine and testing strategies that will not increase infections in the destination country compared to a strategy of complete border closure	Alpha, Beta	Quarantines for European destinations that are specific to travel origin can be informed by country-specific prevalence, daily incidence, vaccine coverage, age-demographics, and travel flow. For Alpha, in countries with similar prevalence, quarantine and testing strategies are similar for wild-type transmission. In contrast there is much greater variance between countries in prevalence of Beta VOC. Consequently, more extreme quarantine and testing

											measures would be needed to mitigate its impact.
Zimerman 2021[127]	11-Mar-21	Jun 1, 2020 to Jan 10, 2021	Cureus	Modelling	BRA	Community	773 genomic sequence samples	Social isolation index (SII), which is based on percentage of individuals who stayed within 450m of their home	To assess whether social isolation into small families or groups is associated with the emergence of new variants	Gamma	In the state of Amazonas, where household sizes are large, there was a positive correlation between SII and the prevalence of Gamma when SII was above 40%. Authors hypothesize that forced prolonged cohabitation may boost viral mutation and increased infectivity.

ARG: Argentina; AUS: Australia; AUT: Austria; Brazil: BRA; CAD: Canada; CDC: centres for disease control & prevention; CHL: Chile; CHN: China; CZE: Czech Republic; DEU: Germany; FRA: France; IND: India; ISR: Israel; IMN: Isle of Man; ITA: Italy; JPN: Japan; MMWR: morbidity & mortality weekly report; MYS: Malaysia; NA: North America; N/A: Not available; NPI: non-pharmaceutical intervention; PRT: Portugal; PRY: Paraguay; PYF: French Polynesia; THA: Thailand; URY: Uraguay; USA: United States of America; UK: United Kingdom; VNM: Vietnam; VOC: variant/s of concern

Supplementary Table 2. Critical appraisal results of included studies

Author, Year	Source	Preprint or Peer Review	Adjusted score for PP	Total Score (%)	Overall Quality
Cohort Studies Appraised with NOS Tool[a]					
Buchan, 2021[110]	MedRxiv	PP	-2	6 (67)	Medium
Chudasama, 2021[111]	Journal of Infection	PR	N/A	8 (89)	High
Cross-sectional Studies Appraised with NOS Tool[b]					
Victora, 2021[125]	MedRxiv	PP	-2	6 (60)	Medium
Cohort Studies Appraised with JBI Tool[d]					

Amirthalingam, 2021[44] f	MedRxiv	PP	-2	9 (81.8)	High
Eyre, 2021[12]	MedRxiv	PP	-2	7 (63.6)	Medium
Hillus, 2021[58]	The Lancet: Respiratory Medicine	PR	N/A	11 (100)	High
Karaba, 2021[59]	MedRxiv	PP	-2	7 (63.6)	Medium
Levine-Tiefenbrun, 2021[19]	MedRxiv	PP	-2	6 (54.5)	Medium
Payne, 2021[67]	SSRN	PP	-2	9 (81.2)	High
Urbanowicz, 2021[36]	Science Translational Medicine	PR	N/A	8 (72.7)	High
Yinon, 2021[41]	MedRxiv	PP	-2	8 (72.7)	High
Yorsaeng 2021[42]	MedRxiv	PP	-2	4 (36.4)	Medium
Cross-sectional Studies Appraised with JBI Tool[c]					
Adenaiye, 2021[43]	MedRxiv	PP	-2	3 (37.5)	Medium
Neuberger, 2021[95]	MedRxiv	PP	-2	3 (37.5)	Medium
Si, 2021[69]	Frontiers in Public Health	PR	N/A	5 (62.5)	Medium
Prevalence Studies Appraised with JBI Tool[a]					
Gorji, 2021[56]	MedRxiv	PP	-2	6 (66.6)	High
Lane, 2021[89]	Lancet Public Health	PR	N/A	9 (100)	High
Loenenbach, 2021[91]	Eurosurveillance	PR	N/A	9 (100)	High
Case Series Studies Appraised with JBI Tool[c]					
Ademoski, 2021[128]	MedRxiv	PP	-2	2 (25)	Low
Doyle 2021[11]	MMWR	PR*	-1	4 (44.4)	Medium
Hagan 2021[15]	MMWR	PR*	-1	6 (66.6)	High
Lam-Hine 2021[17]	MMWR	PR*	-1	4 (44..4)	Medium
Maison, 2021[92]	Research Square	PP	-2	2 (25)	Low
Case Control Studies Appraised with JBI Tool[b]					
Abu-Raddad, 2021[1]	Journal of Travel Medicine	PR	N/A	8 (80)	High
Patalon, 2021[28]	MedRxiv	PP	-2	6 (60)	Medium

[a]Total scores calculated out of 9; [b]Total score calculated out of 10; [c]Total score calculated out of 8; [d]Total score calculated out of 11; *sources are not peer reviewed journal articles but have undergone some level of peer review

Search Strategies

All searches last executed on August 25, 2021.

MEDLINE (Ovid MEDLINE All)

COVID-19 search filter: CADTH https://covid.cadth.ca/literature-searching-tools/cadth-covid-19-search-strings/

1	(coronavirus/ or betacoronavirus/ or coronavirus infections/) & (disease outbreaks/ or epidemics/ or p&emics/)
2	(ncov* or 2019ncov or 19ncov or covid19* or covid or sars-cov-2 or sarscov-2 or sarscov2 or severe acute respiratory syndrome coronavirus 2 or severe acute respiratory syndrome corona virus 2).ti,ab,kf,nm,ot,ox,rx,px.
3	((new or novel or "19" or "2019" or wuhan or hubei or china or chinese) adj3 (coronavirus* or corona virus* or betacoronavirus* or CoV or HCoV)).ti,ab,kf,ot.
4	((coronavirus* or corona virus* or betacoronavirus*) adj3 (p&emic* or epidemic* or outbreak* or crisis)).ti,ab,kf,ot.
5	((wuhan or hubei) adj5 pneumonia).ti,ab,kf,ot.
6	or/1-5 [CADTH COVID-19 filter, no date limit]
7	(((uk or united kingdom or engl& or english or britain or british or kent) adj3 (variant* or voc or vui)) or "b117" or "20i 501yv1" or "variant of concern 202012 01" or "voc 202012 01" or "variant under investigation in december 2020" or "variant under investigation 202012 01" or "vui 202012 01").ti,ab,kw,kf.
8	(((south africa* or sa) adj3 (variant* or voc or vui)) or "b1351" or "501v2" or "501yv2" or "20h 501yv2" or "20c 501yv2").ti,ab,kw,kf.
9	((brazil* adj3 (variant* or voc or vui)) or "p1" or "b11281" or ((mutation* or spike*) adj3 (k417t or e484k or n501y))).ti,ab,kw,kf.
10	((mutation* or spike*) adj3 d614g).ti,ab,kw,kf.
11	((india* adj3 (variant* or voc or vui)) or "b1617*" or "g 452v3" or "voc 21apr" or "vui 21apr" or double mutation or double mutant or double variant or triple mutation or triple mutant or triple variant or ((mutation* or spike*) adj3 (e484q or l452r or p681r))).ti,ab,kw,kf.
12	((alpha or beta or Gam-ma or delta) adj3 variant*).ti,ab,kw,kf.
13	or/7-12
14	6 & 13

Embase (Elsevier Embase.com)

COVID-19 search filter: CADTH adapted to Embase.com format; line 1 exploded

1	'SARS-related coronavirus'/exp
2	('coronavirinae'/de OR 'betacoronavirus'/de OR 'coronavirus infection'/de) & ('epidemic'/de OR 'p&emic'/de)
3	(ncov* OR 2019ncov OR 19ncov OR covid19* OR covid OR 'sars-cov-2' OR 'sarscov-2' OR 'sars-cov2' OR sarscov2 OR 'severe acute respiratory syndrome coronavirus 2' OR 'severe acute respiratory syndrome corona virus 2'):ti,ab,kw,de,tt,oa,ok

4	((new OR novel OR '19' OR '2019' OR wuhan OR hubei OR china OR chinese) NEAR/3 (coronavirus* OR 'corona virus*' OR betacoronavirus* OR cov OR hcov)):ti,ab,kw,de,tt,oa,ok
5	((coronavirus* OR 'corona virus*' OR betacoronavirus*) NEAR/3 (p&emic* OR epidemic* OR outbreak* OR crisis)):ti,ab,kw,tt,oa,ok
6	((wuhan OR hubei) NEAR/5 pneumonia):ti,ab,kw,tt,oa,ok
7	#1 OR #2 OR #3 OR #4 OR #5 OR #6
8	(((uk OR 'united kingdom' OR engl& OR english OR britain OR british OR kent) NEAR/3 (variant* OR voc OR vui)) OR 'b.1.1.7' OR b117 OR '20i 501y.v1' OR 'variant of concern 202012 01' OR 'voc 202012 01' OR 'variant under investigation in december 2020' OR 'variant under investigation 202012 01' OR 'vui 202012 01'):ti,ab,kw
9	((('south africa*' OR sa) NEAR/3 (variant* OR voc OR vui)) OR 'b.1.351' OR b1351 OR '501.v2' OR '501y.v2' OR '20h 501y.v2' OR '20c 501y.v2'):ti,ab,kw
10	((brazil* NEAR/3 (variant* OR voc OR vui)) OR 'p.1' OR p1 OR 'b.1.1.28.1' OR b11281 OR ((mutation* OR spike*) NEAR/3 (k417t OR e484k OR n501y))):ti,ab,kw
11	((mutation* OR spike*) NEAR/3 d614g):ti,ab,kw
12	((india* NEAR/3 (variant* OR voc OR vui)) OR 'b.1.617*' OR b1617* OR 'g 452.v3' OR 'voc 21apr' OR 'vui 21apr' OR 'double mutation' OR 'double mutant' OR 'double variant' OR 'triple mutation' OR 'triple mutant' OR 'triple variant' OR ((mutation* OR spike*) NEAR/3 (e484q OR l452r OR p681r))):ti,ab,kw
13	((alpha OR beta OR Gam-ma OR delta) NEAR/3 variant*):ti,ab,kw
14	#8 OR #9 OR #10 OR #11 OR #12 OR #13
15	#7 & #14

Cochrane Database of Systematic Reviews & Cochrane CENTRAL (Cochrane Library, Wiley)

1	MeSH descriptor: [Coronavirus] this term only
2	MeSH descriptor: [Betacoronavirus] this term only
3	MeSH descriptor: [Coronavirus Infections] this term only
4	{or #1-#3}
5	MeSH descriptor: [Disease Outbreaks] this term only
6	MeSH descriptor: [Epidemics] this term only
7	MeSH descriptor: [P&emics] this term only
8	{or #5-#7}
9	#4 & #8
10	(ncov* or 2019ncov or 19ncov or covid19* or covid or "sars-cov-2" or "sarscov-2" or sarscov2 or "severe acute respiratory syndrome coronavirus 2" or "severe acute respiratory syndrome corona virus 2"):ti,ab,kw

11	((new or novel or "19" or "2019" or wuhan or hubei or china or chinese) near/3 (coronavirus* or "corona virus*" or betacoronavirus* or cov or hcov)):ti,ab,kw
12	((coronavirus* or "corona virus*" or betacoronavirus*) near/3 (p&emic* or epidemic* or outbreak* or crisis)):ti,ab,kw
13	((wuhan or hubei) near/5 pneumonia):ti,ab,kw
14	{or #9-#13}
15	(variant* or voc or vui or mutation* or spike):ti,ab
16	#14 & #15

Epistemonikos Living Overview of the Evidence (LOVE) for COVID-19

Basic search of the following terms within the LOVE:

variant* OR voc OR vui OR "B.1.1.7" OR "20I/501Y.V1" OR "202012/01" OR "B.1.351" OR "501.V2" OR "501Y.V2" OR "20H/501Y.V2" OR "20C/501Y.V2" OR "P.1" OR "B.1.1.28.1" OR "K417T" OR "E484K" OR "N501Y" OR "D614G" OR "B.1.617" OR "B.1.617.1" OR "B.1.617.2" OR "B.1.617.3" OR "G/452.V3" OR "VOC-21APR" OR "VUI-21APR" OR "double mutation" OR "double mutant" OR "triple mutation" OR "triple mutant" OR "E484Q" OR "L452R" OR "P681R"

medRxiv / bioRxiv

medRxiv & bioRxiv simultaneous search; Date limit changed for each search update (this update: May 11 - July 14, 2021); Title & Abstract search; All words (unless otherwise specified); 50 per page; Best Match; export first 50 results only

Searches:

alpha variant
beta variant
Gam-ma variant
delta variant
uk variant
united kingdom variant
engl& variant
english variant
britain variant
british variant
kent variant
south africa variant
brazil variant
variant of concern *(phrase search)*

Public Health Implications of SARS-CoV-2 VOC, updated October 22, 2021

variants of concern *(phrase search)*
B.1.1.7
20I/501Y.V1
202012/01
B.1.351
501.V2
501Y.V2
20H/501Y.V2
20C/501Y.V2
P.1
B.1.1.28.1
K417T
E484K
N501Y
D614G
india variant
B.1.617
B.1.617.1
B.1.617.2
B.1.617.3
G/452.V3
VOC-21APR
VUI-21APR
E484Q
L452R
P681R

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