Supplementary Table 1. Summary of studies from May 11th to July 14th 2021 (n=29)

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
Adamoski 2021[1]	21-Jun-21	Oct 10th 2020 to May 24th 2021	medRxiv	Cross-sectional	BRA	Univers-ity	7249 people; 12558 tests	Positive sample Genotype	Provide safer work environment for employees of the Federal University of Paraná in Brazil	Gam-ma	Analysis of saliva presents a cheap, easy to collect, & feasible asymptomatic screening strategy.
Adeyinka 2021[2]	05-Jul-21	Jan 3rd to Feb 6th 2020 & Jan 1st to Jun 15th 2021	medRxiv	Preval-ence Study	CAD	Comm-unity	NR	Prev-alence of VOC, vaccination data & public health measures	Examine clustering patterns of COVID-19 public health efforts & cluster differences in prev-alence of VOC in Canada	Alpha, Beta, Gam-ma & Delta	Public health measures varied greatly across provinces, indicating the importance for increasing the number of fully vaccinated individuals
Aubrey 2021[3]	21-Jun-21	July 15th 2020 to Feb 15th 2021	medRxiv	Surveil-lance Testing	PYF	Comm-unity	59,490 individual self-collected samples	Number of positive SARS-CoV-2 cases	Reduce the importation of SARS COV-2 into French Polynesia through travel	Alpha	Self-collection & pooling proved to be a low resource-intensive approach to testing, while still effectively detecting VOC
Berec 2021[4]	05-Jul-21	Aug 31st 2020 to Jun 30th 2021	medRxiv	Modell-ing	CZE	Comm-unity	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[5]	03-Jun-21	Dec 12th 2020 to May 7th 2021	Vaccines	Modell-ing	CAD	Comm-unity	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.
Borch-ering 2021[6]	14-May-21	Mar 27th 2021	CDC MMWR	Modell-ing	USA	Comm-unity	n/a	Weekly reported cases,	Provide COVID-19 projections in the US over 6 months	Alpha	High vaccination coverage & moderate NPI adherence would allow hospitalizations & deaths to remain

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
								hospitalizati ons & deaths			low, with a projected decline in cases by July 2021. Lower NPI adherence would lead to increases in severe COVID-19 outcomes, even with enhanced vaccination coverage.
Bowie 2021 [7]	10-Jun-21	Jun 1st 2021	medRxiv	Modell-ing	UK	Comm-unity	n/a	Incidence, death rate & reproductiv e 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 [8]	15-Jun-21	Jan to Mar 2021	Internat ional Journal of Clinical Pharma cology & Therape utics	Modell-ing	DEU	Comm-unity	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 [9]	15-Jun-21	Nov 1st 2020 to Jan 20th 2021	SSRN	Observ-ational	UK	Comm-unity	41,341 type 1 groups comprisin g 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 [10]	22-May-21	3 data-sets: Jun 12th to Nov 13th 2020; Nov 14th 2020 to Mar 24th	medRxiv	Modell-ing	UK	Comm-unity	N/A	Reproductio n number, daily infections & daily deaths	Estimate reproduction numbers & transmission rate of Alpha to assess the UK's re-opening plan	Alpha	Number of daily cases are predicted to increase as NPIs are lifted in May & Jun 2021. A further significant increase in cases is predicted with a reduced uptake of vaccination by eligible individuals.

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
		2021; & Mar 2020 to May 12th 2021							in relation to vaccine rollout		
Di Domenico 2021[11]	16-May-21	Mar 2020 to Apr 2021	medRxiv	Modell-ing	FRA	Comm-unity	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 reults as high intensity lockdowns. Short & strict lockdowns perform better than longer moderate lockdowns due to waning adherence of lockdown measures.
Dimeglio 2021[12]	12-May-21	Feb 5th to 12th 2021 & Mar 5th to 12th 2021	Viruses	Modell-ing	FRA	Comm-unity	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[13]	01-Jul-21	NA	SSRN Lancet	Modell-ing	USA	Comm-unity	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[14]	07-Jul-21	N/A	medRxiv	Modell-ing	MYS	Comm-unity	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[15]	09-Jul-21	Jan 25th 2020 to Jan 31st 2021	Lancet Public Health	Prev-alence study	AUS	Comm-unity	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

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
											surveillance is a useful public health tool
Li 2021[16]	27-Jun-21	Mar 1st 2020 to May 31st 2021 & Dec 13th 2020 to May 31st 2021	medRxiv	Modell-ing	USA	Comm-unity	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
Loenen-bach 2021[17]	2027-05-21	Jan to Feb 2021	Euro-surveilla nce	Prev-alence study	DEU	Child-care 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[18]	09-Jun-21	Apr 2nd 2021	Researc h Square	Prev-alence study	USA	Comm-unity	Alpha & Beta	Prev-alence & origin of VOC in Hawai'i	Demonstrate a method to defining COVID-19 variants' lineages	Alpha, Beta, Gam-ma	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[19]	13-Jul-21	Jan 22nd, 2020 to Mar 6th, 2021	medRxiv	Modell-ing	USA	Comm-unity	N/A	Vaccine effective-ness	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
Moghada s 2021[20]	08-Jul-21	Dec 12th 2020 to Jun 28th 2021	medRxiv	Modell-ing	USA	Comm-unity	N/A	Case data in areas with different vaccination progress	Quantify impact of vaccination on cases	Alpha, Gam-ma & 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
Neu-berger 2021[21]	03-Jul-21	Aug 31st 2020 to May 31st 2021 & Ongoing	medRxiv	Cross-sectional study	DEU	Day care centres	8,500 ECEC managers	Reported infections	Define risk determinants & underst& difference in risk between children & adults	Alpha	Centers with children with lower socioeconomic status have a higher risk of infection, strict contact restrictions have shown to prevent infection

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
Nielson 2021[22]	06-Jul-21	NR	medRxiv	Modell-ing	N/A	Comm-unity	N/A	Overdispersi on & mean infectiousne ss of variants	Determine how overdispersion will affect the variant	Alpha	Overdispersion is evolutionarily unstable, & variants could become dominant
Quilty 2021[23]	14-Jun-21	NR	medRxiv	Modell-ing	Global	Comm-unity	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[24]	17-May-21	Dec 2019 to Apr 2021	Viruses	Modell-ing	NA	Comm-unity	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[25]	02-Jun-21	Mar 12th to Apr 11th 2021 & Mar 22nd to April 21st 2021	Researc h Square	Modell-ing	IMN & ISR	Comm-unity	N/A	Viral transmissio n	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
Sanz-Leon 2021[26]	08-Jul-21	Mar to May 2020 & Feb to Mar 2021	medRxiv	Modell-ing	AUS	Comm-unity	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[27]	Jun-2021	Jan 2020 to May 2021	CESifo Working Papers	Modell-ing	OECD count-ries	Comm-unity	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
Yang 2021[28]	25-Jun-21	Mar 2020 to May 2021	medRxiv	Modell-ing	IND	Comm-unity	N/A	Number of infections, reported cases, & reported deaths	Underst& 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[29]	07-Jul-21	Jan 25th 2020 to Mar 12th 2021	medRxiv	Modell-ing	AUS	Comm-unity	N/A	Effective reproductio n number	Create a model to inform decision makers on suitable	Alpha, Delta	The number of cases which were reported on the day of public health

Author, date	Date of publicat-ion	Date of data collection	Source	Study design	Coun-try	Setting	Sample size	Outcome measures	Objective	VOC	Main Findings
									timing for public health measure implementation		measure implementation predicted the size of case outbreaks

AUS: Australia; CAD: Canada; CDC: centres for disease control & prevention; CZE: Czech Republic; DEU: Germany; FRA: France; IND: India; ISR: Israel; IMN: Isle of Man; MMWR: morbidity & mortality weekly report; MYS: Malaysia; NA: North America; N/A: Not available; NPI: non-pharmaceutical intervention; PYF: French Polynesia; USA: United States of America; UK: United Kingdom; 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 [30]	MedRxiv	PP	-2	6 (67)	Medium
Chudasama, 2021 [31]	Journal of Infection	PR	N/A	8 (89)	High
Cross-sectional Studies Appraised with NOS Tool[b]					
Victora, 2021[32]	MedRxiv	PP	-2	6 (60)	Medium
Cross-sectional Studies Appraised with JBI Tool[c]					
Neuberger 2021 [21]	MedRxiv	PP	-2	3 (37.5)	Medium
Prev-alence Studies Appraised with JBI Tool[d]					
Lane, 2021 [15]	Lancet Public Health	PR	N/A	9 (100)	High
Loenenbach, 2021 [17]	Eurosurveillance	PR	N/A	9 (100)	High

[a,d]Total scores calculated out of 9; [b]Total score calculated out of 10; [c]Total score calculated out of 8

Search Strategies

All searches last executed on July 14, 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)*
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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