Supplementary material

Incorporating Social Determinants of Health into Transmission Modeling of COVID-19 Vaccine in the US: A Scoping Review

This supplementary material has been provided by the authors to give readers additional information about their work.

Table of Contents

Supplementary Methods 1. Search strategies in Medline and Embase

Search Strategies for Medline (Ovid) and Embase (Elsevier)

- Filters applied for study types using and adapting when necessary the Canadian Agency for Drugs and Technologies in Health (CADTH) filters, searchfilters.cadth.ca/, for clinical trials (randomized, controlled, pragmatic, equivalence), systematic review or meta-analysis, or observational, validation, clinical or multi-center studies
- No date limits applied.

October 6, 2022

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions <1946 to October 05, 2022>

Medline (Ovid) legend:

Field codes:

/ = Medical Subject Heading (MeSH); ti = article title; ab = abstract; kf = keyword heading word; kw = keyword heading (author keywords); ui = unique identifier

Proximity operator: adj#

Truncation: *

1 Models, Theoretical/ or cellular automata/ or fuzzy logic/ or models, biological/ or epidemiological models/ or models, spatial interaction/ or nomograms/ or nonlinear dynamics/ [Theoretical models 1, subject terms] 537634

2 Models, Theoretical/ or ((computer or computer-based or computational or epidemi* or experimental* or mathematical or statistical or theoretical) adj2 (model or models or modeling or modelling)).ti,ab,kf,kw. [Theoretical models 2, subject/keyword terms] 387271

3 epidemiological models/ or (("communicable disease" or compartmental or epidemic or epidemical or epidemiolog*) adj2 (model or models or modeling or modelling)).ti,ab,kf,kw. [Epidemiological models, Epidem models 1, subject/keywords] 11443

4 ((SEIR or "susceptible exposed infectious recovered" or "susceptible exposed infect* recover*" or "susceptible exposed infect* remove*" or SIR or "susceptible infected recovered" or "susceptib* infect* recover*" or "susceptib* infect* remove*" or SIS or " susceptible infected susceptible" or "susceptible infect* susceptible") adj2 (model or models or modeling or modelling)).ti,ab,kf,kw. [more epidemiological model keywords, Epidem models 2] 2841

5 Computer Simulation/ or (((computer or computer-based or computational) adj2 (model or models or modeling or modelling or simulation* or microsimulation* or micro-simulation*)) or "in silico").ti,ab,kf,kw. [Computer simulation subject/keyword terms] 306086

6 ((risk or prediction) adj2 (model or models or modeling or modelling)).ti,ab,kf,kw. [Risk models - keywords] 59770

7 bayes theorem/ or markov chains/ or (((bayes or bayesian) adj2 (analysis or approach or estimation or forecast* or method or model* or prediction or theorem)) or (Markov adj2 (chain or chains or model* or process* or " random field*")) or ((CTMC or DTMC or MDP or MRF) adj9 (Markov or model*))).ti,ab,kf,kw. [Bayes/Markov subject/keyword terms] 82230

8 (((Math or Mathematical or Dynamic or Dynamical or Stochastic or Deterministic or Discrete-time or Continuous-time or Compartmental or SIR or SEIR or SIRS or SIS or SEIS or SEIRS or Agent-based or "Agent based" or Individual-based or "Individual based" or Individual-level or "Individual level" or "Branching process" or Network) adj2 (model or models or modeling or modelling or "computer simulation*")) or ((Susceptible* adj3 (infected or infectious* or infect*)) and (model* or analysis or framework))).ti,ab,kf,kw. [Math modeling terms from DT] 126092

9 ((epidemic* or pandemic*) adj2 (model or models or modeling or modelling or "computer simulation*" or "forward simulation*")).ti,ab,kf,kw. [Epidemic/pandemic models - keyword terms] 3694

10 Statistics as Topic/ or Space-time clustering/ or Basic reproduction number/ or Stochastic processes/ or (((estimation or statistic*) adj2 (analys* or parameter* or technic or technics or technique or techniques)) or "basic reproduction number" or "reproduction number" or (stochastic adj3 (model* or process or processes))).ti,ab,kf,kw. [Statistics as topic subject/keyword] 328665

11 or/1-10 [Models subset] 1358273

12 COVID-19/ or ("2019 novel coronavirus disease*" or "2019 novel coronavirus epidemic*" or "2019 novel coronavirus infection*" or "2019-nCoV disease*" or "2019-nCoV infection*" or "coronavirus disease 2" or "coronavirus disease 2010" or "coronavirus disease 2019" or "coronavirus disease-19" or "coronavirus infection 2019" or COVID or "COVID 2019*" or "COVID-10" or COVID19 or "long COVID" or "nCoV 2019 disease" or "nCoV 2019 infection" or "new coronavirus pneumonia" or "novel coronavirus 2019 disease" or "novel coronavirus 2019 infection" or "novel coronavirus disease 2019" or "novel coronavirus infected pneumonia" or "novel coronavirus infection 2019" or "novel coronavirus pneumonia" or "paucisymptomatic coronavirus disease 2019" or "pediatric multisystem inflammatory syndrome" or "SARS coronavirus 2 infection" or "SARS coronavirus 2 pneumonia" or "SARS-CoV-2 disease"

or "SARS-CoV-2 infection" or "SARS-CoV-2 pneumonia" or "SARS-CoV2 disease" or "SARS-CoV2 infection" or "SARSCoV2 disease" or "SARSCoV2 infection" or "severe acute respiratory syndrome 2" or "severe acute respiratory syndrome 2 pneumonia" or "severe acute respiratory syndrome coronavirus 2 infection" or "severe acute respiratory syndrome coronavirus 2019 infection" or "severe acute respiratory syndrome CoV-2 infection" or "Wuhan coronavirus disease" or "Wuhan coronavirus infection").ti,ab,kf,kw. [COVID-19 subject/keyword terms] 292054

13 SARS-CoV-2/ or ("2019 nCOV" or "2019 new coronavirus*" or "2019 novel coronavirus*" or "2019 severe acute respiratory syndrome coronavirus 2" or "2019-nCoV" or "coronavirus SARS-2" or "COVID 19 virus*" or "HCoV-19" or "Human coronavirus 2019" or "nCoV-2019" or "novel 2019 coronavirus*" or "novel coronavirus 2019" or "novel coronavirus-19" or "SARS Coronavirus 2" or ((SARS-2 or SARS2) and (viral or virus*)) or "SARS-2-CoV" or "SARS-CoV-2" or "SARS-related coronavirus 2" or "Sever acute respiratory syndrome coronavirus 2" or "Severe acute respiratory coronavirus 2" or "Severe acute respiratory syndorme coronavirus 2" or "Severe acute respiratory syndrome 2 coronavirus" or "Severe acute respiratory syndrome 2 virus*" or SARS-COV-2 or (SARS adj2 ("corona virus 2" or "coronavirus 2" or "coronavirus-2")) or "Severe acute respiratory syndrome corona virus 2" or "Severe acute respiratory syndrome coronavirus 2019" or "Severe acute respiratory syndrome coronoavirus 2" or "Severe acute respiratory syndrome coronvirus 2" or "severe acute respiratory syndrome CoV-2 virus" or " Severe acute respiratory syndrome related coronavirus 2" or "Severe acute respiratory syndrome virus 2" or "Severe acute respiratory syndrome coronavirus 2" or "Wuhan coronavirus*" or "Wuhan seafood market pneumonia virus" or txid2697049).ti,ab,kf,kw. [SARS-COV-2 virus subject/keyword terms] 183036

14 exp animals/ not humans/ 5052226

15 (or/12-13) not 14 [COVID-SARS-COV-2] 296721

16 and/11,15 [Models + COVID/SARS-COV-2 set] 15369

17 Bias/ or selection bias/ or (bias or biases or "epidemiolog* bias*" or "imprecision bias*" or ascertainment or overascertainment or overascertain* or over-ascertain* or underascertainment* or underascertain* or under-ascertain* or undercount* or ((ascertain* or imprecision) adj6 bias*) or (bias* adj3 analys*) or "selection bias*" or "information bias*").ti,ab,kf,kw. [Bias - subject/keyword terms] 257776

18 Data Accuracy/ or dimensional measurement accuracy/ or "sensitivity and specificity"/ or "predictive value of tests"/ or signal-to-noise ratio/ or ((data adj2 (accurac* or qualit*)) or ((reliability or validit*) adj2 results) or (validity adj2 reliability) or "measurement error*" or sensitivity or specificity or

"predictive value*" or "Signal To Noise Ratio*" or "Signal-To-Noise Ratio*").ti,ab,kf,kw. or (quality control/ and data.ti.) [Data quality] 1738749

19 Epidemiologic Methods/ or Epidemiologic Measurements/ or exp Epidemiologic Studies/ or epidemiol*.ti,kf. [Epidemiol method/measurement/studies subject-keyword terms] 3190550

20 ep.fs. [Epidemiology subheading] 2021937

21 incidence.ti. [Incidence in title] 114978

22 or/19-21 [Epidemiology set] 4376375

23 Biosurveillance/ or population surveillance/ or public health surveillance/ or sentinel surveillance/ or (((data or population or "public health" or sentinel or syndromic) adj2 surveillance) or biosurveillance or "surveillance system*").ti,ab,kf,kw. [Biosurveillance subject/keyword terms] 102955

24 (Beta ad2 transmission or Dispersion or (Duration adj2 (latent or latency or incubation or infectiousness)) or "Diagnostic test sensitivity" or Importation).ti,ab,kf,kw. [specific parameters - team identified] 89345

25 ("33323424" or "34611158" or "32587997" or "33634345" or "33406053").ui. [Exemplars] 5

26 (Randomized Controlled Trial or Controlled Clinical Trial or Pragmatic Clinical Trial or Equivalence Trial or Clinical Trial, Phase III).pt. 672914

27 Randomized Controlled Trial/ or Equivalence Trial/ or Pragmatic Clinical Trial/ 579514

28 exp Randomized Controlled Trials as Topic/ 161821

29 "Randomized Controlled Trial*".ti,ab,hw,kf,kw. 809894

30 Controlled Clinical Trial/95054

31 exp Controlled Clinical Trials as Topic/ 167507

32 Randomization/106884

33 Random Allocation/ 106884

34 Double-Blind Method/ 173167

35 Double-Blind Studies/ 173167

36 Single-Blind Method/ 32209

37 Single-Blind Studies/ 32209

38 Placebos/ 35923

39 Placebo*.ti,ab,hw,kf,kw. 254106

40 Control Groups/ 1860

41 Control Group/ 1860

42 (random* or sham or placebo*).ti,ab,hw,kf,kw. 1736633

43 ((singl* or doubl*) adj1 (blind* or dumm* or mask*)).ti,ab,hw,kf,kw. 261091

44 ((tripl* or trebl*) adj1 (blind* or dumm* or mask*)).ti,ab,hw,kf,kw. 1517

45 (control* adj3 (study or studies or trial* or group*)).ti,ab,kf,kw. 1166270

46 (Nonrandom* or non random* or non-random* or quasi-random* or quasirandom*).ti,ab,hw,kf,kw. 51943

47 allocated.ti,ab,hw. 79429

48 ((open label or open-label) adj5 (study or studies or trial*)).ti,ab,hw,kf,kw. 42295

49 ((equivalence or superiority or non-inferiority or noninferiority) adj3 (study or studies or trial*)).ti,ab,hw,kf,kw. 11207

50 (pragmatic study or pragmatic studies).ti,ab,hw,kf,kw. 551

51 ((pragmatic or practical) adj3 trial*).ti,ab,hw,kf,kw. 7190

52 ((quasiexperimental or quasi-experimental) adj3 (study or studies or trial*)).ti,ab,hw,kf,kw. 11000

53 (phase adj3 (I or "1" or II or "2" or III or "3" or IV or "4") adj3 (study or studies or trial*)).ti,ab,hw,kf,kw. 155813

54 or/26-53 [RCT-CCT filter - CADTH, Canadian Agency for Drugs and Technologies in Health FILTER] 2567813

55 (systematic review or meta-analysis).pt. 287122

56 meta-analysis/ or systematic review/ or systematic reviews as topic/ or meta-analysis as topic/ or "meta analysis (topic)"/ or "systematic review (topic)"/ or exp technology assessment, biomedical/ or network meta-analysis/ 323769

57 ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).ti,ab,kf. 286725

58 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).ti,ab,kf. 14395

59 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).ti,ab,kf. 35971

60 (data synthes* or data extraction* or data abstraction*).ti,ab,kf. 36962

61 (handsearch* or hand search*).ti,ab,kf. 10717

62 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).ti,ab,kf. 33295

63 (met analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).ti,ab,kf. 11498

64 (meta regression* or metaregression*).ti,ab,kf. 13170

65 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).mp,hw. 426877

66 (medline or cochrane or pubmed or medlars or embase or cinahl).ti,ab,hw. 310676

67 (cochrane or (health adj2 technology assessment) or evidence report).jw. 20981

68 (comparative adj3 (efficacy or effectiveness)).ti,ab,kf. 16547

69 (outcomes research or relative effectiveness).ti,ab,kf. 10792

70 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).ti,ab,kf. 4090

71 (multi* adj3 treatment adj3 comparison*).ti,ab,kf. 283

72 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).ti,ab,kf. 176

73 umbrella review*.ti,ab,kf. 1143

74 (multi* adj2 paramet* adj2 evidence adj2 synthesis).ti,ab,kf. 13

75 (multiparamet* adj2 evidence adj2 synthesis).ti,ab,kf. 17

76 (multi-paramet* adj2 evidence adj2 synthesis).ti,ab,kf. 11

77 or/55-76 [SRMA Filter - CADTH FILTER] 629101

78 Epidemiologic Methods/ 31606

79 exp Epidemiologic Studies/ 3018840

80 Observational Studies as Topic/ 8172

81 Clinical Studies as Topic/ 763

82 single-case studies as topic/ 97

83 (Observational Study or Validation Studies or Clinical Study).pt. 138222

84 (observational adj3 (study or studies or design or analysis or analyses)).ti,ab,kf. 201390

85 cohort*.ti,ab,kf.791222

86 (prospective adj7 (study or studies or design or analysis or analyses)).ti,ab,kf. 506550

87 ((follow up or followup) adj7 (study or studies or design or analysis or analyses)).ti,ab,kf. 161549

88 ((longitudinal or longterm or (long adj term)) adj7 (study or studies or design or analysis or analyses or data)).ti,ab,kf. 325932

89 (retrospective adj7 (study or studies or design or analysis or analyses or data or review)).ti,ab,kf. 630690

90 ((case adj control) or (case adj comparison) or (case adj controlled)).ti,ab,kf. 152437

91 (case-referent adj3 (study or studies or design or analysis or analyses)).ti,ab,kf. 633

92 (population adj3 (study or studies or analysis or analyses)).ti,ab,kf. 220720

93 (descriptive adj3 (study or studies or design or analysis or analyses)).ti,ab,kf. 100874

94 ((multidimensional or (multi adj dimensional)) adj3 (study or studies or design or analysis or analyses)).ti,ab,kf. 4607

95 (cross adj sectional adj7 (study or studies or design or research or analysis or analyses or survey or findings)).ti,ab,kf. 399121

96 ((natural adj experiment) or (natural adj experiments)).ti,ab,kf. 2958

97 (quasi adj (experiment or experiments or experimental)).ti,ab,kf. 18555

98 ((non experiment or nonexperiment or non experimental or nonexperimental) adj3 (study or studies or design or analysis or analyses)).ti,ab,kf. 1626

99 (prevalence adj3 (study or studies or analysis or analyses)).ti,ab,kf. 46707

100 case series.ti,ab,kf. 96671

101 case reports.pt. 2294994

102 (case adj3 (report or reports or study or studies or histories)).ti,ab,kf. 933908

103 organizational case studies/ 12625

104 or/78-103 [Observational Studies filter - CADTH FILTER] 6540625

105 "Multicenter Studies as Topic"/ or "Multicenter Study".pt. or ((multicenter or multi-center or multicentre or multi-centre) adj2 (study or studies or trial or trials)).ti,ab,kf,kw. [Multicenter studies filter] 379995

106 or/54,77,104-105 [Combined- RCT-CCT-SRMA-ObservationStudies-MulticenterStudies - FILTERS set] 8655177

107 and/15,17 [Bias + COVID/SARS-COV-2 set] 3594

108 107 and 106 [Bias + COVID/SARS-COV-2 set + FILTERS] 2308

109 107 and 106 and 22 [Bias + COVID/SARS-COV-2 set + FILTERS + Epidemiology set - Final Bias set] 921

110 and/16,18 [Data Quality + Models + COVID/SARS-COV-2 set] 1389

111 and/16,18,106 [Data Quality + Models + COVID/SARS-COV-2 + FILTERS -- Final Data Quality set] 587

112 or/109,111 [Final combo Bias/Data Quality set 1] 1487

113 16 and 22 [All Models + COVID/SARS-COV-2 + Epidemiology set - Final Models set 1] 5890

114 (or/3-4,8) and 15 and 106 [Selected Epi/Math Models + COVID/SARS-COV-2 + All 3 FILTERS - Final models set 2] 1031

115 16 and (or/23-24) [Models + COVID/SARS-COV-2 + Biosurveillance/Parameters -- Final models set 3] 425

116 or/113-115 [Final combo Models set] 6532

117 (or/113-115) not 112 [Final combo Models set] 6067

118 or/112,117 [Final combined set for both Bias/DataQuality and Models] 7554

119 or/25,112,117 [Final combined set for both Bias/DataQuality and Models finds all 5 exemplars] 7554

120 112 [Final combo Bias/Data Quality set 1] 1487

121 remove duplicates from 112 [Final combo Bias/Data Quality set 1] 1463

122 remove duplicates from 113 [All Models + COVID/SARS-COV-2 + Epidemiology set - Final Models set 1] 5840

123 remove duplicates from 114 [Final models set 2] 1028

124 remove duplicates from 115 [Final models set 3] 423

125 or/122-124 [**Final models set** - duplicates removed] **6480**

Embase (Elsevier) October 29, 2022

Embase legend:

Field codes: ti = article Title, ab = Abstract, kw = Keyword, de = Index (descriptor) term), mj = Focused (Descriptor)Index term

Proximity operator: NEAR/#

Truncation: *

#123 #119 OR #121 **2709** **[Model final set]**

#122 #112 535 [Bias final set]

#121 #120 AND (#3 OR #4 OR #7 OR #8 OR #9) 1380

#120 #115 NOT #119 5093

#119 #116 OR #117 OR #118 1329

#118 #115 AND #24 51

#117 #115 AND #23 123

#116 #115 AND #22 1243

#115 #114 NOT #112 6422

#114 #113 NOT ([conference abstract]/lim OR [conference review]/lim) 6658

#113 #17 AND (#53 OR #77 OR #107) 8617

#112 #111 NOT ([conference abstract]/lim OR [conference review]/lim) 535

#111 #109 OR #110 599

#110 #17 AND #18 AND (#53 OR #77 OR #107) 274

#109 #16 AND #18 AND #22 AND (#53 OR #77 OR #107) 377

#108 #16 AND #18 AND (#53 OR #77 OR #107) 3255

#107 #78 OR #79 OR #80 OR #81 OR #82 OR #83 OR #84 OR #85 OR #86 OR #87 OR #88 OR #89 OR #90 OR #91 OR #92 OR #93 OR #94 OR #95 OR #96 OR #97 OR #98 OR #99 OR #100 OR #101 OR #102 OR #103 OR #104 OR #105 OR #106 8827590

#106 (case NEAR/3 (report OR reports OR study OR studies OR histories)):ti,ab,kw 1212148

#105 'case report'/de 2881987

#104 'case study'/de OR 'single-case study'/de 89317

#103 case AND series:ti,ab,kw 228542

#102 (prevalence NEAR/3 (study OR studies OR analysis OR analyses)):ti,ab,kw 69021

#101 (('non experiment' OR nonexperiment OR 'non experimental' OR nonexperimental) NEAR/3 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 2352

#100 (quasi NEAR/1 (experiment OR experiments OR experimental)):ti,ab,kw 23157

#99 'natural experiment':ti,ab,kw OR 'natural experiments':ti,ab,kw 3231

#98 (('cross sectional' OR 'cross seciontal') NEAR/7 (study OR studies OR design OR research OR analysis OR analyses OR survey OR findings)):ti,ab,kw 524334

#97 ((multidimensional OR 'multi dimensional') NEAR/3 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 5463

#96 (descriptive NEAR/3 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 153665

#95 (population NEAR/3 (study OR studies OR analysis OR analyses)):ti,ab,kw 335353

#94 ('case referent' NEAR/3 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 698

#93 ((case NEAR/1 control):ti,ab,kw) OR ((case NEAR/1 comparison):ti,ab,kw) OR ((case NEAR/1 controlled):ti,ab,kw) 203729

#92 (retrospective NEAR/7 (study OR studies OR design OR analysis OR analyses OR data OR review)):ti,ab,kw 1055072

#91 ((longitudinal OR longterm OR 'long term') NEAR/7 (study OR studies OR design OR analysis OR analyses OR data)):ti,ab,kw 464464

#90 (('follow up' OR followup) NEAR/7 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 256890

#89 (prospective NEAR/7 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 764202

#88 cohort*:ti,ab,kw 1339101

#87 (observational NEAR/3 (study OR studies OR design OR analysis OR analyses)):ti,ab,kw 314960

#86 'prospective study'/de 805150

#85 'quasi experimental study'/de 10079

#84 'cross-sectional study'/de 513361

#83 'case control study'/exp 211812

#82 'retrospective study'/de 1330973

#81 'follow up'/de 1929096

#80 'longitudinal study'/de 180429

#79 'cohort analysis'/de 910457

#78 'observational study'/de 293200

#77 #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65 OR #66 OR #67 OR #68 OR #69 OR #70 OR #71 OR #72 OR #73 OR #74 OR #75 OR #76 875268

#76 ('multi paramet*' NEAR/2 evidence NEAR/2 synthesis):ti,ab,kw 23

#75 (multiparamet* NEAR/2 evidence NEAR/2 synthesis):ti,ab,kw 42

#74 ((multiparamet* NEAR/2 evidence):ti,ab,kw) AND synthesis:ti,ab,kw 43

#73 (multi* NEAR/2 paramet* NEAR/2 evidence NEAR/2 synthesis):ti,ab,kw 28

#72 'umbrella review*':ti,ab,kw 1226

#71 (mixed NEAR/3 treatment NEAR/3 ('meta analy*' OR metaanaly*)):ti,ab,kw 234

#70 (multi* NEAR/3 treatment NEAR/3 comparison*):ti,ab,kw 428

#69 ((indirect OR 'indirect treatment' OR 'mixed treatment') NEAR/1 comparison*):ti,ab,kw 4979

#68 'outcomes research':ti,ab,kw OR 'relative effectiveness':ti,ab,kw 14463

#67 (comparative NEAR/3 (efficacy OR effectiveness)):ti,ab,kw 21772

#66 cochrane:jt OR ((health NEAR/2 'technology assessment'):jt) OR 'evidence report':jt 27748

#6 5medline:ti,ab,de OR cochrane:ti,ab,de OR pubmed:ti,ab,de OR medlars:ti,ab,de OR embase:ti,ab,de OR cinahl:ti,ab,de 338735

#64 'meta-analy*':de OR metaanaly*:de OR 'systematic review*':de OR 'biomedical technology assessment*':de OR 'bio-medical technology assessment*':de 470241

#63 'meta regressio*':ti,ab,kw OR metaregression*:ti,ab,kw 13255

#62 'met analy*':ti,ab,kw OR metanaly*:ti,ab,kw OR 'technology assessment*':ti,ab,kw OR hta:ti,ab,kw OR htas:ti,ab,kw OR 'technology overview*':ti,ab,kw OR 'technology appraisal*':ti,ab,kw 16456

#61 'mantel haenszel':ti,ab,kw OR peto:ti,ab,kw OR 'der simonian':ti,ab,kw OR dersimonian:ti,ab,kw OR 'fixed effect*':ti,ab,kw OR 'latin square*':ti,ab,kw 38489

#60 handsearch*:ti,ab,kw OR 'hand search*':ti,ab,kw 11922

#59 'data synthes*':ti,ab,kw OR 'data extraction*':ti,ab,kw OR 'data abstraction*':ti,ab,kw 38373

#58 ((integrative NEAR/3 (review* OR overview*)):ti,ab,kw) OR ((collaborative NEAR/3 (review* OR overview*)):ti,ab,kw) OR ((pool* NEAR/3 analy*):ti,ab,kw) 43696

#57 ((quantitative NEAR/3 (review* OR overview* OR synthes*)):ti,ab,kw) OR ((research NEAR/3 (integrati* OR overview*)):ti,ab,kw) 14625

#56 'systematic review*':ti,ab,kw OR ((systematic* NEAR/3 (review* OR overview* OR umbrella*)):ti,ab,kw) OR ((methodologic* NEAR/3 (review* OR overview* OR umbrella*)):ti,ab,kw) OR ((review* NEAR/2 (umbrella* OR overview*)):ti,ab,kw) 286323

#55 'meta analysis'/de OR 'meta analysis topic'/de OR 'network meta analysis'/de OR 'systematic review'/de OR 'systematic review topic'/de OR 'biomedical technology assessment'/de 469851

#54 [systematic review]/lim OR [meta analysis]/lim 493503

#53 #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 13922766

#52 trial:ti,kw 414081

#51 ((quasiexperimental OR 'quasi experimental') NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 17639

#50 ((pragmatic OR practical) NEAR/3 trial*):ti,ab,de,kw 7767

#49 (pragmatic:ti,ab,de,kw AND study:ti,ab,de,kw OR pragmatic:ti,ab,de,kw) AND studies:ti,ab,de,kw 5914

#48 ((equivalence OR superiority OR 'non inferiority' OR noninferiority) NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 16575

#47 (('open label' OR 'open label') NEAR/5 (study OR studies OR trial*)):ti,ab,de,kw 80588

#46 allocated:ti,ab,de,kw 102898

#45 ((multicent* OR 'multi cent*') NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 478657

#44 ((crossover OR 'cross over') NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 66621

#43 (phase NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 370865

#42 (nonrandom*:ti,ab,de,kw OR non:ti,ab,de,kw) AND random*:ti,ab,de,kw OR 'non random*':ti,ab,de,kw OR 'quasi random*':ti,ab,de,kw OR quasirandom*:ti,ab,de,kw 376488

#41 (clinical NEAR/3 (study OR studies OR trial*)):ti,ab,de,kw 6401017

#40 (control* NEAR/3 (study OR studies OR trial* OR group*)):ti,ab,de,kw 10079975

#39 ((tripl* OR trebl*) NEAR/1 (blind* OR dumm* OR mask*)):ti,ab,de,kw 1985

#38 ((singl* OR doubl*) NEAR/1 (blind* OR dumm* OR mask*)):ti,ab,de,kw 348870

#37 random*:ti,ab,de,kw OR sham:ti,ab,de,kw OR placebo*:ti,ab,de,kw 2419890

#36 'crossover procedure'/de 71866

#35 'control group'/de 108885

#34 'placebo'/de 395152

#33 'single blind procedure'/de 48135

#32 'double blind procedure'/de 200759

#31 'randomization'/de 95306

#30 'multicenter study (topic)'/de 38181

#29 'clinical trial'/exp OR 'phase 1 clinical trial'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de 1759981

#28 'clinical study'/de 160859

#27 'multicenter study'/de 339410

#26 'randomized controlled trial'/de OR 'controlled clinical trial'/de OR 'pragmatic trial'/de OR 'controlled study'/de OR 'adaptive clinical trial'/de OR 'equivalence trial'/de 9302855

#25 [randomized controlled trial]/lim OR 'controlled clinical trial'/de 913621

#24 ((beta NEAR/2 transmission):ti,ab,kw) OR dispersion:ti,ab,kw OR ((duration NEAR/2 (latent OR latency OR incubation OR infectiousness)):ti,ab,kw) OR 'diagnostic test sensitivity':ti,ab,kw OR importation:ti,ab,kw 95859

#23 'biosurveillance'/de OR 'disease surveillance'/mj OR 'epidemiological monitoring'/mj OR 'population surveillance'/mj OR 'public health surveillance'/mj OR 'serological surveillance'/mj OR (((data OR population OR 'public health' OR sentinel OR syndromic) NEAR/2 surveillance):ti,ab,kw) OR biosurveillance:ti,ab,kw OR 'surveillance system*':ti,ab,kw 56332

#22 #20 OR #21 414445

#21 incidence:ti 153826

#20 'epidemiological surveillance'/mj OR epidemiol*:ti,ab,de,kw 888368

#19 'data accuracy'/exp/mj OR 'data quality'/mj OR 'data validity'/de OR 'sensitivity and specificity'/mj OR ((data NEAR/2 (accurac* OR qualit*)):ti,ab,kw) OR (((reliability OR validit*) NEAR/2 results):ti,ab,kw) OR ((validity NEAR/2 reliability):ti,ab,kw) OR 'measurement error*':ti,ab,kw OR sensitivity:ti,ab,kw OR specificity:ti,ab,kw OR 'predictive value*':ti,ab,kw OR 'signal to noise ratio*':ti,ab,kw OR 'signal-to-noise ratio*':ti,ab,kw 1799829

#18 'statistical bias'/exp OR 'selection bias'/de OR bias:ti,ab,kw OR biases:ti,ab,kw OR 'epidemiolog* bias*':ti,ab,kw OR 'imprecision bias*':ti,ab,kw OR ascertainment:ti,ab,kw OR overascertainment:ti,ab,kw OR overascertain*:ti,ab,kw OR 'over ascertain*':ti,ab,kw OR underascertainment*:ti,ab,kw OR underascertain*:ti,ab,kw OR 'under ascertain*':ti,ab,kw OR undercount*:ti,ab,kw OR (((ascertain* OR imprecision) NEAR/6 bias*):ti,ab,kw) OR ((bias* NEAR/3 analys*):ti,ab,kw) OR 'selection bias*':ti,ab,kw OR 'information bias*':ti,ab,kw 325829

#17 #11 AND #16 12787

#16 #14 NOT #15 319216

#15 ('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/de OR 'vertebrate'/exp) NOT ('human'/exp OR 'human experiment'/exp) 7620907

#14 #12 OR #13 329740

#13 'severe acute respiratory syndrome coronavirus 2'/mj OR '2019 ncov':ti,ab,kw OR '2019 new coronavirus*':ti,ab,kw OR '2019 novel coronavirus*':ti,ab,kw OR '2019 severe acute respiratory syndrome coronavirus 2':ti,ab,kw OR '2019-ncov':ti,ab,kw OR 'coronavirus sars-2':ti,ab,kw OR 'covid 19 virus*':ti,ab,kw OR 'hcov-19':ti,ab,kw OR 'human coronavirus 2019':ti,ab,kw OR 'ncov-2019':ti,ab,kw OR 'novel 2019 coronavirus*':ti,ab,kw OR 'novel coronavirus 2019':ti,ab,kw OR 'novel coronavirus-19':ti,ab,kw OR 'sars coronavirus 2':ti,ab,kw OR (('sars 2':ti,ab,kw OR sars2:ti,ab,kw) AND (viral:ti,ab,kw OR virus*:ti,ab,kw)) OR 'sars-2-cov':ti,ab,kw OR 'sars-cov-2':ti,ab,kw OR 'sars-related coronavirus 2':ti,ab,kw OR 'sever acute respiratory syndrome coronavirus 2':ti,ab,kw OR 'severe acute respiratory coronavirus 2':ti,ab,kw OR 'severe acute respiratory syndorme coronavirus 2':ti,ab,kw OR 'severe acute respiratory syndrome 2 coronavirus':ti,ab,kw OR 'severe acute respiratory syndrome 2 virus*':ti,ab,kw OR 'sars cov 2':ti,ab,kw OR (sars:ti,ab,kw AND adj2:ti,ab,kw AND ('corona virus 2':ti,ab,kw OR 'coronavirus 2':ti,ab,kw OR 'coronavirus-2':ti,ab,kw)) OR 'severe acute respiratory syndrome corona virus 2':ti,ab,kw OR 'severe acute respiratory syndrome coronavirus 2019':ti,ab,kw OR 'severe acute respiratory syndrome coronoavirus 2':ti,ab,kw OR 'severe acute respiratory syndrome coronvirus 2':ti,ab,kw OR 'severe acute respiratory syndrome cov-2 virus':ti,ab,kw OR 'severe acute respiratory syndrome related coronavirus 2':ti,ab,kw OR 'severe acute respiratory syndrome virus 2':ti,ab,kw OR 'severe acute respiratory syndrome coronavirus 2':ti,ab,kw OR 'wuhan coronavirus*':ti,ab,kw OR 'wuhan seafood market pneumonia virus':ti,ab,kw OR txid2697049:ti,ab,kw 117323

#12 'coronavirus disease 2019'/mj OR '2019 novel coronavirus disease*':ti,ab,kw OR '2019 novel coronavirus epidemic*':ti,ab,kw OR '2019 novel coronavirus infection*':ti,ab,kw OR '2019-ncov disease*':ti,ab,kw OR '2019-ncov infection*':ti,ab,kw OR 'coronavirus disease 2':ti,ab,kw OR 'coronavirus disease 2010':ti,ab,kw OR 'coronavirus disease 2019':ti,ab,kw OR 'coronavirus disease-19':ti,ab,kw OR 'coronavirus infection 2019':ti,ab,kw OR covid:ti,ab,kw OR 'covid 2019*':ti,ab,kw OR 'covid-10':ti,ab,kw OR covid19:ti,ab,kw OR 'long covid':ti,ab,kw OR 'ncov 2019 disease':ti,ab,kw OR 'ncov 2019 infection':ti,ab,kw OR 'new coronavirus pneumonia':ti,ab,kw OR 'novel coronavirus 2019 disease':ti,ab,kw OR 'novel coronavirus 2019 infection':ti,ab,kw OR 'novel coronavirus disease 2019':ti,ab,kw OR 'novel coronavirus infected pneumonia':ti,ab,kw OR 'novel coronavirus infection 2019':ti,ab,kw OR 'novel coronavirus pneumonia':ti,ab,kw OR 'paucisymptomatic coronavirus disease 2019':ti,ab,kw OR 'pediatric multisystem inflammatory syndrome':ti,ab,kw OR 'sars coronavirus 2 infection':ti,ab,kw OR 'sars coronavirus 2 pneumonia':ti,ab,kw OR 'sars-cov-2 disease':ti,ab,kw OR 'sars-cov-2 infection':ti,ab,kw OR 'sars-cov-2 pneumonia':ti,ab,kw OR 'sars-cov2 disease':ti,ab,kw OR 'sars-cov2 infection':ti,ab,kw OR 'sarscov2 disease':ti,ab,kw OR 'sarscov2 infection':ti,ab,kw OR 'severe acute respiratory syndrome 2':ti,ab,kw OR 'severe acute respiratory syndrome 2 pneumonia':ti,ab,kw OR 'severe acute respiratory syndrome coronavirus 2 infection':ti,ab,kw OR 'severe acute respiratory syndrome coronavirus 2019 infection':ti,ab,kw OR 'severe acute respiratory syndrome cov-2 infection':ti,ab,kw OR 'wuhan coronavirus disease':ti,ab,kw OR 'wuhan coronavirus infection':ti,ab,kw 316263

#11 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 997409

#10 'basic reproduction number'/mj OR 'spatiotemporal analysis'/mj OR (((estimation OR statistic*) NEAR/2 (analys* OR parameter* OR technic OR technics OR technique OR techniques)):ti,ab,kw) OR 'basic reproduction number':ti,ab,kw OR 'reproduction number':ti,ab,kw OR ((stochastic NEAR/3 (model* OR process OR processes)):ti,ab,kw) 363384

#9 ((epidemic* OR pandemic*) NEAR/2 (model OR models OR modeling OR modelling OR 'computer simulation*' OR 'forward simulation*')):ti,ab,kw 3207

#8 'mathematical model'/mj OR 'cellular automaton'/exp/mj OR 'stochastic model'/mj OR (((math OR mathematical OR dynamic OR dynamical OR stochastic OR deterministic OR 'discrete time' OR 'continuous time' OR compartmental OR sir OR seir OR sirs OR sis OR seis OR seirs OR 'agent based' OR 'agent based' OR 'individual based' OR 'individual based' OR 'individual level' OR 'individual level' OR 'branching process' OR network) NEAR/2 (model OR models OR modeling OR modelling OR 'computer simulation*')):ti,ab,kw) OR (((susceptible* NEAR/3 (infected OR infectious* OR infect*)):ti,ab,kw) AND (model*:ti,ab,kw OR analysis:ti,ab,kw OR framework:ti,ab,kw)) 168184

#7 'bayes theorem'/mj OR 'markov chain'/exp/mj OR (((bayes OR bayesian) NEAR/2 (analysis OR approach OR estimation OR forecast* OR method OR model* OR prediction OR theorem)):ti,ab,kw) OR ((markov NEAR/2 (chain OR chains OR model* OR process* OR 'random field*')):ti,ab,kw) OR (((ctmc OR dtmc OR mdp OR mrf) NEAR/9 (markov OR model*)):ti,ab,kw) 66064

#6 ((risk OR prediction) NEAR/2 (model OR models OR modeling OR modelling)):ti,ab,kw 81625

#5 'computer simulation'/mj OR (((computer OR 'computer based' OR computational) NEAR/2 (model OR models OR modeling OR modelling OR simulation* OR microsimulation* OR 'micro simulation*')):ti,ab,kw) OR 'in silico':ti,ab,kw 177551

#4 ((seir OR 'susceptible exposed infected recovered' OR 'susceptible exposed infectious recovered' OR 'susceptible exposed infective recovered' OR 'susceptible exposed infected recovery' OR 'susceptible exposed infectious recovery' OR 'susceptible exposed infective recovery' OR 'susceptible exposed infected removed' OR 'susceptible exposed infectious removed' OR 'susceptible exposed infective removed' OR sir OR 'susceptibility infection recovery' OR 'susceptible infected and removed' OR 'susceptible infected recovered' OR 'susceptible infected recovered' OR 'susceptible infected recovery' OR 'susceptible infected removed' OR 'susceptible infected removed' OR 'susceptible infected removed' OR 'susceptible infection recovered' OR 'susceptible infectious recovered' OR 'susceptible infectious recovered' OR 'susceptible infectious recovery' OR 'susceptible infectious removed' OR 'susceptible infectious removed' OR 'susceptible infectious removed' OR 'susceptible infective recovered' OR 'susceptible infective recovery' OR 'susceptible infective removed' OR 'susceptible infective removed' OR 'susceptive infective removal' OR sis OR 'susceptible infected susceptible' OR 'susceptible infectious susceptible' OR 'susceptible infective susceptible') NEAR/2 (model OR models OR modeling OR modelling)):ti,ab,kw 2633

#3 'epidemiological model'/exp/mj OR ((('communicable disease' OR compartmental OR epidemic OR epidemical OR epidemiolog*) NEAR/2 (model OR models OR modeling OR modelling)):ti,ab,kw) 12885

#2 'theoretical model'/mj OR (((computer OR 'computer based' OR computational OR epidemi* OR experimental* OR mathematical OR statistical OR theoretical) NEAR/2 (model OR models OR modeling OR modelling)):ti,ab,kw) 330547

#1 'theoretical model'/mj OR 'fuzzy logic'/mj OR 'disease simulation'/mj 38560

Supplementary Methods 2. List of included and excluded studies in this review

A. List of included studies in this review (92 studies)

1. Bartsch SM, O'Shea KJ, Ferguson MC, Bottazzi ME, Wedlock PT, Strych U, et al. Vaccine efficacy needed for a COVID-19 coronavirus vaccine to prevent or stop an epidemic as the sole intervention. American journal of preventive medicine. 2020;59(4):493-503.

2. Matrajt L, Eaton J, Leung T, Brown ER. Vaccine optimization for COVID-19: who to vaccinate first? medRxiv: the preprint server for health sciences. 2020.

3. Albani VV, Loria J, Massad E, Zubelli JP. The impact of COVID-19 vaccination delay: A data-driven modeling analysis for Chicago and New York City. Vaccine. 2021;39(41):6088-94.

4. Awad SF, Musuka G, Mukandavire Z, Froass D, MacKinnon NJ, Cuadros DF. Implementation of a vaccination program based on epidemic geospatial attributes: Covid-19 pandemic in ohio as a case study and proof of concept. Vaccines. 2021;9(11):1242.

5. Bartsch SM, O'Shea KJ, Wedlock PT, Strych U, Ferguson MC, Bottazzi ME, et al. The benefits of vaccinating with the first available COVID-19 coronavirus vaccine. American journal of preventive medicine. 2021;60(5):605-13.

6. Bartsch SM, Wedlock PT, O'Shea KJ, Cox SN, Strych U, Nuzzo JB, et al. Lives and costs saved by expanding and expediting coronavirus disease 2019 vaccination. The Journal of Infectious Diseases. 2021;224(6):938-48.

7. Bilinski A, Salomon JA, Giardina J, Ciaranello A, Fitzpatrick MC. Passing the Test: A Model-Based Analysis of Safe School-Reopening Strategies. Annals of internal medicine. 2021;174(8):1090-100.

8. Brown RA. A simple model for control of COVID-19 infections on an urban campus. Proceedings of the National Academy of Sciences of the United States of America. 2021;118(36):e2105292118.

9. Bubar KM, Reinholt K, Kissler SM, Lipsitch M, Cobey S, Grad YH, et al. Model-informed COVID-19 vaccine prioritization strategies by age and serostatus. Science. 2021;371(6352):916-21.

10. Buckner JH, Chowell G, Springborn MR. Dynamic prioritization of COVID-19 vaccines when social distancing is limited for essential workers. Proceedings of the National Academy of Sciences. 2021;118(16):e2025786118.

11. Bushman M, Kahn R, Taylor BP, Lipsitch M, Hanage WP. Population impact of SARS-CoV-2 variants with enhanced transmissibility and/or partial immune escape. Cell. 2021;184(26):6229-42. e18.

12. Chaturvedi D, Chakravarty U. Predictive analysis of COVID-19 eradication with vaccination in India, Brazil, and USA. Infection, Genetics and Evolution. 2021;92:104834.

13. Chen X, Zhu G, Zhang L, Fang Y, Guo L, Chen X. Age-stratified COVID-19 spread analysis and vaccination: A multitype random network approach. IEEE Transactions on Network Science and Engineering. 2021;8(2):1862-72.

14. Fujimoto AB, Keskinocak P, Yildirim I. Significance of SARS-CoV-2 specific antibody testing during COVID-19 vaccine allocation. Vaccine. 2021;39(35):5055-63.

15. Giardina J, Bilinski A, Fitzpatrick MC, Kendall EA, Linas BP, Salomon J, et al. Model-estimated relationship between elementary school-related SARS-CoV-2 transmission, mitigation interventions, and vaccination coverage across community incidence levels. Medrxiv. 2021.

16. Gumel AB, Iboi EA, Ngonghala CN, Ngwa GA. Toward achieving a vaccine-derived herd immunity threshold for COVID-19 in the US. Frontiers in Public Health. 2021;9:709369.

17. Hartnett GS, Parker E, Gulden TR, Vardavas R, Kravitz D. Modelling the impact of social distancing and targeted vaccination on the spread of COVID-19 through a real city-scale contact network. Journal of Complex Networks. 2021;9(6):cnab042.

18. Islam MR, Oraby T, McCombs A, Chowdhury MM, Al-Mamun M, Tyshenko MG, et al. Evaluation of the United States COVID-19 vaccine allocation strategy. PloS one. 2021;16(11):e0259700.

19. Ke R, Romero-Severson E, Sanche S, Hengartner N. Estimating the reproductive number R0 of SARS-CoV-2 in the United States and eight European countries and implications for vaccination. Journal of theoretical biology. 2021;517:110621.

20. Li R, Li Y, Zou Z, Liu Y, Li X, Zhuang G, et al. Evaluating the Impact of SARS-CoV-2 Variants on the COVID-19 Epidemic and Social Restoration in the United States: A Mathematical Modelling Study. Frontiers in Public Health. 2021;9.

21. Li Y, Ge L, Zhou Y, Cao X, Zheng J. Toward the impact of non-pharmaceutical interventions and vaccination on the COVID-19 pandemic with time-dependent SEIR model. Frontiers in Artificial Intelligence. 2021;4:648579.

22. Lu M, Ishwaran H. Cure and death play a role in understanding dynamics for COVID-19: Data-driven competing risk compartmental models, with and without vaccination. PloS one. 2021;16(7):e0254397.

23. MacIntyre CR, Costantino V, Chanmugam A. The use of face masks during vaccine roll-out in New YorkCity and impact on epidemic control. Vaccine. 2021;39(42):6296-301.

24. Makhoul M, Chemaitelly H, Ayoub HH, Seedat S, Abu-Raddad LJ. Epidemiological differences in the impact of COVID-19 vaccination in the United States and China. Vaccines. 2021;9(3):223.

25. Matrajt L, Eaton J, Leung T, Dimitrov D, Schiffer JT, Swan DA, et al. Optimizing vaccine allocation for COVID-19 vaccines shows the potential role of single-dose vaccination. Nature communications. 2021;12(1):3449.

26. McGee RS, Homburger JR, Williams HE, Bergstrom CT, Zhou AY. Model-driven mitigation measures for reopening schools during the COVID-19 pandemic. Proceedings of the National Academy of Sciences. 2021;118(39):e2108909118.

27. Moghadas SM, Fitzpatrick MC, Shoukat A, Zhang K, Galvani AP. Simulated identification of silent COVID-19 infections among children and estimated future infection rates with vaccination. JAMA network open. 2021;4(4):e217097-e.

28. Moghadas SM, Vilches TN, Zhang K, Nourbakhsh S, Sah P, Fitzpatrick MC, et al. Evaluation of COVID-19 vaccination strategies with a delayed second dose. PLoS biology. 2021;19(4):e3001211.

29. Moghadas SM, Vilches TN, Zhang K, Wells CR, Shoukat A, Singer BH, et al. The impact of vaccination on coronavirus disease 2019 (COVID-19) outbreaks in the United States. Clinical Infectious Diseases. 2021;73(12):2257-64.

30. Motta FC, McGoff KA, Deckard A, Wolfe CR, Bonsignori M, Moody MA, et al., editors. Assessment of simulated surveillance testing and quarantine in a SARS-CoV-2–vaccinated population of students on a university campus. JAMA Health Forum; 2021: American Medical Association.

31. Paltiel AD, Schwartz JL. Assessing COVID-19 prevention strategies to permit the safe opening of residential colleges in fall 2021. Annals of internal medicine. 2021;174(11):1563-71.

32. Paltiel AD, Schwartz JL, Zheng A, Walensky RP. Clinical Outcomes Of A COVID-19 Vaccine: Implementation Over Efficacy: Study examines how definitions and thresholds of vaccine efficacy, coupled with different levels of implementation effectiveness and background epidemic severity, translate into outcomes. Health Affairs. 2021;40(1):42-52.

33. Patel MD, Rosenstrom E, Ivy JS, Mayorga ME, Keskinocak P, Boyce RM, et al. Association of simulated COVID-19 vaccination and nonpharmaceutical interventions with infections, hospitalizations, and mortality. JAMA network open. 2021;4(6):e2110782-e.

34. Ram V, Schaposnik LP. A modified age-structured SIR model for COVID-19 type viruses. Scientific reports. 2021;11(1):15194.

35. Rao IJ, Brandeau ML. Optimal allocation of limited vaccine to control an infectious disease: Simple analytical conditions. Mathematical biosciences. 2021;337:108621.

36. Romero-Brufau S, Chopra A, Ryu AJ, Gel E, Raskar R, Kremers W, et al. Public health impact of delaying second dose of BNT162b2 or mRNA-1273 covid-19 vaccine: simulation agent based modeling study. bmj. 2021;373.

37. Ryckman T, Chin ET, Prince L, Leidner D, Long E, Studdert DM, et al. Outbreaks of COVID-19 variants in US prisons: a mathematical modelling analysis of vaccination and reopening policies. The Lancet Public Health. 2021;6(10):e760-e70.

38. Shadabfar M, Mahsuli M, Khoojine AS, Hosseini VR. Time-variant reliability-based prediction of COVID-19 spread using extended SEIVR model and Monte Carlo sampling. Results in Physics. 2021;26:104364.

39. Shen M, Zu J, Fairley CK, Pagán JA, An L, Du Z, et al. Projected COVID-19 epidemic in the United States in the context of the effectiveness of a potential vaccine and implications for social distancing and face mask use. Vaccine. 2021;39(16):2295-302.

40. Stoddard M, Sarkar S, Yuan L, Nolan RP, White DE, White LF, et al. Beyond the new normal: Assessing the feasibility of vaccine-based suppression of SARS-CoV-2. Plos one. 2021;16(7):e0254734.

41. Storlie CB, Pollock BD, Rojas RL, Demuth GO, Johnson PW, Wilson PM, et al., editors. Quantifying the importance of COVID-19 vaccination to our future outlook. Mayo Clinic Proceedings; 2021: Elsevier.

42. Swan DA, Bracis C, Janes H, Moore M, Matrajt L, Reeves DB, et al. COVID-19 vaccines that reduce symptoms but do not block infection need higher coverage and faster rollout to achieve population impact. Scientific reports. 2021;11(1):15531.

43. Swan DA, Goyal A, Bracis C, Moore M, Krantz E, Brown E, et al. Mathematical modeling of vaccines that prevent SARS-CoV-2 transmission. Viruses. 2021;13(10):1921.

44. Tatapudi H, Das R, Das TK. Impact of vaccine prioritization strategies on mitigating COVID-19: an agent-based simulation study using an urban region in the United States. BMC medical research methodology. 2021;21(1):1-14.

45. Tran TN-A, Wikle NB, Albert E, Inam H, Strong E, Brinda K, et al. Optimal SARS-CoV-2 vaccine allocation using real-time attack-rate estimates in Rhode Island and Massachusetts. BMC medicine. 2021;19:1-14.

46. Truszkowska A, Behring B, Hasanyan J, Zino L, Butail S, Caroppo E, et al. High-Resolution Agent-Based Modeling of COVID-19 Spreading in a Small Town. Adv Theory Simul. 2021;4(3):2000277.

47. Webb G. A COVID-19 epidemic model predicting the effectiveness of vaccination in the US. Infectious Disease Reports. 2021;13(3):654-67.

48. Zhao X, Tatapudi H, Corey G, Gopalappa C. Threshold analyses on combinations of testing, population size, and vaccine coverage for COVID-19 control in a university setting. Plos one. 2021;16(8):e0255864.

49. Avila-Ponce de León U, Avila-Vales E, Huang K-l. Modeling the transmission of the SARS-CoV-2 delta variant in a partially vaccinated population. Viruses. 2022;14(1):158.

50. Belval EJ, Bayham J, Thompson MP, Dilliott J, Buchwald AG. Modeling the systemic risks of COVID-19 on the wildland firefighting workforce. Scientific Reports. 2022;12(1):8320.

51. Bianchin G, Dall'Anese E, Poveda JI, Jacobson D, Carlton EJ, Buchwald AG. Novel use of online optimization in a mathematical model of COVID-19 to guide the relaxation of pandemic mitigation measures. Scientific Reports. 2022;12(1):4731.

52. Bilinski A, Ciaranello A, Fitzpatrick MC, Giardina J, Shah M, Salomon JA, et al. Estimated transmission outcomes and costs of SARS-CoV-2 diagnostic testing, screening, and surveillance strategies among a simulated population of primary school students. JAMA pediatrics. 2022;176(7):679-89.

53. Blumberg S, Lu P, Kwan AT, Hoover CM, Lloyd-Smith JO, Sears D, et al. Modeling scenarios for mitigating outbreaks in congregate settings. PLoS computational biology. 2022;18(7):e1010308.

54. Bracis C, Moore M, Swan DA, Matrajt L, Anderson L, Reeves DB, et al. Improving vaccination coverage and offering vaccine to all school-age children allowed uninterrupted in-person schooling in King County, WA: Modeling analysis. Mathematical biosciences and engineering: MBE. 2022;19(6):5699.

55. Chen L, Xu F, Han Z, Tang K, Hui P, Evans J, et al. Strategic COVID-19 vaccine distribution can simultaneously elevate social utility and equity. Nature Human Behaviour. 2022;6(11):1503-14.

56. Chen X, Huang H, Ju J, Sun R, Zhang J. Impact of vaccination on the COVID-19 pandemic in US states. Scientific reports. 2022;12(1):1554.

57. Chowdhury MM, Islam MR, Hossain MS, Tabassum N, Peace A. Incorporating the mutational landscape of SARS-COV-2 variants and case-dependent vaccination rates into epidemic models. Infectious Disease Modelling. 2022;7(2):75.

58. Fosdick BK, Bayham J, Dilliott J, Ebel GD, Ehrhart N. Model-based evaluation of policy impacts and the continued COVID-19 risk at long term care facilities. Infectious Disease Modelling. 2022;7(3):463-72.

59. Frazier PI, Cashore JM, Duan N, Henderson SG, Janmohamed A, Liu B, et al. Modeling for COVID-19 college reopening decisions: Cornell, a case study. Proceedings of the National Academy of Sciences. 2022;119(2):e2112532119.

60. Gavish N, Katriel G. The role of childrens' vaccination for COVID-19—Pareto-optimal allocations of vaccines. PLoS Computational Biology. 2022;18(2):e1009872.

61. Giardina J, Bilinski A, Fitzpatrick MC, Kendall EA, Linas BP, Salomon J, et al. Model-estimated association between simulated US elementary school–related SARS-CoV-2 transmission, mitigation interventions, and vaccine coverage across local incidence levels. JAMA Network Open. 2022;5(2):e2147827-e.

62. Gómez Vázquez JP, García YE, Schmidt AJ, Martínez-López B, Nuño M. Testing and vaccination to reduce the impact of COVID-19 in nursing homes: an agent-based approach. BMC Infectious Diseases. 2022;22(1):477.

63. Grabowski F, Kochańczyk M, Lipniacki T. The spread of SARS-CoV-2 variant Omicron with a doubling time of 2.0–3.3 days can be explained by immune evasion. Viruses. 2022;14(2):294.

64. Hachtel GD, Stack JD, Hachtel JA. Forecasting and modeling of the COVID-19 pandemic in the USA with a timed intervention model. Scientific reports. 2022;12(1):4339.

65. He D, Ali ST, Fan G, Gao D, Song H, Lou Y, et al. Evaluation of effectiveness of global COVID-19 vaccination campaign. Emerging Infectious Diseases. 2022;28(9):1873.

66. Head JR, Andrejko KL, Remais JV. Model-based assessment of SARS-CoV-2 Delta variant transmission dynamics within partially vaccinated K-12 school populations. The Lancet Regional Health–Americas. 2022;5.

67. Hekmati A, Luhar M, Krishnamachari B, Matarić M. Simulating COVID-19 classroom transmission on a university campus. Proceedings of the National Academy of Sciences. 2022;119(22):e2116165119.

68. Hupert N, Marín-Hernández D, Gao B, Águas R, Nixon DF. Heterologous vaccination interventions to reduce pandemic morbidity and mortality: Modeling the US winter 2020 COVID-19 wave. Proceedings of the National Academy of Sciences. 2022;119(3):e2025448119.

69. Jhun B, Choi H. Abrupt transition of the efficient vaccination strategy in a population with heterogeneous fatality rates. Chaos: An Interdisciplinary Journal of Nonlinear Science. 2022;32(9).

70. Junge M, Li S, Samaranayake S, Zalesak M. Safe reopening of university campuses is possible with COVID-19 vaccination. Plos one. 2022;17(7):e0270106.

71. Kadelka C, Islam MR, McCombs A, Alston J, Morton N. Ethnic homophily affects vaccine prioritization strategies. Journal of Theoretical Biology. 2022;555:111295.

72. Kim D, Keskinocak P, Pekgün P, Yildirim I. The balancing role of distribution speed against varying efficacy levels of COVID-19 vaccines under variants. Scientific reports. 2022;12(1):7493.

73. Kohli MA, Maschio M, Lee A, Fust K, Van de Velde N, Buck PO, et al. The potential clinical impact of implementing different COVID-19 boosters in fall 2022 in the United States. Journal of Medical Economics. 2022;25(1):1127-39.

74. Kumar CK, Balasubramanian R, Ongarello S, Carmona S, Laxminarayan R. SARS-CoV-2 testing strategies for outbreak mitigation in vaccinated populations. Plos one. 2022;17(7):e0271103.

75. Ledder G. Incorporating mass vaccination into compartment models for infectious diseases. medRxiv. 2022:2022.04. 26.22274335.

76. Li M, Zu J, Zhang Y, Ma L, Shen M, Li Z, et al. COVID-19 epidemic in New York City: development of an age group-specific mathematical model to predict the outcome of various vaccination strategies. Virology Journal. 2022;19(1):1-13.

77. Li Q, Huang Y. Optimizing global COVID-19 vaccine allocation: An agent-based computational model of 148 countries. PLoS computational biology. 2022;18(9):e1010463.

78. Lin L, Zhao Y, Chen B, He D. Multiple COVID-19 waves and vaccination effectiveness in the United States. International journal of environmental research and public health. 2022;19(4):2282.

79. Liu X, Lv Z, Ding Y. Mathematical modeling and stability analysis of the time-delayed SAIM model for COVID-19 vaccination and media coverage. Math Biosci Eng. 2022;19(6):6296-316.

80. Mallela A, Neumann J, Miller EF, Chen Y, Posner RG, Lin YT, et al. Bayesian inference of state-level COVID-19 basic reproduction numbers across the United States. Viruses. 2022;14(1):157.

81. Pantha B, Mohammed-Awel J, Vaidya NK. EFFECTS OF VACCINATION ON THE TRANSMISSION DYNAMICS OF COVID-19 IN DOUGHERTY COUNTY OF GEORGIA, USA. Journal of Biological Systems. 2022;30(03):553-83.

82. Paris CF, Spencer JA, Castro LA, Del Valle SY. Exploring Impacts to COVID-19 Herd Immunity Thresholds Under Demographic Heterogeneity that Lowers Vaccine Effectiveness. medRxiv. 2022.

83. Piccirillo V. COVID-19 pandemic control using restrictions and vaccination. Math Biosci Eng. 2022;19:1355-72.

84. Rabil MJ, Tunc S, Bish DR, Bish EK. Benefits of integrated screening and vaccination for infection control. Plos one. 2022;17(4):e0267388.

85. Rabil MJ, Tunc S, Bish DR, Bish EK. Effective screening strategies for safe opening of universities under Omicron and Delta variants of COVID-19. Scientific Reports. 2022;12:21309.

86. Rao IJ, Brandeau ML. Sequential allocation of vaccine to control an infectious disease. Mathematical Biosciences. 2022;351:108879.

87. Safdar S, Ngonghala CN, Gumel AB. Mathematical assessment of the role of waning and boosting immunity against the BA. 1 Omicron variant in the United States. medRxiv. 2022:2022.07. 21.22277903.

88. Singh BK, Walker J, Paul P, Reddy S, Gowler CD, Jernigan J, et al. De-escalation of asymptomatic testing and potential of future COVID-19 outbreaks in US nursing homes amidst rising community vaccination coverage: a modeling study. Vaccine. 2022;40(23):3165-73.

89. Taboe HB, Asare-Baah M, Iboi EA, Ngonghala CN. Quantifying the impact of vaccines and booster doses on COVID-19 in the US. medRxiv. 2022:2022.07. 06.22277303.

90. Walker J, Paul P, Dooling K, Oliver S, Prasad P, Steele M, et al. Modeling strategies for the allocation of SARS-CoV-2 vaccines in the United States. Vaccine. 2022;40(14):2134-9.

91. Yang Q, Gruenbacher DM, Scoglio CM. Estimating data-driven coronavirus disease 2019 mitigation strategies for safe university reopening. Journal of the Royal Society Interface. 2022;19(188):20210920.

92. Ngonghala CN, Taboe HB, Safdar S, Gumel AB. Unraveling the dynamics of the Omicron and Delta variants of the 2019 coronavirus in the presence of vaccination, mask usage, and antiviral treatment. Applied mathematical modelling. 2023;114:447-65.

B. List of excluded studies with reasons in this review (150 studies)

#	Study ID	Title	Journal	Vol	Issue	Pages	DOI	Exclusion reason
1	Aguas 2021	Potential global impacts of alternative dosing regimen and rollout options for the ChAdOx1 nCoV-19 vaccine	Nature communications	12	1	6370	10.1038/s41467-021-26449-8	Exclusion reason: Not US-based.
2	Aguiar 2022	The role of mild and asymptomatic infections on COVID-19 vaccines performance: A modeling study	Journal of Advanced Research	39		157-166	10.1016/j.jare.2021.10.012	Exclusion reason: Not US-based.
3	Ahmed 2021	Numerical simulation and stability analysis of a novel reaction-diffusion COVID-19 model	Nonlinear Dynamics	106	2	1293-1310	10.1007/s11071-021-06623-9	Exclusion reason: Not US-based.
4	Ahn 2022	Reproduction Factor Based Latent Epidemic Model Inference: A Data-driven Approach Using COVID-19 Datasets	IEEE Journal of Biomedical and Health Informatics	27	3	1259-1270	10.1109/JBHI.2022.3213175	Exclusion reason: NOT US STUDY
5	Albani 2021	COVID-19 underreporting and its impact on vaccination strategies	BMC Infectious Diseases	21	1	1111	10.1186/s12879-021-06780-7	Exclusion reason: NOT US STUDY
6	Ali 2020	The role of asymptomatic class, quarantine and isolation in the transmission of COVID-19	Journal of Biological Dynamics	14	1	389-408	10.1080/17513758.2020.1773000	Exclusion reason: Vaccines not considered;
7	Angelov 2022	Optimal vaccination strategies using a distributed model applied to COVID-19	Central European Journal of Operations Research				10.1007/s10100-022-00819-z	Exclusion reason: Not US-based.

8	Antonio 2022	Effectiveness of COVID-19 Vaccines: Evidence from the First-Year Rollout of Vaccination Programs	Vaccines	10	3	409	10.3390/vaccines10030409	Exclusion reason: Not an eligible model type (non-transmission model).
9	Antonopoulos 2022	A generic model for pandemics in networks of communities and the role of vaccination	Chaos	32	6	63127	10.1063/5.0082002	Exclusion reason: Not US-based.
10	Arino 2022	Bistability in deterministic and stochastic SLIAR-type models with imperfect and waning vaccine protection	Journal of Mathematical Biology	84	7	61	10.1007/s00285-022-01765-9	Exclusion reason: Not US-based.
11	Ballesteros 2020	Hamiltonian structure of compartmental epidemiological models	Physica D	413		13265 6	10.1016/j.physd.2020.132656	Exclusion reason: Not US-based.
12	Basu 2021	Quality-Adjusted Life-Year Losses Averted With Every COVID-19 Infection Prevented in the United States	Value in Health	24	5	632-640	10.1016/j.jval.2020.11.013	Exclusion reason: NOT STUDY VACCINE/VACCINAT ION/VACCINE STRATEGY
13	Batista 2020	Minimizing disease spread on a quarantined cruise ship: A model of COVID-19 with asymptomatic infections	Mathematical Biosciences	329		10844 2	10.1016/j.mbs.2020.108442	Exclusion reason: Vaccines not considered.
14	Bays 2021	What effect might border screening have on preventing the importation of COVID-19 compared with other infections? A modelling study	Epidemiology and Infection	149		e238	10.1017/S0950268821002387	Exclusion reason: Vaccines not considered;

15	Bekiros 2020	SBDiEM: A new mathematical model of infectious disease dynamics	Chaos Solitons & Fractals	136		109828	10.1016/j.chaos.2020.109828	Exclusion reason: Wrong outcome assessed (e.g. mortality, healthcare utilization).
16	Bokharaie 2021	A study on the effects of containment policies and vaccination on the spread of SARS-CoV-2	PLoS ONE	16	3	e0247439	10.1371/journal.pone.0247439	Exclusion reason: NOT US STUDY
17	Bottcher 2021	Decisive conditions for strategic vaccination against SARS-CoV-2	Chaos	31	10	101105	10.1063/5.0066992	Exclusion reason: NOT US STUDY
18	Boujallal 2022	Set-Valued Control to COVID-19 Spread with Treatment and Limitation of Vaccination Resources	Iranian Journal of Science & Technology Transaction a Science	46	3	829-838	10.1007/s40995-022-01295-5	Exclusion reason: Not US-based.
19	Brabers 2022	The spread of infectious diseases from a physics perspective	medRxiv			2022-06	10.1101/2022.06.01.22275842	Exclusion reason: Wrong outcome assessed (e.g. mortality, healthcare utilization).
20	Brook 2021	Optimizing COVID-19 control with asymptomatic surveillance testing in a university environment	Epidemics	37		100527	10.1016/j.epidem.2021.100527	Exclusion reason: Not US-based.

21	Carlsson 2021	A note on variable susceptibility, the herd-immunity threshold and modeling of infectious diseases	Plos one	18	2	e0279454	10.1101/2021.07.08.21260175	Exclusion reason: Not US-based.
22	Chattopadhyay 2021	Infection kinetics of Covid-19 and containment strategy	Scientific Reports	11	1	11606	10.1038/s41598-021-90698-2	Exclusion reason: Vaccines not considered.
23	Chen 2022	Measurement of contagion spatial spread probability in public places: A case study on COVID-19	Applied Geography	143		102700	10.1016/j.apgeog.2022.102700	Exclusion reason: Not US-based.
24	Ciunkiewicz 2022	Agent-based epidemiological modeling of COVID-19 in localized environments	Computers in Biology and Medicine	144		105396	10.1016/j.compbiomed.2022.105396	Exclusion reason: Not US-based.
25	Dagpunar 2021	A prototype vaccination model for endemic Covid-19 under waning immunity and imperfect vaccine take-up	medRxiv			2021-11	10.1101/2021.11.06.21266002	Exclusion reason: Not US-based.
26	Dai 2022	Global prediction model for COVID-19 pandemic with the characteristics of the multiple peaks and local fluctuations	BMC Medical Research Methodology	22	1	4-Jan	10.1186/s12874-022-01604-x	Exclusion reason: Vaccines not considered.
27	de Miguel-Arribas 2022	Impact of vaccine hesitancy on secondary COVID-19 outbreaks in the US: an age-structured SIR model	BMC Infectious Diseases	22	1	12-Jan	10.1186/s12879-022-07486-0	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY

28	Di Giamberardino 2021	A data-driven model of the COVID-19 spread among interconnected populations: epidemiological and mobility aspects following the lockdown in Italy	Nonlinear Dynamics	106	2	1239-1266	10.1007/s11071-021-06840-2	Exclusion reason: Not US-based.
29	Dogra 2022	Mathematical modeling identifies optimal dosing schedules for COVID-19 vaccines to minimize breakthrough infections	medRxiv				10.1101/2022.09.14.22279959	Exclusion reason: NOT US STUDY
30	Engelbrecht 2021	Test for Covid-19 seasonality and the risk of second waves	One Health	12		100202	10.1016/j.onehlt.2020.100202	Exclusion reason: Vaccines not considered.
31	España 2022	Prioritizing interventions for preventing COVID-19 outbreaks in military basic training	PLoS Computational Biology	18	10	e1010489	10.1371/journal.pcbi.1010489	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
32	Faucher 2022	Agent-based modelling of reactive vaccination of workplaces and schools against COVID-19	Nature communications	13	1	1414	10.1038/s41467-022-29015-y	Exclusion reason: Not US-based.
33	Favero 2022	Modelling preventive measures and their effect on generation times in emerging epidemics	Journal of the Royal Society Interface	19	191	20220128	10.1098/rsif.2022.0128	Exclusion reason: Not US-based.
34	Fisman 2022	Impact of population mixing between vaccinated and unvaccinated subpopulations on infectious disease dynamics: implications for SARS-CoV-2 transmission	CMAJ Canadian Medical Association Journal	194	16	E573-E580	10.1503/cmaj.212105	Exclusion reason: Not US-based.

35	Flahault 2003	[SARS-CoV: 2. Modeling SARS epidemic]	Medecine Sciences: M/S	19	11	1161-4	10.1051/medsci/200319111161	Exclusion reason: Non-English.
36	Forde 2021	Modeling the Influence of Vaccine Administration on COVID-19 Testing Strategies	Viruses	13	12	19	10.3390/v13122546	Exclusion reason: Wrong outcome assessed (e.g. mortality, healthcare utilization).
37	Gandolfi 2022	A new threshold reveals the uncertainty about the effect of school opening on diffusion of Covid-19	Scientific Reports	12	1	3012	10.1038/s41598-022-06540-w	Exclusion reason: Not US-based.
38	Gaudou 2020	COMOKIT: A Modeling Kit to Understand, Analyze, and Compare the Impacts of Mitigation Policies Against the COVID-19 Epidemic at the Scale of a City	Frontiers in Public Health	8		563247	10.3389/fpubh.2020.563247	Exclusion reason: Not US-based.
39	Geoffroy 2022	Vaccination strategies when vaccines are scarce: on conflicts between reducing the burden and avoiding the evolution of escape mutants	Journal of the Royal Society Interface	19	191	20220045	10.1098/rsif.2022.0045	Exclusion reason: NOT US STUDY

40	Glasser 2022	Analysis of Serological Surveys of Antibodies to SARS-CoV-2 in the United States to Estimate Parameters Needed for Transmission Modeling and to Evaluate and Improve the Accuracy of Predictions	Journal of Theoretical Biology	556		111296	10.1016/j.jtbi.2022.111296	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
41	Goh 2022	A country-specific model of COVID-19 vaccination coverage needed for herd immunity in adult only or population wide vaccination programme	Epidemics	39		100581	10.1016/j.epidem.2022.100581	Exclusion reason: Not US-based.
42	Goldenbogen 2022	Control of COVID-19 Outbreaks under Stochastic Community Dynamics, Bimodality, or Limited Vaccination	Advanced science	9	23	e2200088	10.1002/advs.202200088	Exclusion reason: Not US-based.
43	Good 2020	The Interaction of Natural and Vaccine-Induced Immunity with Social Distancing Predicts the Evolution of the COVID-19 Pandemic	mBio	11	5	23	10.1128/mBio.02617-20	Exclusion reason: Not US-based.
44	Hanly 2022	Modelling vaccination capacity at mass vaccination hubs and general practice clinics: a simulation study	BMC Health Services Research	22	1	11-Jan	10.1186/s12913-022-08447-8	Exclusion reason: Not an eligible model type (non-transmission model).
45	Hassan 2021	Mathematical Modeling and Covid-19 Forecast in Texas, USA: a prediction model analysis and the probability of disease outbreak	Disaster Medicine and Public Health Preparedness	17		e19	10.1017/dmp.2021.151	Exclusion reason: Vaccines not considered.

46	Head 2021	Model-based assessment of SARS-CoV-2 Delta variant transmission dynamics within partially vaccinated K-12 school populations	MedRxiv				10.1101/2021.08.20.21262389	Exclusion reason: DUPLICATED STUDIES
47	Herrera-Serrano 2022	An efficient nonstandard computer method to solve a compartmental epidemiological model for COVID-19 with vaccination and population migration	Computer Methods and Programs in Biomedicine	221		10692 0	10.1016/j.cmpb.2022.106920	Exclusion reason: Not US-based.
48	Hickey 2022	Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases	medRxiv			2022-08	10.1101/2022.08.21.22279035	Exclusion reason: Not US-based
49	Higgins 2022	[A structural method to assess the course of the SARS-CoV-2 pandemic in school environmentsMetodo estructural para examinar el curso de la pandemia por el SARS-CoV-2 en ambientes escolares]	Pan American Journal of Public Health	46		e117	10.26633/RPSP.2022.117	Exclusion reason: Non-English.
50	Hirata 2020	Topological epidemic model: Theoretical insight into underlying networks	Chaos	30	10	10110 3	10.1063/5.0023796	Exclusion reason: Vaccines not considered.
51	Hogan 2021	Within-country age-based prioritisation, global allocation, and public health impact of a vaccine against SARS-CoV-2: A mathematical modelling analysis	Vaccine	39	22	2995-3006	10.1016/j.vaccine.2021.04.002	Exclusion reason: NOT US STUDY

52	Hohenegger 2022	Effective mathematical modelling of health passes during a pandemic	Scientific Reports	12	1	6989	10.1038/s41598-022-10663-5	Exclusion reason: Not US-based.
53	Horvat 2022	An extended SIR model with vaccine dynamics for SARS-CoV-2 adaptation rate	medRxiv			2022-02	10.1101/2022.02.11.22270784	Exclusion reason: Not US-based
54	Huang 2021	Modeling of the Long-Term Epidemic Dynamics of COVID-19 in the United States	International Journal of Environmental Research & Public Health	18	14	16	10.3390/ijerph18147594	Exclusion reason: Vaccines not considered.
55	Humphrey 2021	Large-scale frequent testing and tracing to supplement control of Covid-19 and vaccination rollout constrained by supply	Infectious Disease Modelling	6		955-974	10.1016/j.idm.2021.06.008	Exclusion reason: Not US-based.
56	Huntingford 2021	Optimal COVID-19 Vaccine Sharing Between Two Nations That Also Have Extensive Travel Exchanges	Frontiers in Public Health	9		633144	10.3389/fpubh.2021.633144	Exclusion reason: Not US-based.
57	Ilyin 2021	A Recursive Model of the Spread of COVID-19: Modelling Study	JMIR Public Health and Surveillance	7	4	e21468	10.2196/21468	Exclusion reason: Vaccines not considered.
58	Jitsuk 2022	Vaccination strategies impact the probability of outbreak extinction: a case study of COVID-19 transmission	medRxiv			2022-07	10.1101/2022.07.23.22277952	Exclusion reason: Not US-based
59	Joshi 2022	Comparative performance of between-population vaccine allocation strategies with applications to SARS-CoV-2	MedRxiv			2021-06	10.1101/2021.06.18.21259137	Exclusion reason: NOT US STUDY

60	Kadelka 2021	Effect of homophily and correlation of beliefs on COVID-19 and general infectious disease outbreaks	PLoS ONE	16	12	e0260973	10.1371/journal.pone.0260973	Exclusion reason: NOT US STUDY
61	Kastalskiy 2021	Social stress drives the multi-wave dynamics of COVID-19 outbreaks	Scientific Reports	11	1	22497	10.1038/s41598-021-01317-z	Exclusion reason: Vaccines not considered.
62	Khan 2021	Effect of high and low risk susceptibles in the transmission dynamics of COVID-19 and control strategies	PLoS ONE	16	9	e0257354	10.1371/journal.pone.0257354	Exclusion reason: NOT US STUDY
63	Khan 2022	Correlated stochastic epidemic model for the dynamics of SARS-CoV-2 with vaccination	Scientific Reports	12	1	16105	10.1038/s41598-022-20059-0	Exclusion reason: Not US-based.
64	Kheifetz 2022	On the Parametrization of Epidemiologic Models-Lessons from Modelling COVID-19 Epidemic	Viruses	14	7	1468	10.3390/v14071468	Exclusion reason: Not US-based.
65	Kheirallah 2020	The Effect of Strict State Measures on the Epidemiologic Curve of COVID-19 Infection in the Context of a Developing Country: A Simulation from Jordan	International Journal of Environmental Research & Public Health	17	18	6530	10.3390/ijerph17186530	Exclusion reason: Not US-based;
66	Krueger 2022	Risk assessment of COVID-19 epidemic resurgence in relation to SARS-CoV-2 variants and vaccination passes	Communication medicale	2		23	10.1038/s43856-022-00084-w	Exclusion reason: Not US-based.

67	Kumar 2021	Social media effectiveness as a humanitarian response to mitigate influenza epidemic and COVID-19 pandemic	Annals of Operations Research	319	1	823-51	10.1007/s10479-021-03955-y	Exclusion reason: Vaccines not considered.
68	Kumar 2021	Activity-based epidemic propagation and contact network scaling in auto-dependent metropolitan areas	Scientific Reports	11	1	22665	10.1038/s41598-021-01522-w	Exclusion reason: Vaccines not considered.
69	Le Rutte 2021	The potential impact of Omicron and future variants of concern on SARS-CoV-2 transmission dynamics and public health burden: a modelling study	medRxiv			2021-12	10.1101/2021.12.12.21267673	Exclusion reason: Not US-based.
70	Lebkiri 2020	Impact of containment type on covid-19 propagation in morocco using the sir model	Bangladesh Journal of Medical Science	19	Special issue	S58-S65	10.3329/bjms.v19i0.48167	Exclusion reason: Not US-based.
71	Lee 2021	Analysis of Superspreading Potential from Transmission Clusters of COVID-19 in South Korea	International Journal of Environmental Research & Public Health	18	24	7	10.3390/ijerph182412893	Exclusion reason: Not US-based;
72	Lee 2021	The value of decreasing the duration of the infectious period of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection	PLoS Computational Biology	17	1	e1008470	10.1371/journal.pcbi.1008470	Exclusion reason: Vaccines not considered.

73	Lee 2022	Epidemic Vulnerability Index for Effective Vaccine Distribution against Pandemic	IEEE/ACM Transactions on Computational Biology and Bioinformatics				10.1109/TCBB.2022.3198365	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
74	LeRutte 2022	Modelling the impact of Omicron and emerging variants on SARS-CoV-2 transmission and public health burden	Communication medicale	2		93	10.1038/s43856-022-00154-z	Exclusion reason: Not US-based.
75	Lin 2022	Vaccination strategy for preventing the spread of SARS-CoV-2 in the limited supply condition: A mathematical modeling study	Journal of Medical Virology	94	8	3722-3730	10.1002/jmv.27783	Exclusion reason: NOT US STUDY
76	LuisaVissat 2022	A comparison of COVID-19 outbreaks across US Combined Statistical Areas using new methods for estimating R0 and social distancing behaviour	UC Berkeley. Report #: 100640.				10.1016/j.epidem.2022.100640	Exclusion reason: Vaccines not considered.
77	Makhoul 2020	Epidemiological Impact of SARS-CoV-2 Vaccination: Mathematical Modeling Analyses	Vaccines	8	4	668	10.3390/vaccines8040668	Exclusion reason: Not US-based.
78	Marinov 2022	Adaptive SIR model with vaccination: simultaneous identification of rates and functions illustrated with COVID-19	Scientific Reports	12	1	15688	10.1038/s41598-022-20276-7	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
79	Marzouk 2022	SARS-CoV-2 transmission in opposition-controlled Northwest Syria: modeling pandemic responses during political conflict	International Journal of Infectious Diseases	117		103-115	10.1016/j.ijid.2022.01.062	Exclusion reason: Not US-based.

80	Mokhtari 2021	A multi-method approach to modeling COVID-19 disease dynamics in the United States	Scientific Reports	11	1	12426	10.1038/s41598-021-92000-w	Exclusion reason: Vaccines not considered.
81	Molla 2022	Adaptive and optimized COVID-19 vaccination strategies across geographical regions and age groups	PLoS Computational Biology	18	4	e1009974	10.1371/journal.pcbi.1009974	Exclusion reason: Not US-based.
82	Monod 2021	Age groups that sustain resurging COVID-19 epidemics in the United States	Science	371	6536	eabe8372	10.1126/science.abe8372	Exclusion reason: Vaccines not considered
83	Nashebi 2022	Using a real-world network to model the tradeoff between stay-at-home restriction, vaccination, social distancing and working hours on COVID-19 dynamics	Peer J	10		e14353	10.1101/2022.04.15.22273449	Exclusion reason: Not US-based
84	Newcomb 2021	Combining predictive models with future change scenarios can produce credible forecasts of COVID-19 futures	PLoS One	17	11	e0277521	10.1101/2021.12.14.21267804	Exclusion reason: Vaccines not considered.
85	O'Dea 2022	A semi-parametric, state-space compartmental model with time-dependent parameters for forecasting COVID-19 cases, hospitalizations and deaths	Journal of the Royal Society Interface	19	187	20210702	10.1098/rsif.2021.0702	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
86	Olivares 2021	Uncertainty quantification of a mathematical model of COVID-19 transmission dynamics with mass vaccination strategy	Chaos Solitons & Fractals	146		110895	10.1016/j.chaos.2021.110895	Exclusion reason: Not US-based.

87	Omame 2023	Global asymptotic stability, extinction and ergodic stationary distribution in a stochastic model for dual variants of SARS-CoV-2	Mathematics & Computers in Simulation	204		302-336	10.1016/j.matcom.2022.08.012	Exclusion reason: Not US-based.
88	Otunuga 2022	Analysis of multi-strain infection of vaccinated and recovered population through epidemic model: Application to COVID-19	PLoS ONE	17	7	e0271446	10.1371/journal.pone.0271446	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
89	Palomo-Briones 2022	An agent-based model of the dual causality between individual and collective behaviors in an epidemic	Computers in Biology and Medicine	141		104995	10.1016/j.compbiomed.2021.104995	Exclusion reason: Vaccines not considered.
90	Park 2022	The importance of the generation interval in investigating dynamics and control of new SARS-CoV-2 variants	Journal of the Royal Society Interface	19	191	20220173	10.1098/rsif.2022.0173	Exclusion reason: Not US-based.
91	Pastor-Satorras 2022	The advantage of self-protecting interventions in mitigating epidemic circulation at the community level	Scientific Reports	12	1	15950	10.1038/s41598-022-20152-4	Exclusion reason: Vaccines not considered.
92	Penn 2022	Optimality of Maximal-Effort Vaccination	Bulletin of Mathematical Biology	85	8	73	10.1101/2022.05.12.22275015	Exclusion reason: Not US-based
93	Phan 2022	A simple SEIR-V model to estimate COVID-19 prevalence and predict SARS-CoV-2 transmission using wastewater-based surveillance data	MedRxiv : the Preprint Server for Health Sciences	18		18	10.1101/2022.07.17.22277721	Exclusion reason: Vaccines not considered.

94	Plank 2022	Minimising the use of costly control measures in an epidemic elimination strategy: A simple mathematical model	Mathematical Biosciences	351		108885	10.1016/j.mbs.2022.108885	Exclusion reason: Vaccines not considered.
95	Pung 2022	Using high-resolution contact networks to evaluate SARS-CoV-2 transmission and control in large-scale multi-day events	Nature communications	13	1	1956	10.1038/s41467-022-29522-y	Exclusion reason: Not US-based.
96	Rao 2021	Optimal allocation of limited vaccine to minimize the effective reproduction number	Mathematical Biosciences	339		108654	10.1016/j.mbs.2021.108654	Exclusion reason: NOT ARTICLE TYPES OF INTEREST
97	Reguly 2022	Microsimulation based quantitative analysis of COVID-19 management strategies	PLoS Computational Biology	18	1	e1009693	10.1371/journal.pcbi.1009693	Exclusion reason: Not US-based.
98	Robinson 2022	Comprehensive compartmental model and calibration algorithm for the study of clinical implications of the population-level spread of COVID-19: a study protocol	BMJ Open	12	3	e052681	10.1136/bmjopen-2021-052681	Exclusion reason: Not US-based.
99	Rochman 2021	Evolution of human respiratory virus epidemics	F1000Research	10		447	10.12688/f1000research.53392.2	Exclusion reason: Vaccines not considered.
100	RodrÃguez 2022	An agent-based transmission model of COVID-19 for re-opening policy design	Computers in Biology and Medicine	148		105847	10.1016/j.compbiomed.2022.105847	Exclusion reason: Not US-based.
101	Rodriguez-Maroto 2021	Vaccination strategies in structured populations under partial immunity and reinfection	Journal of Physics A: Mathematical and Theoretical	56	20	204003	10.1101/2021.11.23.21266766	Exclusion reason: NOT US STUDY

102	Saad-Roy 2020	Immune life history, vaccination, and the dynamics of SARS-CoV-2 over the next 5 years	Science	370	6518	811-818	10.1126/science.abd7343	Exclusion reason: Not US-based.
103	Saad-Roy 2021	Epidemiological and evolutionary considerations of SARS-CoV-2 vaccine dosing regimes	Science	372	6540	363-370	10.1126/science.abg8663	Exclusion reason: NOT US STUDY
104	Saad-Roy 2021	Vaccine breakthrough and the invasion dynamics of SARS-CoV-2 variants	medRxiv				10.1101/2021.12.13.21267725	Exclusion reason: NOT US STUDY
105	Sachak-Patwa 2021	The risk of SARS-CoV-2 outbreaks in low prevalence settings following the removal of travel restrictions	Communication medicale	1		39	10.1038/s43856-021-00038-8	Exclusion reason: Not US-based;
106	Safranek 2022	A computer modeling method to analyze rideshare data for the surveillance of novel strains of SARS-CoV-2	Annals of Epidemiology	76		136-42	10.1016/j.annepidem.2022.08.051	Exclusion reason: Vaccines not considered.
107	Saha 2022	Impact of optimal vaccination and social distancing on COVID-19 pandemic	Mathematics & Computers in Simulation	200		285-314	10.1016/j.matcom.2022.04.025	Exclusion reason: Not US-based.
108	Saha 2022	Effect of awareness, quarantine and vaccination as control strategies on COVID-19 with Co-morbidity and Re-infection	Infectious Disease Modelling	7	4	660-689	10.1016/j.idm.2022.09.004	Exclusion reason: NOT US STUDY
109	Saldana 2022	Influence of heterogeneous age-group contact patterns on critical vaccination rates for herd immunity to SARS-CoV-2	Scientific Reports	12	1	2640	10.1038/s41598-022-06477-0	Exclusion reason: Not US-based.

110	Santra 2022	Mathematical Analysis of Two Waves of COVID-19 Disease with Impact of Vaccination as Optimal Control	Computational and Mathematical Methods in Medicine				10.1155/2022/2684055	Exclusion reason: Not US-based.
111	Sararat 2022	Community vaccination can shorten the COVID-19 isolation period: an individual-based modeling approach	medRxiv				10.1101/2022.02.08.22270668	Exclusion reason: NOT US STUDY
112	Sararat 2022	Individual-based modeling reveals that the COVID-19 isolation period can be shortened by community vaccination	Scientific Reports	12	1	17543	10.1038/s41598-022-21645-y	Exclusion reason: NOT US STUDY
113	Schulenburg 2022	Effects of infection fatality ratio and social contact matrices on vaccine prioritization strategies	Chaos	32	9		10.1063/5.0096532	Exclusion reason: Not US-based.
114	Schuppert 2022	[Intensive care bed requirements for COVID-19 in the fall/winter of 2021 : Simulation of different scenarios under consideration of incidences and vaccination rates]	Medizinische Klinik, Intensivmedizin Und Notfallmedizin	117	6	439-446	10.1007/s00063-021-00862-9	Exclusion reason: Non-English.
115	Scutt 2022	Theoretically quantifying the direct and indirect benefits of vaccination against SARS-CoV-2 in terms of avoided deaths	Scientific Reports	12	1	8833	10.1038/s41598-022-12591-w	Exclusion reason: Not US-based.

116	ShamsiGamchi 2022	A novel mathematical model for prioritization of individuals to receive vaccine considering governmental health protocols	European Journal of Health Economics	24	4	633-646	10.1007/s10198-022-01491-5	Exclusion reason: Not US-based.
117	Shivam 2022	Vaccine Stockpile Sharing For Selfish Objectives	PLOS global public health	2	12	e0001312	10.1371/journal.pgph.0001312	Exclusion reason: Not US-based
118	Silva 2021	Optimized delay of the second COVID-19 vaccine dose reduces ICU admissions	Proceedings of the National Academy of Sciences of the United States of America	118	35	31	10.1073/pnas.2104640118	Exclusion reason: Not US-based.
119	Singh 2022	COVID-19 outbreak: a predictive mathematical study incorporating shedding effect	Journal of Applied Mathematics & Computing International Journal	69	1	1239-1268	10.1007/s12190-022-01792-1	Exclusion reason: Vaccines not considered.
120	SoutoFerreira 2022	Assessing the best time interval between doses in a two-dose vaccination regimen to reduce the number of deaths in an ongoing epidemic of SARS-CoV-2	PLoS Computational Biology	18	3	e1009978	10.1371/journal.pcbi.1009978	Exclusion reason: Not US-based.
121	Stevenson 2021	Modelling of hypothetical sars-cov-2 point of care tests for routine testing in residential care homes: Rapid cost-effectiveness analysis	Health Technology Assessment	25	39	vi-73	10.3310/hta25390	Exclusion reason: NOT US STUDY

122	Stoddard 2021	Individually optimal choices can be collectively disastrous in COVID-19 disease control	BMC Public Health	21	1	832	10.1186/s12889-021-10829-2	Exclusion reason: Vaccines not considered.
123	Tang 2022	The minimal COVID-19 vaccination coverage and efficacy to compensate for a potential increase of transmission contacts, and increased transmission probability of the emerging strains	BMC Public Health	22	1	1258	10.1186/s12889-022-13429-w	Exclusion reason: Not US-based.
124	Tang 2022	Controlling Multiple COVID-19 Epidemic Waves: An Insight from a Multi-scale Model Linking the Behaviour Change Dynamics to the Disease Transmission Dynamics	Bulletin of Mathematical Biology	84	10	106	10.1007/s11538-022-01061-z	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
125	Toxvaerd 2022	On the management of population immunity	Journal of Economic Theory	204		105501	10.1016/j.jet.2022.105501	Exclusion reason: Not US-based.
126	Treesatayapun 2022	Epidemic model dynamics and fuzzy neural-network optimal control with impulsive traveling and migrating: Case study of COVID-19 vaccination	Biomedical Signal Processing and Control	71		103227	10.1016/j.bspc.2021.103227	Exclusion reason: Not US-based.
127	Truszkowska 2021	Designing the Safe Reopening of US Towns Through High-Resolution Agent-Based Modeling	Advanced Theory and Simulations	4	9	2100157	10.1002/adts.202100157	Exclusion reason: DUPLICATED STUDIES

128	Truszkowska 2022	Predicting the Effects of Waning Vaccine Immunity Against COVID-19 through High-Resolution Agent-Based Modeling	Advanced Theory and Simulations	5	6	2100521	10.1002/adts.202100521	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
129	Vakil 2022	Projecting the Pandemic Trajectory through Modeling the Transmission Dynamics of COVID-19	International Journal of Environmental Research & Public Health	19	8	4541	10.3390/ijerph19084541	Exclusion reason: NOT US STUDY
130	Valles 2022	Networks of necessity: Simulating COVID-19 mitigation strategies for disabled people and their caregivers	PLoS Computational Biology	18	5	e1010042	10.1371/journal.pcbi.1010042	Exclusion reason: Not US-based.
131	vanderVegt 2022	Learning transmission dynamics modelling of COVID-19 using comomodels	Mathematical Biosciences	349		108824	10.1016/j.mbs.2022.108824	Exclusion reason: Not US-based.
132	Vilches 2022	Estimating COVID-19 Infections, Hospitalizations, and Deaths Following the US Vaccination Campaigns During the Pandemic	JAMA Network Open	5	1	e2142725	10.1001/jamanetworkopen.2021.42725	Exclusion reason: Incorrect article type (e.g., commentary, review, editorial, letter).
133	Wagner 2021	Vaccine nationalism and the dynamics and control of SARS-CoV-2	Science	373	6562	eabj7364	10.1126/science.abj7364	Exclusion reason: Not US-based.
134	Wang 2021	Effects of COVID-19 Vaccination Timing and Risk Prioritization on Mortality Rates, United States	Emerging Infectious Diseases	27	7	1976-1979	10.3201/eid2707.210118	Exclusion reason: NOT ARTICLE TYPES OF INTEREST

135	Wang 2022	SARS-CoV-2 transmissibility compared between variants of concern and vaccination status	Briefings in Bioinformatics	23	2	bbab594	10.1093/bib/bbab594	Exclusion reason: Not an eligible model type (non-transmission model).
136	Wang 2022	Mathematical modeling of mutated COVID-19 transmission with quarantine, isolation and vaccination	Mathematical Biosciences & Engineering: MBE	19	8	8035-8056	10.3934/mbe.2022376	Exclusion reason: Not US-based.
137	Wang 2022	From Policy to Prediction: Forecasting COVID-19 Dynamics Under Imperfect Vaccination	Bulletin of Mathematical Biology	84	9	90	10.1007/s11538-022-01047-x	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
138	Watson 2022	Global impact of the first year of COVID-19 vaccination: a mathematical modelling study	The Lancet Infectious Diseases	22	9	1293-1302	10.1016/S1473-3099(22)00320-6	Exclusion reason: Wrong outcome assessed (e.g. mortality, healthcare utilization).
139	Weston 2022	Targeting Equity in COVID-19 Vaccinations Using the "Evaluating Vulnerability and Equity" (EVE) Model	American Journal of Public Health	112	2	220-222	10.2105/AJPH.2021.306585	Exclusion reason: Not an eligible model type (non-transmission model).

140	Williams 2022	Measuring Vaccine Efficacy Against Infection and Disease in Clinical Trials: Sources and Magnitude of Bias in Coronavirus Disease 2019 (COVID-19) Vaccine Efficacy Estimates	Clinical Infectious Diseases	75	1	e764-e773	10.1093/cid/ciab914	Exclusion reason: NOT US STUDY
141	Wolff 2020	On build-up of epidemiologic models-Development of a SEI3RSD model for the spread of SARS-CoV-2	Zeitschrift fur Angewandte Mathematik und Mechanik	100	11	e202000230	10.1002/zamm.202000230	Exclusion reason: Not US-based.
142	Xue 2022	Infectivity versus fatality of SARS-CoV-2 mutations and influenza	International Journal of Infectious Diseases	121		195-202	10.1016/j.ijid.2022.05.031	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
143	Yang 2021	Development of a model-inference system for estimating epidemiological characteristics of SARS-CoV-2 variants of concern	Nature communications	12	1	5573	10.1038/s41467-021-25913-9	Exclusion reason: NOT US STUDY
144	Yang 2022	Comparison of health-oriented cross-regional allocation strategies for the COVID-19 vaccine: a mathematical modelling study	Annals of Medicine	54	1	941-952	10.1080/07853890.2022.2060522	Exclusion reason: NOT US STUDY

145	Yu 2022	Assessing the Impact of Continuous Vaccination and Voluntary Isolation on the Dynamics of COVID-19: A Mathematical Optimal Control of SEIR Epidemic Model	Computational Intelligence and Neuroscience	2022			10.1155/2022/3309420	Exclusion reason: Not US-based.
146	Zhang 2021	An integrated framework for building trustworthy data-driven epidemiological models: Application to the COVID-19 outbreak in New York City	PLoS Computational Biology	17	9	e1009334	10.1371/journal.pcbi.1009334	Exclusion reason: NOT STUDY VACCINE/VACCINATION/VACCINE STRATEGY
147	Zhao 2021	The impact of awareness diffusion on the spread of COVID-19 based on a two-layer SEIR/V-UA epidemic model	Journal of Medical Virology	93	7	4342-4350	10.1002/jmv.26945	Exclusion reason: Not US-based.
148	Zheng 2022	How Seasonality and Control Measures Jointly Determine the Multistage Waves of the COVID-19 Epidemic: A Modelling Study and Implications	International Journal of Environmental Research & Public Health	19	11	6404	10.3390/ijerph19116404	Exclusion reason: Vaccines not considered.
149	Zhu 2022	Real-World COVID-19 Vaccine Protection Rates against Infection in the Delta and Omicron Eras	Research	6		99	10.1101/2022.09.01.22279492	Exclusion reason: NOT US STUDY
150	Zong 2022	Optimal control analysis of a multigroup SEAIHRD model for COVID-19 epidemic	Risk analysis: an official publication of the Society for Risk Analysis	43	1	62-77	10.1111/risa.14027	Exclusion reason: NOT US STUDY

Supplementary Table 1: General characteristics of included studies

	Aim/Purpose	Model	Population	Intervention	Key findings	Number of factors incorporated into model	Factors incorporated into model
Bartsch, 2020	The team developed a computational model of the U.S. simulating the spread of COVID-19 coronavirus and vaccination.	Compartmental model	General population	Vaccine strategies	This study found that the vaccine has to have an efficacy of at least 70% to prevent an epidemic and of at least 80% to largely extinguish an epidemic without any other measures (e.g., social distancing).	1	Age
Matrajt, 2020	This study used an age-stratified mathematical model paired with optimization algorithms to determine the optimal use of the vaccine for four different metrics: deaths, symptomatic infections, and maximum non-ICU and ICU hospitalizations	Compartmental model	General population	Vaccine strategies	A vaccine with effectiveness =50% would be enough to mitigate the ongoing COVID-19 pandemic substantially, provided that a high percentage of the population is optimally vaccinated. When minimizing deaths, for low vaccine effectiveness, irrespective of vaccination coverage, it is optimal to allocate vaccine to high-risk (older) age groups first. In contrast, for higher vaccine effectiveness, there is a switch to allocate vaccine to high-transmission (younger) age groups first for high vaccination coverage.	1	Age
Albani, 2021	To analyze the impact of delaying COVID-19 vaccination on mortality, hospitalization, and recovery projections in Chicago and New York City	Compartmental model	General population	Vaccine strategies	Delaying the vaccination campaign severely affects mortality, hospitalization, and recovery projections.	0	
Awad, 2021	This study used an innovative spatiotemporal model to assess the impact of vaccination distribution strategies based on disease geospatial attributes and population-level risk assessment.	Compartmental model	General population	Vaccine strategies	The results suggest that a vaccine program that distributes vaccines equally across the entire state effectively averts infections and hospitalizations (2954 and 165 cases, respectively). However, in a context with equitable vaccine allocation, the number of COVID-19 cases in high infection intensity areas will remain high; the cumulative number of cases remained >30,000 cases.	1	Geographical location
Bartsch, 2021	To estimate the clinical and economic value of vaccines with different possible efficacies (to prevent infection or to reduce severe disease) and vaccination timings	Compartmental model	General population	Vaccine strategies	This study shows that there are relatively few situations in which it is worth foregoing the first COVID-19 vaccine available in favor of a vaccine that becomes available later on in the pandemic, even if the latter vaccine has a substantially higher efficacy. For example, if a vaccine with a 50% efficacy in preventing infection becomes available when 10% of the population has already been infected, waiting until 40% of the population is infected for a vaccine with 80% efficacy in preventing infection resulting in 15.6 million additional cases and 1.5 million additional hospitalizations, costing $20.6 billion more in direct medical costs and $12.4 billion more in productivity losses.	1	Age
Bartsch, 2021	To quantify the potential value of increasing COVID-19 vaccination coverage levels and expediting the vaccination process in the United States population. The authors developed a computational model to determine the impact of these measures on	Compartmental model	General population	Vaccine strategies	When achieving a given vaccination coverage in 270 days (70% vaccine efficacy), every 1% increase in coverage can avert an average of 876 800 (217 000–2 398 000) cases, varying with the number of people already vaccinated. Expediting to 180 days could save an additional 5.8 million cases, 215 790 hospitalizations, 26 370 deaths, 206 520 QALYs, $3.5 billion in direct medical costs, and $4.3 billion in productivity losses.	1	Age

	epidemiologic, clinical, and economic outcomes						
Bilinski, 2021	To assess the risk for SARS-CoV-2 transmission in schools and the effects of mitigation strategies on school reopening	Agent-based model	School population	Vaccine strategies	They found a small effect of teacher vaccination on overall transmission but a substantial effect on transmission to teachers. Specifically, teacher vaccination reduced secondary infections over 30 days to 91% and 97% of the average without vaccination in elementary and high schools, respectively.	0	
Brown, 2021	To assess control of the asymptomatic spread of COVID-19 infections in a residential, urban college campus embedded in a large urban community by using public health protocols, founded on surveillance testing, contact tracing, isolation, and quarantine .The analysis is expanded to include the effects of a partially effective vaccine in a partially vaccinated university community.	Compartmental model	University population	Vaccine strategies	The positivity rate was ~0.2% for the Boston University testing program in fall 2020 and has decreased substantially as vaccinations have become available.	0	
Bubar, 2021	To quantify the impact of COVID-19 vaccine prioritization strategies on cumulative incidence, mortality and years of life lost	Compartmental model	General population	Vaccine strategies	Vaccinating adults aged 60 years or older minimized mortality for all levels of vaccine supply when transmission was high. However, the ranking of strategies varied across countries and scenarios	1	Age
Buckner, 2021	To assess the optimal allocation of limited COVID-19 vaccine supply in the United States across sociodemographic groups differentiated by age and essential worker status	Compartmental model	General population	Vaccine strategies	The authors investigate three policy objectives: minimizing infections, years of life lost (YLL), or deaths. They find that the optimal policy is dynamic, with specific groups targeted each period, and these targets shift over time.	2	Age, Occupation
Bushman, 2021	To simulate the emergence and spread of different variants during the epidemic phase in populations that are controlling transmission through nonpharmaceutical interventions andvaccination	Compartmental model	General population	Vaccine strategies	Variants with enhanced transmissibility invade easily in susceptible populations, while variants with partial immune escape do not; the latter can sometimes produce a second wave of infections, but these primarily occur in recovered and vaccinated individuals, who typically experience mild disease.	0	
Chaturvedi, 2021	To predict the possible timescales for the end of the epidemic for different values of vaccination rates	Compartmental model	General population	Vaccine strategies	COVID-19 is under control in all three countries as the expected effective reproduction term (Rt) is less than 1. USA needs even higher value of Vs to get control over COVID-19 due to its highest number of active cases and an approach of dynamic disease control with relaxation rather than inhibitive disease eradication approach.	0	
Chen, 2021	To study how to reduce hospitalizations and mortality from COVID-19 using age-stratified modeling	Compartmental model	General population	Vaccine strategies	The outcome of vaccination prioritization depends on the reproduction number R0. If R0 is relatively high, the elderly should be prioritized. However, if ongoing intervention policies can suppress R0 at a relatively low level, prioritizing the high-transmission age group (adults aged 20-39) is most effective in reducing both mortality and hospitalizations	1	Age
Chowdhury, 2021	to model scenarios by varying the overall population adoption of non-pharmaceutical interventions (NPIs) in	Compartmental model	General population	Vaccine strategies, NPIs	The simulations show that if a large number of individuals cannot be vaccinated by ensuring high efficacy in a short period of time, adopting NPIs is the best approach to	0	

	conjunction with vaccine efficacy, antibody waning, and change in prevalence of the co-circulating variants of the coronavirus over time				manage disease transmission with the emergence of new vaccine breakthrough and more infectious variants.		
Fujimoto, 2021	To assess the value of using SARS-CoV-2 specific antibody testing to prioritize the vaccination of susceptible individuals as part of a COVID-19 vaccine distribution plan when vaccine supply is limited	Compartmental model	General population	Vaccine strategies	The use of antibody testing to prioritize the allocation of limited vaccines reduces infection attack rates and deaths. The size of the reduction depends on when the vaccine becomes available relative to the infection peak day. The largest percentage reduction in cases and deaths occurs when the vaccine is deployed before and close to the infection peak day. The reduction in the number of cases and deaths diminishes as vaccine deployment is delayed.	0	
Giardina, 2021	To assess the relationship between elementary school-related SARS-CoV-2 transmission, mitigation interventions, and vaccination coverage across community incidence levels	Agent-based model	School population	Vaccine strategies	In one scenario with the delta variant and no student vaccination, assuming that baseline mitigation measures of simple ventilation and handwashing reduce the secondary attack rate by 40%, if decision-makers seek to keep the monthly probability of an in-school transmission below 50%, additional mitigation (e.g., masking) would need to be added at a community incidence of approximately 2/100,000/day. Mitigation measures or vaccinations for students can substantially reduce these risks, especially when implemented together.	0	
Gumel, 2021	To assess the population-level impact of these vaccines on curtailing the burden of COVID-19	Compartmental model	General population	Vaccine strategies	A decrease in cumulative mortality is caused by increasing vaccination coverage. While a noticeable decrease in cumulative mortality is also observed when the vaccine coverage equals the herd immunity threshold, cumulative mortality dramatically increases if the vaccine coverage is below the herd immunity threshold.	0	
Hartnett, 2021	To investigate how social distancing measures and the public's reaction to the incipient pandemic affected the connectivity patterns within the city using physician contact networks	Compartmental model	General population	Vaccine strategies	Regardless of social distancing, the targeted strategy far outperforms the uniform one and is able to suppress the epidemic when just a small fraction of the population has been vaccinated. The targeted vaccination strategy will always result in fewer infections than the uniform strategy, since it incorporates information about the person-to-person contact network.	0	
Islam, 2021	To directly evaluate the CDC recommendation by comparing it to all potentially optimal allocation strategies that stagger the vaccine roll-out in up to four phases (17.5 million strategies)	Compartmental model	General population	Vaccine strategies	Under the developed model, the CDC allocation deviated from the optimal allocations by small amounts, with 0.19% more deaths, 4.0% more cases, 4.07% more infections, and 0.97% higher YLL, than the respective optimal strategies. Prioritizing the vaccination of the working age population generally led to fewer cases and infections at the expense of higher deaths and YLL, highlighting the anticipated trade-off in multi-objective decision making. A higher prioritization of individuals with comorbidities in all age groups improved outcomes compared to the CDC allocation	4	Age, Occupation, Comorbidities, Living condition
Ke, 2021	To more accurately assess of early COVID-19 dynamics and explore how vaccination schedules depend on the value of R0 and the distribution of the duration of vaccine-induced immunity in a population	Compartmental model	General population	Vaccine strategies	It is estimated that the median R0 value is 5.8 (confidence interval: 4.7–7.3) in the United States and between 3.6 and 6.1 in the eight European countries.	0	
Li, 2021	To assess the impact of non-pharmaceutical interventions and vaccination on the COVID-19 pandemic with time-dependent SEIR model	Compartmental model	General population	Vaccine strategies	Once vaccination begins, the growth of the immunity group V(t) and the decrease of the infected group I(t) clearly accelerate. The simulation of SEVIS model predicts that the pandemic will die down in fall 2021, assuming the mean vaccination rate to be 1% per day and the probability of gaining immunity after recovery to be 50%.	0	

Li, 2021	To evaluate the impact of vaccination scale-up and potential reduction in the vaccination effectiveness on the COVID-19 epidemic and social restoration in the US	Compartmental model	General population	Vaccine strategies	The overall existing vaccine effectiveness against the variant is 88.5% (95% CI: 87.4–89.5%) with the vaccination coverage of 70% by the end of August, 2021. With this vaccine effectiveness and coverage, there would be 498,972 (109,998–885,947) cumulative infections and 15,443 (3,828–27,057) deaths nationwide over the next 12 months, of which 95.0% infections and 93.3% deaths were caused by the variant.	0	
Lu, 2021	To identify and characterize 4 wave patterns and estimate the mortality rates, respectively	Compartmental model	General population	Vaccine strategies	Mortality rates for vaccinated individuals has been observed to be extremely low, therefore the death rate for this group was set to Mdeath = .001%. It shows a reduced wave after February 2021, which could be a potential fourth wave. Its value is reduced relative to the third contact rate wave due to the success of the vaccination.	0	
Makhoul, 2021	To assess the impact of novel vaccines on COVID-19 morbidity and mortality in two major countries at different epidemic phases	Compartmental model	General population	Vaccine strategies	For VEs of 95% and gradual easing of restrictions, vaccination in the US reduced the peak incidence of infection, disease, and death by >55% and cumulative incidence by >32% and in China by >77% and >65%, respectively. Nearly three vaccinations were needed to avert one infection in the US, but only one was needed in China. For VEp of 95%, vaccination benefits were half those for VES of 95%.	1	Age
Matrajt, 2021	discuss the optimal allocation strategies for COVID-19 vaccines with one and two doses under different degrees of viral transmission.	Compartmental model	General population	Vaccine strategies	With high single-dose efficacy, single-dose vaccination is optimal, preventing up to 22% more deaths than a strategy prioritizing two-dose vaccination for older adults. With low or moderate single-dose efficacy, mixed vaccination campaigns with com- plete coverage of older adults are optimal. However, with modest or high transmission, vaccinating older adults first with two doses is best, preventing up to 41% more deaths than a single-dose vaccination given across all adult populations.	1	Age
McGee, 2021	To explore the risks associated with returning to in-person learning and the value of mitigation measures including cohorting students, proactive testing, quarantine protocols, and vaccinating teachers and staff	Compartmental model	Schools population	Vaccine strategies	Teachers and staff who have been vaccinated against COVID-19 are well protected against infection. Vaccinating teachers can also reduce the risk of outbreaks among students, particularly when paired with cohorting. The combination of vaccinating teachers and cohorting students continues to substantially reduce the risk of outbreaks at higher levels of transmissibility, which suggests this strategy may offer a proactive defense against the spread of more transmissive variants.	0	
Moghadas, 2021	To evaluate the impact of a 2-dose COVID-19 vaccination campaign on reducing incidence, hospitalizations, and deaths in the United States	Agent-based model	General population	Vaccine strategies	Vaccination reduced the overall attack rate to 4.6% from 9.0% without vaccination over 300 days, with the highest reduction observed among individuals aged 65 and older.	2	Age, Comorbidities
Moghadas, 2021	To compare the epidemiological impact of tested and delayed second dose vaccination schedules, considering a range of preexisting immunity accrued since the emergence of COVID-19	Agent-based model	General population	Vaccine strategies	Delaying the second dose of Moderna vaccines by at least 9 weeks could maximize vaccination program effectiveness and avert additional infections, hospitalizations, and deaths per 10,000 population compared to the recommended 4-week interval between doses.	1	Age
Moghadas, 2021	To estimate the benefits of identifying silent infections among children as a proxy for their vaccination	Compartmental model	Children	Vaccine strategies	In the base-case scenarios with an effective reproduction number Re = 1.2, a targeted approach that identifies 11% of silent infections among children within 2 days and 14% within 3 days after infection would bring attack rates to less than 5% with 40% vaccination coverage of adults. If silent infections among children remained undetected, achieving the same attack rates would require an unrealistically high vaccination coverage (81%) of this age group, in addition to 40% vaccination coverage of adults.	1	Age
Motta, 2021	To evaluate the use of surveillance testing and quarantine in a fully vaccinated student population for	Agent-based model	University population	Vaccine strategies, NPIs	In simulations with 90% vaccine effectiveness, weekly surveillance testing was associated with only marginally reduced viral transmission. At 50% to 75%effectiveness, surveillance testing was estimated to reduce the number of infections by as much as 93.6%. A 10-day	0	

	whom vaccine effectiveness may be affected by the type of vaccination, presence of variants, and loss of vaccine-induced or natural immunity over time				quarantine protocol for exposures was associated with only a modest reduction in infections until vaccine effectiveness dropped to 50%. Increased testing of reported contacts was estimated to be at least as effective as quarantine at limiting infections.		
Paltiel, 2021	To examine how different definitions and thresholds of vaccine efficacy, coupled with different levels of implementation effectiveness and background epidemic severity	Compartmental model	General population	Vaccine strategies	Factors related to implementation will contribute more to the success of vaccination programs than the efficacy of a vaccine as determined in clinical trials. The benefits of a vaccine will decline substantially in the event of manufacturing or deployment delays, vaccine hesitancy, or greater epidemic severity.	0	
Paltiel, 2021	To help college administrators design and evaluate customized COVID-19 safety plans	Compartmental model	University population	Vaccine strategies	Under base-case assumptions, if 90% coverage can be attained with a vaccine that is 85% protective against infection and 25% protective against asymptomatic transmission, the model finds that campus activities can be resumed while holding cumulative cases below 5% of the population without the need for routine, asymptomatic testing. Colleges returning to pre–COVID-19 campus activities without either broad vaccination coverage or high-frequency testing put their campus population at risk for widespread viral transmission.	0	
Patel, 2021	To assess the association of simulated COVID-19 vaccine efficacy and coverage scenarios with and without NPIs with infections, hospitalizations, and deaths.	Agent-based model	General population	Vaccine strategies	Higher vaccination coverage with less efficacious vaccines can contribute to a larger reduction in the risk of SARS-CoV-2 infection compared to more efficacious vaccines at lower coverage.	4	Age, Race/Ethnicity, Living condition, Geographical location
RainaMacIntyre, 2021	To examine the impact of face mask and other NPIs use with a gradual roll-out of vaccines in NYC on the epidemic trajectory	Compartmental model	General population	Vaccine strategies	Vaccination alone taking 150 days to achieve target coverage would have decreased the cases (and deaths number) by 4.5% (23.6%), 13% (52.3%) and 20.5% (62.9%) respectively in the scenario where 20%, 50% and 70% of the population gets vaccinated over 150 days in the scenario with no NPIs used except case isolation and contact tracing. Vaccination when used in conjunction with social distancing, it makes a small difference, reducing cases (and deaths) by 1.3% (6.2%), 3.5% (14.5%) and 5.5% (19.2%) respectively for the three scenarios of 20%, 50% and 70% coverage over 150days. Finally, when vaccination is added to social distancing and masks, it further reduces cases only minimally, as in this scenario by the time the vaccination becomes effective, masks use and social distancing have already reduced transmission effectively.	1	Age
Ram, 2021	To investigate the effect of a population's age distribution on the transmission and spread of COVID-19 including age-specific vaccine distribution (effect of prioritizing certain age-groups in vaccine distribution versus a homogeneous distribution across all age groups)	Compartmental model	General population	Vaccine strategies	Vaccinations have a significant mitigating effect on the epidemic, with an average 28.2% reduction in mortality rate compared to without vaccinations. Prioritizing certain age groups in vaccine distribution can further enhance the effectiveness of vaccinations	1	Age
Rao, 2021	to consider the optimal allocation of a limited supply of a preventive vaccine to control an infectious disease, and four different allocation objectives: minimize	Compartmental model	General population	Vaccine strategies	it is optimal to vaccinate younger individuals to minimize new infections, whereas it is optimal to vaccinate older individuals to minimize deaths, life years lost, or QALYs lost due to death.	2	Age, Comorbidities

	new infections, deaths, life years lost, or quality-adjusted life years (QALYs) lost due to death.						
Romero-Brufau, 2021	To estimate population health outcomes with delayed second dose versus the standard schedule of SARS-CoV-2 mRNA vaccination	Agent-based model	General population	va Vaccine strategies	Over all simulation replications, the median cumulative mortality per 100 000 for standard dosing versus delayed second dose was 226 v 179, 233 v 207, and 235 v 236 for 90%, 80%, and 70% first dose efficacy, respectively. The delayed second dose strategy was optimal for vaccine efficacies at or above 80% and vaccination rates at or below 0.3% of the population per day, under both sterilizing and nonsterilizing vaccine assumptions, resulting in absolute cumulative mortality reductions between 26 and 47 per 100 000. The delayed second dose strategy for people under 65 performed consistently well under all vaccination rates tested.	0	
Ryckman, 2021	To assess the impact of vaccination on COVID-19 in US prisons and to examine how three factors influence risks of outbreaks and severe outcomes: resumption of in-person activities, use of NPIs, and vaccination of individuals who are incarcerated.	Compartmental model	Congregate settings population	Vaccine strategies	If a viral variant is introduced into a prison that has resumed pre-2020 contact levels, has moderate vaccine coverage (ranging from 36% to 76% among residents, dependent on age, with 40% coverage for staff), and has no baseline immunity, 23–74% of residents are expected to be infected over 200 days. High vaccination coverage (90%) coupled with NPIs reduces cumulative infections to 2–54%.	5*	Age, Comorbidities
Shadabfar, 2021	To predict the spreading profile of COVID-19 in the US via time-variant reliability analysis while accounting for prevailing uncertainties in the observed data	Compartmental model	General population	Vaccine strategies	The number of active cases decreases sharply by increasing the vaccination rate. For instance, quadrupling the vaccination rate reduces the number of active cases to less than 0.2 million by early 2022.	0	
Shen, 2021	To evaluate the vaccine effectiveness and coverage required to suppress the COVID-19 epidemic in scenarios when social contact was to return to pre-pandemic levels and face mask use was reduced	Compartmental model	General population	Vaccine strategies	Without a vaccine, relaxing social distancing restrictions while maintaining current face mask use would lead to 0.8-4 million infections and 15,000-240,000 deaths across the four states within one year. If face mask use rate decreased by 50%, a low vaccine effectiveness and coverage rate may not be enough to eliminate or suppress the pandemic without further major outbreaks. Delaying vaccination rollout for 1-2 months would not substantially alter the epidemic trend if current nonpharmaceutical interventions are maintained	0	
Stoddard, 2021	To establish the link between vaccine characteristics and effectiveness and also to estimate the mortality burden of COVID-19 under endemic scenarios managed by partially-effective vaccination schemes using an epidemiological modeling framework	Compartmental model	General population	Vaccine strategies	The modeling suggests that complete suppression of SARS-CoV-2 is feasible with high population-level compliance and highly effective vaccines in reducing infection.	0	
Storlie, 2021	To assess the effects of the vaccination on the pandemic	Compartmental model	General population	Vaccine strategies	The model shows that if the population were 75% vaccinated right now, it would completely suppress the growth of COVID-19 cases and hospitalizations, driving them down to very low levels.	0	
Swan, 2021	To assess the effects of the vaccination on the pandemic	Compartmental model	General population	Vaccine strategies	The use of a "symptom reducing" vaccine will require twice as many people vaccinated than a "susceptibility reducing" vaccine with the same 90% VE DIS to prevent 50% of the infections and death over 1 year. Delaying the start of vaccination by 3 months decreases the expected population impact by more than 50%	1	Age

Swan, 2021	to demonstrate the potential effects of VEINF (vaccine efficacy against transmissibility given infection) at the population level given multiple vaccine profiles	Compartmental model	General population	Vaccine strategies	The paper shows that if the Moderna and Pfizer-BioNTech vaccines, which demonstrated VE DIS > 90% in clinical trials, mediate VE DIS by VE SUSC, then a limited fourth epidemic wave of infections with the highly infectious B.1.1.7 variant would have been predicted in spring 2021 assuming rapid vaccine roll out.	1	Age
Tatapudi, 2021	To assess the impact of vaccine prioritization strategies on mitigating COVID-19	Agent-based model	General population	Vaccine strategies	A comparison of the prioritization strategies showed no significant difference in their impacts on pandemic mitigation	3	Age, Occupation, Geographical location
Tran, 2021	To evaluate age-based vaccine distributions on the pandemic	Compartmental model	General population	Vaccine strategies	the study found that allocating a substantial proportion (> 75%) of vaccine supply to individuals over the age of 70 is optimal in terms of reducing total cumulative deaths through mid-2021	2	Age, Occupation
Truszkowska, 2021	To evaluate the effects of testing and vaccination on the pandemic	Agent-based model	General population	Vaccine strategies, NPIs	Until widespread vaccination efforts are underway, maintaining a balance between safety and normalcy during the current COVID- 19 crisis requires the use of non-pharmaceutical prevention measures aswell as efficient detection strategie	2	Occupation, Geographical location
Webb, 2021	to predict the outcome of vaccine implementation for the mitigation of the COVID-19 epidemic in the US	Compartmental model	General population	Vaccine strategies	The model demonstrates that the subsiding of the epidemic as vaccination is implemented depends critically on the scale of relaxation of social measures that reduce disease transmission.	0	
Zhao, 2021	To help inform campus level preparedness plans for adoption of face mask/physical-distancing, testing, remote instructions, and personnel scheduling, during non-availability or partial-availability of vaccines, in the event of SARS-Cov2-type disease outbreaks	Compartmental model	University population	Vaccine strategies, NPIs	Lowering the population size to 34% or 44% of the actual population size, while maintaining contact rates at 4 or 7 among non-essential workers, would help control an outbreak. With at least 95% vaccine coverage, the campus can be kept at full population. If vaccine coverage is lower than 95%, mass testing at 25% per day is required if vaccine coverage is at 63-79%, and mass testing at 33% per day is required if vaccine coverage is at 53-68%.	0	
Avila-Poncede Leon, 2022	To model the transmission of the SARS-CoV-2 Delta variant in a partially vaccinated population	Compartmental model	General population	Vaccine strategies	The results showed that a combination of strengthening vaccine-induced immunity and preventative behavioral measures like face mask-wearing and contact tracing would likely be required to deaccelerate the spread of infectious SARS-CoV-2 variants	0	
Belval, 2022	To support prevention and mitigation efforts along with understanding potential impacts to the wildland firefighting workforce	Agent-based model	Wildland firefighting workforce	Vaccine strategies, NPIs	Vaccination and social distancing interventions are effective in reducing transmission of SARS-CoV-2 at fire incidents, leading to negligible infection rates, number of outbreaks, and worker days missed under a scenario of high compliance with recommended mitigations, including vaccination.	0	
Bianchin, 2022	To determine how risk tolerance and vaccination rates impact the rate at which a population can return to pre-pandemic contact behavior	Compartmental model	General population	Vaccine strategies, NPIs	Coordination in decision-making across regions is essential to maintain the daily number of hospitalizations below desired limits. Increasing risk tolerance can decrease the number of days required to discontinue non-pharmaceutical interventions (NPIs), but at the cost of an increased number of deaths. Vaccination uptake of greater than 70% is needed to safely return to pre-pandemic behaviors	0	
Bilinski, 2022	To evaluate the costs and benefits of COVID-19 testing strategies in the context of full-time, in-person kindergarten through eighth grade (K-8) education at different community incidence levels.	Agent-based model	Schools population	Vaccine strategies, NPIs	Test-to-stay policies were associated with minimal increases in transmission and reduced quarantine time across all levels of community incidence. The cost per infection averted in students and staff by weekly screening was lowest in schools with lower vaccination rates, fewer mitigation measures, and higher community transmission levels.	0	

Blumberg, 2022	To determine how different types of control interventions impact the expected number of symptomatic infections due to outbreaks in congregate settings	Compartmental model	Congregate settings population	Vaccine strategies, NPIs	Vaccination or depopulation can have a greater than linear effect on the expected number of cases. For example, preemptively reducing the size of the susceptible population by 20% reduced overall disease burden by 47%	0	
Bracis, 2022	To assess the benefits of offering vaccination to children ages 5–11	Compartmental model	General population	Vaccine strategies, NPIs	Offering early vaccination to children aged 5-11 with 75% physical interactions in schools was predicted to prevent 756 hospitalizations, cutting youth hospitalizations in half compared to no vaccination. This would largely reduce the need for additional social distancing measures over the school year. If overall vaccination coverage reached 90%, 60% of remaining hospitalizations would be averted and the need for increased social distancing would almost certainly be avoided	1	Age
Chen, 2022	To evaluate the effectiveness of the COVID-19 vaccination program in its early stage and predicted the path to herd immunity in the U.S.	Compartmental model	General population	Vaccine strategies	By early March 2021, they esimated vaccination in the U.S. reduced the total number of new COVID-19 cases by 4.4 million, prevented approximately 0.12 million hospitalizations, and decreased the population infection rate by 1.34 percentage points .	0	
Chen, 2022	proposes a framework for COVID-19 vaccine distribution that prioritizes disadvantaged communities based on community and societal risk indices. The framework shows that prioritizing disadvantaged communities can improve both social utility and equity simultaneously.	Compartmental model	General population	Vaccine strategies	Using this model, we find that social utility and equity can be simultaneously improved when vaccine access is prioritized for the most disadvantaged communities, which holds even when such communities manifest considerable vaccine reluctance. Nevertheless, equity among distinct demographic features may conflict; for example, low-income neighbourhoods might have fewer elder citizens.	2	Age, Geographical location
Fosdick, 2022	to develop an agent-based model and an online dashboard interface that simulates COVID-19 infection within congregate care settings under various mitigation measures	Agent-based model	Congregate settings population	Vaccine strategies, screening	The results of the study suggest that low staff vaccination rates and relaxed screening protocols are two continued risks to long-term care facilities. The model suggests that outbreaks are likely to occur when 78% of residents and 37.5% of staff are vaccinated even with a weekly testing protocol in place. The study found that staff vaccination rates are the primary determinant of the total number of infections in both staff and residents	0	
Frazier, 2022	To determine if and how Cornell should open up for in-person instruction	Compartmental model	University population	Vaccine strategies, NPIs	Once-per-week asymptomatic screening of vaccinated undergraduate students provides substantial value against the Delta variant, even if all students are vaccinated. More targeted testing of the most social vaccinated students provides further value.	1	Age
Gavish, 2022	To evaluate how different vaccine allocations to different age groups affect epidemic outcomes	Compartmental model	Children	Vaccine strategies	The study found that it is optimal to allocate vaccines to adolescents in the age group 10-19, even when they are assumed to be less susceptible than adults. It further found that age group 0-9 is included in the optimal allocation for sufficiently high values of the basic reproduction number	1	Age
Giardina, 2022	To estimate the association between adding or removing in-school mitigation measures (eg, masks) and COVID-19 outcomes within an elementary school community at varying student vaccination and local incidence rates	Agent-based model	School population	Vaccine strategies, NPIs	With student vaccination coverage of 70%or less and moderate assumptions about mitigation effectiveness (eg, masking), mitigation could only be reduced when local case incidence was 14 or fewer cases per 100 000 residents per day to keep the mean additional cases associated with reducing mitigation to 5 or fewer cases per month. To keep the probability of any in-school transmission to less than 50% per month, the local case incidence would have to be 4 or fewer cases per 100 000 residents per day	0	
Gomez-Vazquez, 2022	To quantify the effect of testing and vaccine strategies on the attack rate, length of the epidemic, and hospitalization	Agent-based model	Congregate settings population	Vaccine strategies, NPIs	3-day testing frequency minimized the attack rate and the time to eradicate an outbreak. Prioritization of vaccine among staff or staff and residents minimized the cumulative number of infections and hospitalization, particularly in the scenario of high probability of	0	

					an introduction. Reducing the probability of a viral introduction eased the demand on testing and vaccination rate to decrease infections and hospitalizations		
Grabowski, 2022	To evaluate the spread of Omicron	Compartmental model	General population	Vaccine strategies	The doubling time estimates for Omicron in South Africa's provinces, Gauteng and KwaZulu-Natal, were approximately 3.3 days and 2.7 days, respectively. Similar or even shorter doubling times were observed in other locations such as Australia, New York State, UK, and Denmark.	0	
Hachtel, 2022	To evaluate the effects of series of timed interventions that can account for the influence of real time changes in government policy and social norms on case numbers and deaths in the United States	Compartmental model	General population	Vaccine strategies, NPIs	The model effectively predicts the course of the pandemic under different intervention schedules and shows that without prompt effective interventions, the pandemic will be significantly extended and result in many millions of deaths in the US	0	
He, 2022	To examine the effect of global vaccination programs on the numbers of lives saved	Compartmental model	General population	Vaccine strategies	The study indicated that vaccination averted >1.5 million deaths in the studied countries until November 14, 2021, or at least precluded the need to reintroduce more stringent public health and social measures to control transmission.	0	
Head, 2022	To examine school reopening policies amidst ongoing transmission of the highly transmissible Delta variant, accounting for vaccination among individuals = 12 years	Agent-based model	University population	Vaccine strategies, NPIs	Universal masking reduced infections by over 57% among students, and masking combined with 70% vaccination coverage resulted in fewer than 50 excess cases per 1,000 students/teachers	2	Age, Occupation
Hekmati, 2022	To determine the airborne transmission risk for COVID-19 for holding in-person classes when vaccination, variants, and non-pharmaceutical interventions are considered	Compartmental model	University population	Vaccine strategies, NPIs	The study found that moving 90% of classes online can reduce new infections by up to 18 times. Universal mask usage can reduce new infections by up to 3.6 times. High vaccination rates are predicted to curb transmission even for more contagious variants of the virus	0	
Hupert, 2022	To determine how heterologous vaccination interventions (HVI) should be optimally implemented.	Compartmental model	General population	Vaccine strategies	Non-specific effects of non-COVID-19 vaccines, known as heterologous vaccine interventions (HVIs), can potentially reduce COVID-19 cases, hospitalizations, and mortality during a pandemic wave. HVIs can stimulate heterologous cross-protective effects, providing some protection against SARS-CoV-2 infection and amelioration of COVID-19 disease.	0	
Jhun, 2022	To determine what optimal allocation strategy should be used based on the vaccine supply	Compartmental model	General population	Vaccine strategies	the fatality-based strategy, which is currently employed in many countries, is more effective when the contagion rate is high and vaccine supply is low, but the contact-based method outperforms the fatality-based strategy when there is a sufficiently high supply of the vaccine. Fatality approach: vaccinating those with higher death rates. Contact approach: vaccinating those with higher contact rates.	0	
Junge, 2022	construct an agent-based SEIR model to simulate COVID-19 spread at a 16000-student mostly non-residential urban university during the Fall 2021 Semester, to find out if it is possible to safely reopen to in-person instruction with COVID-19 vaccination, and to determine the effectiveness of different scenarios for vaccine coverage and	Agent-based model	University population	Vaccine strategies	The study found that a combination of 100% mRNA vaccine coverage and weekly screening testing of 25% of the campus population makes it possible to safely reopen to in-person instruction.	0	

	vaccine effectiveness in controlling total infections						
Kadelka, 2022	investigate, (i) how ethnic homophily and social interaction parameters affect the choice of optimal vaccine allocation strategy, and (ii) notwithstanding possible ethical concerns, whether differentiating by ethnicity in these strategies can lead to better societal outcomes (e.g., fewer deaths or fewer cases).	Compartmental model	General population	Vaccine strategies	Allowing for differences in occupational risk level but no ethnic homophily, the 4-phase allocation strategy that minimizes mortality is first to vaccinate people 75 and older, then vaccinate people employed in high-contact jobs (e.g., healthcare and frontline essential workers), then people 65- 74 years old, followed by the remainder of the population (This is consistent with the strategy suggested by the CDC) In the scenario resembling the most likely social context the optimal 10-phase allocation strategy was better than any strategy with five or fewer phases. Taking ethnicity into account when prioritizing vaccine access may reduce COVID-19 deaths.	3	Age, Race/Ethnicity,Occupation
Kholi, 2022	To estimate the number of infections and hospitalizations prevented by a booster strategy in those 18years of age and older in the United States across a 6-month time horizon	Compartmental model	General population	Vaccine strategies	Vaccinating with mRNA-1273(Sept), mRNA-1273.214(Sept), and mRNA-1273.222(Nov) is pre- dicted to reduce infections by 34%, 40%, and 18%, respectively, and hospitalizations by 42%, 48%, and 25%, respectively, over 6 months compared to no booster.	1	Age
Kim, 2022	to evaluate the interactions between the speed of distribution and efficacy against infection of multiple vaccines when variants emerge and assessing the level of infection attack rate	Compartmental model	General population	Vaccine strategies	the speed of vaccine distribution is a crucial factor in achieving low infection attack rates (IAR) during a pandemic, along with vaccine efficacy against both the original strain and emerging variants.	0	
Kumar, 2022	To assess the effect of testing on a vaccinated population	Agent-based model	General population	Vaccine strategies, screening	Testing strategies that combine Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) assays, rapid antigen tests, and vaccinations are effective in mitigating an emerging COVID-19 outbreak driven by vaccine-evasive variants of concern.	1	Age
Ledder, 2022	To look at the effect of vaccination and NPIs (mentioned as contact factor) on outcomes	Compartmental model	General population	Vaccine strategies, NPIs	Vaccination non-acceptance does not matter as much until the supply is greater than demand (later on in the pandemic). Vaccine infrastructure for manufacturing and distribution is more important that vaccine acceptance. Decreasing the contact factor remains more important than the vaccination amount.	0	
Li, 2022	To look at the effect of vaccine allocation globally	Agent-based model	General population	Vaccine strategies	Inoculating at least 10%, 20%, and 26% of populations in all countries requires 1.12, 3.31, and 5.00 million additional vaccine doses every day, respectively. Achieving these benchmarks reduces new cases by 0.56, 2.74, and 3.32 million, respectively. If allocated by the current global distribution, 5.00 million additional vaccine doses will only avert 1.45 million new cases. If those 5.00 million vaccines are allocated based on projected cases in each country, the averted cases will increase more than six-fold to 9.20 million.	3	Age, Gender,Race/Ethnicity
Li, 2022	To look at the effect of age-specific vaccine allocation	Compartmental model	General population	Vaccine strategies	Allocating an additional 100,000 doses of vaccine to the 0-17 and 75-100 age groups by June 1, 2021, with an allocation of 80% to the 0-17 age group and 20% to the 75-100 age group would simultaneously reduce the maximum numbers of new infections and deaths in NYC	1	Age
Lin, 2022	To estimate the effects of the vaccine campaign on the United States	Compartmental model	General population	Vaccine strategies	The paper compared two approaches to model the effectiveness of the vaccination campaign in the US and found that both approaches yielded almost identical results, indicating that the vaccination campaign was effective in controlling the epidemic in the US	0	

Liu, 2022	To study the impact of media coverage on vaccine willingness and health outcomes	Compartmental model	General population	Vaccine strategies	It was found that timely response to media reports and increased media influence intensity were crucial for effective epidemic control.	0	
Mallela, 2022	To evaluate transmissibility/ reproduction numbers across different states in the United States	Compartmental model	General population	Vaccine strategies	Transmission varies greatly across states; some states will have more difficulty achieving herd immunity than others. As of September 20, 2021, no state has achieved herd immunity. Herd immunity may not be achievable through vaccination alone.	0	
Ngonghala, 2022	To study the transmission dynamics of two of these variants (Delta and Omicron) in the US, in the presence of vaccination, treatment of individuals with clinical symptoms of the dis- ease and the use of face masks.	Compartmental model	General population	Vaccine strategies, NPIs	we showed that the vaccine-derived herd immunity can be achieved in the United States (so that the pandemic will be eliminated) if at least 68% of the population is fully vaccinated with two of the three vaccines ap- proven for use in the United States (Pfizer or Moderna vaccine)	0	
Pantah, 2022	to study the impact of vaccination on COVID-19 transmission dynamics in Doughherty county, Georgia, USA as a case study for rural counties across the nation.	Compartmental model	General population	Vaccine strategies	The surge in the COVID-19 cases occurred after the lifting of the restriction policies, after increasing human activities such as protests and gatherings, and public holidays. The cases decline after the implementation of restrictions in public gatherings, social distancing, shelter-in-place, and the start of vaccination.	0	
Paris, 2022	to investigate the impacts of unvaccinated subpopulations on herd immunity and analyzed different scenarios to quantify which subpopulations and vaccine characteristics most impact infection levels in the United States	Compartmental model	General population	Vaccine strategies	The numerical simulation results show that in a heterogeneously vaccinated population (corresponding to 0%, 31%, 59.5%, and 75.3%), herd immunity cannot be achieved. Under this current landscape, our results show that while 16+ have the largest proportion of infections, the two youngest age groups (ages 0-4 and 5-11) are disproportionately affected, since they make up ~ 15% of the population but contribute to ~ 38% of the infections.	1	Age
Piccirillo, 2022	To assess the impact of the vaccination in combination with a restriction parameter that represents non-pharmaceutical interventions measures applied to the compartmental SEIR model to control the COVID-19 epidemic	Compartmental model	General population	Vaccine strategies, NPIs	Vaccination can reduce the peaks of infections and the duration of the pandemic. Vaccination combined with governmental actions (like non-pharmacological ones) are capable to minimize the infected peaks.	0	
Rabil, 2022	To develop effective screening and vaccination strategies, customized for a college campus, to reduce COVID-19 infections, hospitalizations, deaths, and peak hospitalizations.	Compartmental model	University population	Vaccine strategies, screening	With low initial vaccine coverage (30% in our study), even aggressive vaccination and screening result in a high number of infections: 1,020 to 2,040 (1,530 to 2,480) with routine daily (every other day) screening of the unvaccinated; 280 to 900 with daily screening extended to the newly vaccinated in base- and worst-case scenarios, which respectively consider reproduction numbers of 4.75 and 6.75 for the Delta variant.	0	
Rabil, 2022	to develop screening guidelines for the safe opening of college campuses, considering COVID-19 infec-tions/hospitalizations/deaths; peak daily hospitalizations; and the tests required.	Compartmental model	University population	Vaccine strategies, screening	Using the Spring 2022 academic semester as a case study, we study various routine screening strategies, and find that screening the faculty/staff less frequently than the students, and/or the boosted and vaccinated less frequently than the unvaccinated, may avert a higher number of infections per test, compared to universal screening of the entire population at a common frequency.	0	
Rao, 2022	To develop a model to guide the allocation of vaccines over time with the objectives: of minimizing new infections, deaths, life years lost, or QALY lost due to death	Compartmental model	General population	Vaccine strategies	This method generates a prioritized list of population groups for vaccine allocation, for example COVID-19 vaccine, to minimize new infections in the first period: priority order for vaccination is first individuals aged 20–39, then individuals under age 20, then individuals aged 40–65, and finally individuals over age 65.	1	Age

Safdar, 2022	assess the population-level impact of vaccination and booster shots accounting for waning and boosting of immunity against omicron variant	Compartmental model	General population	Vaccine strategies	That the prospect for the effective control and mitigation (and, consequently, elimination) of the COVID-19 pandemic in the United States is very promising using a combined vaccination-boosting strategy, provide the vaccinate and boosting coverages are moderately high enough.	0	
Singh, 2022	To investigate the role of vaccination coverage in the management of future COVID-19 outbreaks in nursing homes and explore the potential benefits of maintaining adequate adherence to recommended use of PPE by nursing home staff for reducing or preventing the risk of SARS-CoV-2 introduction and future COVID-19 outbreaks in nursing homes.	Compartmental model	Congregate settings population	Vaccine strategies	At HCP vaccination coverage of 60%, the probability of an outbreak was below 20% for community coverage of 50%or above. At high coverage, stopping asymptomatic screening and facility-wide testing yielded similar results	0	
Taboe, 2022	1) to investigate the impact of each vaccine type and booster doses (single/double) on the incidence of COVID-19 in the U.S., and 2) to predict future trends of the disease in the U.S., if existing control measures are reinforced or relaxed.	Compartmental model	General population	Vaccine strategies	Our findings suggest that booster shots with the Pfizer-BioNTech or Moderna vaccines conferred superior protection than those with the Johnson & Johnson vaccine. Furthermore, the simulations show that the baseline value of the new daily cases at the peak of the Omicron variant in January 2022 would have dropped significantly (by ˜ 20%) if a fourth dose of the Pfizer-BioNTech or Moderna vaccine was administered at the start of the Omicron wave. Specifically, three million cumulative cases in the U.S. could have been averted between late November 2021 and March 2022.	0	
Walker, 2022	To support the development of this guidance for ACIP -- recommended phased allocation of SARS- CoV-2 vaccines	Compartmental model	General population	Vaccine strategies	- Strategies of subsequently prioritizing adults aged >= 65 years, or a combination of essential workers and adults aged >= 75 years, prevented the most deaths. - Meanwhile, prioritizing adults with high-risk medical conditions immediately after HCP prevented the most infections. - All three strategies prevented a similar fraction of hospitalizations.	3	Age, Occupation, Comorbidities
Yang, 2022	To assess the mitigation strategies (relaxation of NPIs, and adoption of NPIs) needed for safe university reopening in the 2021 autumn semester considering different immunization effectiveness	Agent-based model	University population	Vaccine strategies, NPIs	80% vaccination is needed for safe university reopening without non-pharmaceutical interventions (masks); 60% vaccination is needed with non-pharmaceutical interventions	1	Age

*: 5 factors in this study were Age, comorbidities, prison security level, prison room sizes, and prison activities. For this study, the factors included in our synthesis were age, comorbidities, due to other factors very specific for prison setting

Supplementary Table 2: Characteristics of studies incorporating social determinants of health factors

Author	Year	Model type	Demographic factor				Social Determinants of Health factor		
			Age	Race/ Ethnicity	Gender	Comorbidities	Occupation	Geographical location	Living condition
Awad	2021	Compartmental model	No	No	No	No	No	Yes	No
Buckner	2021	Compartmental model	Yes	No	No	No	Yes	No	No
Islam	2021	Compartmental model	Yes	No	No	Yes	Yes	No	Yes
Patel	2021	Agent-based model	Yes	Yes	No	No	No	Yes	Yes
Tatapudi	2021	Agent-based model	Yes	No	No	No	Yes	Yes	No
Tran	2021	Compartmental model	Yes	No	No	No	Yes	No	No
Truszkowska	2021	Agent-based model	No	No	No	No	Yes	Yes	No
Chen	2022	Compartmental model	Yes	No	No	No	No	Yes	No
Head	2022	Agent-based model	Yes	No	No	No	Yes	No	No
Kadelka	2022	Compartmental model	Yes	Yes	No	No	Yes	No	No
Walker	2022	Compartmental model	Yes	No	No	Yes	Yes	No	No