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Appendices

Appendix 1: Detailed search strategy

Databases searched:

- PubMed
- MedRxiv
- Embase via OVID: Embase 1996 to 2023 March
- EBM Reviews
- ClinicalTrials.gov

Search Limits: Studies involving humans and with publication dates from 2000 and later.

Database retrieval

Databases	02/02/2024
PubMed	419
Embase via OVID	4,243
MedRxiv	953
EBM Reviews	240
ClinicalTrials.gov	1
TOTAL	**5,856**

PubMed Search:

#1 ("COVID 19"[MeSH] OR "COVID 19"[All Fields] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR ncov[All Fields] OR "2019 ncov"[All Fields] OR "coronavirus infections"[MeSH] OR coronavirus[MeSH] OR coronavirus[All Fields] OR coronaviruses[All Fields]

Living Evidence Synthesis

Effectiveness of masking in community and healthcare settings for reducing the incidence, transmission, hospitalizations, and deaths from respiratory infectious diseases

25 March 2024

[MHF product code: LES 14.2]

Note that this living evidence synthesis (LES) is part of a suite of LESs of the best-available evidence about the effectiveness of PHSMs (quarantine and isolation, masks, ventilation, hand hygiene, cleaning, and disinfecting) in preventing transmission of respiratory infectious diseases. This is the second version of this LES, which includes enhancements in scope from the first version by: 1) expanding the primary outcomes from COVID-19 transmission to include other prioritized respiratory infectious diseases (seasonal influenza, H1N1 and RSV); and 2) expanded searches to include these outcomes and to search to further back in time. The next update to this and other LESs in the series is to be determined, but the most up-to-date versions in the suite are available here. We provide context for synthesizing evidence about public health and social measures in Box 1 of the Report.

OR betacoronavirus[MeSH] OR betacoronavirus[All Fields] OR betacoronaviruses[All Fields] OR "wuhan coronavirus"[All Fields] OR 2019nCoV[All Fields] OR Betacoronavirus*[All Fields] OR "Corona Virus*"[All Fields] OR Coronavirus*[All Fields] OR Coronovirus*[All Fields] OR CoV[All Fields] OR CoV2[All Fields] OR COVID[All Fields] OR COVID19[All Fields] OR COVID-19[All Fields] OR HCoV-19[All Fields] OR nCoV[All Fields] OR "SARS CoV 2"[All Fields] OR SARS2[All Fields] OR SARSCoV[All Fields] OR SARS-CoV[All Fields] OR SARS-CoV2[All Fields]) [430,425]

#2 ("influenza"[All Fields] OR "influenza, human"[MeSH] OR "influenzae"[All Fields]) OR flu[All Fields] [167,918]

#3 Influenza A Virus, H1N1 Subtype[MeSH] OR h1n1[TIAB] [24,139]

#4 "respiratory syncytial virus infections"[MeSH] OR "respiratory syncytial virus infections"[All Fields] OR RSV[TIAB] OR "respiratory syncytial virus infection"[All Fields] [18,651]

#5 #1 OR #2 OR #3 OR #4 [599,598]

#6 Masks[Mesh:NoExp] OR "Respiratory Protective Devices"[Mesh] OR mask[All Fields] OR masks[All Fields] OR masking[All Fields] OR face-mask[All Fields] OR facemask[All Fields] OR face-masks[All Fields] OR facemasks[All Fields] OR "face covering"[All Fields] OR "facial covering"[All Fields] OR "mouth covering"[All Fields] OR "face piece"[All Fields] OR "facial protection*"[All Fields] OR "face protection"[All Fields] OR "face shield"[All Fields] OR respirator[All Fields] OR respirators[All Fields] OR "respiratory protection"[All Fields] OR "respiratory equipment"[All Fields] OR "respiratory device"[All Fields] OR "respiratory devices"[All Fields] OR n95[TIAB] OR "n 95"[TIAB] OR kn95[TIAB] OR kf94[TIAB] OR ffp[TIAB] OR ffp1[TIAB] OR ffp2[TIAB] OR ffp3[TIAB] OR n97[TIAB] OR n99[TIAB] OR p2[TIAB] "air-purifying respirator"[All Fields] OR "respiratory protection"[All Fields] OR "transparent panel"[All Fields] OR "surgical mask"[All Fields] OR "surgical masks"[All Fields] OR "filtering face piece"[All Fields] OR "filtering facepiece"[All Fields] [3,211]

#7 #6 and #5 [1,595]

#8 (clinical[TIAB] AND trial[TIAB]) OR clinical trials as topic[MeSH] OR clinical trial[Publication Type] OR random*[TIAB] OR random allocation[MeSH] OR therapeutic use[MeSH Subheading] [6,439,161]

#9 comparative study[pt] OR Controlled Clinical Trial[pt] OR quasiexperiment[TIAB] OR "quasi experiment"[TIAB] OR quasiexperimental[TIAB] OR "quasi experimental"[TIAB] OR quasi-randomized[TIAB] OR "natural experiment"[TIAB] OR "natural control"[TIAB] OR "Matched control"[TIAB] OR (unobserved[TI] AND heterogeneity[TI]) OR "interrupted time series"[TIAB] OR "difference studies"[TIAB] OR "two stage residual inclusion"[TIAB] OR "regression discontinuity"[TIAB] OR non-randomized[TIAB] OR pretest-posttest[TIAB] OR "non randomized controlled trials as topic"[MeSH] OR "cross over studies"[MeSH] OR "cross over studies"[All Fields] OR "crossover study"[All Fields] OR "observational study"[Publication Type] OR "observational studies as topic"[MeSH] OR "observational study"[All Field] [2,727,608]

#10 cohort studies[mesh:noexp] OR longitudinal studies[mesh:noexp] OR follow-up studies[mesh:noexp] OR prospective studies[mesh:noexp] OR retrospective studies[mesh:noexp] OR cohort[TIAB] OR longitudinal[TIAB] OR prospective[TIAB] OR retrospective[TIAB] [3,435,446]

#11 Case-Control Studies[Mesh:noexp] OR retrospective studies[mesh:noexp] OR Control Groups[Mesh:noexp] OR (case[TIAB] AND control[TIAB]) OR (cases[TIAB] AND controls[TIAB]) OR (cases[TIAB] AND controlled[TIAB]) OR (case[TIAB] AND comparison*[TIAB]) OR (cases[TIAB] AND comparison*[TIAB]) OR "control group"[TIAB] OR "control groups"[TIAB] [2,355,060]

#12 ("model"[All Fields] OR "modelling"[All Fields] OR "models"[All Fields]) AND ("studies"[All Fields] OR "study"[All Fields]) [2,823,494]

#13 #8 or #9 or #10 or #11 or #12 [12,007,494]

#14 #7 and #13 [574]

#15 “Communicable Disease Control”[Mesh] OR “Disease Outbreaks”[Mesh] OR “Disease Transmission, Infectious”[Mesh] OR “Infection Control”[Mesh] OR incidence[MeSH] OR “transmission”[MeSH Subheading] OR Transmission[All Fields] OR “Prevention and control”[All Fields] OR “hospitalisation”[All Fields] OR “hospitalization”[MeSH] OR “hospitalization”[All Fields] OR “hospitalised”[All Fields] OR “Communicable Disease Control”[tiab] OR Incidence[All Fields] OR Occurrence[All Fields] OR Transmission[All Fields] OR “transmissibility”[All Fields] OR “transmissible”[All Fields] OR “transmissions”[All Fields] OR “efficacy”[All Fields] OR “effectiveness”[All Fields] [5,613,900]

#16 #13 and #14 [421]

#17 (2020/01/01:2023/12/31[dp]) [3,085,203]

#18 (2016/01/01:2019/12/31[dp]) [2,740,983]

#19 (2012/01/01:2015/12/31[dp]) [2,593,900]

#20 (2008/01/01:2011/12/31[dp]) [2,159,246]

#21 (2004/01/01:2007/12/31[dp]) [1,795,146]

#22 (2001/01/01:2003/12/31[dp]) [1,119,934]

#23 #15 and #16 [349]

#24 #15 and #17 [18]

#25 #15 and #18 [13]

#26 #15 and #19 [30]

#27 #15 and #20 [11]

#28 #15 and #21 [0]

Appendix 2: List of studies included

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
April 2022	New	U.S.	Quasi-experimental	Mask mandate	Transmission, hospitalization, mortality	COVID-19	Community (population level)
Aapo 2022	New	Finland	Ecological	Mask mandate	Transmission	COVID-19	Community (schools)
Abaluck 2022	First version	Bangladesh	Cluster RCT	Mask vs. no mask, types of mask	Transmission	COVID-19	Community (individual level)
Agyapon Ntra 2022	Combinations LES	Multi-country	Ecological	Mask mandate and other public health and social measures (PHSMs)	Transmission	COVID-19	Community (population level)
Aiello 2010	Chou LES	U.S.	RCT	Mask and other PHSMs	Incidence	Influenza-like illness	Community (individual level)
Aiello 2012	Chou LES	U.S.	Cluster RCT	Mask and other PHSMs	Incidence	Influenza-like illness	Community (individual level)
Akinbami 2020	Chou LES	U.S.	Cohort	Mask vs. no mask	Seropositivity	COVID-19	Healthcare
Alfelali 2020	Chou LES	Saudi Arabia	Cluster RCT	Mask vs. no mask	Incidence	Viral respiratory infections	Community (individual level)
Alicia 2023	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Alraddadi 2016	Chou LES	Saudi Arabia	Cohort	Mask vs. no mask	Incidence	MERS	Healthcare
Andrejko 2022a	First version	U.S.	Case-control	Mask vs. no mask, types of mask	Transmission	COVID-19	Community (individual level)
Andrejko 2022b	First version	U.S.	Case-control	Mask vs. no mask, types of mask	Transmission	COVID-19	Community (individual level)
Areekal 2021	First version	India	Cohort	Mask and other PHSMs	Transmission	COVID-19	Healthcare
Baig 2021	First version	Pakistan	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Barasheed 2014	Chou LES	Saudi Arabia	Pilot RCT	Mask vs. no mask	Incidence	Influenza-like illness	Community (individual level)
Barros 2022	New	Multi-country	Ecological	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Baumkötter 2022	Chou LES	Germany	Cohort	Mask vs. no mask	Incidence	COVID-19	Community (individual level)
Belan 2022	Chou LES	France	Case-control	Types of mask	Incidence	COVID-19	Healthcare

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Benjamin 2020	New	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (population level)
Bo 2021	Combinations LES	Multi-country	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Boutzoukas 2021	First version	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (schools)
Boutzoukas 2022	New	U.S.	Cohort	Mask mandate	Transmission	COVID-19	Community (schools)
Bundgaard 2021	First version	Denmark	RCT	Mask vs. no mask	Transmission	COVID-19, other respiratory virus	Community (individual level)
Canini 2010	Chou LES	France	Cluster RCT	Mask vs. no mask	Incidence	Influenza-like illness	Community (individual level)
Cao 2023	Combinations LES	Multi-country	Ecological	Mask and other PHSMs	Incidence	COVID-19	Community (population level)
Caputo 2006	Chou LES	Canada	Cohort	Types of mask	Incidence	SARS-CoV-1	Healthcare
Carazo 2023	Chou LES	Canada	Case-control	Types of mask	Incidence	COVID-19	Healthcare
Chandra 2022	New	U.S.	Cohort	Mask mandate	Transmission	COVID-19	Community (population level)
Charlie 2021	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Chatterjee 2020	Chou LES	India	Case-control	Mask vs. no mask	Incidence	COVID-19	Healthcare
Chen 2009	Chou LES	China	Case-control	Types of mask	Incidence	SARS-CoV-1	Healthcare
Cheng 2020	First version	Hong Kong	Ecological	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Chris 2020	New	Multi-country	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Chughtai 2016	Chou LES	Vietnam	RCT	Mask vs. no mask	Incidence	Respiratory viral infections, Influenza-like illness	Healthcare
Collatuzzo 2022	Chou LES	Italy	Cross-sectional	Mask vs. no mask	Incidence	COVID-19	Healthcare
Coma 2022	New	Spain	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (population level)
Cowling 2008	Chou LES	Hong Kong	Cluster RCT	Mask vs. no mask	Transmission	Influenza	Community (individual level)
Cowling 2009	Chou LES	Hong Kong	Cluster RCT	Mask vs. no mask	Transmission	Influenza	Community (individual level)

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Cristiane Ravagnani 2020	New	Brazil	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Damian 2021	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Da Silva Torres 2022	Chou LES	Brazil	Cross-sectional	Mask vs. no mask	Incidence	COVID-19	Community (individual level)
Davido 2021	Chou LES	France	Cross-sectional	Mask vs. no mask	Incidence	COVID-19	Healthcare
DeJonge 2022	First version	U.S.	Cohort	Mask mandate and other PHSMs	Transmission/incidence	COVID-19	Community (population level)
Dezman 2021	New	U.S.	Ecological	Mask vs. no mask	Emergency department visits	Non-COVID viral illnesses, asthma, and COPD	Healthcare
Dhaval 2021	New	U.S.	Ecological	Mask mandate and other PHSMs	Transmission, hospitalization, deaths	COVID-19	Community (population level)
Dieter 2020	New	Germany	Cross-sectional	Mask and other PHSMs	Deaths	COVID-19	Community (population level)
Ding 2021	New	UK	Case-control	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Diogo 2023	New	Multi-country	Ecological	Mask and other PHSMs	Transmission, deaths	COVID-19	Community (population level)
Doernberg 2022	Chou LES	U.S.	Cohort	Mask vs. no mask	Incidence	COVID-19	Community (individual level)
Doung-Ngern 2020	First version	Thailand	Case-control	Mask vs. no mask	Transmission	COVID-19	Healthcare
Doyle 2021	First version	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (schools)
Emily 2021	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (schools)
Enbal 2020	New	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (population level)
Ertem 2023	New	U.S.	Cohort	Mask mandate	Transmission	COVID-19	Community (population level)
Fletcher 2022	Chou LES	U.S.	Cross-sectional	Types of mask	Incidence	COVID-19	Healthcare
Frochen 2023	New	U.S.	Ecological	Mask mandate	Transmission, deaths	COVID-19	Community (population level)
Garchitorena 2020	Combinations LES	Multi-country	Ecological	Mask mandate and other PHSMs	Incidence, deaths	COVID-19	Community (population level)

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Ge 2022	Combinations LES	Multi-country	Ecological	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Giacomo De 2021	New	Switzerland	Quasi-experimental	Mask mandate	Deaths	COVID-19	Community (population level)
Gigot 2023	First version	U.S.	Cohort	Mask vs. no mask	Transmission	COVID-19	Community (population level)
Ginther 2021	New	U.S.	Quasi-experimental	Mask mandate	Transmission, hospitalization, deaths	COVID-19	Community (population level)
Goncalves 2021	First version	Brazil	Case-control	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Haller 2022	Chou LES	Switzerland	Cohort	Types of mask	Seropositivity	COVID-19	Healthcare
Hansen 2023	New	U.S.	Ecological	Mask mandate	Transmission, hospitalization, deaths	COVID-19	Community (population level)
Hast 2022	First version	U.S.	Case-control	Mask and other PHSMs	Transmission	COVID-19	Community (schools)
Heinzerling 2020	Chou LES	U.S.	Cohort	Mask vs. no mask	Transmission	COVID-19	Healthcare
Herstein 2021	First version	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (individual level)
Hobbs 2020	First version	U.S.	Case-control	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Howard-Anderson 2022	Chou LES	U.S.	Cohort	Mask vs. no mask	Incidence	COVID-19	Healthcare
Huang 2022	New	U.S.	Cohort	Mask mandate	Transmission	COVID-19	Community (population level)
Hughes 2022	New	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (schools)
Hunter 2020	Combinations LES	Multi-country	Quasi-experimental	Mask mandate and other PHSMs	Incidence, deaths	COVID-19	Community (population level)
Huy 2022	Combinations LES	Multi-country	Quasi-experimental	Mask mandate and other PHSMs	Incidence	COVID-19	Community (population level)
Islam 2022	First version	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Jarnig 2022	New	Austria	Cohort	Mask vs. no mask	Transmission	COVID-19	Community (schools)
Jehn 2021	First version	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (schools)
Jie 2020	New	U.S.	Quasi-experimental	Mask and other PHSMs	Deaths	COVID-19	Community (population level)

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Johnston 2023	New	U.S.	Case-control	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Joo 2021	New	U.S.	Ecological	Mask mandate	Transmission, hospitalization	COVID-19	Community (population level)
Karaivanov 2021	New	Canada	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Khalil 2020	Chou LES	Bangladesh	Case-control	Mask vs. no mask	Incidence	COVID-19	Healthcare
Kociolek 2022	New	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Healthcare
Kristin 2021	New	U.S.	Case-control	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Kwon 2021	New	U.S.	Cohort	Mask and other PHSMs	Transmission	COVID-19	Community (individual level)
Lan 2020	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Healthcare
Larson 2010	Chou LES	U.S.	Cluster RCT	Mask vs. no mask	Transmission	Upper Respiratory infections and Influenza	Community (individual level)
Lau 2004	Chou LES	Hong Kong	Case-control	Mask vs. no mask	Transmission	SARS-CoV-1	Healthcare
Lau 2004 HCW	Chou LES	Hong Kong	Case-control	Mask vs. no mask	Incidence	SARS-CoV-1	Community (individual level)
Leech 2021	Combinations LES	Multi-country	Cross-sectional	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Leech 2022	New	Multi-country	Ecological	Mask vs. no mask	Transmission	COVID-19	Community (population level)
Leffler 2020	New	Multi-country	Ecological	Mask and other PHSMs	Deaths	COVID-19	Community (population level)
Lenglart 2023	New	Multi-country	Quasi-experimental	Mask and other PHSMs	Incidence	Bronchiolitis	Community (population level)
Li 2021	First version	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (population level)
Lio 2021	First version	Macao	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Healthcare
Liu 2009	Chou LES	China	Case-control	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
Liu 2021	First version	U.S.	Case-ascertained study	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Liu 2021	New	U.S.	Ecological	Mask and other PHSMs	Transmission	COVID-19	Community (population level)

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Loeb 2004	Chou LES	Canada	Cohort	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
Loeb 2009	Chou LES	Canada	RCT	Types of mask	Incidence	Influenza	Healthcare
Loeb 2022	Chou LES	Multi-country	RCT	Types of mask	Transmission	COVID-19	Healthcare
Ma 2004	Chou LES	China	Case-control	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
MacIntyre 2009	Chou LES	Australia	Cluster RCT	Mask vs. no mask, types of mask	Incidence	Influenza-like illness	Community (individual level)
MacIntyre 2011	Chou LES	China	Cluster RCT	Types of mask	Incidence	Clinical and confirmed respiratory infection, Influenza and Influenza-like illness	Healthcare
MacIntyre 2013	Chou LES	China	Cluster RCT	Types of mask	Incidence	Clinical and confirmed respiratory infections	Healthcare
MacIntyre 2015	Chou LES	Vietnam	Cluster RCT	Mask vs. no mask, types of mask	Incidence	Influenza-like illness	Healthcare
MacIntyre 2016	Chou LES	China	Cluster RCT	Mask vs. no mask	Incidence	Influenza-like illness	Community (individual level)
Madureira 2022	Chou LES	Brazil	Cross-sectional	Mask vs. no mask	Incidence	COVID-19	Healthcare
Mansour 2023	New	Multi-country	Cohort	Types of mask	Transmission	COVID-19	Healthcare
Michael 2021	New	U.S.	Cohort	Mask mandate and other PHSMs	Transmission, deaths	COVID-19	Community (population level)
Milazzo 2022	New	Australia	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Mingwei 2023	New	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (schools)
Moek 2022	First version	Germany	Cross-sectional	Mask mandate	Transmission	COVID-19	Community (individual level)
Moorthy 2022	New	U.S.	Ecological	Mask vs. no mask	Transmission	COVID-19	Community (schools)
Morgane 2021	New	France	Cross-sectional	Types of mask	Transmission, deaths	COVID-19	Healthcare
Murray 2022	New	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (schools)
Nash 2023	Combinations LES	U.S.	Cohort	Mask and other PHSMs	Incidence	COVID-19	Community (population level)

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Nelson 2023	First version	U.S.	Cohort	Mask and other PHSMs	Transmission	COVID-19	Community (schools)
Nishiura 2005	Chou LES	Vietnam	Case-control	Mask vs. no mask	Transmission	SARS-CoV-1	Healthcare
Nishiyama 2008	Chou LES	Vietnam	Cohort	Mask vs. no mask	Incidence	SARS-CoV-1	Healthcare
Pan 2021	New	China	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Healthcare
Pauser 2021	First version	Germany	Cohort	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Payne 2020	First version	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Pei 2006	Chou LES	China	Case-control	Mask vs. no mask	Incidence	SARS-CoV-1	Healthcare
Piapan 2020	Chou LES	Italy	Cohort	Mask vs. no mask	Incidence	COVID-19	Healthcare
Piapan 2022	Chou LES	Italy	Cohort	Mask vs. no mask	Incidence	COVID-19	Healthcare
Pienthong 2022	New	Thailand	Case-control	Mask vs. no mask	Incidence	COVID-19	Healthcare
Poppe 2020	New	Multi-country	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Pozo-Martin 2021	Combinations LES	Multi-country	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Qiu 2022	New	Multi-country	Ecological	Mask mandate and other PHSMs	Transmission	Influenza	Community (population level)
Raboud 2010	Chou LES	Canada	Cohort	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
Rachel 2020	New	Multi-country	Ecological	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Rader 2021	New	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (population level)
Rebmann 2021	First version	U.S.	Case-control	Mask mandate	Transmission	COVID-19	Community (schools)
Reyne 2021	New	France	Cohort	Mask vs. no mask	Transmission	COVID-19	Healthcare
Riley 2022	First version	U.S.	Case-control	Mask mandate	Transmission	COVID-19	Community (individual level)
Rodonovich 2019	Chou LES	U.S.	Cluster RCT	Types of mask	Transmission	Influenza	Healthcare
Rodriguez-Lopez 2021	New	Colombia	Case-control	Types of mask	Transmission	COVID-19	Healthcare
Scales 2003	Chou LES	Canada	Cohort	Mask vs. no mask	Transmission	SARS-CoV-1	Healthcare

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Schauer 2021	New	U.S.	Ecological	Mask mandate	Transmission, hospitalizations, deaths	COVID-19	Community (population level)
Scott 2021	New	Australia	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Sertcelik 2023	New	Turkey	Case-control	Types of mask	Transmission	COVID-19	Healthcare
Seto 2003	Chou LES	Hong Kong	Case-control	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
Sharif 2021	Chou LES	Bangladesh	Cross-sectional	Mask and other PHSMs	Transmission	COVID-19	Community (individual level)
Sharma 2021	Combinations LES	Multi-country	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Shaweno 2021	First version	Ethiopia	Cross-sectional	Mask and other PHSMs	Transmission	COVID-19	Community (individual level)
Simmerman 2011	Chou LES	Thailand	Cluster RCT	Mask vs. no mask	Transmission	Influenza-like illness	Community (individual level)
Sims 2021	Chou LES	U.S.	Cohort	Mask vs. no mask, types of mask	Seropositivity	COVID-19	Healthcare
Sohee 2020	New	U.S.	Cohort	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Sombetzki 2021	First version	Germany	Cohort	Mask mandate and other PHSMs	Transmission	COVID-19	Community (individual level)
Sophie 2021	New	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (population level)
Sruthi 2020	New	Switzerland	Ecological	Mask and other PHSMs	Transmission	COVID-19	Community (population level)
Su 2021	New	Taiwan	Cohort	Mask vs. no mask	Transmission	COVID-19	Healthcare
Suess 2012	Chou LES	Germany	Cluster RCT	Mask vs. no mask	transmission	Influenza	Community (individual level)
Sugimura 2021	First version	Japan	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Szajek 2022	New	Switzerland	Cohort	Types of mask	Incidence	COVID-19	Healthcare
Taylor 2022	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Teleman 2004	Chou LES	Singapore	Case-control	Mask vs. no mask	Incidence	SARS-CoV-1	Healthcare
Temkin 2022	New	Israel	Quasi-experimental	Mask mandate	Transmission	COVID-19	Healthcare

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Theuring 2021	First version	Germany	Cross-sectional	Mask and other PHSMs	Transmission	COVID-19	Community (schools)
Thompson 2022	New	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Healthcare
Tjaden 2023	Chou LES	U.S.	Case-control	Mask vs. no mask, types of mask	Incidence	COVID-19	Community (individual level)
Tjaden 2023	New	U.S.	Case-control	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Tomomi 2021	New	Japan	Cross-sectional	Mask and other PHSMs	Transmission	COVID-19	Community (individual level)
Tong 2020	New	Singapore	Quasi-experimental	Mask vs. no mask	Incidence	Respiratory viral infections (respiratory syncytial virus and parainfluenza virus)	Healthcare
Tong 2020	New	China	Cohort	Mask vs. no mask	Transmission	COVID-19	Healthcare
Tori 2022	New	U.S.	Quasi-experimental	Mask mandate	Transmission	COVID-19	Community (schools)
Torres 2023	New	Portugal	Ecological	Mask mandate	Transmission, deaths	COVID-19	Community (population level)
Tuan 2007	Chou LES	Vietnam	Cohort	Mask vs. no mask	Incidence	SARS-CoV-1	Community (individual level)
Ulyte 2021	First version	Switzerland	Cohort	Mask mandate	Transmission	COVID-19	Community (schools)
Van den Broek-Altenburg 2021	First version	U.S.	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Varela 2022	First version	Colombia	RCT	Types of mask	Transmission	COVID-19	Community (individual level)
Venugopal 2021	Chou LES	U.S.	Cross-sectional	Mask vs. no mask, types of mask	Transmission	COVID-19	Healthcare
Wan 2020	New	U.S.	Cross-sectional	Mask mandate and other PHSMs	Transmission	COVID-19	Healthcare
Wang 2020	New	U.S.	Ecological	Mask mandate	Transmission	COVID-19	Healthcare
Wang 2020	Chou LES	China	Cohort	Mask vs. no mask	Transmission	COVID-19	Healthcare
Wang 2020	First version	China	Cross-sectional	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Wilder-Smith 2005	Chou LES	Singapore	Cohort	Mask vs. no mask	Transmission	SARS-CoV-1	Healthcare
Williams 2021	New	Canada	Cohort	Mask mandate	Transmission	COVID-19	Healthcare

First Author	Source	Jurisdiction studied	Methods used	Intervention	Outcome	Disease	Setting
Wilson 2022	New	France	Case-control	Types of mask	Transmission	COVID-19	Healthcare
Wu 2004	Chou LES	China	Case-control	Mask vs. no mask	Transmission	COVID-19	Community (individual level)
Xiong 2023	New	Hong Kong	Ecological	Mask mandate and other PHSMs	Transmission	Influenza	Community (population level)
Xue-Jing 2022	New	Multi-country	Ecological	Mask mandate	Transmission	COVID-19	Community (population level)
Yang 2021	Combinations LES	U.S.	Ecological	Mask mandate and other PHSMs	Transmission	COVID-19	Community (population level)
Yin 2004	Chou LES	China	Case-control	Mask vs. no mask, types of mask	Transmission	SARS-CoV-1	Healthcare
Youssef 2022	New	Lebanon	Cross-sectional	Mask vs. no mask	Transmission	Influenza	Community (population level)
Zweig 2021	Combinations LES	Multi-country	Ecological	Mask mandate and other PHSMs	Incidence	COVID-19	Community (population level)

Appendix 3: List of studies excluded in the last stage of reviewing process

Title	Year	Reason
Infectious severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in exhaled aerosols and efficacy of masks during early mild infection	2022	No empirical/No details of effectiveness
Timing is everything: The relationship between COVID outcomes and the date at which mask mandates are relaxed	2021	Modelling
Misinformation about COVID-19: Evidence for differential latent profiles and a strong association with trust in science	2021	Misinformation
Utility of cloth masks in preventing respiratory infections: A systematic review	2020	Evidence Synthesis
Critical levels of mask efficiency and of mask adoption that theoretically extinguish respiratory virus epidemics	2020	Modelling
Assessing the effectiveness of mandatory outdoor mask policy: The natural experiment of Campania	2023	Modelling
The mask-wearing bias in the estimates of vaccine efficacy	2021	No empirical/No details of effectiveness
Covid-19 prevention and control measures in workplace settings: A rapid review and meta-analysis	2021	Evidence Synthesis
Assessment of the COVID-19 vaccine program: Impact of the no mask mandate executive order in the state of Texas	2021	Modelling
Slight reduction in SARS-CoV-2 exposure viral load due to masking results in a significant reduction in transmission with widespread implementation	2020	Modelling
Association between self-reported masking behavior and SARS-CoV-2 infection wanes from pre-delta to omicron-predominant periods — North Carolina COVID-19 community research partnership	2022	Duplicated
Impact of population mask wearing on Covid-19 post lockdown	2020	Modelling
How long and effective does a mask protect you from an infected person who emits virus-laden particles: By implementing one-dimensional physics-based modeling	2022	Modelling
Downsides of face masks and possible mitigation strategies: A systematic review and meta-analysis	2021	Evidence Synthesis
SARS-CoV-2 transmission with and without mask wearing or air cleaners in schools in Switzerland: A modeling study of epidemiological, environmental, and molecular data	2023	Modelling
Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials	2020	Evidence Synthesis
Maintaining face mask use before and after achieving different COVID-19 vaccination coverage levels: a modelling study	2022	Modelling
Comparative effectiveness of N95 respirators and surgical/face masks in preventing airborne infections in the era of SARS-CoV2 pandemic: A meta-analysis of randomized trials	2020	Evidence Synthesis
Wearing masks and establishing COVID-19 areas reduces secondary attack risk in nursing homes	2020	Duplicated
Assessing the impact of non-pharmaceutical interventions (NPI) on the dynamics of COVID-19: A mathematical modelling study in the case of Ethiopia	2020	Modelling
The efficacy of facemasks in the prevention of COVID-19: A systematic review	2022	Evidence Synthesis
Estimating the effect and cost-effectiveness of facemasks in reducing the spread of the severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) in Uganda	2020	Modelling
SARS-CoV-2 infection among community health workers in India before and after use of face shields	2020	No details of effectiveness
Effect of specific non-pharmaceutical intervention policies on SARS-CoV-2 transmission in the counties of the United States	2020	Modelling
COVID-19 pandemic and personal protective equipment shortage: protective efficacy comparing masks and scientific methods for respirator reuse	2020	Evidence Synthesis
Effectiveness of face masks for reducing transmission of SARS-CoV-2: A rapid systematic review	2023	Evidence Synthesis
Community use of face masks and similar barriers to prevent respiratory illness such as COVID-19: A rapid scoping review	2020	Evidence Synthesis

Title	Year	Reason
Evaluation of different types of face masks to limit the spread of SARS-CoV-2 – A modeling study	2021	Duplicated
Can a combination of vaccination and face mask wearing contain the COVID-19 pandemic?	2022	Evidence Synthesis
Potential benefit of masking and other COVID-19 infection prevention measures on late-onset infections in the NICU	2021	Duplicated
Could masks curtail the post-lockdown resurgence of COVID-19 in the US?	2020	Modelling
How efficient are facial masks against COVID-19? Evaluating the mask use of various communities one year into the pandemic	2021	No empirical/No details of effectiveness
Facemask use in community settings to prevent respiratory infection transmission: A rapid review and meta-analysis	2021	Evidence Synthesis
Efficiency of community face coverings and surgical masks to limit the spread of aerosol	2022	Modelling
Impact of wearing masks, hand hygiene, and social distancing on influenza, enterovirus, and all-cause pneumonia during the coronavirus pandemic: Retrospective national epidemiological surveillance study	2020	No empirical/No details of effectiveness
The influence of gender and ethnicity on facemasks and respiratory protective equipment fit: A systematic review and meta-analysis	2021	Evidence Synthesis
Masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings: A living rapid review	2020	Evidence Synthesis
Comparative effectiveness of mask type in preventing SARS-CoV-2 in health care workers: uncertainty persists	2022	No empirical/No details of effectiveness
Major update: Masks for prevention of SARS-CoV-2 in health care and community settings-final update of a living, rapid review	2023	Duplicated
Masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings	2023	Duplicated
Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks (Update August 4, 2020)	2020	Duplicated
Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: A systematic review and meta-analysis	2020	Evidence Synthesis
Evaluation of N95 respirators, modified snorkel masks and low-cost powered air-purifying respirators: A prospective observational cohort study in healthcare workers	2021	No empirical/No details of effectiveness
Face mask use in the community for reducing the spread of COVID-19: A systematic review	2020	Evidence Synthesis
Face mask use in the general population and optimal resource allocation during the COVID-19 pandemic	2020	Modelling
Impact of non-pharmaceutical interventions on COVID-19 incidence and deaths: cross-national natural experiment in 32 European countries	2022	Duplicated
The impact of universal mask use on SARS-COV-2 in Victoria, Australia on the epidemic trajectory of COVID-19	2021	Modelling
Face masks, old age, and obesity explain country's COVID-19 death rates	2021	Modelling
Masks use and facial dermatitis during COVID-19 outbreak: is there a difference between CE and non-CE approved masks? Multi-center, real-life data from a large Italian cohort	2021	No empirical/No details of effectiveness
The potential for cloth masks to protect health care clinicians from SARS-CoV-2: A rapid review	2021	Evidence Synthesis
Front lines of the COVID-19 pandemic: what is the effectiveness of using personal protective equipment in health service environments?—a systematic review	2022	Evidence Synthesis
A room, a bar and a classroom: How the coronavirus is spread through the air depends on heavily mask filtration efficiency	2020	Modelling
Decrease in hospitalizations for COVID-19 after mask mandates in 1083 U.S. counties	2020	No empirical/No details of effectiveness
Masks for prevention of viral respiratory infections among health care workers and the public: PEER umbrella systematic review	2020	Evidence Synthesis

Title	Year	Reason
Personal protective equipment for reducing the risk of COVID-19 infection among healthcare workers involved in emergency trauma surgery during the pandemic: an umbrella review	2020	Duplicated
Extended use or re-use of single-use surgical masks and filtering facepiece respirators: A rapid evidence review	2020	No empirical/No details of effectiveness
The impact of COVID-19 pandemic social distancing and mask mandates on the prevalence of influenza and RSV during their peak season	2022	No empirical/No details of effectiveness
Face masks to control the source of respiratory infections: A systematic review of the scientific literature before and after COVID-19	2023	Evidence Synthesis
Global projections of lives saved from COVID-19 with universal mask use	2020	Modelling
High-quality masks reduce COVID-19 infections and deaths in the US	2021	Modelling
Vaccinating children against COVID-19 is essential prior to the removal of non-pharmaceutical interventions	2021	Modelling
How well do face masks protect the wearer compared to public perceptions?	2021	No empirical/No details of effectiveness
Modelling how face masks and symptoms-based quarantine synergistically and cost-effectively reduce SARS-CoV-2 transmission in Bangladesh	2022	Modelling
Investigation of the efficiency of mask wearing, contact tracing, and case isolation during the Covid-19 outbreak	2021	Modelling
The impact of surgical mask-wearing, contact tracing program, and vaccination on COVID-19 transmission in Taiwan from January 2020 to March 2022: a modelling study	2022	Modelling
Understanding the role of mask-wearing during COVID-19 on the island of Ireland	2022	Modelling
How long and effective does a mask protect you from an infected person who emits corona virus-laden particles: by implementing physics-based modeling	2022	Duplicated
Do they really work? Quantifying fabric mask effectiveness to improve public health messaging	2022	No empirical/No details of effectiveness
Effect of a multimodal strategy for prevention of nosocomial influenza: a retrospective study at Grenoble Alpes University Hospital from 2014 to 2019	2022	No empirical/No details of effectiveness
[Analysis of the adjustment of self-filtering masks in combination with surgical masks for the protection of health professionals in the care of patients affected by SARS-COV-2 from an experimental study]	2021	No empirical/No details of effectiveness
Facial protection for healthcare workers during pandemics: A scoping review	2020	Evidence Synthesis
A model showing the relative risk of viral aerosol infection from breathing and the benefit of wearing masks in different settings with implications for Covid-19	2020	Modelling
Face-masking, an acceptable protective measure against COVID-19 - Findings of Ugandan high-risk groups	2020	No empirical/No details of effectiveness
Slight reduction in SARS-CoV-2 exposure viral load due to masking results in a significant reduction in transmission with widespread implementation	2021	Duplicated
Network assessment and modeling the management of an epidemic on a college campus with testing, contact tracing, and masking	2021	Modelling
Personal protective equipment for reducing the risk of COVID-19 infection among health care workers involved in emergency trauma surgery during the pandemic: An umbrella review	2021	Duplicated
Personal protective equipment for reducing the risk of COVID-19 infection among healthcare workers involved in emergency trauma surgery during the pandemic: An umbrella review protocol	2021	Evidence Synthesis
Impacts of K-12 school reopening on the COVID-19 epidemic in Indiana, USA	2021	Modelling
Evaluation of different types of face masks to limit the spread of SARS-CoV-2: A modeling study	2022	Modelling
Possibly critical role of wearing masks in general population in controlling COVID-19	2020	No empirical/No details of effectiveness
Impact assessment of full and partial stay-at-home orders, face mask usage, and contact tracing: An agent-based simulation study of COVID-19 for an urban region	2020	Modelling
Face masks to prevent transmission of respiratory diseases: Systematic review and meta-analysis of randomized controlled trials	2021	Evidence Synthesis

Title	Year	Reason
Protection from COVID-19: The efficacy of face masks	2021	Evidence Synthesis
Masks in a post COVID-19 world: A better alternative to curtailing influenza?	2021	Modelling
Association of COVID-19 misinformation with face mask wearing and social distancing in a nationally representative US sample	2021	Misinformation
The need of health policy perspective to protect Healthcare Workers during COVID-19 pandemic. A GRADE rapid review on the N95 respirators effectiveness	2020	Evidence Synthesis
Effectiveness of non-pharmaceutical public health interventions against COVID-19: A systematic review and meta-analysis	2021	Evidence Synthesis
Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK	2020	Modelling
Physical interventions to interrupt or reduce the spread of respiratory viruses	2020	Evidence Synthesis
Physical interventions to interrupt or reduce the spread of respiratory viruses	2023	Evidence Synthesis
Mask interventions in K12 schools can also reduce community transmission in fall 2021	2021	Modelling
Case fatality of SARS in mainland China and associated risk factors	2009	No empirical/No details of effectiveness
Facemasks prevent influenza-like illness: implications for COVID-19	2020	No empirical/No details of effectiveness
Reopening universities without testing during COVID-19: Evaluating a possible alternative strategy in low risk countries	2021	Modelling
Epidemiologic and economic modelling of optimal COVID-19 policy: public health and social measures, masks and vaccines in Victoria, Australia	2022	Modelling
Facemasks and similar barriers to prevent respiratory illness such as COVID-19: A rapid systematic review	2020	Evidence Synthesis
Declines in SARS-CoV-2 transmission, hospitalizations, and mortality after implementation of mitigation measures- Delaware, March-June 2020	2020	No empirical/No details of effectiveness
The effect of N95 respirators on vital parameters, PETCO(2), among healthcare providers at the pandemic clinics	2023	No empirical/No details of effectiveness
Reconstructing a COVID-19 outbreak within a religious group using social network analysis simulation in Korea	2021	Modelling
Comparative effectiveness of N95, surgical or medical, and non-medical facemasks in protection against respiratory virus infection: A systematic review and network meta-analysis	2022	Evidence Synthesis
The effect of shortening the quarantine period and lifting the indoor mask mandate on the spread of COVID-19: a mathematical modeling approach	2023	Modelling
Overview of tight fit and infection prevention benefits of respirators (filtering face pieces)	2023	Evidence Synthesis
Respiratory admissions before and during the COVID-19 pandemic with mediation analysis of air pollutants, mask-wearing and influenza rates	2023	No empirical/No details of effectiveness
P2/N95 respirators & surgical masks to prevent SARS-CoV-2 infection: Effectiveness & adverse effects	2022	Evidence Synthesis
Estimation of effects of contact tracing and mask adoption on COVID-19 transmission in San Francisco: A modeling study	2020	Modelling
What is required to prevent a second major outbreak of the novel coronavirus SARS-CoV-2 upon lifting the metropolitan-wide quarantine of Wuhan city, China	2020	Modelling
Preventing the spread of SARS-CoV-2 with masks and other "Low-tech" interventions	2020	No empirical/No details of effectiveness
Protective efficient comparisons among all kinds of respirators and masks for health-care workers against respiratory viruses: A PRISMA-compliant network meta-analysis	2021	Evidence Synthesis
Efficacy of face mask in preventing respiratory virus transmission: A systematic review and meta-analysis	2020	Evidence Synthesis
Limited effect of reducing pulmonary tuberculosis incidence amid mandatory facial masking for COVID-19	2023	No empirical/No details of effectiveness
Uncertainty analysis of facemasks in mitigating SARS-CoV-2 transmission	2022	Modelling
Respiratory protection: What SARS-CoV-2 has taught us	2023	Evidence Synthesis

Title	Year	Reason
Effectiveness of N95 respirators versus surgical masks against influenza: A systematic review and meta-analysis	2020	Evidence Synthesis
Vaccination and three non-pharmaceutical interventions determine the end of COVID-19 at 381 metropolitan statistical areas in the US	2021	Modelling
Physical interventions to interrupt or reduce the spread of respiratory viruses. Part 2 - Hand hygiene and other hygiene measures: Systematic review and meta-analysis	2020	Evidence Synthesis
Unravelling the role of the mandatory use of face covering masks for the control of SARSCoV-2 in schools: A quasi-experimental study nested in a population-based cohort in Catalonia (Spain)	2023	Duplicated
Impact of universal masking in health care and community on SARS-CoV-2 spread	2020	No empirical/No details of effectiveness
A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients	2020	Evidence Synthesis
Effectiveness of facemasks for opening a university campus in Mississippi, United States - a modelling study	2022	Modelling
Personal protective equipment and particulate filter use during the COVID-19 pandemic: "Acidotic times"	2021	No empirical/No details of effectiveness
The use of facemasks by the general population to prevent transmission of Covid 19 infection: A systematic review	2020	Evidence Synthesis
Face masks for preventing respiratory infections in the community: A systematic review	2020	Evidence Synthesis
SARS-CoV-2 pandemic preventive methods efficacy - a simulation case study	2021	Modelling
Errors of interpretation – "Correcting the record on the comparative efficacy of surgical masks versus respirators: Historical research findings suggesting their equivalence and used to support downgraded respiratory protection for non-ICU UK healthcare workers, resulted from unrecognised errors of arithmetic'	2022	No empirical/No details of effectiveness
The joint impact of COVID-19 vaccination and non-pharmaceutical interventions on Infections, hospitalizations, and mortality: An agent-based simulation	2021	Modelling
Mask mandates can limit COVID spread: Quantitative assessment of month-over-month effectiveness of governmental policies in reducing the number of new COVID-19 cases in 37 US States and the District of Columbia	2020	Modelling
Mask mandates reduce COVID-19 mortality: Analysis of 37 states and the District of Columbia, with a further analysis of the impact of demographic and medical factors on efficacy	2021	Modelling
Country-specific lockdown measures in response to the COVID-19 pandemic and its impact on tuberculosis control: A global study	2022	No empirical/No details of effectiveness
Even one metre seems generous. A reanalysis of data in: Chu *et al.* (2020) Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19	2020	No empirical/No details of effectiveness
Changes in Masking Policies in US Healthcare Facilities in the First Quarter of 2023: Do COVID-19 Cases, Hospitalizations, or Local Political Preferences Predict Loosening Restrictions?	2023	No empirical/No details of effectiveness
Downsides of face masks and possible mitigation strategies: a systematic review and meta-analysis	2020	Duplicated
Effects of New York's executive order on face mask use on COVID-19 infections and mortality: A modeling study	2020	Modelling
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	2020	Modelling
Prevalence of SARS-CoV-2: An age-stratified, population-based, sero-epidemiological survey in Islamabad, Pakistan	2021	Duplicated
Face masks considerably reduce COVID-19 cases in Germany	2020	Modelling
Effectiveness of adding a mask recommendation to other public health measures	2021	No empirical/No details of effectiveness
Efficacy of surgical masks or cloth masks in the prevention of viral transmission: Systematic review, meta-analysis, and proposal for future trial	2021	Evidence Synthesis

Title	Year	Reason
Mathematical assessment of the impact of non-pharmaceutical interventions on curtailing the 2019 novel Coronavirus	2020	Modelling
Unraveling the dynamics of the Omicron and Delta variants of the 2019 coronavirus in the presence of vaccination, mask usage, and antiviral treatment	2022	Modelling
Ranking the effectiveness of non-pharmaceutical interventions to counter COVID-19 in UK universities with vaccinated population	2021	Modelling
Infectious SARS-CoV-2 in exhaled aerosols and efficacy of masks during early Mild infection	2021	No empirical/No details of effectiveness
Masking by health care and public safety workers in non-patient care areas to mitigate SARS-CoV-2 infection: A systematic review	2022	Evidence Synthesis
Impact of community masking on SARS-CoV-2 transmission in Ontario after adjustment for differential testing by age and sex	2023	Modelling
Aerosolized SARS-CoV-2 transmission risk: Surgical or N95 masks?	2021	No empirical/No details of effectiveness
Estimating data-driven COVID-19 mitigation strategies for safe university reopening	2021	Modelling
Universal masking during COVID-19 pandemic - current evidence and controversies	2020	Evidence Synthesis
The role of masks in reducing the risk of new waves of COVID-19 in low transmission settings: A modeling study	2020	Modelling
The role of masks, testing and contact tracing in preventing COVID-19 resurgences: A case study from New South Wales, Australia	2021	Duplicated
The use of face masks during vaccine roll-out in New York City and impact on epidemic control	2021	Modelling
Triaging of respiratory protective equipment on the assumed risk of SARS-CoV-2 aerosol exposure in patient-facing healthcare workers delivering secondary care: A rapid review	2020	Evidence Synthesis
Fit testing of N95 or P2 masks to protect health care workers	2020	No empirical/No details of effectiveness
The efficacy of continuous use disposable N95 masks in clinical practice in the emergency department	2021	No empirical/No details of effectiveness
Assessing the impact of mask usage on COVID-19 transmission using a computer simulation	2021	Modelling
Masking significantly reduces, but does not eliminate COVID-19 infection in a spatial agent-based simulation of a University dormitory floor	2021	Modelling
A susceptible vaccinated exposed infected hospitalized and removed/recovered (SVEIHR) model framework for COVID-19	2023	Modelling
Dynamics of COVID-19 pandemic in India and Pakistan: A metapopulation modelling approach	2021	Modelling
Face masks for respiratory viral illness prevention in healthcare settings: A concise systemic review and meta-analysis	2023	Evidence Synthesis
Child mask mandates for COVID-19: A systematic review	2023	Evidence Synthesis
Are cloth masks a substitute to medical masks in reducing transmission and contamination? A systematic review	2020	Evidence Synthesis
The impact of three progressively introduced interventions on second wave daily COVID-19 case numbers in Melbourne, Australia	2022	Modelling
Efficacy of personal protective equipment to prevent environmental infection of COVID-19 among healthcare workers: A systematic review	2023	Evidence Synthesis
To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic	2020	Modelling
Effectiveness of face masks against COVID-19	2023	No empirical/No details of effectiveness
Non-pharmacological measures implemented in the setting of long-term care facilities to prevent SARS-CoV-2 infections and their consequences: A rapid review	2021	Evidence Synthesis
Role of masks, testing and contact tracing in preventing COVID-19 resurgences: A case study from New South Wales, Australia	2021	Modelling
Consistent mask use and SARS-CoV-2 epidemiology: A simulation modelling study	2023	Modelling
Cloth masks versus medical masks for COVID-19 protection	2020	No empirical/No details of effectiveness

Title	Year	Reason
Physical interventions to interrupt or reduce the spread of respiratory viruses. Part 1 - Face masks, eye protection and person distancing: systematic review and meta-analysis	2020	Evidence Synthesis
Assessment of COVID-19 risk and prevention effectiveness among spectators of mass gathering events	2021	Modelling
Risk factors and protective measures for healthcare worker infection during highly infectious viral respiratory epidemics: A systematic review and meta-analysis	2022	Evidence Synthesis
Efficacy of face masks against respiratory infectious diseases: A systematic review and network analysis of randomized-controlled trials	2021	Evidence Synthesis
When can we stop wearing masks? Agent-based modeling to identify when vaccine coverage makes nonpharmaceutical interventions for reducing SARS-CoV-2 infections redundant in indoor gatherings	2021	Modelling
Effectiveness of non-pharmaceutical interventions on SARS-CoV-2 transmission during the period January 2021 until May 2022: A systematic literature review	2023	Evidence Synthesis
Surgical masks vs respirators for the protection against coronavirus infection: state of the art	2020	Evidence Synthesis
Reconciling the efficacy and effectiveness of masking on epidemic outcomes	2023	Modelling
Efficacy of universal masking for source control and personal protection from simulated cough and exhaled aerosols in a room	2021	No empirical/No details of effectiveness
Respirators, face masks, and their risk reductions via multiple transmission routes for first responders within an ambulance	2021	Modelling
Absence of nosocomial influenza and respiratory syncytial virus infection in the coronavirus disease 2019 (COVID-19) era: Implication of universal masking in hospitals	2021	No empirical/No details of effectiveness
State-level masking mandates and COVID-19 outcomes in the United States a demonstration of the causal roadmap	2022	Modelling
Mandatory mask-wearing policy and universal anti-viral treatment mitigate influenza outbreaks during the COVID-19 pandemic	2021	No empirical/No details of effectiveness
Modeling the evolution of SARS-CoV-2 under non-pharmaceutical interventions	2021	Modelling
High efficacy of face masks explained by characteristic regimes of airborne SARS-CoV-2 virus abundance	2021	Modelling
Face masks to prevent transmission of COVID-19: a systematic review and meta-analysis	2020	Evidence Synthesis
How efficient can non-professional masks suppress COVID-19 pandemic?	2020	Modelling
Comparative efficacy of respiratory personal protective equipment against viral respiratory infectious diseases in healthcare workers: A network meta-analysis	2021	Evidence Synthesis
COVID-19 projections for K12 schools in fall 2021: Significant transmission without interventions	2021	Modelling
Can Koreans be 'FREE' from mask wearing?: Advanced mathematical model can suggest the idea	2023	Modelling
The impact of multiple non-pharmaceutical interventions on controlling COVID-19 outbreak without lockdown in Hong Kong: A modelling study	2022	Modelling
The impact of mask-wearing and shelter-in-place on COVID-19 outbreaks in the United States	2020	Modelling
Masks or N95 respirators during COVID-19 pandemic-which one should I wear?	2020	Evidence Synthesis
Combinational recommendation of vaccinations, mask-wearing, and home-quarantine to control influenza in megacities: An agent-based modeling study with large-scale trajectory data	2022	Modelling
Clinical efficiency of surgical masks and filtering face-piece 2 masks	2023	No details of effectiveness
A causal inference approach for estimating effects of non-pharmaceutical interventions during Covid-19 pandemic	2022	No details of effectiveness
Impact of non-pharmaceutical interventions on COVID-19 incidence and deaths: cross-national natural experiment in 32 European countries	2022	No details of effectiveness
Evaluating the impact of non-pharmaceutical interventions for SARS-CoV-2 on a global scale	2020	No details of effectiveness

Title	Year	Reason
The impact of face-masks on total mortality heterogenous effects by gender and age	2021	No details of effectiveness
Face masks, public policies and slowing the spread of COVID-19: Evidence from Canada	2021	No details of effectiveness
Respective role of non-pharmaceutical interventions on bronchiolitis outbreaks: An interrupted time series analysis based on a multinational surveillance system	2022	No details of effectiveness
The impact of non-pharmaceutical interventions on COVID-19 cases in South Australia and Victoria	2022	No details of effectiveness

Appendix 4: Risk of bias assessment of experimental studies (RoB)

Study ID	Source of the assessment	Randomization	Allocation concealment	Baseline groups comparable	Blinding study participants	Blinding of outcomes	Attrition and missing data	Intention-to-treat analysis	Analysis of adherence	Cluster adjustment for clustering	Quality rating
Abaluck 2022	Chou LES	Yes	Unclear	Yes	No	No	Yes	No	Yes	Yes (accounted for during randomization)	Fair
Aiello 2010	Chou LES	Yes	Yes	No	No	Unclear	Yes	Yes	Yes	Yes	Good
Aiello 2012	Chou LES	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Good
Alfelali 2020	Chou LES	Yes	Unclear	Yes	No	Yes	Yes	Yes	Yes	Yes	Good
Barasheed 2014	Chou LES	Yes	Unclear	No	No	No	Yes	Yes	Yes	No	Fair
Bundgaard 2021	Chou LES	Yes	Yes	Yes	No	No	Yes	Yes	Yes	NA	Good
Canini 2010	Chou LES	Yes	Yes	Yes	No	Partially	Yes	Yes	Yes	Yes	Good
Chughtai 2016	Chou LES	Yes	Unclear	Unclear	No	No	Yes	No	Yes	Yes	Fair
Cowling 2008	Chou LES	Yes	Yes	No	No	Yes for laboratory outcomes; no for clinical outcomes	Yes	Yes	Yes	Yes	Fair
Cowling 2009	Chou LES	Yes	Yes	No	No	Yes for laboratory outcomes; no for clinical outcomes	Yes	Yes	Yes	Yes	Fair
Larson 2010	Chou LES	Yes	Unclear	No	Unclear	Unclear	Yes	Unclear	Yes	NA	Fair
Loeb 2009	Chou LES	Yes	No	Yes	No	Yes for laboratory outcomes; no for clinical outcomes	Yes	Yes	Yes	NA	Good
Loeb 2022	Chou LES	Yes	Yes	Yes	No	Yes	Attrition yes, missing data no	No	Yes	NA	Fair
MacIntyre 2009	Chou LES	Yes	No	Yes	No	Yes for laboratory outcomes;	Yes	Yes	Yes	Yes	Good

Study ID	Source of the assessment	Randomization	Allocation concealment	Baseline groups comparable	Blinding study participants	Blinding of outcomes	Attrition and missing data	Intention-to-treat analysis	Analysis of adherence	Cluster adjustment for clustering	Quality rating
						no for clinical outcomes					
MacIntyre 2011	Chou LES	Yes	Unclear	No	No	Unclear	Yes	Yes	Yes	Yes	Fair
MacIntyre 2013	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Yes	Yes	Fair
MacIntyre 2015	Chou LES	Yes	Unclear	Yes	No	Yes for laboratory outcomes; no for clinical outcomes	Yes	Yes	Yes	Yes	Good
MacIntyre 2016	Chou LES	Yes	Unclear	Yes	No	Yes for laboratory outcomes; no for clinical outcomes	Yes	Yes	Yes	Yes	Good
Rodonovich 2019	Chou LES	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Good
Simmerman 2011	Chou LES	Yes	Unclear	Yes	No	Unclear	Yes	No	Yes	Yes	Good
Suess 2012	Chou LES	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Good

Appendix 5: Risk of bias assessment of observational studies (RoB)

Modified version of the U.S. Preventive Services Task Force

Study ID	Source of the assessment	Attempt to enroll all random sample	Did the study use accurate methods for ascertaining exposures and potential confounders	Blinded	Attrition or missing data	High attrition	Outcomes pre-specified	Other sources of bias	Quality rating
Akinbami 2020	Chou LES	Yes	No	Unclear	No	Unclear	Yes	No control for confounders	Fair
Andrejko 2022a	Chou LES	Yes	Unclear	No	No	Unclear	Yes	Yes	Fair
Baumkötter 2022	Chou LES	Yes	Unclear	Unclear	No	Unclear	Yes	Yes	Fair
Belan 2022	Chou LES	No	Unclear	Unclear	No	Unclear	Yes	Yes	Fair
Carazo 2023	Chou LES	No	Unclear	Unclear	No	Unclear	Yes	Yes	Fair
Chatterjee 2020	Chou LES	No	Unclear	No	No	Unclear	Yes	Yes	Fair
Collatuzzo 2022	Chou LES	Unclear	Unclear	Unclear	No	Unclear	Yes	Yes	Fair
da Silva Torres 2022	Chou LES	Unclear	Unclear	Unclear	Yes	High attrition np, missing data yes	Yes	Yes	Fair
Davido 2021	Chou LES	Yes	No	No	Yes	No	Yes	Yes	Fair
Doernberg 2022	Chou LES	No	Unclear	No	Yes	Unclear	Yes	Yes	Fair
Doung-Ngern 2020	Chou LES	Yes	No	Unclear	No	Yes	Yes	Potential recall bias	Poor
Fletcher 2022	Chou LES	Yes	No	No	No	Unclear	Yes	Approximately 50% participation rate; no control for confounders	Fair
Gonçalves 2021	Chou LES	No	Unclear	No	No	No	Yes; ascertainment unclear from controls	Yes	Fair
Haller 2022	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Fair
Howard-Anderson 2022	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Fair

Study ID	Source of the assessment	Attempt to enroll all random sample	Did the study use accurate methods for ascertaining exposures and potential confounders	Blinded	Attrition or missing data	High attrition	Outcomes pre-specified	Other sources of bias	Quality rating
Khalil 2020	Chou LES	Unclear	No	Unclear	No	Unclear	Yes	Unclear control for confounders	Poor
Lio 2021	Chou LES	No	Unclear	No	No	No	Yes; ascertainment unclear	Yes	Fair
Madureira 2022	Chou LES	Yes	Unclear	Unclear	Yes	No	Yes	Unclear	Fair
Piapan 2020	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Fair
Piapan 2022	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Fair
Rebmann 2021	Chou LES	Unclear	Unclear	No	No	No	Yes	Yes	Fair
Sharif 2021	Chou LES	Unclear	Unclear	No	No	No	Yes	Unclear (reports adjusted estimates but unclear what the study adjusted for)	Poor
Sims 2021	Chou LES	Yes	No	Unclear	No	Unclear	Yes	48% participation rate; limited control for confounders	Fair
Sugimura 2021	Chou LES	No	Unclear	No	No	No	Yes; ascertainment unclear	Partial (gender and contact type only)	Fair
Tjaden 2023	Chou LES	Unclear	Unclear	No	No	Unclear	Yes	Yes	Fair
van den Broek-Altenburg 2021	Chou LES	Yes	No	No	No	Unclear	Yes	Potential selection bias; survey participation rate 14% of initial sample; SARS-CoV-2 testing rate 26% of survey participants	Fair
Venugopal 2021	Chou LES	Yes	Unclear	Unclear	No	Unclear	Yes	Yes	Fair
Wang 2020	Chou LES	Yes	Unclear	No	No	Unclear	Yes	Yes	Fair

Source for Chou LES: Masks for prevention of SARS-CoV-2 in health care and community settings—Final update of a living, rapid review

ROBBINS-1

Study ID	Source of the assessment	Confounding or co-intervention bias	Selection bias	Misclassification bias	Deviation bias	Missing data bias	Outcome measurement bias	Outcome reporting bias	Overall judgement
Akinbami 2020	Kim 2022	Low	Low	Moderate	Low	Low	Low	Low	Moderate
Alraddadi 2016	Kim 2022	Low	Low	Moderate	Serious	NI	Low	Moderate	Serious
Barros 2022	Combinations	Moderate	Low	Moderate	Low	Low	Low	Low	Moderate
Chen 2009	Kim 2022	Low	Low	Moderate	Low	Low	Low	Moderate	Moderate
Cheng 2020	Kim 2022	NI	Moderate	Critical	Low	NI	Low	NI	Critical
Diogo 2023	Combinations	Serious	Moderate	Moderate	Moderate	Low	Moderate	Low	Serious
Doung-Ngern 2020	Kim 2022	Low	Low	Low	Moderate	Low	Low	Low	Moderate
GiacomoDe 2021	Combinations	Moderate	Low	Low	Low	Low	Moderate	Low	Moderate
Karaivanov 2021	Combinations	Serious	Moderate	Serious	Moderate	Moderate	Serious	Moderate	Critical
Khalil 2020	Kim 2022	Low	Low	Moderate	Low	Low	Low	Low	Moderate
Lenglart 2023	Combinations	Serious	Moderate	Moderate	Low	Low	Moderate	Low	Serious
Loeb 2004	Kim 2022	Serious	Low	Low	Low	Low	Moderate	NA	Serious
Milazzo 2022	Combinations	Critical	Serious	Serious	Moderate	Moderate	Serious	Moderate	Critical
Nishiura 2005	Kim 2022	Low	Low	Low	Low	Low	Moderate	NI	Moderate
Raboud 2010	Kim 2022	Low	Low	Moderate	Low	Low	Low	Moderate	Moderate
Rachel 2020	Combinations	Moderate	Low	Serious	Low	Low	Moderate	Moderate	Serious
Scales 2003	Kim 2022	Low	Moderate	Low	Low	Low	Low	NI	Moderate
Seto 2003	Kim 2022	Serious	Low	Moderate	Low	Moderate	Moderate	NI	Serious
Sims 2021	Kim 2022	Moderate	Low	Low	Low	Low	Low	Moderate	Moderate
Teleman 2004	Kim 2022	Low	Moderate	Low	Low	Moderate	Moderate	NI	Moderate
AgyaponNtra 2022	Combinations	Moderate	Serious	Low	Low	Low	Moderate	Moderate	Serious

Study ID	Source of the assessment	Confounding or co-intervention bias	Selection bias	Misclassification bias	Deviation bias	Missing data bias	Outcome measurement bias	Outcome reporting bias	Overall judgement
Bo 2021	Combinations	Moderate	Low	Moderate	Low	Moderate	Moderate	Low	Moderate
Cao 2023	Combinations	Moderate	Moderate	Moderate	Low	Low	Moderate	Low	Moderate
Garchitorena 2020	Combinations	Moderate	Low	Moderate	Low	Low	Serious	Serious	Serious
Ge 2022	Combinations	Moderate	Low	Moderate	Low	Low	Moderate	Low	Moderate
Hunter 2020	Combinations	Moderate	Moderate	Low	Low	Moderate	Low	Low	Moderate
Huy 2022	Combinations	Moderate	Low	Moderate	Low	Moderate	Low	Low	Moderate
Leech 2021	Combinations	Serious	Moderate	Serious	Low	Moderate	Moderate	Serious	Critical
Nash 2023	Combinations	Serious	Moderate	Low	Low	Moderate	Low	Low	Serious
Pozo-Martin 2021	Combinations	Moderate	Low	Moderate	Low	Low	Moderate	Low	Moderate
Sharma 2021	Combinations	Moderate	Low	Low	Low	Low	Low	Low	Moderate
Wilder-Smith 2005	Kim 2022	Low	Low	Low	Low	NI	Moderate	NI	Moderate
Yang 2021	Combinations	Moderate	Low	Moderate	Low	Low	Moderate	Low	Moderate
Zweig 2021	Combinations	Moderate	Serious	Serious	Serious	Moderate	Serious	Serious	Critical

Source for combinations: Effectiveness of combinations of public health and social measures over time and across jurisdictions for reducing transmission of COVID-19 and other respiratory infections in non-healthcare community-based settings

Source for Kim 2022: Comparative effectiveness of N95, surgical or medical, and non-medical facemasks in protection against respiratory virus infection: A systematic review and network meta-analysis

Appendix 6: GRADE assessments

Note: For all grade assessments, when studies included in the comparison were a mix of randomized and non-randomized studies, we selected non-randomized given that is more prudent and penalized the assessment of certainty given the presence of non-randomized studies.

GRADE profile: Mask compared to no mask for COVID-19

Setting: Community
Bibliography: Abaluck 2022; Andrejko 2022a; Andrejko 2022b; Baig 2021; Baumkötter 2022; Benjamin 2020; Bundgaard 2021; Cheng 2020; daSilvaTorres 2022; Doernberg 2022; Gigot 2023; Gonçalves 2021; Hobbs 2020; Jarnig 2022; Johnston 2023; Leech 2022; Liu 2021; Moorthy 2022; Murray 2022; Pauser 2021; Payne 2020; Rader 2021; Sophie 2021; Sugimura 2021; Tjaden 2023; Tjaden 2023; van den Broek-Altenburg 2021; Wang 2020; Wu 2004

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/Incidence (assessed with: different metrics)									
29	non-randomized studies	serious[a]	not serious	not serious	serious[b]	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Most studies favoured wearing a mask (n=25), some reported no difference (n=4). Wearing a mask was associated with less seroprevalence (varying from 6% to 59%), reduced transmission (varying from 19% to 86%), and a reduction in the number of cases (varying from 73% to 33 times). Two studies found a non-significant difference but reported fewer cases among those wearing masks.	⨁⨁⨁⨁ High	CRITICAL

Setting: Healthcare
Bibliography: Akinbami 2020; Chatterjee 2020; Collatuzzo 2022; Davido 2021; Doung-Ngern 2020; Heinzerling 2020; Howard-Anderson 2022; Khalil 2020; Lio 2021; Madureira 2022; Pan 2021; Piapan 2020; Piapan 2022; Pienthong 2022; Reyne 2021; Sims 2021; Su 2021; Thompson 2022; Tong 2020; Venugopal 2021; Wang 2020

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/Incidence (assessed with: different metrics)									
20	non-randomized studies	serious[a]	serious[b]	not serious	serious[c]	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Most studies favoured wearing masks (n=16). Wearing a mask was associated with less seropositivity (varying from 33% to 72%), with reduced transmission (varying from 80% to more than 13 times), and a reduction in the number of cases (varying from 69% to 5.5 times).	⨁⨁◯◯ Low	CRITICAL

CI: confidence interval

Explanations

a. Most studies might have been exposed to low to moderate selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. Most studies found a benefit of wearing a mask, but few studies found no difference with not wearing a mask.
c. Studies used different outcomes and measurement metrics; some studies provided adjusted measures, and others did not; in most studies, the findings were precise.

GRADE profile: Mask compared to no mask for SARS/MERS

Setting: Community
Bibliography: Lau 2004; Tuan 2007

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
2	non-randomized studies	serious[a]	very serious[b]	not serious	serious[c]	all plausible residual confounding would reduce the demonstrated effect	One study reported a beneficial effect on reducing transmission (OR 4.16 [95% CI 2.37–7.30], and the other reported no difference (OR 1.04 [0.05–19.52]).	⨁◯◯◯ Very low	CRITICAL

Explanations

a. Studies might have been exposed to low to moderate selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. One study found a benefit of wearing a mask; the other study reported no difference.
c. Studies have width confidence intervals.

Setting: Healthcare settings
Bibliography: Alraddadi 2016; Lau 2004; Liu 2009; Loeb 2004; Ma 2004; Nishiura 2005; Nishiyama 2008; Pei 2006; Raboud 2010; Scales 2003; Seto 2003; Teleman 2004; Wilder-Smith 2005; Yin 2004

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
14	non-randomized studies	serious[a]	serious[b]	not serious	not serious	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Wearing a mask was associated with reduced transmission (varying from 44% to 12 times), and a reduction in cases (varying from two to 10 times). Consistent use of masks (principally N95) was associated with a strong protective effect.	⨁⨁⨁◯ Moderate	CRITICAL

Explanations

a. Most studies might have been exposed to low to moderate selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. Most studies found a benefit of wearing a mask, but few studies found no difference with not wearing a mask.

GRADE profile: Mask compared to no mask for Influenza and Influenza-like illness

Setting: Community
Bibliography: Barasheed 2014; Canini 2010; Cowling 2008; Cowling 2009; Larson 2010; MacIntyre 2009; MacIntyre 2016; Simmerman 2011; Suess 2012; Youssef 2022

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
10	randomized trials	not serious	very serious[a]	serious[b]	serious[c]	dose response gradient	Wearing a mask was associated with reduced transmission (varying from 19% to six times), and a reduction in the number of cases (varying from 70% to 2.2 times). Three studies reported no difference in transmission, and two found no difference in the number of cases.	⨁◯◯◯ Very low	CRITICAL

Explanations

a. Half studies found a benefit of wearing a mask and the other half reported no difference with no wearing.
b. Some studies focused on Influenza and others in Influenza-like illness.
c. Some studies had width confidence intervals.

Setting: Healthcare
Bibliography: Chughtai 2016; MacIntyre 2015

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
2	randomized trials	not serious	very serious[a]	very serious[b]	very serious[c]	all plausible residual confounding would reduce the demonstrated effect	One study found that being compliant with medical or cloth masks did not have a difference with not wearing a mask; the other study found that medical masks were protective against Influenza-like illness, while cloth masks resulted in significantly higher rates of infection than medical masks.	⨁◯◯◯ Very low	CRITICAL

Explanations

a. One study found a benefit of wearing a mask and the other reported no difference with no wearing.
b. Both studies focused on Influenza-like illness, and one also included any respiratory viral infections.
c. Studies have width confidence intervals.

GRADE profile: Mask compared to no mask for other respiratory illness and infections

Setting: Community
Bibliography: Alfelali 2020; Bundgaard 2021; Larson 2010

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
3	randomized trials	not serious	very serious[a]	serious[b]	serious[c]	all plausible residual confounding would reduce the demonstrated effect	One study found that facemask use did not seem to be effective against laboratory-confirmed viral respiratory infections (OR 1.4 [95% CI 0.9–2.1, p=0.18]) nor against clinical respiratory infection (OR 1.1 [95% CI, 0.9–1.4, p=0.40]). The other study reported that wearing a mask was associated with lower secondary transmission.	⨁◯◯◯ Very low	CRITICAL

Explanations

a. One study found a benefit of wearing a mask and the other reported no difference with no wearing.
b. One study focused on Upper Respiratory infections and Influenza, and the other study was focused on viral respiratory infections.
c. Studies have width confidence intervals.

Setting: Healthcare setting
Bibliography: Chughtai 2016; Dezman 2021; Tong 2020

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
3	non-randomized studies	serious[a]	very serious[b]	serious[c]	serious[d]	all plausible residual confounding would reduce the demonstrated effect	One study found that being compliant with medical or cloth masks did not differ of not wearing a mask. The other study found a decrease in respiratory viral infections in very-low birth weight infants (from 1.1 to 0.3 per 1,000 patient-days).	⨁◯◯◯ Very low	CRITICAL

Explanations

a. Most studies might have been exposed to low to moderate selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. One study found a benefit of wearing a mask and the other reported no difference with no wearing.
c. Interventions were evaluated in different conditions and populations.
d. Studies have width confidence intervals.

GRADE profile: Mask adjusted by other PHSMs compared to no mask for COVID-19

Setting: Community
Bibliography: Barros 2022; Dieter 2020; Ding 2021; Diogo 2023; Hast 2022; Jie 2020; Kristin 2021; Kwon 2021; Leffler 2020; Liu 2021; Nelson 2023; Rachel 2020; Sharif 2021; Shaweno 2021; Sohee 2020; Sruthi 2020; Theuring 2021; Tomomi 2021; Ge 2022; Leech 2021; Cao 2023; Nash 2023

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
19	non-randomized studies	serious[a]	not serious	not serious	serious[b]	very strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	All studies favoured mask wearing. Wearing a mask was associated with less seropositivity (around 3.5 times), with reduced transmission (varying from 23% to 97%) and a reduction in the number of cases. In schools, wearing a mask was associated with a smaller number of cases among students and staff.	⨁⨁⨁⨁ High	CRITICAL
Deaths (assessed with: different metrics)									
4	non-randomized studies	very serious[c]	not serious	not serious	serious[d]	very strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	All studies favoured mask wearing, showing a reduction in the number of deaths varying from 1% to 16%.	⨁⨁⨁◯ Moderate	CRITICAL

Explanations

a. Most studies might have been exposed to low to moderate selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. Studies used different outcomes and measurement metrics; some studies provided adjusted measures, and others did not; in most studies, the findings were precise.
c. Most studies might have been exposed to moderate to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
d. Some studies did not report confidence intervals.

GRADE profile: Mask adjusted by other PHSMs compared to no mask for Influenza/Influenza-like illness

Setting: Community
Bibliography: Aiello 2010; Aiello 2012

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
2	randomized trials	not serious	very serious[a]	not serious	serious	all plausible residual confounding would reduce the demonstrated effect dose response gradient	One RCT found no difference in reducing the rate of Influenza-like illness, and the other cluster RCT reported a reduction in the rate of Influenza-like illness ranging from 48% to 75%.	⨁⨁⨁◯ Moderate	CRITICAL

Explanations

a. One study reported no difference; the other study reported a benefit of wearing masks.

GRADE profile: N95/respirators compared to medical/surgical masks and cloth masks for COVID-19

Setting: Community
Bibliography: Abaluck 2022; Andrejko 2022a; MacIntyre 2009; Tjaden 2023; Varela 2022

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
5	randomized trials	serious[a]	not serious	serious[b]	not serious	all plausible residual confounding would reduce the demonstrated effect	Overall, N95/respirators and surgical masks have the stronger effects when compared to not mask wearing (adjusted OR 0.17; 95 CI0.05–0.64 for N95, and adjusted OR 0.34 95% CI 0.13–0.90 for medical/surgical mask). Cloth masks had a subtle beneficial effect. There was no identified superiority of N95/respirators over medical/surgical masks, of medical/surgical masks over closed face shields, or a superiority of medical/surgical masks over cloth masks.	⨁⨁⨁◯ Moderate	CRITICAL

Setting: Healthcare setting
Bibliography: Belan 2022; Carazo 2023; Fletcher 2022; Haller 2022; Loeb 2022; Mansour 2023; Morgane 2021; Rodriguez-Lopez 2021; Sertcelik 2023; Sims 2021; Szajek 2022; Venugopal 2021; Wilson 2022

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
12	non-randomized studies	serious[a]	not serious	serious[b]	not serious	all plausible residual confounding would reduce the demonstrated effect dose response gradient	Overall, FFP2 and surgical masks have the stronger effects when compared to not mask wearing (OR 0.43 95% CI 0.32–0.57 for FFP2, and OR 0.51 95% CI 0.39–0.65 for medical/surgical mask). Two studies reported superiority of N95 over medical mask, one cohort (OR 0.76 95% CI: 0.63–0.92), and one case-control (adjusted OR 0.39 95% CI: 0.29–0.51). In other studies there was no identified superiority of N95/respirators over medical/surgical masks, medical/surgical masks over closed face shields, FFP2 over medical mask, or a superiority of medical/surgical masks over cloth masks.	⨁⨁◯◯ Low	CRITICAL

Explanations

a. Most studies might have been exposed to low to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. This question is better suited for a network meta-analysis given that some studies compared N95 against medical masks, medical masks were compared to face shields or FFP2, but N95 were not compared to face shields or FFP2.

GRADE profile: N95/respirators compared to medical/surgical masks for SARS 1/MERS

Setting: Healthcare setting
Bibliography: Caputo 2006; Chen 2009; Liu 2009; Loeb 2004; Ma 2004; Raboud 2010; Seto 2003; Yin 2004

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
8	non-randomized studies	serious[a]	serious[b]	not serious	serious[c]	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Overall, N95 and multiple layers of cotton medical masks have stronger effects when compared to not mask wearing. Three studies reported the superiority of a double-layer cotton mask (OR 0.40 95% CI 0.25–0.64) or multiple-layers of mask over a single-layer mask (OR 0.41 95% CI 0.17–0.97). One study reported the superiority of N95/respirator over medical/surgical masks (OR 0.18 95% CI 0.06–0.53), and another reports superiority over paper masks. In other studies, there was no identified superiority of N95/respirators over medical/surgical masks, N95/respirators over disposable masks, N95 over 12- or 16-layer cotton surgical masks, or superiority of 12- or 16-layer cotton surgical masks over disposable masks.	⨁⨁◯◯ Low	CRITICAL

Explanations

a. Most studies might have been exposed to low to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. This question is better suited for a network meta-analysis given that some studies compared N95 against medical masks, single layer masks were compared against multiple layer masks, disposable masks were compared to multiple layer masks.
c. Studies used different outcomes and measurement metrics; some studies provided adjusted measures, and others did not; in most studies, the findings were precise.

GRADE profile: N95/respirators compared to medical/surgical masks or other masks for Influenza/Influenza-like illness

Setting: Healthcare setting
Bibliography: Loeb 2009; MacIntyre 2011; MacIntyre 2015; Rodonovich 2019

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
4	randomized trials	not serious	not serious	not serious	not serious	all plausible residual confounding would reduce the demonstrated effect	Overall, medical/surgical masks were not inferior to N95/respirators. One study found that medical/surgical masks were superior to cloth masks.	⨁⨁⨁⨁ High	CRITICAL

GRADE profile: N95/respirators compared to medical/surgical masks or other masks for other respiratory illnesses and infections

Setting: Healthcare setting
Bibliography: MacIntyre 2011; MacIntyre 2013

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
2	randomized trials	not serious	not serious	not serious	serious[a]	all plausible residual confounding would reduce the demonstrated effect dose response gradient	Both studies reported more cases in the medical/surgical mask arm in comparison to the N95/respirators arm. In one study, the difference was statistically significant (incidence in medical mask 17% vs. 7.2% in N95 arm), and in the other study, cases in the medical/surgical mask were double of cases in the N95 arm, but the difference was not statistically significant.	⨁⨁⨁⨁ High	CRITICAL

Explanations

a. The difference between medical/surgical masks and N95/respirators was statistically significant in one study but not in the other.

GRADE profile: Mask mandate compared to no mandate for COVID-19

Setting: Community
Bibliography: Damian 2021; Doyle 2021; Emily 2021; Enbal 2020; Ertem 2023; Frochen 2023; Giacomo De 2021; Ginther 2021; Hansen 2023; Herstein 2021; Huang 2022; Hughes 2022; Islam 2022; Jehn 2021; Joo 2021; Karaivanov 2021; Li 2021; Mingwei 2023; Moek 2022; Poppe 2020; Rebmann 2021; Riley 2022; Schauer 2021; Scott 2021; Taylor 2022; Tori 2022; Torres 2023; Ulyte 2021; Xue-Jing 2022

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
37	non-randomized studies	serious[a]	serious[b]	not serious	not serious	very strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Most studies favoured mask mandate (n=30), few found a non-significant difference between mask mandate and not mandate (n=6), and one ecological study found more cases of COVID-19 after mask mandate. Mask mandate was associated with less seropositivity, with reduced transmission (varying from 2.4% to 3.6 times), and a reduction in the number of cases (varying from 11% to 2.3 times). In schools, mask mandate was associated with a low rate of primary and secondary infections in nine studies, and no difference in two studies. Only study found that in the most socially vulnerable counties in New York State, mask mandates were associated with a decrease in cases, and with a narrowing of infection disparities between low and mid terciles of vulnerability.	⨁⨁⨁⨁ High	CRITICAL
Hospitalizations (assessed with: different metrics)									
5	non-randomized studies	serious[a]	very serious[c]	not serious	very serious[d]	all plausible residual confounding would reduce the demonstrated effect dose response gradient	Three studies reported a reduction in the hospitalization rate (60% or 11 per 100,000 inhabitants on average), one study found a non-significant difference between mask mandate and not mandate, and one ecological study reported a higher average number of positive hospitalized patients, patients in the ICU, and patients on a ventilator after mask mandate.	⨁◯◯◯ Very low	CRITICAL
Deaths (assessed with: different metrics)									
6	non-randomized studies	serious[a]	serious[e]	not serious	very serious[f]	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Five studies reported a reduction in deaths rate (around 65% or 0.7 per 100,000 inhabitants on average), while one ecological study reported a higher average number of deaths after mask mandate.	⨁◯◯◯ Very low	CRITICAL

Explanations

a. Most studies might have been exposed to moderate to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. Most studies found a benefit of mask mandate, but few studies found no difference with not mandate, and one study reported an increase in cases after mask mandate.
c. Three studies found a benefit, one reported no difference, and one study found a deleterious effect.
d. Studies have width confidence intervals.
e. Five studies found a benefit while one study reported a deleterious effect.
f. Two studies did not report the confidence intervals.

GRADE profile: Mask mandate compared to no mandate for COVID-19

Setting: Healthcare setting
Bibliography: Kociolek 2022; Lan 2020; Temkin 2022; Wang 2020; Williams 2021

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
5	non-randomized studies	serious[a]	not serious	not serious	not serious	strong association all plausible residual confounding would reduce the demonstrated effect	All studies reported that mask mandate was associated with less seropositivity (varying from a decrease of 0.49% to 1.7% per day), a reduction in transmission, and a reduction in the number of cases (a decline from 4.3 to 14.3 cases per week).	⨁⨁⨁◯ Moderate	CRITICAL

CI: confidence interval

Explanations

a. Most studies might have been exposed to low to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.

GRADE profile: Mask mandate adjusted by other PHSMs compared to no mandate for COVID-19

Setting: Community
Bibliography: Cristiane Ravagnani 2020; DeJonge 2022; Dhaval 2021; Michael 2021; Milazzo 2022; Qiu 2022; Sombetzki 2021; Xiong 2023; Agyapon Ntra 2022; Bo 2021; Garchitorena 2020; Hunter 2020; Huy 2022; Pozo-Martin 2021; Sharma 2021; Yang 2021; Zweig 2021

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
Transmission/incidence (assessed with: different metrics)									
14	non-randomized studies	serious[a]	not serious[b]	not serious	not serious	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Most studies found that mask mandates have a benefit in controlling the pandemic in addition to the other public health social measures (n=11). Two multi-country studies reported no difference when a mask mandate was added to the other public measures implemented, and one study (covering the period from 1 January to 20 April 2020) reported an increase in cases after the mask mandate was issued in 30 European countries. In multivariable analysis considering other public health social measures, mask mandate was associated with reduced transmission (varying from 12% to 2.3 times) and a reduction in the number of cases (varying from 2% to 19%). In schools, mask mandate was associated with a low rate of primary and secondary infections.	⨁⨁⨁⨁ High	CRITICAL
Deaths (assessed with: different metrics)									
4	non-randomized studies	serious[a]	very serious[c]	not serious	serious[c]	strong association all plausible residual confounding would reduce the demonstrated effect dose response gradient	Two studies found that the adoption of a public mask mandate was associated with a decrease in deaths (13 deaths per 100.000 inhabitants). Another study reported no difference when a mask mandate was added to the PHSMs implemented, and one study (covering the period from 1 January to 20 April 2020) reported an increase in deaths after the mask mandate was issued in 30 European countries.	⨁◯◯◯ Very low	CRITICAL
Hospitalizations (assessed with: cases per 100.000 inhabitants)									
1	non-randomized studies	serious[d]	not serious	serious[e]	not serious	all plausible residual confounding would reduce the demonstrated effect	This study reported a decrease of 2.38 percentage points in the proportion of hospital admissions.	⨁◯◯◯ Very low	CRITICAL

CI: confidence interval

Explanations

a. Most studies might have been exposed to low to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. Most studies found a benefit of mask mandate, but few studies found no difference or even a deleterious effect.
c. Two studies reported a benefit, one reported no difference, and the fourth study reported a deleterious effect.
d. The study has serious risk of bias.
e. Only one study contributes to this outcome.

GRADE profile: Mask mandate adjusted by other PHSMs compared to no mandate for Influenza

Setting: Community
Bibliography: Qiu 2022; Xiong 2023

Certainty assessment							Impact	Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations			
(assessed with: different metrics)									
2	non-randomized studies	very serious[a]	not serious	not serious	serious[b]	strong association all plausible residual confounding would reduce the demonstrated effect	Both studies found a favourable effect of mask mandate, one reported a reduction of 7.75% in the transmission of Influenza, and the other reported that after lifting the mask mandate in Hong Kong, Influenza transmission increased substantially.	⨁◯◯◯ Very low	CRITICAL

Explanations

a. Most studies might have been exposed to moderate to serious selection bias, misclassification bias, outcomes measurement bias, and confounding.
b. One study has a narrow confidence interval, the other did not provide the confidence interval.

Appendix 7: Summary of findings for included studies

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population children 9–12 Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: Finland Methods used: Ecological	Surveillance jurisdiction database	Based on comparisons between the cities and between the age groups of the unvaccinated children (10–12 years versus 7–9 years), no additional effect seemed to be gained from children wearing masks at school	The study compared the differences in trends of 14-day incidences between Helsinki and Turku among 10 to 12 year olds, and for comparison, also among ages 7–9 and 30–49 by using join point regression.
Population general population Intervention Mask vs. no mask, types of mask Comparison Medical mask, no-medical mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: Bangladesh Methods used: Cluster RCT	342,183 adults (at baseline) from 572 villages: 178,322 in intervention group vs. 163,861 in control group; 336,010 provided symptom data; 10,790 consented to blood collection	Mask wearing was associated with 9.5% reduction in symptomatic seroprevalence (IG prevalence 0.68%, Control prevalence 0.76%); estimated 11.6% reduction in the proportion of individuals with COVID-19-like symptoms (IG 7.63%, Control 8.6%)	Proper mask-wearing was 42.3% in IG versus 13.3% in CG (adjusted % point difference 0.29 [95% CI 0.26–0.31]); physical distancing was 29.2% in IG versus 24.1% in CG (0.05 [CI 0.05, 0.06]); no change in social distancing. Surgical masks found to be more effective than cloth; surgical masks led to relative reduction in symptomatic seroprevalence of 11.1% (adjusted prevalence ratio 0.89 [CI 0.78, 1.00]); confidence limits for cloth masks include both an effect size similar to surgical masks and no effect (adjusted prevalence ratio 0.94 [CI 0.78, 1.10]).
Population adults Intervention Mask and other NPIs Comparison Outcomes Incidence Disease Influenza-like illness	Publication date: 2010 Jurisdiction studied: U.S. Methods used: RCT	Residence house clusters: 7; total participants: 1,297 young adults living in university residence halls during 2006 to 2007 influenza season	Neither face mask use and hand hygiene nor face mask use alone was associated with a significant reduction in the rate of influenza-like illness cumulatively	
Population adults Intervention Mask and other NPIs Comparison Outcomes Incidence Disease Influenza-like illness	Publication date: 2012 Jurisdiction studied: U.S. Methods used: Cluster RCT	Residence house clusters: 37; total participants: 1,178 young adults living in 37 residence houses in five university residence halls during 2007 to 2008 influenza season	Face masks and hand hygiene combined may reduce the rate of Influenza-like illness and confirmed influenza in community settings	Significant reduction in the rate of Influenza-like illness among participants randomized to the face mask and hand hygiene intervention during the latter half of the study period, ranging from 48% to 75% when compared to the control group.

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population mostly healthcare workers Intervention Mask vs. no mask Comparison N95, surgical mask, paper mask Outcomes Seropositivity Disease COVID-19	Publication date: 2020 Jurisdiction studied: U.S. Methods used: Cohort	16,397 participants (86% healthcare workers) in 27 hospitals in Detroit, Michigan May to June 2020	Consistently wearing an N95 respirator or surgical face mask lowered the likelihood of being seropositive	Always use N95 versus less than always: adjusted OR 0.83 (95% CI 0.72–0.95). Always use surgical mask versus less than always: adjusted OR 0.86 (95% CI 0.75–0.98).
Population adults Intervention Mask vs. no mask Comparison Outcomes Incidence Disease Viral respiratory infections	Publication date: 2020 Jurisdiction studied: Saudi Arabia Methods used: Cluster RCT	Tent clusters: 318; total number of participants: 7,687 Pilgrims in 2013, 2014, 2015	Face mask use did not seem to be effective against laboratory-confirmed viral respiratory infections (odds ratio [OR] 1.4 [95% confidence interval [CI] 0.9–2.1, p=0.18]) nor against clinical respiratory infection (OR 1.1 [95% CI 0.9–1.4, p=0.40])	Overall, respiratory viruses were detected in 277 of 650 (43%) nasal/pharyngeal swabs collected from symptomatic pilgrims. Common viruses were rhinovirus (35.1%), influenza (4.5%), and parainfluenza (1.7%). In the intervention arm, respectively 954 (24.7%) and 1,842 (47.7%) participants used face masks daily and intermittently, while in the control arm, respectively 546 (14.3%) and 1,334 (34.9%) used face masks daily and intermittently.
Population general population Intervention mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2023 Jurisdiction studied: U.S. Methods used: Ecological	Surveillance jurisdiction database	The majority of counties experienced a reduction in transmission after mask mandates were implemented (varying from 2.4% to 30.8%); the most comprehensive reductions were shown after the statewide mandate was implemented with nearly all health districts exhibiting some decrease; after the statewide mandate was lifted, most districts exhibited an increase in transmission	
Population healthcare workers Intervention Mask vs. no mask Comparison N95, medical mask Outcomes Incidence Disease MERS-CoV	Publication date: 2016 Jurisdiction studied: Saudi Arabia Methods used: Cohort	King Faisal Specialist Hospital and Research Center (Jeddah, Saudi Arabia), 283 participants May to June 2014	Among healthcare workers who reported always wearing a medical mask or N95 respirator, the risk for infection was lower than for those reporting not always or never doing so	Medical mask or N95 respirator, direct contact (use always versus sometimes/never): RR 0.69 (95% CI 0.28–1.69) • Medical mask: RR 2.06 (95% CI 0.86–4.95) • N95: RR 0.44 (95% CI 0.17–1.12).

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
				Medical mask or N95 respirator, aerosol-generating procedure (use always versus sometimes/ never): RR 0.32 (95% CI 0.12–0.86) • Medical mask: RR 0.59 (95% CI 0.20–1.71) • N95: RR 0.45 (95% CI 0.16–1.29); adjusted RR 0.44 (95% CI 0.15–1.24) (medical mask almost always worn in sometimes or never group).
Population general population Intervention Mask vs. no mask, types of mask Comparison Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Case-control	1,006 California residents reporting high-risk exposures ≤14 days before testing: 751 of 1,448 COVID-19 cases vs. 255 of 1,443 COVID-19 negative controls	Mask usage was protective when both parties reported mask usage (aOR 0.50 [95% CI 0.26–0.96]), when exposures took place outside the household (aOR 0.39 [95% CI 0.22–0.70]), when exposures occurred without physical contact (aOR 0.37 [95% CI 0.20–0.69]), and when exposures were indoors (aOR 0.51 [95% CI 0.28–0.93)	52% of cases (n=751 of 1,448) and 18% of controls (n=255 of 1,443) reported high-risk exposures; among these participants, 14% of cases (n=101) and 34% of controls (n=87) reported mask usage during these exposures. Mask usage was not protective when exposures occurred within the household, involved physical contact, or occurred outdoors. Notably, the benefits of mask-wearing were found to be highest in unvaccinated and partially vaccinated participants.
Population general population Intervention Mask vs. no mask, types of mask Comparison Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Case-control	n=1,828 California residents (cases: n=652; controls: n=1176)	Self-reported data on face mask use identified those who always wore a mask had significantly lower odds of a positive COVID-19 test compared to those who never masked (aOR 0.44 [95% CI 0.24–0.82]); reductions in positive tests were also noted among those who masked most (aOR 0.55 [95% CI 0.29–1.05]) or sometimes (aOR 0.71 [95% CI 0.35–1.46]) compared to those who never masked	Analysis of mask type identified wearing a N95/KN95 respirator (aOR 0.17 [95% CI 0.05–0.64]) or surgical mask (aOR 0.34 [95% CI 0.13–0.90]) were associated with lower positive test rates compared to no mask wearing. Cloth masks also had a lower positive rate when compared to non-masking, but it was not significant (aOR 0.44 [95% CI 0.17–1.17]).
Population general population Intervention Mask mandate Comparison Mask Outcomes	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Quasi-experimental	Surveillance jurisdiction database	In both adjusted and unadjusted analyses, the study did not detect a reduction in case load, hospitalization rates, or mortality associated with the implementation of mask mandates	The daily case load before the mask order per 100,000 individuals was 187.5 (95% CI 157.0–217.0) versus 200.7 (95% CI 179.8–221.6) after GA-29; the number of daily hospitalized patients with COVID-19 was

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Transmission, hospitalization, mortality Disease COVID-19				171.4 (95% CI 143.8–199.0) before GA-29 versus 225.1 (95% CI 202.9–247.3) after; daily mortality was 2.4 (95% CI 1.9–2.9) before GA-29 versus 5.2 (95% CI 4.6–5.8).
Population patients Intervention Mask and other NPIs Comparison Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: India Methods used: Cohort	1,286 close contacts of COVID-19 patients admitted to Government Medical College	Results from binary logistic regression analyses suggested that self-reported mask use was associated with a statistically significant reduction of odds of COVID-19 infection (aOR 0.570 [p=0.001])	
Population general population Intervention Mask vs. no mask Comparison Mask Outcomes Disease COVID-19	Publication date: 2021 Jurisdiction studied: Multi-country Methods used: Modelling	Surveillance jurisdiction database	Mask wearing played an important role in mitigating the spread of COVID-19	Widespread mask wearing associates with an expected 7% (95% CI 3.94%–9.99%) decline in the growth rate of daily active cases of COVID-19 in the country. This daily decline equates to an expected 88.5% drop in daily active cases over 30 days compared to 0% mask wearing, all else held equal.
Population adults Intervention Mask vs. no mask Comparison Outcomes Incidence Disease Influenza-like illness	Publication date: 2014 Jurisdiction studied: Saudi Arabia Methods used: Pilot RCT	22 tents were randomized to 'mask' (n=12) or 'control' (n=10); there were 164 pilgrims recruited; 75 in 'mask' and 89 in 'control' group Year 2011		Less contacts become symptomatic for Influenza-like illness in the 'mask' tents compared to the 'control' tents (31% versus 53%, p=0.04); however, laboratory results did not show any difference between the two groups.
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: Multi-country Methods used: Modelling	Surveillance of 113 countries in global databases PHSMs included: mask mandate; lockdowns; home schooling; work from home policies; other 30 March 2020 to 4 October 2021	Issuing face mask usage caused a persistent reduction on Rt after their initiation, which was not observed with the other social distancing measures	By the end of three weeks, school closures had continuously reduced Rt until 0.81 (95% CI 0.63, 0.98]), mask-wearing caused a decrease until 0.81 (95% CI 0.73, 0.88), and work-from-home orders led to Rt reduction of 0.84 (95% CI 0.75, 0.93). Overall, the confidence intervals for the individual effects of all restrictions overlapped, suggesting a comparable effect between each other.

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population general population Intervention Mask vs. no mask Comparison Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: Germany Methods used: Cohort	10,250 participants were enrolled October 2020 to June 2021	The protective effect of wearing masks declined after controlling for potential confounding factors	A protective association between wearing face masks and SARS-CoV-2 transmission was identified (PR 0.73 [95% CI 0.55–0.96]); however, the protective effect declined after controlling for potential confounding factors (PR 0.96 [95% CI 0.68–1.36]).
Population healthcare workers Intervention Types of mask Comparison Respirator, surgical mask, cloth mask Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: France Methods used: Case-control	2,076 cases and 2,076 matched controls 10 April to 9 July 2021	Protection of N95 respirators and surgical face masks did not differ	Surgical mask versus cloth mask: adjusted OR 0.60 (0.06–5.56) N95 versus surgical mask: adjusted OR 0.85 (0.55–1.29)
Population general population Intervention Mask vs. no mask Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: U.S. Methods used: Cross-sectional	378,207 individuals responded to the survey between 3 June and 27 July 2020, of which 4,186 were no empirical/no details of effectiveness for missing data	10% increase in self-reported mask wearing was associated with an increased odds of transmission control (OR 3.53 [95% CI 2.03–6.43])	Communities with high reported mask wearing and physical distancing had the highest predicted probability of transmission control.
Population K-12 students and staff Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Cohort	A total of 1,112,899 students and 157,069 staff attending 61 K–12 districts across 9 states	In unadjusted analysis, districts that were optionally masked throughout the study period had 3.6 times the rate of secondary transmission as universally masked districts; and for every 100 community-acquired cases, universally masked districts had 7.3 predicted secondary infections, whereas optionally masked districts had 26.4	The districts reported 40,601 primary and 3,085 secondary infections. Six districts had optional masking policies, nine had partial masking policies, and 46 had universal masking.
Population general population Intervention Mask vs. no mask Comparison Outcomes Transmission Disease COVID-19, other respiratory virus	Publication date: 2021 Jurisdiction studied: Denmark Methods used: RCT	3,030 participants in intervention group vs. 2,994 in control group; 4,862 completed the study	Infection with SARS-CoV-2 occurred in 42 participants recommended masks (1.8%) and 53 control participants (2.1%); the between-group difference was 0.3 percentage point (95% CI 1.2–0.4; p=0.38) (OR 0.82 [CI 0.54–1.23, p=0.33]); multiple imputation accounting for loss to follow-up yielded similar results; although the	In the mask group, nine participants (0.5%) were positive for one or more of the 11 respiratory viruses other than SARS-CoV-2, compared with 11 participants (0.6%) in the control group (between-group difference, 0.1 percentage point [CI 0.6–0.4 percentage point, p=0.87]) (OR 0.84 [CI 0.35–2.04, p=0.71]).

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
			difference observed was not statistically significant, the 95% CIs are compatible with a 46% reduction to a 23% increase in infection	
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: Switzerland Methods used: Ecological	Surveillance jurisdiction database	The requirement of masks in public transport and secondary schools contributed to an overall 0.025 (CI 0.018–0.030) reduction in Rt, compared to the baseline usage even when there are no mandates	
Population general population Intervention Mask vs. no mask Comparison Outcomes Incidence Disease Influenza-like illness	Publication date: 2010 Jurisdiction studied: France Methods used: Cluster RCT	Household clusters: 105; index cases: 105; household contacts: 306 2008 to 2009 influenza season	There was no identified effectiveness of masks	Influenza-like illness was reported in 24/148 (16.2%) of the contacts in the intervention arm and in 25/158 (15.8%) of the contacts in the control arm and the difference between arms was 0.40% (95% CI: –10% to 11%, p=1.00).
Population healthcare workers Intervention Types of mask Comparison N95, surgical mask Outcomes Incidence Disease SARS-CoV-1	Publication date: 2006 Jurisdiction studied: Canada Methods used: Cohort	10 Toronto hospitals, 33 participants SARS 1 (February 23 to April 21) or SARS 2 (April 22 to July 1), 2005	The number of people Wearing a mask increased from SARS 1 to SARS 2	N95 or N95 equivalent versus surgical mask: OR, 0.12 (95% CI 0.01–1.92).
Population healthcare workers Intervention Types of mask Comparison N95, surgical/medical mask Outcomes Incidence Disease COVID-19	Publication date: 2023 Jurisdiction studied: Canada Methods used: Case-control	4,919 cases, 4,803 controls, 2,046 patient-facing cases and 1,362 controls 15 November 2020 to 29 May 2021	Wearing an N95 respirator during contact with COVID-19 patients was a protector factor (aOR 0.7)	Total time period: 15 November 2020 to 29 May 2021. N95 versus surgical mask during contact with COVID-19 patients, non-aerosol-generating medical procedure: adjusted OR 0.7 (0.5–0.9). N95 versus surgical mask during contact with COVID-19 patients, aerosol-generating medical procedure: adjusted OR 0.7 (0.4–1.2). Always used mask versus not always during contact with non-COVID-19 patients: adjusted OR 1.0 (0.7–1.4). Masking while at work: Always versus sometimes/never: adjusted OR 1.2 (0.6-2.7).

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
				Most of the time versus sometimes/never: adjusted OR 1.2 (0.5–2.9). Pre-vaccination period: 15 November 2020 to 15 January 2021. N95 versus surgical mask during contact with COVID-19 patients, non-aerosol-generating medical procedure: adjusted OR 0.8 (0.5–1.2). N95 versus surgical mask during contact with COVID-19 patients, aerosol-generating medical procedure: adjusted OR 0.6 (0.3–1.1). Always used mask versus not always during contact with non-COVID-19 patients: adjusted OR 0.8 (0.5–1.2). Masking while at work, always versus no always: adjusted OR 1.0 (0.6–1.7). Postvaccination period: 16 January 2021 to 29 May 2021. N95 versus surgical mask during contact with COVID-19 patients, non-aerosol-generating medical procedure: adjusted OR 0.6 (0.3–1.1). N95 versus surgical mask during contact with COVID-19 patients, aerosol-generating medical procedure: adjusted OR 0.6 (0.2–2.0). Always used mask versus not always during contact with non-COVID-19 patients: adjusted OR 1.5 (0.7–3.6). Masking while at work, always versus not always: adjusted OR 0.6 (0.3–1.4).
Population healthcare workers Intervention Mask vs. no mask Comparison Outcomes Incidence Disease COVID-19	Publication date: 2020 Jurisdiction studied: India Methods used: Case-control	378 healthcare worker cases and 373 healthcare worker controls April to May 2020	Usage of masks was associated with reduced odds of infection	Any mask versus no mask: OR 0.35 (0.22–0.57).

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population children Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Cohort	565 counties	Non-masking counties had around 30 additional daily cases per 100,000 children after two weeks of schools reopening	After nine weeks, cases per 100,000 were 18.3 in counties with mandates compared to 15.8 in those without them (p=0.12). In a larger sample of 1,832 counties, between weeks 2 and 9, cases per 100,000 fell by 38.2 and 37.9 in counties with and without mask requirements, respectively (p=0.93).
Population healthcare workers Intervention Types of mask Comparison Surgical mask, single layer, double layer Outcomes Incidence Disease SARS-CoV-1	Publication date: 2009 Jurisdiction studied: China Methods used: Case-control	Hospital of Sun Yat-sen University, 91 cases and 657 controls Mid-May 2023	Double-layer masks were found to protect against infection	Double-layer versus single-layer cotton masks: OR, 0.40 (95% CI 0.25–0.64).
Population general population Intervention Mask vs. no mask Comparison Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: Hong Kong Methods used: Ecological	10,050 persons were observed	In examining the 961 cases in clusters involving masked (e.g., people at work) and unmasked (e.g., dining in restaurants, exercising at the gym) activities, there was significantly greater unmasked COVID-19 cluster settings than the equal number of masked and unmasked clusters predicted by the null hypothesis (p=0.036)	During the three consecutive days of assessment, masking behaviour was noted in 10,050 individuals, where 337 (3.4%) people were not using a mask. Within the first 100 days of the pandemic, there were 961 confirmed COVID-19 cases in the Hong Kong Special Administrative Region (HKSAR).
Population general population Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	All 50 states and the District of Columbia (D.C.), these data were abstracted by month for April to September 2020	Mean COVID-19 rates for states with at least 75% mask adherence in the preceding month was 109.26 per 100,000 compared to 249.99 per 100,000 for those with less adherence	Fourteen of the 15 states with no mask wearing policy for the general public through September reported a high COVID-19 rate. Of the eight states with at least 75% mask adherence, none reported a high COVID-19 rate. States with the lowest levels of mask adherence were most likely to have high COVID-19 rates in the subsequent month, independent of mask policy or demographic factors.
Population general population Intervention Mask mandate	Publication date: 2020	Surveillance of eight countries: China, Czechia, Hong Kong, Japan,	Face mask use was negatively associated with number of COVID-19 cases/inhabitant (coef. -326,	

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Comparison Mask Outcomes Transmission Disease COVID-19	Jurisdiction studied: Multi-country Methods used: Ecological	Singapore, South Korea, Thailand, and Malaysia	[95% CI -601- -51, p=0.021])	
Population healthcare workers Intervention Mask vs. no mask Comparison Medical mask, cloth mask Outcomes Incidence Disease Respiratory viral infections, Influenza-like illness	Publication date: 2016 Jurisdiction studied: Vietnam Methods used: RCT	1,607 healthcare workers were recruited from 14 Hanoi hospitals, 580 (36.1%) were in the medical masks arm, 569 (35.4%) in the cloth mask arm, and 458 (28.5%) in the control arm Year 2014	Being compliant with medical or cloth mask use (average use ≥70% of working time) was not associated with clinical respiratory illness, influenza-like illness, or laboratory-confirmed viral infection	
Population healthcare workers and contacts Intervention Mask vs. no mask Comparison FFP2-3 Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: Italy Methods used: Cross-sectional	Surveillance data for 4,883 contacts reported by 2,952 healthcare workers (224 cases) March to September 2020	The OR for use of surgical mask was 0.59 (95% CI 0.40–0.86) for use only by healthcare worker, OR 0.49 (95% CI 0.22–1.07) for use only by the infected person, and OR 0.40 (95% CI 0.27–0.60) by both, compared to use by neither	FFP2 or FFP3 use by healthcare workers (HCW) versus non-use: adjusted OR 0.48 (0.21–1.09). Any mask use by HCW versus non-use: adjusted OR 0.63 (0.45–0.87). Any mask use by HCW and SARS-CoV-2 infected contact versus non-use: adjusted OR 0.40 (0.27–0.60).
Population children 3–11 Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: Spain Methods used: Quasi-experimental	1,907 schools, 28,575 bubble groups and 599,314 children aged 3–11 years attending preschool (3–5 years, without face mandate) and primary education (6–11 years, with face mandate) First term of the 2021–2022 academic year (13 September to 22 December 2021)	There were found no significant differences between children with mask mandate and without during the study period	SARS-CoV-2 incidence was significantly lower in preschool than in primary education, and an increasing trend with age was observed. Six-year-old children showed higher incidence than five year olds (3.54% vs. 3.1%; OR 1.15 [95% CI 1.08–1.22]) and slightly lower but not statistically significant for new cases in a bubble group (4.36% vs. 4.59%; incidence risk ratio 0.96 [95% CI 0.82–1.11) and R* (0.9 vs. 0.93; OR 0.96 [95% CI 0.87–1.09]). Results remained consistent using a regression discontinuity design and linear regression extrapolation approaches.

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population general population Intervention Mask vs. no mask Comparison Surgical mask Outcomes Transmission Disease Influenza	Publication date: 2009 Jurisdiction studied: Hong Kong Methods used: Cluster RCT	Household clusters: 259; index cases: 259; household contacts: 794 Year 2008	Secondary attack ratios did not significantly differ at the household level (24% in the control group, 14% in the hand hygiene group, and 18% in the face mask plus hand hygiene group; p=0.37)	
Population general population Intervention Mask vs. no mask Comparison Surgical mask Outcomes Transmission Disease Influenza	Publication date: 2008 Jurisdiction studied: Hong Kong Methods used: Cluster RCT	Household clusters: 128; index cases: 128; household contacts: 370 Year 2007	The laboratory-based or clinical secondary attack ratios did not significantly differ between wearing or not wearing a mask	
Population general population Intervention Mask vs. no mask Comparison Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: Brazil Methods used: Cross-sectional	1,337 individuals (first wave=736/second wave=601) October 2020 to December 2021	Low frequency of protective mask use were considered risk factors for SARS-CoV-2 infection during the first wave compared to the second wave (OR 3.38 [95% CI 1.24–9.18, p=0.0168])	
Population general population Intervention Mask mandate and other NPIs Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: Brazil Methods used: Ecological	Surveillance jurisdiction database March 1 to July 4 2020	The incremental benefit of mandatory universal masking was subtle, with an impact on incidence rates but not on daily Rt series	The incremental beneficial impact of universal masking was not immediate on overall incidence (metropolitan area, LRC 0.40 [95% CI 0.01–0.79]; inner state, LRC 0.16 [95% CI –0.11–0.43]), but we observed a long-term significant impact (p<0.05) for both metropolitan area (LRC –0.04 [95% CI –0.05–0.02]) and the inner state (LCR –0.03 [95% CI: –0.04–0.02]).
Population general population Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	Surveillance of all continental states 18 April 2020 to 3 April 2021 18 April–16 May 2020 (Q1), 29 May–3 July 2020 (Q2), 8 July–27 July 2020 (Q3), 1 Aug–9 Dec 2020 (Q4), or no statewide mandate as of 6 March 2021 (Q5)	Mask mandates were associated with greater mask use but ultimately did not influence total normalized cases or post-mandate case growth	Earlier mask mandates were not associated with lower total cases or lower maximum growth rates. Earlier mandates were weakly associated with lower minimum COVID-19 growth rates. Growth rates and total growth were comparable between U.S. states in the first and last mask use quintiles during the fall-winter wave.

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Population healthcare workers Intervention Mask vs. no mask Comparison N95, surgical mask Outcomes Incidence Disease COVID-19	Publication date: 2021 Jurisdiction studied: France Methods used: Cross-sectional	Raymond-Poincaré Hospital, 99 participants 5 March to 10 May 2020	Not systematically using a face mask when caring for a patient was a risk factor for infection (aOR 13.9 [95% CI 1.8–293.0])	Systematic use of facemask versus no systematic use: adjusted OR 0.07 (0.003–0.56).
Population general population Intervention Mask mandate and other NPIs Comparison Outcomes Transmission/incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Cohort	51,997 educators from 307 districts; linked to COVID-19 cases—2,838 educators from 300 districts; N=298 districts for masking policy (73 had a robust masking policy; 202 absent a robust masking policy) 2 September to 24 November 2021	In comparison to school districts without a robust masking policy, those who worked in districts with such requirements had a 19% reduced COVID-19 hazard during the study period (HR 0.81 [95% CI 0.71–0.92]), which remain statistically significant when stratified by grade levels (i.e., elementary, middle, high school)	2,828 (5.5%) educators were infected with COVID-19 during 2 September to 24 November 2021. Seventy-three school districts reported having a robust masking policy that required masking in both educators and students.
Population general population Intervention Mask vs. no mask Comparison Mask Outcomes Emergency department visits Disease Non-COVID viral illnesses, asthma, and COPD	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	Emergency Departments in a 11-hospital system in Maryland during 2019–2020	A 10% percent increase in the prevalence of community masking was associated with a 17.0%, 8.8%, and 9.4% decrease in emergency department (ED) visits for non-COVID viral illnesses and exacerbations of asthma and exacerbations of chronic obstructive pulmonary disease, respectively (p<.001 for all)	
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes Transmission, hospitalization, deaths Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	Surveillance jurisdiction database	Increasing the prevalence of masking is associated with a decrease in ED visits for viral illnesses and exacerbations of asthma and chronic obstructive pulmonary disease (COPD)	Mask mandates were associated with a statistically significant decrease in new cases (–3.55 per 100,000), deaths (–0.13 per 100,000), and the proportion of hospital admissions (–2.38 percentage points) up to 40 days after the introduction of mask mandates both at the state and county level. These effects are large, corresponding to 14% of the highest recorded number of cases, 13% of deaths, and 7% of admission proportion. Mask mandates were linked to a 23.4 percentage point increase in mask adherence in four diverse states.

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
				Lifting of mandates were estimated associated with a decrease of –3.19 percentage points in mask adherence and 12 per 100,000 (13% of the highest recorded number) of daily new cases with no significant effect on hospitalizations and deaths.
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes Deaths Disease COVID-19	Publication date: 2020 Jurisdiction studied: Germany Methods used: Cross-sectional	Surveillance database April–July 2020	After stipulating face mask wearing on April 27, the nominal lethality decreases down to 1% later in summer; a detailed analysis shows that mask wearing really reduces the number of fatal infections and the officially reported daily infections in May and June are less lethal than before	
Population healthcare workers Intervention Mask vs. no mask Comparison Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Cohort	Stanford Health Care (SHC), UCSF Health (UCSF), and Zuckerberg San Francisco General Hospital , 2,435 participants May to September 2020	No significant difference identified	Wearing a mask when not at work: All of the time: 2.8% (49/1,778); adjusted HR 0.8 (0.5–1.6). Most/some of the time or never: 3.3% (21/641).
Population healthcare workers Intervention Medical mask vs. no medical mask Comparison Medical mask, no-medical mask Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: Thailand Methods used: Case-control	COVID-19 case group = 211 persons who tested positive for SAR-CoV-2 by 2020 Apr 21; control group = 839 persons who were negative for COVID-19 as of 21 April 2020	Using multivariable analyses, wearing a mask during the entire contact time with a person with COVID-19 was associated with decreased risk for SARS-CoV-2 infection	Type of masks was not significantly associated with infection risk.
Population students and staff Intervention Mask mandate Comparison Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	63,654 cases of COVID-19 among persons aged 5–17 years reported to FDOH (34,959 school- related COVID-19 cases, including 25,094 (72%) among students and 9,630 (28%) among staff)	Overall, higher student incidences of COVID-19 were reported in school districts without mask mandates than those with mask mandates	
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes	Publication date: 2021 Jurisdiction studied: UK	409,009 valid COVID-19 tests from nose and throat swabs nested in 72,866 households for 100,138 individuals in the labour force aged 18–64 years	Wearing a mask outside the home consistently and significantly predicted lower infection before the 2020 Christmas period and among women	Wearing a face covering or mask outdoors was a significant predictor of a lower chance of infection before 19 December 2020 (OR 0.44 [95% CI 0.27–0.73]) when a stricter

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Transmission Disease COVID-19	Methods used: Case-control	10 May 2020 to 2 February 2021		second lockdown was implemented.
Population general population Intervention Mask and other NPIs Comparison Mask Outcomes Transmission, deaths Disease COVID-19	Publication date: 2023 Jurisdiction studied: Multi-country Methods used: Ecological	Surveillance database for 32 countries of the EU27, EEA and U.K. March–December 2020	Mask policies reduced SARS-CoV-2 incidence (except after 35 days); during wave 1, mask reduced deaths after 21, 28 and 35-days	Across all countries, a total of 1,614,594 COVID-19 cases and 178,369 associated deaths were analyzed during the first wave and 18,471,042 cases and 328,426 deaths during the second wave. However, such associations with reduced incidence were only noted in the Southern and Eastern regions during the second wave, while an inverse effect was found in all other regions for at least one of the time-lags considered (adjusted for all other non-pharmaceutical intervention (NPI) effects).
Population children and staff Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	Surveillance database 2020–2021	No correlations between transmission and mask mandates was found	
Population general population Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: U.S. Methods used: Quasi-experimental	Surveillance database 12 June to 25 September 2020	After three weeks of mask mandate implementation, counties with mask mandate had a daily percent COVID-19 growth rate that was 1.32 times lower, or a 32% decrease	Over the 15-week period, the average daily percent growth of reported COVID-19 cases across all five counties was 1.81% (±1.62%). The average daily percent growth in incident COVID-19 cases was similar between M+ and M- counties in the 3 weeks prior to implementation of mandatory mask policies (0.90% [±0.68] vs. 1.27% [±1.23%], respectively, p=0.269). Crude modelling with a difference-in-difference indicator showed that after three weeks of mask mandate implementation, M+ counties had a daily percent COVID-19

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
				growth rate that was 1.32 times lower, or a 32% decrease. At 12 weeks post-mask-policy implementation, the average daily COVID-19 case growth among M- was 2.42% (±1.92), and was significantly higher than the average daily COVID case growth among M+ counties (1.36% (±0.96%)) ($p<0.001$). A significant negative association was identified among counties between percent growth of COVID-19 cases and percent racial minorities per county ($p<0.001$), as well as population density ($p<0.001$).
Population general population Intervention Mask mandate Comparison Mask Outcomes Transmission Disease COVID-19	Publication date: 2023 Jurisdiction studied: U.S. Methods used: Cohort	Surveillance databases of U.S. counties from 4 April 2020 to 28 June 2021 2,954 counties were included (2,304 recommended-to-required mask, 535 no-recommendation-to-recommended mask, 115 no-recommendation-to-required mask)	Indoor mask mandates were associated with fewer cases per week (cumulative reduction of 23.52/100 000 residents during the 12 weeks after policy change), but no effect was identified after vaccination introduction	Indoor mask mandates were associated with 1.96 fewer cases/100,000/ week (cumulative reduction of 23.52/100,000 residents during the 12 weeks after policy change). Reductions were driven by communities with critical and extreme COVID-19 risk, where masking mandated policies were associated with an absolute reduction of 5 to 13.2 cases/100,000 residents/week (cumulative reduction of 60 to 158 cases/100,000 residents over 12 weeks). Impacts in low- and moderate-risk counties were minimal (<1 case/100,000 residents/week). After vaccine availability, mask mandates were not associated with significant reductions at any risk level.
Population metal-mechanical workers Intervention Mask vs. no mask Comparison	Publication date: 2021 Jurisdiction studied: Italy	815 metal-mechanical workers who had never stopped working during the pandemic period in three different factories in the Emilia-Romagna Region	There was not comparison; all workers wear masks	

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Mask Outcomes Disease COVID-19	Methods used: Cohort			
Population community transmission Intervention Mask mandate Comparison Mask Outcomes Disease COVID-19	Publication date: 2023 Jurisdiction studied: U.S. Methods used: Ecological	Random selection of 10 schools from the Safer at School Early Alert System project for bi-weekly systematic observations of masking behaviours of students, staff, and parents 2 March and 27 May 2022	No full text available	The odds of a positive wastewater signal in the five days after observation decreased by 47% (aOR 0.53 [95% CI 0.28–0.99]) for each 10% increase in the proportion of fully masked individuals.
Population healthcare workers Intervention Types of mask Comparison N95, surgical/medical mask Outcomes Incidence Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Cross-sectional	Metro Health–University of Michigan Health, 1,385 participants 17 August to 4 September 2020 (period 1) and during 2 to 23 December 2020 (period 2)	No significant difference identified	Study Period 1 N95 versus surgical mask: OR 1.25 (0.55–2.85). Study Period 2 N95 versus surgical mask: OR 1.18 (0.86–1.62).
Population social vulnerable population Intervention Mask mandate Comparison Mask Outcomes Transmission, deaths Disease COVID-19	Publication date: 2023 Jurisdiction studied: U.S. Methods used: Ecological	Surveillance databases for 3,140 reporting counties or combined county entities 21 January 2020 to 30 November 2021	In the most socially vulnerable counties, mask mandates were associated with a decrease in cases and deaths; mask mandates were associated with a narrowing of infection disparities between low and mid terciles of vulnerability as well as narrowing of mortality disparities among mid and high terciles of vulnerability compared to the lowest tercile	Mask mandates were associated with decreases in mid-SVI cases (IRR 0.79) and deaths (IRR 0.90) and high-SVI cases (IRR 0.89) and deaths (IRR 0.88). Mandates were associated with the mitigation of infection disparities (change in IRR 0.92) and mortality disparities (change in IRR 0.85) between low- and mid-SVI counties and mortality disparities between low- and high-SVI counties (change in IRR 0.84).
Population general population Intervention Mask vs. no mask Comparison Outcomes Transmission Disease COVID-19	Publication date: 2023 Jurisdiction studied: U.S. Methods used: Cohort	279 individuals from 240 households: 80 industrial livestock operation (ILO) workers and their family members, 80 neighbours of ILO (ILON), 80 participants living in metropolitan areas of North Carolina (Metro) February 2021–July 2022	Participants who reported not wearing a mask in public during the previous two weeks had significantly higher infection-induced IgG prevalence (78.6%) compared to those who reported wearing a mask (49.3%) (PR 1.59 [95% CI 1.19–2.13])	
Population general population Intervention Mask vs. no mask Comparison Outcomes	Publication date: 2021 Jurisdiction studied: Brazil	n=1,667 community residents (cases: n=291; controls: n=1,396); mask use and COVID-19 positive test rates were compared between n=229 case patients and a	Mask use was associated with a decrease in COVID-19 cases (OR 0.12 [95% CI 0.04–0.30])	When data from participants who stayed home at all times were removed from the sample, the trend in decreased COVID-19

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Transmission Disease COVID-19	Methods used: Case-control	subset of controls (n=464/1,396) as mask data was not consistently collected during data collection		cases as a result of mask use was maintained (OR 0.13 [95% CI 0.04-0.36]). When those who never and sometimes masked were grouped and compared with those who always masked, COVID-19 cases remained low (OR 0.36 [95% CI 0.17–0.74]).
Population general population Intervention Mask mandate Comparison Mask Outcomes Deaths Disease COVID-19	Publication date: 2021 Jurisdiction studied: Switzerland Methods used: Quasi-experimental	Surveillance database for 26 Swiss cantons in the first 40 weeks of each year between 2000 and 18 October 2020	Mask mandate for public places has a heterogeneous impact on mortality, with small positive effects on male mortality entirely driven by older-age cohorts (90+)	Adding contact tracing and stricter distancing to compulsory face-mask policy does not lead to better results in terms of mortality.
Population general population Intervention Mask mandate Comparison Mask Outcomes Transmission, hospitalization, deaths Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Quasi-experimental	15 counties that always had a mask mandate (referred to as mask) as of 10 July 2020, and 68 counties that had no mandate (no mask) as of 31 October 2020	Counties that adopted mask mandate experienced significantly lower rates of COVID-19 cases, hospitalizations, and deaths compared with those that did not	Cases were lower by 20.33 (95% CI −26.54−14.12) per day in mask relative to no mask counties through 4 December. This is equivalent to a 60% reduction in COVID-19 cases at the mean of 34.18 (95% CI 33.31–35.06). Hospitalizations were lower by 0.81 (95% CI −1.21−0.40) per day, a 60% reduction at the mean of 1.35 (95% CI 1.30–1.39). Deaths were lower by 0.29 (95% CI −0.51−0.08) per day, a 65% reduction from the mean of 0.45 (95% CI 0.42–0.48).
Population healthcare workers Intervention Types of mask Comparison FFP2, surgical mask Outcomes Seropositivity Disease COVID-19	Publication date: 2022 Jurisdiction studied: Switzerland Methods used: Cohort	Total cohort 3,259; seroconverted subgroup 2,916 22 June 2020 to 9 March 2021	No significant difference identified; however, sub-group analysis showed that FFP2 were protective in healthcare workers taking care of 20 or more patients	Mostly FFP2 use versus mostly surgical mask use: adjusted HR 0.80 (0.64–1.00). Among those wearing FFP2, 81/716 (11%) reported a SARS-CoV-2-positive swab, compared to 352/2543 (14%) surgical mask users; seroconversion was documented in 85/656 (13%) FFP2 and 426/2255 (19%) surgical mask users. Adjusted for baseline characteristics, COVID-19 exposure, and risk behaviour, FFP2 use

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
				was non-significantly associated with decreased risk for SARS-CoV-2-positive swab (adjusted hazard ratio [aHR] 0.8 [95% CI 0.6–1.0]) and seroconversion (adjusted odds ratio [aOR] 0.7 [95% CI 0.5–1.0]). In subgroup analysis, FFP2 use was clearly protective among those with frequent (> 20 patients) COVID-19 exposure (aHR 0.7 for positive swab [95% CI 0.5–0.8]; aOR 0.6 for seroconversion [95% CI 0.4–1.0]).
Population general population Intervention Mask and other NPIs Comparison Outcomes Transmission Disease COVID-19	Publication date: 2022 Jurisdiction studied: U.S. Methods used: Case-control	n=796 students and education staff participated in first survey; 628 completed survey and COVID-19 testing and were eligible for bivariate comparisons	Among study findings, elementary aged students had a positivity rate of 44% (n=4/9) among unmasked students who played sports compared to 8% among other students (n=28/344; OR 9.0 95% CI 2.3–35.5, p<0.005]); among middle/high school students, COVID-19 positive rate was 18% (n=15/85) among students who played sports compared to 6% in other students (n=7/121; OR 3.5 [95% CI 1.4–9.0]); positive rate increased to 20% (n=15/74) among sports-playing students who reported unmasked sport playing time compared to 6% among masked sports-playing students (OR 4.3 [95% CI 1.7–11.3, p<0.001)	
Population healthcare workers Intervention Mask vs. no mask Comparison N95 Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: U.S. Methods used: Cohort	37 participants February 2020	No significant difference identified; most of healthcare workers were unprotected	Non-N95 face mask during aerosol-generating procedures, always versus sometimes or never: 0.77 (0.03–20.02). Non-N95 face mask during non-aerosol generating procedures, always versus sometimes or never: 1.29 (0.05–30.38).
Population general population Intervention Mask mandate	Publication date: 2023	48 contiguous U.S. and the District of Columbia (more than 3,000 matched counties)	State mask mandates reduced new weekly COVID-19 cases, hospital admissions, and deaths by	The effect depends on political leaning with larger effects in Democratic-leaning

PICO components	Study characteristics	Sample description and intervention	Declarative title and key findings	Key findings
Comparison Mask Outcomes Transmission, hospitalization, deaths Disease COVID-19	Jurisdiction studied: U.S. Methods used: Ecological	20 January 2020 and 20 December 2020	55, 11, and 0.7 per 100,000 inhabitants on average	counties. Our results imply that statewide mandates saved 87,000 lives through 19 December 2020, while a nationwide mandate could have saved 57,000 additional lives.
Population general population Intervention Mask mandate Comparison Outcomes Transmission Disease COVID-19	Publication date: 2021 Jurisdiction studied: U.S. Methods used: Ecological	≈26,000 meat processing workers	Using confirmed case data, incidence of SARS-CoV-2 infection before and after the date the last intervention was initiated (e.g., physical barriers were installed if universal mask policy began first) was reported; 10 days after the last intervention was initiated, eight facilities (62%) showed a statistically significant decrease in incidence and three showed a non-significant decrease, while one facility showed a statistically significant increase in incidence and one showed a non-significant increase in incidence	
Population children Intervention Mask vs. no mask Comparison Outcomes Transmission Disease COVID-19	Publication date: 2020 Jurisdiction studied: U.S. Methods used: Case-control	397 children and adolescents, including 154 case-patients (positive SARS-CoV-2 test results) and 243 control participants (negative SARS-CoV-2 test results)	Children and adolescents who received a positive RT-PCR test were less likely to have a parent/guardian report consistent mask use; however, the sample included children and adolescents who received testing with health care facilities associated with one large academic medical center in Mississippi and might not be representative of children and adolescents in other geographic areas	

Vélez CM, Wilson MG, Lavis JN. Living Evidence Synthesis 14.2: Effectiveness of masking in community and healthcare settings for reducing the incidence, transmission, hospitalizations, and deaths from respiratory infectious diseases. Hamilton: McMaster Health Forum, 25 March 2024.

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