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Supplementary appendix 2

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Chen X, Chen Z, Azman AS, et al. Serological evidence of human infection with SARS-CoV-2: a systematic review and meta-analysis. *Lancet Glob Health* 2021; published online March 8. http://dx.doi.org/10.1016/S2214-109X(21)00026-7.

Supplementary appendix

Contents

Methods and results

Data extraction and variable list

We screened all eligible studies to determine: 1) study characteristics, study population and related types/levels of exposure to SARS-CoV-2; 2) antibody detection assays used; 3) predefined outcomes, i.e., SARS-CoV-2 antibody seroprevalence

The following variables were extracted from qualified studies, including the author's name, publication date, study design, sampling period, study period, study population and location, age and occupation of participants, exposure setting, frequency and type of exposure, the use of personal protective equipment (PPE) for healthcare workers, laboratory methodology for serologic confirmation of SARS-CoV-2 infections (including assay methods, the manufacturer and related agency authorization, targeted immunoglobulin and antigens, days from exposure to sampling, experiment validations, sensitivity and specificity of the validated assay, cross-reactivity with other coronaviruses, seropositive threshold value, confirmatory assay and definitions of serological infections for each study), assessment of participants' symptom (including the number of symptomatic and asymptomatic serological infections), and predefined outcomes (i.e. the total number of participants, the number of participants provided single or paired sera, the number of seropositive

participants, adjustments of the results and potential risk factors for serological infections).

Rationale for modifying scoring systems for antibody detection assays that focused on human infection with avian influenza SARS-CoV-2 virus

In consideration of a published sero-epidemiological study protocol by Consortium for the Standardization of Influenza Seroepidemiology (CONSISE), an established scoring system for serological study concerning animal influenza exposure in humans, and a population-based seroepidemiological investigation protocol for COVID-19 from the WHO, we developed a modified scoring system to develop a more appropriate system to weigh the serological evidence for SARS-CoV-2 infections in humans.[1-3] In our scoring system, study design, laboratory assay and outcome adjustment are three main considerations. Studies reporting the method to recruit participants or sampling methods (e.g. convenient sample or randomly-selected samples) receive a higher score. Specifically, studies with detailed sampling framework, or using stratified/multi-stage sampling are assessed the highest points (3 points), followed by those studies with simplified random (2 points) or convenience sampling (1 point). If a study does not report how they recruited their study participants, the study receives zero points.

Multiple serological assays are available to detect SARS-CoV -2 antibodies, with various test performance (different sensitivity and specificity), different targeted antigens, immunoglobulin isotypes, and various positive threshold or cut-off values. It is difficult to compare the performance of different serological assays without a uniform "gold standard". Studies using well-validated (previously evaluated in published paper) in-house serological assays, as well as those using detection kits approved by GPC/WHO-recognized national regulatory authority [e.g. Food and Drug administration (FDA), Conformité Européenne-In Vitro Diagnostics (CE-IVD), and National Medical Products Administration (NMPA)], are assigned 1 point. Additionally, if internal validations (using their own specimens to evaluate sensitivity and specificity) were performed prior to assay of population samples, they are assigned 2 points. Similarly, if a study used confirmatory assays, such as microneutralization assay (2 points) or other serological methods (1 point), to validate their initial screening results, additional points were given. If a study only used microneutralization assay to detect SARS-CoV-2 antibodies, 2 points were assigned to it.

For the outcome analysis, adjustment for the local demographic factors (mainly including age and sex) or test performance is of great importance to interpret the serological results. A total of four points are assigned for studies accounting for these two adjustments at the same time, with 2 points for each adjustment.

Quality assessment of serological studies

Based on their overall score, the study quality was further classified into four Grades, A, B, C and D, according to their quartiles. Grade A spanned studies with a scores ranging from 10 to 12, Grade B from 7 to 9, Grade C from 4 to 6, and Grade D from 0 to 3.

Rationale for assessing asymptomatic and symptomatic SARS-CoV-2 infections

We evaluated all included studies according to whether a study reported any acute respiratory illness (i.e. fever or respiratory symptoms) among participants during the COVID-19 epidemic. To distinguish symptomatic and asymptomatic serological infections among different populations, we recorded serologically-confirmed number of symptomatic or asymptomatic individuals for studies assessing participants' fever or other COVID-19 related respiratory symptoms. Specifically, seroprevalence of symptomatic ($p_{sym} = \frac{Number\ of\ symptomatic\ infections}{Total\ number\ of\ participants\ provided\ specimens}$) and asymptomatic infections ($p_{asym} = \frac{Number\ of\ asymptomatic\ infections}{Total\ number\ of\ participants\ provided\ specimens}$) were calculated based on the total number of participants who provided specimens. If a study reported participants' non-COVID-19 symptoms or reported symptoms before the start of SARS-CoV-2 epidemic in their country, corresponding symptomatic of asymptomatic serological results would not be included in analysis.

Rationale for correcting seroprevalence estimates by using Bayesian measurement error models

In our main analysis we did not correct for imperfect serological test performance. We conducted a sensitivity analysis to explore the impact of sensitivity and specificity of serological assays on our pooled estimates of seroprevalence.

We obtained the adjusted number of seropositive individuals through multiplying the adjusted seroprevalence by the number of participants tested for each study. If an original study reported the test-performance-adjusted seroprevalence, we used the reported one. If an original study didn't report the adjusted seroprevalence, we extracted the data of sensitivity and specificity for different serological assays based on the following principles in order of preference: 1) independent internal evaluation conducted by serosurvey investigators themselves; 2) external evaluation from official regulators (e.g., FDA); 3) published paper of evaluating test performance; 4) manufacturer-reported data. Specifically, we assumed that the sensitivity and specificity of neutralization assays were 100%. If a study used a second assay to confirm the results of the first assay, we calculated the combined sensitivity and specificity with the following formula:

$$Combined\ specificity = Specificity\ of\ test\ A + Specificity\ of\ test\ B - (Specificity\ of\ test\ A * Specificity\ of\ test\ B);$$

$$Combined\ sensitivity = Sensitivity\ of\ test\ A * Sensitivity\ of\ test\ B,$$

where test A and test B represented the first and the second serological assay, respectively.

Briefly, we used a Bayesian framework to calculate adjusted seroprevalence with following specifications:[45]

$$y \sim \text{Binomial}(n, p)$$

$$p = (1-\gamma)(1-\pi) + \delta\pi$$

$$y\gamma \sim \text{Binomial}(n\gamma, \gamma)$$

$$y\delta \sim \text{Binomial}(n\delta, \delta)$$

where p represents the expected frequency of positive test, Π represents prevalence, γ and δ represent the specificity and sensitivity respectively. For each study, we used the sensitivity and specificity values and corresponding denominators to fit the specified model. We set 4 chains with 2000 iterations (1000 warmup), and we implemented 5 diagnostic criterions to ensure the wellness of fit, including 1) no chains ending with a divergence; 2) no iterations saturating the max tree depth of 10; 3) the E-BFMI (effective Bayesian fraction of missing information) over 0.2 for all chains; 4) all $\hat{R}$ between 0.9 and 1.0; 5) the effective sample size being larger than 0.001 times the number of iterations.[6,7] All 5 criterions must be achieved at the same time, or the model will be rerun. At last, we will get adjusted seroprevalence and according credible interval.

Supplementary Tables

Table S1. Search strategy for three peer-reviewed databases and five preprint servers

Database	Step	Searching strategy	Number of articles*
PubMed	#1	2019-nCoV OR "coronavirus disease 2019" OR COVID-19 OR "severe acute respiratory syndrome coronavirus 2" OR SARS-CoV-2	80,422
	#2	seroprevalen* OR seroincidenc* OR seroconversion OR seronegative OR seropositive* OR seroepidemiolog* OR serolog* OR serosurvey* OR antibod* OR (infection* AND ("attack rate" OR "cumulative incidence"))	986,898
	#3	2019/12/01-2020/12/22	1,673,686
	#4	Language: English	27,180,252
	#5	#1 **AND** #2 **AND** #3 **AND** #4	3,685
Web of Science	#1	TS = (2019-nCoV OR "coronavirus disease 2019" OR COVID-19 OR "severe acute respiratory syndrome coronavirus 2" OR SARS-CoV-2)	66,366
	#2	TS= (seroprevalen* OR seroincidenc* OR seroconversion OR seronegative OR seropositive OR seropositivity OR seroepidemiolog* OR serolog* OR serosurvey* OR antibod* OR (infection* AND ("attack rate" OR "cumulative incidence")))	1,061,760
	#3	2019/01/01-2020/12/22	-
	#4	Language: English	-
	#5	#1 **AND** #2 **AND** #3 **AND** #4	2,684
Embase	#1	2019-nCoV OR "coronavirus disease 2019" OR COVID-19 OR "severe acute respiratory syndrome coronavirus 2" OR SARS-CoV-2	77,287

	#2	seroprevalen* OR seroincidenc* OR seroconversion OR seronegative OR seropositive* OR seroepidemiolog* OR serolog* OR serosurvey* OR antibod* OR (infection* AND ("attack rate" OR "cumulative incidence"))	1,266,619
	#3	2019/12/01-2020/12/22	-
	#4	Language: English	-
	#5	#1 **AND** #2 **AND** #3 **AND** #4	2,549
medRxiv & bioRxiv	#1	COVID-19 OR SARS-CoV-2	12,963
	#2	sero* OR antibod*	43,244
	#3	2019/12/01-2020/12/22	57,944
	#4	#1 **AND** #2 **AND** #3	4,995
SSRN*	#1	COVID-19 AND antibody, COVID-19 AND seroprevalence	147
Wellcome*	#1	COVID-19	60
Europe PMC	#1	2019-nCoV OR "coronavirus disease 2019" OR COVID-19 OR "severe acute respiratory syndrome coronavirus 2" OR SARS-CoV-2	91,906
	#2	seroprevalen* OR seroincidenc* OR seroconversion OR seronegative OR seropositive* OR seroepidemiolog* OR serolog* OR serosurvey* OR antibod* OR (infection* AND ("attack rate" OR "cumulative incidence"))	998,149
	#3	Type: Preprints	218,252
	#4	2019/12/01-2020/12/22	1,671,278
	#5	#1 **AND** #2 **AND** #3 **AND** #4	2,361

*Databases do not permit Boolean operator OR, extensive search was done for SSRN and Wellcome.

Table S2. Descriptive characteristics of serological studies included in the systematic review

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Peer-reviewed database										
Victoria et al., 2020	Washington, USA	Jan 2020	Longitudinal study	Office co-workers, waiting room contacts, healthcare contacts	11 office co-workers 20 waiting room contacts, and 7 healthcare workers	Office co-workers: 39 (24-62) years old; Waiting room contacts: 53.5 (<1-78) years old; Healthcare contacts: 36 (30-56) years old; All contacts: 45 (0-78) years old	Office co-workers: being an office co-worker of the case-patient with close contact of any duration; Waiting room contacts: sharing a healthcare waiting room or area during the same time and up to 2 hours after the case-patient was present; Healthcare contacts: any face-to-face interaction between healthcare personnel and the case-patient without wearing the full personal protective equipment (i.e., gown, gloves, eye protection, and N95 respirator) or potential contact with the case-patients' secretions by HCP without wearing full PPE.	Yes	Yes (Office co-workers: unk/9/11; waiting room contacts:4/10/20; healthcare contacts:2/4/7)	All 8 HCP had interactions with the case-patient without wearing the full recommended PPE (only partial PPE were used); One public health employee who briefly visited the case-patient's home and had a face-to-face conversation without wearing PPE, and this HCP was not included in the analysis.
To et al., 2020	Hongkong, China	Jan 2020	Cross-sectional study for general population; Longitudinal study for Hong residents evacuated from Hubei	General population; Hongkong residents evacuated from Hubei	1938 general population (specimens collected from clinical biochemistry laboratory); 469 Hongkong residents evacuated from Hubei	General population: 0-80 years old; Hongkong residents evacuated from Hubei: 41 years old	Poorly-defined exposures for both populations	Symptom of Hongkong residents evacuated from Hubei was assessed.	Yes (General population: 580/0/580, 233/0/233; Hongkong residents evacuated from Hubei:452/0/469)	Here only showed the result from the specimens collected after Dec 2019; 452 Hongkong residents evacuated from Hubei provided at least one blood sample
Hippich et al., 2020	Bavaria, Germany	Jan 2020	Longitudinal study	Children participating in a diabetes screening program; Neonates in a Bavarian screening study	11884 children 1916 neonates	Children: median (IQR): 3.2 (2.2-5.1) years old; Neonates: median (IQR): 2 (0-2) years old	-	Yes	Yes (Children: 11867/17/11884; Neonates: 1916/0/1916)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Liang et al., 2020	Guangdong, China; Wuhan, Hubei, China	Jan 2020	Cross-sectional study	Inpatients and their healthy companions	Guangzhou: 8782; Wuhan: 8272	Guangzhou: 54 (44-62) years old Wuhan: 55 (38-67) years old	Poorly-defined exposures	Yes (The seropositive individuals had no history of COVID-19 symptoms, and therefore regarded as asymptomatic or mild)	Yes (Guangzhou: 8782/0/8782; Wuhan: 8272/0/8272)	-
Ng et al., 2020	Singapore	Jan 2020	Cross-sectional study	close contact	1150	Median (IQR): 35 (26 – 51) years old	-	Yes	Yes (1150/0/1150)	-
Hallowell et al., 2020	USA	Feb 2020	Cross-sectional study	Evacuees from Wuhan in a repatriation	193	42 (0–74) years old	Among participants with serological results: 1 person had close contact with laboratory-confirmed COVID-19 case-patient in past 2 months; 30 had close contact with person with fever and/or acute respiratory illness in past 2 month	Yes (9/193 of evacuees reported having experienced signs or symptoms associated with COVID-19 in the previous 2 weeks, and 24/193 of evacuees reported signs/symptoms associated with COVID-19 in the previous 2 months)	Yes (186/0/193)	-
Sam et al., 2020	Kuala Lumpur and Selangor state, Malaysia	Jan 2020	Cross-sectional study	Residual serum samples collected at a teaching hospital	588	All ages	Residual serum with poorly-defined exposures	No	Yes (588/0/588)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Jeong et al., 2020	New York, USA	Feb 2020	Cross-sectional study	Emergency professionals	50	Median (IQR): 35 (31-49) years old	-	No	Yes (50/0/50)	-
Buss et al., 2020	Manaus and São Paulo, Brazil	Feb 2020;	Cross-sectional study	Blood donors	Feb: Manaus blood donors: 821; São Paulo blood donors: 799. Mar: Manaus blood donors: 832; São Paulo blood donors: 2454. Apr: Manaus blood donors: 829; São Paulo blood donors: 900. May: Manaus blood donors: 901; São Paulo blood donors: 826. June: Manaus blood donors: 911; São Paulo blood donors: 880. July: Manaus blood donors: 1147; São Paulo blood donors: 879. Aug: Manaus blood donors: 881; São Paulo blood donors: 906. Sep: Manaus blood donors: 868; São Paulo blood donors: 933. Oct: Manaus blood donors: 882; São Paulo blood donors: 877.	-	-	No	Yes (Feb: Manaus blood donors: 821/0/821; São Paulo blood donors: 799/0/799. Mar: Manaus blood donors: 832/0/832; São Paulo blood donors: 2454/0/2454. Apr: Manaus blood donors: 829/0/829; São Paulo blood donors: 900/0/900. May: Manaus blood donors: 901/0/901; São Paulo blood donors: 826/0/826. June: Manaus blood donors: 911/0/911; São Paulo blood donors: 880/0/880. July: Manaus blood donors: 1147/0/1147; São Paulo blood donors: 879/0/879. Aug: Manaus blood donors: 881/0/881; São Paulo blood donors: 906/0/906. Sep: Manaus blood donors: 868/0/868; São Paulo blood donors: 933/0/933. Oct: Manaus blood donors: 882/0/882; São Paulo blood donors: 877/0/877)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Stadlbauer et al., 2020	New York City, USA	Feb 2020	Cross-sectional study	Patients with emergency department visit (urgent care group); Patients with OB/GYN visit (routine care group)	4101 patients in urgent care group; 6590 patients in routine care group	All ages	-	No	Yes (patients in urgent care group: 4101/0/4101; patients in routine care group 6590/0/6590)	-
Chen et al., 2020	Nanjing, China	Feb 2020	Cross-sectional study	Healthcare worker	105	30.0 (26.0-39.5) years old	Direct contact with four COVID-19 patients	Yes (12/105 of participants reported general symptoms, including fever, headache, sore throat,etc.)	Yes (105/0/105)	78/105 of healthcare workers used disposable non-surgical face mask, which generally lacks the capability of filtering particles, viruses and bacteria.
Liu et al., 2020	Connecticut, USA	Feb 2020	cross-sectional study	Newborn	3048	-	-	No	Yes (3048/0/3048)	-
Cavicchiolo et al., 2020	Veneto, Italy	Feb 2020	Cross-sectional study	Neonates	75	-	-	No	Yes (75/0/75)	Only neonates at risk of SARS-CoV-2 infection with a positive maternal history were tested at birth and at 14 days of life.
Plebani et al., 2020	Padova, Italy	Feb 2020	Cross-sectional study	Healthcare workers	8285	43.2±11.6 years old	-	No	Yes (8285/0/8285)	-
Cox et al., 2020	Bergen, Norway	Feb 2020	Cross-sectional study	Household members of confirmed COVID-19 cases	77	-	Household contact	No	Yes (77/0/77)	-
Villalaı´n et al., 2020	Madrid, Spain	Feb 2020	Cross-sectional study	pregnant woman	769	-	-	Yes	Yes (769/0/769)	-
Brandstetter et al., 2020	Regensburg, Germany	Mar 2020	Cross-sectional study	Hospital staff	180 hospital staff with different levels of exposures	18-65 years old	Close contact: unprotected contact with a distance of less than 2 meters for 15 minutes or longer; Moderate contact: contact with a distance of less than 2 meters while using personal protective equipment or unprotected contact with a distance of more than 2 meters; No contact: not aware of any contact to a COVID-19 patient.	Yes	Yes (Hospital staff with close contact: 50/0/50; Hospital staff with moderate contact: 63/0/63; Hospital staff with no contact: 57/0/57)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Solodky et al., 2020	Lyon, France	Mar 2020	Cross-sectional study	Healthcare worker; cancer patients	244 85	-	Poorly-defined exposures	Healthcare worker: Yes Cancer patients: No	Yes (healthcare worker: 244/0/244; cancer patients: 85/0/85)	All healthcare workers used adequate PPE (consult correspondence author).
Zhang et al., 2020	Guangdong, China	Mar 2020	Cross-sectional study	Healthy individuals returning to Shenzhen	1589	36.4 (11–89) years old	-	Yes (All were asymptomatic)	Yes (1589/0/1589)	1589 individuals without clinical symptoms (cough, fever, and fatigue)
Suda et al., 2020	Japan	Mar 2020	Cross-sectional study	Outpatients with liver disease	700	20-84 years old	Poorly-defined exposure	Yes (All were asymptomatic)	Yes (700/0/700)	-
Bogogiannidou et al., 2020	Greece	Mar 2020	Cross-sectional study	Leftover blood samples from nationwide labs	6586	All ages	Poorly-defined exposure with residual blood samples	No	Yes (6586/0/6586)	-
Xu et al., 2020	Hubei, Guangdong, China	Mar 2020	Cross-sectional study	Hemodialysis Patients; Healthcare worker	Hemodialysis Patients: 1542 Healthcare worker: 3205	-	-	Yes	Yes (Hemodialysis Patients: 1542/0/1542, healthcare worker: 3205/0/3205)	-
Vena et al., 2020	Liguria and Lombardia, Italy	Mar 2020	Cross-sectional study	non-hospitalized participants in an outpatient setting.	3609	Median (IQR): 51 (41–63) years old	-	Yes	Yes (3609/0/3609)	-
Ng et al., 2020	San Francisco Bay Area, USA	Mar 2020	Cross-sectional study	Blood donors; Hospitalized patients admitted for non-respiratory indications	Blood donors: 1000; Hospitalized patients admitted for non-respiratory indications: 387	-	-	Yes	Yes (Blood donors: 1000/0/1000, Hospitalized patients admitted for non-respiratory indications: 387/0/387)	-
Venugopal et al., 2020	New York, USA	Mar 2020	cross-sectional study	Healthcare workers	478	Older than 20 years old	-	Yes	Yes (478/0/478)	-
Dingens et al., 2020	Seattle, USA	Mar 2020	Cross-sectional study	Residual serum samples from Seattle Children's Hospital	1076	-	-	Yes	Yes (1076/0/1076)	-
Barzin et al., 2020	North Carolina, USA	Mar 2020	Cross-sectional study	Patients in outpatient clinics; Inpatients unrelated to COVID-19	Patients in outpatient clinics: 2937; Inpatients unrelated to COVID-19: 1449	Older than 20 years old	-	Yes	Yes (Patients in outpatient clinics: 2937/0/2937; Inpatients unrelated to COVID-19: 1449/0/1449)	-
Pérez-García et al., 2020	Madrid, Spain	Mar 2020	Cross-sectional study	Healthcare worker	2963	-	-	Yes	Yes (2424/0/2963)	-
Trieu et al., 2020	Norway	Mar 2020	Longitudinal study	Healthcare workers	607	Median (IQR): 39 (20 – 78) years old	-	Yes	Yes (Baseline: 0/607/607)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Fischer et al., 2020	North Rhine-Westphalia, Lower-Saxony, Hesse, German	Mar 2020	Cross-sectional study	Blood donors	3186	18-65 years old	-	Yes	Yes (3186/0/3186)	-
McCafferty et al., 2020	North East London, UK	Mar 2020	cross-sectional study	Patients in an urban hemodialysis unit	1046	-	-	No	Yes (811/0/1046)	-
Brown et al., 2020	USA	Mar 2020	Cross-sectional study	Student who contacted with infected teacher	21	17 (5-18) years old	Interactive classroom contact (mean in-class time was 108 minutes); noninteractive classroom contact (mean in-class time was 50 minutes).	Yes	Yes (21/0/21)	-
Han et al., 2020	Wuhan, Hubei, China	Mar 2020	Cross-sectional study	Persons during work resumption screening	22633	-	-	Yes (All were asymptomatic)	Yes (22633/0/22633)	-
Zhou et al., 2020	Wuhan, Hubei, China	Mar 2020	Cross-sectional study	Hospital staff	3674	Older than 18 years old	-	Yes	Yes (3674/0/3674)	-
Thompson et al., 2020	Scottish, UK	Mar 2020	Cross-sectional study	Blood donors	3500	Median (IQR): 47 (34-56) years old	-	No	Yes (3500/0/3500)	-
Carlo et al., 2020	Foggia, Italy	Mar 2020	Longitudinal study	High-risk HCWs; Intermediate-risk HCWs; Low-risk HCWs	High-risk HCWs: 428; Intermediate-risk HCWs: 2736; Low-risk HCWs: 78	High-risk HCWs: 51.3±9.1 years old; Intermediate-risk HCWs: 46.7±11.6 years old;	-	Yes	Yes (3209/33/3242)	-
Tu et al., 2020	Wuhan, Hubei, China	Mar 2020	Cohort study	Pediatric medical workers	325	-	Contact with confirmed and/or suspected cases of COVID-19	No	Yes (325/0/325)	-
Kohler et al., 2020	St Gallen, Switzerland	Mar 2020	Cohort study	Hospital workers	1012	38.3 (16.9-64.8) years old	HCW caring for known COVID-19 cases	Yes	Yes (1012/0/1012)	-
Fuereder et al., 2020	Vienna, Austria	Mar 2020	Cross-sectional study	Healthcare professionals; cancer patients	Healthcare professionals: 62; cancer patients: 84	41 (23–59) years old; median: 61 years old	-	Yes	Yes (Healthcare professionals: 62/0/62, cancer patients: 84/0/84)	-
Fusco et al., 2020	Naples, Italy	Mar 2020	Cross-sectional study	Healthcare worker	120	Median (IQR): 43 (32-51.5) years old	Direct contact with patient or patients' environment	Yes	Yes (0/115/120)	102 (89%) HCWs participate to training event about PPE procedures

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Havers et al., 2020	USA	Mar 2020	Cross-sectional study	Residual patient sera collected for routine screening	3264 (Washington) 2482 (New York City) 1184 (Louisiana) 1742 (South Florida) 824 (Pennsylvania) 1882 (Missouri) 1132 (Utah) 1224 (California) 1431 (Connecticut) 860 (Minnesota)	All ages	-	No	Washington: Yes (3264/0/3264) New York City: Yes (2482/0/2482) Louisiana: Yes (1184/0/1184) South Florida: Yes (1742/0/1742) Pennsylvania: Yes (824/0/824) Missouri: Yes (1882/0/1882) Utah: Yes (1132/0/1132) California: Yes (1224/0/1224) Connecticut: Yes (1431/0/1431) Minnesota: Yes (860/0/860)	Crude estimates were not obtained from the study.
Xu et al., 2020	Guangdong, China	Mar 2020	Cross-sectional study	Blood donors	2199	34 (18-59) years old	-	No	Yes (2199/0/2199)	-
Behrens et al., 2020	Hannover, Germany	Mar 2020	Longitudinal study	First line health care professional	217	Mean (range): 36.5 (18-63) years old	Direct contact with a confirmed SARS-CoV-2 infected person	Yes	Yes (217/0/217)	Rigorous use of PPE
Loconsole et al., 2020	Bari, Italy	Mar 2020	Cross-sectional study	Patients admitted to Emergency Department	819	Median (IQR): 66 (52–80) years old	-	Yes	Yes (819/0/819)	-
Mansour et al., 2020	New York, USA	Mar 2020	Cross-sectional study	Healthcare worker	285	18-84 years old	Exposure to aerosolized SARS-CoV-2 or direct patient exposure (emergency medicine, critical care, anesthesiology; direct contact with patients)	Yes	Yes (285/0/285)	Standard protective precautions per CDC guidelines for all HCW were continuously recommend.
Gallian et al., 2020	France	Mar 2020	Cross-sectional study	Bloor donors	998	Median: 41 years old	Poorly-defined exposure	Yes (no history of fever or symptom of respiratory infection in the previous 2 weeks)	Yes (998/0/998)	-
Korth et al., 2020	Essen, Germany	Mar 2020	Cross-sectional study	High-risk healthcare worker; intermediated-risk healthcare worker; low-risk healthcare worker	244 high-risk healthcare workers; 37 intermediated-risk healthcare workers and 35 low-risk healthcare workers	High-risk healthcare worker: 36.7±10.7 years old intermediated-risk healthcare worker: unk low-risk healthcare worker: 42.3±3.2 years old	High-risk healthcare: daily COVID-19 patient contact; intermediated-risk healthcare worker: daily non-COVID-19 patient contact; low-risk healthcare worker: without daily patient contact;	Yes	Yes (high-risk healthcare worker:244/0/244; intermediated-risk healthcare worker: 37/0/37; low-risk healthcare worker: 35/0/35)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Bielecki et al., 2020	Switzerland	Mar 2020	Cross-sectional study	Two soldier cohorts at a Swiss Army Base	Company 1: 154 Company 2 and 3: 354	Company 1: 20.4 (18-27) years old Company 2: 18-28 years old	Company 1: without any COVID-19 cases; Company 2 and 3: heavily affected by COVID-19	Yes	Yes (Company 1: 88/0/154; Company 2 and 3: 181/0/354)	-
Tsaneva et al., 2020	Varna, Bulgaria	Mar 2020	Cross-sectional study	Outpatients	586	3-92 years old	Poorly-defined exposure	Yes	Yes (584/2/586)	-
Houlihan et al., 2020	London, UK	Mar 2020	Longitudinal study	First-line healthcare worker	200	Median (IQR): 34 (29-44) years old	Contact with COVID-19 patients	Yes	Yes (200/181/200)	UK authorities altered to mandate PPE for all patient contact
Liu et al., 2020	Hubei, China	Mar 2020	cross-sectional study	community residents and employees	35040	36 (30-45) years old	-	No	Yes (35040/0/35040)	-
Basteiro et al., 2020	Barcelona, Spain	Mar 2020	Cross-sectional study	Health care workers	578	43.8±11.1 years old	-	Yes	Yes (0/578/578)	Highly available use of PPE for their healthcare workers.
Isherwood et al., 2020	UK	Mar 2020	Cross-sectional study	Patients in a tertiary acute general surgical unit; Healthcare staff in the same healthcare setting	Patients in a tertiary acute general surgical unit: 1964 Healthcare staff in the same healthcare setting: 215	Healthcare staff: 20-69 years old	-	No	Yes (Patients in a tertiary acute general surgical unit: 1964/0/1964, Healthcare staff in the same healthcare setting: 215/0/215)	Early implementation of PPE for healthcare staff

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Xu et al., 2020	Hubei, Chongqing, Sichuan, Guangdong, China	Mar 2020	Cross-sectional study	Healthcare worker; healthcare worker relative; Hemodialysis patient; Outpatient; Hotel staff member; Community resident; Factory worker	714 healthcare workers in Wuhan; 3091 healthcare workers in Hubei, 319 healthcare workers in Chongqing; 260 healthcare workers in Guangdong; 219 Healthcare worker relatives in Wuhan; 979 Hemodialysis patients in Hubei; 993 outpatients in Chongqing; 563 Hemodialysis patients in Guangdong; 346 Hotel staff member in Hubei; 9442 Community residents in Sichuan; 442 Factory workers in Guangdong	Healthcare worker in Wuhan: 33 (28, 39) years old; Healthcare worker in Hubei :35 (29, 47) years old; Healthcare worker in Chongqing: 33 (28, 50) years old; Healthcare worker in Guangdong: 32 (27, 40) years old; Healthcare worker relative in Wuhan: 42 (31, 56) years old; Hemodialysis patient in Hubei: 57 (48, 67) years old; Hemodialysis patient in Guangdong:59 (47, 70) years old; Outpatient in Chongqing:52 (36, 64) years old; Hotel staff member in Wuhan: 46 (37, 50) years old; Community resident in Sichuan:56 (40, 69) years old Factory workers in Guangdong: 29 (25, 32) years old	Healthcare workers in Wuhan engaged in COVID-19 patients' management	No	Yes (Healthcare worker in Wuhan:714/0/714, Healthcare worker in Hubei: 3091/0/3091, Healthcare worker in Chongqing:319/0/319, Healthcare worker in Guangdong:260/0/260; Healthcare worker relative in Wuhan: 219/0/219; Hemodialysis patient in Hubei: 979/0/979; Hemodialysis patient in Guangdong: 563/0/563; Outpatient in Chongqing: 993/0/993; Hotel staff member in Wuhan: 346/0/346; Community resident in Sichuan: 9442/0/9442; Factory worker in Guangzhou: 442/0/442)	-
Milani et al., 2020	Milan, Italy	Mar 2020	Cross-sectional study	Personnel of the University of Milan	197	-	Poorly-defined exposure	Yes	Yes (197/0/197)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Medas et al., 2020	Cagliari, Italy	Mar 2020	Cross-sectional study	patients admitted at surgical department	86	Mean: 57.6 years old	-	Yes	Yes (86/0/86)	All personnel involved in preadmission tests used personal protective equipment (PPE), including goggles, gowns, gloves, and caps.
Vos et al., 2020	Netherlands	Mar 2020	Cross-sectional study	General population	3147	2-90 years old	-	Yes	Yes (3147/0/3147)	-
Savirón-Cornudella et al., 2020	Madrid, Spain	Mar 2020	Cross-sectional study	Pregnant women	260	-	-	Yes	Yes (260/0/260)	-
Bryan et al., 2020	Idaho, USA	Apr 2020	Cross-sectional study	Community resident	4856 residents	All ages	-	No	Yes (4856/0/4856)	-
Hains et al., 2020	Indianapolis, USA	Apr 2020	Cohort study	Hemodialysis patients; Healthcare worker	13 hemodialysis patients and 25 healthcare workers	Hemodialysis patients: 13 (2-16) years old Healthcare worker: 40.5 (25-61) years old	Potential contact with a hemodialysis patient diagnosed with COVID-19 in the unit.	Yes	Yes (Hemodialysis patients: 0/13/13; Healthcare worker: 0/25/25)	Patients wore surgical masks at all times, as did health care workers.
Liu et al., 2020	Guangdong, China	Apr 2020	Cross-sectional study	Healthcare worker deployed to Wuhan, and healthcare professionals at home hospital	116 Doctors, 304 nurses and 77 control healthcare professionals	Doctors: 42.2 years old; Nurses: 33.4 years old; Control healthcare professionals: 57.8 years old	Caring for patients with critical disease and operating aerosol generating procedure (AGPs), Control healthcare professionals: without exposure to COVID-19 patients at home hospital	Yes	Yes (Doctors: 116/0/116, Nurses: 304/0/304; Control healthcare professionals: 77/0/77)	Appropriate personal protective equipment (standardized PPE, including protective suits, masks, gloves, goggles, face shields, mand gowns) for all frontline doctors and nurses
Malickova et al., 2020	Czech Republic	Apr 2020	Cross-sectional study	Inflammatory bowel disease healthcare professionals	92	45 (38-57) years old	Poorly-defined exposure	Yes	Yes (92/0/92)	-
Paulino-Ramirez et al., 2020	Dominican Republic	Apr 2020	Cross-sectional study	Community residents in emerging hotspots	12897	Mean: 42 years old	-	No	Yes (12897/0/12897)	-
Chirathaworn et al, 2020	Bangkok, Thailand	Apr 2020	Cross-sectional study	Individuals who came into close contacts with the patients	308	Median (IQR): 35 (26 – 48) years old	May either be relatives of COVID-19 patients living in the same household or interacted with patients for a significant amount of time (including healthcare providers to the patients, passengers on the same bus, close friends, co workers, and neighbors)	Yes	Yes (308/0/308)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Posfay-Barbe et al., 2020	Geneva, Switzerland	Apr 2020	Cross-sectional study	Children seeking medical care	208	Younger than 16 years old	-	No	Yes (208/0/208)	-
Slot et al., 2020	Netherlands	Apr 2020	Cross-sectional study	Regular blood plasma donors	7361	Range: 18-72 years old	-	Yes	Yes (7361/0/7361)	-
Olayanju et al., 2020	Oyo state, Nigeria	Apr 2020	Cross-sectional study	Frontline healthcare workers	133	Range: 20-60 years old	Contact with COVID-19 patients	Yes	Yes (133/0/133)	And healthcare workers continued to attend patients with minimal precautionary measures.
Berte et al., 2020	Milan and Cagliari, Italy; Erlangen, Germany	Apr 2020	Cross-sectional study	Inflammatory bowel diseases patients	354	Median (IQR): 43 (31-57) years old	-	Yes	Yes (354/0/354)	-
Ciechanowicz et al., 2020	Warsaw, Poland	Apr 2020	Cross-sectional study	Patients with psoriasis treated with biologic therapy	61	Median: 46 years old	-	Yes	Yes (61/0/61)	-
Ko et al., 2020	South Korea	Apr 2020	Cross-sectional study	COVID-19- designated HCWs; Non-COVID-19-designated HCWs	COVID-19- designated HCWs: 309; Non-COVID-19-designated HCWs: 123	COVID-19- designated HCWs: 31.1±7.84 years old; Non-COVID-19-designated HCWs: 34.9±10.9 years old	-	Yes	Yes (COVID-19- designated HCWs: 309/0/309; Non-COVID-19-designated HCWs: 123/0/123)	-
Lackermair et al., 2020	Bavaria, Germany	Apr 2020	Cross-sectional study	Healthcare worker	151	38 (26–47) years old	-	Yes	Yes (151/0/151)	-
Sotgiu et al., 2020	Milan, Italy	Apr 2020	Cross-sectional study	Healthcare worker	202	Median (IQR): 45 (35-54) years old	Contact with Covid-19 patients	No	Yes (202/0/202)	No information was available on the adherence to the use of personal protective equipment by the healthcare workers.
Mohanty et al., 2020	Texas, USA	Apr 2020	Cross-sectional study	Asymptomatic patients, caregivers, and healthcare workers	-	51.94±15.6 years old	-	Yes	Yes (1670/0/1670)	-
Wu et al., 2020	Wuhan, Hubei, China	Apr 2020	Cross-sectional study	People applying for a permission of resume; hospitalized patients	1021 persons applying for a permission of resume; 381 hospitalized patients	-	Poorly-defined exposure	Yes	Yes (Persons applying for a permission of resume: 1021/0/1021; Hospitalized patient: 381/0/381)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Stubblefield et al., 2020	Tennessee, USA	Apr 2020	Cross-sectional study	Healthcare worker worked in COVID-19 units	249	33 (21–70) years old	Direct contact with COVID-19 patients	Yes	Yes (249/0/249)	Enhanced use of PPE (face shield, gown and gloves in addition to a surgical mask) was instituted when interacting with patients known or suspected to have SARS-CoV-2.
Self et al., 2020	12 states, USA	Apr 2020	Cross-sectional study	Frontline Health care personnel	3248	Median: 36 years old	Cared for patients with COVID-19,	Yes	Yes (3248/0/3248)	-
Stellato et al., 2020	Naples, Italy	Apr 2020	Longitudinal study	Patients, caregivers and health care workers	662	-	-	No	Yes (unk/unk/662)	-
Flannery et al., 2020	Pennsylvania, USA	Apr 2020	Cross-sectional study	Pregnant women presenting for delivery	1293	Median (IQR): 31 (27-35) years old	-	No	Yes (1293/0/1293)	-
Stock et al., 2020	New York, USA	Apr 2020	Cross-sectional study	Adult clinicians	98	37.6±10.6 years old	-	Yes	Yes (98/0/98)	-
Goldberg et al., 2020	Massachusetts, USA	Apr 2020	Cross-sectional study	Staff members at a Skilled Nursing Facility; residents at a Skilled Nursing Facility	Staff members at a Skilled Nursing Facility: 97; residents at a Skilled Nursing Facility: 56;	Staff members at a Skilled Nursing Facility: 45 years old residents at a Skilled Nursing Facility: 83 (54-102) years old	Poorly-defined exposure	Yes (All were asymptpmatic)	Yes (Staff members at a Skilled Nursing Facility: 84/0/97, residents at a Skilled Nursing Facility: 56/0/56;)	While appropriate PPE policies were in place, adherence cannot be confirmed.
Stringhini et al., 2020	Geneva, Switzerland	Apr 2020	Cross-sectional study	General population	Week1: 341; Week2: 469; Week3: 577; Week4: 604; Week5: 775; Overall: 2766	Older than 5 years old	-	Yes	Yes (week1: 341/0/341; week2: 469/0/469; week3: 577/0/577; week4: 604/0/604; week5: 775/0/775; overall: 2766/0/2766)	-
Erikstrup et al., 2020	Denmark	Apr 2020	Cross-sectional study	Blood donors	20640	17–69 years old	Poorly-defined exposure	Yes (Donors must self-defer for two weeks if they develop fever with upper respiratory symptom)	Yes (20640/0/20640)	-
Lahner et al., 2020	Rome, Italy	Apr 2020	Cross-sectional study	Healthcare worker	2057	46 (16–69) years old	Exposure to SARS-CoV-2-positive subjects	Yes	Yes (1084/0/2057)	Wearing of personal protective equipment for all HCWs.

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Labriola et al., 2020	Brussels, Belgium	Apr 2020	Longitudinal study	Patients on in-center maintenance hemodialysis	98	68.8±14 years old	-	Yes	Yes (98/0/98)	-
Pallett et al., 2020	London, UK	Apr 2020	Cross-sectional study	Healthcare worker	1704	Symptomatic healthcare worker (mean): 38.2 years old Asymptomatic healthcare worker (mean): 42.4 years old	Delivered direct clinical care to SARS-CoV-2- positive inpatients in cohort areas or isolation rooms involving aerosol-generating procedures	Yes	Yes (1704/0/1704)	-
Sood et al., 2020	California, USA	Apr 2020	Cross-sectional study	General population	863	Older than 18 years old	-	Yes	Yes (863/0/863)	-
Shakiba et al., 2020	Guilan, Iran	Apr 2020	Cross-sectional study	Residents	551	-	-	Yes	Yes (551/0/551)	-
Madsen et al., 2020	Utah, USA	Apr 2020	Cross-sectional study	ED employees	279	-	-	No	Yes (270/0/279)	Employees should continue to wear full personal protective equipment when caring for patients with respiratory complaints.
Sims et al., 2020	Michigan, USA	Apr 2020	-	Healthcare worker	20614	43.1±13.0 years old	-	Yes	Yes (20614/0/20614)	N-95 masks and eye protection distribution was centralized and anyone potentially working with COVID-19 patients could be issued an N-95 mask and eye protection on a daily basis. Requirements to sign in and out of rooms were removed.
Crovetto et al., 2020	Barcelona, Spain	Apr 2020	Cross-sectional study	Pregnant women attending first trimester screening	874	-	-	Yes	Yes (874/0/874)	-

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Gudbjartsson et al., 2020	Iceland	Apr 2020	Cross-sectional study	Persons contact with the Icelandic health care system for reasons other than Covid-19; Icelanders in the greater Reykjavik area; Residents of Vestmannaeyjar; Icelanders had been quarantined	Persons contact with the Icelandic health care system for reasons other than Covid-19: 18609; Icelanders in the greater Reykjavik area: 4843; Residents of Vestmannaeyjar: 663; Icelanders had been quarantined: 4222	Persons contact with the Icelandic health care system for reasons other than Covid-19: 56±20 years old; Icelanders in the grea Reykjavik area: 48 ±13 years old; Residents of Vestmannaeyjar: 52 ±18 years old; Icelanders had been quarantined: 47±17 years old	-	Yes	Yes (Persons contact with the Icelandic health care system for reasons other than Covid-19: 18609/0/18609, Icelanders in the greater Reykjavik area: 4843/0/4843, Residents of Vestmannaeyjar: 663/0/663, Icelanders had been quarantined: 4222/0/4222)	-
Naranbhai et al., 2020	Massachusetts, USA	Apr 2020	Cross-sectional study	Asymptomatic residents	200	Median (IQR): 46 (27-55) years old	-	Yes	Yes (200/0/200)	-
Herzberg et al., 2020	Schleswig-Holstein, Germany	Apr 2020	Longitudinal study	Hospital employees and nuns	871	Range: 18-90 years old	-	No	Yes (0/0/871)	All employees working with COVID-19 suspected or confirmed patients must wear personal protective equipment (PPE) including filtering face piece-masks type 2 or 3 (FFP-2/FFP-3).
Dacosta-Urbieta et al., 2020	Galicia, Spain	Apr 2020	cross-sectional study	Healthcare workers	175	-	22.5% of the workers had a known exposure to SARS-CoV-2- positive patients.	Yes	Yes (175/0/175)	-
Lumley et al., 2020	South-East England, USA	Apr 2020	Cross-sectional study	Antenatal women	1000	Median (IQR): 32 (28-35) years old	-	No	Yes (1000/0/1000)	-
Rudberg et al., 2020	Stockholm, Sweden	Apr 2020	Cross-sectional study	Healthcare worker	2149	44±12 years old	Exposure to patients infected with covid-19	Yes	Yes (2149/0/2149)	-
Buntinx et al., 2020	Belgium	Apr 2020	Cross-sectional study	Residents and staff member in a nursing home	Residents: 100; Staff member: 88	-	-	Yes	Yes (Residents: 100/0/100, Staff member: 80/0/80)	-
Martin et al., 2020	Brussels, Belgium	Apr 2020	Longitudinal study	Staff members worked in a tertiary reference hospital for infectious diseases	532	37 (21-66) years old	All staff members worked in the Covid-19 highly exposed units	Yes	Yes (0/326/532)	They followed the ECDC recommendations for the use of PPE.

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Amendola et al., 2020	Milan, Italy	Apr 2020	Cross-sectional study	Healthcare worker	663	Median: 44 years old	-	Yes	Yes (663/0/663)	-
Iversen et al., 2020	Denmark	Apr 2020	Cross-sectional study	Healthcare worker; Blood donors	Healthcare worker: 28792; Blood donors: 4672	Healthcare worker: 44.4±12.6 Blood donors: 40.7±13.4	-	Yes	Yes (Healthcare worker: 28792/0/28792, Blood donors: 4672/0/4672)	-
Olalla et al., 2020	Marbella, Spain	Apr 2020	Cross-sectional study	Health care workers	498	Mean: 41.5 years old	Contact with CoVID-19 cases inside or outside the workplace	Yes	Yes (498/0/498)	-
Cosma et al., 2020	Piedmont, Italy	Apr 2020	Cross-sectional study	Pregnant women	138	32.6 ± 3.54 for seropositive individuals; 33.9 ± 4.63 for seronegative individuals	-	Yes	Yes (138/0/138)	-
Caban-Martinez et al., 2020	South Florida, USA	Apr 2020	Cross-sectional study	Frontline firefighter/paramedic workforce	203	Older than 21 years old	-	Yes	Yes (203/0/203)	-
Poletti et al., 2020	Lombardy, Italy	Apr 2020	Cross-sectional study	Close contacts of COVID-19 cases	5484	Median (IQR): 50 (30–61) years old	Contact with COVID-19 cases	No	Yes (4120/0/5484)	-
Waterfield et al., 2020	UK	Apr 2020	Longitudinal study	Healthy children of healthcare workers	1007	10.1 (2-15) years old	Confirmed household contact	Yes	Yes (992/0/1007)	-
Racine-Brzostek et al., 2020	New York, USA	Apr 2020	Cross-sectional study	Health care workers	2274	37 (31-48) years old	Patient-facing for physicians	Yes	Yes (2274/0/2274)	-
Calcagno et al., 2020	Turin, Italy	Apr 2020	Cross-sectional study	Healthcare workers	5444	49.4±10.6 years old	Contacts with COVID-19 patients	No	Yes (5444/0/5444)	-
Poustchi et al., 2020	Iran	Apr 2020	Cross-sectional study	General population; High-risk populations	General population: 3530; High-risk populations: 5372	All ages	-	Yes	Yes (General population: 3530/0/3530; High-risk populations: 5372/0/5372)	-
Cito et al., 2020	Abruzzo region, Italy	Apr 2020	Cross-sectional study	Villagers	687	All ages	-	Yes	Yes (667/0/687)	-
Rosenberg et al., 2020	New York, USA	Apr 2020	Cross-sectional study	General population	15626	Older than 18 years old	-	No	Yes (15101/0/15626)	-

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Daniel et al., 2020	USS Theodore Roosevelt aircraft carrier, USA	Apr 2020	Cross-sectional study	Service member	382	18-59 years old	Service member may contact with the 1000 service members who were previously determined to be infected with SARS-CoV-2 during the period.	Yes	Yes (382/0/382)	-
Schmidt et al., 2020	Lower Saxony, Germany	Apr 2020	Cross-sectional study	Clinic staff	406	Older than 18 years old	-	Yes	Yes (385/0/406)	All employees are constantly carrying FFP1 masks for their protection when in contact with the patients or co-workers.
Moscola et al., 2020	New York, USA	Apr 2020	Cross-sectional study	Health Care Personnel in the New York City Area	46117	Median (IQR): 42 (31.5–34.5) years old	Working in a COVID-19–positive unit	No	Yes (40329/0/46117)	All Northwell HCP (employees) were provided with personal protective equipment from March 7, 2020, onward.
Tarabichi et al., 2020	Ohio, USA	Apr 2020	Longitudinal study	Public first responders	296	-	-	Yes	Yes (36/260/296)	-
Rosser et al., 2020	California, USA	Apr 2020	Cross-sectional study	Healthcare personnel	10449	18-84 years old	-	Yes	Yes (10449/0/10449)	-
Armin et al., 2020	Tehran, Iran	Apr 2020	Cross-sectional study	Staff of a Children's Hospital	475	Younger than 62 years old	-	Yes	Yes (475/0/475)	-
Montenegro et al., 2020	Barcelona, Spain	Apr 2020	Longitudinal study	Community individuals; patients consulting the primary care physician	Community individuals: 311; patients consulting the primary care physician: 743	Community individuals: 43.7±21.79; patients consulting the primary care physician: 46.97±20.0 years old	-	Yes	Yes (Community individuals: 311/0/311, patients consulting the primary care physician: 634/0/743)	-
Kaufman et al., 2020	USA	Apr 2020	Longitudinal study	national clinical laboratory residual specimen	2437336	-	-	No	Yes (2120379/316957/2437336)	-
Ahmad et al., 2020	California, USA	Apr 2020	Cross-sectional study	High-risk populations	244	Mean: 51.1 years old	-	Yes	Yes (244/0/244)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Steensels et al., 2020	Belgium	Apr 2020	Cross-sectional study	Hospital staff	3056	39.5 ± 13.1 for seropositive individuals; 41.3 ± 12.4 for seronegative individuals	Contact with COVID-19 patients	Yes	Yes (3056/0/3056)	-
Mostafa et al., 2020	Cairo, Egypt	Apr 2020	Cross-sectional study	Health care workers	4040	Older than 18 years old	Contact with a confirmed case or suspected case	Yes	Yes (4040/0/4040)	-
Kantele et al., 2020	Helsinki, Finland	Apr 2020	Cross-sectional study	Healthcare workers	1131	Median (IQR): 38 (31-48) years old	Known contacts with Covid-19 patients, Contact with persons with Covid-19/suspicion of Covid-19/travel abroad	Yes	Yes (1095/0/1131)	-
Soriano et al., 2020	Madrid, Spain	Apr 2020	Cross-sectional study	University employees; University employees' relatives; Social services and health care workers; Individuals living in communities; Other people	175 University employees; 85 University employees' relatives; 108 Social services and health care workers; 234 Individuals living in communities; 72 other people	University employees: 44 (31, 67) years old; University employees' relatives: 41 (18, 76) years old; Social services and health care workers: 42 (21, 79) years old; Individuals living in communities: 60 (20, 89) years old; Other: 53 (18, 76) years old	-	Yes	Yes (University employees: 175/0/175, University employees' relatives: 85/0/85, Social services and health care workers: 108/0/108, Individuals living in communities: 234/0/234, Other: 72/0/72)	-
Eyre et al., 2020	Oxford, UK	Apr 2020	Cross-sectional study	Health care workers	10610	Older than 18 years old	Contact with a confirmed or suspected case.	Yes	Yes (9958/0/10610)	From 1st February 2020, "level-2 PPE" (FFP3/N99 mask, eye protection, gown, gloves) was mandated for any contact with a confirmed or suspected case.
Halatoko et al., 2020	Lomé, Togo	Apr 2020	Cross-sectional study	High-risk populations	955	Median (IQR): 36 (32-43) years old	-	Yes	Yes (955/0/955)	-
Shields et al., 2020	Birmingham, UK	Apr 2020	Cross-sectional study	Health-care workers	516	Median (IQR): 42 (30-51) years old	-	Yes	Yes (516/0/516)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Makaronidis et al., 2020	London, UK	Apr 2020	Cross-sectional study	People with an acute loss in their sense of smell and/or taste in community	590	39.4±12 years old	-	Yes	Yes (567/0/590)	-
Guerriero et al., 2020	Verona, Italy	Apr 2020	Cross-sectional study	Verona population	1515	49.1±21.2 years old	-	Yes	Yes (1515/0/1515)	-
Menachemi et al., 2020	Indiana, USA	Apr 2020	Cross-sectional study	Indiana residents (random sample); Indiana residents (non-random sample)	3658 898	Older than 12 years old	-	No	Yes (3518/0/3658; 898/0/898)	-
Vilibic-Cavlek et al., 2020	Croatia	Apr 2020	Cross-sectional study	Personnel in the healthcare facilities	592	Range: 20-65 years old	Contact with a confirmed COVID-19 patient, participation in large community events, and travelling to areas with documented COVID-19 transmission	Yes	Yes (592/0/592)	-
Pollán et al.., 2020	Spain	Apr 2020	Cross-sectional study	General population	61075	All ages	-	Yes	Yes (61075/0/61075)	-
Petersen et al., 2020	Faroe Islands, Denmark	Apr 2020	Cross-sectional study	Inhabitants of the Faroe Islands	1500	42.1±23.1 years old	-	Yes	Yes (1075/0/1500)	-
Bajema et al., 2020	Georgia, USA	Apr 2020	Cross-sectional study	Commercial laboratory residual Sera	1343	All ages	-	No	Yes (1343/0/1343)	-
Biggs et al., 2020	Georgia, USA	Apr 2020	Cross-sectional study	Community household residents	696	All ages	-	Yes	Yes (696/0/696)	-
Sydney et al., 2020	New York, USA	Apr 2020	Cross-sectional study	Healthcare workers	1700	-	-	Yes	Yes (1700/0/1700)	-
Brotons et al., 2020	Barcelona, Spain	Apr 2020	Cross-sectional study	Children household member; Adlut household member.	Children household member: 672; Adlut household member: 412.	Children household member: 5.9±3.7 years old; Adult household member: 40±10.2 years old.	Household contact	No	Yes (Children household member: 672/0/672, Adult household member: 412/0/412)	-
Hunter et al., 2020	Indiana, USA	Apr 2020	Cross-sectional study	Healthcare worker	734	Mean: 43 years old	-	No	Yes (734/0/734)	Institutional application of WHO guidelines for PPE use

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Tilley et al., 2020	California, USA	Apr 2020	Cross-sectional study	University student population	790	-	-	Yes	Yes (790/0/790)	-
Tsatsaris et al., 2020	Paris, France	Apr 2020	Cross-sectional study	Pregnant women	529	33.7±4.7 years old	-	Yes	Yes (529/0/529)	-
Uyoga et al., 2020	Kenya	Apr 2020	Cross-sectional study	Blood donors	3174	15-66 years old	-	No	Yes (3098/0/3174)	-
Josè et al., 2020	Foggia, Italy	May 2020	Cross-sectional study	Healthy blood donors	904	18-65 years old	-	Yes	Yes (904/0/904)	-
Paderno et al., 2020	Italy	May 2020	Cross-sectional study	Healthcare worker in otolaryngology unit	58	Mean: 41 years old	Contacts with infected patients in hospital and outside hospital	Yes	Yes (58/0/58)	Adequate PPE were used in hospital
Merkely et al., 2020	Hungary	May 2020	Cross-sectional study	Hungarian population	10504	48.7±18.0 years old	-	Yes	Yes (10474/0/10504)	-
Addetia et al., 2020	Washington, USA	May 2020	Cross-sectional study	Ship's crew	122	-	-	No	Yes (120/0/122)	-
Ladhani et al., 2020	London, UK	May 2020	Cross-sectional study	Children of healthcare workers with confirmed COVID-19	44	-	-	Yes	Yes (44/0/44)	-
Nailescu et al., 2020	Indiana, USA	May 2020	Cross-sectional study	Pediatric kidney transplant recipients	31	Median (IQR): 12 (2-21) years old	-	Yes	Yes (31/0/31)	-
Sperotto et al., 2020	Udine, Italy	May 2020	Cross-sectional study	Allogeneic stem cell transplantation recipients	70	Median (IQR): 56 (23-73) years old	-	Yes	Yes (70/0/70)	-
Mack et al., 2020	Germany	May 2020	Longitudinal study	Professional football players and staff	1157	-	-	No	Yes (150/1007/1157)	-
Belingheri et al., 2020	Lombardy, Italy	May 2020	Cross-sectional study	Healthcare worker	3520	Median (IQR): 47 (35-55) years old	-	No	Yes (3520/0/3520)	-
Lastrucci et al., 2020	Tuscany, Italy			'health service' group 'support service' group 'work-from-home' group	2828; 1103 725	48 (38-56) years old; 50 (36-61) years old; 49 (39.7-56) years old	-	No	Yes ('health service' group: 2828/0/2828; 'support service' group: 1103/0/1103; 'work-from-home 'group: 725/0/725)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Dioscoridi et al., 2020	Milan, Italy	May 2020	Cohort study	Family members of healthcare workers; healthcare workers	Family members of healthcare workers: 81; health care workers: 38	Family members of healthcare workers: unk; healthcare workers: 47±18 years old	Health care workers: working in a COVID-19 hospital; Family members lived in the same house with healthcare workers	Yes	Yes (Family members: 81/0/81, healthcare workers: 38/0/38)	In-hospital infection control measures and personal protective equipment use were in line with national and international recommendations.
Péré et al., 2020	Paris, France	May 2020	Cross-sectional study	Healthcare workers	3569	Median: 39.6 years old	-	No	Yes (3569/0/3569)	-
Borges et al., 2020	Sergipe, Brazil	May 2020	Cross-sectional study	Asymptomatic residents	3046	39.76±16.83 years old	-	Yes	Yes (2921/0/3046)	-
Torres et al., 2020	Santiago, Chile	May 2020	Cross-sectional study	Students; Staff members	1029 students and 240 staff members	Students: 10.8±4.1 years old; Staff members: 42.8±10.4 years old	Contact with more than 1 confirmed Covid-19 case	Yes	Yes (Students: 1009/0/1029, Staff members: 235/0/240)	-
Poulikakos et al., 2020	North West England, UK	May 2020	Cross-sectional study	Healthcare workers	281	-	Directly involved in patient care	Yes	Yes (281/0/281)	-
Veerus et al., 2020	Estonia	May 2020	Cross-sectional study	Pregnant women	433	31±5.89 years old	-	No	Yes (433/0/433)	-
Brunner et al., 2020	rural upstate New York, USA	May 2020	Cross-sectional study	Employees of Bassett Healthcare Network; Patients	Employees of Bassett Healthcare Network: 764 Patients: 762	Employees of Bassett: unk; Healthcare Network: range: 19-78 years old	-	Employees of Bassett Healthcare Network: Yes. Patients: No	Yes (Employees of Bassett Healthcare Network: (764/0/764), patients: (762/0/762))	-
Vijh et al., 2020	British Columbia, Canada	May 2020	Cross-sectional study	Residents in both facilities; Staff in both facilities	Residents in both facilities: 127; Staff in both facilities: 176	Residents in both facilities: median: 86 years old; Staff in both facilities: median: 49 years old.	-	Yes	Yes (Residents in both facilities: 122/0/127, patients: 169/0/176)	
Rashid-Abdi et al., 2020	Vasteras, Sweden	May 2020	Longitudinal study	Healthcare workers at a department of Infectious diseases	120	39±12 years old	-	Yes	Yes (120/unk/120)	-
Stefanelli et al., 2020	Trento, Italy	May 2020	Cross-sectional study	Resident	6098	Older than 10 years old	-	Yes	Yes (6098/0/6098)	
Feehan et al., 2020	Louisiana, USA	May 2020	Cross-sectional study	General population	2640	Mean: 50.6 years old	-	No	Yes (2640/0/2640)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Sutton et al., 2020	Oregon, USA	May 2020	Cross-sectional study	Patients visiting ambulatory, emergency, or inpatient health care setting	897	All ages	-	No	Yes (897/0/897)	-
Bampoe et al., 2020	London, UK	May 2020	Cross-sectional study	Maternity healthcare workers	200	Older than 18 years old	Patient-facing	Yes	Yes (200/0/200)	It was not until 1 June 2020 that all staff members in patient-facing areas were advised by Public Health England to wear surgical masks to reduce the risk of infection to others.
Cento et al., 2020	Milan, Italy	May 2020	Cross-sectional study	Consecutive patients	2753	All ages	-	No	Yes (2753/0/2753)	-
Rivas et al., 2020	California, USA	May 2020	Cross-sectional study	Healthcare workers	6201	41.46±12.01 years old	-	Yes	Yes (6201/0/6201)	-
Capasso et al., 2020	Campania Region, Italy	May 2020	Cross-sectional study	Multiple sclerosis patients; University staff from non-clinical departments; Healthcare staff from COVID-19 wards	Multiple sclerosis patients: 310; University staff from non-clinical departments: 862; Healthcare staff from COVID-19 wards: 235	Multiple sclerosis patients: 42.3 ± 12.4 years old; University staff from non-clinical departments: 42.9± 13.3 years old; Healthcare staff from COVID-19 wards: 39.4±10.9 years old	-	Yes	Yes (Multiple sclerosis patients: 310/0/310; University staff from non-clinical departments: 862/0/862; Healthcare staff from COVID-19 wards: 235/0/235)	-
Murhekar et al., 2020	India	May 2020	Cross-sectional study	General population	28000	Older than 18 years old	-	Yes	Yes (28000/0/28000)	-
Tong et al., 2020	Jiangsu, China	May 2020	Cross-sectional study	Medical staff who went to Wuhan city for support	222	32 (24-58) years old	Directly involved in patient care	Yes	Yes (191/0/222)	-
Iwuji et al., 2020	Texas, USA	May 2020	Cross-sectional study	First responders	683	18-76 years old	-	Yes	Yes (683/0/683)	-
Mughal et al., 2020	New Jersey, USA	May 2020	Cross-sectional study	Healthcare personnel in the ICU setting.	134	Median (IQR) :39.2 (28.0-48.5) years old	Exposed to critically ill COVID-19 patients in ICU unit	Yes (All participants were asymptomatic)	Yes (121/0/134)	Proper education and utilization of personal protective equipment

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Hallal et al., 2020	Nationwide, Brazil	May 2020	Cross-sectional study	Community residents	Round1: 25025; Round2: 31165	All ages	-	No	Yes (Round1: (24995/0/25025), Round2: (31162/0/31165))	-
Delmas et al., 2020	Paris, France	May 2020	Cross-sectional study	Health care workers	4607	41.8±12.6 years old	Contact to covid-19 cases	Yes	Yes (4607/0/4607)	Masks were compulsory and protective equipment was available
Costa et al., 2020	São Paulo, Brazil	May 2020	Cross-sectional study	Asymptomatic healthcare workers	5645	All ages	-	Yes	Yes (4987/0/5645)	Personal protective equipment (PPE) was made available to all HCW
Zhang et al., 2020	Jiangsu, China	May 2020	Cross-sectional study	Close contacts of COVID-19 patients	284	-	Contact with COVID-19 patients	Yes	Yes (120/0/284)	-
Pan et al., 2020	Hubei, China	May 2020	Cross-sectional study	Community individuals	61437	Median (IQR): 48 (32-64) years old	-	No	Yes (61437/0/61437)	-
Akinbami et al., 2020	Michigan, USA	May 2020	Cross-sectional study	Healthcare, First Response, and Public Safety Personnel	16397	Range: 19-82 years old	-	No	Yes (16397/0/16397)	-
Kempen et al., 2020	Addis Ababa, Ethiopia	May 2020	Cross-sectional study	Resident in Addis Ababa	99	Older than 14 years old	-	Yes	Yes (99/0/99)	-
Pagani et al., 2020	Lombardy, Italy	May 2020	Cross-sectional study	Population of Castiglione D'Adda	562	All ages	Contact with verified case	Yes	Yes (509/0/562)	-
Jespersen et al., 2020	Central Denmark Region, Denmark	May 2020	Cross-sectional study	Healthcare workers and administrative personnel at the hospitals	17987	All ages	Departments with limited patient contact	No	Yes (17948/0/17987)	-
Ladhani et al., 2020	London, UK	May 2020	Longitudinal study	Residents in care homes Staffs in care homes	Residents in care homes: 118; Staffs in care homes: 164	Older than 18 years old	-	Yes	Yes (Residents in care homes: 118/unk /118; Staffs in care homes: 164/unk/164)	-
Yogo et al., 2020	California, USA	May 2020	Cross-sectional study	High-Risk Healthcare Workers	1554	Older than 18 years old	Direct contact to patients with COVID-19 and those working in congregate care area	Yes	Yes (1554/0/1554)	-
Santos-Hövener et al., 2020	Kupferzell, Germany	May 2020	Cross-sectional study	Kupferzell residents	2203	Older than 18 years old	-	Yes	Yes (2203/0/2203)	-
Alserehi et al., 2020	Saudi Arabia	May 2020	Cross-sectional study	Healthcare workers in COVID-19 referral hospitals; Healthcare workers in nonaffected hospitals	Healthcare workers in COVID-19 referral hospitals: 9379; Healthcare workers in nonaffected hospitals: 3242	-	-	No	Yes (Healthcare workers in COVID-19 referral hospitals: 9379/0/9379; Healthcare workers in nonaffected hospitals : 3242/0/3242)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Alali et al., 2020	Kuwait	May 2020	Cross-sectional study	Migrant workers	525	Mean: 43 years old	-	Yes	Yes (673/0/673)	-
Del Brutto et al., 2020	Atahualpa, Ecuador	May 2020	Cross-sectional study	Inhabitants in Atahualpa	673	59.2±12.8 years old	-	Yes	Yes (673/0/673)	-
Blairon et al., 2020	Belgium	May 2020	Cross-sectional study	Healthcare worker	1485	-	215 workers (14.3%) reported having a function with no contact with patients while 1138 (75.9%) have had regular or occasional contact	Yes	Yes (1485/0/1485)	The usage of PPE was not reported.
Noh et al., 2020	Southwestern Seoul, Korea	May 2020	Cross-sectional study	Outpatients	1500	0-92 years old	-	No	Yes (1500/0/1500)	-
Ho et al., 2020	Taiwan, China	May 2020	Cross-sectional study	Outpatients and emergency department patients	14765	Older than 20 years old	-	No	Yes (Period 1: (9777/0/9777), Period 2: (4988/0/4988))	-
Murakami et al., 2020	Washington, USA	May 2020	Cross-sectional study	Emergency department healthcare providers	138	Median: 35 years old	-	Yes	Yes (138/0/138)	-
Lidström et al., 2020	North of Stockholm, Sweden	May 2020	Cross-sectional study	Healthcare staff	8679	18-85 years old	-	Yes (All were asymptomatic)	Yes (8679/0/8679)	-
Haizler-Cohen et al., 2020	New York state, USA	May 2020	Cross-sectional study	Pregnant women	1671	-	-	No	Yes (1671/0/1671)	-
Martin et al., 2020	Leicester, UK	May 2020	Cross-sectional study	Hospital staff	10662	44 (33-53) years old	-	No	Yes (10662/0/10662)	-
Black et al., 2020	Leicester, UK	May 2020	Cross-sectional study	Co-workers at a UK renal transplant centre	200	45.3±12.0 years old	-	Yes	Yes (200/0/200)	-
Kassem et al., 2020	Egypt	June 2020	Cross-sectional study	Healthcare workers employed in the gastroenterology	74	Median: 32 years old	-	Yes	Yes (74/0/74)	Strict regulations on the use of personal protective
Hibino et al., 2020	Kanagawa, Japan	June 2020	Cross-sectional study	Medical staff	806	33 (21-83) years old	136 staff members had direct contact with COVID-19 patients	Yes	Yes (806/0/806)	Direct contact with COVID-19 patients while equipped with standard personal protective equipment.
Prendecki et al., 2020	England, UK	June 2020	Cross-sectional study	Kidney transplant recipients	855	57 (45-66) years old	-	No	Yes (855/0/855)	-
Nsn et al., 2020	UK	June 2020	Cross-sectional study	Nursing home residents	241	-	-	Yes	Yes (241/0/241)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Abdelmoniem et al., 2020	Cairo, Egypt	June 2020	Cross-sectional study	Frontline healthcare workers	203	31.9±6.6years old	-	Yes	Yes (203/0/203)	-
Pedersen et al., 2020	The Danish Capital Region, the Zealand Region, and the Central Denmark Region, Denmark	June 2020	Cross-sectional study	Retired blood donors; Active blood donors	Retired blood donors: 1201; Active blood donors: 1110	Retired blood donors: median (IQR): 73 (71-76) years old; Active blood donors: range: 18-69 years old	-	Yes	Yes (Retired blood donors: (1201/0/1201), Active blood donors: (1110/0/1110))	-
Dimcheff et al., 2020	Michigan and Ohio, USA	June 2020	Cross-sectional study	Employees of a Veterans Affairs Healthcare System	1476	Older than 18 years old	An exposure was defined as close contact (within six feet) with an individual with confirmed COVID-19 for greater than 15 minutes with the example being exposed to a family member at home who has had a positive COVID-19 nasal swab.	Yes	Yes (1476/0/1476)	All personnel who worked on the COVID-19 wards were provided powered air purifying respirators (PAPRs) or N95 respirators along with personal protective equipment (PPE) that consisted of face shields, gowns, and gloves according to Centers for Disease Control and Prevention (CDC) recommendations in the Winter of 2020.
Mesnil et al., 2020	Paris, France	June 2020	Cross-sectional study	Hospital professionals	646	39±11 years old	Working in COVID-19 unit	No	Yes (646/0/646)	Personal protective equipment for healthcare workers (HCW) in contact with COVID-19 patients (surgical or FFP2 masks for respiratory protection, disposable gown and protective goggles), use of High Efficiency Particulate Air filters (HEPA) for ventilators.
Insúa et al., 2020	Buenos Aires, Argentina	June 2020	Cross-sectional study	Staff physicians and residents from a children's hospital	116	45.6±13.3 years old	-	No	Yes (116/0/116)	-
Dimeglio et al., 2020	Toulouse, France	June 2020	Cross-sectional study	Healthcare workers	8758	40 (32-50) years old	-	Yes	Yes (8758/0/8758)	-
Mahajan et al., 2020	Connecticut, USA	June 2020	Cross-sectional study	Community residents	567	50.1±17.2 years old	-	Yes	Yes (567/0/567)	-
Dodd et al., 2020	44 states, USA	June 2020	Cross-sectional study	Blood donors	160328	Older than 16 years old	-	No	Yes (160328/0/160328)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Martínez-Baz et al., 2020	Pamplona, Spain	June 2020	Cross-sectional study	Health Workers	11201	Older than 18 years old	-	Yes	Yes (8665/0/11201)	-
Anand et al., 2020	USA	June 2020	Cross-sectional study	Adult patients receiving dialysis	31509	Older than 18 years old	-	No	Yes (28503/0/31509)	-
Lundkvist et al., 2020	Stockholm, Sweden	June 2020	Cross-sectional study	Residents in Norra Djurgårdsstadena and Tensta	Residents in Norra Djurgårdsstaden: 123 Residents in Tensta: 90	Mean: Residents in Norra Djurgårdsstaden: 37 years old; Residents in Tensta: 50 years old	-	No	Yes (Residents in Norra Djurgårdsstaden): 123/0/123, Residents in Tensta: 90/0/90)	-
Younas et al., 2020	Karachi, Pakistan	June 2020	Cross-sectional study	Blood donors	370	30.6±6.3 years old	-	No	Yes (370/0/370)	-
Gujski et al., 2020	Mazowieckie, Poland	June 2020	Cross-sectional study	Police employees	5802	Older than 20 years old	-	No	Yes (5082/0/5082)	-
Malani et al., 2020	Mumbai, India	June 2020	Cross-sectional study	Mumbai residents	Matunga Non-slums: 1183 Matunga Slums :2121 Chembur West Non-slums :941 Chembur West Slums: 1511 Dahisar Non-slums: 578 Dahisar Slums: 570	All older than 12 years old	-	No	Yes (Matunga Non-slums: 1183/0/1183; Matunga Slums :2121/0/2121; Chembur West Non-slums : 941/0/941; Chembur West Slums : 1511/0/1511; Dahisar Non-slums : 578/0/578; Dahisar Slums: 570/0/570)	-
Khan et al., 2020	Kashmir, India	June 2020	Cross-sectional study	Hospital visitors	2923	Older than 18 years old	-	Yes	Yes (2906/0/2923)	-
Pray et al., 2020	Wisconsin, USA	June 2020	Cross-sectional study	Summer school retreat attendees	152	Range: 14-45 years old	-	Yes	Yes (148/0/152)	-
Bloomfield et al., 2020	Prague, Czech Republic	July 2020	Cross-sectional study	General pediatric patients	200	Range: 0-18 years old	-	Yes	Yes (200/0/200)	-
Kumar et al., 2020	Kerala, India	July 2020	Cross-sectional study	healthcare workers	635	Mean (range): 34.8 (19-70) years old	-	Yes	Yes (635/0/635)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Noor et al., 2020	Peshawar, Pakistan	July 2020	Cross-sectional study	Healthcare workers	Healthcare worker in COVID-19 receiving hospital: 439; Healthcare worker in non-COVID-19 receiving hospital: 572	Healthcare worker in COVID-19 receiving hospital: 33.25±8.71 years old; Healthcare worker in non-COVID-19 receiving hospital: 33.94±11.77 years old	-	No	Yes (Healthcare worker in COVID-19 receiving hospital: 439/0/439; Healthcare worker in non-COVID-19 receiving hospital: 572/0/572)	-
Yamaki et al., 2020	California, USA	July 2020	Cross-sectional study	Patients who had visited an affiliated outpatient clinic or emergency department	992	Older than 10 years old	-	No	Yes (865/0/992)	-
Bajema et al., 2020	USA	July 2020	Cross-sectional study	Residual sera from commercial labs	177919	-	-	No	Yes (177919/0/177919)	-
Godbout et al., 2020	Virginia, USA	July 2020	Cross-sectional study	Healthcare workers	1962	19-75 years old	Provided direct care to COVID-19 patient	Yes	Yes (1962/0/1962)	-
Silva et al., 2020	Maranhão, Brazil	July 2020	Cross-sectional study	Residents	3289	All ages	-	Yes	Yes (3289/0/3156)	-
Kumar et al., 2020	Mumbai, India	Aug 2020	Cross-sectional study	HCWs from designated COVID-19 hospitals; HCWs from Non-COVID-19 hospitals	HCWs from designated COVID-19 hospitals: 401; HCWs from Non-COVID-19 hospitals: 400	Older than 20 years old	-	Yes	Yes (HCWs from designated COVID-19 hospitals: 401/0/401; HCWs from Non-COVID-19 hospitals: 400/0/400)	-
Chau et al., 2020	Ho Chi Minh City, Vietnam	Aug 2020	Cross-sectional study	Health care workers of a tertiary referral hospital	408	Mean (range): 32 (20-60) years old	Caring for COVID-19 patients or conducting SARS-CoV-2 testing	No	Yes (408/0/408)	-
Preprint database										
Sughayer et al., 2020	Amman, Jordan	Jan 2020	Cross-sectional study	Healthy blood donors	746	18-63 years old	Poorly-defined exposures	Yes	Yes (746/0/746)	-
Germain et al., 2020	France	Jan 2020	Cross-sectional study	Tissue donors	144	Median (IQR): 68 (57-79) years old	-	No	Yes (144/0/144)	-
Martinez-Acuña et al., 2020	Nuevo Leon, Mexico	Jan 2020	Cross-sectional study	Blood donors	1968	Median (IQR): 34.8 (18-65) years old	-	Yes	Yes (1931/0/1968)	-
McCulloch et al., 2020	Washington, USA	Jan 2020	Cross-sectional study	Inpatients and outpatients who underwent routine screening	916	Median (IQR): 45 (32.5-60) years old	-	No	Yes (916/0/916)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Chang et al., 2020	Hubei, Hebei, Guangdong, China	Jan 2020;	Cross-sectional study	Blood donors	Wuhan, Hubei, China: 17794; Shijiazhuang, Hebei, China: 13540; Shenzhen, Guangdong, China: 6810	Wuhan, Hubei, China: 33 (IQR 19-47) years old; Shijiazhuang, Hebei, China: 40 (IQR 33-48) years old; Shenzhen, Guangdong, China: 36 (IQR 19-53) years old	Poorly-defined exposures	Yes	Yes (Wuhan, Hubei, China: 17794/0/17794; Hebei, China: 13540/0/13540; Guangdong, China: 6810/0/6810)	-
Li et al., 2020	Shanghai, China	Feb 2020	Cross-sectional study	Individuals with different ocular diseases	1331	Median (IQR): 58 (36-68) years old	-	No	Yes (1331/0/1331)	-
Xiong et al., 2020	Wuhan, Hubei, China	Feb 2020	Longitudinal study	Healthcare workers with intensive exposure to COVID-19 patients	797	31 (23–53) years old	Close contact with COVID-19 patients	Yes (All were asymptomatic)	Yes (785/12/797)	Among infected healthcare workers: 15 of 35 dressed in full PPE, and 16 worn N95 mask and gown
Valenti et al., 2020	Milan, Italy	Feb 2020	Cross-sectional study	Blood donors	789	18-70 years old	-	Yes	Yes (789/0/789)	-
Yu et al., 2020	Hubei, China	Feb 2020	Cross-sectional study	Health Care Workers	1184	33 (20-68) years old	Contact with confirmed COVID-19 patient	Yes	Yes (337/0/1184)	All HCWs were requested to strictly followed the requirements of hand hygiene and proper personal protective equipment.
Kuwelker et al., 2020	Bergen, Norway	Feb 2020	Cross-sectional study	Household members of confirmed cases	179	33±19 years old	-	Yes	Yes (179/0/179)	-
Liu et al., 2020	Wuhan, Hubei, China	Feb 2020	Cross-sectional study	Healthcare providers; general workers; other patients	Healthcare providers: 3832 general workers: 19555 other patients: 1616	Mean age: Healthcare providers: 37.1 years old; general workers: 41.6 years old; other patients: 53.3 years old	Most of the healthcare providers were exposed to SARS-CoV-2 during the first few months of the outbreak when use of personal protection equipment was sparse as person-to-person transmission was not suspected;	No	Yes (Healthcare providers: 3832/0/3832, general workers: 19555/0/19555, other patients: 1616/0/1616)	-
Kamath et al., 2020	New York State, USA	Mar 2020	Cross-sectional study	Healthy blood donors	1559	17-80 years old	-	No	Yes (1559/0/1559)	-
Santana et al., 2020	São Paulo, Brazil	Mar 2020	Longitudinal study	Patients on disease-modifying anti-rheumatic drugs	100	Median: 46.5 (14.2) years old	-	Yes	Yes (6/94/100)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Tubiana et al., 2020	Paris, France	Mar 2020	Longitudinal study	Healthcare workers	154	Median (IQR): 35 (29.0-46.8) years old	Exposed to COVID-19 index	No	Yes (147/0/154)	-
Skowronski et al., 2020	British Columbia,Canada	Mar 2020	Cross-sectional study	Anonymized residual sera were obtained from patients	Mar 2020: 870; May 2020: 889	Median: 45 years old	Poorly-defined exposures	No	Yes (Mar 2020: 869/0/870; May 2020: 885/0/889)	-
Vu et al., 2020	France	Mar 2020	Cross-sectional study	Individuals undergoing routine diagnosis	Mar: 3834 Apr: 3595 May: 3592	All ages	-	No	Yes (Mar:3834/0/3834; Apr:3595/0/3595; May:3592/0/3592)	-
Dietrich et al., 2020	Louisiana, USA	Mar 2020	Cohort study	Children from a Children's Hospital	812	Median (IQR): 11 (4–15) years old	-	No	Yes (68/744/812)	-
Brehm et al., 2020	Hamburg, Germany	Mar 2020	Longitudinal study	Health care workers; non-health care workers	Health care workers: 1026; non-health care workers: 227	Mean (range): 38.4 (16-69) years old	Health care workers: Contact to covid-19 cases	Yes	Yes (Health care workers: 1026/0/1026, non-health care workers: 227/0/227)	-
Tang et al., 2020	Wuhan, Hubei, China	Mar 2020	Cross-sectional study	Outpatients in Zhongnan Hospital, Wuhan University	2952	All ages	-	Yes	Yes (2952/0/2952)	-
Augusto et al., 2020	London, UK	Mar 2020	Cross-sectional study	healthcare workers	400	36.7 (10.4) years old	Contact with confirmed COVID-19 patient, Contact with confirmed COVID-19 colleague.	Yes	Yes (385/0/400)	-
Wang et al., 2020	Anhui, China	Mar 2020	Cross-sectional study	Healthcare workers deployed to Wuhan; Healthcare workers who remained in Hefei	Healthcare workers deployed to Wuhan: 142 Healthcare workers who remained in Hefei: 284	Over 20 years old	Provided care for patients with COVID-19.	No	Yes (Healthcare workers deployed to Wuhan: 142/0/142; Healthcare workers who remained in Hefei: 284/0/284)	Healthcare workers deployed to Wuhan were provided with adequate supply of PPE.
Ling et al., 2020	Wuhan, Hubei, China	Mar 2020	Cross-sectional study	Persons experiencing back-to-work medical examinations	18721	40 (42–50) years old	-	Yes	Yes (18391/0/18721)	-
Paradiso et al., 2020	Bari, Italy	Mar 2020	Longitudinal study	Healthcare worker	606	47 (20-73) years old	Direct contact with individuals with suspected COVID-19 disease in the last two weeks	Yes	Yes (213/393/606)	-
Herzog et al., 2020	Belgium	Mar 2020	Cross-sectional study	Persons with blood samples collected from clinical lab	Period 1: 3910 Period 2: 3397 Period 3: 3242 Period 4: 2960 Period 5: 3023	Mean: 55 years old Mean: 49 years old - - -	-	No	Yes (Collection period 1: 3910/0/3910, Collection period 2: 3397/0/3397, Collection period 3: 3242/0/3242, Collection period 4: 2960/0/2960, Collection period 5: 3023/0/3023)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Dopico et al., 2020	Stockholm, Sweden	Mar 2020	Cross-sectional study	Blood donor and pregnant women	1900	-	-	No	Yes (1900/0/1900)	-
Streeck et al., 2020	Heinsberg, Germany	Mar 2020	Cross-sectional study	Local inhabitants	1007	53 (1-90) years old	-	Yes	Yes (919/0/1007)	-
Doi et al., 2020	Kobe, Japan	Mar 2020	Cross-sectional study	Patients who visited outpatient clinics with blood samples	1000	All ages	-	No	Yes (1000/0/1000)	-
Tosato et al., 2020	Italy	Apr 2020	Cross-sectional study	Healthcare professionals	133	51 (39–55) years old	-	Yes	Yes (133/0/133)	PPE together with social distancing and preventive hygiene measures were applied by all our staff since the spread of the pandemic in our country.
Carozzi et al., 2020	Tuscany, Italy	Apr 2020	Cross-sectional study	Health care workers	17098	-	-	Yes	Yes (17098/0/17098)	-
Siddiqui et al., 2020	New Delhi, India	Apr 2020	Longitudinal study	Staff of a tertiary care hospital; individuals visiting that hospital for COVID-19 testing	Staff of a tertiary care hospital: 448; individuals visiting that hospital for COVID-19 testing: 332	Older than 18 years old	Contact with symptomatic/suspected person	Yes	Yes (Staff of a tertiary care hospital: 448/0/448, individuals visiting that hospital for COVID-19 testing: 332/0/332)	-
Davis et al., 2020	England, UK	Apr 2020	Longitudinal study	Staff and postgraduate students	2807	Mean: 37 years old	-	Yes	Yes (1882/0/2807)	-
Kammon et al., 2020	Alzintan, Libya	Apr 2020	Cross-sectional study	Community residents; Healthcare workers	142 community residents; 77 healthcare workers:	All ages	-	Yes	Yes (Community residents: 142/0/142; Healthcare workers: 77/0/77)	The healthcare workers took effective protection measures while dealing with patients
Wagner et al., 2020	Vienna, Austria	Apr 2020	Longitudinal study	working adults	1655	Older than 15 years old	-	Yes	Yes (1655/unk/1655)	-
Bendavid et al., 2020	California, USA	Apr 2020	Cross-sectional study	Local residents	3439	All ages	-	Yes	Yes (3330/0/3439)	-
Egerup et al., 2020	Copenhagen, Denmark	Apr 2020	Cross-sectional study	Parturient women; partners of parturient women; newborns	Parturient women: 1361; partners of parturient women: 1236; newborns: 1342	-	-	Yes	Yes (Parturient women: 1313/0/1361, partners of parturient women: 1189/0/1236, newborns: 1206/0/1342)	-
Krähling et al., 2020	Frankfurt, Germany	Apr 2020	Cross-sectional study	Employees in the Frankfurt metropolitan area	1000	18-65 years old	-	Yes	Yes (1000/0/1000)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Richard et al., 2020	Geneva, Switzerland	Apr 2020	cross-sectional study	general population	8344;	Median (IQR): 46.9 (5 – 94) years old	-	Yes	Yes (8344/0/8344)	-
Nopsopon et al., 2020	Thailand	Apr 2020	Cross-sectional study	Hospital staff; patients who needed procedural treatment or operation	Hospital staff: 675 patients who needed procedural treatment or operation: 182	Hospital staff: median (IQR): 36.5 (28–45) years old patients who needed procedural treatment or operation: median (IQR): 37 (25–53) years old	Some of the hospital staff and patients have the history of travel to high risk area and of close contact confirmed case	Yes	Yes (Hospital staff: 675/0/675, patients who needed procedural treatment or operation: 182/0/182)	-
Leidner et al., 2020	Oregon, USA	Apr 2020	Longitudinal study	Healthcare workers	10019	42 (18-82) years old	Direct patient contact, contact with patient biospecimens or patient linens	Yes	Yes (10019/0/10019)	Rigorous enforcement of PPE
Halbrook et al., 2020	California, USA	Apr 2020	Cross-sectional study	Health system workers; first responders	Health system workers: 1108; first responders: 679	Older than 18 years old	-	Yes	Yes (Health system workers: 1108/0/1108; first responders: 679/0/679)	-
Fujita et al., 2020	Kyoto, Japan	Apr 2020	Cross-sectional study	Healthcare workers	92	Older than 20 years old	Treat suspected COVID-19 cases	Yes	Yes (92/0/92)	-
Bal et al., 2020	Lyon, France	Apr 2020	Cross-sectional study	Health care workers	252	Median (IQR): 35.9 (27.5-47) years old	-	Yes	Yes (190/0/252)	-
Psichogiou et al., 2020	Greece	Apr 2020	Cross-sectional study	Healthcare workers from two hospitals (Hospital-1 was involved in the care of COVID-19 patients while hospital-2 was not)	Hospital-1 HCWs: 906 Hospital-2 HCWs: 589	Older than 18 years old	First-line health care workers (FL-HCWs), defined as personnel whose activities involve contact with patients.	Yes	Yes (Hospital-1 HCWs: 906/0/906, hospital-2 HCWs: 589/0/589)	Only suboptimal use of personal protective equipment was noted in both hospitals.
Thomas et al., 2020	Minnesota, USA	Apr 2020	Cross-sectional study	Health Care Workers; Asymptomatic outpatients	1282 2379	49 (0.17-93) years old 41 (18-73) years old	With confirmed and non-confirmed COVID-19 exposures ≥14 days prior Potential COVID-19 exposures or history of prior symptoms consistent with COVID-19 ≥14 days prior.	Yes	Yes (Health Care Workers:1282/0/1282; Asymptomatic outpatients:2379/0/2379)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Woon et al., 2020	Klang Valley, Malaysia	Apr 2020	Cross-sectional study	Asymptomatic healthcare workers	400	34.9±7.8 years old	Close contact with infected patients; Prolonged face-to-face exposure with infected patients, Handled/contact with body fluids of infected patients, Contact with contaminated objects, contaminated surfaces	Yes	Yes (400/0/400)	-
Cohen et al., 2020	Paris, France	Apr 2020	Cross-sectional study	Children consulting an ambulatory pediatrician	605	4.9±3.9 years old	Contact with confirmed/ suspected COVID-19	Yes	Yes (605/0/605)	543 available contact data on 605 enrolled patients
Sikora et al., 2020	UK	Apr 2020	Cross-sectional study	Cancer centre staff	161	Mean: 43 years old	-	No	Yes (161/0/161)	-
Galán et al., 2020	Madrid, Spain	Apr 2020	Cross-sectional study	Healthcare workers	2919	43.8 ±11.1 years old	Direct contact with COVID-19 patients	Yes	Yes (2590/0/2919)	27% of them without using appropriate PPE.
Garralda et al.., 2020	Madrid, Spain	Apr 2020	Cross-sectional study	Health care workers	2439	mean (range): 42.1 (18-65) years old	Unsafe contact or exposure to a confirmed case	Yes	Yes (2439/0/2439)	Mandatory use of face mask inside hospital since Mar 13, 2020
Erber et al., 2020	Munich, German	Apr 2020	Cross-sectional study	Clinical staff, non-clinical MRI staff, and medical students	4604	Older than 18 years old	Patient facing role, Aerosol generating procedures, COVID-19 assigned area	Yes	Yes (4554/0/4604)	-.
Garritsen et al., 2020	Netherland	Apr 2020	Longitudinal study	Individuals that had experiencing symptoms	7241	Median (IQR): 50(40-59) years old	-	Yes	Yes (unk/unk/7241)	-
Snoeck et al., 2020	Luxembourg	Apr 2020	Cohort study	General population	1862	47±15 years old and 18–84 years old	-	Yes	Yes (1820/0/1862)	-.
Comar et al., 2020	Trieste, Italy	Apr 2020	Cross-sectional study	Healthcare workers	727	22-77 years old	-	Yes	Yes (727/0/727)	-
Nisar et al., 2020	Karachi, Pakistan	Apr 2020	Cross-sectional study	Households	April: 1000; June: 1004	All ages	-	No	Yes (April: 1000/0/1000; June: 1004/0/1004)	-
Wang et al., 2020	Beijing, China	Apr 2020	Cross-sectional study	Communities residents	2184	42.3±19.5 years old	-	Yes	Yes (2184/0/2184)	-
Lisandru et al., 2020	Corsica, France	Apr 2020	Cross-sectional study	Patients having carried out a blood analysis	1973	Median (IQR): 52 (34-70) year	-	No	Yes (1973/0/1973)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Zou et al., 2020	Atlanta, USA	Apr 2020	Cross-sectional study	Local residents	142	-	-	No	Yes (127/0/142)	-
Nopsopon et al., 2020	Ranong, Thailand	Apr 2020	Cross-sectional study	Hospital staff	844	42 (32-50) years old	History of travel to the high-risk area was 2.5%, history of close contact PCR confirmed COVID-19 case was 2.0%, history of close contact suspected case was 38.1%.	Yes	Yes (844/82/844);	-
McDade et al., 2020	USA	Apr 2020	Longitudinal study	Household members of essential workers	202	Range: 18-70 years old	-	Yes	Yes (177/25/202)	-
Baker et al., 2020	Atlanta,USA	Apr 2020	Cross-sectional study	Medical staff members	10275	-	Caring for COVID-19 positive patient(s), Community contact with confirmed/suspected positive individual(s)	Yes	Yes (10275/0/10275)	-
Appa et al., 2020	California, USA	Apr 2020	Cross-sectional study	Residents and county essential workers	1880	Older than 4 years old	-	Yes	Yes (1810/0/1880)	-
Baxendale et al., 2020	Royal Papworth Hospital, UK	Apr 2020	Cross-sectional study	Medical staff	500	Median (IQR): 42 (33-51) years old	Critical-care patient facing, non-critical-care patient facing	Yes	Yes (493/0/500)	-
Elli et al., 2020	Milan, Italy	Apr 2020	Cross-sectional study	Celiac disease patients	362	Age at enrolment 45±15 years, age at diagnosis 33±16	-	Yes	Yes (109/0/362)	-
Takita et al., 2020	Tokyo, Japan	May 2020	Cross-sectional study	Community residents	1071	All ages	-	Yes	Yes (1071/0/1071)	-
Tönshoff et al., 2020	Baden-Württemberg, Germany	Apr 2020	Cross-sectional study	Children and their parents	4964	Children: 1-10 years old; Parents: 23-66 years old	-	Yes	Yes (4964/0/4964)	-
Mortgat et al., 2020	Belgium	Apr 2020	Cross-sectional study	Healthcare worker	699	Median: 39.5 years old	-	Yes	Yes (699/0/699)	-
Jerković et al., 2020	Croatia	Apr 2020	Cross-sectional study	Industry workers	1494	46 (18–79) years old	-	Yes	Yes (1494/0/1494)	-
Alessandro et al., 2020	Lombardy, Italy	Apr 2020	Cross-sectional study	General population Healthcare Workers	1792 2415	44±16 years old 48±10 years old	Contacts with patients	No	Yes (General population:1792/0/1792; Healthcare Workers:2415/0/2415)	PPE adopted since the beginning of the local spread of pandemic disease

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Dillner et al., 2020	Stockholm, Sweden	Apr 2020	Cross-sectional study	Healthy hospital employees	14057	All ages	-	No	Yes (12928/0/14057)	-
Alemu et al., 2020	Addis Ababa, Ethiopia	Apr 2020	Cross-sectional study	Residents	301	30±10.9 years old	-	No	Yes (301/0/301)	-
Aziz et al., 2020	Bonn, Germany	Apr 2020	Cross-sectional study	Community residents	4771	30-100 years old	-	No	Yes (4755/0/4771)	-
Chamie et al., 2020	San Francisco, USA	Apr 2020	Cross-sectional study	All residents (>4 years) and workers in census tract	3953	Older than 4 years old	-	Yes	Yes (3861/0/3953)	-
Nesbitt et al., 2020	Rhode Island, USA	Apr 2020	Cross-sectional study	Blood donor	2008	Median: 56 years old	-	No	Yes (1996/0/2008)	-
Wells et al., 2020	London & South-East England, UK	Apr 2020	Cross-sectional study	Members of the Twins UK cohort	431	48.38±28 years old	-	Yes	Yes (431/0/431)	-
Fontanet et al., 2020	Paris, France	Apr 2020	Cross-sectional study	Pupils, their parents and relatives, and staff of primary schools	1340	The pupils: 6-11 years old; Parents: 40 (37-44) years old; Teachers: 47.5 (40-51) years old; Non-teaching staff: 47.5 (32-54) years old	-	Yes	Yes (1340/0/1340)	-
Anna et al., 2020	Paris, France	Apr 2020	Cross-sectional study	Institute Curie workers	1847	Mean:38 years old; Range:19-75 years old	-	Yes	Yes (1847/0/1847)	-
Sandri et al., 2020	Lombardy, Italy	Apr 2020	Cross-sectional study	Health care and administrative staff	3985	Median (IQR): 42 (21-86) years old	-	Yes	Yes (3985/0/3985)	All of the personnel working in the emergency room or customer care had to wear obligatory PPE
Calife et al., 2020	Baixada Santista metropolitan area, Brazil	-	Cross-sectional study	Residents	2342	37.78±19.98 years old	-	No	Yes (2342/0/2342)	-
Brant et al., 2020	California, USA	May 2020	Cross-sectional study	Health care workers	3013	42.62±12.12 years old	-	No	Yes (2932/0/3013)	Appropriate PPE usage since January 2020

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Brant-Zawadzki et al., 2020	Orange County, USA	May 2020	Cross-sectional study	Health care workers First responders	Baseline: Health care workers 3458; First responders 226; Follow up: Health care workers 2754; First responders 92	Health care workers: 42.33±12.13 years old First responders: 42.0±8.61 years old	-	Yes	Yes (Health care workers (3458/2754/3458); First responders (226/92/226)	-
Jones et al., 2020	England, UK	May 2020	Cross-sectional study	HCWs and support staff	12254	-	-	No	Yes (6858/0/12254)	-
Li et al., 2020	Shanghai, China	May 2020	Cross-sectional study	Patients with ocular surface diseases; Patients with no-ocular surface diseases; Patients without ocular disease	Patients with ocular surface diseases: 330; Patients with no-ocular surface diseases: 4614; Patients without ocular disease: 1470	-	-	No	Yes (Patients with ocular surface diseases: 330/0/330; Patients with no-ocular surface diseases: 4614/0/4614; Patients without ocular disease: 1470/0/1470)	-
Barallat et al., 2020	Barcelona, Spain.	May 2020	Cross-sectional study	Healthcare worker	7563	43.81±12.43 years old	Hospital admitted for COVID was low	Yes	Yes (7563/0/7563)	Recommend to continue to wear personal protective equipment
Tess et al., 2020	São Paulo, Brazil	May 2020	Cross-sectional study	Local inhabitants	517	Older than 18 years old	-	Yes	Yes (517/0/517)	-
Mattern et al., 2020	Paris, France	May 2020	Cross-sectional study	All patients admitted to the delivery room	272	Median (IQR): 31 (30.5-37) for seropositive individuals; Median (IQR): 33 (29-36) for seronegative individuals;	-	Yes	Yes (249/0/272)	-
Carrat et al., 2020	Ile-de-France, Grand Est, Nouvelle-Aquitaine, France	May 2020	Cross-sectional study	General adult population	14628	-	-	Yes	Yes (14628/0/14628)	-
Samore et al., 2020	Utah, Salt Lake, Davis, and Summit, USA	May 2020	Cross-sectional study	Community-representative participants	8108	Median (IQR): 44 (30-62) years old	-	No	Yes (8108/0/8108)	-
Dupraz et al., 2020	Vaud, Switzerland	May 2020	Cross-sectional study	Household members; Close contacts outside the household	Household members: 302; Close contacts outside the household: 69	Household members: 37±21.3 years old; Close contacts outside the household: 47.8±17years old	Household members: close contact with confirmed case; Close contacts outside the household: close contact with confirmed case	Yes	Yes (Household members: 302/0/302; Close contacts outside the household: 69/0/69)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Royo-Cebrecos et al., 2020	Andorra, Europe	May 2020	Cross-sectional study	Entire population in Andorra	First survey: 70389; Second survey: 63708;	Older than 2 years old	-	Yes	Yes (First survey: 70389/0/70389; Second survey: 63708/0/63708)	-
McLaughlin et al., 2020	Blaine County Idaho, USA	May 2020	Cross-sectional study	Residents of Blaine County	917	Older than 18 years old	-	No	Yes (917/0/917)	-
Rauber et al., 2020	Bundesland, Germany	May 2020	Cross-sectional study	Individuals undergone liver transplantation	219	56.9 (18.1-78.2) years old	-	Yes	Yes (219/0/219)	-
McBride et al., 2020	New York City, USA	May 2020	Cross-sectional study	Outpatients coming into the Department of Radiation Oncology	919	62 (6-96) years old	-	Yes	Yes (919/0/919)	-
Jõgi et al., 2020	Saaremaa and Tallinn county, Estonia	May 2020	Cross-sectional study	Participants consulted in general practitioners	1960	All ages	-	Yes	Yes (1960/0/1960)	-
Ebinger et al., 2020	California, USA	May 2020	Cross-sectional study	Health Care Workers	6062	All ages	Regular contact with Covid-19 patients; work on a unit housing/caring for Covid-19 patients	Yes	Yes (6062/0/6062)	-
Hurk et al., 2020	Netherlands	May 2020	Cross-sectional study	Blood donor	8275	Range: 18-73 years old	-	Yes	Yes (7150/0/8275)	-
Hassan et al., 2020	Stockholm, Sweden	May 2020	Cross-sectional study	Home care employees	405	Median (IQR): 43 (32-44) years old	-	No	Yes (403/0/405)	-
Weis et al., 2020	Jena, Germany	May 2020	Cross-sectional study	Community residents	626	Adult: 58.1 years old, Children: 9.62 years old	-	Yes	Yes (620/0/626)	-
Rigatti et al., 2020	USA	May 2020	Cross-sectional study	Life insurance applicants	50025	Median (IQR): 42 (34-54) years old	-	Yes	Yes (50025/0/50025)	-
Faniyi et al., 2020	Birmingham NHS Foundation Trust, UK	May 2020	Cross-sectional study	Health Care Workers	392	Median (IQR): 41 (30-50) years old	-	Yes	Yes (392/0/392)	-
Stout et al., 2020	USA	May 2020	Cross-sectional study	Life insurance applicants	May: 18441 Jun: 31822 Sep: 63103	Median (IQR): 42 (33-54) years old	-	Yes	Yes (May:18441/0/18441; Jun:31822/0/31822; Sep:63103/0/63103)	-
Gomes et al., 2020	Espírito Santo, Brazil	May 2020	Cross-sectional study	General population	4612	All ages	-	Yes	Yes (4608/0/4608)	-

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Wu et al., 2020	Wuhan, Hubei, China	May 2020	Cross-sectional study	People living with HIV; HIV-naïve residents	People living with HIV: 857; HIV-naïve residents: 1048	People living with HIV: 39.7±14.1years old; HIV-naïve residents living in the Wuchang district: 47.4±14.2 years old	-	No	Yes (People living with HIV: 857/0/857; HIV-naïve resident: 1048/0/1048)	-
Rebeiro et al., 2020	Tennessee, USA	May 2020	Cross-sectional study	health care workers	11787	Older than 18 years old	-	No	Yes (11787/0/11787)	-
Schubl et al., 2020	California, USA	May 2020	Cross-sectional study	healthcare worker	1557	Older than 18 years old	Known COVID-19 exposure at home and job-related exposure	Yes	Yes (1557/0/1557)	-
Majdoubi et al., 2020	Greater Vancouver, Canada	May 2020	Cross-sectional study	Adult residents	276	42.4±11.9 years old	-	Yes	Yes (276/0/276)	-
Nakamura et al., 2020	Iwate, Japan	May 2020	Cross-sectional study	Healthcare workers	1000	40±11 years old	-	No	Yes (1000/0/1000)	No confirmed COVID-19 cases were reported in the local
Tsertsvadze et al., 2020	Tbilisi, Georgia	May 2020	Cross-sectional study	Adult residents of capital city of Tbilisi	1068	Older than 18 years old	Contact with suspected or confirmed case, History of international travel	Yes	Yes (1068/0/1068)	-
Reuben et al., 2020	Washington, USA	May 2020	Cross-sectional study	First responders	399	42.55±9.07 years old	Occupational exposure	Yes	Yes (310/0/399)	-
Bahrs et al., 2020	Germany	May 2020	Cross-sectional study	Employees at a University Hospital	660	Median (IQR): 40.5 (32.0-49.0) years old	-	Yes	Yes (660/0/660)	Mandatory masking since March
Chibwana et al., 2020	Blantyre City, Malawi	May 2020	Cross-sectional study	Health care workers	500	31 (20-64) years old	Involved in clinical work related to COVID-19	Yes	Yes (500/0/500)	-
Laub et al., 2020	Bavaria, Germany	May 2020	Cross-sectional study	Children with pediatric multiorgan immune syndrome	2934	Median (IQR): 7 (4-10) years old	-	Yes	Yes (2932/0/2934)	-
Armann et al., 2020	Saxony, Germany	May 2020	Longitudinal study	Students and teachers	Students grade 8–11: 1538; Teachers: 507; 4 weeks after the end of the summer holidays: Students grade 8–11: 1334; Teachers: 445;	Median (IQR): Students grade 8–11: 15 (14-16) years old; Teachers: 51 (37-57) years old;	-	Yes	Yes (Students grade 8–11: 204/1334/1538; Teachers: 62/445/507)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Hibino et al., 2020	Tokyo, Japan	May 2020	Longitudinal study	Healthy volunteers working for a Japanese company	650	Range: 19-69 years old	-	No	Yes (350/0/650)	-
Barchuk et al., 2020	Saint Petersburg, Russia	May 2020	Cross-sectional study	Adults residents	1038	Older than 18 years old	-	Yes	Yes (1038/0/1038)	-
Wilkins et al., 2020	Illinois, USA	May 2020	Cross-sectional study	Healthcare workers	6714	40.6±12.0 years old	-	No	Yes (6510/0/6714)	Adequate PPE available for use by all staff at all times.
Abo-Leyah et al., 2020	Scotland, UK	May 2020	Cross-sectional study	Health and social care workers; Blood Samples taken at general practice surgeries	Health and social care workers: 2062; Blood Samples taken at general practice surgeries: 231	Mean: 44.8 years old	-	Yes	Yes (Health and social care workers: 2062/0/2062; Blood Samples taken at general practice surgeries: 231/0/231)	-
Vince et al., 2020	Croatia	May 2020	Longitudinal study	Football players and club staff	350	28.5 ±9.1 years old	-	Yes	Yes (0/305/350)	-
Alkurt et al., 2020	Istanbul and Kocaeli, Turkey	May 2020	Cross-sectional study	Healthcare workers	813	-	-	Yes	Yes (813/0/813)	-
Vassallo et al., 2020	USA	Jun 2020	Cross-sectional study	Blood Donors	189656	Older than 16 years old	-	No	Yes (189656/0/189656)	-
Melo et al., 2020	Sergipe, Brazil	Jun 2020	Cross-sectional study	Healthcare workers	471	-	-	No	Yes (471/0/471)	-
Favara et al., 2020	Eastern Region, UK	Jun 2020	Longitudinal study	Staff involved in treating cancer patients	434	40 (19-66) years old	Working within the oncology department ward or out-patient setting and not primarily within a dedicated SARS-CoV-2 in-patient ward	Yes	Yes (434/0/434)	-
Remes-Troche et al., 2020	Veracruz, Mexico	Jun 2020	Cross-sectional study	Adults outpatients	2174	41.8±15.17 years old	-	Yes	Yes (2174/0/2174)	-
Ladage et al., 2020	Austria	-	Cross-sectional study	Inhabitants in a township	835	-	-	Yes	Yes (835/0/835)	-
Silva et al., 2020	Buenos Aires, Argentina	Jun 2020	Cross-sectional study	Healthcare workers from public facilities	738	Older than 18 years old	Close contact with a confirmed case of COVID- 19	Yes	Yes (738/0/738)	75.86% of people claimed to always use Personal Protective Equipment, 16.4% use PPE most of the time.

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Craigie et al., 2020	Dunedin, New Zealand	Jun 2020	Cross-sectional study	Probable cases and higher risk individuals	1127 9	49 (10-59) years old 46 (4–90) years old	-	-	Yes (1127/0/1127, 9/0/9)	-
Silva et al., 2020	São Paulo, Brazil	Jun 2020	Cross-sectional study	Professionals in research institute	406	Median (IQR): 50 (40-57) years old	-	Yes	Yes (406/0/406)	-
Strazzulla et al., 2020	le de France region, France	Jun 2020	Cross-sectional study	Nursing home residents	66	78.27±10.64 years old	-	Yes	Yes (61/0/66)	-
Ray et al., 2020	New Delhi, India	Jun 2020	Cross-sectional study	Patients who were admitted to the medicine wards and intensive care unit (ICU)	212	41.2±15.4 years old	-	No	Yes (212/0/212)	-
Bardai et al., 2020	Montreal, Canada	Jun 2020	Cross-sectional study	Children patients; accompanying persons; hospital employees	Children patients: 39; accompanying persons: 61; hospital employees: 99	Median (IQR): Children patients: 15.6 (13.4-16.8) years old; accompanying persons: 47.1 (41.4; 50.8) years old; hospital employees: 42.5 (32.5; 52.5)	-	Yes	Yes (Children patients: 39/0/39, accompanying persons: 61/0/61, hospital employees: 99/0/99)	-
Cooper et al., 2020	Cambridge University Hospitals NHS Foundation Trust, UK	Jun 2020	Cross-sectional study	Staff member	5698	Median: 38 years old	-	Yes	Yes (5698/0/5698)	-
Hommes et al., 2020	Berlin, Germany	Jun 2020	Cross-sectional study	Students and teachers	535	-	-	Yes	Yes (527/0/535)	-
Nishida et al., 2020	Osaka Prefecture, Japan	Jun 2020	Cross-sectional study	Hospital staff	926	40.0±11.8 years old	Direct contact with confirmed or suspected COVID-19 patients	Yes	Yes (925/0/926)	Standard precautions for general patients and personal protective equipment, including N95 masks, face shields, caps, gowns and double gloves, were used, when treating patients with suspected or confirmed COVID-19.
Nawa et al., 2020	Tochigi, Japan	Jun 2020	Cross-sectional study	Households randomly selected from Utsunomiya City's basic resident registry	2290	All ages	-	Yes	Yes (742/0/2290)	All cases were afebrile

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Qutob et al., 2020	West Bank, Palestine	May 2020	Cross-sectional study	West Bank's residents; Individuals visiting medical laboratories	West Bank's residents: 1355; Individuals visiting medical laboratories: 1136;	Older than 15 years old	-	No	Yes (Individuals visiting medical laboratories: 1136/0/1136; West Bank's residents: 1319/0/1355)	-
Khan et al., 2020	District Srinagar, India	Jun 2020	Cross-sectional study	Healthcare workers	2915	38.6 years old	-	Yes	Yes (2905/0/2915)	-
Haq et al., 2020	Peshawar city, Pakistan	Jun 2020	Cross-sectional study	Healthcare workers	1011	33.6 ±10.5 years old	Direct contact with COVID patient;	Yes	Yes (1011/0/1011)	Inadequate use of PPE
Jin et al., 2020	New York City Metro, USA	Jun 2020	Cross-sectional study	Blood Donors	1000	Range: 16-78 years old	-	No	Yes (1000/0/1000)	-
Ulyte et al., 2020	Zurich, Switzerland	Jun 2020; Oct 2020	Longitudinal study	School children	2603	range: 6-16 years old	-	No	Yes (107/2496/2603)	-
Asuquo et al., 2020	Calabar, Nigeria	Jun 2020	Cross-sectional study	Clinic staff and patients	66	Older than 18 years old	-	No	Yes (66/0/66)	-
Ward et al., 2020	England, UK	Jun 2020	Cross-sectional study	Community adults	105651	Older than 18 years old	-	Yes	Yes (Round1: 99908/0/99908; Round2: 105829/0/105829; Round3: 159367/0/159367)	-
Menezes et al., 2020	Brazil	Jun 2020	Cross-sectional study	Community residents	33205	All ages	-	Yes	Yes (31869/0/33205)	-
Laursen et al., 2020	Sweden and Denmark	Jun 2020	Longitudinal study	Employees in a rescue corps	3272	Majority: 40-60 years old	-	No	Yes (3243/0/3272)	-
Kahlert et al., 2020	Northern and Eastern Switzerland, Switzerland	Jun 2020	Cross-sectional study	Hospital Workers	4664	Median (IQR): 38.3 (29.7-49.5) years old	-	No	Yes (4664/0/4664)	-
ROEDERER et al., 2020	Paris and Seine-Saint-Denis, France	Jun 2020	Cross-sectional study	Residents in food distribution sites, emergency shelters, and workers residences	818	Mean: 39 years old	-	Yes	Yes (818/0/818)	-
Demonbreun et al., 2020	Illinois, USA	Jun 2020	Cross-sectional study	Community/university-based participants	1545	Older than 18 years old	-	Yes	Yes (1545/0/1545)	-
Ariza et al., 2020	Bogotá, Colombia	Jun 2020	Longitudinal study	medical trainees or medical doctors	351	-	-	Yes	Yes (351/335/351)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Majiya et al., 2020	Niger State, Nigeria	Jun 2020	Cross-sectional study	Residents	185	All ages	Travel overseas, contact with overseas returnee	Yes	Yes (185/0/185)	-
Javed et al., 2020	Peshawar and Quetta, Pakistan	Jul 2020	Cross-sectional study	Working population	24210	18-65 years old	-	Yes	Yes (24210/0/24210)	-
Buonsenso et al., 2020	Rome, Italy	-	Cross-sectional study	Household contacts of index patients	80	0-56 years old	Household contacts of index patients	No	Yes (80/0/80)	-
Kasztelewicz et al., 2020	Warsaw, Poland	Jul 2020	Longitudinal study	Healthcare workers in a tertiary pediatric hospital	2282	Mean (range): 48 (38-56) years old	Contact with confirmed COVID-19 patient	Yes	Yes (1879/0/2282)	-
Malecki et al., 2020	Wisconsin, USA	Jul 2020	Longitudinal study	Adults and children	WAVE I: 1056 WAVE II: 1070	Older than 12 years old	-	No	Yes (WAVE I: 996/unk/1056; WAVE II: 994/ unk /1070)	A total of 876 individuals participated in both WAVE I and WAVE II
FUKUDA et al., 2020	Tokyo, Japan	Jul 2020	Cross-sectional study	Healthcare workers with low exposure risk at a frontline hospital	4147	36.8±12 years old	-	Yes	Yes (4147/0/4147)	-
Díaz-Salazar et al., 2020	Nuevo Leon, Mexico	Jul 2020	Cross-sectional study	Government employees	3268	Mean (range): 40 (3-49) years old	-	Yes	Yes (3268/0/3268)	-
Bruckner et al., 2020	Orange County, California, USA	Jul 2020	Cross-sectional study	Adults residents	2979	Older than 18 years old	-	-	Yes (2979/0/2979)	-
Goenka et al., 2020	Kolkata, India	Jul 2020	Cross-sectional study	High-risk Healthcare workers; Moderate-risk Healthcare workers; Low-risk Healthcare workers	High-risk Healthcare workers: 136 Moderate-risk healthcare workers: 911 Low-risk healthcare workers: 75	Majority: 30-50	Working/ have worked in COVID ward/Intensive Care Unit	Yes	Yes (High risk health care workers: 136/0/136 Moderate risk health care workers: 911/0/911 Low risk health care workers: 75/0/75)	-
Flemand et al., 2020	France	Jul 2020	Cross-sectional study	Individuals visiting the recruitment centers	480	Mean (range): 38.3 (0.2-87) years old	-	Yes	Yes (480/0/480)	-
Lopez et al., 2020	Midwestern region, USA	Jul 2020	Cross-sectional study	School employees	753	Older than 18 years old	-	Yes	Yes (753/0/753)	-
Ghose et al., 2020	Maharashtra, India	Jul 2020	Cross-sectional study	Community residents	2089	-	-	Yes	Yes (1659/0/2089)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Pasqualotto et al., 2020	Ten cities,Brazil	Jul 2020	Longitudinal study	Military police forces	1592	34±8 years old	-	Yes	Yes (1526/66/1592)	The vast majority reported use of personal protective equipment at work, such as masks (99.2%), gloves (23.2%), and face shields
Satpati et al., 2020	West Bengal, India	Jul 2020	Cross-sectional study	Population of Paschim Medinipur District	458	All ages	-	Yes	Yes (458/0/458)	-
Al-Thani et al., 2020	Qatar	Jul 2020	Cross-sectional study	The craft and manual worker	2641	Mean (range): 35 (18-80) years old	-	Yes	Yes (2641/0/2641)	-
Sharma et al., 2020	Delhi, India	Jul 2020	Cross-sectional study	Residents of Delhi	First round: 15046 Second round: 17409 Third round: 15015	Older than 5 year old	-	Yes	Yes (First round: 15046/0/15046; Second round: 17409/0/17409; Third round: 15015/0/15015)	-
Kshatri et al., 2020	Bhubaneswar, Berhampur, Rourkela, India	Aug 2020	Cross-sectional study	Adult population	4146	44.20±14.2 years old	-	Yes	Yes (4146/0/4146)	-
Cruz-Arenas et al., 2020	Mexico City, Mexico	Aug 2020	Cross-sectional study	Health care workers in a non-COVID' hospital	300	Older than 18 years old	-	Yes	Yes (300/0/300)	-
Murhekar et al., 2020	India	Aug 2020	Cross-sectional study	General population	29082	Older than 10 years old	-	Yes	Yes (29082/0/29082)	-
Rezwan et al., 2020	Karachi, Pakistan	Sep 2020	Cross-sectional study	Industrial workers Healthcare workers Healthy voluntary blood donors Dialysis patients	Industrial workers: 1118 Healthcare workers: 478 Healthy voluntary blood donors: 505 Dialysis patients: 303	35.27±13.7 years old	-	No	Yes (Industrial workers: 1118/0/1118; Healthcare workers: 478/0/478; Healthy voluntary blood donors: 505/0/505; Dialysis patients: 303/0/303)	-
Babu et al., 2020	Karnataka, India	Sep 2020	Cross-sectional study	General population	16585	Older than 18 years old	-	Yes	Yes (15939/0/16585)	-
Thielecke et al., 2020	Berlin, Germany	Sep 2020	Cross-sectional study	Kindergarten children, staff and connected household members	720	All ages	-	Yes	Yes (672/0/720)	-
Ladage et al., 2020	Wachau, Austria	Oct 2020	Longitudinal study	Inhabitants	242	-	-	Yes	Yes (242/0/242)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Kumar et al., 2020	Ontario, Canada	-	Cross-sectional study	Health care workers	996	40.8±11.1 years old	Directly looked after COVID patient in the last 2 weeks	Yes	Yes (996/0/996)	Universal masking was in effect in the hospital and HCW with direct patient contact were required to wear a face shield. N95 masks were reserved for aerosol generating procedures.
Official reports										
MedLife, Romania, 2020	Romania	-	Cross-sectional study	Healthcare workers	371	-	Contact with patients: average 25 people per day (two thirds were patients)2020	-	Yes (371/0/371)	-
Public Health Ontario, Canada, 2020	Ontario, Canada	Mar 2020	Cross-sectional study	Serum or plasma left over after diagnostic testing	Mar 2020: 827; May 2020: 1061; Jun 2020: 7014	All ages	-	No	Yes (Mar 2020: 827/0/827, May 2020: 1061/0/1061, Jun 2020: 7014/0/7014)	-
Norwegian Institute of Public Health, 2020	Norway	Apr 2020	Cross-sectional study	Residual serum samples	900	All ages	-	No	Yes (900/0/900)	-
Office of National Statistics, UK, 2020	UK	Apr 2020	Cohort study	General population	5248	Older than 2 years old	-	Yes	Yes (5248/0/5248)	-
The Government of Jersey, UK, 2020	UK	Apr 2020	Longitudinal study	Adult resident population living in private households in Jersey	Round 1: 855;	Older than 16 years old	-	Yes	Yes (Round 1: 855/0/855)	-
Canadian Blood Services, 2020	Canada	May 2020	Cross-sectional study	Blood donor	37737	Older than 17 years old	-	No	Yes (37737/0/37737)	-
Ministry of Health, Labour and Welfare, Japan, 2020	Tokyo, Japan; Osaka, Japan; Miyagi, Japan	Jun 2020	Cross-sectional study	Residents	Tokyo: 1971; Osaka: 2970; Miyagi: 3009	-	-	No	Yes (Tokyo: 1971/0/1971, Osaka: 2970/0/2970, Miyagi: 3009/0/3009)	-
NHS BT collection, 2020	England, UK	Jun 2020	Cross-sectional study	Blood donor	16670	Older than 17 years old	-	No	Yes (16670/0/16670)	-
RCGP collection, 2020	England, UK	Jun 2020	Cross-sectional study	Sera collected via general practitioners at the time of routine blood tests	4315	Range: 18-64 years old	-	No	Yes (4315/0/4315)	-
SEU and Paediatric collections, 2020	England, UK	Jun 2020	Cross-sectional study	Residual sera from participating hospital laboratories	1212	Range: 18-64 years old	-	No	Yes (1212/0/1212)	-

Reference	Location (country)	Study period (starting timepoint)	Study type	Study population	No. of participants	Age of participants (Median, range/mean±SD)	Exposures	Symptom assessment	Serology collected (No. of single serum/paired sera/participants)	Comment
Health Protection Surveillance Centre, 2020	Ireland	Jun 2020	Cross-sectional study	People living in two geographical areas in Ireland	1733	Range: 12-69 years old	-	Yes	Yes (1733/0/1733)	-
Islamic Republic of Afghanistan Ministry of Public Health, Afghanistan, 2020	Afghanistan	Jul 2020	Cross-sectional study	General population	9514	Mean: 27 years old	-	No	Yes (9514/0/9514)	-

Abbreviations: IQR: interquartile range; PPE: personal protective equipment; unk: unknown; CLIA: Chemiluminescent immunoassay

Table S3. Summary of antibody detection assays to identify human infection with SARS-CoV-2 included in systematic review

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Peer-reviewed databases								
Victoria et al., 2020	Yes	First: 14 days Second: 6 weeks	ELISA	Total antibodies	SP	Sensitivity: 96.0% Specificity: >99.0%	The cut-off OD value is 0.4; Total anti-SARS-CoV-2 antibody titers >400 was considered to be seropositive.	RT-PCR were also performed for participants; the ELISA were well-validated
To et al., 2020	Yes	1-13 days for Hongkong residents evacuated from Hubei	ELISA	IgG,	NP, SP	Sensitivity: 57.8%-73.3%; Specificity: 100.0%	The cut-off OD values were 0.610 for anti-nucleoprotein IgG and 0.573 for anti-RBD IgG	RT-PCR were also performed for participants
			MN	Neutralizing antibodies	-	Sensitivity: 91.1% (95%CI 78.8%-97.5%); Specificity: 100.0%	Titer > 1:20 were considered to be seropositive.	
Hippich et al., 2020.	Yes	-	Luciferase immunoprecipitation	IgG	NP, SP	Sensitivity: 97.3%; Specificity: 100.0%	We defined anti- SARS-CoV-2 positivity as an RBD antibody titer of >0.9 AU and positive for anti-nucleocapsid antibodies-	
Liang et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	-	-
			LFIA	IgG, IgM	-	-	-	This antibody assay was approved by the Chinese Food and Drug Administration and pended approval by US FDA.
Ng et al., 2020	No	-	NT	Neutralizing antibodies	-	-	Sample resulted in inhibition of 30% or greater	-
Hallowell et al., 2020	No	Within 14 days	ELISA	IgG, IgM, IgA	SP	-	Any specimens with titers ≥400 were considered positive by ELISA	RT-PCR were also performed for participants; Serum samples that were positive by ELISA were confirmed by microneutralization test.
			MN	Neutralizing antibodies	-	-	-	
Sam et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: 97.1% Specificity: 88.6 %	-	-
			MN	Neutralizing antibodies	-	Sensitivity: 100% Specificity: 100 %	-	-
Jeong et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Buss et al., 2020	-	-	CLIA	IgG	NP	Sensitivity: 84.0% Specificity: 99.9%	1.4 S/C threshold to define positive result	-
Stadlbauer et al., 2020	Yes	-	ELISA	IgG	-	Sensitivity: 95.0% Specificity: 100.0 %	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Chen et al., 2020	No	Within 14 days	ELISA	IgG, IgM	NP, SP	Sensitivity: 93.3% Specificity: 100.0 %	The cut off was determined if OD of 1:20 diluted serum was above the cut-off values for either IgM or IgG against both RBD and NP protein	RT-PCR were also performed for participants
			MN	Neutralizing antibodies	-	-	-	
Liu et al., 2020	No	-	ELISA	IgG	SP	Specificity: 100.0 %	-	-
Cavicchiolo et al., 2020	No	-	CLIA	IgG, IgM	-	-	-	RT-PCR were also performed for participants
Plebani et al., 2020	No	-	CLIA	IgG	NP, SP	Sensitivity: 73.0% Specificity: 98.0 %	-	-
Cox et al., 2020	No		ELISA	IgG	SP	-	-	The laboratory method was described before [8].
Villalaı´n et al., 2020	No	-	ELISA	IgG	SP	-	Titer >1:100 was defined as SARS-CoV-2 seropositivity	
Brandstetter et al., 2020	No	15-28 days	ELISA	IgG, IgA	SP	-	The OD ratio >1 was considered positive (The OD was detected at 450 nm and the OD-ratio of the measurement of each sample to the supplied calibrator was calculated)	RT-PCR were also performed for participants
Solodky et al., 2020	No	15 days or more	LFIA	IgG	-	-	-	RT-PCR were also performed for participants
Zhang et al., 2020	No	-	ELISA	IgG, IgA, IgM	-	-	The cutoff value of this test was defined by receiver operating characteristic curves	-
Suda et al., 2020	No	-	LFIA	IgG		Specificity: 98.0%	-	-
			CLIA	IgG	NP	Specificity: 100.0%	cutoff index ≥ 1.0 indicates a positive diagnosis	
Bogogiannidou et al., 2020	No	-	CLIA	IgG	NP	Sensitivity: 84.0% Specificity: 99.7%	-	All positive samples, as well as 100 randomly chosen negative samples were confirmed with ELISA
Xu et al., 2020	No	-	CLIA	IgG	NP, SP	Sensitivity: 83.0% Specificity: 100.0%	An S/CO value of >1.0 for either IgG or IgM was regarded as positive.	-
Vena et al., 2020	No	-	CLIA, LFIA	IgG, IgM	NP, SP	-	-	-
Ng et al., 2020	No	-	CLIA	IgG	NP	-	-	Seropositive samples were confirmed by MN and chemiluminescent immunoassay.

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Venugopal et al., 2020	No	-	CLIA	IgG	NP	-	An index value of ≥ 1.4	-
Dingens et al., 2020	No	-	ELISA	IgG	SP	-	-	Seropositive samples were validated by Abbott CLIA and MN.
Barzin et al., 2020	No	-	CLIA	IgG	NP	Sensitivity: 100.0% Specificity: 98.9%	An index value of ≥ 1.4	-
Pérez-García et al., 2020	No	-	LFIA	IgG, IgM		Sensitivity: 88.0% Specificity: 100.0%	-	-
Trieu et al., 2020	Yes	-	ELISA	IgG, IgM, IgA	SP	-	The OD ratio ≥ 0.708 were considered to be seropositive.	-
Fischer et al., 2020	No	-	ELISA	IgG	SP	-	The OD ratio ≥ 1.1 were considered to be seropositive.	Seropositive results were confirmed using the Architect SARS-CoV-2 IgG targeting the viral nucleocapsid and the LIAISON SARS-CoV-2 S1/S2 IgG assay targeting the SARS-CoV-2 spike protein.
McCafferty et al., 2020	No	-	CLIA	IgG, IgM	NP	-	-	
Brown et al., 2020	No	14 days	ELISA	IgG, IgM, IgA	SP	-	Antibody titers of >400 was considered to be seropositive	-
Han et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	RT-PCR were also performed for participants
Zhou et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	IgM or IgG level ≥10.0 AU/ml was designated as positive.	-
Thompson et al., 2020	No	-	MN	Neutralizing antibodies	-	Sensitivity: 94.11% (95%CI 79.2-100.0%); Specificity: 100.0% (95%CI 98.10-100%)	-	-
			ELISA	IgG	SP	-	-	A second ELISA based assay was used to confirm the analysis
Carlo et al., 2020	Yes	-	CLIA	IgG, IgM	NP, SP	Specificity: 100.0%	-	-
Tu et al., 2020	No	-	ELISA	IgG, IgM	NP, SP	-	Adding the average absorbance of the negative control plus 0.042	-
	No	-	Dual-target immuno-fluorescence assay	IgG	NP, SP	-	RBD/N fluorescence value was > 2000	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Kohler et al., 2020	No	-	LFIA	IgG	-	-	-	-
Fuereder et al., 2020	No	-	CLIA	Total antibodies	NP	-	A cut-off index >1 is regarded as positive	Seropositive samples were validated by Abbott CLIA (An index (S/C) >1.4 is regarded as positive); RT-PCR were also performed for participants.
Fusco et al., 2020	Yes	-	CLIA	IgG, IgM	NP, SP		-	-
Havers et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	Sensitivity: 96.0% (95%CI 89.98 – 98.89%); Specificity: 99.3% (95%CI 98.32 – 99.88%).	A specimen was considered reactive if, on confirmatory testing, at a background corrected optical density (OD) of 0.4 and at a serum dilution of 1:100, it had a signal to threshold ratio of >1.	-
Xu et al., 2020	No	-	ELISA	IgG, IgA	NP, SP	-	-	-
Behrens et al., 2020	No	Mean: 30.4 days	ELISA	IgG, IgA	NP, SP	IgG: Specificity: 99.3% IgA: Specificity: 97.5%	IgG ratio >1.1 were seropositive	-
			NT	Neutralizing antibodies	-	-	-	-
Loconsole et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Mansour et al., 2020	No	2 weeks	ELISA	IgG	SP	-	Antibody titers of ≥ 320 was considered to be seropositive	-
Gallian et al., 2020	No	-	NT	Neutralizing antibodies	-	Specificity: 100.0%	-	-
Korth et al., 2020	No	-	ELISA	IgG	SP	-	-	RT-PCR were also performed for participants
Bielecki et al., 2020	No	-	ELISA	IgG, IgM, IgA	-	Sensitivity: 83.0% Specificity: 100.0%	The OD ratio >1.1 was considered positive	RT-PCR were also performed for participants
Tsaneva et al., 2020	Yes	⩾7 days	LFIA	IgG, IgM	-	-	-	Two of the COVID-19 positive women were tested with a pair of serum samples
	Yes	-	ELISA	-	SP	-	The cut-off OD values of 0.9 were considered positive	RT-PCR were also performed for participants

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Houlihan et al., 2020								
			Flow cytometry	-	SP	-	-	
Liu et al., 2020	-	-	CLIA	IgG	NP, SP	-	-	-
Basteiro et al., 2020	Yes	⩾10 days	Microsphere-based assay	IgG, IgA, IgM	SP	IgG: Sensitivity: 97.0% Specificity: 98.0% IgA: Sensitivity: 97.0% Specificity: 98.0% IgM: Sensitivity: 75.0% Specificity: 98.0%	Assay cutoff was calculated as 10 to the mean plus 3 standard deviations of log10-transformed median fluorescent intensities (MFIs) of 47 negative controls.	RT-PCR were also performed for participants
Isherwood et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Xu et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	IgG: Sensitivity: 95.0% Specificity: 93.3% IgM: Sensitivity: 95% Specificity: 100.0%	Antibody levels were expressed as the ratio of the chemiluminescence signal over the cutoff (S/CO) value. An S/CO value higher than 1.0 for either IgG or IgM was regarded as positive.	RT-PCR were also performed for participants
Milani et al., 2020	No	-	ELISA	IgG, IgM, and total antibodies	SP	-	-	RT-PCR were also performed for participants
Medas et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	IgM cut-off is 1.0 AU/mL, IgG cut-off is 1.1 AU/mL.	-
Vos et al., 2020	No	-	multiplex-immunoassay	IgG	SP	-	the cut off for seropositivity: 2.37AU/mL	
Savirón-Cornudella et al., 2020	Yes	-	LFIA	IgG	-	-	-	
Bryan et al., 2020	No	-	CLIA	IgG	NP	Sensitivity: 96.9% (89.5-99.5%) at 14 days, and 100% (95.1%-100%) at day 17; Specificity: 99.9%	The index value cutoff of 1.40 was considered positive (according to manufacturer's recommended)	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Hains et al., 2020	Yes	Within 21 days	ELISA	IgG, IgM	SP	-	A positive ELISA result at 0.14 were considered seropositive. Participants were considered to have seroconverted if positive for IgM or IgG.	RT-PCR were also performed for participants
Liu et al., 2020	No	2 weeks or more	CLIA	IgG, IgM	NP, SP	IgG: Sensitivity: 97.8% Specificity: 97.9% IgM: Sensitivity: 88.2% Specificity: 99.0%	-	RT-PCR were also performed for participants
Malickova et al., 2020	No	-	ELISA	IgG	SP	-	An OD ratio >1.1 was considered positive.	RT-PCR were also performed for participants
Paulino-Ramirez et al., 2020	No	-	LFIA	IgG, IgM	SP	-	-	-
Chirathaworn et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Posfay-Barbe et al., 2020	No	-	ELISA	IgG	SP	-	ELISA ≥1.5 as positive;	-
Slot et al., 2020	No	-	ELISA	Total antibodies	SP	-	OD/CO ratio≥1	-
Olayanju et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Berte et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: 97.64%; Specificity: 95.2%	-	-
			ELISA	IgA	SP	Sensitivity: 71.4%; Specificity: 99.8%	-	-
Ciechanowicz et al., 2020	No	-	ELISA	IgG, IgM, IgA	NP, SP	-	-	-
Ko et al., 2020			Fluorescence immunoassay (FIA)	IgG	-	Sensitivity: 99.1%; Specificity: 94.1%	-	-
Lackermair et al., 2020	No	-	ELISA	IgG	SP	-	-	RT-PCR were also performed for participants
Sotgiu et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Mohanty et al., 2020;	No	-	LFIA	IgG, IgM		Sensitivity: 100.0%; Specificity: 100.0%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Wu et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	RT-PCR were also performed for participants
Stubblefield et al., 2020	No	-	ELISA	IgG, IgM, IgA (pan immunoglobulin)	-	-	-	-
Self et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	Sensitivity: 96.0% Specificity: 99.0%	A specimen was considered reactive if it had a signal to threshold ratio >1.0 at a serum dilution of 1:100, correcting for background.	-
Stellato et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Flannery et al., 2020	No	-	ELISA	IgG, IgM	SP	Sensitivity: 100.0% Specificity: 98.9%	Either IgG or IgM level >0.48 arbitrary units	RT-PCR were also performed for participants
Stock et al., 2020	No	-	ELISA	IgG	NP	-	The cutoff OD value was 1.1	-
Goldberg et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 90.0% Specificity: 99.47% (IgM); 99.74% (IgG);	-	RT-PCR were also performed for participants; The assay had validated by EUA
Stringhini et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: 93.0% Specificity: 100.0%	The index value cutoff of 1.10 was considered positive (according to manufacturer's recommended)	-
Erikstrup et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 82.6% (95%CI 75.7%-88.2%); Specificity: 99.5% (95%CI 98.7%-99.9%)	Samples were concluded as reactive if the IgM, the IgG, or both bands were visible.	-
Lahner et al., 2020	No	-	CLIA	IgG, IgM	-	14days: Sensitivity: 80.0% 20days: Sensitivity:100.0%	-	RT-PCR were also performed for participants
Labriola et al., 2020	Yes	-	CLIA	IgG, IgM, IgA	NP	-	-	-
Pallett et al., 2020	No	More than 14days	LFIA	IgG, IgM	-	IgG: Sensitivity: (95%CI 88.2%-93.4%); Specificity:	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
						(95%CI 94.0%-99.0%) IgM: Sensitivity: (95%CI 88.2%-93.4%);		
Sood et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 82.7% (95%CI 76.0%-88.4%); Specificity: 99.5% (95%CI 99.2%-99.7%)	-	The unweighted and weighted proportions of positive tests (either IgM or IgG) in the analysis sample were calculated.
Shakiba et al., 2020			LFIA	IgG, IgM	-	Sensitivity: 83.3% Specificity: 99.0%	-	-
Madsen et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: 95.4% Specificity: 98.3%	-	-
Sims et al., 2020	No	-	ELISA	IgG	SP	Sensitivity:99.35% (95% CI: 97.93-99.86%); Specificity: 98.14% (95% CI: 97.75%-99.22%)	-	-
Crovetto et al., 2020	No	-	ELISA	IgG, IgM, IgA	-	-	-	-
Gudbjartsson et al., 2020	-	-	CLIA	Total antibodies	SP, NP	-	-	Positive results for both assays for a test result to be considered positive
			ELISA	Total antibodies	SP, NP	-	-	
Naranbhai et al., 2020	-	-	LFIA	IgG, IgM	-	Sensitivity: IgG:85% IgM:80% IgG or IgM:90% Specificity: >99%	-	-
Herzberg et al., 2020	Yes	-	ELISA	IgG	NP	-	-	-
Dacosta-Urbieta et al., 2020	No	-	LFIA	IgG	-	-	-	-
	No	-	ELISA	IgG	SP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Lumley et al., 2020								
			PVNT	Neutralizing antibodies	-	-	-	-
Rudberg et al., 2020	No	-	Multiplexed microsphere-based assay	IgG	NP, SP	Sensitivity: 99.4% Specificity: 99.1%	Cutoff was defined as signals above the mean+6 SD	-
Buntinx et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Martin et al., 2020	Yes	-	ELISA	IgG	SP	-	-	RT-PCR were also performed for participants
Amendola et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Iversen et al., 2020	No	-	LFIA	IgG, IgM		Sensitivity: 82.5% Specificity: 99.5%	-	RT-PCR were also performed for participants
Olalla et al., 2020	No		LFIA	IgG	SP	-	-	RT-PCR were also performed for participants
Cosma et al., 2020	-	-	LFIA	IgG, IgM	SP, NP	-	The cut-off index (COI) in which a COI > 1.1 indicates a positive result.	RT-PCR were also performed for participants
	-	-	CLIA	IgG	SP	-	The antibody concentration is expressed as arbitrary units (AU/mL) and grades the results as positive when ≥ 15 AU/mL (CLIA).	RT-PCR were also performed for participants
Caban-Martinez et al., 2020	No		LFIA	IgG, IgM	-	-	-	-
Poletti et al., 2020	No	-	CLIA	IgG	SP	-	A positive result (>15 AU/mL) indicates the presence of IgG antibodies	-
Waterfield et al., 2020	No	-	CLIA	IgG, total antibodies	NP, SP	-	Abbott: 1.4 S/C; Roche: 1.0 COI; DiaSorin: 15.0 AU/ml	-
Racine-Brzostek et al., 2020	-	-	Cyclic enhanced fluorescence assay	IgG, IgM	-	-	-	-
Calcagno et al., 2020	No	-	CLIA	IgG	SP	-	-	-
Poustchi et al., 2020			ELISA	IgG, IgM	-	Sensitivity: IgG:61.0%, IgM:51.3% Specificity: IgG:98.2%, IgM: 98.2%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Cito et al., 2020	No	-	ELISA	Total antibodies	SP	-	A/CO values are >=1.0	-
Rosenberg et al., 2020	No	-	Microsphere immunoassay	IgG	NP	Sensitivity: 87.9% (95%CI 83.7%-92.1%); Specificity: 99.8%	The mean MFI (median fluorescence intensity) of 90-100 negative DBS was used to set cut-offs	-
Daniel et al., 2020	No	22 (IQR 15-26) days	ELISA	Total antibodies	SP	-	The cut-off OD values of 1.0 were considered positive.	RT-PCR were also performed for participants
			MN	Neutralizing antibodies	-	-	Titer > 1:40 were considered to be seropositive.	
Schmidt et al., 2020	No	-	ELISA	IgG	SP	-	The cut-off OD values of 1.0 were considered positive	-
Moscola et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: < 10 days after onset of symptoms: 33.3% (1/3) > 10 days after onset of symptoms 80% (4/5); Specificity: 98.5% (197/200)	-	-
	No	-	ELISA	IgG	NP, SP	Sensitivity: 95% (19/20); Sensitivity: 98.3% (118/120)	-	-
	No	-	CLIA	IgG	NP	Sensitivity: 8-13 days: 91.18% (31/34) >14 days: 100% (73/73); Specificity: 99.63% (1066/1070)	-	-
	No		Immunometric	IgG	SP	Sensitivity: 87.5% (42/48) Specificity: 100% (407/407)	-	-
	No		Immunometric	-	SP	Sensitivity: 83.3% (30/36) Specificity: 100% (400/400)	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
	No		CLIA	IgG	SP	Sensitivity: 6-14 days: 89.80% (44/49) >15 days: 97.56% (40/41) Specificity: 99.3% (1082/1090)	-	-
	No		CLIA	-	NP	Sensitivity: 7-13 days: 88.10% (52/59) >14 days: 100% (29/29) Specificity: 99.3% (5262/5272)	-	-
Tarabichi et al., 2020	Yes	-	ELISA	IgG, IgM	NP	-	-	-
Rosser et al., 2020	-	-	ELISA	IgG	-	-	-	-
Armin et al., 2020			LFIA	IgG, IgM	-	-	-	-
Montenegro et al., 2020	-	-	LFIA	IgG, IgM	-	-	-	-
Kaufman et al., 2020	Yes	-	CLIA/ELISA	IgG, IgM, IgA	NP, SP	-	-	-
Ahmad et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Steensels et al., 2020	No	-	LFIA	IgG	NP	Sensitivity: 92.2% Specificity: 97.0%	-	-
Mostafa et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Kantele et al., 2020	No	-	ELISA	IgG	SP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Soriano et al., 2020	No	-	LFIA	IgG, IgM	SP, NP	-	-	-
Eyre et al., 2020	No	-	CLIA	IgG	NP	-	Abbott Architect (CLIA) with a manufacturer's signal-to-cut-off index of 1.4	-
			ELISA	IgG	SP	-	Using net-normalized signal cut-off of 8 million as a positive cut-off for ELISA	-
Halatoko et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	This test was validated by Laboratory Department of the ministry of health in Togo
Shields et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	-	-	RT-PCR were also performed for participants
Makaronidis et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Guerriero et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Menachemi et al., 2020	No	-	CIIA	IgG	-	-	-	-
Vilibic-Cavlek et al., 2020	No	-	ELISA	IgG	NP, SP	-	-	-
Pollán et al.., 2020	No	-	LFIA	IgG, IgM	SP	IgG: Sensitivity: 82.1% Specificity: 100.0%	-	-
	No	-	CLIA	IgG	NP	Sensitivity: 89.7%; Specificity: 100.0%	The amount of IgG antibodies to SARS-CoV-2 in each sample is determined by comparing its chemiluminescent relative light unit (RLU) to the calibrator RLU (index S/C).	-
Petersen et al., 2020	No	-	ELISA	IgG, IgM	-	-	-	-
Bajema et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	Sensitivity: 96.0%; Specificity: 99.3%	-	-
Biggs et al., 2020	No	-	CLIA	Total antibodies	SP	Sensitivity: 93.2%;	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
						Specificity: 99.0%		
Sydney et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Brotons et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Hunter et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Tilley et al., 2020	No	-	ELISA	IgG	SP	-	Negative (ratio <0.8); borderline (ratio .8 to <1.1); positive (ratio> 1.1)	-
Tsatsaris et al., 2020	No	-	CLIA	IgG	NP	-	The results were considered positive if the IgG S/C index was ≥ 1.4	-
Uyoga et al., 2020	No	-	ELISA	IgG	SP	Sensitivity:92.7% (95% CI: 87.9-96.1%); Specificity:99.0% (95% CI 98.1-99.5%)	An OD ratio >2	-
Josè et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	IgG: The RLU-ratio of 1.1 positive were considered positive; IgM: The RLU-ratio of 1.0 positive were considered positive;	RT-PCR were also performed for participants
Paderno et al., 2020	No	-	CLIA	IgG	SP	-	-	RT-PCR were also performed for participants; Positive cases were defined as those with positive IgG serology and/or positive nasal/ pharyngeal swab.
Merkely et al., 2020	No	-	CLIA	IgG	NP	-	-	RT-PCR were also performed for participants;
Addetia et al., 2020	No	-	CLIA	IgG	NP	-	-	The presence of anti-Spike and neutralizing antibodies was analyzed in pre-departure sera samples from individuals that were positive in the Abbott assay screening through four different methods
		-	NT	Neutralizing antibodies	-	-	-	-
Ladhani et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Nailescu et al., 2020	No	-	ELISA	IgG, IgM	SP	Sensitivity: 94.4%; Specificity: 98.5%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Sperotto et al., 2020	No	-	LFIA	IgG	-	-	-	-
			LFIA	IgG, IgM	-	-	-	-
Mack et al., 2020	-	-	ELISA, CLIA	IgG, IgM	NP, SP	-	-	-
Belingheri et al., 2020	No	-	CLIA	IgG	SP	-	-	-
Lastrucci et al., 2020	No	-	LFIA	IgG, IgM	SP	Sensitivity: 100.0%; Specificity: 98.8%	-	-
Dioscoridi et al., 2020	Yes	-	ELISA	IgG, IgM	-	-	-	-
Péré et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Borges et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 95%; Specificity: 97%	-	-
Torres et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Poulikakos et al., 2020	No	-	CLIA	IgG	NP, SP	-	-	-
Veerus et al., 2020	-	-	CLIA	IgG	NP	-	The IgG antibody level above 1.4 Index (S/C) was defined as a positive result.	-
Brunner et al., 2020	No	-	CLIA (Abbott Architect)	IgG	NP	-	-	-
			CLIA (Ortho-Clinical VITROS Diagnostics)	IgG	SP	-	-	-
Vijh et al., 2020	No	median: 50 days (IQR = 15)	ELISA, CLIA	Total antibodies	NP, SP	-	-	-
Rashid-Abdi et al., 2020	Yes	-	CLIA	IgG	NP	-	A signal/cut-off (S/C) ratio of ≥ 1.4 was reported as positive	-
Stefanelli et al., 2020	No	-	CLIA	IgG	NP	-	An index of ≥1.4 is interpreted as positive and index of <1.4 as negative.	-
Feehan et al., 2020	No	-	CLIA	IgG	NP	-	-	RT-PCR were also performed for participants

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Sutton et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Bampoe et al., 2020	No	-	CLIA	IgG	NP	-	A relative light index > 1.4 was considered to be a positive result	-
Cento et al., 2020	No	-	CLIA	IgG	NP	-	a signal/cut-off (S/Co) ratio ≥1.4 was interpreted as reactive	-
Rivas et al., 2020	No	-	CLIA	IgG	NP	-	signal-to-cutoff ratio (SC/CO) ≥0.4	
Capasso et al., 2020			LFIA	IgG, IgM	-	-		
Murhekar et al., 2020	No	-	ELISA	IgG	-	Sensitivity: 92.4%; Specificity: 97.9%	samples with optical density (OD) value more than the cut-off value and positive/negative (P/N) ratio more than 1.5 were considered as positive	-
Tong et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	-	-
Iwuji et al., 2020	No	-	CLIA	IgG	NP	-	The threshold for a positive result was 1.4 Index.	-
Mughal et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Hallal et al., 2020	No	-	LFIA	IgG, IgM	SP	Sensitivity: 84.8% Specificity: 99.95%	-	appearance of a dark-colored line
Delmas et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Costa et al., 2020	No	-	LFIA	IgG, IgM	SP	-	-	-
Zhang et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	-	-	RT-PCR were also performed for participants
Pan et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Akinbami et al., 2020	No	-	CLIA	IgG	SP	-	Signal-to-cutoff ratio >1.0 was considered positive	-
Kempen et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Pagani et al., 2020	-	-	CLIA	IgG	NP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Jespersen et al., 2020	No	-	ELISA	Total antibodies	SP	-	The sample absorbance (A) value was divided by a cut- off (CO) value for the ELISA plate based on an average absorbance value for 3 negative kit controls. A/CO values ≥ 1.1 were considered positive.	-
Ladhani et al., 2020	No	-	ELISA	IgG	NP, SP	-	-	-
			ELISA	IgG	NP, SP	-	-	-
Yogo et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP	-	-	-
Santos-Hövener et al., 2020	No	-	ELISA	IgG	SP	-	ratio≥1.1	-
Alserehi et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Alali et al., 2020			LFIA	IgG, IgM	-	-	-	-
Del Brutto et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	As IgM and IgG responses in SARS-CoV-2 develop with only a few days of difference, we defined seropositivity as a positive response to any of them.
Blairon et al., 2020	No	-	CLIA	IgG	SP	Sensitivity: 100%	A positive result (>15 AU/mL) indicates the presence of IgG antibodies	Confirmed by a semi-quantitative ELISA method
Noh et al., 2020	No	-	CLIA	IgG	NP		A cutoff index (COI, signal sample/cutoff) of ≥ 1.0 was considered positive	
			PRNT	Neutralizing antibodies	-	-	-	-
Ho et al., 2020	No	-	CLIA	IgG, IgM	NP	-	Samples with a reported COI greater than 1.0 are considered positivity	-
Murakami et al., 2020	No	-	LFIA	IgG	-	-	-	-
Lidström et al., 2020	No	-	CLIA	IgG	NP	-	A positive/ negative cut-off of 1.4 S/C was used in line with the manufacturer's instructions.	-
Haizler-Cohen et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Martin et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Black et al., 2020	No	-	CLIA	IgG	NP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Kassem et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Hibino et al., 2020	No	-	CLIA	IgG	NP	Sensitivity: 100%	positivity cut-off index of 1.40.	-
Prendecki et al., 2020	No	-	CLIA, ELISA, LFIA	IgG, IgM	SP, NP	Sensitivity: Abbott-CLIA: 68.4% (51.3%–82.5%); Fortress-ELISA: 92.1% (78.6%-98.3%); LFIA: 84.2% (68.7%–94.0%) Specificity:100.0% (92.3%–100.0%)	- -	-
Nsn et al., 2020	No	-	CLIA	IgG	-	-	-	-
Abdelmoniem et al., 2020			LFIA	IgG, IgM	-	-	-	-
Pedersen et al., 2020	No	-	ELISA	Total antibodies	SP	Sensitivity: 96.7%; Specificity: 99.5%	-	-
Dimcheff et al., 2020	-	-	CLIA	IgG	NP		A value greater than or equal to 1.4 RLU is considered a positive antibody response.	-
Mesnil et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Insúa et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	≥ 1 AU/mL was considered as reactive.	-
Dimeglio et al., 2020	No		ELISA	Total antibodies	SP	-	-	-
Mahajan et al., 2020	No	-	CLIA	IgG	SP	-	Antibody levels were expressed as the ratio of the chemiluminescence signal over the cutoff (S/CO) value. An S/CO value≥1.00 was reported as positive	-
Dodd et al., 2020	-	-	CLIA	Total antibodies	SP	-	-	-
Martínez-Baz et al., 2020	No	-	CLIA	Total antibodies	NP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Anand et al., 2020	No	-	CLIA	Total antibodies	SP	-	-	-
Lundkvist et al., 2020	No	-	LFIA	IgG	-	Sensitivity: 100.0% Specificity: IgG: 95.0% IgM: 100.0%	-	-
Younas et al., 2020	-	-	CLIA	IgG, IgM, IgA	NP	-	Result reported as reactive if cutoff index (COI)>1.0 and non- reactive for COI<1.0	Seropositive samples were confirmed by ELISA
Gujski et al., 2020	No	-	ELISA	IgG, IgM, IgA	NP, SP	-	Samples with the anti-SARS-CoV-2 IgM+IgA index below 6 were considered negative, those with the index between 6 and 8 were considered indeterminate/equivocal, and those with the index above 8 were considered positive.	
Malani et al., 2020	No	-	CLIA	IgG	NP	-	-	
Khan et al., 2020	No	-	CLIA	IgG	NP	-	-	For quality control, a single sample of each control level was tested once every 24 hours.
Pray et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Bloomfield et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP	-	-	-
			ELISA	IgG, IgA	SP	-	-	-
Kumar et al., 2020	No	-	CLIA	Total antibodies	NP	-	-	-
Noor et al., 2020	No	-	CLIA	IgG, IgM	NP	-	The cut-off for significant antibodies level was taken as 1 or more as per manufacturer instruction.	-
Yamaki et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Bajema et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP, SP	-	ARCHITECT-CLIA: a cutoff index of 1.4 or greater was considered seropositive VITROS-CLIA: a cutoff index of 1.0 or greater was considered seropositive	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Godbout et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Silva et al., 2020	No	-	CLIA	IgG, IgM	NP	-	-	-
Kumar et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP	-	COI ≥ 1.0	-
Chau et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP	-	-	-
Preprint database								
Sughayer et al., 2020	No	-	CLIA	Total antibodies	NP	-	-	-
Germain et al., 2020	-	-	ELISA	Total antibodies	SP	-	Wantai total antibodies positivity threshold ≥ 1.1	-
			CLIA	IgG	NP	-	Abbott Architect IgG positivity threshold ≥ 1.4	-
Martinez-Acuña et al., 2020	No	-	CLIA	IgG	NP	-	An index S/C threshold of 1.5 or superior was taken as a positive result	-
McCulloch et al., 2020	No	-	ELISA	IgG, IgM, IgA	SP	-	Samples were considered seropositive if the anti-SARS-CoV-2 optical density (OD) spike was equal to or greater than a cutoff of 0.4.	-
Chang et al., 2020	Yes	-	ELISA	Total antibodies	SP, NP	-	Those IgG or IgM positive samples with the signal to the cutoff ratio (S/CO) ≥10 were further diluted (1:10, 1:40, 1:160..., and 1:40960 by normal saline and tested again.	-
	Yes	-	NT	Neutralizing antibodies	-	-	An ID50 ≥20 was determined as a cutoff value for the presence of neutralizing antibodies.	-
Li et al., 2020	-	-	CLIA	IgG, IgM	SP, NP	-	An S/CO value higher than 1.0 for either IgG or IgM was regarded as positive.	-
Xiong et al., 2020	Yes	27-32 days	ELISA	IgG, IgM	-	-	-	RT-PCR were also performed for participants
Valenti et al., 2020	No	-	LFIA	IgG, IgM	NP	IgG: Sensitivity: 100.0% Specificity: 99.2%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
						IgM: Sensitivity: 68.0% Specificity: 99.2%		
Yu et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	-	-
Kuwelker et al., 2020	No	-	ELISA	IgG	SP	-	Endpoint titres were calculated as the reciprocal of the serum dilution giving an optical density (OD) value=3 standard deviations above the mean of historical pre-pandemic serum samples	Historical serum samples collected before 2019 were defined as seronegative in the RBD ELISA, which was confirmed with RT-PCR
			MN	Neutralizing antibodies	-	-	The MN titre was determined as the reciprocal of the serum dilution giving 50% inhibition of virus infectivity	-
			NT	Neutralizing antibodies	-	-	The VN titre was determined as the reciprocal of the highest serum dilution giving no CPE	-
Liu et al., 2020	No	⩾21 days	CLIA	IgG, IgM	NP, SP	-	-	RT-PCR were also performed for participants
			LFIA	IgG, IgM	-	-	-	
Kamath et al., 2020	No	-	Serum epitope repertoire analysis (SERA)	IgG, IgM	-	Sensitivity: ≥91%; Specificity: 98.7%	-	-
Santana et al., 2020	Yes	-	CLIA	IgG, IgM	NP, SP	-	-	-
Tubiana et al., 2020		-	ELISA	IgG	NP, SP	-	-	-
Skowronski et al., 2020	No	-	CLIA	Total antibodies	NP, SP	-	Resulted signal to cut-off (S/C) ratios of 1) ≥1.00 considered reactive for Ortho-Clinical Diagnostics; 2) ≥1.40 considered reactive for Abbott Laboratories; 3) ≥1.00 considered reactive for Siemens Healthineers;	All positive specimens were further assessed by gold-standard neutralization assay.
			MN	Neutralizing antibodies	-	-		
Vu et al., 2020	No	-	Luciferase-linked immunosorbent assays (LuLISA)	IgG	NP, SP	Sensitivity: 86.0% Specificity: 100%	Serum samples are considered positive when the RLU value is above the threshold determined for each of the LuLISA IgG/N and IgG/S assays from a pre- pandemic serum collection	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
			PVNT	Neutralizing antibodies		Sensitivity: 85.0% Specificity: 100%	Samples are considered positive with RLU/s values below a threshold set as the mean minus 3-fold the standard deviation determined on a collection of pre-pandemic sera	-
Dietrich et al., 2020	Yes	-	ELISA	IgG	SP	-	Positive reactions were defined as a net OD reading > 0.7	-
Brehm et al., 2020	Yes		ELISA	IgG	SP	Specificity: 99.1%	OD ratio >1.5 were seropositive	-
Tang et al., 2020	No	-	LFIA	IgG, IgM	-	-	Both the control line and the test line appear simultaneously	RT-PCR were also performed for participants
Augusto et al., 2020	No	-	ELISA	IgG	SP	-	-	RT-PCR were also performed for participants
Wang et al., 2020	No	-	CLIA	IgG, IgA, IgM	NP, SP		-	RT-PCR were also performed for participants; The detected chemiluminescent signal over background signal was calculated as relative light units (RLU), COI was the ratio of RLU to statistically determined cut-off.
Ling et al., 2020	No	-	LFIA	IgG, IgM	-	IgG: Sensitivity: 86.7% Specificity: 98.0% IgM: Sensitivity: 76.2% Specificity: 99.0%	-	RT-PCR were also performed for participants
Paradiso et al., 2020	Yes	-	LFIA	IgG, IgM	-	-	The presence of SARS-CoV-2 IgG and IgM antibodies is indicated by a red/purple line that appears in the specific region	RT-PCR were also performed for participants
			CLIA.	IgG, IgM	-	-	signal/cutoff (S/C) ratio was 1	
Herzog et al., 2020	-	-	ELISA	IgG	SP	-	The cut-off OD values of 1.1 and above were considered positive	-
Dopico et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Streeck et al., 2020	-	-	ELISA	IgG, IgA	SP	Specificity: 98.3%	The cut-off OD values of 1.1 and above were considered positive.	RT-PCR were also performed for participants
			NT	Neutralizing antibodies	-	-	-	RT-PCR were also performed for participants
Doi et al., 2020	No	-	LFIA	IgG	-	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Tosato et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	⩾1.000 kAU/L were considered seropositive (IgM); ⩾1.100 kAU/L were considered seropositive (IgG).	RT-PCR were also performed for participants
Carozzi et al., 2020	No	At least 14 days after a diagnostic PCR-positive assay result	LFIA	IgG, IgM		Sensitivity: 97.0%-99.0% Specificity: 92.0%-95.0%	Presence of the expected control line and of a line at the IgG or IgM position	RT-PCR were also performed for participants
Siddiqui et al., 2020	No	-	CLIA	Total antibodies	NP	-	-	-
Davis et al., 2020	No	-	LIFA	IgG, IgM	SP	Sensitivity: 89% Specificity:100%	-	-
Kammon et al., 2020	No	-	LFIA	IgG, IgM	-	-	The presence of only the control line indicates a negative result and valid test; the presence of both the control line and the IgM or IgG antibody line indicates a positive result for IgM or IgG antibody, respectively.	-
Wagner et al., 2020	Yes	-	ELISA	IgG, IgM, IgA	SP	-	-	-
Bendavid et al., 2020	No	-	LFIA	IgG, IgM	SP	Sensitivity: 82.8% (95%CI 76.0%-88.4%) Specificity: 99.5% (95%CI 99.2%-99.7%)	-	-
Egerup et al., 2020	-	-	CLIA	IgG, IgM	NP, SP		A positive result was defined as values ≥ 8 AU/mL for IgM and ≥ 10 AU/mL for IgG	-
Krähling et al., 2020	No	-	ELISA	IgG	SP	-	The cut-off value was calculated as the average of the OD values plus 4 standard deviations.	RT-PCR were also performed for participants
			NT	Neutralizing antibodies	-	-	-	
Richard et al., 2020	No	-	ELISA	IgG	SP	Sensitivity:93% Specificity: 100%	cut off for positivity ≥1.1	-
Nopsopon et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 94.1%; Specificity: 98.0%	-	-
Leidner et al., 2020	No	-	ELISA	IgG	NP	Sensitivity: 80.0%; Specificity: 100.0%	-	

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Halbrook et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Fujita et al., 2020	No	-	ELISA	IgG	NP	-	-	-
Bal et al., 2020	No	-	ELISA	Total antibodies	SP	-	-	-
Psichogiou et al., 2020	No	-	CLIA	IgG, IgM	SP	-	Samples were concluded as reactive if the IgM or the IgG or both bands were positive.	-
Thomas et al., 2020	No	Days post symptom onset or exposure > 14	ELISA	Total antibodies	SP	Sensitivity: 100.0% (Days post symptom onset >14) Specificity: 100.0% (Days post symptom onset >14)	The Antibody Index (AI) was calculated by dividing each sample's OD450nm by the serum pooled control mean. Antibody indices were categorized as follows: Negative, ≤ 2.5; Equivocal, 2.51-4.0; Positive > 4.0	-
Woon et al., 2020	No	-	NT	Neutralizing antibodies	SP	Sensitivity: 100%; Specificity: 100%	-	-
Cohen et al., 2020	No	-	CLIA	IgG, IgM	-	-	-	Positive serology was defined as a case positive for IgM and negative for IgG or positive for IgM and IgG or negative for IgM and positive for IgG. RT-PCR were also performed for participants
Sikora et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Galán et al., 2020	No	-	ELISA	IgG	NP, SP	-	The cut-off OD values of 1.1 and above were considered positive	RT-PCR were also performed for participants
Garralda Fernandez et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	-	RT-PCR were also performed for participants
Erber et al., 2020	No	-	CLIA	IgG	NP, SP	-	Values ≥10 AU/mL were considered positive	-
Garritsen et al., 2020	No	-	LFIA	IgG, IgM	NP, SP	Sensitivity: IgM: 90.5% IgG: 90.5% Specificity: IgM: 99% IgG: 98%	IgG/IgM and control band were visible with the naked	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Snoeck et al., 2020	No	-	ELISA	IgG, IgA	SP	IgG: Sensitivity: 85.7% Specificity: 97.8% IgA: Sensitivity: 92.9% Specificity: 89.2%	The cut-off OD values of 1.1 and above were considered positive	RT-PCR were also performed for participants
Comar et al., 2020	No	-	LFIA	IgG, IgM		Sensitivity: 95.6% Specificity: 95.2%	-	RT-PCR were also performed for participants
Nisar et al., 2020	No	-	CLIA	IgG, IgM	NP	-	-	-
Wang et al., 2020	-	-	LFIA	IgG, IgM		Sensitivity:100.0% Specificity: 100.0%	-	-
			NT	Neutralizing antibodies		-	A titer of 1:4 or higher indicated seropositivity	-
Lisandru et al., 2020	-	-	ELISA	IgG	SP	-	A result was considered borderline if the ratio was ≥ 0.8 and <1.1 and positive if the sample ratio was ≥ 1.1.	-
Zou et al., 2020	No	-	ELISA	IgG, IgM	SP	-	-	-
Nopsopon et al., 2020	Yes	-	LFIA	IgG, IgM	-	Sensitivity: 94.1% Specificity: 98.0%	-	-
McDade et al., 2020	Yes	-	ELISA	IgG	SP	-	-	RT-PCR were also performed for participants
Baker et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Appa et al., 2020	No	-	CLIA	IgG	NP	-	-	-
			ELISA	IgG	SP	-	-	-
			ELISA	IgG, IgA	SP	-		
			MN	Neutralizing antibodies	-	-	Titer >1:4 was considered positive	
Baxendale et al., 2020	No	-	Microsphere-based assay	IgG	NP, SP	Sensitivity: 97% Specificity: 100%	-	-
Elli et al., 2020	No	-	ELISA	IgG, IgA	NP, SP	Sensitivity: 95%(IgG_antiSP),95%(IgG_antiNP),	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
						95%(IgA_antiSP),69%(IgA_antiNP) Specificity: 97%(IgG_antiSP),91%(IgG_antiNP), 91.5%(IgA_antiSP),85%(IgA_antiNP)		
Takita et al., 2020	No	-	LFIA	IgG	-	Sensitivity: 76.4% Specificity: 100.0%	-	-
Tönshoff et al., 2020	-	-	ELISA	IgG	-	-		Unclear or discordant results were further assessed by CLIA or a second ELISA
			IFA	IgG	-	-		
			NT	Neutralizing antibodies		-		
Mortgat et al., 2020	-	27 (11-56) days	ELISA	IgG	SP	-	Sera were considered positive at an S/N ratio ≥1.1, as suggested by the manufacturer	-
Jerković et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Alessandro et al., 2020	No	-	CLIA	IgG	SP	-	Positive or negative results were established by the following cuts off: <12: Negative; ≥15: positive.	-
Dillner et al., 2020	-	-	Microsphere-based assay	IgG	NP, SP	Sensitivity: 99.2% Specificity: 99.8%	-	-
Alemu et al., 2020	-	-	LFIA	IgG, IgM	-	IgG: Sensitivity: 69.00% Specificity: 100% IgM: Sensitivity: 93.1% Specificity: 99.2%		
Aziz et al., 2020	-	-	ELISA	IgG	SP	-	cut-off of >1.1	Two additional confirmatory tests in all those individuals whose ELISA assay results were either positive (i.e. >1·1) or borderline (i.e. between 0·8 and 1·1) were performed
			IFA	-	-	-	-	-
			PRNT	Neutralizing antibodies	-	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Chamie et al., 2020	No	-	CLIA	IgG	NP	-	-	RT-PCR were also performed for participants
Nesbitt et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
			CLIA	Total antibodies	SP	-	-	-
Wells et al., 2020	No	-	ELISA	IgG	SP, NP	Sensitivity: 90.0% (95%CI 60.0%-99.0%) Specificity: 100.0% (95%CI 93.0%-100.0%)	A participant was considered seropositive if an IgG response (OD value) to both N and S was detected that was 4-fold above the background of the assay. This cut-off is based on the analysis of 300+ pre-COVID-19 serum samples	RT-PCR were also performed for participants
Fontanet et al., 2020	No	-	Flow cytometry	-	SP	-	-	-
Anna et al., 2020	-	-	Luciferase-linked immunosorbent assays (LuLISA)	IgG	SP	Specificity: 98.0%	-	-
			PVNT		SP	Specificity: 99.0%	-	-
Sandri et al., 2020	No	-	CLIA	IgG	SP	-	Truly positive: >15.0 AU/mL; positive: ≥12.0 AU/mL	-
Calife et al., 2020	-	-	CLIA	IgG, IgM	NP	-	-	-
Brant et al., 2020	No	-	CLIA	IgG	SP	-	-	-
Brant-Zawadzki et al., 2020	No	-	CLIA	IgG	SP	Sensitivity: 93.6% (95%CI: 78.6–99.2%) Specificity:100% (95% CI: 92.9–100.0%)	-	-
Jones et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Li et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	An S/CO value higher than 1 for either IgG or IgM was considered positive	-
Barallat et al., 2020	No	-	CLIA	IgG (spike); IgG (nucleocapsid)	NP, SP	-	IgG (spike):> 15.0 AU/mL were considered positive; IgG (nucleocapsid): antibody levels were expressed as the ratio of the chemiluminescence signal over the cutoff (S/CO) value. An S/CO value higher than 1.4 for either IgG positive.	-
Tess et al., 2020	No	-	CLIA	IgG, IgM	NP, SP	-	IgG: reagent >1.1 UA/mL, IgM: reagent >1.0UA/mL	Individuals who were reactive to either IgM or IgG were considered positive

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Mattern et al., 2020	No	-	CLIA	IgG	NP	-	Positive if the IgG index value was 1.40	RT-PCR were also performed for participants
Carrat et al., 2020	-	-	ELISA	IgG	NP, SP	-	ELISA-positive with an optical density ratio ≥ 1.1	-
			Neutralization assay	Neutralizing antibodies	-	-	Positive was defined as a titer ≥40	-
Samore et al., 2020	-	-	CLIA	IgG	NP	Sensitivity: 83%	as positive (ratio >1.4) or negative (ratio <1.4)	-
Dupraz et al., 2020	No	-	Luminex immunoassay	IgG	SP	Sensitivity: 96.7% Specificity: 99.2%	at an antibody Multiplex Fluorescent Immunoassay (MFI) ratio of ⩾6	-
Royo-Cebrecos et al., 2020	No	-	LIFA	IgG, IgM	-	Sensitivity: 92% Specificity: 100%	-	-
McLaughlin et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Rauber et al., 2020	-	-	ELISA	IgG	-	-	-	-
McBride et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Jõgi et al., 2020	-	-	CLIA	IgG	NP	-	signal/cut-off ratio 0.3 to 1.39	-
Ebinger et al., 2020	No	-	CLIA	IgG	NP	-	Manufacturer's signal-to-cut-off index of 1.4	-
Hurk et al., 2020	No	-	ELISA	Total antibodies	SP	Sensitivity: 98.7% Specificity: 99.6%	OD/CO ratio >1.0 were considered positive	-
Hassan et al., 2020	No	-	A multiplex antigen bead array	IgG	NP, SP	Sensitivity: 99.2% Specificity: 99.8%	-	-
Weis et al., 2020	No	-	ELISA	IgG	-	-	-	-
			CLIA	IgG	-	-	-	-
Rigatti et al., 2020			CLIA	Total antibodies	NP	-	-	-
Faniyi et al., 2020	-	-	ELISA	Total antibodies	SP	-	Samples with mean OD450nm plus 2 standard deviations (+2SD) above pre-2019 negative serum control samples were reported as positive	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Stout et al., 2020	No	-	CLIA	Total antibodies	NP	-	-	-
Gomes et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Wu et al., 2020	No	-	LFIA/CLIA	IgG, IgM	-	-	-	-
Rebeiro et al., 2020	No	-	CLIA	IgG	NP	-	-	-
Schubl et al., 2020	No	-	A novel coronavirus antigen microarray (CoVAM)	IgG, IgM	-	-	-	-
Majdoubi et al., 2020	-	-	CLIA	Total antibodies	SP	-	-	-
Nakamura et al., 2020	No	-	CLIA (Abbott)	IgG	NP	-	-	-
			CLIA (Roche)	Total antibodies	NP	-	-	-
			LFIA	IgG, IgM	NP	-	-	
Tsertsvadze et al., 2020	-	-	LFIA	IgG	-	-	-	-
Reuben et al., 2020	No	-	CLIA	IgG	SP	-	-	-
Bahrs et al., 2020	-	-	ELISA	IgG	NP	-	-	
			CLIA	IgG	NP	-	-	-
Chibwana et al., 2020	No	-	ELISA	IgG	SP, NP		The assay interpretation was as follows; positive result (OD 0.6), indeterminate result (OD 0.55 to < 0.6) and negative (OD < 0.55)	-
Laub et al., 2020			CLIA	Total antibodies	SP, NP	-	-	
			ELISA	IgG				-
Armann et al., 2020	No	-	CLIA	IgG	SP	-	Antibody levels > 15.0 AU/ml were considered positive	-
Hibino et al., 2020	Yes	-	LFIA	IgG, IgM	-	-	-	
Barchuk et al., 2020	No	-	CLIA	IgG	NP	-	Cut off for positivity 1.4	-
			ELISA	Total antibodies	SP	-	cutoff for positivity 1.0	

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Wilkins et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Abo-Leyah et al., 2020	-	-	CLIA	IgG	SP	-	-	-
Vince et al., 2020	Yes	-	ELISA	IgG, IgA	NP, SP	-	OD ratio ≥1.1	-
Alkurt et al., 2020	No	-	CLIA	IgG	NP	-	Cut-off value of 1.40 S/C was considered positive	-
Vassallo et al., 2020	-	-	CLIA	IgG, IgM, IgA	SP	-	Results with signal-to-cutoff (S/C) ratios ≥1 are reported as positive	-
Melo et al., 2020	-	-	IFA	IgG, IgM	-	-	-	-
Favara et al., 2020	No	-	LFIA	IgG, IgM	NP, SP	-	-	RT-PCR were also performed for participants
			Microsphere-based assay	IgG	NP, SP	-	-	
Remes-Troche et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Ladage et al., 2020	No	-	LIFA	IgG, IgM	-	Sensitivity: 31% Specificity: 99%	-	-
			ELISA	IgG, IgA		-		
Silva et al., 2020	-	-	ELISA	IgG	SP	Sensitivity: 74.0% Specificity: 100.0%		
Craigie et al., 2020	-	14 weeks (range 11-17 weeks).	CLIA/ELISA	IgG	NP	-	Abbott-CLIA≥1.40 S/C, In-house-ELISA: ≥0.2 OD(RBD)/≥300 titer (spike) Wantai ELISA≥1 A/C.O, Euroimmun-ELISA≥1.1 ratio,	-
			NT	Neutralizing antibodies		-	NT≥20 inhibition	
Silva et al., 2020	-	-	LFIA	IgG, IgM	SP	-	-	
Strazzulla et al.	No	-	CLIA	Total antibodies	NP	-	-	-
Ray et al., 2020	No	-	ELISA	IgG	SP	Sensitivity: 88.2% Specificity: 99.8%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Bardai et al., 2020	-	-	ELISA	IgG	NP, SP	-	-	-
Cooper et al., 2020	No	-	CLIA	Total antibodies	SP	-	Index Values >= 1.0 are reported as reactive	-
Hommes et al., 2020	No	-	ELISA	IgG	SP	-	-	-
Nishida et al., 2020	-	-	CLIA	IgG	NP	-	-	-
Nawa et al., 2020	No	-	CLIA	IgG	NP, SP	-	A cut-off value of 10 AU/ml was considered positive	-
Qutob et al., 2020	-	-	CLIA	Total antibodies	NP	-	-	-
Khan et al., 2020	-	-	CLIA	IgG	NP	-	The test result was considered positive for SARS-CoV-2 IgG if the index value was ≥1.4 as provided by the manufacturer.	-
Haq et al., 2020	-	-	CLIA	Total antibodies	NP	-	1 AU/ml and less than 1 AU/ml was considered Negative and more than or equal to 1AU/ml as positive.	-
Jin et al., 2020			CLIA (Ortho-Clinical VITROS Diagnostics)	Total antibodies	SP	-	-	-
			CLIA (Abbott Architect)	IgG	NP			
			NT	Neutralizing antibodies	-			
Ulyte et al., 2020	Yes	-	multiplex, microsphere-based assay	IgG, IgM, IgA	NP, SP	Sensitivity:94.3% Specificity: 99%	-	-
Asuquo et al., 2020	No	-	LFIA	IgG, IgM	SP	-	-	-
Ward et al., 2020	No	-	LFIA	IgG	-	Sensitivity: 84.4% Specificity: 98.0%	-	-
Menezes et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 77.1% Specificity: 98.0%	-	-
Laursen et al., 2020	-	-	LFIA	IgG, IgM	-	Sensitivity: 82.58% (95% CI: 75.7%-88.2%) Specificity: 99.54% (95% CI: 98.7%-99.9%)	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Kahlert et al., 2020	No	-	CLIA	Total antibodies	NP	-	A cut-off index, COI, > 1	-
ROEDERER et al., 2020	-	-	Luciferase-linked immunosorbent assays (LuLISA)	Total antibodies	NP, SP	-	-	-
Demonbreun et al., 2020	No	-	CLIA	IgG	SP	-	A value >0.39μg/ml was considered positive.	-
Ariza et al., 2020	Yes	-	CLIA	IgG	NP	-	Samples with a signal- to-cutoff (S/CO) ratio greater than or equal to 1.4 were considered positive	-
Majiya et al., 2020	No	-	LFIA	IgG, IgM	-	Sensitivity: 100.0% Specificity: 100.0%	-	-
Javed et al., 2020	No	-	LFIA	IgG, IgM	-	-	-	-
Buonsenso et al., 2020	No	-	ELISA	IgG	NP, SP	-	-	-
Kasztelewicz et al., 2020	No	-	CLIA	IgG	NP	-	S/CO ratio of ≥1.40	-
Malecki et al., 2020	No	-	CLIA	IgG	NP	-	-	-
FUKUDA et al., 2020	No	-	CLIA	IgG, IgM, IgA	NP	-	COI ⩾ 1.0	-
Díaz-Salazar et al., 2020	No	-	CLIA	IgG, IgM	NP	-	-	-
Bruckner et al., 2020	-	-	coronavirus antigen microarray	IgG, IgM	NP, SP	Sensitivity: 94.0% Specificity: 100.0%	-	-
Goenka et al., 2020	-	-	CLIA	IgG	SP		-	-
Flemand et al., 2020	-	-	ELISA	IgG	SP	Sensitivity: 75-93.8% Specificity: 97.9%	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Lopez et al., 2020	-	-	CLIA	IgG	NP	-	Values were considered positive if index was >1.1, negative if <0.8, and borderline if between 0.8-1.1	-
Ghose et al., 2020	No	-	ELISA	IgG	SP	Sensitivity:84.7% (95%CI: 80.6%-88.1%) Specificity:100%	cut-off ratio ≥ 1	-
Pasqualotto et al., 2020	-	-	ELISA	IgG, IgA	SP	-	Values were considered positive if index was >1.1, negative if <0.8, and borderline if between 0.8-1.1	-
Satpati et al., 2020	-	-	ELISA	IgG	-	-	-	-
Al-Thani et al., 2020	No	-	CLIA	Total antibodies	NP	-	reactive for optical density cutoff index ≥1.0	-
Sharma et al., 2020	No	-	ELISA (The ELISA COVID-Kawach IgG)	IgG	-	Sensitivity: 92.1% Specificity: 97.7%	-	-
			ELISA (the ERBALISA COVID-19 IgG)			Sensitivity: 99.12 Specificity: 99.33%		
Kshatri et al., 2020	-	-	CLIA	IgG	NP	-	The value was expressed in Cut off Index (CoI) and a value of ≥1.0 was reactive"	-
Cruz-Arenas et al., 2020	No	-	LIFA	IgG, IgM	-	-	-	-
			ELISA	IgG	NP		a resulting ratio ≥ 1.1	
Murhekar et al., 2020	No	–	CLIA	IgG	NP	-	Cut off index value of ≥1.4 were interpreted as positive for SARS- CoV-2 antibodies	-
Rezwan et al., 2020	-	-	CLIA	Total antibodies	NP	-	Cut-of-Index (COI) value was >1.0	-
Babu et al., 2020	No	-	ELISA	IgG	-	-	-	-
Thielecke et al., 2020	No	-	ELISA	IgG	SP	-	Threshold, >1.1	-
Ladage et al., 2020	No	-	ELISA	IgG, IgA	SP	-	-	-
	No	-	CLIA	IgG	NP		An index measurement ≥1.4 was considered positive	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
Kumar et al., 2020			ELISA	IgG	SP		Results are evaluated semi-quantitatively by calculation of a ratio of the extinction of the control or patient sample over the extinction of the calibrator, and ratio of < 1.1 was positive	-
Official reports								
MedLife, Romania, 2020	No	-	CLIA	-		-	-	-
	No	-	ELISA	-		-	-	-
Public Health Ontario, Canada, 2020	-	-	CLIA	IgG	NP, SP	Sensitivity: 90.4% Specificity: 100.0%	-	-
Norwegian Institute of Public Health, 2020	No	-	Flow cytometry	IgG	-	Sensitivity:86% (95%CI: 74%-94%) Specificity:100% (95%CI: 99%-100%)	-	-
Office of National Statistics, UK, 2020	No	-	CLIA	IgG		-	-	-
the Government of Jersey, UK, 2020	Yes	-	LFIA	IgG, IgM	-	-	-	-
Canadian Blood Services, 2020	-	-	CLIA	IgG	NP	-	-	-
Ministry of Health, Labour and Welfare, Japan, 2020	-	-	CLIA	IgG, IgM	NP	-	-	-
NHS BT collection, 2020	No	-	ELISA	-	SP	-	-	-

Reference	Paired serums	Days from last possible exposure to sampling (median/range)	Assay methods (screening methods/confirmatory methods)	Antibodies measured	Targeted antigen	Test performance (sensitivity, specificity)*	Reported positive cut-off value	Comments
RCGP collection, 2020	No	-	CLIA	IgG	NP	-	-	-
SEU and Paediatric collections, 2020	No	-	CLIA	IgG	NP	-	-	-
Health Protection Surveillance Centre, 2020	No	-	CLIA	IgG	NP	-	-	-
Islamic Republic of Afghanistan Ministry of Public Health, Afghanistan, 2020	-	-	LFIA	IgG, IgM	-	-	-	-

Abbreviations: ELISA, Enzyme-linked immunosorbent assay; CLIA: Chemiluminescent immunoassay; LFIA: lateral flow immunoassays; MIA: Microsphere immunoassay; MN, Microneutralisation assay; NT, Neutralization assay; PVNT: Pseudovirus neutralization tests; PRNT: plaque-reduction neutralization test; IFA: Immunofluorescence assay; OD value: Optical density value; POC: point of care; RLU: relative light unit

Table S4. Summary of studies reporting seroprevalence of human infections with SARS-CoV-2 included in systematic review

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Peer-reviewed databases				
Victoria et al., 2020	Jan 2020	Office co-workers waiting room contacts healthcare contacts	0/8 (0) 0/14 (0) 0/6 (0)	-
To et al., 2020	Jan 2020	General population Hong Kong resident evacuated from Hubei	IgG (either anti-NP or anti-RBD): 53/1938 (2.7); Neutralizing antibodies: 0/1938 (0) IgG (either anti-NP or anti-RBD): 13/452 (2.9); Neutralizing antibodies: 15/452 (3.3)	-
Hippich et al., 2020	Jan 2020	Children participating in a diabetes screening program Neonates in a Bavarian screening study	82/11884 (0.7) 9/1916 (0.5)	-
Liang et al., 2020	Jan 2020	Inpatients and their healthy companions	Guangzhou: IgG or IgM: 52/8782 (0.6); IgG: 14/8782 (0.2); IgM: 39/8782 (0.4) Wuhan: IgG or IgM: 177/8272 (2.1); IgG: 123/8272 (1.5); IgM: 71/8272 (0.9)	-
Ng et al., 2020	Jan 2020	Close contact	44/1150 (3.8)	-
Hallowell et al., 2020	Jan 2020	Evacuees from Wuhan in a repatriation	1/186 (0.5)	-
Sam et al., 2020	Jan 2020	Residual serum samples collected at a teaching hospital	IgG: 46/588 (7.8) neutralizing antibodies: 3/588 (0.5)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Jeong et al., 2020	Feb 2020	Emergency professionals	23/50 (46.0)	Loss of taste and smell (RR 2.8; 95% CI 1.7 to 4.60); fever (RR 2.0; 95% CI 1.1 to 3.47); dyspnea (RR 1.8; 95% CI 1.1 to 3.19).
Buss et al., 2020	Feb 2020	Blood donors	Manaus:1/821 (0.1)	-
			São Paulo:7/799 (0.9)	
	Mar 2020		Manaus:6/832 (0.7)	
			São Paulo:22/2454 (0.9)	
	Apr 2020		Manaus :46/829 (5.5)	
			São Paulo :27/900 (3.0)	
	May 2020		Manaus:359/901 (39.9)	
			São Paulo:44/826 (5.3)	
	Jun 2020		Manaus:422/911 (46.3)	
			São Paulo:105/880 (11.9)	
	Jul 2020		Manaus:419/1147 (36.5))	
			São Paulo:84/879 (9.6)	
	Aug 2020		Manaus:242/881 (27.5)	
			São Paulo:113/906 (12.5)	
	Sep 2020		Manaus:214/868 (24.7)	
			São Paulo:101/933 (10.8)	
	Oct 2020		Manaus:183/882 (20.7)	
			São Paulo:100/877 (11.4)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Stadlbauer et al., 2020	Feb 2020	Patients with emergency department visit (urgent care group) Patients with OB/GYN visit (routine care group)	1067/4101 (26.0) 731/6590 (11.1)	-
Chen et al., 2020	Feb 2020	Healthcare workers	IgG or IgM: 19/105 (18.1) neutralizing antibodies: 18/105 (17.1)	Univariate analysis: Exposure for more than 30 minutes at less than 1 meter: 3.478 (1.224-9.887), ref: no exposure; Close contact with patient 2: 7.125(1.627-31.210), ref: close contact with patient 1; Doctors: 3.850 (1.131- 13.105), ref: colleague; Multivariate analysis: Close contacts with patient 2: 6.605(1.123-38.830), ref: close contact with patient 1; Doctor: 346.837 (8.924-13479.434), ref: colleague; Wearing disposable non-surgical face mask: 0.127 (0.017-0.968), ref: without wearing disposable non-surgical face mask
Liu et al., 2020	Feb 2020	Newborn	182/3048 (6.0)	Infants that were antibody positive for COVID-19 were more likely to be born later during the study period (adjusted OR:1.05; 95% CI, 1.01–1.10, P = 0.01); and to mothers with older maternal age (adjusted OR, 1.13; 95% CI, 1.02–1.25, P = 0.01).

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Cavicchiolo et al., 2020	Feb 2020	Neonates	0/75 (0.0)	-
Plebani et al., 2020	Feb 2020	Healthcare worker	IgG: 343/8285 (4.1) IgM: 82/8285 (1.0) IgG or IgM: 378/8285 (4.6)	A significant higher seroprevalence could be observed in health care assistants compared to other groups ($\chi 2$=5.34, p=0.021)
Cox et al., 2020	Feb 2020	Household members of confirmed COVID-19 cases	24/77 (31.2)	-
Villalaı´n et al., 2020	Feb 2020	Pregnant woman	86/769 (11.2)	-
Brandstetter et al., 2020	Mar 2020	Hospital staff with close contact Hospital staff with moderate contact Hospital staff with no contact	IgG: 1/50 (2.0); IgA: 3/50 (6.0); IgG or IgA: 4/50 (8.0) IgG: 0/63 (0); IgA: 1/63 (1.6); IgG or IgA: 1/63 (1.6) IgG: 0/50 (0); IgA: 6/50 (12.0) ; IgG or IgA: 6/50 (12.0)	-
Solodky et al., 2020	Mar 2020	Healthcare worker, cancer patients	13/244 (5.3) 5/85 (5.9)	-
Zhang et al., 2020	Mar 2020	Healthy individuals returning to Shenzhen	IgG: 6/1589 (0.4); IgA: 0/1589 (0); IgM: 0/1589 (0)	-
Suda et al., 2020	Mar 2020	Outpatients with liver disease	IgG (Immunochromatographic test): 2/300 (0.67) IgG (CLIA) :1/600 (0.17)	-
Bogogiannidou et al., 2020	Mar 2020	Leftover blood samples from nationwide labs	24/6586 (0.36)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Xu et al., 2020	Mar 2020	Hemodialysis Patients; healthcare worker;	51/1542 (3.3) 39/3205 (1.2)	Independent risk factors for SARS-CoV-2 infection were being older than 65 years, having manifestation of lung infection in imaging examinations, and having a lower level of serum albumin.
Vena et al., 2020	Mar 2020	non-hospitalized participants in an outpatient setting	398/3609 (11.0)	Factors Associated with Anti-Sars-CoV-2 Antibodies Positivity: occupational exposure to the virus: 2.36 (1.59–3.50); living in a long-term care facility: 4.53 (3.19–6.45); reporting previous symptoms of influenza-like illness: 4.86 (3.75–6.30); loss of sense of smell or taste: 41.00 (18.94–88.71)
Ng et al., 2020	Mar 2020	Blood donors; Hospitalized patients admitted for non-respiratory indications	1/1000 (0.1) 1/387 (0.3)	-
Venugopal et al., 2020	Mar 2020	Healthcare workers	130/478 (27.2)	Symptomatic participants had a 75% (98/130) rate of seroconversion compared to those without symptoms
Dingens et al., 2020	Mar 2020	Residual serum samples from Seattle Children's Hospital	8/1076 (0.7)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Barzin et al., 2020	Mar 2020	Patients in outpatient clinics inpatients unrelated to COVID-19	24/2937 (0.8) 10/1449 (0.7)	
Pérez-García et al., 2020	Mar 2020	Healthcare worker	IgG or IgM: 542/2424 (22.4) IgG: 527/2424 (21.7) IgM: 55/2424 (2.3)	Previous contact with COVID-19 patients
Trieu et al., 2020	Mar 2020	Healthcare workers	11/607(1.8)	-
Fischer et al., 2020	Jan 2020	Blood donors	29/3186 (0.9)	-
McCafferty et al., 2020	Mar 2020	Patients in an urban hemodialysis unit	93/811 (11.5)	
Brown et al., 2020	Mar 2020	Student who contacted with infected teacher	1/21 (4.8)	-
Han et al., 2020	Mar 2020	Persons during work resumption screening	IgG: 813/22633 (3.6) IgM: 236/22633 (2.0) IgG or IgM: 196/22633 (0.9)	-
Zhou et al., 2020	Mar 2020	Hospital staff	IgG or IgM: 89/3674 (2.4) IgG:73/3674 (2.0) IgM: 26/3674 (0.7)	-
Thompson et al., 2020	Mar 2020	Blood donors	111/3500 (3.2)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Carlo et al., 2020	Mar 2020	High-risk HCWs	IgG: 3/428 (0.7) IgM: 4/428 (0.9)	-
		Intermediate-risk HCWs	IgG:34/2736 (1.2) IgM: 25/2736 (0.9)	
		Low-risk HCWs	IgG: 0/78 (0) IgM: 1/78 (1.3)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Tu et al., 2020	Mar 2020	Pediatric medical workers (close contact group)	ELISA: IgG: 66/191 (34.6) IgM: 16/191 (8.4) dual-target immuno-fluorescence assay: IgG: 79/191 (41.4)	-
		Pediatric medical workers (Non-close contact group)	ELISA: IgG: 12/110 (10.9) IgM: 1/110 (0.9) dual-target immuno-fluorescence assay: IgG: 16/109 (14.7)	
		Pediatric medical workers (Non-contact group)	ELISA: IgG: 1/24 (4.2) IgM: 0/24 (0) dual-target immuno-fluorescence assay: IgG: 3/24 (12.5)	
Kohler et al., 2020	Mar 2020	Hospital workers	8/1012 (0.8)	-
Fuereder et al., 2020	Mar 2020	Healthcare professionals Cancer patients	2/62 (3.2) 2/84 (2.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Fusco et al., 2020	Mar 2020	Healthcare worker	IgG: 2/115 (1.7) IgM: 0/115 (0.0)	-
Havers et al., 2020	Mar 2020	Residual patient sera collected for routine screening	Washington: 43/3264 (1.3) New York City: 144/2482 (5.8) Louisiana: 81/1184 (6.8) South Florida: 38/1742 (2.2) Pennsylvania: 20/824 (2.4) Missouri: 54/1882 (2.9) Utah: 26/1132 (2.3) California: 12/1224 (1.0) Connecticut: 70/1431 (4.9) Minnesota: 14/860(1.6)	-
Xu et al., 2020	Mar 2020	Blood donors	IgG: 2/2199 (0.1) IgA: 2/2199 (0.1) Total antibodies: 7/2199 (0.3)	-
Behrens et al., 2020	Mar 2020	Firstline health care professional	IgG: 2/217 (0.9) IgA: 9/217 (4.1) Neutralizing antibodies: 1/217 (0.5)	-
Loconsole et al., 2020	Mar 2020	Patients admitted to Emergency Department	70/819 (8.5)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Mansour et al., 2020	Mar 2020	Healthcare worker	93/285 (32.6)	-
Gallian et al., 2020	Mar 2020	Blood donors	27/998 (2.7)	-
Korth et al., 2020	Mar 2020	High-risk Healthcare worker, Intermediated-risk healthcare worker, Low-risk healthcare worker,	3/244 (1.2) 2/37 (5.4) 0/35 (0.0)	-
Bielecki et al., 2020	Mar 2020	Soldiers stationed at a Swiss Army Base Company 1 Company 2	 7/88 (8.0) 111/181 (61.3)	-
Tsaneva et al., 2020	Mar 2020	Outpatients	IgG: 22/586 (3.8); IgM: 13/586 (2.2); IgG or IgM: 28/586 (4.8)	
Houlihan et al., 2020	Mar 2020	First-line healthcare worker	46/181 (25.4)	-
Liu et al., 2020	Mar 2020	Community residents and employees	1360/35040 (3.9)	-
Basteiro et al., 2020	Mar 2020	Health care workers	IgG or IgM or IgA: 54/578 (9.3); IgG: 44/578 (7.6); IgM: 36/578 (6.2); IgA: 47/578 (8.1)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Isherwood et al., 2020	Mar 2020	Patients in a tertiary acute general surgical unit Healthcare staff in the same healthcare setting	71/1964 (3.6) 15/215 (7.0)	-
Xu et al., 2020	Mar 2020	Healthcare worker in Wuhan Healthcare worker in Hubei Healthcare worker in Chongqing Healthcare worker in Guangdong Healthcare worker relative in Wuhan Hemodialysis patient in Hubei Hemodialysis patient in Guangdong Outpatient in Chongqing Hotel staff member in Wuhan Community resident in Sichuan Factory workers in Guangdong	IgG:27/714 (3.8); IgM:6/714 (0.8); IgG or IgM: 27/714 (3.8) IgG:37/3091 (1.2); IgM:4/3091 (0.1); IgG or IgM: 41/3091 (1.3) IgG:8/319 (2.5); IgM:2/319 (0.6); IgG or IgM: 10/319 (3.1) IgG:1/260 (0.4); IgM:2/260 (0.8); IgG or IgM: 3/260 (1.2) IgG:7/219 (3.2); IgM:3/219 (1.4); IgG or IgM: 7/219 (3.2) IgG:19/979 (1.9); IgM:19/979 (1.9); IgG or IgM: 35/979 (3.6) IgG:12/563 (2.1); IgM:7/563 (1.2); IgG or IgM: 16/563 (2.8) IgG:37/993 (3.7); IgM:1/993 (0.1); IgG or IgM: 38/993 (3.8) IgG:11/346 (3.2); IgM:8/346 (2.3); IgG or IgM: 13/346 (3.8) IgG:26/9442 (0.3); IgM:29/9442 (0.3); IgG or IgM: 55/9442 (0.6) IgG:4/442 (0.9); IgM: 4/442 (0.9); IgG or IgM:6 /442 (1.4)	-
Milani et al., 2020	Mar 2020	Personnel of the University of Milan	Total antibodies:5/197 (2.5) IgM:5/197 (2.5) IgG:11/197 (5.6)	-
Medas et al., 2020	Mar 2020	Patients admitted at surgical department	IgG or IgM: 5/86 (5.8) IgM: 4/86 (4.7) IgG: 3/86 (3.5)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Vos et al., 2020	Mar 2020	General population	74/3147 (2.4)	-
Savirón-Cornudella et al., 2020	Mar 2020	Pregnant women	18/260 (6.9)	-
Bryan et al., 2020	Apr 2020	Community resident	87/4856 (1.8)	-
Hains et al., 2020	Apr 2020	Hemodialysis patients Healthcare worker	IgG:3/13 (23.1); IgM:2/13 (15.4) IgG:7/25 (28.0); IgM:4/25 (16.0)	-
Liu et al., 2020	Apr 2020	Healthcare worker deployed to Wuhan Healthcare professionals at home hospital	IgG:0/420 (0.0); IgM: 0/420 (0.0) IgG:0/77 (0.0); IgM: 0/77 (0.0)	-
Malickova et al., 2020	Apr 2020	Inflammatory bowel disease healthcare professionals	2/92 (2.2)	-
Paulino-Ramirez et al., 2020	Apr 2020	Community residents in emerging hotspots	IgG: 704/12897 (5.5) IgM: 491/12897 (3.8)	-
Chirathaworn et al., 2020	Apr 2020	Individuals who came into close contacts with the patients	15/308 (4.9)	-
Posfay-Barbe et al., 2020	Apr 2020	Children seeking medical care	18/208 (8.7)	-
Slot et al., 2020	Apr 2020	Regular blood plasma donors	230/7361 (3.1)	-
Olayanju et al., 2020	Apr 2020	Frontline healthcare workers	60/133 (45.1)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Berte et al., 2020	Apr 2020	Inflammatory bowel diseases patients	IgG:8/354 (2.3) IgA:12/354 (3.4)	Multivariate analysis: The presence of a COVID-19 infected relative (RR 52.4, 95%CI 1.5-1769.2; p=0.027); Univariate analysis: History of fever and anosmia/ageusia in the last two months (RR 54.5, 95%CI 2.1-1434.9; p=0.016)
Ciechanowicz et al., 2020	Apr 2020	Patients with psoriasis treated with biologic therapy	IgG:7/61 (11.5) IgG or IgM or IgA: 7/61(11.5)	-
Ko et al., 2020	Apr 2020	COVID-19- designated HCWs Non-COVID-19-designated HCWs	1/309 (0.3) 0/123 (0)	-
Lackermair et al., 2020	Mar 2020	Healthcare worker	4/151 (2.6)	-
Sotgiu et al., 2020	Mar 2020	Healthcare worker	IgM: 29/202 (14.4) IgG: 29/202 (7.4)	-
Mohanty et al., 2020	Apr 2020	Asymptomatic patients, caregivers, and healthcare workers	129/1670 (7.7)	-
Wu et al., 2020	Apr 2020	People applying for a permission of resume Hospitalized patients	IgG:98/1021 (9.6); IgM: 0/1021 (0.0) IgG:40/381(10.5); IgM: 1/381 (0.0)	-
Stubblefield et al., 2020	Apr 2020	Healthcare worker worked in COVID-19 units	19/249 (7.6)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Self et al., 2020	Apr 2020	frontline Health care personnel	194/3248 (6.0)	Detection of SARS-CoV-2 antibodies was less common among participants who reported using a face covering for all clinical encounters (6%) than among those who did not (9%) (p = 0.012).
Stellato et al., 2020	Apr 2020	Patients, caregivers and health care workers	5/662 (0.8)	-
Flannery et al., 2020	Apr 2020	Pregnant women presenting for delivery	IgG or IgM: 80/1293 (6.2) IgG: 76/1293 (5.9) IgM: 59/1293 (4.6)	Black/non-Hispanic and Hispanic/Latino women have higher SARS-CoV-2 seroprevalence rates relative to women of other races
Stock et al., 2020	Apr 2020	Adult clinicians	15/98 (15)	-
Goldberg et al., 2020	Apr 2020	Staff members at a Skilled Nursing Facility; residents at a Skilled Nursing Facility	4/84 (4.8) 11/56 (19.6)	-
Stringhini et al., 2020	Apr 2020	General population	Week1: 12/341 (3.5) Week2: 28/469 (6.0) Week3: 61/577 (10.6) Week4: 36/604 (6.0) Week5: 82/775 (10.6) Overall: 219/2766 (7.9)	Univariate analysis: Aged 5–9 years:0.32 (0.11-0.63); 65 years and older:0.50 (0.28-0.78); ref: aged 20–49 years
Erikstrup et al., 2020	Apr 2020	Blood donors	412/20640 (2.0)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Lahner et al., 2020	Apr 2020	Healthcare worker	IgG: 8/1084 (0.7) IgM: 0/1084 (0.0)	-
Labriola et al., 2020	Apr 2020	Patients on in-center maintenance hemodialysis	8/98 (8.2)	-
Pallett et al., 2020	Apr 2020	Health-care workers	IgG: 624/1704 (36.6) IgM: 45/1704 (2.6)	-
Sood et al., 2020	Apr 2020	General population	35/863 (4.1)	-
Shakiba et al., 2020	Apr 2020	Residents	IgG: 113/528 (21.7) IgM:102/528 (19.3) IgG or IgM:117/528 (22.2)	-
Madsen et al., 2020	Apr 2020	ED employees	16/270 (6.0)	-
Sims et al., 2020	Apr 2020	Healthcare worker	1818/20614 (8.8)	-
Crovetto et al., 2020	Apr 2020	Pregnant women attending first trimester screening	125/874 (14.3)	-
Gudbjartsson et al., 2020	Apr 2020	persons contact with the Icelandic health care system for reasons other than Covid-19 Icelandersi n the greater Reykjavik area Residents of Vestmannaeyjar Icelanders had been quarantined	39/18609 (0.2) 21/4843 (0.4) 3/663 (0.5) 97/4222 (2.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Naranbhai et al., 2020	Apr 2020	Asymptomatic residents	IgG or IgM: 63/200 (31.5) IgG: 45/200 (22.5) IgM: 53/200 (26.5)	The number of cohabiting children: 1.057 (1.001-1.117); reduced sense of smell or taste: 1.519 (1.208-1.910)
Herzberg et al., 2020	Apr 2020	Hospital employees and nuns	23/871 (2.6)	-
Dacosta-Urbieta et al., 2020	Apr 2020	Healthcare workers	IgG or IgM: 7/175 (4.0) IgG: 3/175 (1.7) IgM: 4/175 (2.3)	-
Lumley et al., 2020	Apr 2020	Antenatal women	IgG: 53/1000 (5.3) Neutralizing antibodies: 43/1000 (4.3)	-
Rudberg et al., 2020	Apr 2020	Healthcare worker	410/2149 (19.1)	Seroprevalence was strongly associated with patient-related work (OR: 2.9), covid-19 patient contact (OR: 1.43), and occupation assisting nurse (OR: 3.67).
Buntinx et al., 2020	Apr 2020	Residents in a nursing home staff member in a nursing home	IgG:15/100 (1.5) IgM: 13/100 (1.3) IgG or IgM: 17/100 (1.7) IgG: 14/88 (15.9) IgM: 11/88 (12.5) IgG or IgM: 18/88 (20.5)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Martin et al., 2020	Apr 2020	General population	36/326 (11.0)	-
Amendola et al., 2020	Apr 2020	Healthcare worker	34/663(5.1)	-
Iversen et al., 2020	Apr 2020	Healthcare worker	IgG: 808/28792 (2.8) IgM: 768/28792 (2.7) IgG or IgM: 1163/28792 (4.0)	Male health-care workers: RR=1.49 [1.31–1.68]; p<0·001; ref: female health-care workers; Frontline health-care workers: RR 1.38 [1.22–1.56]; p<0·001; ref: health-care workers in other settings; Health-care workers working on dedicated COVID-19 wards: RR 1.65 [1.34–2.03]; p<0·001); ref: other frontline health-care workers
		Blood donors	IgG-only: 86/4672 (1.8) IgM-only: 92/4672 (2.0) IgG or IgM: 142/4672 (3.0)	-
Olalla et al., 2020	Apr 2020	Health care workers	9/498 (1.8)	-
Cosma et al., 2020	Apr 2020	Pregnant women	IgG: 8/138 (5.9) IgM: 4/138 (2.9) IgG and IgM: 2/138 (1.4)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Caban-Martinez et al., 2020	Apr 2020	Frontline firefighter/paramedic workforce"	IgG or IgM: 18/203 (8.9) IgM: 10/203 (4.9) IgG: 10/203 (4.9)	-
Poletti et al., 2020	Apr 2020	Close contacts of COVID-19 cases	2187/4120 (53.1)	-
Waterfield et al., 2020	Apr 2020	Healthy children of healthcare workers	68/992 (6.9)	-
Racine-Brzostek et al., 2020	Apr 2020	Health care workers	IgG or IgM: 805/2274 (35.4) IgG: 798/2274 (35.1) IgM: 232/2274 (10.2)	Ancillary: 2.12; administrative staff: 2.20; ref: physicians, nurse practitioners, and physician assistants
Calcagno et al., 2020	Apr 2020	Health care workers	377/5444 (6.9)	-
Poustchi et al., 2020	Apr 2020	General population High-risk populations	IgG:412/3530 (11.7) IgM: 204/3530 (5.8) IgG or IgM: 494/3530 (14.0) IgG: 691/5372 (12.9) IgM:337/5372 (6.3) IgG or IgM: 919/5372 (17.1)	-
Cito et al., 2020	Apr 2020	Villagers	73/667 (10.9)	-
Rosenberg et al., 2020	Apr 2020	General population	1887/15101 (12.5)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Daniel et al., 2020	Apr 2020	Service member	Total antibodies: 228/382 (60.0); neutralizing antibodies: 135/382 (35.3)	Univariate analysis: Hispanic/Latino participants were more likely to have positive microneutralization test results than were participants of non-Hispanic/Latino or unspecified ethnicity: 2.4 (1.1-5.1).
Schmidt et al., 2020	Apr 2020	Clinic staff	11/385 (2.9)	-
Moscola et al., 2020	Mar 2020	Health Care Personnel in the New York City Area	5523/40329 (13.7)	Previous positive PCR test result (RR, 1.52 [95% CI, 1.44-1.60]) High suspicion of virus exposure (RR, 1.23 [95% CI, 1.18-1.28])
Tarabichi et al., 2020	May 2020	Public first responders	IgG: 9/296 (3.0) IgM: 8/296 (2.7)	-
Rosser et al., 2020	Apr 2020	Healthcare personnel	136/10449 (1.3)	Hispanic ethnicity: OR 2.68; ref: non-Hispanic ethnicity
Armin et al., 2020	Apr 2020	Staff of a Children's Hospital	IgG:89/475 (18.7) IgM: 75/475 (15.8) IgG or IgM: 140/475 (29.5)	BMI ≥ 24 (OR:1.72. 95% CI: 1.17 to 2.57); ref: BMI below 24; family of four members (OR:1.49, 95% CI: 1.01 to 2.20), ref: families with three or fewer members

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Montenegro et al., 2020	Apr 2020	Community individuals Patients consulting the primary care physician	IgG: 11/311 (3.5) IgM: 12/311 (3.9) IgG or IgM: 17/311 (5.5) IgG or IgM: 244/634 (38.5)	-
Kaufman et al., 2020	Apr 2020	-	316957/2402282 (13.2)	-
Ahmad et al., 2020	Apr 2020	High-risk populations	51/244 (20.9)	-
Steensels et al., 2020	Apr 2020	Hospital staff	197/3056 (6.4)	Univariate analysis: Having a household contact: 3.15 (2.33-4.25); ref: without any household contact
Mostafa et al., 2020	Apr 2020	Health care workers	IgG: 15/4040 (0.4) IgM: 39/4040 (1.0)	-
Kantele et al., 2020	Apr 2020	Healthcare workers	29/1095 (2.6)	Aged 55 years or older (OR 2.4, 95% CI 1.1 –5.2), ref: the younger
Soriano et al., 2020	Apr 2020	University employees; University employees' relatives Social services and health care workers Individuals living in communities Other	17/175 (9.7) 7/85 (8.2) 14/108 (13.0) 45/234 (19.2) 10/72 (13.9)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Eyre et al., 2020	Apr 2020	Healthcare worker	IgG (CLIA): 951/9958 (9.6) IgG (ELISA): 905/9958 (9.1) IgG (CLIA or ELISA): 1069/9958 (10.7)	Working in Covid-19 facing areas (2.47, 1.99-3.08, p<0.001) or throughout the hospital (1.39, 1.04-1.85, p=0.02) was associated with increased risk compared to non-Covid-19 areas
Halatoko et al., 2020	Apr 2020	High-risk populations	IgG: 8/955 (0.8) IgM: 2/955 (0.2) IgG or IgM: 9/955 (0.9)	-
Shields et al., 2020	Apr 2020	Healthcare workers	126/516 (24.4)	Black, Asian and minority ethnic ethnicity: 1.92 (1.14-3.23).
Makaronidis et al., 2020	Apr 2020	People with an acute loss in their sense of smell and/or taste in community	IgG: 425/567 (75.0) IgM: 136/567 (24.0) IgG or IgM: 439/567 (77.4)	-
Guerriero et al., 2020	Apr 2020	Verona population	41/1515 (2.7)	-
Menachemi et al., 2020	Apr 2020	Indiana residents derived from tax returns	38/3518(1.1) 52/889 (5.8)	The overall prevalence was significantly higher among Hispanics (8.3%) than among non-Hispanics (2.3%) (p = 0.03). Participants who reported having a current household member who had previously been told by a provider that they had COVID-19 had a higher overall prevalence (33.6% versus 2.2%; p = 0.004).

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Vilibic-Cavlek et al., 2020	Apr 2020	Personnel in the healthcare facilities	9/592(1.5)	-
Pollán et al.., 2020	Apr 2020	General population	LFIA: 3054/51075 (5.0) CLIA: 2390/51958 (4.6)	-
Petersen et al., 2020	Apr 2020	Inhabitants of the Faroe Islands	6/1075(0.6)	-
Bajema et al., 2020	Apr 2020	Commercial Laboratory Residual Sera	56/1343 (4.2)	-
Biggs et al., 2020	Apr 2020	Community household residents	19/696 (2.7)	-
Sydney et al., 2020	Apr 2020	Healthcare workers	327/1700 (19.2)	-
Brotons et al., 2020	Apr 2020	Children household member Adult household member	118/672 (17.6) 77/412 (18.7)	-
Hunter et al., 2020	Apr 2020	Healthcare worker	12/734 (1.6)	-
Tilley et al., 2020	Apr 2020	University student population.	32/790 (4.1)	-
Tsatsaris et al., 2020	Apr 2020	Pregnant women	25/529 (4.7)	-
Uyoga et al., 2020	Apr 2020	Blood donors	174/3098 (5.6)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Josè et al., 2020	May 2020	Healthy blood donors	IgG or IgM: 9/904 (1.0); IgG: 9/904 (1.0) IgM: 1/904 (1.0)	-
Paderno et al., 2020	May 2020	Healthcare worker in otolaryngology unit	4/58 (6.9)	-
Merkely et al., 2020	May 2020	Hungarian population	69/10474 (0.7)	-
Addetia et al., 2020	May 2020	Ship's crew	IgG: 6/120 (5.0) Neutralizing antibodies: 3/120 (2.5)	-
Ladhani et al., 2020	May 2020	Children of healthcare workers with confirmed COVID-19	20/44 (45.5)	-
Nailescu et al., 2020	May 2020	Pediatric kidney transplant recipients	1/31 (3.2)	-
Sperotto et al., 2020	May 2020	Allogeneic stem cell transplantation recipients	IgG: 0/70 (0) IgM: 0/70 (0) IgG or IgM: 0/70 (0)	-
Mack et al., 2020	May 2020	Professional football players and staff	23/1157 (2.0)	-
Belingheri et al., 2020	May 2020	Healthcare worker	303/3520 (8.6)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Lastrucci et al., 2020	May 2020	'Health service' group 'Support service' group 'Work-from-home' group	16/2828 (4.1) 15/1103 (1.4) 7/725 (1.0)	'Health service' group: OR 4.38 (95%CI 2.19–10.41); ref: 'Work-from-home' group
Dioscoridi et al., 2020	May 2020	Family members health care workers	26/81 (32.1) 2/38 (5.3)	-
Péré et al., 2020	May 2020	Health care workers	437/3569 (12.2)	-
Borges et al., 2020	May 2020	Asymptomatic residents	IgG: 218/2635 (8.3) IgM: 347/2921 (11.9)	-
Torres et al., 2020	May 2020	Students staff members	100/1009 (9.9) 36/235 (15.3)	-
Poulikakos et al., 2020	May 2020	Healthcare workers	17/281 (6.0)	-
Veerus et al., 2020	May 2020	Pregnant women	2/433 (0.5)	-
Brunner et al., 2020	May 2020	Employees of Bassett Healthcare Network Patients	15/764 (2.0) 34/762 (4.5)	-
Vijh et al., 2020	May 2020	Residents in both facilities Staff in both facilities	68/122 (55.7) 45/169 (26.6)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Rashid-Abdi et al., 2020	May 2020	Health- care workers at a department of infectious diseases	18/120 (15.0)	-
Stefanelli et al., 2020	May 2020	Resident	1402/6098 (22.9)	-
Feehan et al., 2020	May 2020	General population	183/2640 (6.9)	-
Sutton et al., 2020	May 2020	Patients visiting ambulatory, emergency, or inpatient health care setting	9/897 (1.0)	-
Bampoe et al., 2020	May 2020	Maternity healthcare workers	29/200 (14.5)	Presence of anosmia:18 (6-55)
Cento et al., 2020	May 2020	Consecutive patients	140/2753 (5.1)	
Rivas et al., 2020	May 2020	Healthcare workers	297/6201 (4.8)	
Capasso et al., 2020	May 2020	Multiple sclerosis patients University staff from non-clinical departments Healthcare staff from COVID-19 wards	IgG: 9/310 (2.9) IgM: 0/310 (0) IgG or IgM:9/310 (2.9) IgG: 5/862 (0.6) IgM: 6/862 (0.7) IgG or IgM: 11/862 (1.3) IgG: 17/235 (7.2) IgM: 16/235 (6.8) IgG or IgM: 25/235 (10.6)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Murhekar et al., 2020	May 2020	General population	157/28000 (0.56)	
Tong et al., 2020	May 2020	Medical staff who went to Wuhan city for support	0/191 (0.0)	-
Iwuji et al., 2020	May 2020	First responders	5/683 (0.7)	
Mughal et al., 2020	May 2020	Healthcare personnel (HCP) in the ICU setting.	1/121 (0.8)	-
Hallal et al., 2020	May 2020	Community residents	Round1: 347/24955 (1.4) Round2: 753/31162 (2.4)	Unadjusted OR: Indigenous individuals: 5.89 (95%CI 2.99-10.66) ref: the white.
Delmas et al., 2020	May 2020	Health care workers	527/4607 (11.5)	-
Costa et al., 2020	May 2020	Asymptomatic healthcare workers	701/5645 (12.4)	
Zhang et al., 2020	May 2020	Close contacts of COVID-19 patients	17/120 (14.2)	-
Pan et al., 2020	May 2020	Community individuals	IgG or IgM: 1470/61437 (2.4) IgG: 1200/61437 (2.0) IgM: 324/61437 (2.4)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Akinbami et al., 2020	May 2020	Healthcare, First Response, and Public Safety Personnel	1131/16397 (6.9)	Exposure to a household member with confirmed COVID-19: 6.18 (4.81-7.93), ref: no or unknown exposure; Working within 15 km of the Detroit center: 5.60 (3.98-7.89)
Kempen et al., 2020	May 2020	Local residents	3/99 (3.0)	-
Pagani et al., 2020	May 2020	Population of Castiglione D'Adda	115/509 (22.6)	-
Jespersen et al., 2020	May 2020	Healthcare workers and administrative personnel at the hospitals	668/17948 (3.7)	Nursing staff (7.3, 3.5–14.9), medical doctors (4.0, 1.8–8.9), and biomedical laboratory (5.0, 2.1–11.6) scientists; ref: medical secretaries
Ladhani et al., 2020	May 2020	Residents in care homes Staffs in care homes	84/118 (71.2) 113/164 (68.9)	
Yogo et al., 2020	May 2020	High-risk healthcare workers	39/1554 (2.5)	known community exposure to COVID-19 and Hispanic/Latino participants were associated with seropositivity.
Santos-Hövener et al., 2020	May 2020	Kupferzell residents	167/2203 (7.6)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Alserehi et al., 2020	May 2020	Healthcare workers in COVID-19 referral hospitals Healthcare workers in nonaffected hospitals	273/9379 (2.9) 26/3242 (0.8)	case-hospitals: OR 3.71, 95% CI; 2.47–5.55, ref: control- hospitals
Alali et al., 2020	May 2020	Migrant workers	IgG: 193/525 (36.8) IgM: 43/525 (8.2) IgG or IgM: 200/525 (38.1)	Multivariate analysis: Smokers: OR:0.49, (95% CI: 0.34 – 0.72); ref: non-smokers
Del Brutto et al., 2020	May 2020	Inhabitants in Atahualpa	IgG: 294/673 (43.7) IgM: 256/673 (38.0) IgG or IgM: 303/673 (45.0)	-
Blairon et al., 2020	May 2020	Healthcare worker	217/1485 (14.6)	-
Noh et al., 2020	May 2020	Outpatients	IgG: 1/1500 (0.1) Neutralizing antibodies: 1/1500 (0.1)	-
Ho et al.,2020	May 2020	Outpatients and emergency department patients	Period 1: 7/9777 (0.1) Period 2: 4/4988 (0.1)	-
Murakami et al., 2020	May 2020	Emergency department healthcare providers	7/138 (5.1)	
Lidström et al., 2020	May 2020	Healthcare staff	577/8679 (6.6)	Lower age (0.984, 0.978–0.991) and male sex (1.334, 1.104–1.612) were both associated with an increased risk of infection.

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Haizler-Cohen et al., 2020	May 2020	Pregnant women	269/1671 (16.1)	-
Martin et al., 2020	May 2020	Hospital staff	1148/10662 (10.8)	
Black et al., 2020	May 2020	Co-workers at a UK renal transplant centre	24/200 (12.0)	
Kassem et al., 2020	Jun 2020	Healthcare workers employed in the gastroenterology	IgG:3/74 (4.05) IgM:9/74 (12.2) IgG or IgM: 9/74 (12.2)	-
Hibino et al., 2020	Jun 2020	Medical staff	6/806 (0.7)	-
Prendecki et al., 2020	Jun 2020	Kidney transplant recipients	89/855 (10.4)	-
Abdelmoniem et al., 2020	Jun 2020	Frontline healthcare workers	IgG: 23/203 (11.3) IgM: 34/203 (16.7) IgG or IgM: 37/203 (18.2)	
Nsn et al., 2020	Jun 2020	Nursing home residents	173/241 (71.8)	-
Pedersen et al.	Jun 2020	Retired blood donors Active blood donors	22/1201 (1.8) 33/1110 (3.0)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Dimcheff et al., 2020	Jun 2020	Employees of a Veterans Affairs Healthcare System	72/1476 (4.9)	Employees who reported exposure to a known COVID-19 case outside of work: 4.53 (2.67-7.68), ref: those that did not.
Mesnil et al., 2020	Jun 2020	Hospital professionals	78/646 (12.1)	-
Insúa et al., 2020	Jun 2020	Staff physicians and residents from a children's hospital	1/116 (0.9)	-
Dimeglio et al., 2020	Jun 2020	Healthcare workers	263/8758 (3.0)	Women had lower neutralizing antibody titers than men ($p = 0.02$) and asymptomatic HCW had lower neutralizing antibody titers than symptomatic workers ($p<0.01$)
Mahajan et al., 2020	Jun 2020	Community residents	23/567 (4.1)	-
Dodd et al., 2020	Jun 2020	Blood donors	4786/160328 (3.0)	Donors who were aged 55 years and older: 2.43 (1.94-3.04); African American: 2.58 (1.71-3.88), Hispanic: 2.31 (1.77-3.00), ref: White donors; Donors from the Northeast: 1.83 (1.57-2.12), ref: West.
Martínez-Baz et al., 2020	Jun 2020	Health workers	637/8665 (7.4)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Anand et al., 2020	Jun 2020	Adult patients receiving dialysis	2292/28503 (8.0)	-
Lundkvist et al., 2020	Jun 2020	Randomly selected individuals	IgG: 5/123 (4.1) 26/90 (28.9)	-
Younas et al., 2020	Jun 2020	Blood donors	81/370 (21.9)	-
Gujski et al., 2020	Jun 2020	Police employees	IgM or IgA: 450/5082 (8.9) IgG: 217/5082 (4.3)	-
Malani et al., 2020	Jun 2020	Mumbai residents	Matunga Non-slums: 200/1183 (16.9) Matunga Slums: 1234/2121(58.2) Chembur West Non-slums: 156/941(16.6) Chembur West Slums: 864/1511(57.2) Dahisar Non-slums: 67/578 (11.6) Dahisar Slums: 298/570 (52.3)	
Khan et al., 2020	Jul 2020	Hospital visitors	111/2906 (3.8)	Age 30-69 years, a recent history of symptoms of an influenza-like-illness, and a history of being placed under quarantine were significantly related to higher odds of the presence of SARS-CoV- 2 specific IgG antibodies
Pray et al., 2020	Aug 2020	Summer school retreat attendees	118/148 (80.0)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Bloomfield et al., 2020	Jul 2020	General pediatric patients	Total Ab:0/200 (0) IgG or IgA:0/200 (0)	
Kumar et al., 2020	Jul 2020	Healthcare workers	0/635(0.0)	-
Noor et al., 2020	Jul 2020	Healthcare worker in COVID-19 receiving hospital Healthcare worker in non-COVID-19 receiving hospital	124/439 (28.2) 187/572 (32.7)	-
Yamaki et al., 2020	Jul 2020	Patients who had visited an affiliated outpatient clinic or emergency department	81/992 (9.4)	-
Bajema et al., 2020	Jul 2020	Residual sera from commercial labs	8885/177919 (5.0)	-
Godbout et al., 2020	Jul 2020	Healthcare workers	27/1962 (1.4)	-
Silva et al., 2020	Jul 2020	Residents	1167/3289 (35.5)	-
Kumar et al., 2020	-	HCWs from designated COVID-19 hospitals HCWs from Non-COVID-19 hospitals	35/401 (8.7) 54/400 (13.5)	-
Chau et al., 2020	Aug 2020	Health care workers of a tertiary referral hospital	0/408 (0)	-
Preprint database				
Sughayer et al., 2020	Jan 2020	Healthy blood donors	0/746 (0)	-
Germain et al., 2020	Jan 2020	Tissue donors	ELISA:1/144 (0.7) CLIA: 0/144 (0.0)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Martinez-Acuña et al., 2020	Jan 2020	Blood donors	77/1931 (4.0)	Donors aged 18 to 49 years (89.5%) were more likely to be seropositive compared to those aged 50 years or older (10.5%) (P<0.001)
McCulloch et al., 2020	Jan 2020	Inpatients and outpatients who underwent routine screening	10/916 (1.1)	-
Chang et al., 2020	Jan 2020	Blood donors in Wuhan Blood donors in Shijiazhuang Blood donors in Shenzhen	Total antibodies:590/17794 (3.3); Neutralizing antibodies:407/17794 (2.3) Total antibodies:60/13540 (0.4) Neutralizing antibodies:1/13540 (0.0) Total antibodies:28/6810 (0.4) Neutralizing antibodies:2/6810 (0.0)	Multivariate regression analysis revealed that age and gender were independent risk factors for the presence of antibodies against SARS-CoV-2.
Li et al., 2020	Jan 2020	Individuals with different ocular diseases	IgG or IgM:11/1331 (0.8) IgM:3/1331 (0.2) IgG:9/1331 (0.7)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Xiong et al., 2020	Feb 2020	Healthcare workers with intensive exposure to COVID-19	IgG: 35/797 (4.4) IgM: 3/797 (0.4)	-
Valenti et al., 2020	Mar 2020	Blood donors	40/789 (5.1)	-
Yu et al., 2020	Feb 2020	Health Care Workers	7/337 (2.1)	-
Kuwelker et al., 2020	Feb 2020	Household members of confirmed cases	IgG:81/179 (45.3) Neutralizing antibodies (MN): 71/179 (39.7) Neutralizing antibodies (NT): 51/179 (28.5)	-
Liu et al., 2020	Feb 2020	Healthcare providers general workers other patients	IgG: 153/3832 (0.4); IgM: 57/3832 (1.5) IgG: 900/19555 (4.6); IgM: 254/19555 (1.3) IgG: 16/1616 (1.0); IgM: 3/1616 (0.2)	-
Kamath et al., 2020	Feb 2020	Healthy blood donors	57/1559 (3.7)	
Santana et al., 2020	Feb 2020	Patients on disease-modifying anti-rheumatic drugs	IgG:6/100 (6) IgG or IgM:7/100 (7)	-
Tubiana et al., 2020	Feb 2020	Healthcare workers	15/147 (10.2)	-
Skowronski et al., 2020	May 2020	Anonymized residual sera were obtained from patients	Neutralizing antibodies: snapshot1: 0/869 (0.2) snapshot2: 4/885 (0.5)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Vu et al., 2020	Mar 2020	Individuals undergoing routine diagnosis	March: IgG (NP): 72/3834 (1.9) IgG (SP): 79/3834 (2.1) Neutralizing antibodies: 1/3834 (0.0) April: IgG (NP): 273/3595 (7.6) IgG (SP): 219/3595 (6.1) Neutralizing antibodies: 88/3595 (2.4) May: IgG (NP): 329/3592 (9.2) IgG (SP): 263/3592 (7.3) Neutralizing antibodies: 105/3592 (2.9)	-
Dietrich et al., 2020	Mar 2020	Children from a Children's Hospital	62/812 (6.3)	-
Brehm et al., 2020	Mar 2020	Health care workers non-health care workers;	9/1026 (0.9) 1/217 (0.4)	-
Tang et al., 2020	Mar 2020	Outpatients in Zhongnan Hospital, Wuhan University (excluding COVID-19 patients)	IgG: 145/2952(4.9) IgM: 51/2952 (1.7)	-
Augusto et al., 2020	Mar 2020	Health care workers	15/385 (3.9)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Wang et al., 2020	Mar 2020	HCWs who deployed to work in Wuhan HCWs who deployed to work in Wuhan HCWs who deployed to work in Wuhan HCWs who remained in Hefei HCWs who remained in Hefei HCWs who remained in Hefei	IgM:0/142 (0.0) IgG: 0/142 (0.0) IgA: 0/142 (0.0) IgM: 0/284 (0.0) IgG: 0/284 (0.0) IgA: 0/284 (0.0)	-
Ling et al., 2020	Mar 2020	Back-to-work participants	IgG: 627/18391 (3.4) IgM: 89/18391 (0.5) IgG or IgM: 657/18391 (3.5)	-
Paradiso et al., 2020	Mar 2020	Healthcare worker	IgG:1/606 (0.2) IgM:3 /606 (0.5)	-
Herzog et al., 2020	Mar 2020	Persons with blood samples collected from clinical lab	Period 1:100/3910 (2.6) Period 2:193/3397 (5.7)	Increasing age, male sex, smoking, and comorbidities such as cardiovascular diseases and diabetes have been identified as risk factors for developing severe illness.
Dopico et al., 2020	Mar 2020	Blood donor and Pregnant women	129/1900 (6.8)	-
Streeck et al., 2020	Mar 2020	Local inhabitants	IgG: 106/919 (11.5) IgA: 170/919 (18.5)	-
Doi et al., 2020	Mar 2020	Patients who visited outpatient clinics with blood samples	33/1000 (0.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Tosato et al., 2020	Apr 2020	Healthcare professionals	IgG: 6/133 (4.5) IgM: 0/133 (0.0)	-
Carozzi et al., 2020	Apr 2020	Health care workers	IgG: 240/17098 (1.4) IgM:109/17098 (0.6)	-
Siddiqui et al., 2020	Apr 2020	Staff of a tertiary care hospital Individuals visiting that hospital for COVID-19 testing	74/448 (16.5) 78/332 (23.5)	Doctors (6/59, 10.2%) and nurses (7/72, 9.7%) had lower seropositivity rates than the other staff
Davis et al., 2020	Apr 2020	Staff and postgraduate students	124/1882 (6.6)	-
Kammon et al., 2020	Apr 2020	Community residents healthcare workers	6/142 (2.8) 0/77 (0.0)	-
Wagner et al., 2020	Apr 2020	Working adults	14/1655 (0.8)	-
Bendavid et al., 2020	Apr 2020	Local residents	50/3330 (1.5)	-
Egerup et al., 2020	Apr 2020	Parturient women partners of parturient women newborns	29/1313 (2.2) 34/1189 (2.9) 17/1206 (1.4)	-
Krähling et al., 2020	Apr 2020	Employees in the Frankfurt metropolitan area	5/1000 (0.5)	-
Richard et al., 2020	Apr 2020	General population	Overall: 590/8344 (7.1)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Nopsopon et al., 2020	Apr 2020	Hospital staff, patients who needed procedural treatment or operation	IgM: 25/675 (3.7) 22/182 (12.1) IgG: 1/675 (0.1) 1/182 (0.5)	Participants with present upper respiratory tract symptoms had a higher rate of positive IgM than those without (9.6% vs. 4.5%)
Leidner et al., 2020	Apr 2020	Healthcare workers	253/10019 (2.5)	Significantly increased seropositivity among HCW age 50 and above, with odds ratio of 1.51 (95% CI 1.17-1.94)
Halbrook et al., 2020	Apr 2020	Health system workers; first responders	43/1108 (3.9) 55/679 (8.1)	-
Fujita et al., 2020	Apr 2020	Healthcare workers	5/92 (5.4)	Univariate analysis: Participants working at the otolaryngology department and/or having a history of seasonal common cold symptoms had a significantly higher titer of SARS-CoV-2 IgG antibody (p=0.046, p=0.046, respectively).
Bal et al., 2020	Apr 2020	Health care workers	7/190 (3.7)	-
Psichogiou et al., 2020	Apr 2020	Healthcare workers from two hospitals	15/1495 (1.0)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Thomas et al., 2020	Apr 2020	Health Care Workers Asymptomatic outpatients	38/1282 (3.0) 106/2379 (4.5)	-
Woon et al., 2020	Apr 2020	Asymptomatic healthcare workers	0/400 (0.0)	-
Cohen et al., 2020	Apr 2020	Children consulting an ambulatory pediatrician	63/543 (11.6)	Contact with a person with proven COVID-19: OR 15.1 (95%CI 6.6-34.6).
Sikora et al., 2020	Apr 2020	Cancer center staff	IgM: 10/161 (6.2) IgG: 5/161 (3.1) IgG or IgM: 12/161 (7.5)	-
Galán et al., 2020	Apr 2020	Healthcare workers wearing PPE Healthcare workers with wearing PPE	818/2590 (31.6)	Multivariate analysis: Being physicians (OR 2.37, CI95% 1.61-3.49), nurses (OR 1.67, 95%CI 1.14-2.46), or nurse-assistants (OR 1.84, 95%CI 1.24-2.73), HCW working at COVID-19 hospitalization areas (OR 1.71, 95%CI 1.22-2.40), non-COVID-19 hospitalization areas (OR 1.88, 95%CI 1.30-2.73), and at the Emergency Room (OR 1.51, 95%CI 1.01-2.27).
Garralda Fernandez et al., 2020	Apr 2020	Health care workers	IgG: 411/2439 (16.9) IgM: 32/2439 (1.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Erber et al., 2020	Apr 2020	Clinical staff, non-clinical MRI staff, and medical students	102/4554 (2.2)	We found an association between seropositivity and male sex (OR 1•54 [95% CI, 1•03–2•27]) or age, with the highest frequency observed for the age group of 51–60 years (OR 1•75 [95% CI, 1•06–2•85] compared to those ≤30 years)
Garritsen et al., 2020	Apr 2020	Individuals that had experiencing symptoms	1481/7241 (20.5)	-
Snoeck et al., 2020	Apr 2020	General population	IgG: 35/1820 (2.0), IgA: 201/1820 (11.0)	-
Comar et al., 2020	Apr 2020	Healthcare worker	52/727 (7.2)	Multivariate analysis: Being medical doctor: 1.82
Nisar et al., 2020	Apr 2020	Households	Apr:2/1000 (0.2) Jun:164/1004 (16.3)	-
Wang et al., 2020	Apr 2020	Communities residents	IgG: 13/2184 (0.6) IgG, IgM: 3/2184 (0.1) Neutralizing antibodies: 0/2184 (0.0)	-
Lisandru et al., 2020	Apr 2020	Patients having carried out a blood analysis	59/1973 (3.0)	-
Zou et al., 2020	Apr 2020	Local residents	IgG: 3/127 (2.4) IgM: 6/127 (4.7) IgG or IgM: 9/127 (7.1)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Nopsopon et al., 2020	Apr 2020	Healthcare staff	IgG: 0/844 (0) IgM: 7/844 (0.8) IgG or IgM: 7/844 (0.8)	Female staff seemed to have higher rate of positive IgM (1.0%, 95% CI: 0.5%, 2.1%) than male (0.5%, 95% CI: 0.1%, 2.6%)
McDade et al., 2020	Apr 2020	Household members of essential workers	33/202 (16.3)	-
Baker et al., 2020	Apr 2020	Medical staff members	586/10275 (5.7)	Community contact with a person known or suspected to have COVID-19 (aOR=1.9, 95% CI:1.4-2.5) and zip code level COVID-19
Appa et al., 2020	Apr 2020	Residents and county essential workers	CLISA:9/1810 (0.5) ELISA:4/1810 (0.2)	-
Baxendale et al., 2020	Apr 2020	Medical staff	70/493 (14.2)	-
Elli et al., 2020	Apr 2020	Celiac disease patients	IgG or IgA: 20/109 (18.3) IgG: 15/109 (13.8) IgA: 16/109 (14.7)	-
Takita et al., 2020	May 2020	Inhabitants	41/1071(3.8)	Univariate analysis: The central Tokyo of 23 special wards exhibited a significantly higher prevalence compared to the other area of Tokyo (p =0.02, 4.68% (95%CI: 3.08-6.79) versus 1.83 (0.68-3.95) in central and suburban Tokyo.

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Tönshoff et al., 2020	Apr 2020	Children and their parents	IgG:70/4964 (1.4) Neutralizing antibodies: 66/4964 (1.3)	-
Mortgat et al., 2020	Apr 2020	Healthcare worker	59/699 (8.4)	-
Jerković et al., 2020	Apr 2020	Industry workers	IgG: 13/1494 (0.9) IgM: 9/1494 (0.6) IgG or IgM: 19/1494 (1.3)	-
Alessandro et al., 2020	Apr 2020	Health Care Workers General population	400/2415 (16.6) 534/1792 (29.8)	-
Dillner et al., 2020	Apr 2020	Healthy hospital employees	1481/12928 (11.5)	-
Alemu et al., 2020	Apr 2020	Residents	23/301 (7.6)	-
Aziz et al., 2020	Apr 2020	Community residents	ELISA:46/4755 (1.0) Immunofluorescent test:26/4755 (0.6) Plaque reduction neutralization test:17/4755 (0.4)	-
Chamie et al., 2020	Apr 2020	All residents (>4 years) and workers in census tract	131/3861 (3.4)	-
Nesbitt et al., 2020	Apr 2020	Blood donor	LFIA: IgM: 68/1996 (3.4); IgG: 13/1996 (0.7) CLIA:14/1996(0.7)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Wells et al., 2020	Apr 2020	Members of the Twins K cohort	51/431 (11.8)	Seropositive participants were older (median age seropositive 48, median age seronegative 36; p = 0.046). No difference in sex (% female of seropositive participants 72, and 87 for seronegative) or BMI (median 23.8 seropositive; 22.8 seronegative) was evident between the groups.
Fontanet et al., 2020	Apr 2020	Pupils, their parents and relatives, and staff of primary schools	139/1340 (10.4)	-
Anna et al., 2020	Apr 2020	Institute Curie workers	IgG (NP): 183/1847 (9.9) IgG (SP): 181/1847 (9.8) Neutralizing antibodies: 176/1847 (9.5)	-
Sandri et al., 2020	Apr 2020	Healthcare workers	447/3985 (11.2)	-
Calife et al., 2020	Jun 2020	Residents	33/2342 (1.4)	-
Brant et al., 2020	May 2020	Healthcare workers	31/2932 (1.1)	Significant differences between observed negative and positive cases were found for age (z = 2.65, p = 0.008), race (p = 0.037), presence of fever (p < 0.001), and loss of smell (p < 0.001)

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Brant-Zawadzki et al., 2020	May 2020	Healthcare Workers	May: 32/3458 (0.9) July: 28/2754 (1.0)	-
		First responders	May: 12/226 (5.3) July: 1/92 (1.1)	
Jones et al., 2020	May 2020	HCWs and support staff	-	-
Li et al., 2020	May 2020	Patients with ocular surface diseases	IgG: 1/330 (0.3) IgM: 5/330 (1.5) IgG or IgM: 6/330 (1.8)	
		Patients with no-ocular surface diseases	IgG: 5/4614 (0.1) IgM: 6/4614 (0.1) IgG or IgM: 10/4614 (0.2)	
		Patients without ocular disease	IgG: 1/1470 (0.1) IgM: 3/1470 (0.2) IgG or IgM: 4/1470 (0.3)	
Barallat et al., 2020	May 2020	Healthcare worker	IgG (SP): 712/7563 (9.4) IgG (SP or NP): 779/7563 (10.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Tess et al., 2020	May 2020	Local inhabitants	IgG: 21/517 (4.1) IgM: 7/517 (1.4) IgG or IgM: 27/517 (5.2)	-
Mattern et al., 2020	May 2020	All patients admitted to the delivery room	20/249 (8.0)	-
Carrat et al., 2020	May 2020	General adult population	IgG (SP): 983/14628 (6.7) IgG (NP): 511/14628 (3.5) Neutralizing antibodies: 424/14628 (2.9)	-
Samore et al., 2020	May 2020	Community-representative participants	89/8108 (1.1)	-
Dupraz et al., 2020	May 2020	Household members Close contacts outside the household	160/302 (53.0) 12/69 (17.4)	Household members aged 65 or more: aOR 3·63, 95%CI 1·05-12·60, ref: younger adults; those not strictly adhering to simple hygiene rules like hand washing: aOR 1·80, 95%CI 1·02-3·17.
Royo-Cebrecos et al., 2020	May 2020	Entire population in Andorra	First survey:6816/70389 (9.7) Second survey:5433/63708 (8.5)	-
McLaughlin et al., 2020	May 2020	Residents	208/917 (22.7)	-
Rauber et al., 2020	May 2020	Individuals undergone liver transplantation	7/219(3.2)	-
McBride et al., 2020	May 2020	Outpatients coming into the Department of Radiation Oncology	44/919 (4.8)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Jõgi et al., 2020	May 2020	Participants consulted in general practitioners	60/1960 (3.1)	-
Ebinger et al., 2020	May 2020	Health Care Workers	212/6062 (3.5)	The strongest self-reported symptom associated with greater odds of seropositive status was anosmia (11.53 [7.51, 17.70], P<0.001)
Hurk et al., 2020	May 2020	Blood donor	419/7150 (5.9)	-
Hassan et al., 2020	May 2020	Home care employees	81/403 (20.1)	-
Weis et al., 2020	May 2020	Community residents	52/620 (8.4)	-
Rigatti et al., 2020	May 2020	Life insurance applicants	1520/50025 (3.0)	-
Faniyi et al., 2020	May 2020	Health care workers	214/392 (54.6)	-
Stout et al., 2020	May 2020	Life insurance applicants	547/18441 (3.0) 981/31822 (3.1) 4180/63103 (6.6)	-
Gomes et al., 2020	May 2020	Maternity healthcare workers	97/4608 (2.1)	-
Wu et al., 2020	May 2020	People living with HIV HIV-naïve residents	IgG: 3/857 (0.3); IgM: 3/857 (0.3); IgG or IgM: 4/857 (0.5) IgG: 54/1048 (5.2); IgM: 35/1048 (3.3); IgG or IgM: 66/1048 (6.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Rebeiro et al., et al.	May 2020	Health care workers	116/11787 (1.0)	-
Schubl et al.	May 2020	Healthcare worker	165/1557 (10.6)	-
Majdoubi et al., 2020	May 2020	Adult residents	3/276 (1.1)	-
Nakamura et al., 2020	May 2020	Healthcare workers	CLIA (Abbott): 4/1000 (0.4); CLIA (Roche): 0/1000 (0.0); POC qualitative test: 33/1000 (3.3)	-
Tsertsvadze et al., 2020	May 2020	Adult residents of capital city of Tbilisi	9/1068 (0.8)	-
Reuben et al., 2020	May 2020	First responders	11/310 (3.5)	-
Bahrs et al., 2020	May 2020	Employees at a University Hospital	18/660 (2.7)	-
Chibwana et al., 2020	May 2020	Health care workers	84/500 (16.8)	-
Laub et al., 2020	May 2020	Children with pediatric multiorgan immune syndrome	162/2832 (5.7)	-
Armann et al., 2020	May 2020	Students and teachers	Students:11/1538 (0.7) Teachers:1/507 (0.2)	-
Hibino et al., 2020	May 2020	Healthy volunteers working for a Japanese company	IgG: 95/350 (27.1) IgM: 90/350 (25.7)	-
Barchuk et al., 2020	May 2020	Adults residents	IgG:97/1038 (9.3) Total antibodies: 107/1035 (10.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Wilkins et al., 2020	May 2020	Healthcare workers .	316/6510 (4.9)	Known out-of-hospital exposure was 4.7 (3.5-6.4), ref: without out-of-hospital exposure; Participants with a family member who tested positive for COVID-19: 26.8 (17.3-41.8), ref: Participants without a positive family; Services (3.0, 1.2-6.4); medical assistants (2.9, 1.4-5.5); nurses (2.12, 1.5-3.2) had higher odds: ref : administrators; Participating in the care of COVID-19 patients: 2.19 (1.61-3.01), ref: participants who did not report participating in the care of COVID-19 patients.
Abo-Leyah et al., 2020	May 2020	Health and social care workers; Blood Samples taken at general practice surgeries	299/2062 (14.5) 11/231 (4.8)	-
Vince et al., 2020	May 2020	Football players and club staff	IgG: 1/305 (0.3) IgG: 2/305 (0.7) IgA: 24/349 (6.9)	
Alkurt et al., 2020	May 2020	Healthcare workers	22/813 (2.7)	-
Vassallo et al., 2020	Jun 2020	Blood Donors	2948/189656 (1.6)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Melo et al., 2020	Jun 2020	Healthcare workers	IgM: 28/471 (5.9) IgG: 64/471 (13.6)	-
Favara et al., 2020	Jun 2020	Hospital staff working in an oncology department	Rapid POC serology: 34/434 (7.8) Microsphere-based assay: 80/434 (18.4)	-
Remes-Troche et al., 2020	Jun 2020	Adults outpatients	642/2174 (29.5)	-
Ladage et al., 2020	-	Inhabitants in a township	IgG (LIFA) :28/835 (3.4) IgM (LIFA):2/835 (0.2) IgG (ELISA) :71/835 (8.5) IgA (ELISA) :75/835 (9.0)	-
Silva et al., 2020	Jun 2020	Health care workers from public facilities	5/738 (0.7)	-
Craigie et al., 2020	Jun 2020	Probable cases and higher risk individuals	8/1127 (0.7) 1/9 (11.1)	-
Silva et al., 2020	Jun 2020	Professionals in research institute	32/406 (7.9)	-
Strazzulla et al., 2020	Jun 2020	Nursing home residents	34/61 (55.7)	-
Ray et al., 2020	Jun 2020	Patients who were admitted to the medicine wards and intensive care unit (ICU)	42/212 (19.8)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Bardai et al., 2020	Jun 2020	children patients accompanying persons hospital employees	3/39 (7.7) 7/61 (11.5) 12/99 (12.1)	-
Cooper et al., 2020	Jun 2020	Staff member	410/5698 (7.2)	-
Hommes et al., 2020	Jun 2020	Students and teachers	7/527 (1.3)	-
Nishida et al., 2020	Jun 2020	Hospital staff	4/925 (0.4)	-
Nawa et al., 2020	Jun 2020	Households randomly selected from Utsunomiya City's basic resident registry	3/742 (0.7)	-
Qutob et al., 2020	Jun 2020	West Bank's residents Individuals visiting medical laboratories	0/1319 (0.0) 4/1136 (0.4)	-
Khan et al., 2020	Jun 2020	Healthcare Workers	73/2905 (2.5)	-
Haq et al., 2020	Jun 2020	Healthcare Workers	310/1011 (30.7)	-
Jin et al., 2020	Jun 2020	Blood Donors	Total antibodies: 121/1000 (12.1) IgG:109/1000 (10.9) Neutralizing antibodies: 91/1000 (9.1)	-
Ulyte et al., 2020	Jun 2020	School children	Baseline:74/2496 (3.0) Follow up: 173/2503(7.0)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Asuquo et al., 2020	Jun 2020	Clinic staff and patients	17/66 (25.8)	-
Ward et al., 2020	Jun 2020	Community adults	Jun: 5544/99908 (5.6) July: 4995/105829 (4.7) Sep: 7037/159367 (4.4)	-
Menezes et al., 2020	Jun 2020	Community residents	849/31869 (2.7)	-
Laursen et al., 2020	Jun 2020	Employees in a rescue corps	159/3243 (4.9)	-
Kahlert et al., 2020	Jun 2020	Hospital Workers	139/4664 (3.0)	Non- occupational exposures independently associated with seropositivity were contact with a COVID-19 positive household (adjusted OR=54, 95%-CI: 31-97) and stay in a COVID-19 hotspot (aOR=2.2, 95%-CI: 1.1-3.9)
ROEDERER et al., 2020	Jun 2020	Residents in food distribution sites, emergency shelters, and workers residences	303/818 (37.0)	-
Demonbreun et al., 2020	Jun 2020	Community/university-based participants	306/1545 (19.8)	-
Ariza et al., 2020	Jun 2020	medical trainees or medical doctors	8/351 (2.3)	-
Majiya et al., 2020	Jun 2020	Residents	IgG: 47/185 (25.4) IgM:4/185 (2.2)	

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Javed et al., 2020	Jul 2020	Working population	IgG:2543/24210 (10.5) IgM:2783/24210 (11.5) IgG, IgM:4234/24210 (17.5)	-
Buonsenso et al., 2020	Jun 2020	Household contacts of index patients	44/80 (55.0)	-
Kasztelewicz et al., 2020	Jul 2020	Healthcare workers in a tertiary pediatric hospital	16/1879 (0.9)	-
Malecki et al., 2020	Jul 2020	Adults and children	Jul-Aug: 14/996 (1.4) Oct-Dec: 65/994 (6.5)	-
FUKUDA et al., 2020	Jul 2020	Healthcare workers with low exposure risk at a frontline hospital	14/4147(0.3)	-
Díaz-Salazar et al., 2020	Jul 2020	Government employees	193/3268(5.9)	Those who reported symptoms of COVID-19 in the previous four weeks to the survey: OR 4.1, 95% CI 2.9-5.5.
Bruckner et al., 2020	Jul 2020	Adults residents	351/2979 (11.8)	-
Goenka et al., 2020	Jul 2020	High-risk Healthcare workers Moderate-risk Healthcare workers Low-risk Healthcare workers	27/136 (19.9) 101/911 (11.1) 6/75 (8.0)	-
Flemand et al., 2020	Jul 2020	Individuals visiting the recruitment centers	63/480 (13.1)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Lopez et al., 2020	Jul 2020	School employees	22/753 (2.9)	-
Ghose et al., 2020	Jul 2020	Community residents	857/1659 (51.7)	Living in slums (OR 1.91; 95%CI 1.34-2.73; p=0.007) or in dwellings with per-capita floor space <5 m^2 (OR 2.09; 95%CI 1.43-3.04) were identified as independent risk factors
Pasqualotto et al., 2020	Jul 2020	Military police forces	IgG: 28/1592 (1.8) IgA: 43/1592 (2.7)	-
Satpati et al., 2020	Jul 2020	Population of Paschim Medinipur District	19/458 (4.2)	-
Al-Thani et al., 2020	Jul 2020	The craft and manual worker	1427/2641(55.3)	-
Sharma et al., 2020	Aug 2020	Residents	first round: 4267/15046 (28.4) second round: 4311/17409 (24.8) third round: 3829/15015 (25.5)	-
Kshatri et al., 2020	Aug 2020	Adult population	842/4146 (20.3)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Cruz-Arenas et al., 2020	Aug 2020	Health care workers in a 'non-COVID' hospital	LIFA: IgG:31/300 (10.3) IgM:15/300 (5.0) IgG or IgM:33/300 (11.0) ELISA: IgG:39/299 (13.0)	-
Murhekar et al., 2020	Aug 2020	General population	3135/29082 (10.8)	-
Rezwan et al., 2020	Sep 2020	Industrial workers Healthcare workers Healthy voluntary blood donors Dialysis patients	779/1118 (70.0) 234/478 (49.0) 191/505 (37.8) 118/303 (38.9)	-
Babu et al., 2020	Sep 2020	General population	2565/15939 (16.1)	-
Thielecke et al., 2020	Sep 2020	Kindergarten children, staff and connected household members	1/672 (0.1)	-
Ladage et al., 2020	Oct 2020	Inhabitants	IgG or IgA:140/242(57.9) IgG:110/242 (45.4) IgA:116/242 (47.9)	-
Kumar et al., 2020	Jun 2020	Healthcare worker	CLIA: 14/996 (1.4) ELISA: 22/996 (2.2)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Official reports				
MedLife, Romania, 2020		Healthcare workers	11/371 (3.0)	-
Public Health Ontario, Canada, 2020	Mar 2020	Residual serum samples	March 2020: 3/827 (0.4) May 2020: 15/1061 (1.4) June 2020: 79/7014 (1.1) July 2020: 70/7001 (1) August 2020: 72/6789 (1.1)	-
Norwegian Institute of Public Health, 2020	Apr 2020	Residual serum samples	10/900 (1.1)	-
Office of National Statistics, UK, 2020	Apr 2020	General population	476/9343 (5.1)	-
Government of Jersey, UK, 2020	Apr 2020	Adult resident population	Baseline: 24/855 (2.9) 1st follow-up: 45/1062 (4.2) 2nd follow-up: 62/1386 (4.5)	-
Canadian Blood Services, 2020	May 2020	Blood donor	275/37737 (0.7)	-

Reference	Starting month	Study population	No. of positive/total no. of participants provided sera (seroprevalence rate, %)	Risk factors for SARS-CoV-2 infections (OR, 95%CI)
Ministry of Health, Labour and Welfare, Japan, 2020	Jun 2020	Residents	2/1971 (0.1) 5/2970 (0.2) 1/3009 (0.0)	-
NHS BT collection, 2020	Jun 2020	Blood donor	1051/16670 (6.3)	-
RCGP collection, 2020	Jun 2020	Sera collected via general practitioners	205/4315 (4.8)	-
SEU and Paediatric collections, 2020	Jun 2020	Residual sera from participating hospital laboratories	72/1212 (5.9)	-
Health Protection Surveillance Centre, 2020	Jun 2020	People living in two geographical areas in Ireland	33/1733 (1.9)	-
Islamic Republic of Afghanistan Ministry of Public Health, Afghanistan, 2020	Jul 2020	General population	2997/9514 (31.5)	

Abbreviations: ELISA, Enzyme-linked immunosorbent assay; CLIA: Chemiluminescent immunoassay; LFIA: lateral flow immunoassays; MIA: Microsphere immunoassay; MN, Microneutralisation assay; POC: point of care;

* The sensitivity and specificity validated by the authors rather than manufactures.

Table S5. Scoring system used for evaluation of published reports describing seroevidence of human infection with SARS-CoV-2

	Parameter	Maximum score	Individual score			
			0	1	2	3
Study design	Representativeness of samples	3	Without reporting the method of recruitment of study participants or the selection of study sites	Convenience samples without randomly selecting study participants (e.g. archived specimens from clinical labs, or healthcare workers in single center)	Randomly-selected samples in communities or multiple healthcare settings	Multi-stage/stratified samples from communities or universal samples from healthcare settings
Laboratory method	Approval by National Regulatory Authority	1	No	Yes	NA	NA
	Validation prior to assay for surveillance	2	No	NA	Yes	NA
	Confirmation methods	2	No	Second serological assay (except the VNT or pVNT)	VNT or pVNT	NA
Outcomes	Correction for age or sex*	2	No	NA	Yes	NA

	Correction for testing performance (sensitivity and specificity)	2	No	NA	Yes	NA
	Total	12	NA	NA	NA	NA

Note: VNT, Virus neutralization tests (such as the plaque-reduction neutralization test (PRNT) and microneutralization); pVNT, Pseudovirus neutralization tests;

* Studies stratified their findings in separate age groups or sex will be assigned with 2 points.

Table S6. Definition of subjects included in meta-analysis

Type of exposure	Population	Definition
Exposed to laboratory-confirmed or suspected COVID-19 patients	Close contact	A person or a group of people who lived with or cared for a virologically-confirmed or suspected COVID-19 patients during the infectious period (e.g. household members, family contacts and relatives.), as well as other persons who worked with or had close contact with the virologically-confirmed or suspected COVID-19 patients during the infectious period (e.g. office co-workers, people sharing same waiting room, service member in the same aircraft carrier, patients in the same hemodialysis unit, and other potential social contacts). Specifically, clustering cases (excluding the patient) in the community or working place were also considered as close contacts.
	High-risk healthcare worker	A group of persons who provided routine medical care for virologically-confirmed or suspected COVID-19 patients during the infectious period without wearing personal protective equipment (including protective suits, mask, gloves, goggles, face shields, and gowns).
Exposed to laboratory-confirmed /suspected/non COVID-19 patients	Low-risk healthcare worker	A group of persons who provided routine medical care for virologically-confirmed or suspected COVID-19 patients during the infectious period with the use of personal protective equipment (including protective suits, mask, gloves, goggles, face shields, and gowns), as well as those people who provided medical care for non-COVID-19 patients.
Without known exposure to laboratory-confirmed or suspected COVID-19 patients	General population	Persons without known exposure to laboratory-confirmed or suspected COVID-19 patients (e.g. community residents).

Indeterminate exposure to laboratory-confirmed or suspected COVID-19 patients	Poorly-defined population	Persons with undefined or unknown exposure to laboratory-confirmed or suspected COVID-19 patients, as well as those participants cannot be categorized as the study populations mentioned above due to limited exposure information.

Table S7. Quality assessment of serological studies

Reference	Study characteristics		Laboratory method			Outcome		Total	Grade
	Study population	Representativeness of samples	Approval for NRA	pre-experiment validations	Confirmation methods	Correction for age/sex or other socio-demographic factors	Correction for test performance		
Peer-reviewed databases									
Victoria et al., 2020	Close contacts, Low-risk healthcare workers	1	1	2	0	0	0	4	C
To et al., 2020	Poorly-defined population	1	0	2	2	2	0	7	B
Hippich et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Liang et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Ng et al., 2020	Close contacts	3	1	0	2	0	0	6	C
Hallowell et al., 2020	Close contacts, Poorly-defined population	1	1	0	2	0	0	4	C
Sam et al., 2020	Poorly-defined population	1	1	2	2	2	0	8	B
Jeong et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Buss et al., 2020	Poorly-defined population	1	1	2	0	2	2	8	B
Stadlbauer et al., 2020	Poorly-defined population	1	1	2	1	2	0	7	B

Chen et al., 2020	High-risk healthcare workers	1	1	2	2	2	0	8	B
Liu et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Cavicchiolo et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Plebani et al., 2020	Poorly-defined population	2	1	2	0	2	0	7	B
Cox et al., 2020	Close contacts	1	1	0	0	0	0	2	D
Villalaı´n et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Brandstetter et al., 2020	High-risk healthcare workers	1	1	0	0	0	0	2	D
Solodky et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	0	0	0	0	0	1	D
Zhang et al., 2020	Poorly-defined population	1	0	0	0	0	0	1	D
Suda et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Bogogiannidou et al., 2020	Poorly-defined population	1	1	2	1	2	2	9	B
Xu et al., 2020	Poorly-defined population	2	1	2	0	2	0	7	B
Vena et al., 2020	Poorly-defined population	1	1	2	0	2	0	6	C

Ng et al., 2020	Poorly-defined population	1	1	2	2	0	0	6	C
Venugopal et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Dingens et al., 2020	Poorly-defined population	1	1	0	2	2	0	6	C
Barzin et al., 2020	Poorly-defined population	2	1	2	0	0	0	5	C
Pérez-García et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C
Trieu et al., 2020	Low-risk healthcare workers	2	1	0	2	2	0	7	B
Fischer et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
McCafferty et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Brown et al., 2020	Close contacts	1	1	0	0	0	0	2	D
Han et al., 2020	General population	1	1	0	0	0	0	2	D
Zhou et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Thompson et al., 2020	Poorly-defined population	1	1	2	2	0	0	6	C
Carlo et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D

Tu et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	1	0	0	3	D
Kohler et al., 2020	Low-risk healthcare workers	2	1	0	1	2	0	6	C
Fuereder et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Fusco et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Havers et al., 2020	Poorly-defined population	1	1	0	1	2	2	7	B
Xu et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Behrens et al., 2020	Low-risk healthcare workers	1	1	0	2	0	0	4	C
Loconsole et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Mansour et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Gallian et al., 2020	Poorly-defined population	1	1	2	2	0	0	6	C
Korth et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Bielecki et al., 2020	Close contacts, Poorly-defined population	1	1	2	0	0	0	4	C
Tsaneva et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C

Houlihan et al., 2020	Low-risk healthcare workers	1	0	0	1	0	0	2	D
Liu et al., 2020	General population	1	1	0	0	2	0	4	C
Basteiro et al., 2020	Low-risk healthcare workers	2	1	2	0	2	0	7	B
Isherwood et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	0	2	0	4	C
Xu et al., 2020	Low-risk healthcare workers , General population, Poorly-defined population	1	1	2	0	0	0	4	C
Milani et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Medas et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Vos et al., 2020	General population	3	1	0	0	2	2	8	B
Savirón-Cornudella et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Bryan et al., 2020	General population	1	1	2	0	2	0	6	C
Hains et al., 2020	Close contacts, Low-risk healthcare workers	1	1	0	1	2	0	5	C
Liu et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C

Malickova et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Paulino-Ramirez et al., 2020	General population	2	1	0	0	2	0	5	C
Chirathaworn et al,, 2020	Close contacts	1	1	0	0	0	0	2	D
Posfay-Barbe et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Slot et al., 2020	Poorly-defined population	1	1	2	1	2	0	7	B
Olayanju et al., 2020	High-risk healthcare workers	1	1	0	0	0	0	2	D
Berte et al., 2020	Poorly-defined population	2	1	2	0	2	0	7	B
Ciechanowicz et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Ko et al., 2020	Low-risk healthcare workers	2	1	2	2	2	0	9	B
Lackermair et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Sotgiu et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Mohanty et al., 2020	Poorly-defined population	1	1	2	0	0	0	4	C
Wu et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D

Stubblefield et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Self et al., 2020	Low-risk healthcare workers	2	1	2	0	2	0	7	B
Stellato et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	0	0	0	2	D
Flannery et al., 2020	Poorly-defined population	1	1	2	0	0	0	4	C
Stock et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Goldberg et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Stringhini et al., 2020	General population	3	1	2	1	2	2	11	A
Erikstrup et al., 2020	Poorly-defined population	1	1	2	0	2	2	8	B
Lahner et al., 2020	Low-risk healthcare workers	1	1	2	0	0	0	4	C
Labriola et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Pallett et al., 2020	Poorly-defined population	2	1	2	1	0	0	6	C
Sood et al., 2020	General population	3	1	2	0	2	2	10	A
Shakiba et al., 2020	General population	3	1	0	0	2	2	8	B

Madsen T et al., 2020	Low-risk healthcare workers	1	1	2	0	0	0	4	C
Sims et al., 2020	Low-risk healthcare workers	2	1	0	0	2	2	7	B
Crovetto et al., 2020	Poorly-defined population	0	1	0	1	0	0	2	D
Gudbjartsson et al., 2020	General population, Poorly-defined population	2	1	2	1	2	0	8	B
Naranbhai et al., 2020	General population	1	1	2	0	2	2	8	B
Herzberg et al., 2020	Low-risk healthcare workers	2	1	0	1	0	0	4	C
Dacosta-Urbieta et al., 2020	Low-risk healthcare workers	2	0	0	0	0	0	2	D
Lumley et al., 2020	Poorly-defined population	1	1	0	2	0	0	4	C
Rudberg et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C
Buntinx et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Martin et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Amendola et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C

Iversen et al., 2020	Low-risk healthcare workers, Poorly-defined population	3	1	2	0	2	2	10	A
Olalla et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Cosma et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Caban-Martinez et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Poletti et al., 2020	Close contacts	1	1	0	0	2	0	4	C
Waterfield et al., 2020	Poorly-defined population	2	1	0	1	2	0	6	C
Racine-Brzostek et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Calcagno et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Poustchi et al., 2020	General population, Poorly-defined population	3	1	2	0	2	2	10	A
Cito et al., 2020	General population	3	1	0	0	2	0	6	C
Rosenberg et al., 2020	General population	1	1	2	0	2	2	8	B
Daniel et al., 2020	Close contacts	1	1	0	2	0	0	4	C

Schmidt et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Moscola et al., 2020	Low-risk healthcare workers	3	1	2	0	2	0	8	B
Tarabichi et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Rosser et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Armin et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Montenegro et al., 2020	General population, Poorly-defined population	2	1	0	1	2	0	6	C
Kaufman et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Ahmad et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Steensels et al., 2020	Low-risk healthcare workers	1	1	2	0	0	0	4	C
Mostafa et al., 2020	Low-risk healthcare workers	2	1	0	0	0	0	3	D
Kantele et al., 2020	Low-risk healthcare workers	1	1	0	2	2	0	6	C
Soriano et al., 2020	Close contacts, Poorly-defined population	1	1	0	0	0	0	2	D
Eyre et al., 2020	Low-risk healthcare workers	2	1	0	1	0	0	4	C

Halatoko et al., 2020	Low-risk healthcare workers, Poorly-defined population	2	1	0	0	0	0	3	D
Shields et al., 2020	Low-risk healthcare workers	1	0	0	0	2	0	3	D
Makaronidis et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Guerriero et al., 2020	General population	2	1	0	0	2	0	5	C
Menachemi et al., 2020	General population	3	0	0	0	2	0	5	C
Vilibic-Cavlek et al., 2020	Poorly-defined population	1	1	0	2	0	0	4	C
Pollán et al.., 2020	General population	3	1	2	1	2	0	9	B
Petersen et al., 2020	General population	2	1	0	0	2	2	7	B
Bajema et al., 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Biggs et al., 2020	General population	3	1	2	0	2	0	8	B
Sydney et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Brotons et al., 2020	Close contacts	2	1	2	0	2	0	7	B
Hunter et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C

Tilley et al., 2020	Poorly-defined population	2	1	0	0	2	2	7	B
Tsatsaris et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Uyoga et al., 2020	Poorly-defined population	1	1	2	0	2	2	8	B
Josè et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Paderno et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Merkely et al., 2020	General population	3	1	0	0	2	0	6	C
Addetia et al., 2020	Poorly-defined population	1	1	0	2	0	0	4	C
Ladhani et al., 2020	Close contacts	1	1	0	0	2	0	4	C
Nailescu et al., 2020	Poorly-defined population	1	1	0	1	2	0	5	C
Sperotto et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Mack et al., 2020	Poorly-defined population	1	1	0	2	0	0	4	C
Belingheri et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Lastrucci et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D

Dioscoridi et al., 2020	Close contacts, Low-risk healthcare workers	1	1	0	1	0	0	3	D
Péré et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Borges et al., 2020	General population	1	1	2	0	2	2	8	B
Torres et al., 2020	Close contacts	2	1	0	0	2	0	5	C
Poulikakos et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Veerus et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Brunner et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Vijh et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Rashid-Abdi et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Stefanelli et al., 2020	General population	1	1	0	0	2	2	6	C
Feehan et al., 2020	General population	3	1	0	0	2	0	6	C
Sutton et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Bampoe et al., 2020	High-risk healthcare workers	2	1	0	0	0	0	3	D

Cento et al., 2020	Poorly-defined population	1	1	0	1	2	0	5	C
Rivas et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Capasso et al., 2020	Poorly-defined population	1	0	0	0	2	0	3	D
Murhekar et al., 2020	General population	3	1	2	1	2	2	11	A
Tong et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Iwuji et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Mughal et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Hallal et al., 2020	General population	3	1	2	0	2	2	10	A
Delmas et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Costa et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Zhang et al., 2020	Close contacts	2	1	0	0	0	0	3	D
Pan et al., 2020	General population	2	1	0	0	2	0	5	C
Akinbami et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C

Kempen et al., 2020	General population	1	1	0	0	2	0	4	C
Pagani et al., 2020	General population	2	1	0	0	2	0	5	C
Jespersen et al., 2020	Poorly-defined population	2	1	0	0	2	2	7	B
Ladhani et al., 2020	Poorly-defined population	2	1	0	2	0	0	5	C
Yogo et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C
Santos-Hövener et al., 2020	General population	2	1	0	2	2	2	9	B
Alserehi et al., 2020	Low-risk healthcare workers, Poorly-defined population	2	1	0	2	0	0	5	C
Alali et al., 2020	Poorly-defined population	3	1	0	0	2	0	6	C
Del Brutto et al., 2020	General population	3	1	0	0	2	0	6	C
Blairon et al., 2020	Poorly-defined population	2	1	2	1	0	0	6	C
Noh et al., 2020	Poorly-defined population	1	0	0	2	0	0	3	D
Ho et al., 2020	Poorly-defined population	1	1	2	1	2	0	7	B
Murakami et al., 2020	Low-risk healthcare workers	1	1	0	1	2	0	5	C

Lidström et al., 2020	Low-risk healthcare workers	3	1	0	0	2	0	6	C
Haizler-Cohen et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Martin et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Black et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Kassem et al., 2020	Low-risk healthcare workers	1	0	0	0	0	0	1	D
Hibino et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C
Prendecki et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Nsn et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Abdelmoniem et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Pedersen et al., 2020	Poorly-defined population	1	1	2	0	0	2	6	C
Dimcheff et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Mesnil et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Insúa et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D

Dimeglio et al., 2020	Poorly-defined population	2	1	0	2	2	0	7	B
Mahajan et al., 2020	General population	2	1	2	1	2	0	8	B
Dodd et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Martínez-Baz et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Anand et al., 2020	Poorly-defined population	2	1	0	0	2	2	7	B
Lundkvist et al., 2020	General population	2	1	2	0	0	0	5	C
Younas et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Gujski et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Malani et al., 2020	General population	3	1	0	0	2	2	8	B
Khan et al., 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Pray et al., 2020	Close contacts	1	1	0	0	0	0	2	D
Bloomfield et al., 2020	Poorly-defined population	1	1	0	1	2	2	7	B
Kumar et al., 2020	Low-risk healthcare workers	1	1	0	1	0	0	3	D

Noor et al., 2020	High-risk healthcare workers	2	1	0	0	2	0	5	C
Yamaki et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Bajema et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Godbout et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Silva et al., 2020	General population	3	1	0	0	2	0	6	C
Kumar et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Chau et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Preprint servers									
Sughayer et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Germain et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Martinez-Acuña et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
McCulloch et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Chang et al., 2020	Poorly-defined population	1	1	0	2	2	0	6	C
Li et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D

Xiong et al., 2020	Low-risk healthcare workers	0	0	0	0	0	0	0	D
Valenti et al., 2020	Poorly-defined population	1	1	2	0	2	2	8	B
Yu et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Kuwelker et al., 2020	Close contacts	1	1	0	2	2	0	6	C
Liu et al., 2020	High-risk healthcare workers, General population, Poorly-defined population	1	1	0	0	2	0	4	C
Kamath et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Santana et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Tubiana et al., 2020	High-risk healthcare workers	2	1	0	1	2	0	6	C
Skowronski et al., 2020	Poorly-defined population	1	1	0	2	2	2	8	B
Vu et al., 2020	Poorly-defined population	1	1	2	2	2	2	10	A
Dietrich et al., 2020	Poorly-defined population	1	1	2	0	2	0	6	C
Brehm et al., 2020	Low-risk healthcare workers	1	1	2	0	0	0	4	C

Tang et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Augusto et al., 2020	Low-risk healthcare workers	2	1	0	0	0	0	3	D
Wang et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Ling et al., 2020	General population	1	1	2	0	2	2	8	B
Paradiso et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Herzog et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Dopico et al., 2020	Poorly-defined population	1	0	2	0	0	0	3	D
Streeck et al., 2020	General population	2	1	2	2	0	2	9	B
Doi et al., 2020	Poorly-defined population	1	0	0	0	2	0	3	D
Tosato et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Carozzi et al., 2020	Low-risk healthcare workers	2	1	2	1	0	0	6	C
Siddiqui et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	0	2	0	4	C
Davis et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C

Kammon et al., 2020	Low-risk healthcare workers, General population	2	1	0	0	2	0	5	C
Wagner et al., 2020	Poorly-defined population	1	1	0	2	2	0	6	C
Bendavid et al., 2020	General population	1	1	2	0	2	2	8	B
Egerup et al., 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Krähling et al., 2020	Poorly-defined population	1	0	2	2	0	0	5	C
Richard et al., 2020	General population	3	1	2	1	2	2	11	A
Nopsopon et al., 2020	Low-risk healthcare workers, Poorly-defined population	3	1	2	0	2	0	8	B
Leidner et al., 2020	Low-risk healthcare workers	2	1	2	0	0	0	5	C
Halbrook et al., 2020	Low-risk healthcare workers, Poorly-defined population	2	1	0	0	2	0	5	C
Fujita et al., 2020	Low-risk healthcare workers	1	1	0	0	0	0	2	D
Bal et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Psichogiou et al., 2020	Low-risk healthcare workers	1	0	2	0	2	0	5	C

Thomas et al., 2020	Close contacts, Low-risk healthcare workers	2	0	2	0	0	0	4	C
Woon et al., 2020	Low-risk healthcare workers	2	1	2	0	2	0	7	B
Cohen et al., 2020	Close contacts, Poorly-defined population	2	1	0	0	0	0	3	D
Sikora et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Galán et al., 2020	High-risk healthcare workers	1	1	0	0	2	0	4	C
Garralda et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Erber et al., 2020	Low-risk healthcare workers	2	1	0	1	2	0	6	C
Garritsen et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Snoeck et al., 2020	General population	3	1	2	0	2	0	8	B
Comar et al., 2020	Low-risk healthcare workers	1	1	2	0	0	0	4	C
Nisar et al., 2020	General population	2	1	2	0	2	0	7	B
Wang et al., 2020	General population	3	1	2	2	2	0	10	A
Lisandru et al., 2020	Poorly-defined population	1	1	0	2	2	0	6	C

Zou et al., 2020	General population	1	1	0	0	0	0	2	D
Nopsopon et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C
McDade et al., 2020	Poorly-defined population	0	1	2	0	0	0	3	D
Baker et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C
Appa et al., 2020	General population	3	1	2	1	0	2	9	B
Baxendale et al., 2020	Low-risk healthcare workers	1	1	2	0	2	0	6	C
Elli et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Takita et al., 2020	General population	1	0	2	0	2	0	5	C
Tönshoff et al., 2020	General population	1	1	0	2	2	0	6	C
Mortgat et al., 2020	Low-risk healthcare workers	3	1	0	0	2	0	6	C
Jerković et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Alessandro et al., 2020	Low-risk healthcare workers, General population	2	1	0	0	2	0	5	C
Dillner et al., 2020	Poorly-defined population	2	1	2	0	2	0	7	B

Alemu et al., 2020	General population	2	1	0	0	2	2	7	B
Aziz et al., 2020	General population	3	0	0	2	0	0	5	C
Chamie et al., 2020	General population	1	1	0	0	2	2	6	C
Nesbitt et al., 2020	Poorly-defined population	1	1	0	1	2	0	5	C
Wells et al., 2020	General population	1	1	2	1	0	0	5	C
Fontanet et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Anna et al., 2020	Poorly-defined population	1	1	2	2	2	0	8	B
Sandri et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Calife et al., 2020	General population	3	1	0	0	0	0	4	C
Brant et al., 2020	Low-risk healthcare workers	1	1	0	0	2	2	6	C
Brant-Zawadzki et al., 2020	Low-risk healthcare workers, Poorly-defined population	2	1	2	0	2	0	7	B
Jones et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C
Li et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D

Barallat et al., 2020	Low-risk healthcare workers	1	1	0	1	2	0	5	C
Tess et al., 2020	General population	2	1	2	0	2	0	7	B
Mattern et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Carrat et al., 2020	General population	2	1	0	2	2	0	7	B
Samore et al., 2020	General population	3	1	2	0	2	2	10	A
Dupraz et al., 2020	Close contacts	1	1	2	0	2	0	6	C
Royo-Cebrecos et al., 2020	General population	1	1	2	0	2	0	6	C
McLaughlin et al., 2020	General population	3	1	0	0	2	2	8	B
Rauber et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
McBride et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Jõgi et al., 2020	Poorly-defined population	2	1	0	2	2	0	7	B
Ebinger et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Hurk et al., 2020	Poorly-defined population	1	1	2	0	2	0	6	C

Hassan et al., 2020	Poorly-defined population	1	1	2	0	2	0	6	C
Weis et al., 2020	General population	3	1	0	1	0	0	5	C
Rigatti et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Faniyi et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Stout et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Gomes et al., 2020	General population	3	1	0	0	2	0	6	C
Wu et al., 2020	General population, Poorly-defined population	3	1	0	2	0	0	6	C
Rebeiro et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Schubl et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Majdoubi et al., 2020	Poorly-defined population	2	1	0	0	2	2	7	B
Nakamura et al., 2020	Low-risk healthcare workers	1	1	0	1	0	0	3	D
Tsertsvadze et al., 2020	General population	1	1	0	0	2	2	6	C
Reuben et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C

Bahrs et al., 2020	Low-risk healthcare workers	1	1	0	1	2	0	5	C
Chibwana et al., 2020	Poorly-defined population	1	1	0	0	0	2	4	C
Laub et al., 2020	Poorly-defined population	1	1	0	2	2	0	6	C
Armann et al., 2020	Poorly-defined population	2	1	0	1	0	0	4	C
Hibino et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Barchuk et al., 2020	General population	2	1	0	1	2	2	8	B
Wilkins et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C
Abo-Leyah et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	0	2	0	4	C
Vince et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Alkurt et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Vassallo et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Melo et al., 2020	Poorly-defined population	2	1	2	0	0	0	5	C
Favara et al., 2020	High-risk healthcare workers	2	1	2	1	0	0	6	C

Remes-Troche et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Ladage et al., 2020	General population	2	1	2	1	0	0	6	C
Silva et al., 2020	Low-risk healthcare workers	2	1	2	0	0	0	5	C
Craigie et al., 2020	Poorly-defined population	1	1	2	1	0	0	5	C
Silva et al., 2020	Poorly-defined population	1	1	0	1	0	0	3	D
Strazzulla et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Ray et al., 2020	Poorly-defined population	1	1	2	1	2	0	7	B
Bardai et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	0	0	0	0	2	D
Cooper et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Hommes et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Nishida et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Nawa et al., 2020	General population	2	1	0	0	2	0	5	C

Qutob et al., 2020	General population, Poorly-defined population	3	1	0	0	2	0	6	C
Khan et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Haq et al., 2020	High-risk healthcare workers	1	1	0	0	2	0	4	C
Jin et al., 2020	Poorly-defined population	1	1	0	2	0	0	4	C
Ulyte et al., 2020	Poorly-defined population	2	1	2	0	2	2	9	B
Asuquo et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Ward et al., 2020	General population	3	1	2	0	2	2	10	A
Menezes et al., 2020	General population	3	1	2	0	0	0	6	C
Laursen et al., 2020	Low-risk healthcare workers, Poorly-defined population	1	1	2	1	2	0	7	B
Kahlert et al., 2020	Low-risk healthcare workers	2	1	0	1	2	0	6	C
ROEDERER et al., 2020	Poorly-defined population	2	1	0	2	2	0	7	B
Demonbreun et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C

Ariza et al., 2020	Low-risk healthcare workers	1	1	2	1	2	0	7	B
Majiya et al., 2020	General population	3	1	2	0	2	0	8	B
Javed et al., 2020	General population	3	1	0	0	0	0	4	C
Buonsenso et al., 2020	Close contacts	1	1	0	0	0	0	2	D
Kasztelewicz et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Malecki et al., 2020	General population	2	1	0	0	2	0	5	C
FUKUDA et al., 2020	Low-risk healthcare workers	1	1	0	0	2	0	4	C
Díaz-Salazar et al., 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Bruckner et al., 2020	General population	2	1	2	0	2	2	9	B
Goenka et al., 2020	Low-risk healthcare workers	2	1	0	0	2	0	5	C
Flemand et al., 2020	Poorly-defined population	1	1	2	0	2	0	6	C
Lopez et al., 2020	Poorly-defined population	1	1	0	0	0	2	4	C
Ghose et al., 2020	General population	1	1	0	2	2	0	6	C

Pasqualotto et al., 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Satpati et al., 2020	General population	3	1	0	0	2	0	6	C
Al-Thani et al., 2020	Poorly-defined population	2	1	0	0	2	0	5	C
Sharma et al., 2020	General population	3	1	0	0	2	2	8	B
Kshatri et al., 2020	General population	3	1	0	0	2	0	6	C
Cruz-Arenas et al., 2020	Low-risk healthcare workers	2	1	0	1	2	0	6	C
Murhekar et al., 2020	General population	3	1	2	0	2	2	10	A
Rezwan et al., 2020	Poorly-defined population	1	1	0	0	2	0	4	C
Babu et al., 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Thielecke et al., 2020	Poorly-defined population	2	1	0	0	0	0	3	D
Ladage et al., 2020	General population	1	1	0	0	0	0	2	D
Kumar et al., 2020	Low-risk healthcare workers	1	1	0	1	2	0	5	C
Official reports									

MedLife, Romania, 2020	Poorly-defined population	1	1	0	0	0	0	2	D
Public Health Ontario, 2020	Poorly-defined population	1	1	2	1	2	2	9	B
Norwegian Institute of Public Health, 2020	Poorly-defined population	1	0	2	0	2	2	7	B
Office for National Statistics, UK, 2020	General population	2	1	2	0	0	2	7	B
Government of Jersey, 2020	General population	3	1	0	0	2	2	8	B
Canadian Blood Services, 2020	Poorly-defined population	1	1	0	0	2	2	6	C
Ministry of Health, Labour and Welfare, 2020	General population	2	1	0	1	0	0	4	C
NHS BT collection, 2020	Poorly-defined population	1	1	0	0	2	2	6	C
RCGP collection, 2020	Poorly-defined population	1	1	0	1	2	0	5	C
SEU and Paediatric collections, 2020	Poorly-defined population	1	1	0	1	2	0	5	C
Health Protection Surveillance Centre, 2020	General population	2	1	0	1	2	0	6	C
Islamic Republic of Afghanistan Ministry of Public Health, 2020	General population	3	1	0	0	0	0	4	C

Table S8. The summary of eighty-two grade A and grade B studies included into the main analysis on the basis of WHO regions and pre-defined study populations

Author, Country	Study population	No. of specimens tested	Grade
African Region			
Alemu et al., Ethiopia[9]	General population	301	B
Majiya et al., Nigeria[10]	General population	185	B
Uyoga et al., Kenya[11]	Poorly-defined population	3098	B
Region of the Americas			
Self et al., USA[12]	Low-risk Healthcare worker	3248	B
Ariza et al., Colombia[13]	Low-risk Healthcare worker	351	B
Brant-Zawadzki et al., USA[14]	Low-risk Healthcare worker	3458	B
Sims et al., USA[15]	Low-risk Healthcare worker	20614	B
Moscola et al., USA[16]	Low-risk Healthcare worker	40329	B
Hallal et al., Brazil[17]	General population	56157	A
Samore et al., USA[18]	General population	8108	A
Sood et al., USA[19]	General population	863	A
Naranbhai et al., USA[20]	General population	200	B
Borges et al., Brazil[21]	General population	2635	B
Bruckner et al., USA[22]	General population	2979	B
Mahajan et al., USA[23]	General population	567	B
Tess et al., Brazil[24]	General population	517	B
McLaughlin et al., USA[25]	General population	917	B
Rosenberg et al., USA[26]	General population	15101	B
Bendavid et al., USA[27]	General population	3330	B
Biggs et al., USA[28]	General population	696	B
Appa et al., USA[29]	General population	1810	B
Public Health Ontario, Canada[30]	Poorly-defined population	34700	B
Tilley et al., USA[31]	Poorly-defined population	790	B
Anand et al., USA[32]	Poorly-defined population	28503	B
Brant-Zawadzki et al., USA[14]	Poorly-defined population	226	B
Stadlbauer et al., USA[33]	Poorly-defined population	10691	B
Majdoubi et al., Canada[34]	Poorly-defined population	276	B
Buss et al., Brazil[35]	Poorly-defined population	17526	B
Skowronski et al., Canada[36]	Poorly-defined population	1754	B
Havers et al., USA[37]	Poorly-defined population	16025	B
Eastern Mediterranean Region			
Poustchi et al., Iran[38]	General population	3530	A
Nisar et al., Pakistan[39]	General population	2004	B

Shakiba et al., Iran[40]	General population	528	B
Poustchi et al., Iran[38]	Poorly-defined population	5372	A
European Region			
Brotons et al., Spain[41]	Close contact	1084	B
Iversen et al., Denmark[42]	Low-risk Healthcare worker	28792	A
Laursen et al., Sweden and Denmark[43]	Low-risk Healthcare worker	1689	B
Trieu et al., Norway[44]	Low-risk Healthcare worker	607	B
Basteiro et al., Spain[45]	Low-risk Healthcare worker	578	B
Ward et al., UK[46]	General population	365104	A
Stringhini et al., Switzerland[47]	General population	2766	A
Richard et al., Switzerland[48]	General population	5567	A
Office for National Statistics, UK[49]	General population	9343	B
Gudbjartsson et al., Iceland[50]	General population	5506	B
Carrat et al., France[51]	General population	14628	B
Barchuk et al., Russia[52]	General population	1038	B
Vos et al., Netherlands[53]	General population	3147	B
Santos-Hövener et al., Germany[54]	General population	2203	B
Streeck et al., Germany[55]	General population	919	B
Snoeck et al., Luxembourg[56]	General population	1820	B
Pollán et al., Spain[57]	General population	51958	B
Petersen et al., Denmark[58]	General population	1075	B
Government of Jersey, UK[59]	General population	855	B
Vu et al., France[60]	Poorly-defined population	11021	A
Iversen et al., Denmark[42]	Poorly-defined population	4672	A
Gudbjartsson et al., Iceland[50]	Poorly-defined population	22831	B
Dimeglio et al., France[61]	Poorly-defined population	8758	B
Dillner et al., Sweden[62]	Poorly-defined population	12928	B
Jespersen et al., Denmark[63]	Poorly-defined population	17948	B
Norwegian Institute of Public Health, Norway[64]	Poorly-defined population	900	B
Anna et al., France[65]	Poorly-defined population	1847	B
Laursen et al., Sweden and Denmark[43]	Poorly-defined population	1583	B
ROEDERER et al., France[66]	Poorly-defined population	818	B
Slot et al., Netherlands[67]	Poorly-defined population	7361	B
Jõgi et al., Estonia[68]	Poorly-defined population	1960	B
Berte et al., Italy and Germany[69]	Poorly-defined population	354	B

Bloomfield et al., Czech Republic[70]	Poorly-defined population	200	B
Ulyte et al., Switzerland[71]	Poorly-defined population	2496	B
Valenti et al., Italy[72]	Poorly-defined population	789	B
Erikstrup et al., Denmark[73]	Poorly-defined population	20640	B
Bogogiannidou et al., Greece[74]	Poorly-defined population	6586	B
Plebani et al., Italy[75]	Poorly-defined population	8285	B
South-East Asia Region			
Woon et al., Malaysia[76]	Low-risk Healthcare worker	400	B
Nopsopon et al., Thailand[77]	Low-risk Healthcare worker	675	B
Murhekar et al., India[78]	General population	28000	A
Murhekar et al., India[79]	General population	29082	A
Malani et al., India[80]	General population	6904	B
Sharma et al., India[81]	General population	47470	B
Ray et al., India[82]	Poorly-defined population	212	B
Nopsopon et al., Thailand[77]	Poorly-defined population	182	B
Western Pacific Region			
Chen et al., China[83]	High-risk Healthcare worker	105	B
Ko et al., South Korea[84]	Low-risk Healthcare worker	432	B
Wang et al., China[85]	General population	2184	A
Ling et al., China[86]	General population	18712	B
To et al., China[87]	Poorly-defined population	1265	B
Ho et al., China[88]	Poorly-defined population	14765	B
Sam et al., Malaysia[89]	Poorly-defined population	588	B
Xu et al., China[90]	Poorly-defined population	4747	B

Table S9. Estimated seroprevalence of antibodies to SARS-CoV-2 by WHO regions and study population among eighty-two grade A and grade B studies

Study population	All infections					Symptomatic infections					Asymptomatic infections				
	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)
Overall															
Close contacts	1	195	1084	18.0 [15.7-20.3]	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	4	105	3.8 [0.1-7.5]	-	1	14	105	13.3 [6.8-19.8]	-
Low-risk HCWs	12	8512	101173	4.2 [1.5-6.9]	99.8 (p<0.001)	6	1161	25720	1.7 [0.0-3.7]	99.4 (p<0.001)	6	861	25720	1.2 [0.0-2.7]	99.2 (p<0.001)
General population	38	45949	698709	8.0 [6.8-9.2]	99.9 (p<0.001)	14	13443	452004	2.1 [1.3-2.8]	99.9 (p<0.001)	14	7817	452004	1.9 [1.3-2.5]	99.5 (p<0.001)
Poorly-defined population	36	13079	272697	4.8 [4.0-5.6]	99.7 (p<0.001)	4	10	1601	0.4 [0.0-1.1]	69.7 (p=0.019)	4	42	1601	1.3 [0.0-2.8]	92.5 (p<0.001)
African Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
General population	2	70	486	16.3 [0.0-33.7]	96.0 (p<0.001)	1	25	185	13.5 [8.6-18.4]	-	1	22	185	11.9 [7.2-16.6]	-
Poorly-defined population	1	174	3098	5.6 [4.8-6.4]	-	0	-	-	-	-	0	-	-	-	-
Region of the Americas															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-

High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	5	7575	68000	6.4 [0.7-12.0]	99.9 (p<0.001)	3	1160	24213	3.5 [1.8-5.3]	95.4 (p<0.001)	3	860	24213	2.3 [0.5-4.1]	97.5 (p<0.001)
General population	13	4055	93880	6.8 [5.0-8.5]	99.5 (p<0.001)	4	56	4761	1.9 [0.1-3.7]	94.8 (p<0.001)	4	239	4761	2.8 [0.0-5.6]	98.1 (p<0.001)
Poorly-defined population	9	7491	110491	6.0 [3.1-8.9]	99.9 (p<0.001)	1	2	276	0.7 [0.0-1.7]	-	1	1	276	0.4 [0.0-1.1]	-
Eastern Mediterranean Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
General population	3	691	6062	13.4 [8.8-18.0]	96.3 (p<0.001)	0	-	-	-	-	0	-	-	-	-
Poorly-defined population	1	691	5372	12.9 [12.0-13.8]	-	0	-	-	-	-	0	-	-	-	-
European Region															
Close contacts	1	195	1084	18.0 [15.7-20.3]	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	4	935	31666	4.5 [2.3-6.7]	95.3 (p<0.001)	0	-	-	-	-	7	6929	426162	1.3 [0.6-1.9]	99.0 (p<0.001)
General population	14	21988	465929	4.7 [3.6-5.9]	99.5 (p<0.001)	7	13362	426162	2.4 [1.5-3.3]	99.2 (p<0.001)	2	40	1143	2.5 [0.0-7.4]	97.5 (p<0.001)
Poorly-defined population	19	4561	131977	4.4 [3.4-5.3]	99.4 (p<0.001)	2	8	1143	1.0 [0.0-3.2]	87.6 (p=0.004)	0	-	-	-	-
South-East Asia Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)	2	0	1075	0.0 [0.0-0.2]	0.0 (p=0.520)
General population	4	18518	111456	19.6 [5.5-33.6]	100 (p<0.001)	0	-	-	-	-	0	-	-	-	-

Poorly-defined population	2	43	394	10.0 [0.0-28.9]	97.9 (p<0.001)	1	0	182	0.0 [0.0-0.8]	-	1	1	182	0.5 [0.0-1.6]	-
Western Pacific Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	4	105	3.8 [0.1-7.5]	-	1	14	105	13.3 [6.8-19.8]	-
Low-risk HCWs	1	1	432	0.2 [0.0-0.7]	-	1	0	432	0.0 [0.0-0.3]	-	1	1	432	0.2 [0.0-0.7]	-
General population	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)	2	0	20896	0.0 [0.0-0.0]	0.0 (p=1.000)	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)
Poorly-defined population	4	119	21365	0.9 [0.0-1.9]	96.9 (p<0.001)	0	-	-	-	-	0	-	-	-	-

Table S10. Sensitivity analysis of seroprevalence of antibodies to SARS-CoV-2 among eighty-two grade A and grade B studies, considering alternative serological assays used in the same study and seropositive by any positives of the assays

Study population	Studies using original serological assays (Main analysis)					Studies using alternative serological assays (Sensitivity analysis I)					Any positives of the assays (Sensitivity analysis II)*				
	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)
Overall															
Close contacts	1	195	1084	18.0 [15.7-20.3]	-	1	195	1084	18.0 [15.7-20.3]	-	1	195	1084	18.0 [15.7-20.3]	-
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-
Low-risk HCWs	12	8512	101173	4.2 [1.5-6.9]	99.8 (p<0.001)	12	8511	101173	4.2 [1.5-6.9]	99.8 (p<0.001)	12	8513	101173	4.2 [1.6-6.9]	99.8 (p<0.001)
General population	38	45949	698709	8.0 [6.8-9.2]	99.8 (p<0.001)	38	46618	707823	8.0 [6.8-9.3]	99.9 (p<0.001)	38	46823	698709	8.1 [6.9-9.4]	99.9 (p<0.001)
Poorly-defined population	36	13079	272697	4.8 [4.0-5.6]	99.7 (p<0.001)	36	13079	272697	4.8 [4.0-5.6]	99.7 (p<0.001)	36	13193	272697	4.8 [4.0-5.6]	99.7 (p<0.001)
African Region															
General population	2	70	486	16.3 [0.0-33.7]	96.0 (p<0.001)	2	70	486	16.3 [0.0-33.7]	96.0 (p<0.001)	2	70	486	16.3 [0.0-33.7]	96.0 (p<0.001)
Poorly-defined population	1	174	3098	5.6 [4.8-6.4]	-	1	174	3098	5.6 [4.8-6.4]	-	1	174	3098	5.6 [4.8-6.4]	-
Region of the Americas															
Low-risk HCWs	5	7575	68000	6.4 [0.7-12.0]	99.9 (p<0.001)	5	7574	68000	6.3 [0.7-11.9]	99.9 (p<0.001)	5	7576	68000	6.4 [0.8-12.1]	99.9 (p<0.001)

General population	13	4055	93880	6.8 [5.0-8.5]	99.5 (p<0.001)	13	4050	93880	6.7 [5.0-8.3]	99.5 (p<0.001)	13	4057	93880	6.8 [5.0-8.5]	99.5 (p<0.001)
Poorly-defined population	9	7491	110491	6.0 [3.1-8.9]	99.8 (p<0.001)	9	7491	110491	6.0 [3.1-8.9]	99.9 (p<0.001)	9	7491	110491	6.0 [3.1-8.9]	99.9 (p<0.001)
Eastern Mediterranean Region															
General population	3	691	6062	13.4 [8.8-18.0]	97.8 (p<0.001)	3	691	6062	13.4 [8.8-18.0]	96.3 (p<0.001)	- 3	691	6062	13.4 [8.8-18.0]	96.3 (p<0.001)
Poorly-defined population	1	691	5372	12.9 [12.0-13.8]		1	691	5372	12.9 [12.0-13.8]	-	1	691	5372	12.9 [12.0-13.8]	-
European Region															
Close contact	1	195	1084	18.0 [15.7-20.3]	-	1	195	1084	18.0 [15.7-20.3]	-	1	195	1084	18.0 [15.7-20.3]	-
Low-risk HCWs	4	935	31666	4.5 [2.3-6.7]	95.3 (p<0.001)	4	935	31666	4.5 [2.3-6.7]	95.3 (p<0.001)	4	935	31666	4.5 [2.3-6.7]	95.3 (p<0.001)
General population	14	21988	465929	4.7 [3.6-5.9]	99.5 (p<0.001)	14	22662	475043	4.8 [3.7-6.0]	99.5 (p<0.001)	14	22860	465929	5.0 [3.9-6.1]	99.4 (p<0.001)
Poorly-defined population	19	4561	131977	4.4 [3.4-5.3]	99.4 (p<0.001)	19	4561	131977	4.4 [3.4-5.3]	99.4 (p<0.001)	19	4675	131977	4.4 [3.4-5.3]	99.3 (p<0.001)
South-East Asia Region															
Low-risk HCWs	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)
General population	4	18518	111456	19.6 [5.5-33.6]	100.0 (p<0.001)	4	18518	111456	19.6 [5.5-33.6]	100.0 (p<0.001)	4	18518	111456	19.6 [5.5-33.6]	100.0 (p<0.001)
Poorly-defined population	2	43	394	10.0 [0.0-28.9]	97.9 (p<0.001)	2	43	394	10.0 [0.0-28.9]	97.9 (p<0.001)	2	43	394	10.0 [0.0-28.9]	97.9 (p<0.001)
Western Pacific Region															
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-

Low-risk HCWs	1	1	432	0.2 [0.0-0.7]	-	1	1	432	0.2 [0.0-0.7]	-	1	1	432	0.2 [0.0-0.7]	-
General population	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)
Poorly-defined population	4	119	21365	0.9 [0.0-1.9]	96.9 (p<0.001)	4	119	21365	0.9 [0.0-1.9]	96.9 (p<0.001)	4	119	21365	0.9 [0.0-1.9]	96.9 (p<0.001)

* Some studies tested different number of specimens with two serological assays, which may lead to the difference of total number of participants being tested between different sensitivity analyses.

Table S11. Sensitivity analysis of seroprevalence adjusted for test performance among eighty-two grade A and grade B studies

Study population	Pooled estimates of crude seroprevalence (main analysis)					Pooled estimates of seroprevalence adjusted for test performance (Sensitivity analysis III)				
	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)
Overall										
Close contacts	1	195	1084	18.0 [15.7-20.3]	-	1	175	1084	16.1 [14.0-18.3]	-
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-
Low-risk HCWs	12	8512	101173	4.2 [1.5-6.9]	99.8 (p<0.001)	12	8814	101173	4.4 [1.6-7.2]	99.8 (p<0.001)
General population	38	45949	698709	8.0 [6.8-9.2]	99.8 (p<0.001)	38	46671	698709	8.2 [7.0-9.4]	99.9 (p<0.001)
Poorly-defined population	36	13079	272697	4.8 [4.0-5.6]	99.7 (p<0.001)	36	13606	272697	4.4 [4.0-4.8]	99.8 (p<0.001)
African Region										
General population	2	70	486	16.3 [0.0-33.7]	96.0 (p<0.001)	2	73	486	16.8 [0.4-33.2]	95.4 (p<0.001)
Poorly-defined population	1	174	3098	5.6 [4.8-6.4]	-	1	161	3098	5.2 [4.4-6.0]	-
Region of the Americas										
Low-risk HCWs	5	7575	68000	6.4 [0.7-12.0]	99.9 (p<0.001)	5	7849	68000	6.3 [0.5-12.2]	99.9 (p<0.001)
General population	13	4055	93880	6.8 [5.0-8.5]	99.5 (p<0.001)	13	4339	93880	6.4 [4.7-8.1]	99.6 (p<0.001)
Poorly-defined population	9	7491	110491	6.0 [3.1-8.9]	99.8 (p<0.001)	9	7993	110491	6.4 [3.2-9.6]	99.9 (p<0.001)
Eastern Mediterranean Region										
General population	3	691	6062	13.4 [8.8-18.0]	97.8 (p<0.001)	3	850	6062	15.5 [10.8-20.3]	95.9 (p<0.001)
Poorly-defined population	1	691	5372	12.9 [12.0-13.8]		1	967	5372	18.0 [17.0-19.0]	- -
European Region										
Close contact	1	195	1084	18.0 [15.7-20.3]	-	1	175	1084	16.1 [14.0-18.3]	-
Low-risk HCWs	4	935	31666	4.5 [2.3-6.7]	95.3 (p<0.001)	4	962	31666	5.0 [2.4-7.5]	96.2 (p<0.001)
General population	14	21988	465929	4.7 [3.6-5.9]	99.5 (p<0.001)	14	23728	465929	5.4 [4.0-6.8]	99.7 (p<0.001)

Poorly-defined population	19	4561	131977	4.4 [3.4-5.3]	99.4 (p<0.001)	19	4305	131977	4.0 [3.2-4.7]	99.6 (p<0.001)
South-East Asia Region										
Low-risk HCWs	2	1	1075	0.1 [0.0-0.3]	0.0 (p=0.520)	2	1	1075	0.1 [0.0-0.3]	-
General population	4	18518	111456	19.6 [5.5-33.6]	100.0 (p<0.001)	4	17369	111456	18.6 [6.6-30.7]	100.0 (p<0.001)
Poorly-defined population	2	43	394	10.0 [0.0-28.9]	97.9 (p<0.001)	2	50	394	11.7 [0.0-33.8]	98.3 (p<0.001)
Western Pacific Region										
High-risk HCWs	1	18	105	17.1 [9.9-24.4]	-	1	18	105	17.1 [9.9-24.4]	-
Low-risk HCWs	1	1	432	0.2 [0.0-0.7]	-	1	2	432	0.5 [0.0-1.1]	-
General population	2	627	20896	1.7 [0.0-5.0]	99.8 (p<0.001)	2	312	20896	0.8 [0.0-2.5]	99.6 (p<0.001)
Poorly-defined population	4	119	21365	0.9 [0.0-1.9]	96.9 (p<0.001)	4	130	21365	1.0 [0.0-2.2]	97.7 (p<0.001)

Table S12. Multivariable meta-regression for change in the seroprevalence of human antibodies to SARS-CoV-2 among eighty-two grade A and grade B studies

Study characteristics	Change in the seroprevalence (coefficient β†) (95% CI)
WHO regions	
African Region	1
Region of the Americas	-6.2 (-16.0, 3.6)
Eastern Mediterranean Region	2.3 (-10.0, 14.6)
European Region	-7.6 (-17.3, 2.0)
South-East Asia Region	1.5 (-9.0, 12.0)
Western Pacific Region	-11.6 (-22.6, -0.6)*
Study populations	
High-risk healthcare worker	1
Close contact	-1.4 (-24.0, 21.3)
Low-risk healthcare worker	-17.7 (-35.1, -0.3)*
General population	-12.6 (-29.8, 4.6)
Poorly-defined group	-15.6 (-32.6, 1.5)
Study quality	
Grade A	1
Grade B	4.4 (-0.2, 8.9)
Test performance*	
Sensitivity	0.0 (-0.2, 0.2)
Specificity	0.7 (-0.7, 2.0)

*** p<0.001; **0.001<p<0.01; *0.01<p<0.05.

† The regression coefficient β refers to the change in the seroprevalence of human antibodies to SARS-CoV-2. A negative sign for the coefficient β corresponds to a reduction in the seroprevalence of SARS-CoV-2 specific antibodies for given changes in the covariate, while a positive sign corresponds to an increase in the seroprevalence of SARS-CoV-2 specific antibodies.

* The sensitivity and specificity were included in regression model as continuous variables, which indicated the change in the seroprevalence for per unit (%) of sensitivity and specificity.

Table S13. Relative risk of infections with SARS-CoV-2 by age groups and sex among eighty-two grade A and grade B studies

Categories	Relative risk (RR, 95% CI)
Overall	
Age group†	
Young	0.777 (0.718-0.842)*
Middle-age	Ref
Old	0.755 (0.591-0.964)*
Sex	
Female	Ref
Male	1.022 (0.955-1.093)
Race	
White	Ref
Black	2.701 (2.295-3.178)*
Asian	1.917 (1.815-2.025)*
Region of the Americas	
Age group†	
Young	0.718 (0.595-0.867)*
Middle-age	Ref
Old	0.787 (0.657-0.942)*
Sex	
Female	Ref
Male	0.991 (0.848-1.159)
Race	
White	Ref
Black	2.643 (1.920-3.637)*
Asian	1.781 (1.471-2.158)*
European Region	
Age group†	
Young	0.790 (0.699-0.893)*
Middle-age	Ref
Old	0.713 (0.499-1.020)
Sex	
Female	Ref
Male	1.000 (0.934-1.070)
Race	
White	Ref
Black	2.743 (2.497-3.014)*
Asian	1.929 (1.822-2.043)*

* $p<0.05$

† The age groups between each study were not perfectly aligned. Specially, the Young represent participants younger than 20 years, while the old represent

participants older than 65 years. The Middle-age group represent participants aged 20-64 years.

Table S14. The cumulative incidence and estimated number of serological infections of selected grade A and grade B studies involved of general population

Author	Location, Country	Age of participants	Unadjusted seroprevalence (%) (a)	Adjusted seroprevalence (%) (factors) (a') *	Total population (b)	Age proportion for population (%) (c)	Age-specific population (d = b*c)	Date in 14 days before mid-term sampling time	Total number of COVID-19 cases (e)	Infections (a*b/a'*b)
Region of the Americas										
Hallal et al.‖	Brazil	≥ 1 yrs	1.96	-	213863051	98.7	211108455	2020/5/12	178214	4135180.0
Biggs et al.‡	DeKalb, Fulton County, Georgia, USA	All ages	2.7	2.5	1806672	100	1806672	2020/4/16	3176	45166.8
Appa et al. †	Marin, California, USA	≥ 4 yrs	0.5	0.29	258826	95.5	247179	2020/4/8	148	716.8
Mahajan et al. †	Connecticut, USA	≥ 18 yrs	4.1	4.0	3565287	76.7	2734575	2020/6/20	45715	109383.0
Bruckner et al.	Orange, California, USA	≥ 18 yrs	11.8	11.5	3175692	78.3	2486567	2020/7/14	26120	285955.2
Samore et al. ‡†	Four counties (Utah, Salt Lake, Davis, Summit), Utah, USA	≥ 12 yrs	1.1	0.8	2200000	75.2	1654400	2020/5/18	6233	13235.2
McLaughlin et al. ‡	Blaine, Idaho, USA	≥ 18 yrs	22.7	22.9	-	-	17611	2020/4/27	492	4032.9
European Region										
Petersen et al.‡	Faroe Islands, Denmark	All ages	0.6	0.7	52154	100	52154	2020/4/15	184	365.1
Pollán et al..¶	Spain	All ages	4.6	-	46459218	100	46459218	2020/4/20	200210	2137063.2
Stringhini et al.‖	Geneva, Switzerland	≥ 5 yrs	7.9	-	504128	94.8	477810	2020/4/8	4239	37830.9
Richard et al.‖	Geneva, Switzerland	≥ 5 yrs	6.6	-	504128	94.8	477810	2020/5/22	5212	31756.7
Ward et al.‡	England, UK	≥ 18 yrs	4.8	-	56286961	78.6	44241551	2020/7/26	257859	2129775.4
Office of National Statistics.‡	England, UK	≥ 16 yrs	5.1	6.2	-	-	45042000	2020/6/18	158078	2791800.0
Government of Jersey	Jersey, UK	≥ 16 yrs	2.9	3.1	-	-	-	2020/4/18	245	3300.0
Streeck et al. ‡§	Gangelt, Kreis Heinsberg, Germany	All ages	11.5	14.1	12597	100	12597	2020/3/20	439	1777.4

Snoeck et al. †	Luxembourg	≥ 18 yrs	1.9	2.09	603951	-	469709	2020/4/11	3270	9816.9
Barchuk et al. †	Saint Petersburg, Russia	≥ 18 yrs	9.3	7.4	5351935	83.2	4452810	2020/5/28	14839	329508.0
Vos et al. †	Netherlands	2-90 yrs	2.4	-	17181252	100	17181252	2020/4/6	18803	410133.1
South-East Asia Region										
Malani et al. ‖	Mumbai, India	≥ 12 yrs	40.8	-	20411274	77.9	15890177	2020/6/25	70878	6488182.0
Murhekar et al. (round 1) ‡†	India	≥ 18 yrs	0.56	0.73				2020/5/9	62808	6468388.0
Murhekar et al. (round 2) ‡	India	≥ 10 yrs	10.8	6.6	-	-		2020/8/21	2975701	74326463.0
Sharma et al. ‖	Delhi, India	≥ 5 yrs	26.1	-	30290936	91.8	27797992	2020/8/27	167604	7265424.2

* Adjust factors mainly include demographic factors (age and/or sex) and test performance (sensitivity and specificity of assays).

‖ We aggregated the multiple sampling results to calculate the crude estimated during the whole study period, and adjusted seroprevalence could not be calculated. Stringhini et al. reported the data from the first five weeks; Richard et al. reported the data from week 6 to week 12.

‡ The estimated number of infections or population size were reported in their own study.

¶ The seroprevalence of immunoassay were used in main analysis

†The age proportion used to calculate population size in specific age groups were not perfectly aligned with the age group reported in original study.

§ The number of COVID-19 cases in the local as of Mar 30 were extracted in the original study to represent the cumulative number of cases as of Mar 20.

Table S15. The data source of population size and COVID-19-related epidemiological data of grade A and grade B studies involved of general population

Author	Location	Institution	Source of population	Institution	Source of epi-data
Hallal et al.	Brazil	World pop	https://www.worldpop.org/	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Biggs et al.	Georgia, USA	National Center for Health Statistics	https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation. htm#Vintage2018.	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Appa et al.	Marin, California, USA	U.S. Census Bureau, Population Division	https://archive.vn/20200214061229/https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2018_PEPANNRES&prodType=table https://www.census.gov/quickfacts/marincountycalifornia	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Mahajan et al.	Connecticut, USA	United State Census Bureau/ Statista	https://www2.census.gov/programs-surveys/popest/tables/2010-2019/state/totals/nst-est2019-01.xlsx?# https://www.statista.com/statistics/1021891/connecticut-population-share-age-group/	JHU CSSE COVID-19 Dashboard/ Connecticut Open Data	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series https://data.ct.gov/Health-and-Human-Services/COVID-19-Cases-and-Deaths-by-Age-Group/ypz6-8qyf
Bruckner et al.	Orange, California, USA	U.S. Census Bureau	https://www.census.gov/quickfacts/orangecountycalifornia	JHU CSSE COVID-19 Dashboard/ California Department of Public Health	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/COVID-19/COVID-19-Cases-by-Age-Group.aspx
Samore et al.	Four counties (Utah, Salt Lake, Davis, Summit), Utah, USA	Kem C Gardner Policy Institute	https://gardner.utah.edu/wp-content/uploads/State-of-Utah-Demographic-Profile-2010-2018.pdf	JHU CSSE COVID-19 Dashboard/ Utah Department of Health	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series https://coronavirus-dashboard.utah.gov/#demographics
McLaughlin et al.	Blaine, Idaho, USA	United State Census Bureau	https://www.census.gov/quickfacts/blainecountyidaho	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Petersen et al.	Faroe Islands, Denmark	STATBANK	https://statbank.hagstova.fo/pxweb/en/H2/H2__IB__IB01/fo_aldbygd.px/	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series

Pollán et al..	Spain	World pop	https://www.worldpop.org/	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Stringhini et al.	Geneva, Switzerland	STAT-TAB	https://www.pxweb.bfs.admin.ch/pxweb/en/px-x-0103010000_101/-/px-x-0103010000_101.px/?rxid=34873e36-d320-4c20-b931-8f0596e0e667	Federal Office of Public Health	https://www.bag.admin.ch/dam/bag/en/dokumente/mt/k-und-i/aktuelle-ausbrueche-pandemien/2019-nCoV/covid-19-basisdaten-fallzahlen.xlsx.download.xlsx/Dashboards_1&2_COVID19_swiss_data_pv.xlsx
Richard et al.	Geneva, Switzerland	STAT-TAB	https://www.pxweb.bfs.admin.ch/pxweb/en/px-x-0103010000_101/-/px-x-0103010000_101.px/?rxid=34873e36-d320-4c20-b931-8f0596e0e667	Federal Office of Public Health	https://www.bag.admin.ch/dam/bag/en/dokumente/mt/k-und-i/aktuelle-ausbrueche-pandemien/2019-nCoV/covid-19-basisdaten-fallzahlen.xlsx.download.xlsx/Dashboards_1&2_COVID19_swiss_data_pv.xlsx
Ward et al.	England, UK	Office for National Statistics	https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates	Public Health England	https://coronavirus.data.gov.uk/cases?areaType=nation&areaName=England
Office of National Statistics.	England, UK	Office for National Statistics	https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates	Public Health England	https://coronavirus.data.gov.uk/cases?areaType=nation&areaName=England
Government of Jersey	Jersey, UK	-	-	Government of Jersey	https://www.gov.je/health/coronavirus/pages/coronaviruscases.aspx
Streeck et al.	Gangelt, Kreis Heinsberg, Germany	-	Streeck et al. Infection fatality rate of SARS-CoV-2 infection in a German community with a super-spreading event. medRxiv. https://doi.org/10.1101/2020.05.11.20092916	-	Streeck et al. Infection fatality rate of SARS-CoV-2 infection in a German community with a super-spreading event. medRxiv. https://doi.org/10.1101/2020.05.11.20092916
Snoeck et al.	Luxembourg	World pop	https://www.worldpop.org/	JHU CSSE COVID-19 Dashboard/The Luxembourg government	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series https://msan.gouvernement.lu/fr/graphiques-evolution.html
Barchuk et al.	Saint Petersburg, Russia	-	https://rosstat.gov.ru/free_doc/new_site/population/demo/Popul2018.xls https://populationandeconomics.pensoft.net/article/47234/download/pdf/349836	Multiple sources	https://cn.bing.com/search?q=Coronavirus+trend+in+St+Petersburg+City&tf=U2VydmljZT1HZW5lcmljQW5zd2VycyBTY2VuYXJpbz1Db3JvbmFWaXJ1c01MIFBvc2l0aW9uPVRPUCBSYW5raW5nRGF0YT1UcnVlIEZvcmNlUGxhY2U9VHJ1ZSBQYWlycz1zY246Q29yb25hVmlydXNNTDtjb3VudHJ5Q29kZTpSVVM7c3RhdGVDb2RlOlN0JTIwUGV0ZXJzYnVyZyUyMENpdHk7aW50ZW50OkNoZWNrQ29yb25hVHJlbmQ7YWJvdmVuZXdzOlRydWU7IHw%3d&hs=kI3jO5C%2fFDZhJlVfw%2fmpk9X%2b%2fTFYSn%2blfwOZGekQYnM%3d&FORM=COVIDR
Vos et al.	Netherlands	World pop	https://www.worldpop.org/	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series

Malani et al.	Mumbai, India	UN	http://www.populationu.com/cities/mumbai-population	News report	https://www.google.com/amp/s/m.hindustantimes.com/india-news/are-coronavirus-cases-in-mumbai-plateauing/story-tDo9h8IcE0BXVSuwYjOxxJ_amp.html
Murhekar et al.	India	World pop	https://www.worldpop.org/	JHU CSSE COVID-19 Dashboard	https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series
Sharma et al.	Delhi, India	-	https://worldpopulationreview.com/world-cities/delhi-population	Multiple sources	https://cn.bing.com/search?q=Coronavirus+trend+in+Maharashtra&tf=U2VydmljZT1HZW5lcmljQW5zd2VycyBTY2VuYXJpbz1Db3JvbmFWaXJ1c01MIFBvc2l0aW9uPVRPUCBSYW5raW5nRGF0YT1UcnVlIEZvcmNlUGxhY2U9VHJ1ZSBQYWlycz1zY246Q29yb25hVmlydXNNTDtjb3VudHJ5Q29kZTpJTkQ7c3RhdGVDb2RlOk1IO2ludGVudDpDaGVja0Nvcm9uYVRyZW5kO2Fib3ZlbmV3czpUcnVlOyB8&hs=WARPquqWriUvRyVXy7sza4FF3FR7Qb0ftF6qFU4LGV4%3d&FORM=COVIDR

Table S16. Sensitivity and specificity values used in the sensitivity analysis of seroprevalence adjusted for test performance

Author	Study population	Screening assay	Sen (%)	Spe (%)	Confirmatory assay	Sen (%)	Spe (%)	Combined Sen (%)	Combined Spe (%)	Data Source
Brotons et al.	Close contact	LFIA	100.0	97.5	-	-	-	-	-	US. FDA[91]
Tess et al.	General population	CLIA	92.1	99.1	-	-	-	-	-	US. FDA[91]
Stringhini et al.	General population	ELISA	93.0	100.0	-	-	-	-	-	Internal validation[47]
Snoeck et al.	General population	ELISA	77.8	97.8	-	-	-	-	-	Internal validation[56]
Pollán et al..	General population	CLIA	88.6	100.0	-	-	-	-	-	Internal validation[57]
Biggs et al.	General population	CLIA	93.2	99.0	-	-	-	-	-	Internal validation[28]
Majiya et al.	General population	LFIA	100.0	100.0	-	-	-	-	-	Internal validation[10]
Gudbjartsson et al.	General population, Poorly-defined population	CLIA/ELISA	91.2	99.8	-	-	-	-	-	Internal validation[50]
Nisar et al.	General population	CLIA	80.0	100.0	-	-	-	-	-	Internal validation[39]
Borges et al.	General population	LFIA	95.8	97.0	-	-	-	-	-	Internal validation[21]
Mahajan et al.	General population	CLIA	94.4	100.0	-	-	-	-	-	Internal validation[23]/ US. FDA[91]
Vos et al.	General population	Multiplex-immunoassay	84.4	99.0	-	-	-	-	-	External validation[92]
Richard et al.	General population	ELISA	93.0	100.0	-	-	-	-	-	Internal validation[47,48]
Basteiro et al.	Low-risk Healthcare worker	CLIA	96.9	100.0	-	-	-	-	-	Internal validation[45]

Nopsopon et al.	Low-risk Healthcare worker, Poorly-defined population	LFIA	94.1	98.0	-	-	-	-	-	Internal validation[77]
Moscola et al. *	Low-risk Healthcare worker	ELISA/CLIA/ Immunometric	87.3	99.4	-	-	-	-	-	Internal validation[16]
Self et al.	Low-risk Healthcare worker	ELISA	96.0	99.0	-	-	-	-	-	Internal validation[12]
Ariza et al.	Low-risk Healthcare worker	CLIA	89.3	99.6	-	-	-	-	-	US. FDA[91]
Brant-Zawadzki et al.	Low-risk Healthcare worker	CLIA	93.6	100.0	-	-	-	-	-	Internal validation[14]
Laursen et al.	Low-risk Healthcare worker, Poorly-defined population	LFIA	82.6	99.5	-	-	-	-	-	Internal validation[43]
Trieu et al.	Low-risk Healthcare worker	ELISA	92.5	100.0	NT	100	100	92.5	100.0	US. FDA[91]
Ko et al.	Low-risk Healthcare worker	FIA	99.1	94.1	NT	100	100	99.1	100.0	Internal validation[84]
Skowronski et al. ‖	Poorly-defined population	CLIA	85.0	100.0	-	-	-	-	-	Internal validation[36]
Iversen et al.	Poorly-defined population	LFIA	82.5	99.5	-	-	-	-	-	Internal validation[42]
Xu et al.	Poorly-defined population	CLIA	83.0	100.0	-	-	-	-	-	Internal validation[90]
Plebani et al.	Poorly-defined population	CLIA	73.4	98.0	-	-	-	-	-	Internal validation[75]
Ray et al.	Poorly-defined population	ELISA	88.2	99.8	-	-	-	-	-	Internal validation[82]
Tilley et al.	Poorly-defined population	ELISA	90.0	100.0	-	-	-	-	-	US. FDA[91]

Dimeglio et al.	Poorly-defined population	ELISA	96.7	97.5	NT	100	100	96.7	100.0	US. FDA[91]
Dillner et al.	Poorly-defined population	multiplex, microsphere-based assay	99.2	99.8	-	-	-	-	-	Internal validation[62,93]
Stadlbauer et al.	Poorly-defined population	ELISA	95.0	100.0	-	-	-	-	-	Internal validation[33]
Slot et al.	Poorly-defined population	ELISA	98.3	99.4	ELISA	98.3	99.4	96.6	100.0	Internal validation[67]
Jõgi et al.	Poorly-defined population	CLIA	92.7	99.9	NT	100	100	92.7	100.0	PHE[94]
Ho et al.	Poorly-defined population	CLIA	82.5	99.8	ELISA	100	100	82.5	100.0	US. FDA[88]/ Internal validation[88]
Berte et al.	Poorly-defined population	ELISA	97.6	95.2	-	-	-	-	-	Internal validation[69]

Abbreviation: sen, sensitivity; spe, specificity; LFIA, lateral flow immunoassays; CLIA, chemiluminescence immunoassays; ELISA, enzyme-linked immunosorbent assays; FIA, fluorescence immunoassay; US. FDA, US Food and Drug Administration; PHE: Public Health England; NT, neutralization test.

* Average sensitivity and specificity from a total of seven serological assays were used.

‖ An overall sensitivity of 85% and perfect specificity were assumed according to original study.

Table S17. Estimated seroprevalence of antibodies to SARS-CoV-2 by WHO regions and study populations among all 404 studies

Study population	All infections					Symptomatic infections					Asymptomatic infections				
	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)	No. of studies	Total no. of positive	Total no. of participants provided serum	Estimated seroprevalence (95% confidence interval)	I^2 (P)
Overall															
Close contacts	22	3515	12609	26.6 [18.3-35.0]	99.5 (p<0.001)	11	290	2613	10.1 [5.6-14.7]	96.6 (p<0.001)	11	222	2613	9.5 [5.0-14.0]	96.7 (p<0.001)
High-risk HCWs	16	1073	7508	18.7 [12.3-25.1]	98.3 (p<0.001)	8	201	2201	5.1 [1.6-8.6]	96.6 (p<0.001)	8	306	2201	11.0 [4.9-17.1]	96.7 (p<0.001)
Low-risk HCWs	115	20682	293318	6.1 [5.4-6.7]	99.4 (p<0.001)	58	3630	115691	0.9 [0.8-1.0]	98.6 (p<0.001)	58	3992	115691	2.3 [1.8-2.8]	98.2 (p<0.001)
General population	84	70674	1078010	8.4 [7.6-9.1]	99.9 (p<0.001)	32	16211	606867	1.6 [1.4-1.8]	99.8 (p<0.001)	32	16065	606867	2.9 [2.4-3.5]	99.7 (p<0.001)
Poorly-defined population	209	378410	3776915	8.1 [7.4-8.8]	99.9 (p<0.001)	74	4114	305026	0.2 [0.1-0.2]	98.9 (p<0.001)	74	12531	305026	4.7 [4.1-5.2]	99.3 (p<0.001)
African Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	1	60	133	45.1 [36.7-53.6]	-	1	0	133	0.0 [0.0-1.0]	-	1	60	133	45.1 [36.7-53.6]	-
Low-risk HCWs	1	5	370	1.4 [0.2-2.5]	-	1	2	370	0.5 [0.0-1.3]	-	1	6	370	1.6 [0.3-2.9]	-
General population	3	73	585	11.6 [1.7-21.5]	94.7 (p<0.001)	2	26	284	7.0 [0.0-19.3]	95.3 (p<0.001)	2	24	284	6.8 [0.0-16.4]	92.1 (p<0.001)
Poorly-defined population	4	278	4249	9.8 [4.6-14.9]	98.5 (p<0.001)	2	2	1085	0.1 [0.0-0.4]	33.1 (p=0.221)	2	90	1085	8.8 [0.0-24.3]	98.8 (p<0.001)
Region of the Americas															
Close contacts	8	499	4240	19.5 [8.8-30.3]	99.0 (p<0.001)	5	198	1700	8.1 [0.0-17.2]	95.9 (p<0.001)	5	74	1700	3.1 [0.4-5.7]	69.3 (p=0.011)
High-risk HCWs	3	46	512	12.9 [3.4-22.4]	94.1 (p<0.001)	1	0	226	0.0 [0.0-0.6]	-	1	7	226	3.1 [0.8-5.4]	-
Low-risk HCWs	32	10102	122743	6.5 [4.8-8.1]	99.5 (p<0.001)	17	1218	52049	0.8 [0.6-1.0]	98.7 (p<0.001)	17	1405	52049	2.3 [1.6-3.1]	96.1 (p<0.001)
General population	25	7707	166312	7.5 [6.3-8.6]	99.5 (p<0.001)	7	1727	44394	5.3 [3.5-7.2]	99.7 (p<0.001)	7	681	44394	3.0 [1.9-4.1]	98.9 (p<0.001)
Poorly-defined population	62	354333	3328333	7.5 [6.0-9.0]	100.0 (p<0.001)	22	895	186231	0.0 [0.0-0.1]	98.1 (p<0.001)	22	8849	186231	5.4 [4.2-6.6]	99.2 (p<0.001)
Eastern Mediterranean Region															
Close contacts	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
High-risk HCWs	2	434	1450	29.9 [27.6-32.3]	0.0 (p=0.351)	1	145	1011	14.3 [12.2-16.5]	-	1	165	1011	16.3 [14.0-18.6]	-
Low-risk HCWs	7	343	8683	8.1 [5.9-10.2]	98.5 (p<0.001)	1	0	203	0.0 [0.0-0.7]	-	1	23	203	11.3 [7.0-15.7]	-
General population	7	6237	41247	12.5 [4.8-20.2]	99.9 (p<0.001)	1	1	142	0.7 [0.0-2.1]	-	1	5	142	3.5 [0.5-6.6]	-
Poorly-defined population	8	3991	22583	22.7 [17.0-28.4]	99.9 (p<0.001)	3	176	3912	2.1 [0.4-3.8]	98.9 (p<0.001)	3	1444	3912	28.0 [0.0-64.6]	99.9 (p<0.001)
European Region															

Close contacts	11	2940	6791	37.1 [25.0-49.1]	98.8 (p<0.001)	4	72	485	17.3 [1.1-33.5]	96.8 (p<0.001)	4	136	485	23.9 [0.0-52.5]	98.8 (p<0.001)
High-risk HCWs	8	362	1476	16.4 [6.1-26.6]	96.7 (p<0.001)	4	52	726	6.0 [2.9-9.1]	60.3 (p=0.056)	4	60	726	4.1 [0.0-9.5]	92.3 (p<0.001)
Low-risk HCWs	54	9785	138929	7.4 [6.3-8.5]	99.1 (p<0.001)	25	2389	48804	2.8 [2.6-3.0]	99.1 (p<0.001)	25	2359	48804	2.8 [1.8-3.9]	98.8 (p<0.001)
General population	31	31389	572333	7.0 [5.9-8.2]	99.7 (p<0.001)	15	14386	512101	2.7 [1.9-3.5]	99.6 (p<0.001)	15	13081	512101	2.1 [1.1-3.0]	99.8 (p<0.001)
Poorly-defined population	108	15584	296586	7.2 [6.6-7.8]	99.2 (p<0.001)	38	2970	48684	3.9 [3.5-4.3]	99.3 (p<0.001)	38	1266	48684	2.6 [2.1-3.1]	96.8 (p<0.001)
South-East Asia Region															
Close contacts	1	15	308	4.9 [2.5-7.3]	-	1	11	308	3.6 [1.5-5.6]	-	1	4	308	1.3 [0.0-2.6]	-
High-risk HCWs	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Low-risk HCWs	6	209	4124	2.4 [1.4-3.3]	97.9 (p<0.001)	4	9	2367	0.1 [0.0-0.4]	65.0 (p=0.036)	4	66	2367	0.7 [0.0-1.5]	96.1 (p<0.001)
General population	7	20236	117719	22.0 [11.2-32.8]	100.0 (p<0.001)	2	52	4604	0.6 [0.0-1.9]	96.6 (p<0.001)	2	809	4604	11.6 [0.0-26.2]	99.4 (p<0.001)
Poorly-defined population	7	2959	23277	10.8 [5.0-16.5]	99.6 (p<0.001)	4	71	6325	1.0 [0.1-1.9]	93.5 (p<0.001)	4	190	6325	3.3 [1.5-5.0]	93.6 (p<0.001)
Western Pacific Region															
Close contacts	2	61	1270	8.5 [0.0-18.6]	-	1	9	120	7.5 [2.8-12.2]	-	1	8	120	6.7 [2.2-11.1]	-
High-risk HCWs	2	171	3937	10.1 [0.0-22.9]	92.1 (p<0.001)	1	4	105	3.8 [0.1-7.5]	-	1	14	105	13.3 [6.8-19.8]	-
Low-risk HCWs	15	238	18469	0.8 [0.4-1.2]	92.9 (p<0.001)	10	12	11898	0.0 [0.0-0.1]	17.3 (p=0.284)	10	133	11898	0.8 [0.3-1.2]	91.0 (p<0.001)
General population	11	5032	179814	2.4 [1.6-3.2]	99.7 (p<0.001)	5	19	45342	0.0 [0.0-0.0]	79.3 (p<0.001)	5	1465	45342	1.9 [0.0-3.8]	99.7 (p<0.001)
Poorly-defined population	20	1265	101887	1.4 [1.1-1.7]	98.3 (p<0.001)	5	0	58789	0.0 [0.0-0.0]	0.0 (p=1.000)	5	692	58789	1.5 [0.9-2.1]	97.6 (p<0.001)

Appendix figures

Figure S1. Quality scores assigned to SARS-CoV-2 serological studies by study populations, December 2019- December 2020.

(A) Median quality score and range from assessment of serological studies of close contacts, high-risk healthcare workers, low-risk healthcare workers, general population, and Poorly-defined population. **(B)** Quality of studies by grade category (i.e. A, B, C and D). Category A included studies with scores ranging from 10 to 12, category B from 7 to 9, category C from 4 to 6, and category D from 0 to 3.

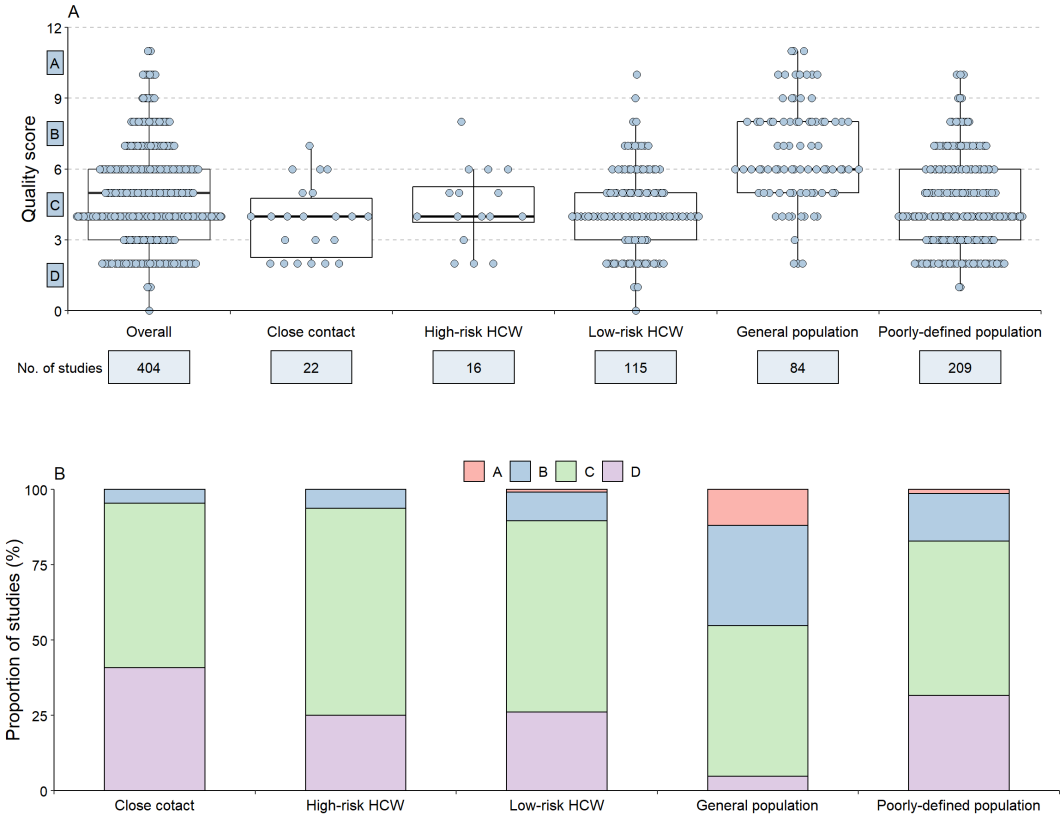


Figure S2. The starting sampling date for each serological study included in this meta-analysis in African Region

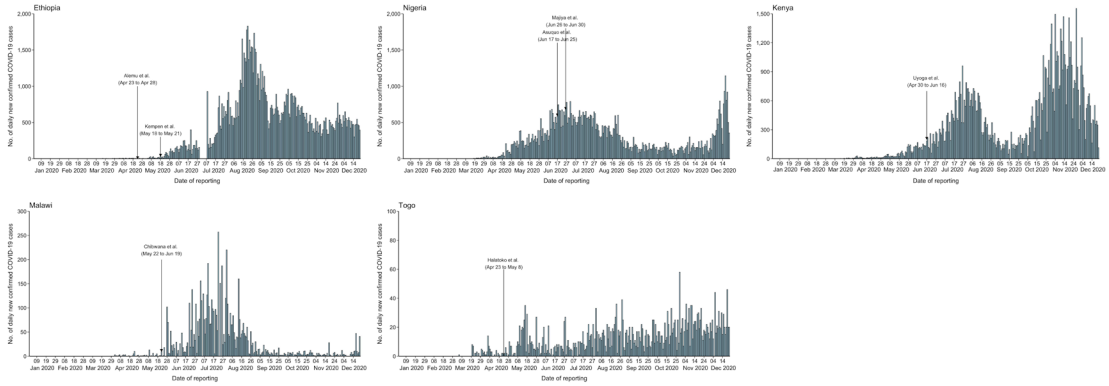
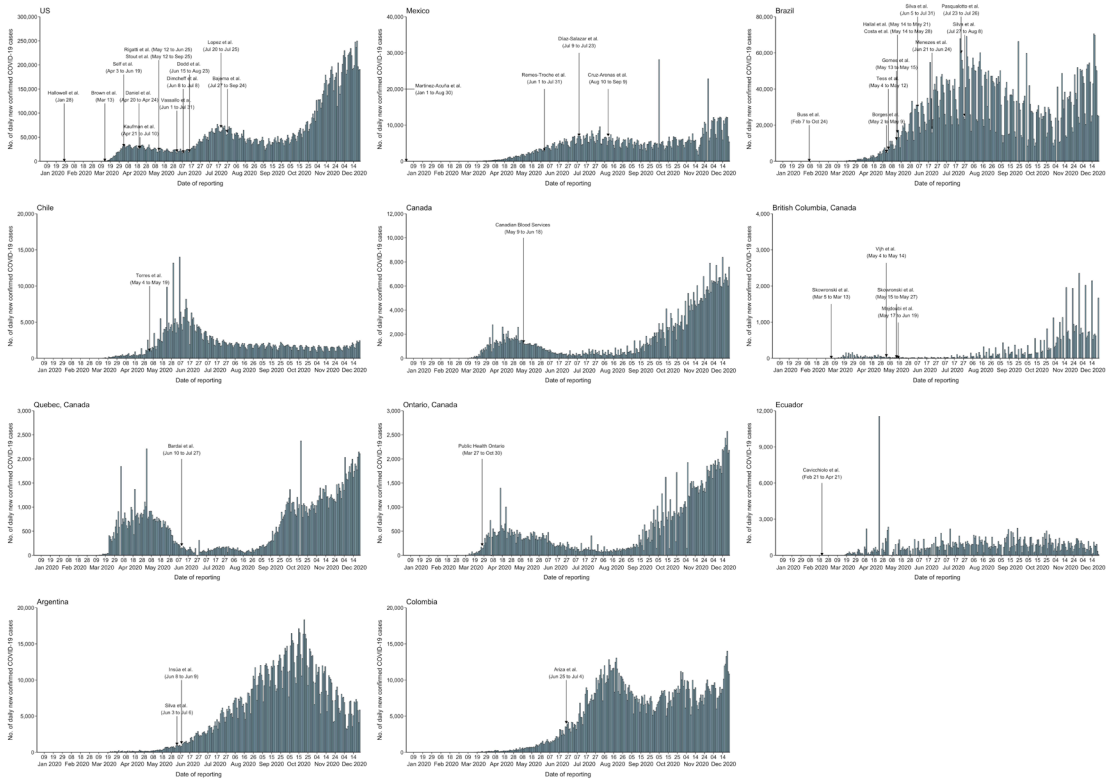


Figure S3. The starting sampling date for each serological study included in this meta-analysis in region of the Americas



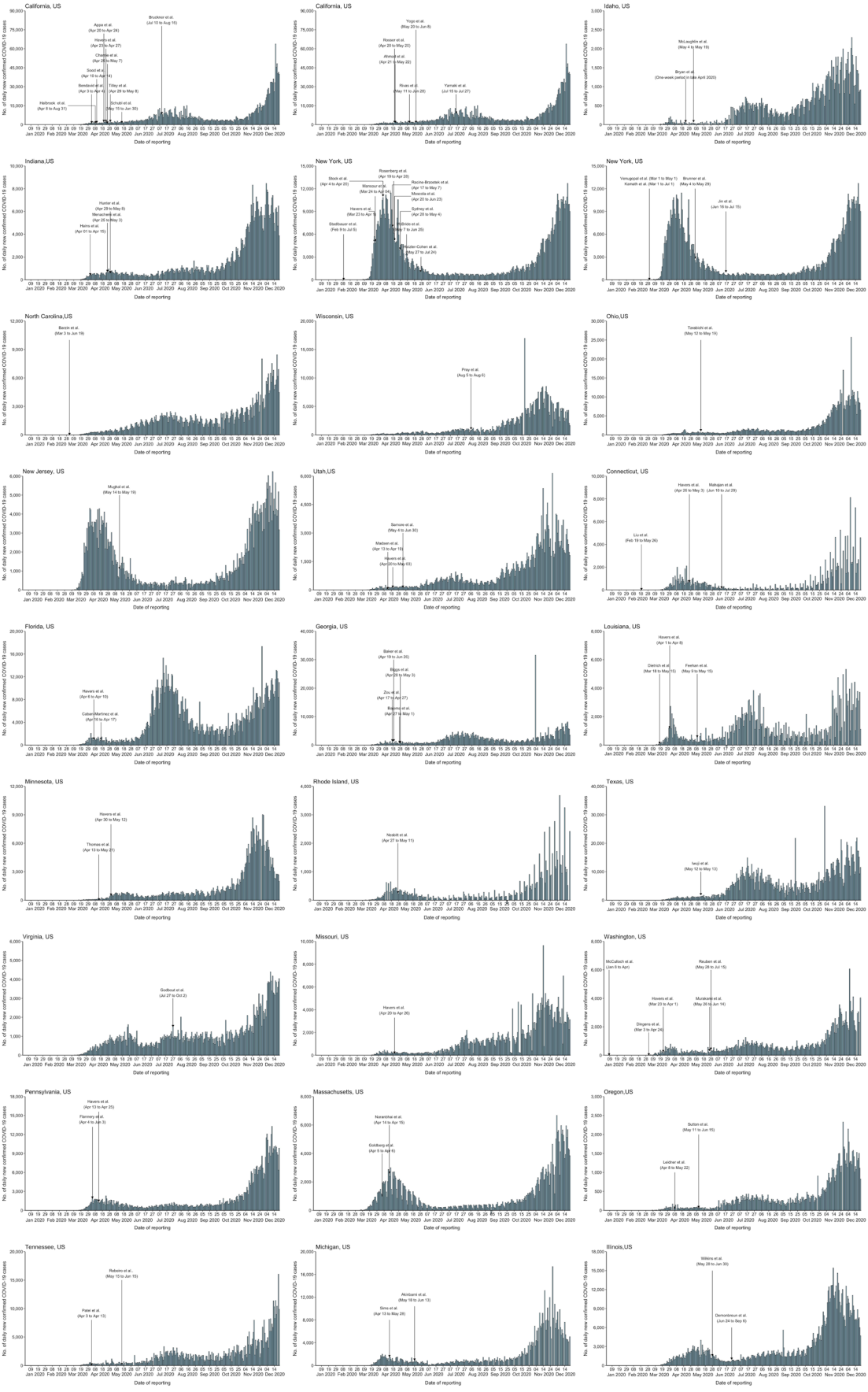

California, US
Bruckner et al. (Jul 10 to Aug 16)
Appe et al. (Apr 20 to Apr 24)
Hoenig et al. (Apr 23 to Apr 27)
Chesle et al. (Apr 28 to May 7)
Sood et al. (Apr 10 to Apr 14)
Bendavid et al. (Apr 3 to Apr 4)
Tilley et al. (Apr 29 to May 8)
Helbrook et al. (Apr 8 to Aug 31)
Schuld et al. (May 15 to Jun 30)
California, US
Yogo et al. (May 29 to Jun 8)
Rosser et al. (Apr 29 to May 20)
Ahmad et al. (Apr 21 to May 22)
Rivas et al. (May 11 to Jun 26)
Yamaki et al. (Jul 15 to Jul 27)
Idaho, US
McLaughlin et al. (May 4 to May 19)
Bryan et al. (One-week period in late April 2020)
Indiana,US
Hunter et al. (Apr 29 to May 8)
Mercachelli et al. (Apr 25 to May 3)
Harris et al. (Apr 01 to Apr 15)
New York, US
Rosenberg et al. (Apr 19 to Apr 29)
Block et al. (Apr 4 to Apr 20)
Racine-Brzostek et al. (Apr 17 to May 7)
Mansour et al. (Mar 24 to Apr 04)
Moscola et al. (Apr 20 to Jun 23)
Havers et al. (Mar 23 to Apr 5)
Sydney et al. (Apr 28 to May 4)
Stadlbauer et al. (Feb 9 to Jul 5)
Rithide et al. (May 7 to Jun 25)
Reuter-Cohen et al. (May 27 to Jul 24)
New York, US
Venugopal et al. (Mar 1 to May 1)
Brunner et al. (May 4 to May 29)
Kamath et al. (Mar 1 to Jul 1)
Jin et al. (Jan 16 to Jul 15)
North Carolina,US
Barzin et al. (Mar 3 to Jun 16)
Wisconsin, US
Pray et al. (Aug 5 to Aug 6)
Ohio,US
Tarabichi et al. (May 12 to May 19)
New Jersey, US
Mughal et al. (May 14 to May 19)
Utah,US
Barnore et al. (May 4 to Jun 30)
Madsen et al. (Apr 13 to Apr 19)
Havers et al. (Apr 20 to May 03)
Connecticut, US
Havers et al. (Apr 28 to May 3)
Mahajan et al. (Jun 10 to Jul 29)
Liu et al. (Feb 19 to May 26)
Florida, US
Havers et al. (Apr 6 to Apr 10)
Cobar-Martinez et al. (Apr 15 to Apr 17)
Georgia, US
Baker et al. (Apr 19 to Jun 26)
Biggs et al. (Apr 29 to May 3)
Zou et al. (Apr 17 to Apr 27)
Rubino et al. (Apr 27 to May 1)
Louisiana, US
Havers et al. (Apr 1 to Apr 8)
Dietrich et al. (Mar 18 to May 15)
Fenhan et al. (May 9 to May 15)
Minnesota, US
Hoevers et al. (Apr 30 to May 12)
Thomas et al. (Apr 13 to May 01)
Rhode Island, US
Nesbitt et al. (Apr 27 to May 11)
Texas, US
Ieuji et al. (May 12 to May 13)
Virginia, US
Godbout et al. (Jul 27 to Oct 2)
Missouri, US
Havers et al. (Apr 20 to Apr 26)
Washington, US
McCulloch et al. (Jan 6 to Apr)
Reuben et al. (May 28 to Jul 15)
Havers et al. (Mar 23 to Apr 1)
Mundekere et al. (May 26 to Jun 14)
Dingens et al. (Mar 3 to Apr 24)
Pennsylvania, US
Havers et al. (Apr 13 to Apr 25)
Flannery et al. (Apr 4 to Jun 3)
Massachusetts, US
Nuranithai et al. (Apr 14 to Apr 15)
Goldberg et al. (Apr 5 to Apr 6)
Oregon,US
Sutton et al. (May 11 to Jun 15)
Leidner et al. (Apr 8 to May 22)
Tennessee, US
Rebeiro et al., (May 15 to Jun 15)
Patel et al. (Apr 3 to Apr 13)
Michigan, US
Akinbami et al. (May 18 to Jun 13)
Sims et al. (Apr 13 to May 28)
Illinois,US
Wilkins et al. (May 28 to Jun 30)
Demombreun et al. (Jun 24 to Sep 6)
No. of daily new confirmed COVID-19 cases
Date of reporting

Figure S4. The starting sampling date for each serological study included in this meta-analysis in Eastern Mediterranean Region

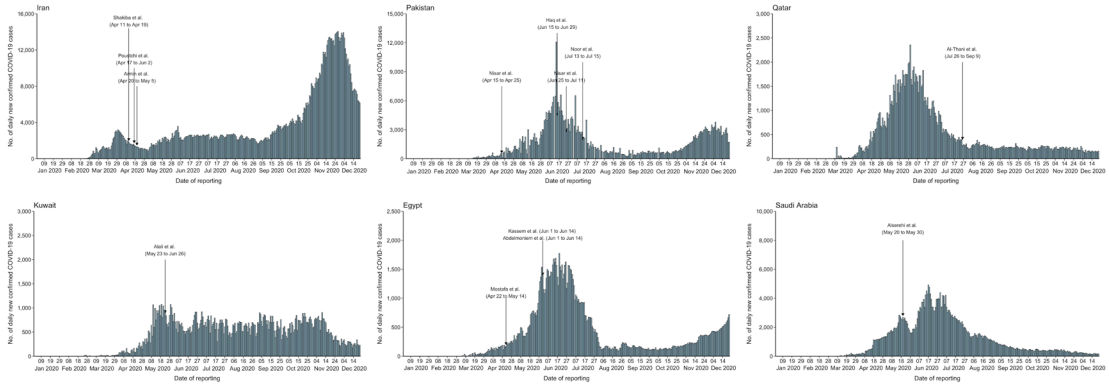
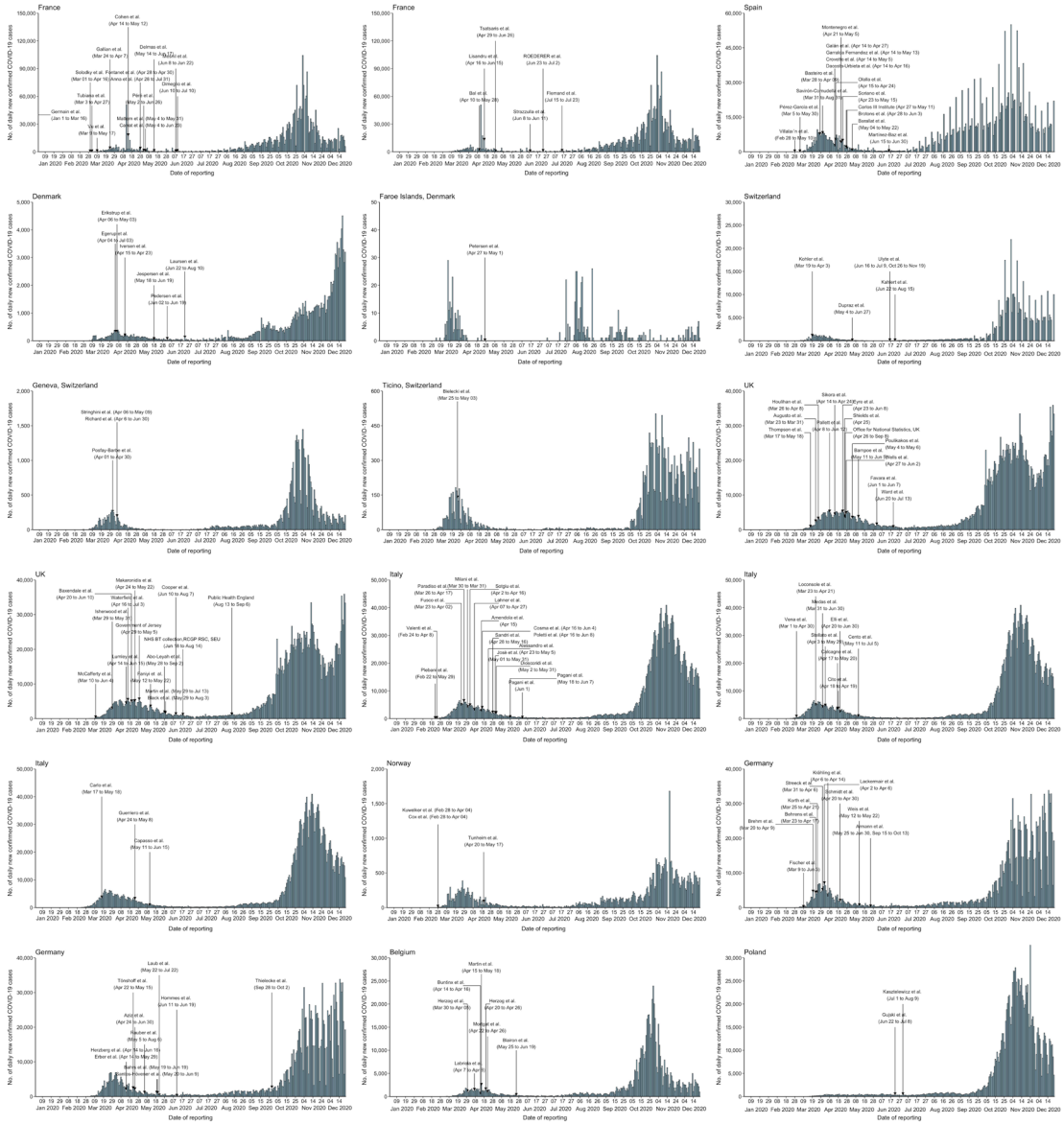


Figure S5. The starting sampling date for each serological study included in this meta-analysis in European Region



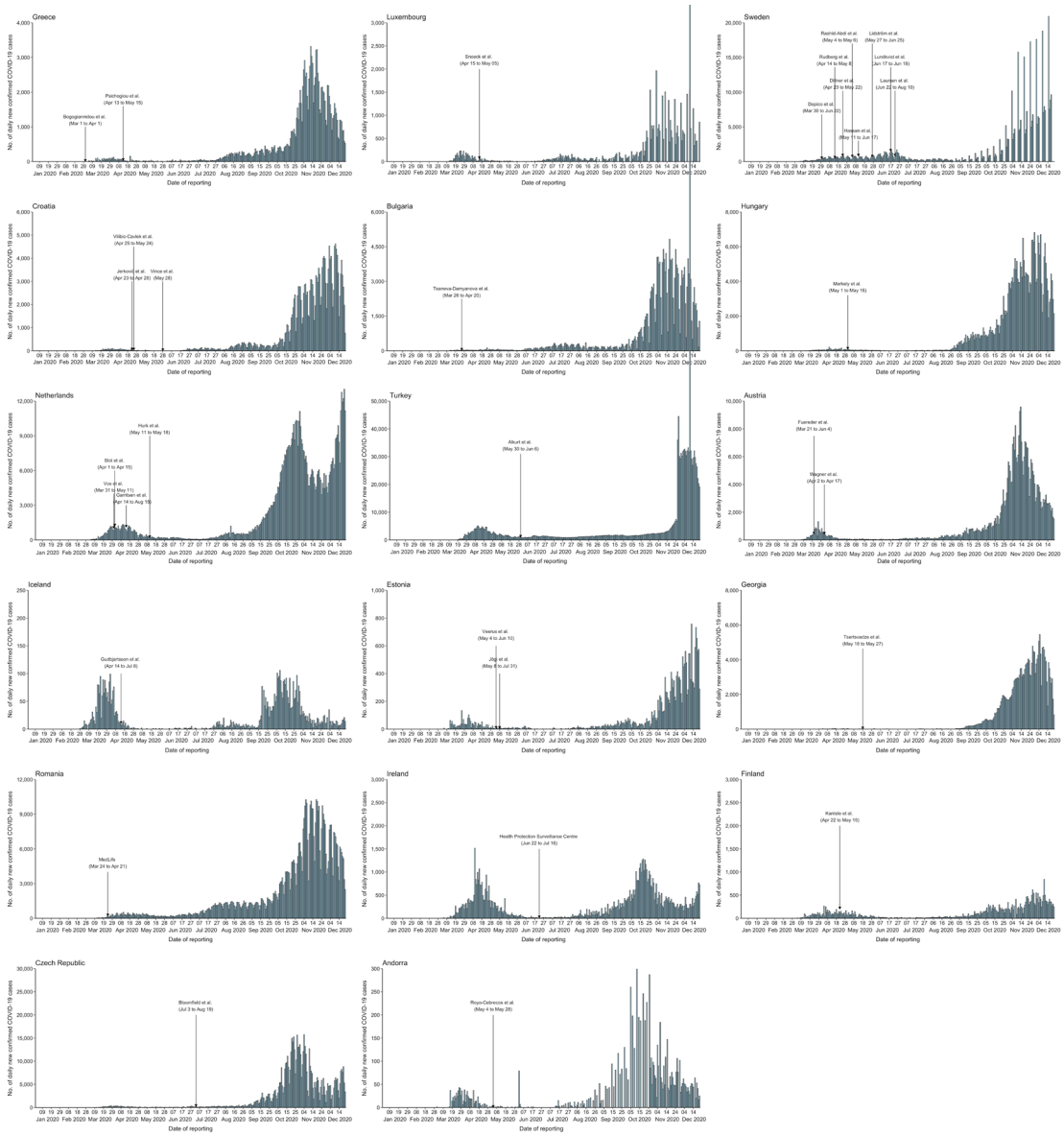

Greece
Psichogiou et al. (Apr 13 to May 15)
Bogogiannidou et al. (Mar 1 to Apr 1)
Luxembourg
Snoeck et al. (Apr 15 to May 05)
Sweden
Rashidi-Alavijeh et al. (May 4 to May 6)
Lidström et al. (May 27 to Jun 25)
Rudberg et al. (Apr 14 to May 8)
Lundkvist et al. (Jun 17 to Jun 18)
Dillner et al. (Apr 23 to May 22)
Lauren et al. (Jun 22 to Aug 10)
Dispoto et al. (Mar 30 to Jun 22)
Hedean et al. (May 11 to Jun 17)
Croatia
Vilibic-Cavlek et al. (Apr 25 to May 24)
Jerkovic et al. (Apr 23 to Apr 28)
Vince et al. (May 28)
Bulgaria
Tsanova-Zamyanova et al. (Mar 28 to Apr 20)
Hungary
Merkely et al. (May 1 to May 16)
Netherlands
Hunk et al. (May 11 to May 18)
Slot et al. (Apr 1 to Apr 15)
Vos et al. (Mar 31 to May 11)
Kamminga et al. (Apr 14 to Aug 15)
Turkey
Alkurt et al. (May 30 to Jun 6)
Austria
Fuereder et al. (Mar 21 to Jun 4)
Wagner et al. (Apr 2 to Apr 17)
Iceland
Gudbjartsson et al. (Apr 14 to Jul 8)
Estonia
Veerus et al. (May 4 to Jun 10)
Jõgi et al. (May 6 to Jul 31)
Georgia
Tsertsvadze et al. (May 16 to May 27)
Romania
MedLife (Mar 24 to Apr 21)
Ireland
Health Protection Surveillance Centre (Jun 22 to Jul 16)
Finland
Kanerva et al. (Apr 22 to May 15)
Czech Republic
Bloomfield et al. (Jul 3 to Aug 19)
Andorra
Royo-Cebrecos et al. (May 4 to May 28)
No. of daily new confirmed COVID-19 cases
Date of reporting

Figure S6. The starting sampling date for each serological study included in this meta-analysis in South-East Asia Region

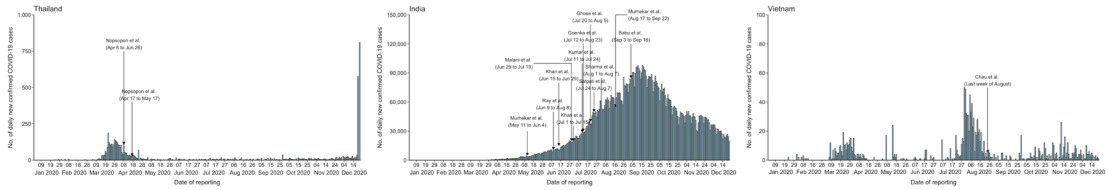


Figure S7. The starting sampling date for each serological study included in this meta-analysis in Western Pacific Region

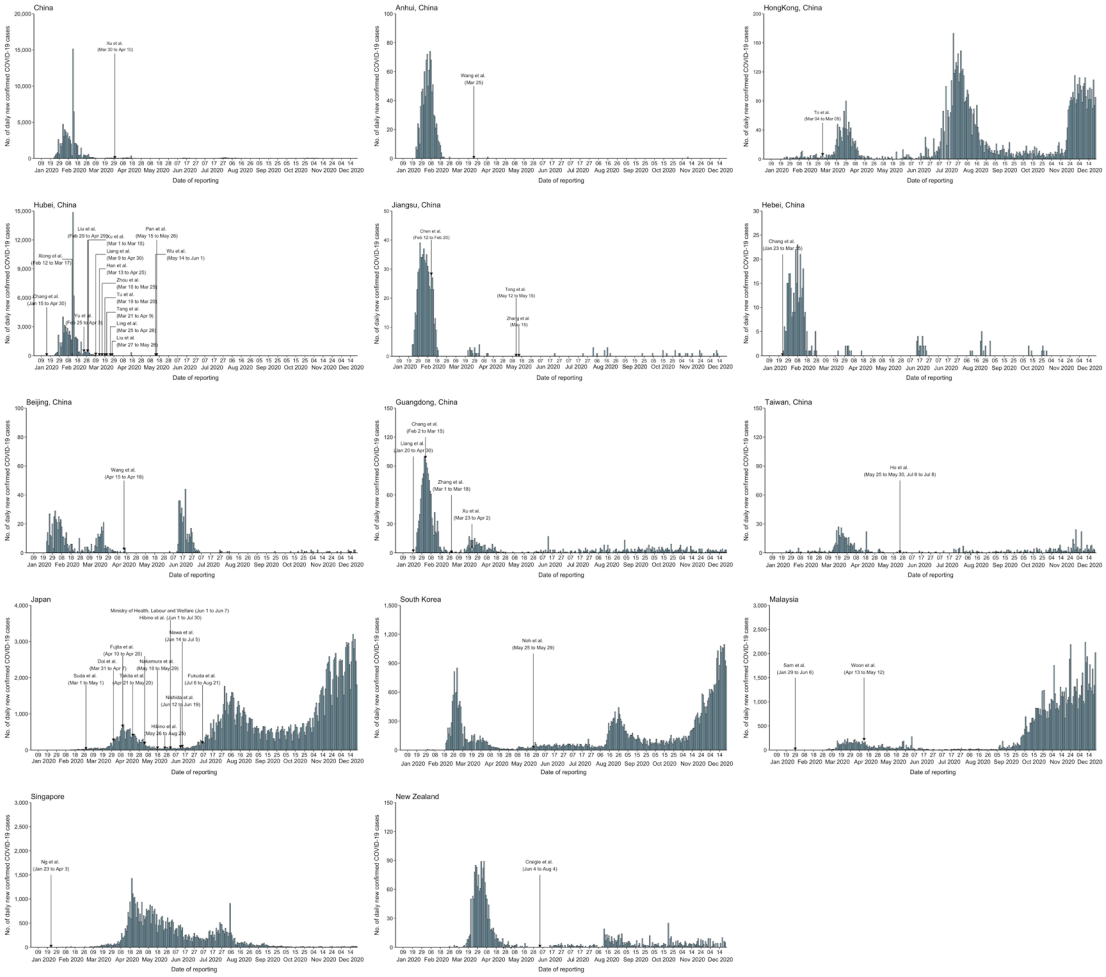


Figure S8. The proportion of reported cases that occurred in each area by 2 weeks before the middle time point of each population-based serosurvey

We calculate the proportion of reported COVID-19 that occurred 2 weeks before the middle time point of each population-based serosurvey cases among all cases up to Dec 22 that occurred in each area with available epidemiological data.

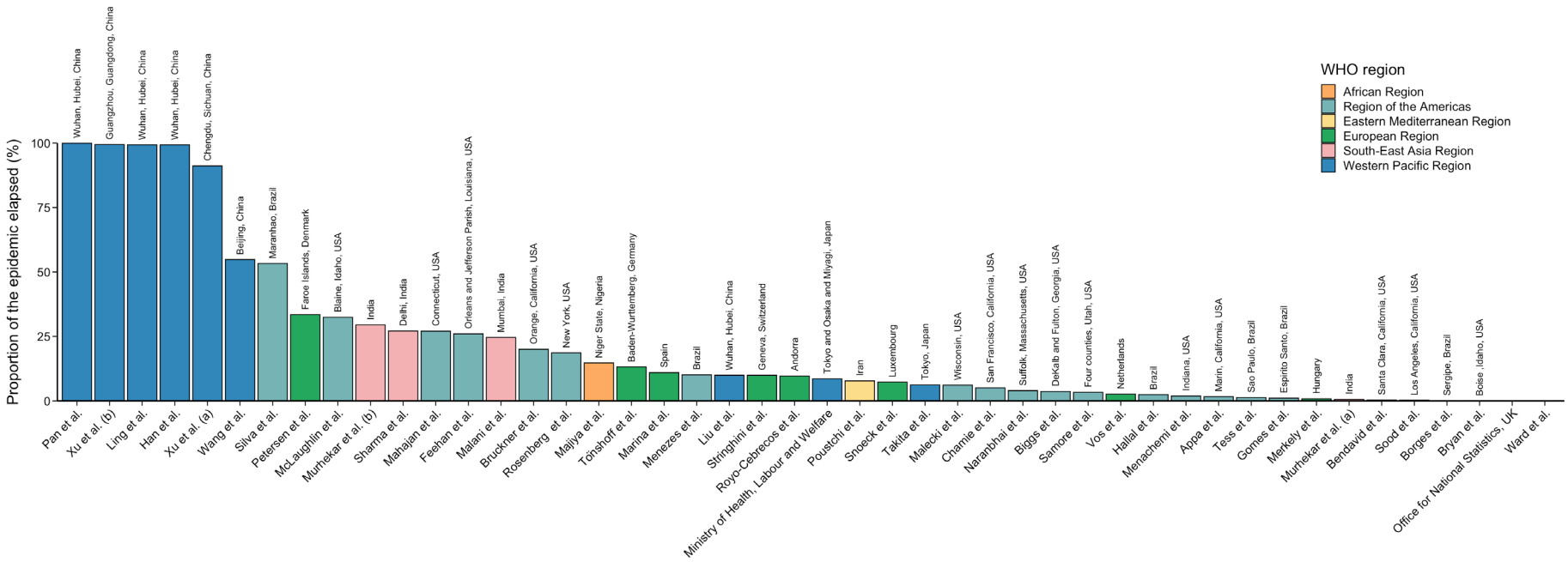

Proportion of the epidemic elapsed (%)
100
75
50
25
0
WHO region
African Region
Region of the Americas
Eastern Mediterranean Region
European Region
South-East Asia Region
Western Pacific Region
Wuhan, Hubei, China
Guangzhou, Guangdong, China
Wuhan, Hubei, China
Wuhan, Hubei, China
Chengdu, Sichuan, China
Beijing, China
Maranhao, Brazil
Faroe Islands, Denmark
Blaine, Idaho, USA
India
Delhi, India
Connecticut, USA
Orleans and Jefferson Parish, Louisiana, USA
Mumbai, India
Orange, California, USA
New York, USA
Niger State, Nigeria
Baden-Wurttemberg, Germany
Spain
Brazil
Wuhan, Hubei, China
Geneva, Switzerland
Andorra
Tokyo and Osaka and Miyagi, Japan
Iran
Luxembourg
Tokyo, Japan
Wisconsin, USA
San Francisco, California, USA
Suffolk, Massachusetts, USA
DeKalb and Fulton, Georgia, USA
Four counties, Utah, USA
Netherlands
Brazil
Indiana, USA
Marin, California, USA
Sao Paulo, Brazil
Espirito Santo, Brazil
Hungary
India
Santa Clara, California, USA
Los Angeles, California, USA
Sergipe, Brazil
Boise, Idaho, USA
Pan et al.
Xu et al. (b)
Ling et al.
Han et al.
Xu et al. (a)
Wang et al.
Silva et al.
Petersen et al.
McLaughlin et al.
Murhekar et al. (b)
Sharma et al.
Mahajan et al.
Feehan et al.
Malani et al.
Bruckner et al.
Rosenberg et al.
Majiya et al.
Tönshoff et al.
Marina et al.
Menezes et al.
Liu et al.
Stringhini et al.
Royo-Cebrecos et al.
Ministry of Health, Labour and Welfare
Poustchi et al.
Snoeck et al.
Takita et al.
Malecki et al.
Chamie et al.
Naranbhai et al.
Biggs et al.
Samore et al.
Vos et al.
Hallal et al.
Menachemi et al.
Appa et al.
Tess et al.
Gomes et al.
Merkely et al.
Murhekar et al. (a)
Bendavid et al.
Sood et al.
Borges et al.
Bryan et al.
Office for National Statistics, UK
Ward et al.

Figure S9. Geographical distribution of SARS-CoV-2 serosurveys in humans by study populations, December 2019-December 2020.

(A) Serological studies in the whole world. (B) Serological studies in Europe. The color of the map indicates the cumulative incidence of reported cases with darker colors representing higher values.

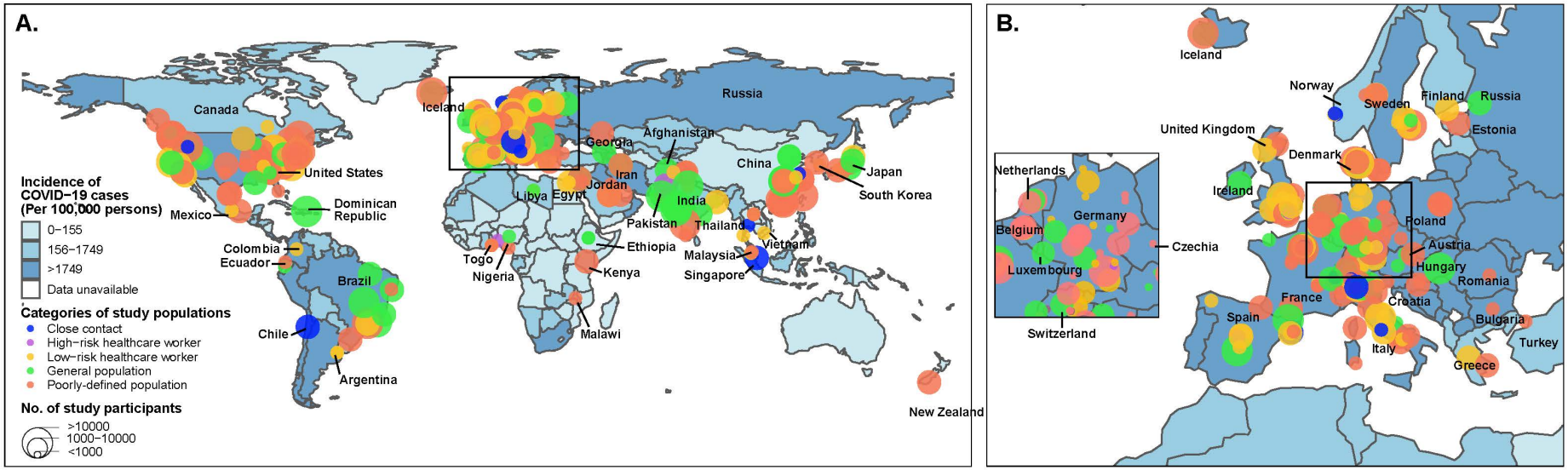


Figure S10. Estimated seroprevalence of antibodies to SARS-CoV-2 among grade A and grade B studies involving general populations by age group

(A) Seroprevalence of infections with SARS-CoV-2 by age groups. Seroprevalence of infections with SARS-CoV-2 by age groups in the Region of the Americas **(B)** and the European region **(C).**

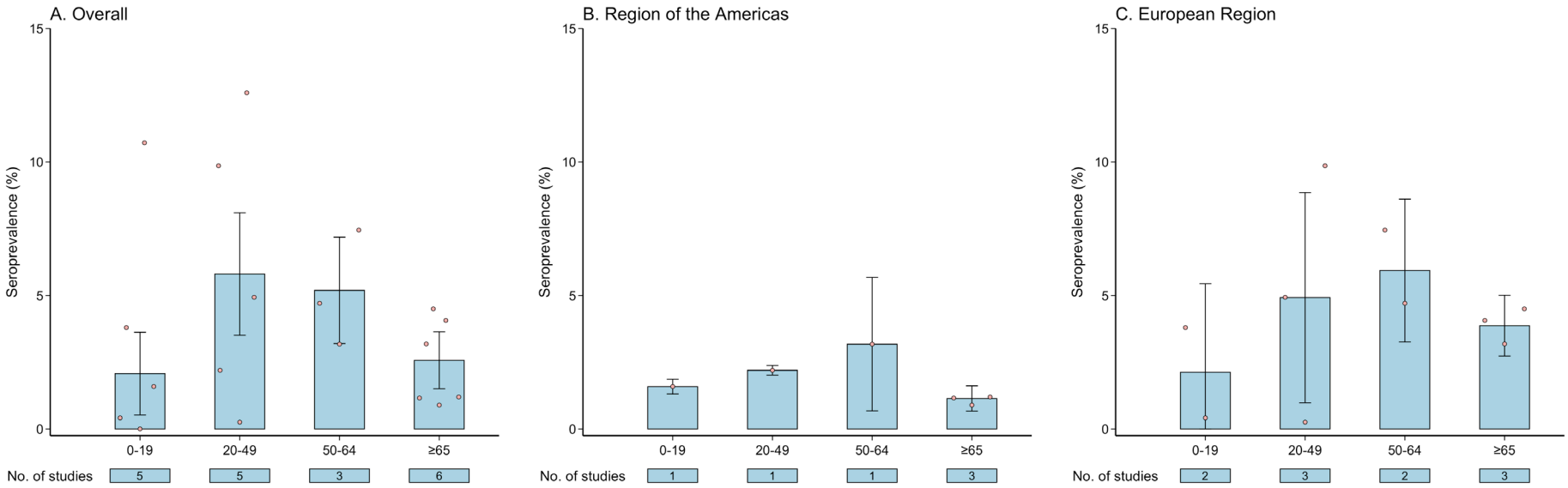


Figure S11. Estimated seroprevalence of antibodies to SARS-CoV-2 among grade A and grade B studies involving general populations by sex

(A) Seroprevalence of infections with SARS-CoV-2 by sexes. Seroprevalence of infections with SARS-CoV-2 by sexes in the African region **(B),** the Region of the Americas **(C),** the Eastern Mediterranean Region **(D),** the European region **(E),** the South-East Asia Region **(F),** and the Western Pacific region **(G).**

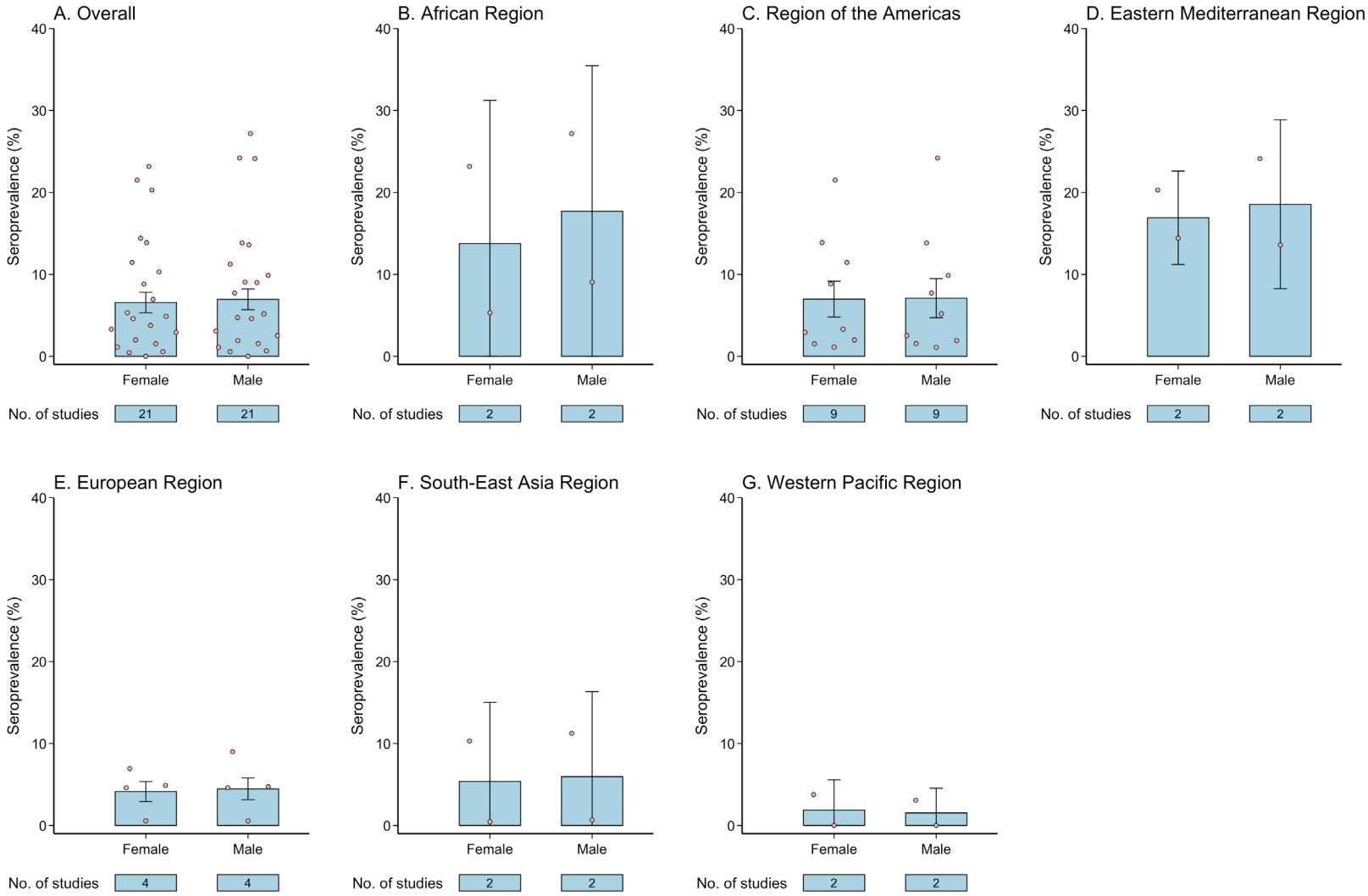

A. Overall
B. African Region
C. Region of the Americas
D. Eastern Mediterranean Region
E. European Region
F. South-East Asia Region
G. Western Pacific Region
Seroprevalence (%)
0
10
20
30
40
Female
Male
No. of studies
21
21
2
2
9
9
2
2
4
4
2
2
2
2

Figure S12. Estimated seroprevalence of antibodies to SARS-CoV-2 among grade A and grade B studies involving general populations by race

(A) Seroprevalence of infections with SARS-CoV-2 by races. Seroprevalence of infections with SARS-CoV-2 by races in the Region of the Americas **(B)** and the European region **(C).**

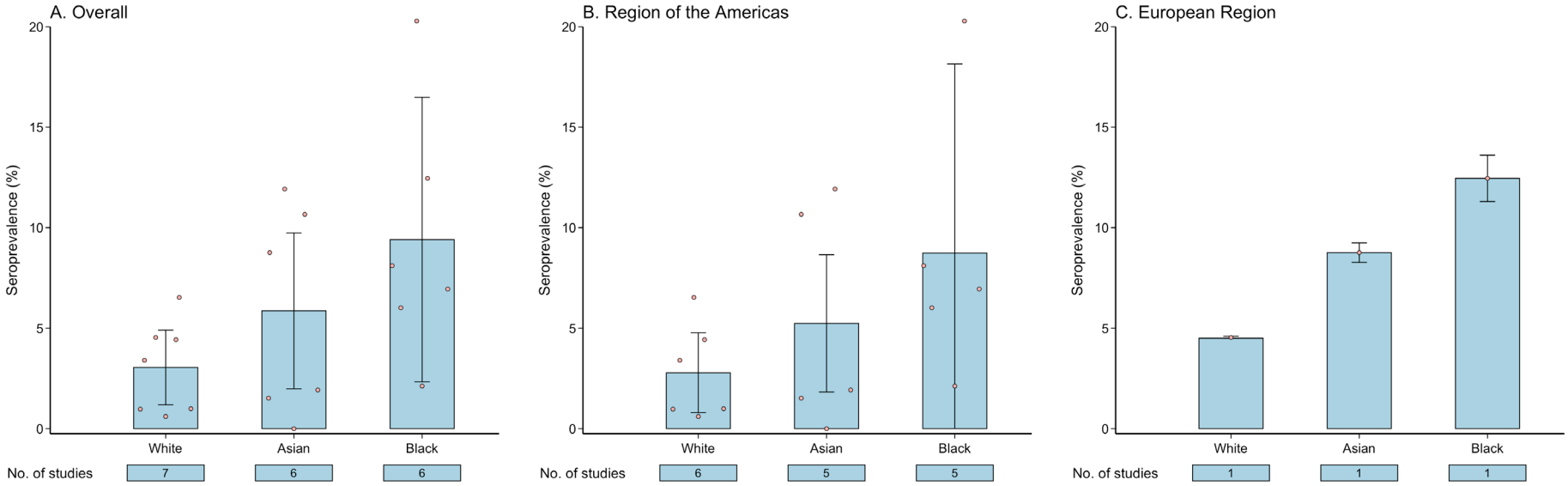


Figure S13. Regression analysis between seroprevalence and local cumulative incidence among grade A and grade B studies involving general populations

The shaded region represents the 95% confidence level for the predicted value.

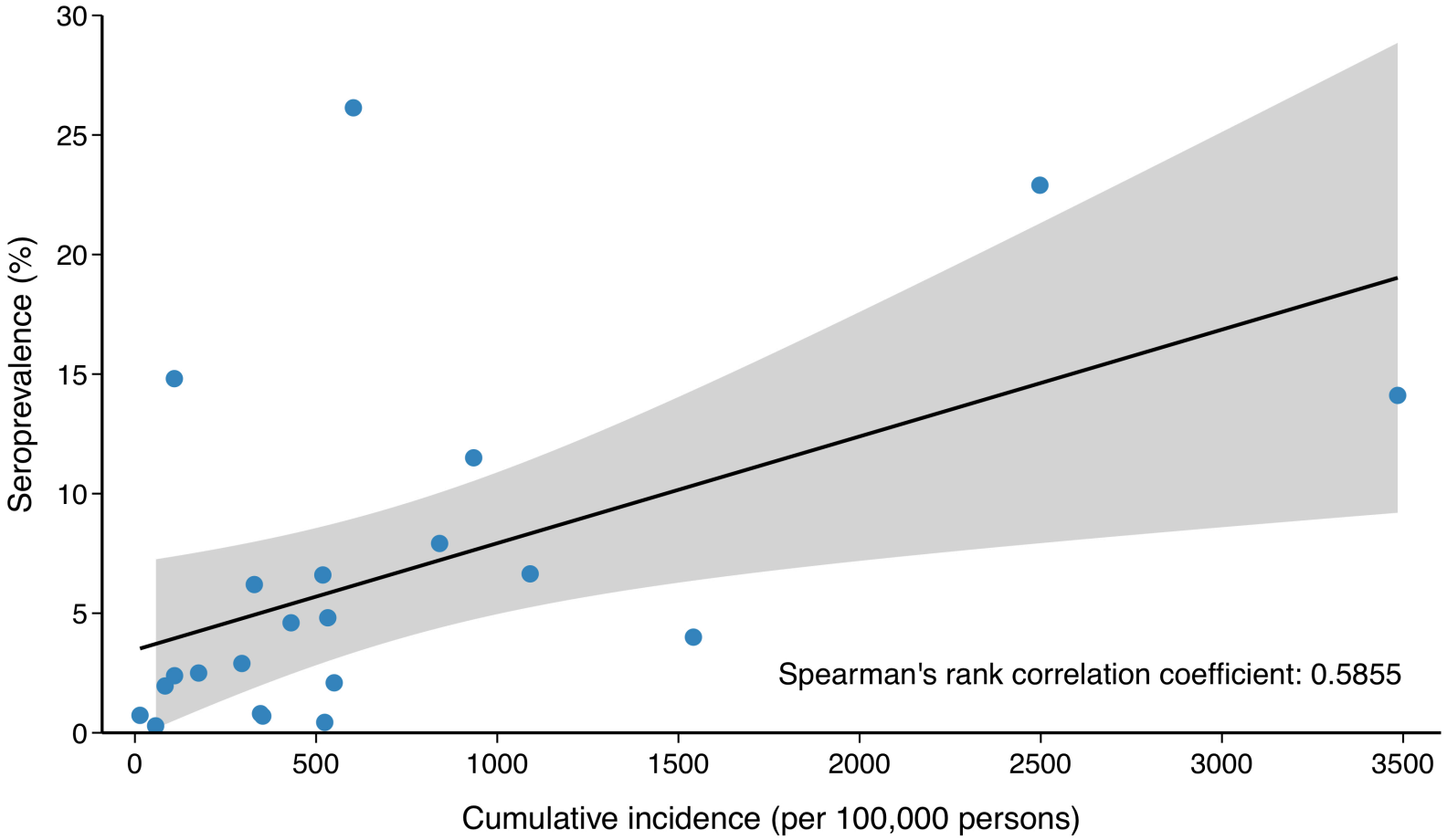
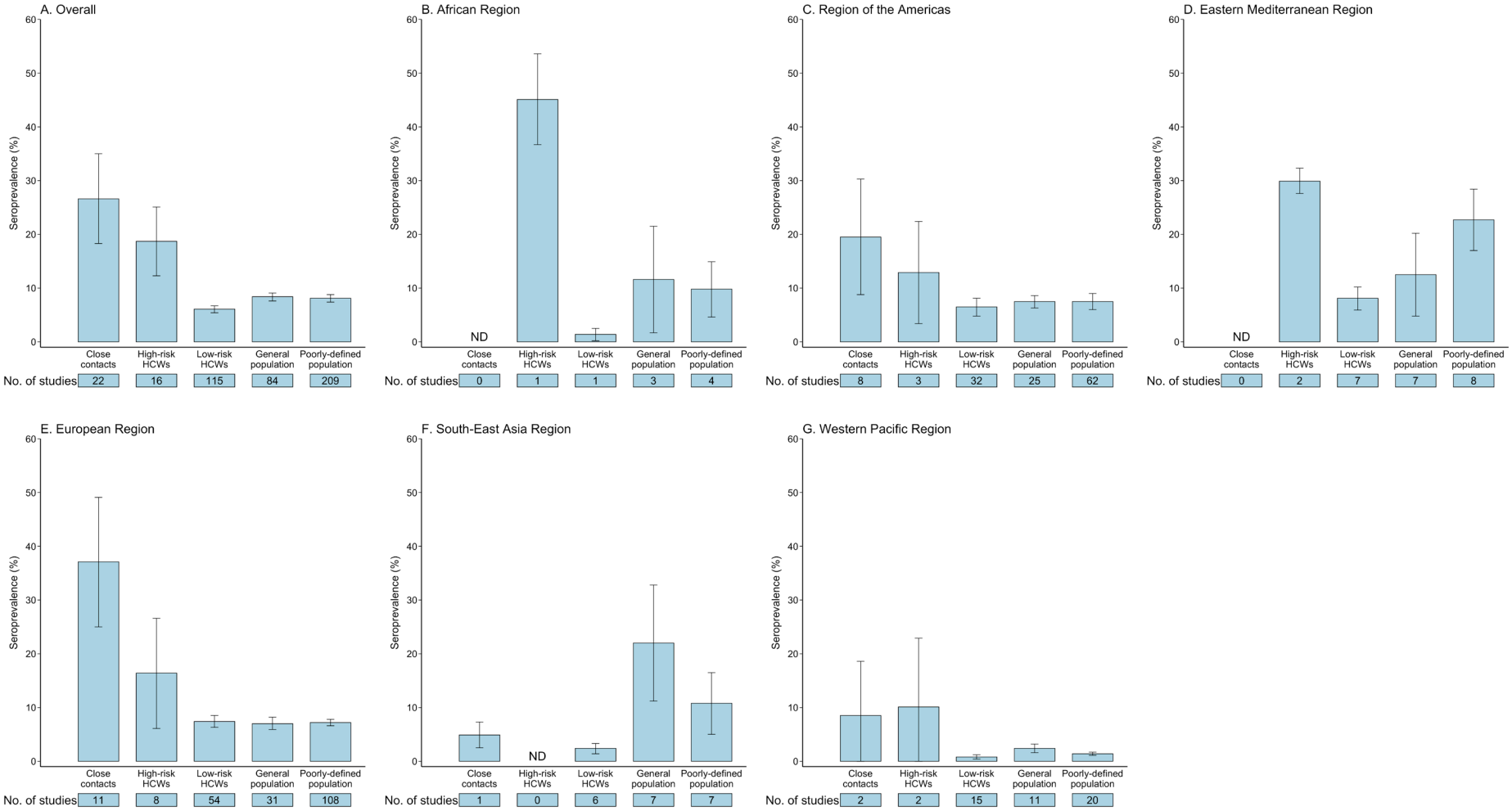

Seroprevalence (%)
30
25
20
15
10
5
0
0
500
1000
1500
2000
2500
3000
3500
Cumulative incidence (per 100,000 persons)
Spearman's rank correlation coefficient: 0.5855

Figure S14. Estimated seroprevalence by WHO regions and study populations among all 404 studies


A. Overall
B. African Region
C. Region of the Americas
D. Eastern Mediterranean Region
E. European Region
F. South-East Asia Region
G. Western Pacific Region
Seroprevalence (%)
0
10
20
30
40
50
60
ND
Close contacts
High-risk HCWs
Low-risk HCWs
General population
Poorly-defined population
No. of studies
22
16
115
84
209
0
1
1
3
4
8
3
32
25
62
2
7
7
8
11
8
54
31
108
1
0
6
7
7
2
2
15
11
20

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