Seroprevalence of SARS-CoV-2 antibodies in Africa: A systematic review and meta-analysis

Table S1: PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	3-4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5-6
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Table S2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	6-7
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	6-7
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	6-7
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	6
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	7
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	7
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	7
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	7

Section and Topic	Item #	Checklist item	Location where item is reported
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	7
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	7-8
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	NA
Study characteristics	17	Cite each included study and present its characteristics.	10-11
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table S3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	12, 14-16
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	NA
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	12, 14-16
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	15-16
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	19
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	NA
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	19-21
	23b	Discuss any limitations of the evidence included in the review.	21
	23c	Discuss any limitations of the review processes used.	NA
	23d	Discuss implications of the results for practice, policy, and future research.	32
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	5
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	5
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	NA
Competing interests	26	Declare any competing interests of review authors.	29
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	30

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Table S2: **Detailed Search Strategy**

Databases	Search Strategy
PubMed	((((((((((((Prevalence[Title/Abstract])) OR (Seroprevalence[Title/Abstract])) OR (Seroepidemiology[Title/Abstract])) OR (Proportion[Title/Abstract])) OR (Serosurvey[Title/Abstract])) OR (surveillance[Title/Abstract])) OR (Anti[Title/Abstract])) OR (Antibody[Title/Abstract])) OR (antibodies[Title/Abstract])) OR (IgG[Title/Abstract])) OR (IgM[Title/Abstract])) OR (IgA[Title/Abstract])) AND (((((((SARS[Title/Abstract]) OR (SARS-CoV-2[Title/Abstract])) OR (SARS-CoV2[Title/Abstract])) OR (COVID-19[Title/Abstract])) OR (COVID19[Title/Abstract])) OR (coronavirus[Title/Abstract])) OR (nCoV[Title/Abstract]))) AND ((((((((((((

Science	TI/AB=(Algeria OR Egypt OR Libya OR Morocco OR “South Sudan” OR Sudan OR Tunisia OR Burundi OR Comoros OR Djibouti OR Eritrea OR Ethiopia OR Kenya OR Madagascar OR Malawi OR Mauritius OR Mozambique OR Rwanda OR Seychelles OR Somalia OR Tanzania OR Uganda OR Zambia OR Zimbabwe OR Benin OR “Burkina Faso” OR “Cape Verde” OR “Cote d'Ivoire” OR “Ivory Coast” OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Liberia OR Mali OR Mauritania OR Niger OR Nigeria OR Senegal OR “Sierra Leone” OR Togo OR Angola OR Cameroon OR “Central African Republic” OR Chad OR Congo OR “Equatorial Guinea” OR Gabon OR “Sao Tome” OR Botswana OR Lesotho OR Namibia OR “South Africa” OR Swaziland)
Google Scholar	SARS OR COVID OR coronavirus OR nCoV) (Prevalence OR Seroprevalence OR Seroepidemiology OR Surveillance OR anti OR Antibody OR antibodies OR IgG OR IgM OR IgA) (Algeria OR Egypt OR Libya OR Morocco OR “South Sudan” OR Sudan OR Tunisia OR Burundi OR Comoros OR Djibouti OR Eritrea OR Ethiopia OR Kenya OR Madagascar OR Malawi OR Mauritius OR Mozambique OR Rwanda OR Seychelles OR Somalia OR Tanzania OR Uganda OR Zambia OR Zimbabwe OR Benin OR “Burkina Faso” OR “Cape Verde” OR “Cote d'Ivoire” OR “Ivory Coast” OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Liberia OR Mali OR Mauritania OR Niger OR Nigeria OR Senegal OR “Sierra Leone” OR Togo OR Angola OR Cameroon OR “Central African Republic” OR Chad OR Congo OR “Equatorial Guinea” OR Gabon OR “Sao Tome” OR Botswana OR Lesotho OR Namibia OR “South Africa” OR Swaziland)

Table S3: Quality assessment of the included studies.

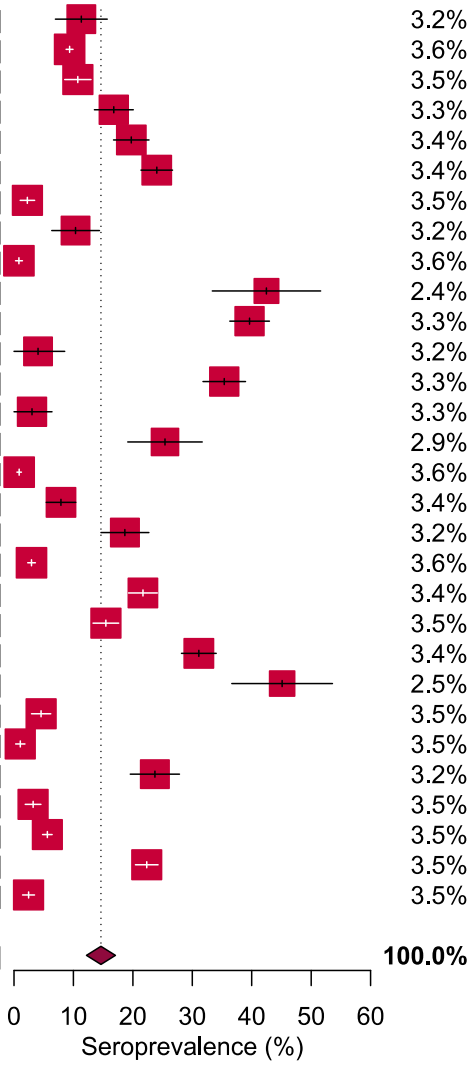
No.	Study ID	Questions assessing included studies									Yes (%)
		1	2	3	4	5	6	7	8	9	
1	Abdella 2021	Y	Y	Y	Y	N	Y	Y	N	Y	77.8
2	Abdelmoniem 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
3	Adetifa 2021	Y	Y	Y	Y	N	Y	U	Y	Y	77.8
4	Assefa 2021	Y	Y	Y	Y	N	Y	U	N	Y	66.7
5	Batchi-Bouyou 2021	Y	U	N	Y	Y	Y	Y	Y	Y	77.8
6	Chibwana 2020	Y	Y	Y	Y	N	Y	Y	N	U	66.7
7	Etyang 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
8	Fai 2021	U	Y	N	Y	Y	Y	Y	Y	U	66.7
9	Fwoloshi 2021	Y	Y	U	Y	N	Y	Y	Y	U	66.7
10	George 2021	Y	Y	Y	N	Y	Y	N	N	Y	66.7
11	Goldblatt 2021	Y	Y	U	N	N	Y	Y	Y	U	55.6
12	Halatoko 2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
13	Kagucia 2021	Y	Y	U	Y	N	Y	Y	Y	U	66.7
14	Kammon 2020	Y	U	N	Y	Y	Y	N	N	U	44.5
15	Kassem 2020	Y	U	Y	Y	Y	Y	Y	Y	Y	88.9
16	Katchunga 2021	Y	U	N	Y	Y	Y	Y	Y	U	66.7
17	Kempen 2020	Y	N	N	N	N	Y	Y	Y	U	44.5
18	Milleliri 2021	Y	U	Y	Y	N	Y	Y	Y	U	66.7
19	Mostafa 2021	Y	U	Y	N	Y	Y	Y	Y	U	66.7
20	Mukhtar 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
21	Mukwege 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
22	Mulenga 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
23	Nega 2020	Y	U	N	Y	N	Y	Y	N	N	44.5
24	Ngere 2021	Y	Y	Y	Y	N	Y	Y	N	Y	77.8
25	Nkuba 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
26	Nwosu 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
27	Olayanju 2021	Y	U	N	N	N	Y	Y	Y	U	44.5
28	Quashie 2021	Y	U	U	N	N	Y	Y	Y	U	44.5
29	Rusakaniko 2021	Y	Y	N	Y	Y	Y	Y	Y	U	77.8
30	Sebastião 2021	Y	N	Y	Y	Y	Y	Y	Y	U	77.8
31	Shaw 2021	Y	U	N	Y	N	Y	Y	Y	U	55.6
32	Shaweno 2021	Y	Y	N	Y	N	Y	Y	Y	U	66.7
33	Uyoga 2021	Y	U	Y	Y	N	Y	Y	Y	Y	77.8
34	Wiens 2021	Y	Y	Y	Y	N	Y	Y	Y	Y	88.9
35	Zarmouh 2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	100

1. Was the sample frame appropriate to address the target population? 2. Were study participants sampled in an appropriate way? 3. Was the sample size adequate? 4. Were the study subjects and the setting described in detail? 5. Was the data analysis conducted with sufficient coverage of the identified sample? 6. Were valid methods used for the identification of the condition? 7. Was the condition measured in a standard, reliable way for all participants? 8. Was there appropriate statistical analysis? 9. Was the response rate adequate, and if not, was the low response rate managed appropriately? Y=Yes; N=No; U=Unclear or NA Not applicable

A

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Overall IgG					
Abdelmoniem 2021	23	203	11.3	[7.0; 15.7]	3.2%
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	3.6%
Batchi-Bouyou 2021	81	754	10.7	[8.5; 13.0]	3.5%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	3.3%
Etyang 2021	135	684	19.7	[16.8; 22.7]	3.4%
Fai 2021	240	999	24.0	[21.4; 26.7]	3.4%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	3.5%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	3.2%
Halatoko 2020	8	955	0.8	[0.3; 1.4]	3.6%
Ifeorah 2021	48	113	42.5	[33.4; 51.6]	2.4%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	3.3%
Kassem 2020	3	74	4.1	[0.0; 8.5]	3.2%
Katchunga 2021	242	684	35.4	[31.8; 39.0]	3.3%
Kempen 2020	3	99	3.0	[0.0; 6.4]	3.3%
Majiya 2020	47	185	25.4	[19.1; 31.7]	2.9%
Mostafa 2021	20	2282	0.9	[0.5; 1.3]	3.6%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	3.4%
Mukwege 2021	67	359	18.7	[14.6; 22.7]	3.2%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	3.6%
Musa 2021	241	1111	21.7	[19.3; 24.1]	3.4%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	3.5%
Nwosu 2021	302	971	31.1	[28.2; 34.0]	3.4%
Olayanju 2021	60	133	45.1	[36.7; 53.6]	2.5%
Rusakaniko 2021	29	635	4.6	[2.9; 6.2]	3.5%
Sebastião 2021	7	660	1.1	[0.3; 1.8]	3.5%
Shaw 2021	96	405	23.7	[19.6; 27.8]	3.2%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	3.5%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	3.5%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	3.5%
Zarmouh 2021	22	897	2.5	[1.4; 3.5]	3.5%
Random effects model		**34113**	**14.6**	**[12.2; 17.1]**	**100.0%**

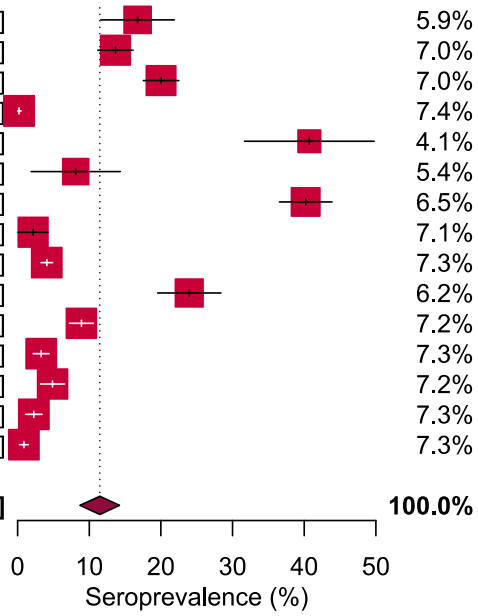
Heterogeneity: I^2 = 99%, τ^2 = 0.0043, χ^2_{29} = 3321.89 (p = 0)



B

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Overall IgM					
Abdelmoniem 2021	34	203	16.7	[11.6; 21.9]	5.9%
Batchi-Bouyou 2021	103	754	13.7	[11.2; 16.1]	7.0%
Fai 2021	200	999	20.0	[17.5; 22.5]	7.0%
Halatoko 2020	2	955	0.2	[0.0; 0.5]	7.4%
Ifeorah 2021	46	113	40.7	[31.6; 49.8]	4.1%
Kassem 2020	6	74	8.1	[1.9; 14.3]	5.4%
Katchunga 2021	275	684	40.2	[36.5; 43.9]	6.5%
Majiya 2020	4	185	2.2	[0.1; 4.3]	7.1%
Mostafa 2021	93	2282	4.1	[3.3; 4.9]	7.3%
Mukwege 2021	86	359	24.0	[19.5; 28.4]	6.2%
Musa 2021	99	1111	8.9	[7.2; 10.6]	7.2%
Nwosu 2021	32	971	3.3	[2.2; 4.4]	7.3%
Rusakaniko 2021	31	635	4.9	[3.2; 6.6]	7.2%
Sebastião 2021	15	660	2.3	[1.1; 3.4]	7.3%
Zarmouh 2021	8	897	0.9	[0.3; 1.5]	7.3%
Random effects model		**10882**	**11.5**	**[8.7; 14.2]**	**100.0%**

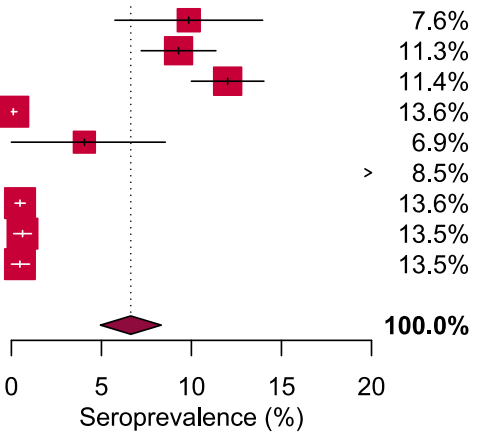
Heterogeneity: I^2 = 99%, τ^2 = 0.0027, χ^2_{14} = 1163.54 (p < 0.01)



C

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
IgG and IgM					
Abdelmoniem 2021	20	203	9.9	[5.8; 14.0]	7.6%
Batchi-Bouyou 2021	70	754	9.3	[7.2; 11.4]	11.3%
Fai 2021	120	999	12.0	[10.0; 14.0]	11.4%
Halatoko 2020	1	955	0.1	[0.0; 0.3]	13.6%
Kassem 2020	3	74	4.1	[0.0; 8.5]	6.9%
Katchunga 2021	238	684	34.8	[31.2; 38.4]	8.5%
Mostafa 2021	11	2282	0.5	[0.2; 0.8]	13.6%
Nwosu 2021	6	971	0.6	[0.1; 1.1]	13.5%
Rusakaniko 2021	3	635	0.5	[0.0; 1.0]	13.5%
Random effects model		**7557**	**6.6**	**[4.9; 8.3]**	**100.0%**

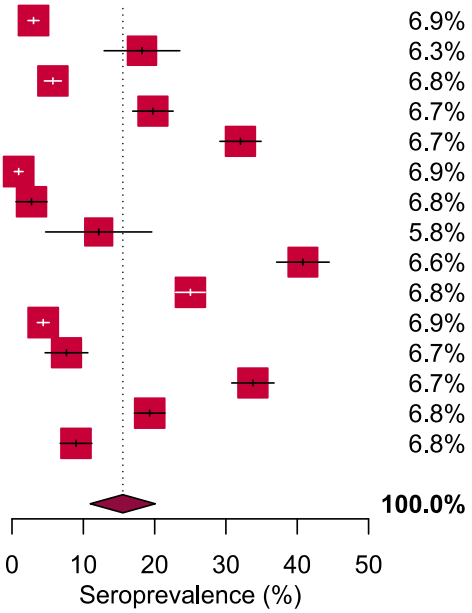
Heterogeneity: I^2 = 99%, τ^2 = 0.0005, χ^2_8 = 585.76 (p < 0.01)



D

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Rapid diagnostic test					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	6.9%
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	6.3%
Assefa 2021	83	1447	5.7	[4.5; 6.9]	6.8%
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	6.7%
Fai 2021	320	999	32.0	[29.1; 34.9]	6.7%
Halatoko 2020	9	955	0.9	[0.3; 1.6]	6.9%
Kammon 2020	6	219	2.7	[0.6; 4.9]	6.8%
Kassem 2020	9	74	12.2	[4.7; 19.6]	5.8%
Katchunga 2021	279	684	40.8	[37.1; 44.5]	6.6%
Milleliri 2021	422	1687	25.0	[22.9; 27.1]	6.8%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	6.9%
Nega 2020	23	301	7.6	[4.6; 10.6]	6.7%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	6.7%
Quashie 2021	252	1305	19.3	[17.2; 21.5]	6.8%
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	6.8%
Random effects model		**14372**	**15.5**	**[11.0; 20.1]**	**100.0%**

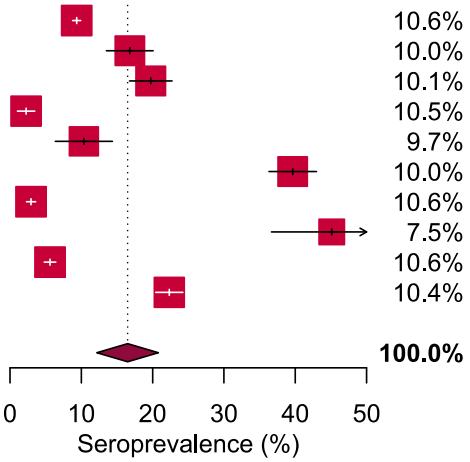
Heterogeneity: I^2 = 99%, τ^2 = 0.0079, χ^2_{14} = 1921.90 (p = 0)



E

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Enzyme-linked immunosorbent assay					
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	10.6%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	10.0%
Etyang 2021	135	684	19.7	[16.8; 22.7]	10.1%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	10.5%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	9.7%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	10.0%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	10.6%
Olayanju 2021	60	133	45.1	[36.7; 53.6]	7.5%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	10.6%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	10.4%
Random effects model		**20508**	**16.5**	**[12.2; 20.8]**	**100.0%**

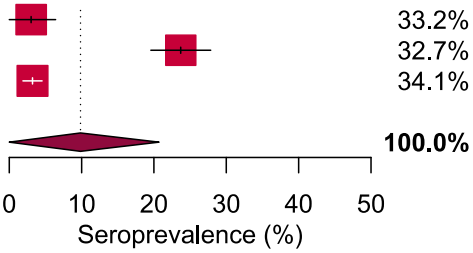
Heterogeneity: I^2 = 99%, τ^2 = 0.0046, χ^2_9 = 1090.15 (p < 0.01)



F

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Chemiluminescent microparticle immunoassay					
Kempen 2020	3	99	3.0	[0.0; 6.4]	33.2%
Shaw 2021	96	405	23.7	[19.6; 27.8]	32.7%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	34.1%
Random effects model		**1188**	**9.8**	**[0.0; 20.7]**	**100.0%**

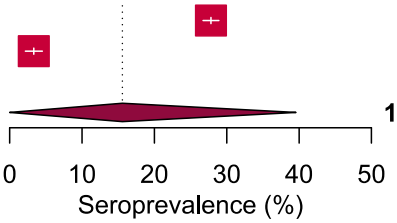
Heterogeneity: I^2 = 98%, τ^2 = 0.0089, χ^2_2 = 86.58 (p < 0.01)



G

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Clinical Laboratory Improvement Amendments					
George 2021	1802	6477	27.8	[26.7; 28.9]	50.0%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	50.0%
Random effects model		**7374**	**15.6**	**[0.0; 39.6]**	**100.0%**

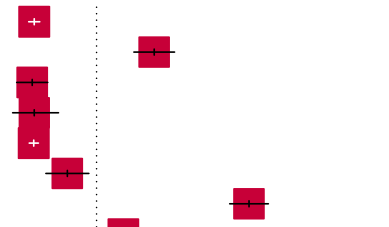
Heterogeneity: I^2 = 100%, τ^2 = 0.0299, χ^2_1 = 893.66 (p < 0.01)



H

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
General population					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	7.8%
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	7.6%
Kammon 2020	6	219	2.7	[0.6; 4.9]	7.7%
Kempen 2020	3	99	3.0	[0.0; 6.4]	7.5%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	7.8%
Nega 2020	23	301	7.6	[4.6; 10.6]	7.6%
Ngere 2021	384	1164	33.0	[30.3; 35.7]	7.6%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	7.7%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	7.6%
Sebastião 2021	20	660	3.0	[1.7; 4.3]	7.8%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	7.8%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	7.7%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	7.8%
Random effects model		**13229**	**11.7**	**[7.4; 16.0]**	**100.0%**

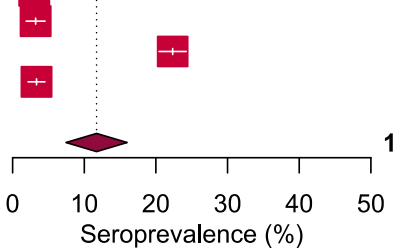
Heterogeneity: I^2 = 99%, τ^2 = 0.0060, χ^2_{12} = 1372.65 (p < 0.01)



I

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Healthcare workers					
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	8.8%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	9.4%
Etyang 2021	135	684	19.7	[16.8; 22.7]	9.5%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	9.8%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	9.2%
Kassem 2020	9	74	12.2	[4.7; 19.6]	8.0%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	9.8%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	9.6%
Mukwege 2021	148	359	41.2	[36.1; 46.3]	8.9%
Olayanju 2021	60	133	45.1	[36.7; 53.6]	7.6%
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	9.6%
Random effects model		**6122**	**16.3**	**[11.5; 21.2]**	**100.0%**

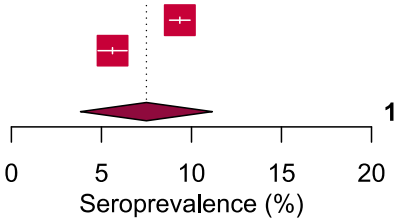
Heterogeneity: I^2 = 98%, τ^2 = 0.0063, χ^2_{10} = 474.06 (p < 0.01)



J

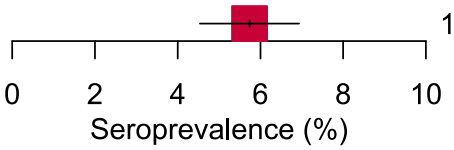
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Blood donors					
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	50.3%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	49.7%
Random effects model		**13020**	**7.5**	**[3.8; 11.2]**	**100.0%**

Heterogeneity: I^2 = 98%, τ^2 = 0.0007, χ^2_1 = 54.42 (p < 0.01)



K

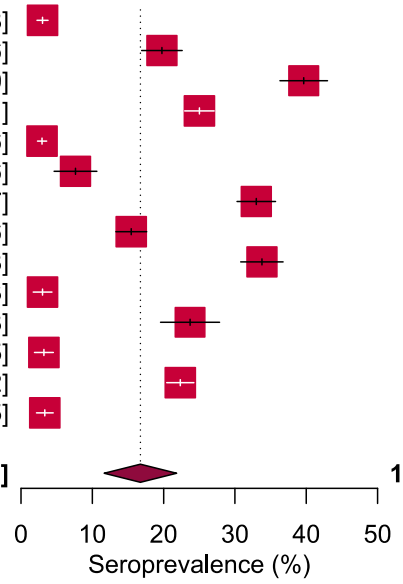
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Pregnant women					
Assefa 2021	83	1447	5.7	[4.5; 6.9]	100.0%



L

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Community					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	7.2%
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	7.1%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	7.0%
Milleliri 2021	422	1687	25.0	[22.9; 27.1]	7.2%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	7.2%
Nega 2020	23	301	7.6	[4.6; 10.6]	7.1%
Ngere 2021	384	1164	33.0	[30.3; 35.7]	7.1%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	7.2%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	7.1%
Sebastião 2021	20	660	3.0	[1.7; 4.3]	7.2%
Shaw 2021	96	405	23.7	[19.6; 27.8]	6.9%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	7.2%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	7.2%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	7.2%
Random effects model		**15833**	**16.7**	**[11.7; 21.8]**	**100.0%**

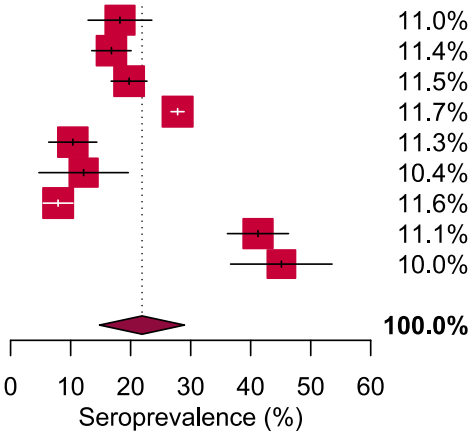
Heterogeneity: I^2 = 99%, τ^2 = 0.0093, χ^2_{13} = 2134.79 (p = 0)



M

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Hospital					
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	11.0%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	11.4%
Etyang 2021	135	684	19.7	[16.8; 22.7]	11.5%
George 2021	1802	6477	27.8	[26.7; 28.9]	11.7%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	11.3%
Kassem 2020	9	74	12.2	[4.7; 19.6]	10.4%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	11.6%
Mukwege 2021	148	359	41.2	[36.1; 46.3]	11.1%
Olayanju 2021	60	133	45.1	[36.7; 53.6]	10.0%
Random effects model		**9107**	**21.9**	**[14.8; 29.0]**	**100.0%**

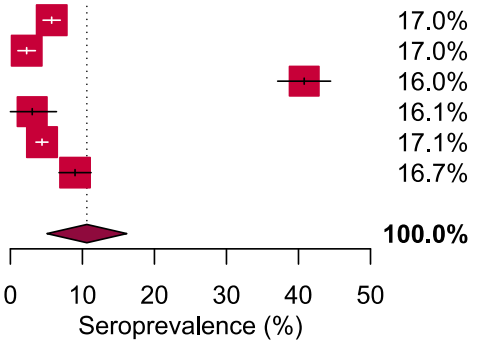
Heterogeneity: I^2 = 98%, τ^2 = 0.0111, χ^2_8 = 359.67 (p < 0.01)



N

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Healthcare facilities					
Assefa 2021	83	1447	5.7	[4.5; 6.9]	17.0%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	17.0%
Katchunga 2021	279	684	40.8	[37.1; 44.5]	16.0%
Kempen 2020	3	99	3.0	[0.0; 6.4]	16.1%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	17.1%
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	16.7%
Random effects model		**5722**	**10.6**	**[5.1; 16.1]**	**100.0%**

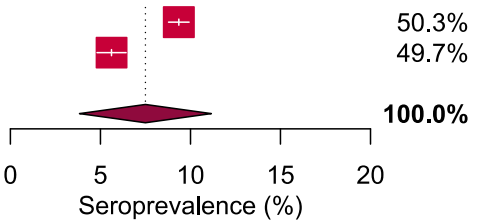
Heterogeneity: I^2 = 99%, τ^2 = 0.0046, χ^2_5 = 398.06 (p < 0.01)



O

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Blood transfusion centre					
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	50.3%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	49.7%
Random effects model		**13020**	**7.5**	**[3.8; 11.2]**	**100.0%**

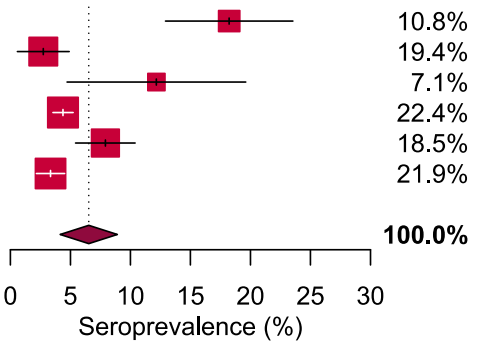
Heterogeneity: I^2 = 98%, τ^2 = 0.0007, χ^2_1 = 54.42 (p < 0.01)



P

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Northern Africa					
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	10.8%
Kammon 2020	6	219	2.7	[0.6; 4.9]	19.4%
Kassem 2020	9	74	12.2	[4.7; 19.6]	7.1%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	22.4%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	18.5%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	21.9%
Random effects model		**4130**	**6.5**	**[4.1; 8.9]**	**100.0%**

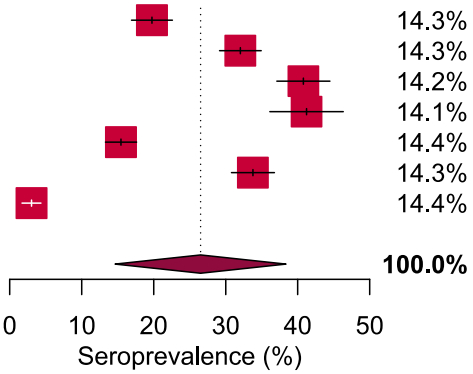
Heterogeneity: I^2 = 88%, τ^2 = 0.0006, χ^2_5 = 43.27 (p < 0.01)



Q

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Central Africa					
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	14.3%
Fai 2021	320	999	32.0	[29.1; 34.9]	14.3%
Katchunga 2021	279	684	40.8	[37.1; 44.5]	14.2%
Mukwege 2021	148	359	41.2	[36.1; 46.3]	14.1%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	14.4%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	14.3%
Sebastião 2021	20	660	3.0	[1.7; 4.3]	14.4%
Random effects model		**5507**	**26.5**	**[14.6; 38.4]**	**100.0%**

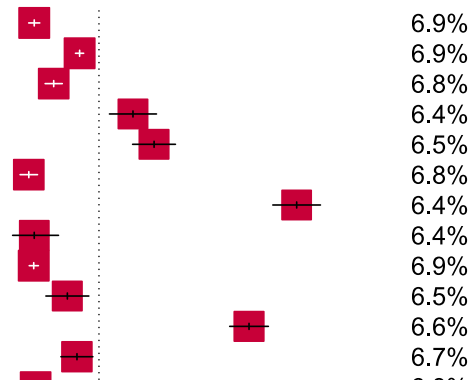
Heterogeneity: I^2 = 99%, τ^2 = 0.0254, χ^2_6 = 907.48 (p < 0.01)



R

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Eastern Africa					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	6.9%
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	6.9%
Assefa 2021	83	1447	5.7	[4.5; 6.9]	6.8%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	6.4%
Etyang 2021	135	684	19.7	[16.8; 22.7]	6.5%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	6.8%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	6.4%
Kempen 2020	3	99	3.0	[0.0; 6.4]	6.4%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	6.9%
Nega 2020	23	301	7.6	[4.6; 10.6]	6.5%
Ngere 2021	384	1164	33.0	[30.3; 35.7]	6.6%
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	6.7%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	6.8%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	6.8%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	6.7%
Random effects model		**26339**	**12.1**	**[8.8; 15.3]**	**100.0%**

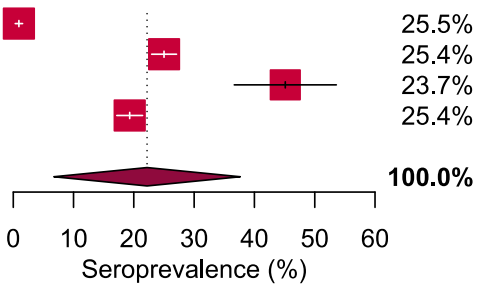
Heterogeneity: I^2 = 99%, τ^2 = 0.0039, χ^2_{14} = 1505.68 (p < 0.01)



S

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Western Africa					
Halatoko 2020	9	955	0.9	[0.3; 1.6]	25.5%
Milleliri 2021	422	1687	25.0	[22.9; 27.1]	25.4%
Olayanju 2021	60	133	45.1	[36.7; 53.6]	23.7%
Quashie 2021	252	1305	19.3	[17.2; 21.5]	25.4%
Random effects model		**4080**	**22.2**	**[6.7; 37.6]**	**100.0%**

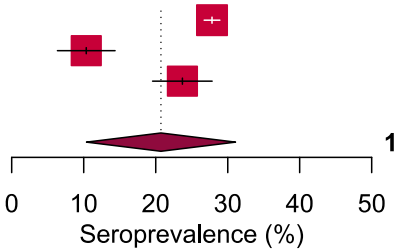
Heterogeneity: I^2 = 100%, τ^2 = 0.0243, χ^2_3 = 779.35 (p < 0.01)



T

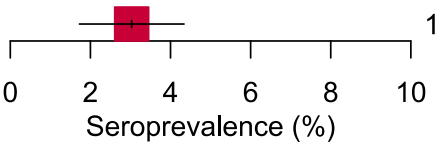
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Southern Africa					
George 2021	1802	6477	27.8	[26.7; 28.9]	34.4%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	32.8%
Shaw 2021	96	405	23.7	[19.6; 27.8]	32.7%
Random effects model		**7104**	**20.7**	**[10.4; 31.1]**	**100.0%**

Heterogeneity: I^2 = 97%, τ^2 = 0.0081, χ^2_2 = 69.64 (p < 0.01)



U

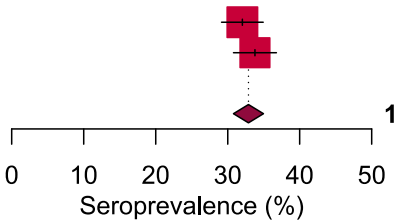
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Angola					
Sebastião 2021	20	660	3.0	[1.7; 4.3]	100.0%



V

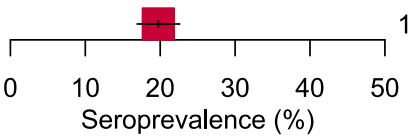
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Cameroon					
Fai 2021	320	999	32.0	[29.1; 34.9]	51.4%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	48.6%
Random effects model		**1970**	**32.9**	**[30.8; 35.0]**	**100.0%**

Heterogeneity: I^2 = 0%, τ^2 = 0, χ^2_1 = 0.68 (p = 0.41)



W

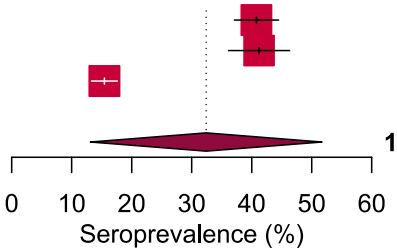
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Republic of the Congo					
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	100.0%



X

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Democratic Republic of the Congo					
Katchunga 2021	279	684	40.8	[37.1; 44.5]	33.4%
Mukwege 2021	148	359	41.2	[36.1; 46.3]	33.0%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	33.6%
Random effects model		**2123**	**32.4**	**[13.1; 51.7]**	**100.0%**

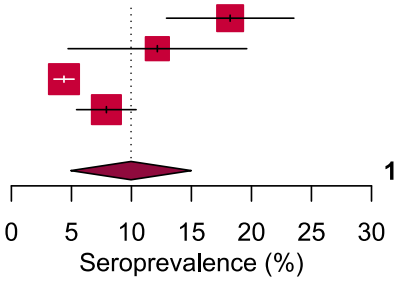
Heterogeneity: I^2 = 99%, τ^2 = 0.0287, χ^2_2 = 183.96 (p < 0.01)



Y

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Egypt					
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	22.8%
Kassem 2020	9	74	12.2	[4.7; 19.6]	18.3%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	30.4%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	28.5%
Random effects model		**3014**	**10.0**	**[5.0; 15.0]**	**100.0%**

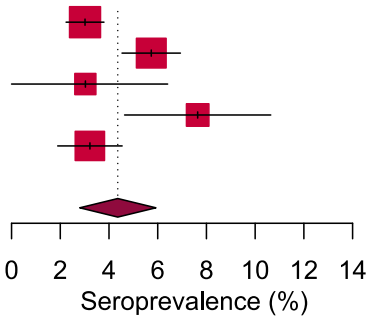
Heterogeneity: I^2 = 91%, τ^2 = 0.0021, χ^2_3 = 34.67 (p < 0.01)



Z

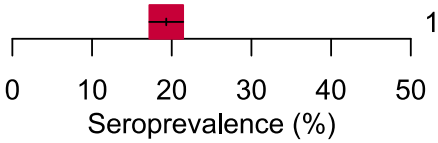
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Ethiopia					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	26.3%
Assefa 2021	83	1447	5.7	[4.5; 6.9]	24.2%
Kempen 2020	3	99	3.0	[0.0; 6.4]	12.2%
Nega 2020	23	301	7.6	[4.6; 10.6]	13.8%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	23.5%
Random effects model		**4387**	**4.4**	**[2.8; 5.9]**	**100.0%**

Heterogeneity: I^2 = 81%, τ^2 = 0.0002, χ^2_4 = 21.15 (p < 0.01)



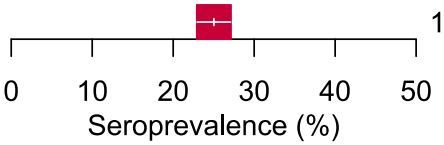
AA

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Ghana					
Quashie 2021	252	1305	19.3	[17.2; 21.5]	100.0%



AB

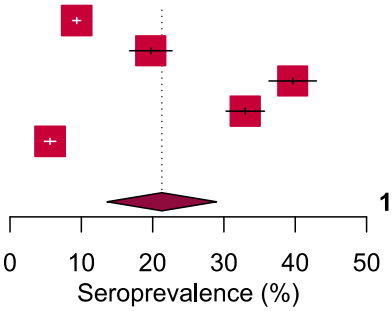
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Ivory Coast					
Milleliri 2021	422	1687	25.0	[22.9; 27.1]	100.0%



AC

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Kenya					
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	20.4%
Etyang 2021	135	684	19.7	[16.8; 22.7]	19.8%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	19.6%
Ngere 2021	384	1164	33.0	[30.3; 35.7]	19.9%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	20.3%
Random effects model		**15698**	**21.3**	**[13.6; 29.0]**	**100.0%**

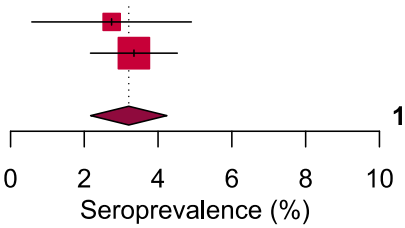
Heterogeneity: I^2 = 99%, τ^2 = 0.0075, χ^2_4 = 738.84 (p < 0.01)



AD

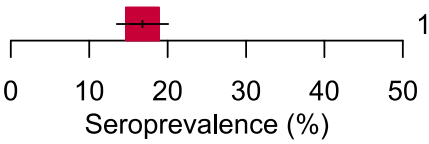
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Libya					
Kammon 2020	6	219	2.7	[0.6; 4.9]	22.9%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	77.1%
Random effects model		**1116**	**3.2**	**[2.2; 4.2]**	**100.0%**

Heterogeneity: I^2 = 0%, τ^2 = 0, χ^2_1 = 0.23 (p = 0.63)



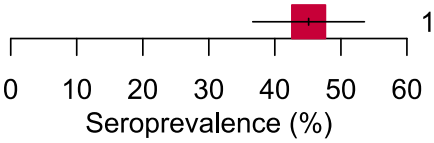
AE

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Malawi					
Chibwana 2020	84	500	16.8	[13.5; 20.1]	100.0%



AF

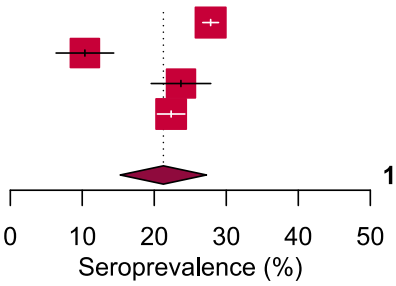
Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Nigeria					
Olayanju 2021	60	133	45.1	[36.7; 53.6]	100.0%



AG

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
South Africa					
George 2021	1802	6477	27.8	[26.7; 28.9]	26.5%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	23.9%
Shaw 2021	96	405	23.7	[19.6; 27.8]	23.7%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	26.0%
Random effects model		**8944**	**21.3**	**[15.3; 27.2]**	**100.0%**

Heterogeneity: I^2 = 96%, τ^2 = 0.0035, χ^2_3 = 83.51 (p < 0.01)

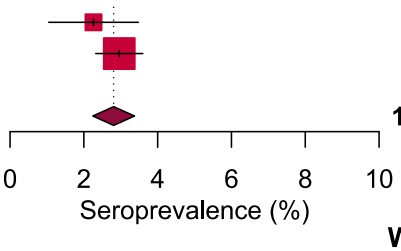


AH

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Togo					
Halatoko 2020	9	955	0.9	[0.3; 1.6]	100.0%

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Zambia					
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	21.6%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	78.4%
Random effects model		**3279**	**2.8**	**[2.2; 3.4]**	**100.0%**

Heterogeneity: I^2 = 0%, τ^2 = 0, χ^2_1 = 0.99 (p = 0.32)



Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Zimbabwe					
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	100.0%

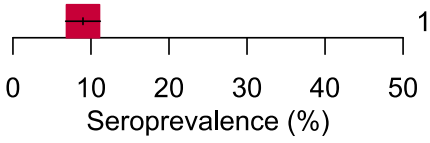


Figure S1. Subgroup analyses representing the seroprevalence of SARS-CoV-2 antibodies in Africa based on antibody isotypes (A-C), antibody tests (D-G), target population (H-K), settings (L-O), regions (P-T) and countries (U-AJ).

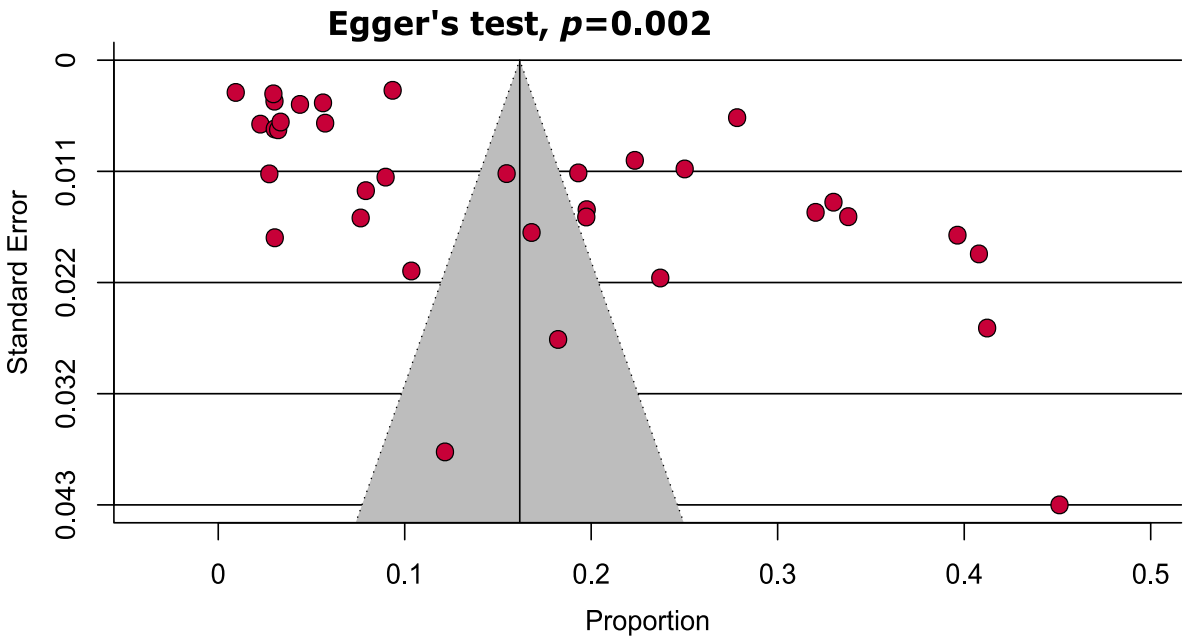


Figure S2. Funnel plot on overall seroprevalence of SARS-CoV-2 antibodies in Africa identified significant publication bias.

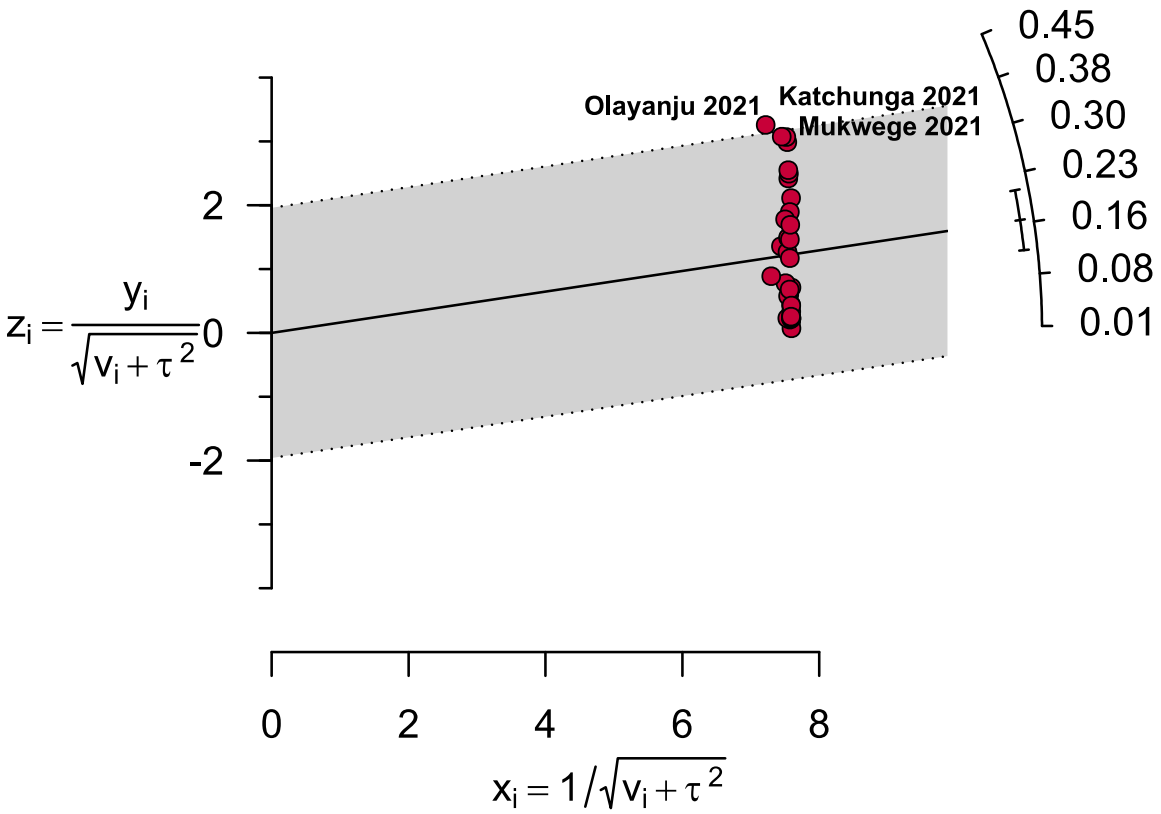
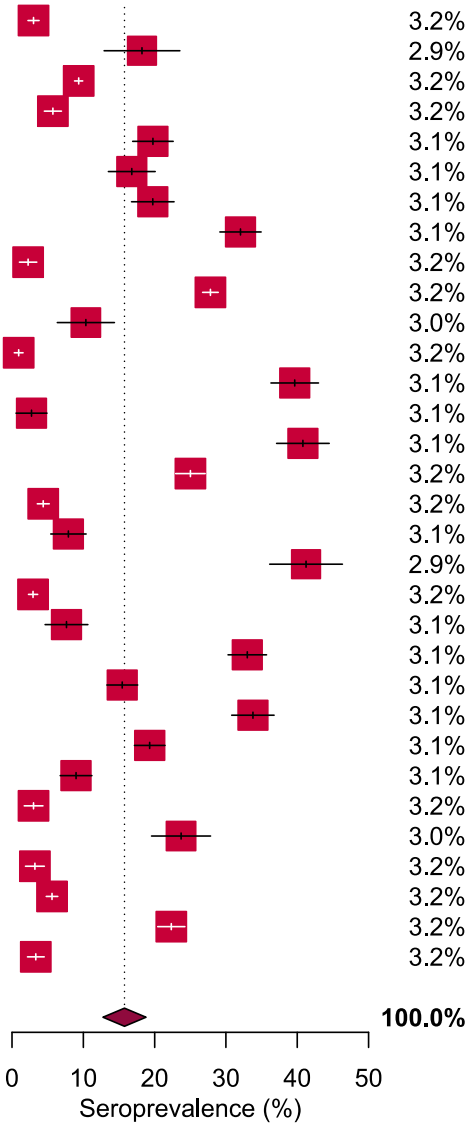


Figure S3. Galbraith plot on overall seroprevalence of SARS-CoV-2 antibodies in Africa identified three outlier studies.

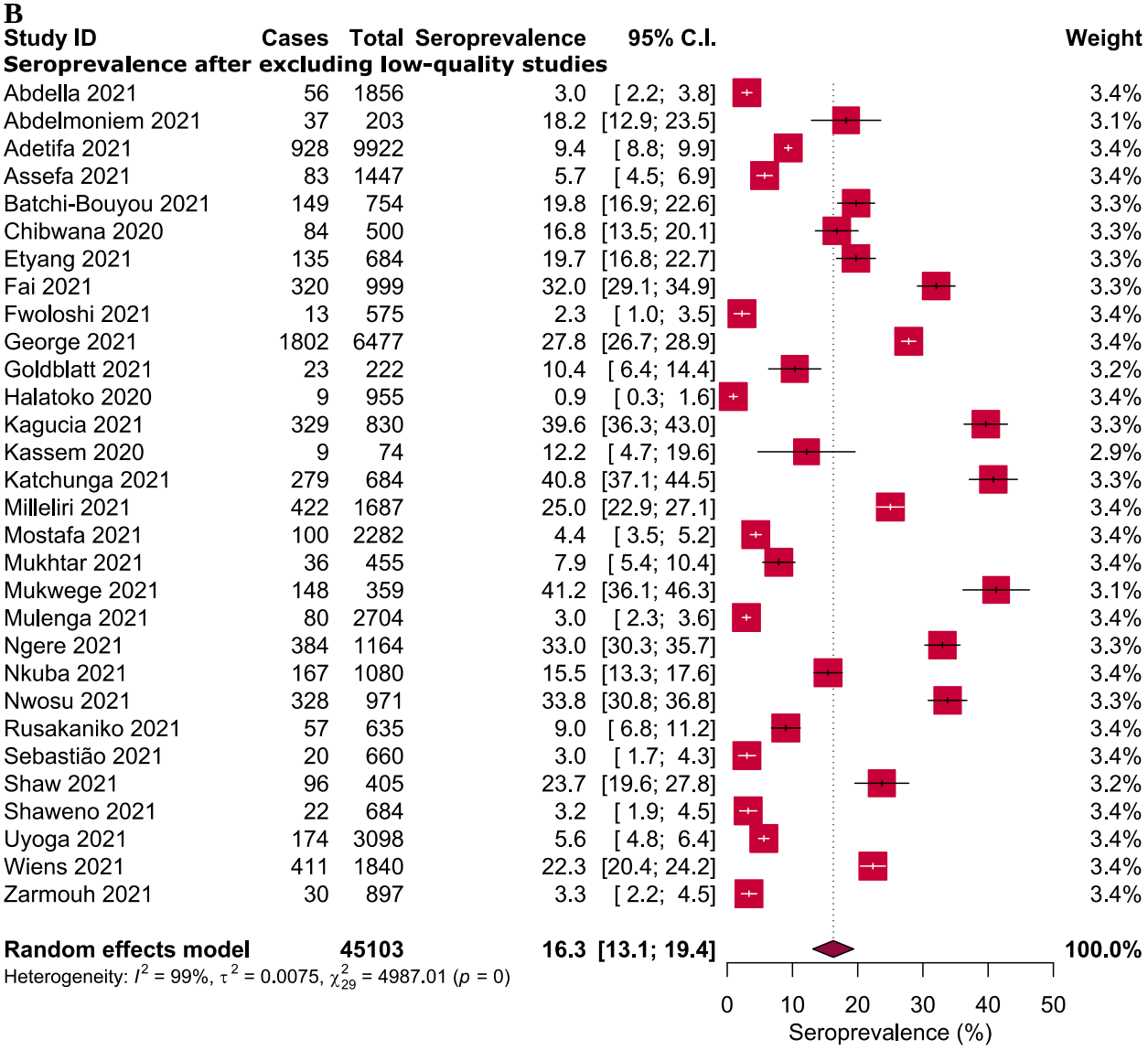
A

Study ID	Cases	Total	Seroprevalence	95% C.I.	Weight
Seroprevalence after excluding small studies					
Abdella 2021	56	1856	3.0	[2.2; 3.8]	3.2%
Abdelmoniem 2021	37	203	18.2	[12.9; 23.5]	2.9%
Adetifa 2021	928	9922	9.4	[8.8; 9.9]	3.2%
Assefa 2021	83	1447	5.7	[4.5; 6.9]	3.2%
Batchi-Bouyou 2021	149	754	19.8	[16.9; 22.6]	3.1%
Chibwana 2020	84	500	16.8	[13.5; 20.1]	3.1%
Etyang 2021	135	684	19.7	[16.8; 22.7]	3.1%
Fai 2021	320	999	32.0	[29.1; 34.9]	3.1%
Fwoloshi 2021	13	575	2.3	[1.0; 3.5]	3.2%
George 2021	1802	6477	27.8	[26.7; 28.9]	3.2%
Goldblatt 2021	23	222	10.4	[6.4; 14.4]	3.0%
Halatoko 2020	9	955	0.9	[0.3; 1.6]	3.2%
Kagucia 2021	329	830	39.6	[36.3; 43.0]	3.1%
Kammon 2020	6	219	2.7	[0.6; 4.9]	3.1%
Katchunga 2021	279	684	40.8	[37.1; 44.5]	3.1%
Milleliri 2021	422	1687	25.0	[22.9; 27.1]	3.2%
Mostafa 2021	100	2282	4.4	[3.5; 5.2]	3.2%
Mukhtar 2021	36	455	7.9	[5.4; 10.4]	3.1%
Mukwege 2021	148	359	41.2	[36.1; 46.3]	2.9%
Mulenga 2021	80	2704	3.0	[2.3; 3.6]	3.2%
Nega 2020	23	301	7.6	[4.6; 10.6]	3.1%
Ngere 2021	384	1164	33.0	[30.3; 35.7]	3.1%
Nkuba 2021	167	1080	15.5	[13.3; 17.6]	3.1%
Nwosu 2021	328	971	33.8	[30.8; 36.8]	3.1%
Quashie 2021	252	1305	19.3	[17.2; 21.5]	3.1%
Rusakaniko 2021	57	635	9.0	[6.8; 11.2]	3.1%
Sebastião 2021	20	660	3.0	[1.7; 4.3]	3.2%
Shaw 2021	96	405	23.7	[19.6; 27.8]	3.0%
Shaweno 2021	22	684	3.2	[1.9; 4.5]	3.2%
Uyoga 2021	174	3098	5.6	[4.8; 6.4]	3.2%
Wiens 2021	411	1840	22.3	[20.4; 24.2]	3.2%
Zarmouh 2021	30	897	3.3	[2.2; 4.5]	3.2%
Random effects model		**46854**	**15.8**	**[12.8; 18.8]**	**100.0%**

Heterogeneity: I^2 = 99%, τ^2 = 0.0074, χ^2_{31} = 5121.56 (p = 0)



B


Study ID
Cases
Total
Seroprevalence
95% C.I.
Weight
Seroprevalence after excluding low-quality studies
Abdella 2021 56 1856 3.0 [2.2; 3.8] 3.4%
Abdelmoniem 2021 37 203 18.2 [12.9; 23.5] 3.1%
Adetifa 2021 928 9922 9.4 [8.8; 9.9] 3.4%
Assefa 2021 83 1447 5.7 [4.5; 6.9] 3.4%
Batchi-Bouyou 2021 149 754 19.8 [16.9; 22.6] 3.3%
Chibwana 2020 84 500 16.8 [13.5; 20.1] 3.3%
Etyang 2021 135 684 19.7 [16.8; 22.7] 3.3%
Fai 2021 320 999 32.0 [29.1; 34.9] 3.3%
Fwoloshi 2021 13 575 2.3 [1.0; 3.5] 3.4%
George 2021 1802 6477 27.8 [26.7; 28.9] 3.4%
Goldblatt 2021 23 222 10.4 [6.4; 14.4] 3.2%
Halatoko 2020 9 955 0.9 [0.3; 1.6] 3.4%
Kagucia 2021 329 830 39.6 [36.3; 43.0] 3.3%
Kassem 2020 9 74 12.2 [4.7; 19.6] 2.9%
Katchunga 2021 279 684 40.8 [37.1; 44.5] 3.3%
Milleliri 2021 422 1687 25.0 [22.9; 27.1] 3.4%
Mostafa 2021 100 2282 4.4 [3.5; 5.2] 3.4%
Mukhtar 2021 36 455 7.9 [5.4; 10.4] 3.4%
Mukwege 2021 148 359 41.2 [36.1; 46.3] 3.1%
Mulenga 2021 80 2704 3.0 [2.3; 3.6] 3.4%
Ngere 2021 384 1164 33.0 [30.3; 35.7] 3.3%
Nkuba 2021 167 1080 15.5 [13.3; 17.6] 3.4%
Nwosu 2021 328 971 33.8 [30.8; 36.8] 3.3%
Rusakaniko 2021 57 635 9.0 [6.8; 11.2] 3.4%
Sebastião 2021 20 660 3.0 [1.7; 4.3] 3.4%
Shaw 2021 96 405 23.7 [19.6; 27.8] 3.2%
Shaweno 2021 22 684 3.2 [1.9; 4.5] 3.4%
Uyoga 2021 174 3098 5.6 [4.8; 6.4] 3.4%
Wiens 2021 411 1840 22.3 [20.4; 24.2] 3.4%
Zarmouh 2021 30 897 3.3 [2.2; 4.5] 3.4%
Random effects model 45103 16.3 [13.1; 19.4] 100.0%
Heterogeneity: I^2 = 99%, τ^2 = 0.0075, χ^2_{29} = 4987.01 (p = 0)
0
10
20
30
40
50
Seroprevalence (%)

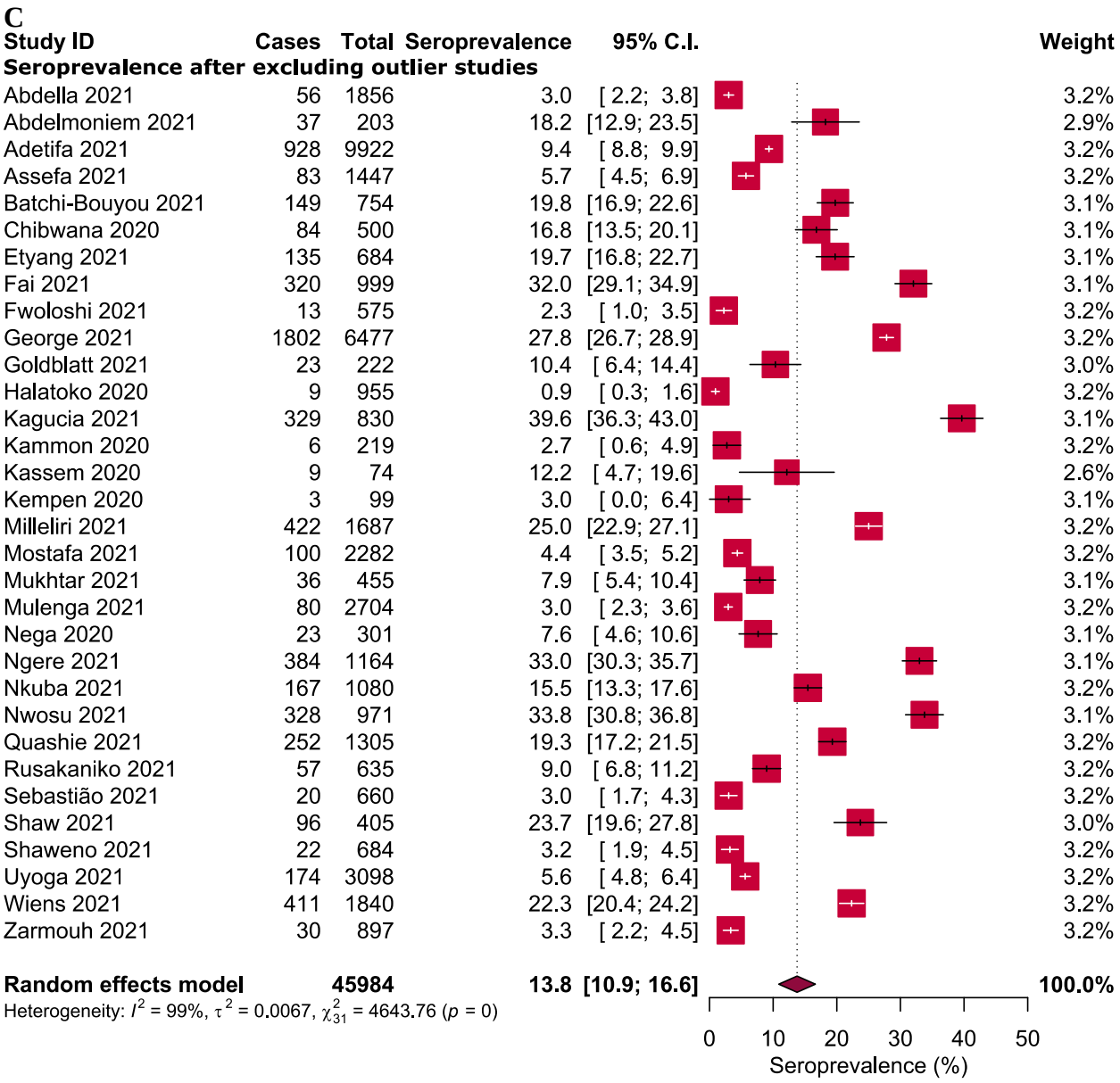


Figure S4. Sensitivity analyses by (A) excluding small studies (<200), (B) excluding low-quality studies and (C) excluding outlier studies.