Supplementary Online Content

Ma Q, Liu J, Liu Q, et al. Global percentage of asymptomatic SARS-CoV-2 infections among the tested population and individuals with confirmed COVID-19 diagnosis: a systematic review and meta-analysis. *JAMA Netw Open*. 2021;4(12):e2137257. doi:10.1001/jamanetworkopen.2021.37257

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

© 2021 Ma Q et al. *JAMA Network Open*.

eMethods 1. Search Strategies

PubMed

("COVID-19"[Title/Abstract] OR "coronavirus"[Title/Abstract] OR "SARS-CoV-2"[Title/Abstract]) AND ("asymptomatic transmission"[Title/Abstract] OR "asymptomatic infection"[Title/Abstract] OR "asymptomatic proportion"[Title/Abstract] OR "asymptomatic carrier"[Title/Abstract] OR "asymptomatic carriers"[Title/Abstract] OR "asymptomatic contact"[Title/Abstract] OR "asymptomatic ratio"[Title/Abstract] OR "asymptomatic cases"[Title/Abstract] OR "asymptomatic case"[Title/Abstract] OR "asymptomatic people"[Title/Abstract] OR "asymptomatic patients"[Title/Abstract] OR "asymptomatic patient"[Title/Abstract]) AND 2019/11/01:2021/12/27[Date - Publication]

EMBASE

('covid 19':ab,ti OR 'sars cov 2':ab,ti OR coronavirus:ab,ti) AND ('asymptomatic transmission':ab,ti OR 'asymptomatic infection':ab,ti OR 'asymptomatic proportion':ab,ti OR 'asymptomatic carrier':ab,ti OR 'asymptomatic carriers':ab,ti OR 'asymptomatic contact':ab,ti OR 'asymptomatic ratio':ab,ti OR 'asymptomatic cases':ab,ti OR 'asymptomatic case':ab,ti OR 'asymptomatic people':ab,ti OR 'asymptomatic patients':ab,ti OR 'asymptomatic patient':ab,ti) AND [1-11-2019]/sd NOT [28-12-2020]/sd

ScienceDirect

((COVID-19)OR(coronavirus)OR(SARS-CoV-2))+ ((asymptomatic transmission)OR(asymptomatic infection)OR(asymptomatic proportion)OR(asymptomatic carrier)OR(asymptomatic contact)OR(asymptomatic ratio)OR(asymptomatic case)OR(asymptomatic people)OR(asymptomatic patient))

((COVID-19)OR(coronavirus)OR(SARS-CoV-2))+ ((asymptomatic carriers)OR(asymptomatic cases)OR(asymptomatic patients))

© 2021 Ma Q et al. *JAMA Network Open*.

eMethods 2. Study Quality Assessments (according to the quality assessment by Yanes-Lane et al[18])

Cohort studies

1.1 Is the cohort representative of the target population?	1.2 Is there likely selection bias?	2.1 Was there a clear definition for an asymptomatic case?	2.2 Is there likely reporting bias?	3.1 Were objective, standard criteria used for diagnosis of the condition?	3.2 Was symptom development assessed in asymptomatic subjects?	3.3 Was follow-up long enough for symptoms to occur? (14 days on average)	3.4 Were symptoms assessed in a systematic and reliable way?	3.5 Adequacy of follow up of cohorts (lost to follow up)	3.6 Is there likely detection bias?

Grading scale: If question 1.2 is answered “yes” then the study is automatically low quality. If one question assessing bias (2.2 or 3.6) is answered "yes" then study is moderate quality. If both questions assessing bias (2.2 and 3.6) are answered "yes" then the study is low quality.

Cross-sectional studies

1.1 Were the criteria for inclusion in the sample clearly defined?	1.2 Was an appropriate method of sampling used? Random, complete, other.	1.3 Participation rate	1.4 Were the study subjects representative of the target population?	1.5 Is there likely to be selection bias?	2.1 Was there a clear definition for an asymptomatic case?	2.2 Were the study subjects and the setting described in detail?	2.3 Is there likely to be reporting bias?	3.1 Were objective, standard criteria used for diagnosis of the condition?	3.2 Was symptom assessment carried out in a standard objective way?	3.3 Is there likely detection bias?

Grading scale: If questions 1.2 is not a random sample, or if question 1.3 has a lower than 70% participation rate, then the study is automatically low quality. If one question assessing bias (1.5, 2.3 or 3.3) is answered "yes" then study is moderate quality. If two or more questions assessing bias (1.5, 2.3 or 3.3) are answered "yes" then the study is low quality.

© 2021 Ma Q et al. *JAMA Network Open*.

Case series

1.1 Were the inclusion criteria for the case series clearly defined?	1.2 Were valid methods used to diagnose COVID-19 for all participants included in the case series?	1.3 Did the case series have consecutive inclusion of participants?	1.4 Did the case series have complete inclusion of participants?	1.5 Is there likely selection bias ?	2.1 Was there clear reporting of the demographics of the participants in the study?	2.2 Was there clear reporting of clinical information of the participants?	2.3 Were the outcomes or follow up results of cases clearly reported?	2.4 Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	2.5 Is there likely reporting bias?

Grading scale: If question 1.1 is answered "no" then the study is automatically low quality, and if 1.1 is answered "yes" but questions 1.3 or 1.4 are answered "no" then the study is also low quality. If one question assessing bias (1.5 or 2.5) is answered "yes" then study is moderate quality. If both questions assessing bias (1.5 or 2.5) are answered "yes" then the study is low quality.

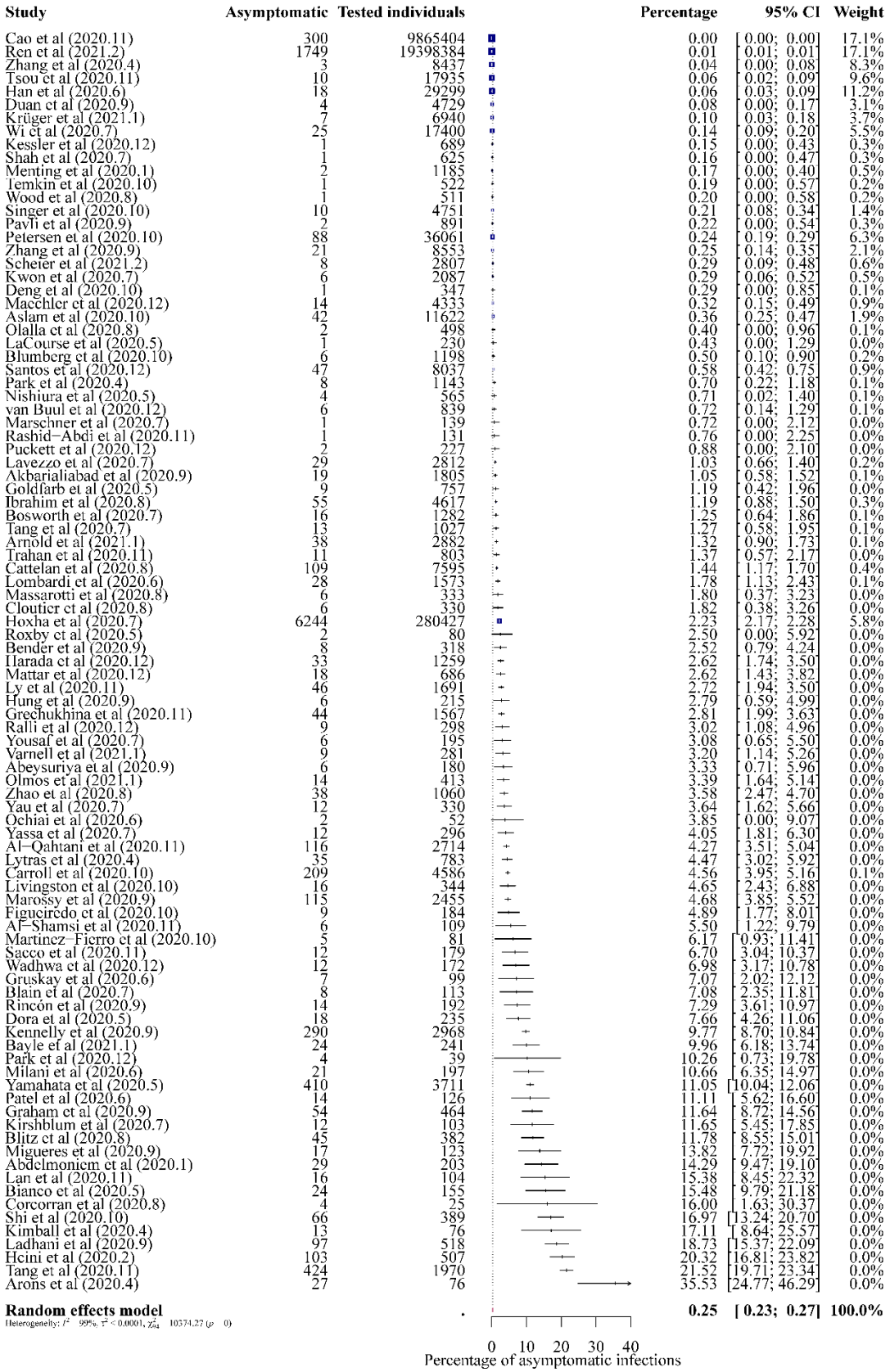
Case series on transmission

1.1 Is the method for contact tracing clearly defined?	1.2 Is the number of contacts identified and tested clearly reported?	1.3 Is there likely bias due to missing information? i.e reporting bias	2.1 Is the method for contact tracing rigorous and exhaustive to identify all potential contacts?	2.2 Was the follow-up of people without symptoms sufficient to allow for the incubation period?	2.3 Is there likely missing data on contacts ?	2.4 Is there likely bias in contact identification?	2.5 Is there likely exposure to other potential index cases that were symptomatic?	2.6 Was the index case symptomatic at any time during the exposure to contacts?	2.7 Was the index case identified after the contacts? i.e was the index case identified by exclusion	2.8 Is there likely bias in index case identification?

Grading scale: If questions 2.6 AND 2.7 are answered "yes" then the study is automatically low quality. If one question assessing bias (1.3, 2.4 or 2.8) is answered "yes" then study is moderate quality. If two or more signalling questions are answered “yes” then the study is low quality. For studies on household transmission, signalling questions 1.1 and 1.2 were omitted.

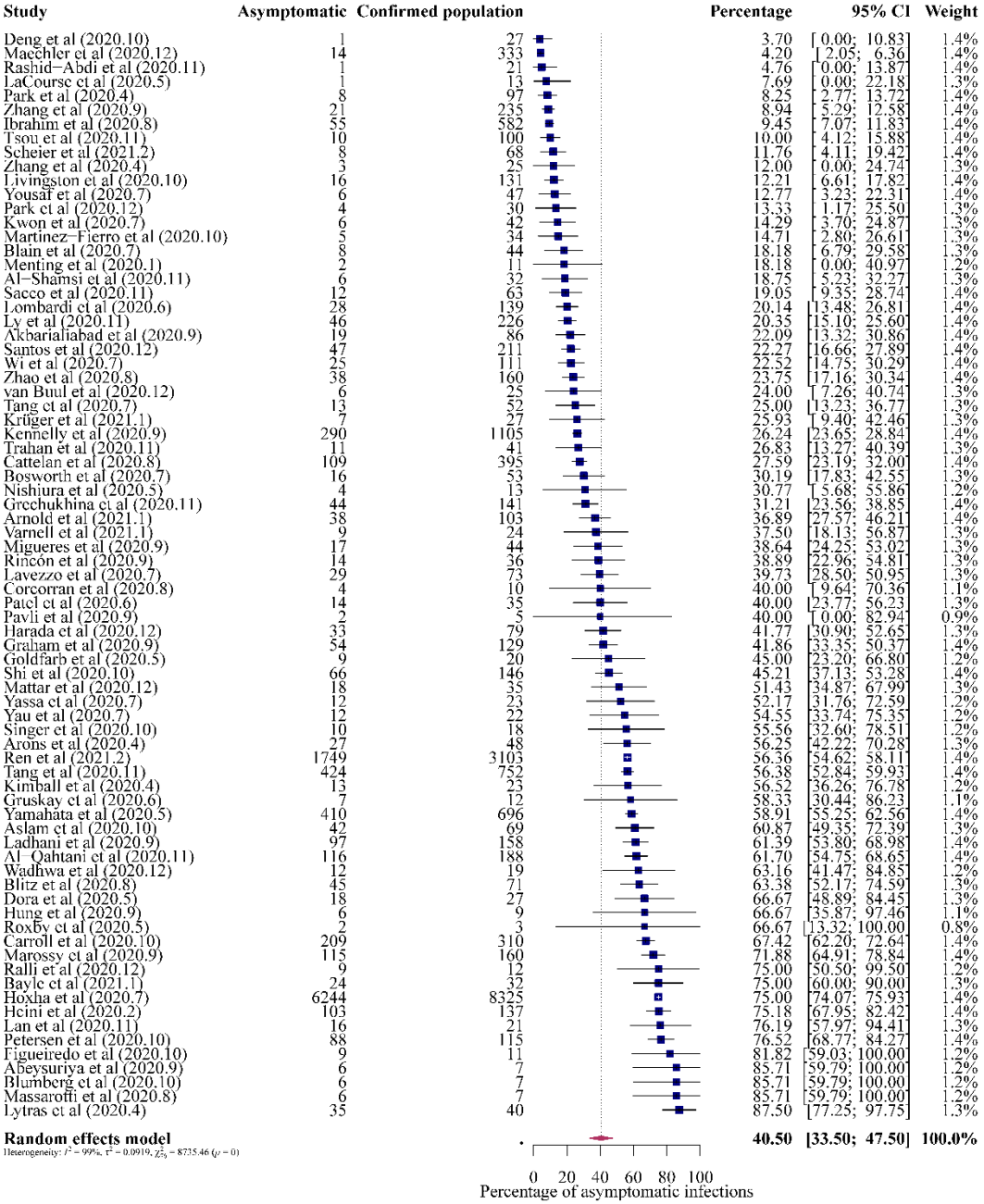
© 2021 Ma Q et al. *JAMA Network Open*.

eFigure 1. Percentage of Asymptomatic Cases Among the Tested Population



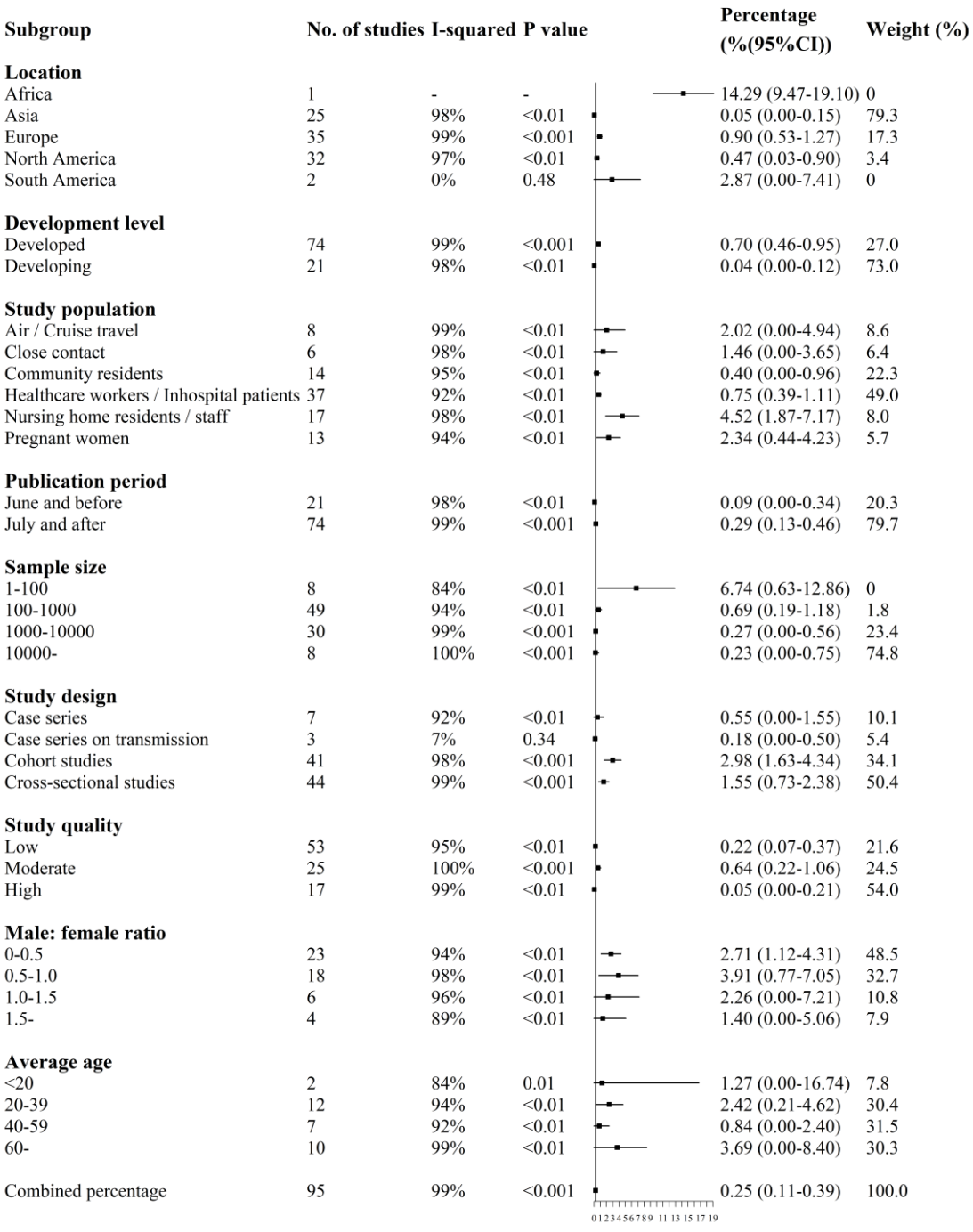
© 2021 Ma Q et al. *JAMA Network Open*.

eFigure 2. Percentage of Asymptomatic Cases Among the Confirmed Population



© 2021 Ma Q et al. *JAMA Network Open*.

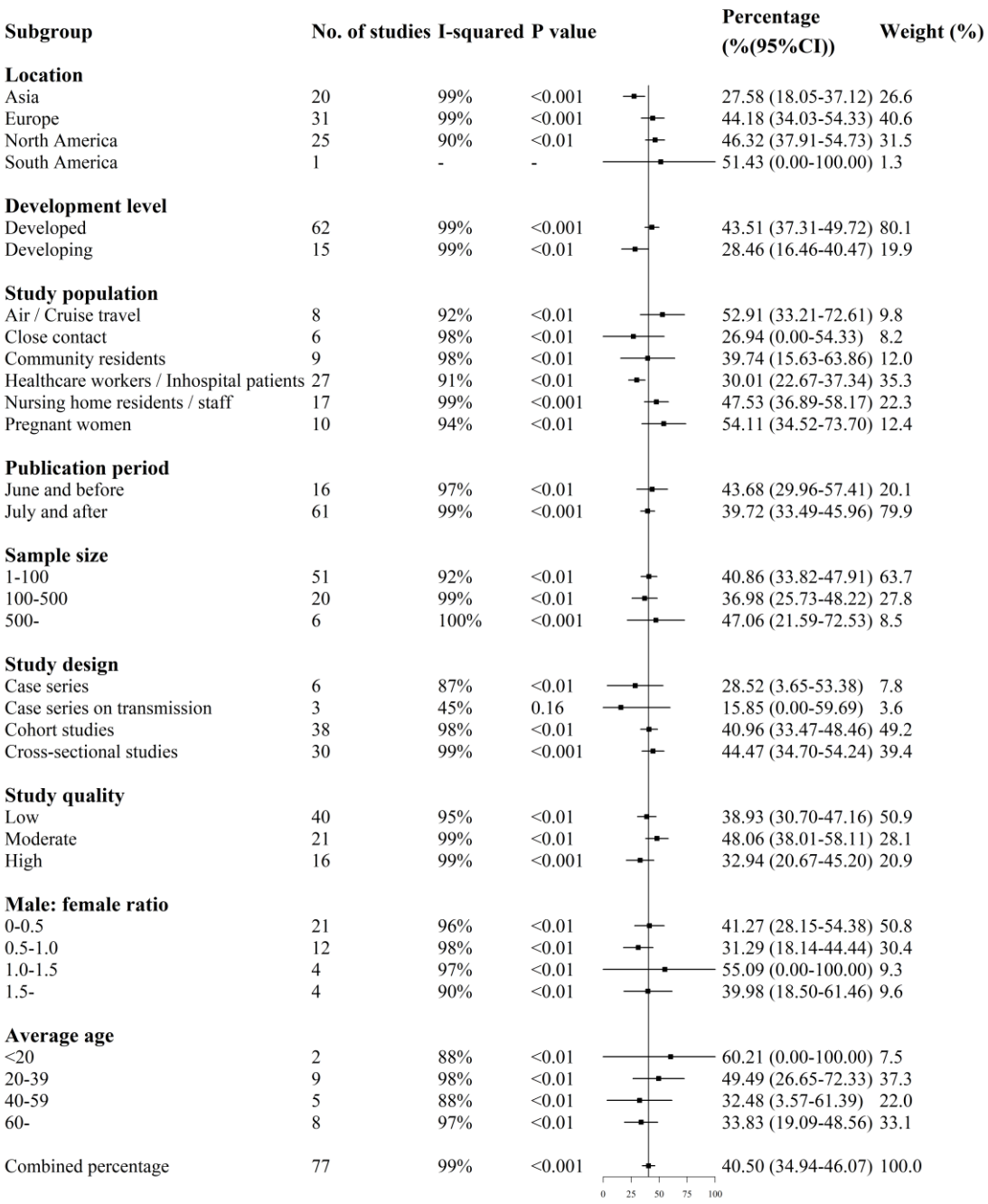
eFigure 3. Percentage of Asymptomatic Cases Among the Tested Population by Subgroups, Using the Knapp-Hartung Adjustments



Subgroup	No. of studies	I-squared	P value	Percentage (%(95%CI))	Weight (%)
Location					
Africa	1	-	-	14.29 (9.47-19.10)	0
Asia	25	98%	<0.01	0.05 (0.00-0.15)	79.3
Europe	35	99%	<0.001	0.90 (0.53-1.27)	17.3
North America	32	97%	<0.01	0.47 (0.03-0.90)	3.4
South America	2	0%	0.48	2.87 (0.00-7.41)	0
Development level					
Developed	74	99%	<0.001	0.70 (0.46-0.95)	27.0
Developing	21	98%	<0.01	0.04 (0.00-0.12)	73.0
Study population					
Air / Cruise travel	8	99%	<0.01	2.02 (0.00-4.94)	8.6
Close contact	6	98%	<0.01	1.46 (0.00-3.65)	6.4
Community residents	14	95%	<0.01	0.40 (0.00-0.96)	22.3
Healthcare workers / Inhospital patients	37	92%	<0.01	0.75 (0.39-1.11)	49.0
Nursing home residents / staff	17	98%	<0.01	4.52 (1.87-7.17)	8.0
Pregnant women	13	94%	<0.01	2.34 (0.44-4.23)	5.7
Publication period					
June and before	21	98%	<0.01	0.09 (0.00-0.34)	20.3
July and after	74	99%	<0.001	0.29 (0.13-0.46)	79.7
Sample size					
1-100	8	84%	<0.01	6.74 (0.63-12.86)	0
100-1000	49	94%	<0.01	0.69 (0.19-1.18)	1.8
1000-10000	30	99%	<0.001	0.27 (0.00-0.56)	23.4
10000-	8	100%	<0.001	0.23 (0.00-0.75)	74.8
Study design					
Case series	7	92%	<0.01	0.55 (0.00-1.55)	10.1
Case series on transmission	3	7%	0.34	0.18 (0.00-0.50)	5.4
Cohort studies	41	98%	<0.001	2.98 (1.63-4.34)	34.1
Cross-sectional studies	44	99%	<0.001	1.55 (0.73-2.38)	50.4
Study quality					
Low	53	95%	<0.01	0.22 (0.07-0.37)	21.6
Moderate	25	100%	<0.001	0.64 (0.22-1.06)	24.5
High	17	99%	<0.01	0.05 (0.00-0.21)	54.0
Male: female ratio					
0-0.5	23	94%	<0.01	2.71 (1.12-4.31)	48.5
0.5-1.0	18	98%	<0.01	3.91 (0.77-7.05)	32.7
1.0-1.5	6	96%	<0.01	2.26 (0.00-7.21)	10.8
1.5-	4	89%	<0.01	1.40 (0.00-5.06)	7.9
Average age					
<20	2	84%	0.01	1.27 (0.00-16.74)	7.8
20-39	12	94%	<0.01	2.42 (0.21-4.62)	30.4
40-59	7	92%	<0.01	0.84 (0.00-2.40)	31.5
60-	10	99%	<0.01	3.69 (0.00-8.40)	30.3
Combined percentage	95	99%	<0.001	0.25 (0.11-0.39)	100.0

© 2021 Ma Q et al. *JAMA Network Open*.

eFigure 4. Percentage of Asymptomatic Cases Among the Confirmed Population by Subgroups, Using the Knapp-Hartung Adjustments



© 2021 Ma Q et al. *JAMA Network Open*.