

---

# Severity and case fatality rates of COVID-19: A systematic review, meta-analysis and an exploratory meta-regression of risk factors

Chathurika Dhanasekara MBBS, PhD, Shao-Hua Chin PhD, Chanaka N. Kahathuduwa MBBS, PhD

**eTable 1. Keywords and Keyword Combinations Used to Screen the PubMed, Scopus, and Web of Science Electronic Databases**

(covid-19) OR (((corona OR coronavirus)) AND wuhan) OR (2019 novel coronavirus infection) OR (COVID19) OR (coronavirus disease 2019) OR (coronavirus disease-19) OR (2019-nCoV disease) OR (2019 novel coronavirus disease) OR (2019-nCoV infection) OR (SARS-CoV-2)
--

**eTable 2. Summary Statistics of All Covariates Used in the Univariate Meta-regression Analyses**

Variable	Events	Total	Studies	Pooled Effect Size (95% CI) †	
				Fixed-effects Model	Random-effects Model
<b>Demographic Variables</b>					
Age (years)	NA	2033	28	32.847 (32.344–33.350)	41.148 (32.737–49.558)
Age ≤ 18 years	110	1349	22	0.082 (0.068–0.097)	0.025 (0.002–0.274)
Age ≥ 60 years	178	975	15	0.183 (0.160–0.208)	0.064 (0.019–0.196)
Female	941	2033	28	0.463 (0.441–0.485)	0.466 (0.431–0.500)
<b>Past Medical History</b>					
DM-2	123	1420	22	0.087 (0.073–0.102)	0.102 (0.069–0.148)
Hypertension	228	1090	19	0.209 (0.186–0.234)	0.120 (0.069–0.201)
Cardiac disease	127	1121	18	0.113 (0.096–0.133)	0.060 (0.029–0.120)
Chronic liver disease	23	926	18	0.025 (0.017–0.037)	0.010 (0.003–0.037)
Chronic kidney disease	12	926	18	0.013 (0.007–0.023)	0.013 (0.007–0.023)
Malignancy	34	1216	19	0.028 (0.020–0.039)	0.024 (0.014–0.040)
COPD	19	1014	12	0.019 (0.012–0.029)	0.018 (0.010–0.031)
Low immunity	2	236	3	0.008 (0.002–0.033)	0.008 (0.002–0.033)
Smoking	16	247	3	0.065 (0.040–0.103)	0.065 (0.040–0.103)
Pregnant	11	506	11	0.022 (0.012–0.039)	0.000 (0.000–0.386)
<b>Presenting Symptoms</b>					
Asymptomatic	24	618	11	0.039 (0.026–0.057)	0.009 (0.001–0.084)
Fever	1310	1578	24	0.830 (0.811–0.848)	0.833 (0.778–0.877)
Cough	992	1656	25	0.599 (0.575–0.622)	0.619 (0.539–0.693)
Sore throat	121	909	16	0.133 (0.113–0.157)	0.131 (0.085–0.197)
Tachypnea	138	325	7	0.425 (0.372–0.479)	0.084 (0.010–0.461)
Dyspnea	245	1452	20	0.169 (0.150–0.189)	0.102 (0.053–0.186)
Myalgia	163	801	14	0.203 (0.177–0.233)	0.192 (0.123–0.288)
Fatigue	328	762	11	0.430 (0.396–0.466)	0.336 (0.198–0.508)
Headache	136	1253	16	0.109 (0.092–0.127)	0.103 (0.071–0.146)
Diarrhea	104	1288	21	0.081 (0.067–0.097)	0.078 (0.059–0.104)
<b>Laboratory Investigations ‡</b>					
Nucleic acid test positive	1529	1617	22	0.946 (0.933–0.956)	1.000 (0.916–1.000)
Leukopenia	258	940	16	0.274 (0.247–0.304)	0.217 (0.111–0.380)
Leukocytosis	99	899	16	0.110 (0.091–0.132)	0.082 (0.048–0.137)
Thrombocytopenia	73	472	8	0.155 (0.125–0.190)	0.137 (0.078–0.229)
Lymphopenia	476	988	17	0.482 (0.451–0.513)	0.410 (0.289–0.543)
High LDH	220	526	9	0.418 (0.377–0.461)	0.433 (0.242–0.646)
Low Albumin	156	423	6	0.369 (0.324–0.416)	0.340 (0.063–0.797)
High CRP	650	930	17	0.699 (0.669–0.728)	0.668 (0.534–0.780)

**eTable 2. Summary Statistics of All Covariates Used in the Univariate Meta-regression Analyses**

Variable	Events	Total	Studies	Pooled Effect Size (95% CI) †	
				Fixed-effects Model	Random-effects Model
High ESR	193	245	4	0.788 (0.732–0.834)	0.795 (0.701–0.866)
High procalcitonin	152	594	12	0.256 (0.222–0.293)	0.175 (0.071–0.370)
High D-dimer	117	504	7	0.232 (0.197–0.271)	0.188 (0.095–0.338)
<b>Radiological Features on CT Thorax</b>					
No lesion on CT	95	894	16	0.106 (0.088–0.128)	0.078 (0.035–0.165)
Patchy consolidation	231	551	11	0.419 (0.379–0.461)	0.418 (0.314–0.530)
Ground glass opacities	416	754	15	0.552 (0.516–0.587)	0.693 (0.487–0.843)
Peripheral distribution	177	229	6	0.773 (0.714–0.823)	0.849 (0.516–0.967)
Bilateral or ≥ 3 lobe involvement	721	953	15	0.757 (0.728–0.783)	0.711 (0.575–0.817)

† Effect size measure is mean for age. For all other variables, it is the proportion of individuals (i.e., events) out of total sample size.

‡ Biochemical parameters have been interpreted as low / high based on reference ranges considered in each study.

**eTable 3. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence of Combined Severe or Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
<b>Demographic Variables</b>						
1	Intercept	-5.921	1.236	-8.344 to -3.498	-4.789	<0.001
	Age	0.093	0.026	0.043 to 0.144	3.634	<0.001
	k = 26, $\tau^2$ = 0.781, I <sup>2</sup> = 88.428, QM = 13.206					
2	Intercept	-1.400	0.310	-2.006 to -9.794	-4.524	<0.001
	Age ≤ 18 years	-3.450	1.287	-5.972 to -5.927	-2.680	0.007
	k = 21, $\tau^2$ = 1.172, I <sup>2</sup> = 91.709, QM = 7.182					
3	Intercept	-3.599	0.461	-4.502 to -2.695	-7.806	<0.001
	Age ≥ 60 years	8.367	1.720	4.997 to 11.738	4.866	<0.001
	k = 15, $\tau^2$ = 0.573, I <sup>2</sup> = 77.484, QM = 23.679					
4	Intercept	-0.491	1.196	-2.836 to 1.853	-0.411	0.681
	Female	-2.836	2.517	-7.769 to 2.397	-1.127	0.260
	k = 26, $\tau^2$ = 1.771, I <sup>2</sup> = 94.515, QM = 1.270					
<b>Past Medical History</b>						
5	Intercept	-2.344	0.471	-3.267 to -1.421	-4.978	<0.001
	DM-2	3.632	2.161	-0.603 to 7.868	1.681	0.093
	k = 20, $\tau^2$ = 1.532, I <sup>2</sup> = 93.418, QM = 2.826					
6	Intercept	-2.966	0.556	-4.056 to -1.877	-5.338	<0.001
	Hypertension	8.381	2.456	3.567 to 13.194	3.413	<0.001
	k = 17, $\tau^2$ = 1.009, I <sup>2</sup> = 88.950, QM = 11.646					
7	Intercept	-2.112	0.476	-3.045 to -1.179	-4.436	<0.001
	Cardiac disease	4.801	2.649	-0.392 to 9.993	1.812	0.070
	k = 16, $\tau^2$ = 1.211, I <sup>2</sup> = 91.573, QM = 3.283					
8	Intercept	-2.274	0.654	-3.555 to -5.992	-3.476	<0.001
	Chronic liver disease	4.698	15.493	-25.668 to 35.064	0.303	0.762
	k = 16, $\tau^2$ = 3.223, I <sup>2</sup> = 94.655, QM = 0.092					
9	Intercept	-2.411	0.507	-3.405 to -1.417	-4.756	<0.001
	Chronic kidney disease	21.831	10.504	1.244 to 42.419	2.078	0.038
	k = 16, $\tau^2$ = 2.235, I <sup>2</sup> = 93.455, QM = 4.320					
10	Intercept	-2.366	0.441	-3.230 to -1.501	-5.363	<0.001
	Malignancy	24.845	10.920	3.442 to 46.247	2.275	0.023
	k = 17, $\tau^2$ = 0.960, I <sup>2</sup> = 89.464, QM = 5.176					
11	Intercept	-1.827	0.399	-2.609 to -1.345	-4.580	<0.001
	COPD	27.432	12.227	3.467 to 51.397	2.243	0.025
	k = 11, $\tau^2$ = 0.733, I <sup>2</sup> = 91.466, QM = 5.033					

**eTable 3. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence of Combined Severe or Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
12	Intercept	-2.020	0.713	-3.416 to -5.623	-2.835	0.005
	Low immunity	66.920	78.023	-86.003 to 219.842	0.858	0.391
	k = 3, $\tau^2 = 0.733$ , I <sup>2</sup> = 71.082, QM = 0.736					
13	Intercept	-8.862	6.638	-21.872 to 4.148	-1.335	0.182
	Smoking	127.878	101.797	-71.641 to 327.397	1.256	0.209
	k = 3, $\tau^2 = 0.048$ , I <sup>2</sup> = 50.308, QM = 1.578					
14	Intercept	-2.088	0.618	-3.299 to -2.876	-3.377	<0.001
	Pregnant	-4.395	6.052	-16.256 to 7.466	-0.726	0.468
	k = 10, $\tau^2 = 2.133$ , I <sup>2</sup> = 90.869, QM = 0.527					
<b>Presenting Symptoms</b>						
15	Intercept	-1.287	0.486	-2.240 to -2.334	-2.647	0.008
	Asymptomatic	-5.774	4.980	-15.534 to 3.987	-1.159	0.246
	k = 11, $\tau^2 = 1.549$ , I <sup>2</sup> = 92.081, QM = 1.344					
16	Intercept	-8.760	2.003	-12.685 to -4.835	-4.374	<0.001
	Fever	8.772	2.378	4.111 to 13.432	3.689	<0.001
	k = 23, $\tau^2 = 0.641$ , I <sup>2</sup> = 86.409, QM = 13.607					
17	Intercept	-3.308	0.987	-5.242 to -1.374	-3.353	<0.001
	Cough	2.736	1.492	-0.187 to 5.665	1.834	0.067
	k = 24, $\tau^2 = 1.280$ , I <sup>2</sup> = 92.822, QM = 3.365					
18	Intercept	-1.698	0.456	-2.590 to -7.854	-3.725	<0.001
	Sore throat	-0.410	1.971	-4.272 to 3.452	-0.208	0.835
	k = 15, $\tau^2 = 1.035$ , I <sup>2</sup> = 89.939, QM = 0.043					
19	Intercept	-3.773	1.205	-6.134 to -1.411	-3.131	0.002
	Tachypnea	5.104	2.616	-0.023 to 19.231	1.951	0.051
	k = 7, $\tau^2 = 1.774$ , I <sup>2</sup> = 89.572, QM = 3.806					
20	Intercept	-1.997	0.354	-2.691 to -1.322	-5.636	<0.001
	Dyspnea	3.056	1.392	0.327 to 5.784	2.195	0.028
	k = 19, $\tau^2 = 0.680$ , I <sup>2</sup> = 88.759, QM = 4.817					
21	Intercept	-2.227	0.749	-3.695 to -6.758	-2.972	0.003
	Myalgia	3.541	2.648	-1.648 to 8.731	1.338	0.181
	k = 13, $\tau^2 = 1.323$ , I <sup>2</sup> = 91.941, QM = 1.789					
22	Intercept	-2.466	0.685	-3.809 to -1.124	-3.600	<0.001
	Fatigue	2.702	1.388	-0.018 to 5.421	1.947	0.052
	k = 11, $\tau^2 = 0.730$ , I <sup>2</sup> = 87.246, QM = 3.791					

**eTable 3. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence of Combined Severe or Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
23	Intercept	-0.803	0.471	-1.727 to 1.129	-1.705	0.088
	Headache	-5.361	3.194	-11.621 to 4.899	-1.679	0.093
	k = 15, $\tau^2$ = 1.153, I <sup>2</sup> = 93.398, QM = 2.817					
24	Intercept	-2.590	0.566	-3.699 to -1.482	-4.579	<0.001
	Diarrhea	11.680	5.237	1.415 to 21.944	2.230	0.026
	k = 20, $\tau^2$ = 1.139, I <sup>2</sup> = 91.537, QM = 4.974					
<b>Laboratory Investigations ‡</b>						
25	Intercept	-0.521	0.404	-1.311 to 8.272	-1.291	0.197
	Nucleic acid test positive	-1.370	0.423	-2.199 to -9.545	-3.235	0.001
	k = 21, $\tau^2$ = 1.477, I <sup>2</sup> = 94.363, QM = 10.464					
26	Intercept	-1.904	0.734	-3.343 to -3.465	-2.594	0.009
	Leukopenia	-0.357	1.926	-4.132 to 3.418	-0.185	0.853
	k = 15, $\tau^2$ = 2.855, I <sup>2</sup> = 96.044, QM = 0.034					
27	Intercept	-3.166	0.857	-4.845 to -1.487	-3.696	<0.001
	Leukocytosis	8.608	5.659	-2.482 to 19.699	1.521	0.128
	k = 15, $\tau^2$ = 2.690, I <sup>2</sup> = 95.111, QM = 2.314					
28	Intercept	-3.945	1.260	-6.414 to -1.476	-3.132	0.002
	Thrombocytopenia	10.488	5.507	-0.306 to 21.282	1.904	0.057
	k = 8, $\tau^2$ = 2.917, I <sup>2</sup> = 94.454, QM = 3.627					
29	Intercept	-3.871	0.840	-5.518 to -2.224	-4.607	<0.001
	Lymphopenia	4.734	1.574	1.649 to 7.823	3.008	0.003
	k = 16, $\tau^2$ = 1.213, I <sup>2</sup> = 90.850, QM = 9.046					
30	Intercept	-4.437	0.686	-5.781 to -3.192	-6.467	<0.001
	High LDH	5.769	1.164	3.488 to 8.054	4.957	<0.001
	k = 9, $\tau^2$ = 0.278, I <sup>2</sup> = 58.546, QM = 24.572					
31	Intercept	-1.507	0.734	-2.945 to -5.869	-2.053	0.040
	Low Albumin	1.299	1.384	-1.414 to 4.312	0.938	0.348
	k = 6, $\tau^2$ = 1.210, I <sup>2</sup> = 89.774, QM = 0.880					
32	Intercept	-4.645	1.018	-6.641 to -2.649	-4.562	<0.001
	High CRP	4.688	1.392	1.959 to 7.417	3.367	<0.001
	k = 16, $\tau^2$ = 0.697, I <sup>2</sup> = 85.579, QM = 11.335					
33	Intercept	2.608	6.597	-10.323 to 15.538	0.395	0.693
	High ESR	-5.846	8.398	-22.305 to 11.613	-0.696	0.486
	k = 4, $\tau^2$ = 1.636, I <sup>2</sup> = 84.528, QM = 0.485					

**eTable 3. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence of Combined Severe or Critical Illness in COVID-19**

Model	Variable	Coefficient <sup>†</sup>	SE	95% CI	Z	p
34	Intercept	-2.535	0.965	-4.427 to -0.643	-2.626	0.009
	High procalcitonin	1.146	2.476	-3.707 to 5.999	0.463	0.644
	k = 11, $\tau^2$ = 3.562, I <sup>2</sup> = 95.576, QM = 0.214					
35	Intercept	-2.962	0.289	-3.528 to -2.395	-10.253	<0.001
	High D-dimer	6.110	0.830	4.484 to 7.736	7.365	<0.001
	k = 7, $\tau^2$ = 0.000, I <sup>2</sup> = 0.000, QM = 54.243					
<b>Radiological Features on CT Thorax</b>						
36	Intercept	-1.016	0.468	-1.932 to -8.798	-2.170	0.030
	No lesions on CT	-10.053	3.413	-16.743 to -3.363	-2.945	0.003
	k = 15, $\tau^2$ = 1.239, I <sup>2</sup> = 89.806, QM = 8.675					
37	Intercept	-2.639	1.142	-4.878 to -2.461	-2.311	0.021
	Patchy consolidations	1.121	2.265	-3.318 to 5.559	0.495	0.621
	k = 10, $\tau^2$ = 1.261, I <sup>2</sup> = 88.147, QM = 0.245					
38	Intercept	-2.231	1.134	-4.454 to -7.938	-1.967	0.049
	Ground glass opacities	0.089	1.650	-3.144 to 3.322	0.054	0.957
	k = 14, $\tau^2$ = 2.583, I <sup>2</sup> = 94.256, QM = 0.003					
39	Intercept	-6.172	3.565	-13.159 to 7.816	-1.731	0.083
	Peripheral distribution	3.966	3.959	-3.794 to 11.725	1.002	0.317
	k = 6, $\tau^2$ = 1.767, I <sup>2</sup> = 83.815, QM = 1.003					
40	Intercept	-4.974	1.267	-7.457 to -2.492	-3.927	<0.001
	Bilateral or $\geq$ 3 lobe involvement	4.435	1.627	1.246 to 7.624	2.725	0.006
	k = 14, $\tau^2$ = 0.696, I <sup>2</sup> = 87.270, QM = 7.428					

<sup>†</sup> Coefficients represent logit-transformed proportions; positive coefficients suggest increased risk and negative coefficients suggest decreased risk.

<sup>‡</sup> Biochemical parameters have been interpreted as low / high based on reference ranges considered in each study.

**eTable 4. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
<b>Demographic Variables</b>						
1	Intercept	-8.153	2.031	-12.134 to -4.173	-4.014	<0.001
	Age	0.115	0.041	0.033 to 6.196	2.774	0.006
	k = 24, $\tau^2 = 1.094$ , I <sup>2</sup> = 85.333, QM = 7.694					
2	Intercept	-2.407	0.527	-3.440 to -1.374	-4.567	<0.001
	Age ≤ 18 years	-7.526	6.892	-21.034 to 5.981	-1.092	0.275
	k = 18, $\tau^2 = 1.635$ , I <sup>2</sup> = 87.100, QM = 1.193					
3	Intercept	-5.479	0.884	-7.211 to -3.747	-6.200	<0.001
	Age ≥ 60 years	8.868	2.647	3.678 to 14.757	3.349	<0.001
	k = 13, $\tau^2 = 0.981$ , I <sup>2</sup> = 69.156, QM = 11.219					
4	Intercept	-1.157	1.429	-3.957 to 1.644	-0.809	0.418
	Female	-3.934	3.082	-9.975 to 2.157	-1.276	0.202
	k = 24, $\tau^2 = 1.890$ , I <sup>2</sup> = 90.774, QM = 1.629					
<b>Past Medical History</b>						
5	Intercept	-2.712	0.510	-3.711 to -1.713	-5.319	<0.001
	DM-2	0.581	2.220	-3.770 to 4.932	0.262	0.794
	k = 19, $\tau^2 = 1.405$ , I <sup>2</sup> = 89.782, QM = 0.068					
6	Intercept	-4.091	0.676	-5.416 to -2.765	-6.050	<0.001
	Hypertension	8.385	2.518	3.450 to 13.321	3.330	<0.001
	k = 17, $\tau^2 = 0.615$ , I <sup>2</sup> = 74.934, QM = 11.090					
7	Intercept	-3.386	0.657	-4.674 to -2.597	-5.150	<0.001
	Cardiac disease	6.745	2.970	0.924 to 12.565	2.271	0.023
	k = 15, $\tau^2 = 1.058$ , I <sup>2</sup> = 86.342, QM = 5.158					
8	Intercept	-2.632	0.494	-3.600 to -1.664	-5.329	<0.001
	Chronic liver disease	-1.965	11.525	-24.553 to 21.623	-0.170	0.865
	k = 15, $\tau^2 = 1.332$ , I <sup>2</sup> = 84.529, QM = 0.029					
9	Intercept	-2.850	0.463	-3.757 to -1.944	-6.161	<0.001
	Chronic kidney disease	11.613	8.335	-4.722 to 27.949	1.393	0.163
	k = 15, $\tau^2 = 1.185$ , I <sup>2</sup> = 84.105, QM = 1.942					
10	Intercept	-2.718	0.428	-3.556 to -1.886	-6.355	<0.001
	Malignancy	20.308	9.919	0.866 to 39.752	2.047	0.041
	k = 16, $\tau^2 = 0.497$ , I <sup>2</sup> = 75.460, QM = 4.191					
11	Intercept	-2.140	0.468	-3.057 to -1.223	-4.573	<0.001
	COPD	-3.422	14.786	-32.402 to 25.557	-0.231	0.817
	k = 11, $\tau^2 = 1.028$ , I <sup>2</sup> = 89.416, QM = 0.054					



**eTable 4. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
<b>Presenting Symptoms</b>						
12	Intercept	-3.186	1.049	-5.243 to -1.129	-3.036	0.002
	Asymptomatic	-9.113	12.896	-34.389 to 16.162	-0.707	0.480
	k = 9, $\tau^2 = 4.359$ , I <sup>2</sup> = 90.352, QM = 0.499					
13	Intercept	-10.098	3.624	-17.201 to -2.995	-2.786	0.005
	Fever	8.525	4.236	0.224 to 16.827	2.013	0.044
	k = 20, $\tau^2 = 1.946$ , I <sup>2</sup> = 89.018, QM = 4.051					
14	Intercept	-4.429	1.361	-7.096 to -1.762	-3.255	0.001
	Cough	2.421	2.119	-1.732 to 6.574	1.142	0.253
	k = 21, $\tau^2 = 2.096$ , I <sup>2</sup> = 90.704, QM = 1.305					
15	Intercept	-2.901	0.617	-4.110 to -1.693	-4.706	<0.001
	Sore throat	-0.011	2.573	-5.054 to 5.733	-0.004	0.997
	k = 14, $\tau^2 = 1.552$ , I <sup>2</sup> = 87.761, QM = 0.000					
16	Intercept	-6.493	3.574	-13.498 to 6.513	-1.816	0.069
	Tachypnea	4.139	6.653	-8.901 to 17.179	0.622	0.534
	k = 7, $\tau^2 = 9.745$ , I <sup>2</sup> = 92.103, QM = 0.387					
17	Intercept	-3.919	0.701	-5.293 to -2.546	-5.592	<0.001
	Dyspnea	5.263	2.589	0.187 to 19.339	2.033	0.042
	k = 17, $\tau^2 = 1.935$ , I <sup>2</sup> = 90.510, QM = 4.131					
18	Intercept	-2.954	0.729	-4.382 to -1.526	-4.055	<0.001
	Myalgia	2.311	2.833	-3.241 to 7.864	0.816	0.415
	k = 13, $\tau^2 = 1.128$ , I <sup>2</sup> = 82.759, QM = 0.666					
19	Intercept	-5.730	1.452	-8.575 to -2.884	-3.947	<0.001
	Fatigue	6.841	3.255	0.462 to 13.221	2.102	0.036
	k = 9, $\tau^2 = 1.883$ , I <sup>2</sup> = 75.036, QM = 4.418					
20	Intercept	-2.093	0.707	-3.478 to -4.718	-2.962	0.003
	Headache	-7.333	6.010	-19.113 to 4.446	-1.220	0.222
	k = 15, $\tau^2 = 1.972$ , I <sup>2</sup> = 92.662, QM = 1.489					
21	Intercept	-3.018	0.673	-4.337 to -1.699	-4.485	<0.001
	Diarrhea	4.228	5.997	-7.525 to 15.981	0.705	0.481
	k = 18, $\tau^2 = 1.279$ , I <sup>2</sup> = 86.591, QM = 0.497					
<b>Laboratory Investigations ‡</b>						
22	Intercept	-728.908	26694.139	-53048.459 to 51594.644	-0.027	0.978
	Nucleic acid test positive	725.702	26694.139	-51593.849 to 53945.253	0.027	0.978
	k = 18, $\tau^2 = 2.861$ , I <sup>2</sup> = 94.023, QM = 0.001					

**eTable 4. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
23	Intercept	-2.923	0.688	-4.272 to -1.575	-4.249	<0.001
	Leukopenia	-0.149	1.679	-3.440 to 3.141	-0.089	0.929
	k = 15, $\tau^2$ = 1.763, I <sup>2</sup> = 87.768, QM = 0.008					
24	Intercept	-3.734	0.742	-5.189 to -2.279	-5.030	<0.001
	Leukocytosis	6.462	4.651	-2.655 to 15.578	1.389	0.165
	k = 15, $\tau^2$ = 1.617, I <sup>2</sup> = 83.727, QM = 1.930					
25	Intercept	-3.319	0.906	-5.095 to -1.543	-3.663	<0.001
	Thrombocytopenia	4.623	3.915	-3.049 to 12.296	1.181	0.238
	k = 8, $\tau^2$ = 1.198, I <sup>2</sup> = 85.576, QM = 1.395					
26	Intercept	-4.303	0.979	-6.222 to -2.383	-4.393	<0.001
	Lymphopenia	3.533	1.996	-0.378 to 7.444	1.770	0.077
	k = 15, $\tau^2$ = 1.264, I <sup>2</sup> = 81.627, QM = 3.134					
27	Intercept	-3.882	0.707	-5.267 to -2.496	-5.491	<0.001
	High LDH	3.392	1.137	1.164 to 5.621	2.984	0.003
	k = 8, $\tau^2$ = 0.315, I <sup>2</sup> = 51.385, QM = 8.904					
28	Intercept	-2.131	0.308	-2.735 to -1.527	-6.914	<0.001
	Low Albumin	0.994	0.517	-0.019 to 2.318	1.923	0.055
	k = 5, $\tau^2$ = 0.081, I <sup>2</sup> = 27.279, QM = 3.697					
29	Intercept	-6.561	1.654	-9.803 to -3.319	-3.967	<0.001
	High CRP	5.696	2.155	1.471 to 9.921	2.642	0.008
	k = 14, $\tau^2$ = 0.741, I <sup>2</sup> = 74.102, QM = 6.983					
30	Intercept	-2.584	0.805	-4.161 to -1.936	-3.209	0.001
	High procalcitonin	-6.018	4.132	-14.116 to 2.081	-1.456	0.145
	k = 10, $\tau^2$ = 2.030, I <sup>2</sup> = 78.770, QM = 2.121					
31	Intercept	-3.367	0.736	-4.808 to -1.925	-4.577	<0.001
	High D-dimer	6.185	2.671	0.950 to 11.421	2.315	0.021
	k = 5, $\tau^2$ = 0.221, I <sup>2</sup> = 39.400, QM = 5.361					
<b>Radiological Features on CT Thorax</b>						
32	Intercept	-2.481	0.621	-3.698 to -1.265	-3.998	<0.001
	No lesions on CT	-6.518	3.726	-13.821 to 2.786	-1.749	0.080
	k = 14, $\tau^2$ = 1.473, I <sup>2</sup> = 79.098, QM = 3.059					
33	Intercept	-2.430	1.574	-5.514 to 9.656	-1.544	0.123
	Patchy consolidations	-2.949	3.633	-10.070 to 4.171	-0.812	0.417
	k = 10, $\tau^2$ = 2.026, I <sup>2</sup> = 77.274, QM = 0.659					

**eTable 4. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Prevalence Critical Illness in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
34	Intercept	-1.955	0.893	-3.705 to -6.204	-2.188	0.029
	Ground glass opacities	-1.912	1.387	-4.630 to 8.856	-1.379	0.168
	k = 14, $\tau^2 = 1.354$ , I <sup>2</sup> = 81.205, QM = 1.901					
35	Intercept	-5.393	3.288	-11.838 to 1.452	-1.640	0.101
	Peripheral distribution	1.619	3.529	-5.297 to 8.536	0.459	0.646
	k = 5, $\tau^2 = 0.617$ , I <sup>2</sup> = 32.942, QM = 0.211					
36	Intercept	-4.371	1.735	-7.772 to -1.978	-2.519	0.012
	Bilateral or $\geq 3$ lobe involvement	1.857	2.445	-2.935 to 6.657	0.759	0.448
	k = 12, $\tau^2 = 1.547$ , I <sup>2</sup> = 84.184, QM = 0.577					

† Coefficients represent logit-transformed proportions; positive coefficients suggest increased risk and negative coefficients suggest decreased risk.

‡ Biochemical parameters have been interpreted as low / high based on reference ranges considered in each study.

**eTable 5. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Mortality Rate Among in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
<b>Demographic Variables</b>						
1	Intercept	-13.847	2.681	-19.101 to -8.593	-5.165	<0.001
	Age	0.198	0.052	0.096 to 9.299	3.838	<0.001
	k = 25, $\tau^2 = 0.506$ , I <sup>2</sup> = 50.639, QM = 14.733					
2	Intercept	-3.250	0.553	-4.334 to -2.166	-5.874	<0.001
	Age ≤ 18 years	-39.307	18.722	-76.002 to -2.613	-2.100	0.036
	k = 20, $\tau^2 = 0.755$ , I <sup>2</sup> = 57.711, QM = 4.408					
3	Intercept	-6.156	1.012	-8.140 to -4.172	-6.081	<0.001
	Age ≥ 60 years	7.499	2.949	1.720 to 13.278	2.543	0.011
	k = 14, $\tau^2 = 0.731$ , I <sup>2</sup> = 44.403, QM = 6.468					
4	Intercept	-4.422	1.938	-8.221 to -3.623	-2.281	0.023
	Female	-0.868	3.930	-8.570 to 6.834	-0.221	0.825
	k = 25, $\tau^2 = 2.986$ , I <sup>2</sup> = 84.794, QM = 0.049					
<b>Past Medical History</b>						
5	Intercept	-3.966	0.865	-5.660 to -2.271	-4.587	<0.001
	DM-2	-4.139	4.769	-13.485 to 5.257	-0.868	0.385
	k = 19, $\tau^2 = 2.493$ , I <sup>2</sup> = 85.131, QM = 0.754					
6	Intercept	-4.843	0.937	-6.680 to -3.396	-5.167	<0.001
	Hypertension	6.070	3.098	-0.002 to 12.143	1.959	0.050
	k = 17, $\tau^2 = 0.818$ , I <sup>2</sup> = 62.909, QM = 3.839					
7	Intercept	-5.658	1.528	-8.653 to -2.663	-3.703	<0.001
	Cardiac disease	6.298	5.635	-4.746 to 17.343	1.118	0.264
	k = 16, $\tau^2 = 3.590$ , I <sup>2</sup> = 87.325, QM = 1.249					
8	Intercept	-5.096	1.329	-7.701 to -2.491	-3.833	<0.001
	Chronic liver disease	2.410	21.686	-40.093 to 44.913	0.111	0.912
	k = 17, $\tau^2 = 3.515$ , I <sup>2</sup> = 84.824, QM = 0.012					
9	Intercept	-4.976	1.169	-7.267 to -2.685	-4.256	<0.001
	Chronic kidney disease	-4.095	24.503	-52.120 to 43.938	-0.167	0.867
	k = 17, $\tau^2 = 3.415$ , I <sup>2</sup> = 85.031, QM = 0.028					
10	Intercept	-5.202	1.169	-7.492 to -2.912	-4.452	<0.001
	Malignancy	25.193	22.794	-19.482 to 69.869	1.105	0.269
	k = 18, $\tau^2 = 2.874$ , I <sup>2</sup> = 86.440, QM = 1.222					
11	Intercept	-4.718	1.206	-7.081 to -2.355	-3.913	<0.001
	COPD	11.975	37.673	-61.863 to 85.813	0.318	0.751
	k = 10, $\tau^2 = 3.332$ , I <sup>2</sup> = 90.202, QM = 0.101					

**eTable 5. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Mortality Rate Among in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
<b>Presenting Symptoms</b>						
12	Intercept	-3.582	0.815	-5.179 to -1.985	-4.397	<0.001
	Asymptomatic	-22.825	23.869	-69.607 to 23.957	-0.956	0.339
	k = 10, $\tau^2$ = 0.832, I <sup>2</sup> = 53.265, QM = 0.914					
13	Intercept	-16.665	6.768	-29.930 to -3.401	-2.462	0.014
	Fever	13.979	7.552	-0.823 to 28.781	1.851	0.064
	k = 21, $\tau^2$ = 2.575, I <sup>2</sup> = 81.750, QM = 3.426					
14	Intercept	-4.380	1.630	-7.574 to -1.186	-2.688	0.007
	Cough	-0.590	2.693	-5.867 to 4.688	-0.219	0.827
	k = 22, $\tau^2$ = 2.526, I <sup>2</sup> = 79.906, QM = 0.048					
15	Intercept	-4.031	1.764	-7.488 to -9.574	-2.285	0.022
	Sore throat	-12.722	13.745	-39.662 to 14.219	-0.926	0.355
	k = 14, $\tau^2$ = 3.976, I <sup>2</sup> = 82.831, QM = 0.857					
16	Intercept	-4.512	1.018	-6.507 to -2.518	-4.434	<0.001
	Tachypnea	3.019	2.240	-1.371 to 7.419	1.348	0.178
	k = 6, $\tau^2$ = 0.000, I <sup>2</sup> = 0.000, QM = 1.816					
17	Intercept	-5.384	0.963	-7.272 to -3.497	-5.592	<0.001
	Dyspnea	5.208	2.959	-0.592 to 11.528	1.760	0.078
	k = 17, $\tau^2$ = 1.833, I <sup>2</sup> = 78.737, QM = 3.097					
18	Intercept	-5.809	1.825	-9.386 to -2.232	-3.183	0.001
	Myalgia	3.859	5.323	-6.575 to 14.292	0.725	0.469
	k = 13, $\tau^2$ = 3.173, I <sup>2</sup> = 78.683, QM = 0.525					
19	Intercept	-4.991	0.697	-6.357 to -3.625	-7.162	<0.001
	Fatigue	2.601	1.314	0.025 to 5.178	1.979	0.048
	k = 10, $\tau^2$ = 0.000, I <sup>2</sup> = 0.000, QM = 3.917					
20	Intercept	-3.100	0.975	-5.010 to -1.189	-3.180	0.001
	Headache	-13.603	10.138	-33.474 to 6.268	-1.342	0.180
	k = 15, $\tau^2$ = 2.078, I <sup>2</sup> = 83.381, QM = 1.800					
21	Intercept	-5.158	1.600	-8.294 to -2.223	-3.224	0.001
	Diarrhea	0.674	12.728	-24.272 to 25.629	0.053	0.958
	k = 18, $\tau^2$ = 4.168, I <sup>2</sup> = 87.268, QM = 0.003					
<b>Laboratory Investigations ‡</b>						
22	Intercept	-277.080	203424.495	-398981.762 to 398427.693	-0.001	0.999
	Nucleic acid test positive	272.246	203424.495	-398432.438 to 398976.929	0.001	0.999
	k = 18, $\tau^2$ = 2.967, I <sup>2</sup> = 85.532, QM = 0.000					

**eTable 5. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Mortality Rate Among in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
23	Intercept	-5.304	2.008	-9.239 to -1.369	-2.642	0.008
	Leukopenia	-2.851	4.864	-12.385 to 6.682	-0.586	0.558
	k = 14, $\tau^2 = 7.059$ , I2 = 89.937, QM = 0.344					
24	Intercept	-7.326	1.868	-10.987 to -3.665	-3.922	<0.001
	Leukocytosis	20.497	7.588	5.624 to 35.369	2.701	0.007
	k = 14, $\tau^2 = 0.790$ , I2 = 55.410, QM = 7.296					
25	Intercept	-5.628	2.680	-10.880 to -3.375	-2.100	0.036
	Thrombocytopenia	-2.645	12.249	-26.652 to 21.362	-0.216	0.829
	k = 8, $\tau^2 = 7.292$ , I2 = 89.313, QM = 0.047					
26	Intercept	-10.089	4.017	-17.961 to -2.216	-2.512	0.012
	Lymphopenia	8.553	6.098	-3.398 to 24.574	1.403	0.161
	k = 15, $\tau^2 = 6.297$ , I2 = 87.338, QM = 1.967					
27	Intercept	-9.907	3.336	-16.444 to -3.369	-2.970	0.003
	High LDH	8.923	4.123	0.842 to 17.604	2.164	0.030
	k = 9, $\tau^2 = 0.938$ , I2 = 46.607, QM = 4.684					
28	Intercept	-6.740	1.325	-9.336 to -4.143	-5.088	<0.001
	Low Albumin	4.782	1.433	1.973 to 7.591	3.337	<0.001
	k = 6, $\tau^2 = 0.000$ , I2 = 0.000, QM = 11.136					
29	Intercept	-22.970	10.385	-43.324 to -2.616	-2.212	0.027
	High CRP	23.196	11.885	-0.097 to 46.499	1.952	0.051
	k = 15, $\tau^2 = 1.120$ , I2 = 63.919, QM = 3.809					
30	Intercept	-6.882	4.270	-15.250 to 1.486	-1.612	0.107
	High procalcitonin	-12.881	22.821	-57.609 to 31.847	-0.564	0.572
	k = 10, $\tau^2 = 11.734$ , I2 = 89.835, QM = 0.319					
<b>Radiological Features on CT Thorax</b>						
32	Intercept	-2.321	0.316	-2.939 to -1.791	-7.344	<0.001
	No lesions on CT	-1941.342	3948.493	-9680.245 to 5797.561	-0.492	0.623
	k = 13, $\tau^2 = 0.000$ , I2 = 0.000, QM = 0.242					
33	Intercept	-4.454	2.631	-9.609 to 2.702	-1.693	0.090
	Patchy consolidations	-1.290	5.246	-11.572 to 8.992	-0.246	0.806
	k = 9, $\tau^2 = 2.859$ , I2 = 72.114, QM = 0.060					
34	Intercept	-1.341	1.554	-4.387 to 1.746	-0.863	0.388
	Ground glass opacities	-8.374	5.039	-18.250 to 1.552	-1.662	0.097
	k = 13, $\tau^2 = 2.225$ , I2 = 77.488, QM = 2.762					

**eTable 5. Results of All Univariate Meta-regression Analyses Examining the Moderator Effects of the Covariates on the Mortality Rate Among in COVID-19**

Model	Variable	Coefficient†	SE	95% CI	Z	p
35	Intercept	-9.953	4.723	-19.210 to -2.695	-2.107	0.035
	Bilateral or ≥ 3 lobe involvement	7.011	6.069	-4.883 to 18.956	1.155	0.248
k = 12, $\tau^2 = 3.840$ , I <sup>2</sup> = 86.622, QM = 1.335						

† Coefficients represent logit-transformed proportions; positive coefficients suggest increased risk and negative coefficients suggest decreased risk.

‡ Biochemical parameters have been interpreted as low / high based on reference ranges considered in each study.