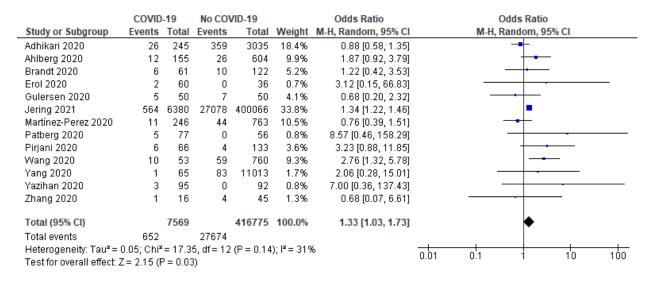
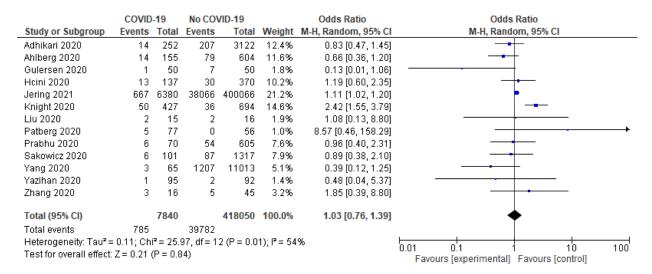
Appendix 4. Forest plots of summary crude odds ratio (OR) for the association between COVID-19 and pregnancy outcomes using random-effects models

4.1 COVID-19 vs no COVID-19

4.1.1 Association of COVID-19 with preeclampsia



4.1.2 Association of COVID-19 with gestational diabetes



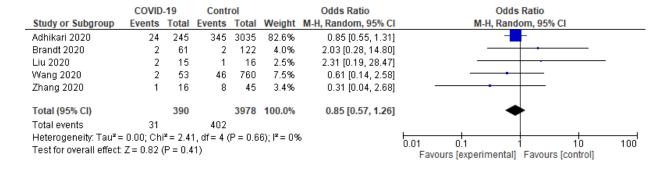
4.1.3 Association of COVID-19 with fetal distress

			COVID-19 Control			Odds Ratio	Odds	Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	lom, 95% CI		
Li 2020	2	17	6	121	23.9%	2.56 [0.47, 13.83]		-	
Prabhu 2020	5	70	26	605	61.3%	1.71 [0.64, 4.61]	_	 	
Zhang 2020	1	16	7	45	14.8%	0.36 [0.04, 3.20]	•	 	
Total (95% CI)		103		771	100.0%	1.50 [0.64, 3.53]	-		
Total events	8		39						
Heterogeneity: Tau² =	0.06; Ch	$i^2 = 2.1$	7, df = 2 (P = 0.3	4); $I^2 = 89$	6	0.01 0.1	1 10	100
Test for overall effect:	Z = 0.93	(P = 0.3)	35)				Favours [experimental]		100

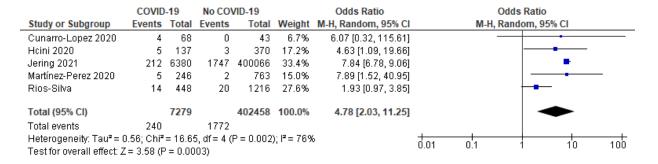
4.1.4. Association of COVID-19 with stillbirth

	COVID	-19	No CO	VID-19		Odds Ratio		(Odds Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, F	Random, 95% (CI	
Adhikari 2020	0	245	18	3035	4.5%	0.33 [0.02, 5.53]		-			
Ahlberg 2020	1	155	4	604	7.0%	0.97 [0.11, 8.78]			+	_	
Hcini 2020	7	137	4	370	17.8%	4.93 [1.42, 17.11]					
Jering 2021	34	6380	1289	400066	54.0%	1.66 [1.18, 2.33]			-		
Knight 2020	3	427	2	694	10.0%	2.45 [0.41, 14.71]					
Martínez-Perez 2020	3	246	1	763	6.6%	9.41 [0.97, 90.86]				-	
Total (95% CI)		7590		405532	100.0%	2.11 [1.14, 3.90]			•		
Total events	48		1318								
Heterogeneity: Tau² =	0.15; Chi ^a	²= 6.58	, df = 5 (F	P = 0.25; I	²= 24%		0.04		 	10	400
Test for overall effect: 2	Z = 2.36 (F	P = 0.02	2)				0.01	0.1	1	10	100

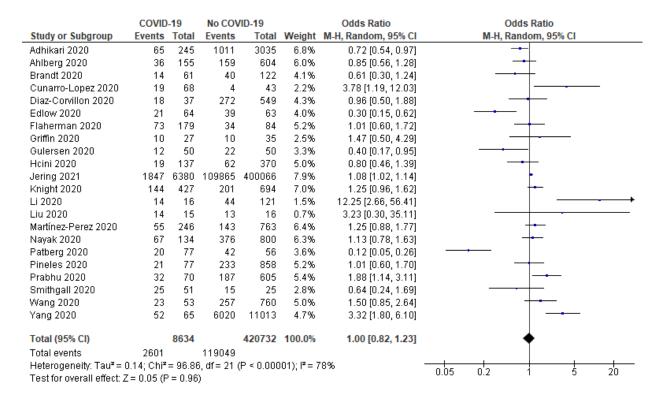
4.1.5. Association of COVID-19 with chorioamnionitis or intra-amniotic infection



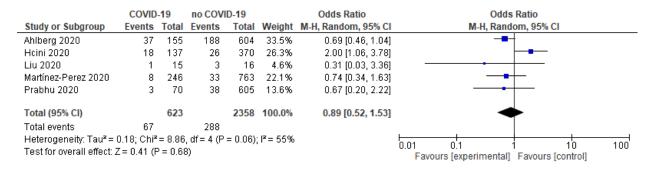
4.1.6. Association of COVID-19 with intensive care unit (ICU) admission



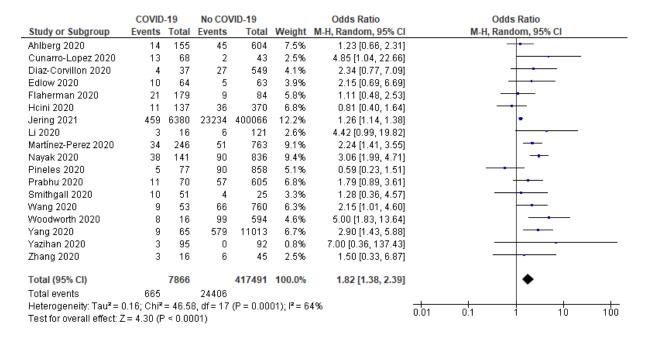
4.1.7. Association of COVID-19 with cesarean delivery



4.1.8. Association of COVID-19 with postpartum hemorrhage



4.1.9. Association of COVID-19 with preterm birth



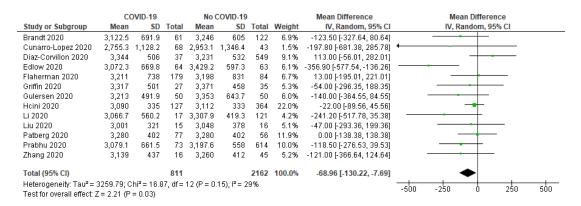
4.1.10. Association of COVID-19 with neonatal sex (male)

	COVID	-19	Cont	rol	Odds Ratio		Odds	Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight M-H, Random, 95% CI		M-H, Rando	om, 95% CI	
Edlow 2020	26	64	34	63	18.0%	0.58 [0.29, 1.18]		_	
Griffin 2020	13	27	14	35	9.0%	1.39 [0.51, 3.84]		-	
Liu 2020	9	15	6	16	4.5%	2.50 [0.59, 10.62]		•	
Prabhu 2020	36	73	315	614	34.5%	0.92 [0.57, 1.50]	-	_	
Yang 2020	36	65	5880	11013	33.9%	1.08 [0.66, 1.77]	-	_	
Total (95% CI)		244		11741	100.0%	0.97 [0.71, 1.33]	•		
Total events	120		6249						
Heterogeneity: Tau² =	0.01; Chi	$i^2 = 4.38$	B, df = 4 (P = 0.36); I ² = 9%		0.01 0.1	10	100
Test for overall effect:	Z = 0.16 ((P = 0.8)	17)				0.01 0.1 Favours [experimental]	l 10 Favours [control]	100

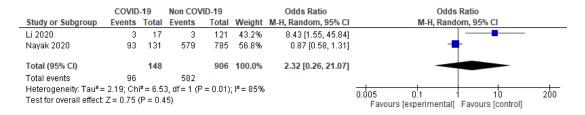
4.1.11. Association of COVID-19 with gestational age at birth (weeks)

	COVID-19			No Co	OVID-	19		Mean Difference	Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
Diaz-Corvillon 2020	38.6	1.9	37	38.8	1.7	549	7.7%	-0.20 [-0.83, 0.43]	
Edlow 2020	39	2	64	39.1	1	63	8.8%	-0.10 [-0.65, 0.45]	-
Flaherman 2020	38.3	2.6	179	38.2	2.8	84	6.8%	0.10 [-0.61, 0.81]	
Griffin 2020	38.9	1.5	27	39.3	1.3	35	6.8%	-0.40 [-1.11, 0.31]	
Gulersen 2020	39.3	1.2	50	39.3	1.4	50	9.3%	0.00 [-0.51, 0.51]	+
Li 2020	38	0.2	17	38	0.7	121	14.7%	0.00 [-0.16, 0.16]	<u>†</u>
Liu 2020	37.4	1.8	15	38.3	1.5	16	3.4%	-0.90 [-2.07, 0.27]	
Martínez-Perez 2020	38	3.8	246	39	4.8	763	8.3%	-1.00 [-1.58, -0.42]	
Patberg 2020	39.1	1	77	39.3	1.1	56	11.6%	-0.20 [-0.56, 0.16]	
Pirjani 2020	32.6	9.7	66	36.6	5.3	133	0.9%	-4.00 [-6.51, -1.49] *	
Prabhu 2020	38.9	1.9	70	39.1	1	605	10.2%	-0.20 [-0.65, 0.25]	
Wang 2020	38.1	2.9	53	38.9	2.1	760	5.9%	-0.80 [-1.59, -0.01]	
Zhang 2020	38.7	1.4	16	37.9	1.6	45	5.6%	0.80 [-0.03, 1.63]	-
Total (95% CI)			917			3280	100.0%	-0.24 [-0.49, 0.00]	◆
Heterogeneity: Tau ² = (0.10; Ch	j² = 31	0.92. ď	f=12 (P	= 0.0	02); l² =	61%		
Test for overall effect: Z				- 0					-4 -2 U 2 4
		,							Favours [experimental] Favours [control]

4.1.12. Association of COVID-19 with birth weight (grams)



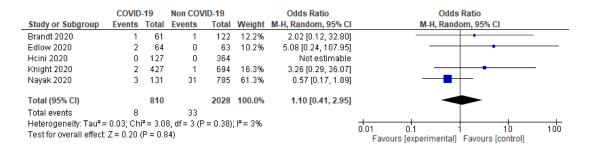
4.1.13. Association of COVID-19 with low birth weight



4.1.14. Association of COVID-19 with neonatal intensive care unit (NICU) admission

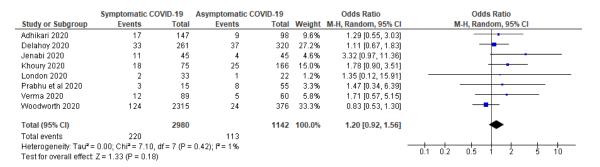
	COVID	-19	No COV	D-19		Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Brandt 2020	53	61	14	122	10.0%	51.11 [20.19, 129.37]	
Cunarro-Lopez 2020	14	68	3	43	9.2%	3.46 [0.93, 12.84]	
Flaherman 2020	31	179	13	84	10.4%	1.14 [0.56, 2.32]	-
Hcini 2020	3	127	12	364	9.2%	0.71 [0.20, 2.56]	
Knight 2020	64	244	37	703	10.7%	6.40 [4.13, 9.91]	-
Martínez-Perez 2020	23	246	18	763	10.5%	4.27 [2.26, 8.05]	
Nayak 2020	24	131	202	785	10.7%	0.65 [0.40, 1.04]	
Patberg 2020	6	77	6	56	9.4%	0.70 [0.21, 2.31]	
Pineles 2020	74	77	107	858	9.5%	173.13 [53.63, 558.89]	+
Prabhu 2020	13	73	68	614	10.5%	1.74 [0.91, 3.33]	 •
Total (95% CI)		1283		4392	100.0%	3.69 [1.39, 9.82]	-
Total events	305		480				
Heterogeneity: Tau ² = 2	2.27; Chi²	= 158.4	42, df = 9	(P < 0.0)	0001); l² =	= 94%	
Test for overall effect: Z	= 2.62 (F	= 0.00	19)				0.02 0.1 1 10 50

4.1.15. Association of COVID-19 with neonatal death



4.2 Symptomatic COVID-19 vs asymptomatic COVID-19

4.2.1. Association of symptomatic COVID-19 with gestational hypertension or preeclampsia



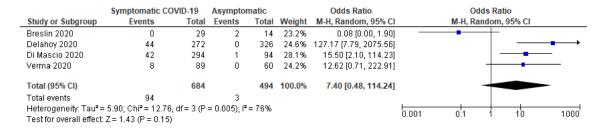
4.2.2. Association of symptomatic COVID-19 with gestational diabetes

	Symptomatic CO	Symptomatic COVID-19		Asymptomatic COVID-19		Odds Ratio		Odds Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, Rand	om, 95% CI	
Adhikari 2020	11	147	3	98	6.1%	2.56 [0.70, 9.43]		_	-	
Delahoy 2020	31	261	33	320	38.1%	1.17 [0.70, 1.97]		_	-	
Sakowicz 2020	4	77	2	24	3.3%	0.60 [0.10, 3.51]		-		
Verma 2020	5	89	5	60	6.2%	0.65 [0.18, 2.37]				
Woodworth 2020	141	2315	21	376	46.3%	1.10 [0.68, 1.76]		_	_	
Total (95% CI)		2889		878	100.0%	1.12 [0.82, 1.55]			•	
Total events	192		64							
Heterogeneity: Tau² =	0.00; Chi ² = 2.73,	df = 4 (P =	0.60); I² = 0%				0.01	0 1	10	100
Test for overall effect:	Z = 0.71 (P = 0.48))						avours [experimental]	Favours [control]	100

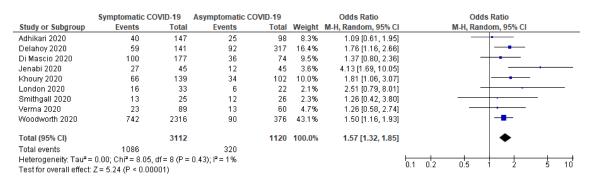
4.2.3. Association of symptomatic COVID-19 with mechanical ventilation

	Symptomatic CC	OVID-19	Asyptomatic CO	tomatic COVID-19 Odds Ratio						
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, Rando	om, 95% CI	
Delahoy 2020	23	272	0	326	26.2%	61.51 [3.72, 1017.50]				-
Di Mascio 2020	35	294	1	94	51.5%	12.57 [1.70, 93.03]			_	_
Diaz-Corvillon 2020	3	21	0	16	22.4%	6.24 [0.30, 130.07]			•	_
Total (95% CI)		587		436	100.0%	16.29 [3.88, 68.47]			•	-
Total events	61		1							
Heterogeneity: Tau ² =	: 0.00; Chi ² = 1.40, (df = 2 (P =	0.50); $I^2 = 0\%$				0.001	94	10	1000
Test for overall effect	Z = 3.81 (P = 0.000)	11)					0.001	0.1	10	1000

4.2.4. Association of symptomatic COVID-19 with intensive care unit (ICU) admission



4.2.5. Association of symptomatic COVID-19 with cesarean delivery

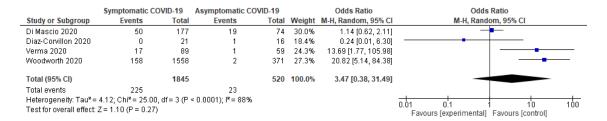


4.2.6. Association of symptomatic COVID-19 with preterm birth

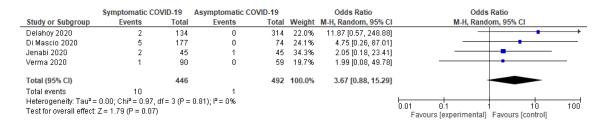
	Symptomatic Co	OVID-19	Asymptomatic CO	VID-19		Odds Ratio		(Odds Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, F	Random, 95	% CI	
Adhikari 2020	20	147	7	98	11.6%	2.05 [0.83, 5.04]			-		
Delahoy 2020	31	134	25	311	16.5%	3.44 [1.94, 6.11]			-	-	
Di Mascio 2020	60	189	10	77	13.9%	3.12 [1.50, 6.48]				-	
Jenabi 2020	12	45	6	45	9.4%	2.36 [0.80, 6.99]			+	_	
Khoury 2020	25	139	11	102	13.5%	1.81 [0.85, 3.88]			+-		
London 2020	9	33	0	22	2.0%	17.45 [0.96, 317.38]			-		
Smithgall 2020	6	25	4	26	6.7%	1.74 [0.43, 7.09]				_	
Verma 2020	14	89	2	60	6.0%	5.41 [1.18, 24.77]					
Woodworth 2020	297	2315	43	376	20.3%	1.14 [0.81, 1.60]			+		
Total (95% CI)		3116		1117	100.0%	2.29 [1.49, 3.53]			•		
Total events	474		108								
Heterogeneity: Tau ² =	= 0.21; Chi ² = 18.75	5, df = 8 (P	= 0.02); I ² = 57%				+			10	
Test for overall effect:			• •				0.005	0.1	1	10	200

4.2.7. Association of symptomatic COVID-19 with neonatal intensive care unit (NICU)

admission



4.2.8. Association of symptomatic COVID-19 with neonatal death

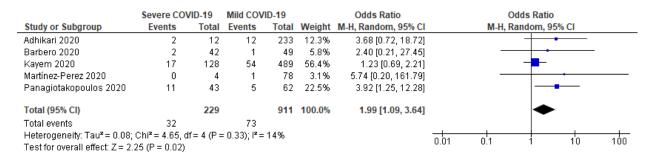


4.3 Severe COVID-19 vs mild COVID-19

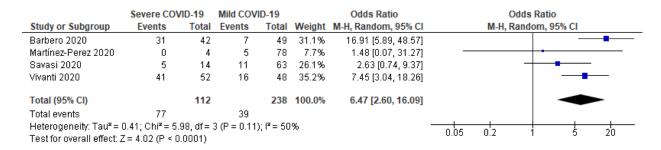
4.3.1. Association of severe COVID-19 with preeclampsia

	Severe COV	/ID-19	Mild COV	ID-19		Odds Ratio		Od	ds Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, Ra	ndom, 95% CI	
Adhikari 2020	2	12	24	233	39.1%	1.74 [0.36, 8.42]		_		
Barbero 2020	3	42	0	49	10.8%	8.77 [0.44, 174.89]		-	-	
Brandt 2020	2	7	4	54	26.1%	5.00 [0.73, 34.46]			+	-
Martínez-Perez 2020	1	4	3	78	15.0%	8.33 [0.66, 105.71]			+	
Mendoza 2020	1	8	0	34	8.9%	13.80 [0.51, 372.88]			-	
Total (95% CI)		73		448	100.0%	4.16 [1.55, 11.15]			•	
Total events	9		31							
Heterogeneity: Tau ^z =	0.00; Chi ² = 2.	24, df=	4 (P = 0.69	$ \cdot ^2 = 09$	6		-		1 10	
Test for overall effect: 2	Z = 2.84 (P = 0)	1.005)					0.005	0.1	1 10	200

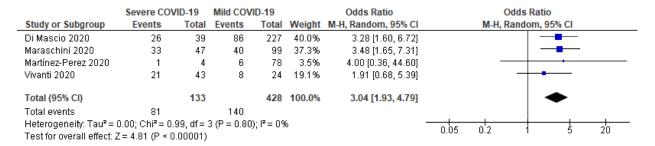
4.3.2. Association of severe COVID-19 with gestational diabetes



4.3.3. Association of severe COVID-19 with abnormal liver function



4.3.4. Association of severe COVID-19 with lymphopenia



Appendix 4, as supplied by the authors. Appendix to: Wei SQ, Bilodeau-Bertrand M, Liu S, et al. The impact of COVID-19 on pregnancy outcomes: a systematic review and meta-analysis. *CMAJ* 2021. doi: 10.1503/cmaj.202604. Copyright © 2021 The Author(s) or their employer(s). To receive this resource in an accessible format, please contact us at cmajgroup@cmaj.ca.

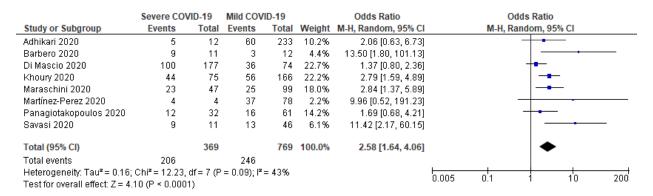
4.3.5. Association of severe COVID-19 with intensive care unit (ICU) admission

	Severe CO	/ID-19	Mild COV	ID-19		Odds Ratio		Odds Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, Random, 95% CI	
Brandt 2020	1	7	0	54	8.8%	25.15 [0.93, 683.58]		-	
Di Mascio 2020	42	294	1	94	24.1%	15.50 [2.10, 114.23]			
Maraschini 2020	5	47	2	99	34.1%	5.77 [1.08, 30.96]		-	
Panagiotakopoulos 2020	13	43	1	62	22.3%	26.43 [3.30, 211.67]			_
Savasi 2020	5	11	0	46	10.6%	78.69 [3.88, 1595.10]		-	
Total (95% CI)		402		355	100.0%	15.46 [5.79, 41.23]		•	
Total events	66		4						
Heterogeneity: Tau² = 0.00;	$Chi^2 = 2.80, c$	f= 4 (P=	= 0.59); l² =	0%			0.004		1000
Test for overall effect: $Z = 5$.	47 (P < 0.000	01)					0.001	0.1 1 10	1000

4.3.6. Association of severe COVID-19 with mechanical ventilation

	Severe CO	VID-19	Mild COV	ID-19		Odds Ratio		Odds Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI		M-H, Random, 95% CI	
Di Mascio 2020	35	294	1	94	13.0%	12.57 [1.70, 93.03]			_
Khoury 2020	9	75	0	166	6.4%	47.57 [2.73, 829.00]			
Maraschini 2020	31	47	8	99	58.7%	22.04 [8.60, 56.50]		-	
Martínez-Perez 2020	2	4	4	78	10.7%	18.50 [2.04, 167.48]			_
Panagiotakopoulos 2020	6	43	1	62	11.2%	9.89 [1.15, 85.43]		•	-
Total (95% CI)		463		499	100.0%	19.31 [9.38, 39.72]		•	
Total events	83		14						
Heterogeneity: Tau ² = 0.00;	$Chi^2 = 1.02, 0$	f= 4 (P =	= 0.91);	0%			0.004	- 1 1 1	4000
Test for overall effect: $Z = 8$.	04 (P < 0.000	M1)					0.001	0.1 1 10	1000

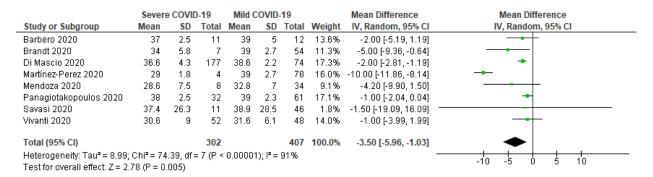
4.3.7. Association of severe COVID-19 with cesarean delivery



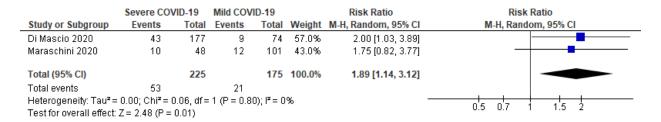
4.3.8. Association of severe COVID-19 with preterm birth

	Severe CO\	/ID-19	Mild COV	ID-19		Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Adhikari 2020	5	12	22	233	10.0%	6.85 [2.00, 23.41]	
Barbero 2020	5	11	3	12	6.7%	2.50 [0.43, 14.61]	
Brandt 2020	4	7	3	54	6.1%	22.67 [3.40, 151.02]	
Di Mascio 2020	60	189	10	77	14.2%	3.12 [1.50, 6.48]	_ -
Kayem 2020	37	58	13	123	13.7%	14.91 [6.80, 32.70]	_ -
Khoury 2020	18	73	18	166	14.2%	2.69 [1.31, 5.54]	
Maraschini 2020	15	47	13	99	13.1%	3.10 [1.33, 7.23]	_ -
Martínez-Perez 2020	4	4	21	78	3.1%	24.07 [1.24, 466.10]	
Panagiotakopoulos 2020	5	32	9	61	10.3%	1.07 [0.33, 3.51]	 -
Savasi 2020	4	11	8	46	8.5%	2.71 [0.64, 11.52]	-
Total (95% CI)		444		949	100.0%	4.29 [2.41, 7.63]	•
Total events	157		120				
Heterogeneity: Tau² = 0.47;	Chi ² = 23.33,	df = 9 (P	= 0.005);1	r= 61%			0.005
Test for overall effect: Z = 4.	.96 (P < 0.000	01)					0.005 0.1 1 10 200

4.3.9. Association of severe COVID-19 with gestational age at birth



4.3.10. Association of severe COVID-19 with low birth weight



4.3.11. Association of severe COVID-19 with neonatal intensive care unit (NICU) admission

	Severe COVID-19		Mild COVID-19		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Di Mascio 2020	50	177	19	74	25.3%	1.14 [0.62, 2.11]	-
Kayem 2020	27	59	10	131	23.6%	10.21 [4.48, 23.26]	_ -
Maraschini 2020	13	48	10	101	22.8%	3.38 [1.36, 8.41]	
Martínez-Perez 2020	3	4	19	78	11.4%	9.32 [0.91, 94.93]	•
Savasi 2020	4	11	5	46	17.0%	4.69 [1.00, 21.85]	•
Total (95% CI)		299		430	100.0%	3.95 [1.43, 10.95]	•
Total events	97		63				
Heterogeneity: Tau ² = 0.97; Chi ² = 19.27, df = 4 (P = 0.0007); I ² = 79%							
Test for overall effect: Z = 2.64 (P = 0.008) 0.02 0.1 1 10 50							

4.3.12. Association of severe COVID-19 with neonatal death

