Supplementary Table S1. The characteristics of the included studies.

Author	Study period	Region	Diagnostic markers	Study design	No. of patients	Gender		Mean/median age	BMI	FPG	eGFR	NLR cutoff
						M	F					
Chen 2022	2019.8-2019.12	China	UACR/eGFR	Case-control	183	144	39	54.75±11.54	NA	NA	NA	1.56
Olores 2023	2018.1-2018.7	Filipino	Hemodialysis	Cohort (All)	63	35	28	63.38±11.107	NA	NA	NA	
				Cohort I (NLR<3.5)	39	21	18	63.51±10.933	24.87±5.29	NA	NA	3.5
				Cohort II (NLR≥3.5)	24	14	10	63.17±11.620	25.36±4.50	NA	NA	
Li 2022	2018.1-2021.1	China	UACR	Case-control I (DM)	290	154	136	59.04±10.63	24.91±3.29	8.54±2.32	102.26±12.40	
				Case-control II (DN1)	190	103	87	60.23±11.39	25.09±3.57	8.76±2.06	96.75±8.84	2.46
				Case-control III (DN2)	175	94	81	61.13±9.66	25.25±3.05	9.12±2.04	76.65±6.68	
Kawamoto 2019	2017.4-2017.6	Japan	eGFR	Case-control I (DM)	265	140	125	72±11	24.1±3.7	NA	71.8±7.5	
				Case-control II (DN1)	77	37	40	81±7	25.0±3.5	NA	52.8±4.3	NA
				Case-control III (DN2)	44	22	22	81±9	24.9±4.0	NA	37.7±4.7	
Suvarna 2023	2021.1-2021.6	India	NA	Case-control I (DM)	100	65	35	55.2±12	NA	NA	NA	NA
				Case-control II (DN)	100	64	36	59.8±10	NA	NA	NA	
Wan 2020	2018	China	UACR/eGFR	Cohort I (NLR≤1.382)	1194	464	730	66.16±8.38	24.67±3.51	7.46±2.13	94.17±14.70	1.382
				Cohort II	1211	530	681	67.06±8.61	25.07±3.60	7.66±2.40	92.82±15.57	1.777

				(1.382<NLR≤1.777)								
				Cohort III (1.777<NLR ≤2.319)	1198	577	621	66.69±8.40	25.26±3.58	7.90±2.45	92.35±16.51	2.319
				Cohort IV (NLR>2.319)	1194	640	554	68.73±9.04	24.84±3.67	8.06±2.77	87.30±20.12	
Liu 2023	2020.1-2021.8	China	UACR/eGFR	Case-control I (DM)	107	53	54	57. 1±11.3	23. 55±3.20	10. 08±3.20	NA	
				Case-control II (DN1)	74	41	33	60. 6±12.7	24. 00±3.96	6. 11±2.76	NA	NA
				Case-control III (DN2)	69	36	33	58. 5±10.5	23. 78±3.31	7. 46±3.20	NA	
Tutan 2023	2021.1-2023.3	Turkey	UPCR	All	327	148	179	61 (23-92)#	NA	14.22 (3.39-37.44) #	NA	
				Case-control I (DM)	219	101	118	60 (23-85)#	NA	14 (4.72-30.28) #	NA	1.93
				Case-control II (DN)	108	47	61	65 (25-92)#	NA	14.89 (3.39-37.44) #	NA	
Zhang 2018	2009-2017	China	eGFR	All	247	171	76	51±8.89	NA	NA	56.53±34.01	
				Cohort I (NLR<2.42)	122	80	42	52±9.63	NA	NA	66.78±37.41	2.42
				Cohort II (NLR≥2.42)	125	91	34	51±8.15	NA	NA	50.03±27.58	
Kamrul-Hasan 2020	2018.7-2019.6	Bangladesh	UACR/eGFR	Case-control I (DM)	162	81	81	48.6±9.6	26.6 ±4.1	9.2 ±3.0	89.5±17.0	NA
				Case-control II (DN)	150	60	90	51.9±11.9	26.5 ±4.8	10.3 ±4.1	75.6±25.1	

Chollangi 2023	2020.12-2022.7	India	UAC	Case-contro I (DM)	45	19	26	62.40±9.9	NA	NA	NA	2.13
				Case-contro II (DN)	45	18	27	62.09±9.6	NA	NA	NA	
Mattared 2019	2017.3-2017.9	Egypt	UAC	Case-control I (DM)	30	NA	NA	60.40±9.98	NA	11.19±3.10	99.13±12.72	NA
				Case-control II (DN)	30	NA	NA	59.10±8.36	NA	12.15±3.10	93.37±9.33	
Ciray 2015	2013.10-2014.2	Turkey	UACR/eGFR	All	114	41	73	59.7±11.3	30.3±4.91	NA	NA	
				Case-control I (DM)	52	41	73	56.9±10.1	30.9±4.61	NA	89.8±21.3	NA
				Case-control II (DN)	62			62.1±11.7	31.1±7.02	NA	67.2±28.2	
Singh 2021	2019.6-2020.6	India	UAC	Case-control I (DM)	178	109	69	55.59±10.64	NA	NA	98.78±11.88	3.28
				Case-control II (DN)	146	86	60	56.66±10.23	NA	NA	35.27±29.79	
Jaaban 2021	2017-2019	Syria	UACR	Case-control I (DM)	67	39	28	54±10	27.66±2.4	NA	107.7±14.75	
				Case-control II (DN1)	50	29	21	58±7	27.27±2.37	NA	87.04±12.2	2.2
				Case-control III (DN2)	41	24	17	61±6	27.5±1.39	NA	70.32±7.23	
Gurmu 2022	2019.10-2020.4	Ethiopia	UAC	Case-control I (DM)	154	71	83	53.85±11.900	24.87±1.47	10.81±1.56	NA	NA
				Case-control II (DN)	45	17	28	60.36±10.30	25.35±1.77	11.50±4.19	NA	
Huang 2014	2013.1-2014.1	China	UAE	Case-control	253	113	140	50.32±10.24	24.41±3.73	NA	NA	NA
Assulyn 2020	2014-2017	Israel	UAC	Case-control I (DM1)	53	24	29	64±11	28.81±5.64	NA	NA	2.54
				Case-control II (DM2)	57	27	30	61±10	29.06±4.73	NA	NA	
				Case-control III (DN)	58	33	25	67±10	29.80±4.97	NA	NA	

Azab 2012	2007.12-2009.12	America	eGFR	Cohort I (NLR<1.6)	110	33	77	56.05±12.06	31.53±7.76	NA	88.44±26.01	1.6
				Cohort II (1.6≤NLR≤2.36)	115	40	75	60.03±11.47	31.45±7.83	NA	76.64±27.56	2.3
				Cohort III (NLR>2.36)	113	49	64	58.18±10.20	33.91±8.19	NA	77.71±22.64	
Huang 2017	2014.1-2015.6	China	UACR	Case-control I (DM)	134	72	62	54.22±10.27	24.20±2.77	NA	NA	
				Case-control II (DN1)	74	48	26	55.46±10.78	25.80±3.88	NA	NA	1.758
				Case-control III (DN2)	113	66	47	60.03±10.31	24.89±3.47	NA	NA	
Akase 2020	2017.4-2017.6	Japan	eGFR	Cohort I (0.65≤ NLR≤1.57)	120	62	58	73±11	25.2±3.8	NA	67.7±12.7	0.65
				Cohort II (1.58 ≤ NLR≤2.32)	119	60	59	75±10	24.8±3.3	NA	63.4±13.9	1.58
				Cohort III (2.33≤ NLR≤15.3)	119	62	57	76±10	23.3±3.8	NA	61.8±15.4	2.33
Bloch 2020	2018.2-2020.2	Pakistan	UAC	Case-control I (DN)	61	30	31	53.00±11.23	NA	9.58±2.28	85.70±27.7	NA
				Case-control II (DM)	71	38	33	51.05±11.21	NA	8.84±2.28	95.99±27.79	
Subramani 2023	2021.11-2022.4	India	UACR	Case-control I (DM)	67	39	28	54±10	27.66±2.4	NA	107.7±14.75	
				Case-control II (DN1)	50	29	21	58±7	27.27±2.37	NA	87.04±12.2	2.2
				Case-control III (DN2)	41	24	17	61±6	27.5±1.39	NA	70.32±7.23	
Khandare 2017	2015.3-2016.3	India	UAE	Case-control I (DN)	56	25	31	52.29±11.45	26.25±4.41	9.64±2.33	85.71±27.72	NA
				Case-control II (DM)	59	26	33	50.05±11.29	26.07±4.11	8.9±2.33	96.2±28.23	

Gupta 2018	2018.4-2018.6	India	UACR	Case-control I (DM)	100	162	138	48.6±4.2	24.7±3.4	NA	118.2±32.4	NA
				Case-control II (DN1)	129			47.6±5.8	24.1±4.1	NA	101±28.2	
				Case-control III (DN2)	71			48.2±54.8	23.2±3.9	NA	88.0±34.2	
Ge 2023	2019.10-2022.1	China	UACR	Case-control I (DM)	273	187	86	56 (49, 64)*	24. 9±3.2	8.14 (6.51, 10.26)*	106.52 (100.18, 116.27)*	NA
				Case-control II (DN1)	120	83	37	57 (49, 66)*	26. 0±3.1	8.59 (6.37, 11.40)*	104. 07 (92. 74, 115.84)*	
				Case-control III (DN2)	70	48	22	59 (49, 65)*	25. 6±3.7	7.52 (5.57, 10.23)*	73. 50 (27.83, 103.32)*	
Xu 2016	2011.10-2014.4	China	UACR	Case-control I (DM)	86	48	38	44.41±10.81	25.39±3.79	10.45±2.93	NA	NA
				Case-control II (DN)	74	48	26	49.22±12.71	25.35±2.94	10.83±2.64	NA	
Ao 2017	2014-2016	China	eGFR	Case-control I (RFD)	100	56	44	70.6±7.6	25.28±6.29	NA	NA	NA
				Case-control II (DN)	100	55	45	56.4±8.5	26.99±3.34	NA	NA	
Cao 2020	2018.10-2019.6	China	UACR	Case-control I (DN)	14	14	0	46.57±9.75	24.67±1.97	NA	60.27±7.30	NA
				Case-control III (RFD)	59	36	23	56.14±9.57	26.13±3.37	NA	67.96±21.42	
Chen 2024	2018.1-2023.6	China	eGFR	Case-control	100	68	32	56.06±2.11	22.73±1.04	NA	NA	NA
Chen 2023	2017.5-2021.3	China	eGFR	Case-control I (RFD)	52	31	21	63.14±10.23	NA	NA	56.24±14.93	3.12
				Case-control II (DN)	69	44	25	62.11±11.09	NA	NA	88.86±18.37	
Fan 2022	2020.11	China	NA	Case-control	53	23	30	52.67±14.8	NA	NA	NA	4.01
Li 2024	1999-2018	American	DEATH	Case-control I (DN)	1122	583	539	67.00 (60.00, 74.00)*	31.60 (27.88,	7.11 (5.61, 9.48)*	48.17 (35.88, 56.20)*	NA

									36.61)*			
				Case-control II (DEATH)	921	424	497	74.00 (66.00, 80.00)*	29.64 (26.84, 34.74)*	7.27 (5.72, 10.10)*	40.44 (27.37, 50.08)*	
Luo 2022	2015.4-2020.10	China	eGFR	Case-control I (RFD)	53	28	25	60.17±8.32	NA	8.37+1.12	45.44±9.48	3.5
				Case-control II (DN)	44	27	17	61.91±8.13	NA	8.03±1.16	71.03±7.08	
Shao 2022	2018.1-2021.4	China	Scr	Case-control I (DN)	41	30	10	52.98±10.86	NA	7.84 (5.38, 8.70)*	117.18 (93.65, 156.45)*	
				Case-control II (RFD1)	40	21	19	51.90±9.87	NA	7.63 (5.32, 9.87)*	86.84 (62.79, 121.25)*	3.6
				Case-control III (RFD2)	45	32	13	51.40±9.26	NA	7.42 (5.70, 8.13)*	39.12 (28.09, 60.91)*	
Su 2024	2021.2-2024.2	China	UAER	Case-control I (DN)	49	46	34	62.49±4.06	23.38±1.50	NA	82.40±7.26	NA
				Case-control II (RFD)	31	NA	NA	NA	NA	NA	61.32±6.09	
Sun 2023	2019.1-2021.12	China	UACR	Case-control	125	99	26	52.84±10.70	25.44±3.33	7.28±3.68	52.45 (23.15, 80.89)*	2.63
Wang 2022	2021.10-2022.6	China	UACR	Case-control I (DN)	45	25	20	58.00±10.75	24.78±3.17	7.32±2.21	101.38 (94.01, 118.94)*	1.925
				Case-control II (RFD)	45	25	20	56.44±14.38	24.89±5.20	7.72±3.87	81.72 (72.66, 96.33)*	
Zhang 2019	2012.7-2018.6	China	UAER	Case-control I (DN)	30	16	14	57.53±9.61	24.73 (23.81, 27.44)*	8.66±2.75	143.32±33.22	2.29
				Case-control II (RFD1)	29	18	11	63.41±10.94	27.13 (23.77,	8.01±3.63	36.01±9.78	

						28.66)*		
	Case-control III (RFD2)	31	22	9	62.32±8.18	23.94 (20.50, 26.94)*	10.70±4.41	6.71±4.77

Abbreviation: NLR, neutrophil-to-lymphocyte ratio; BMI, body mass index; FPG, fasting plasma glucose; RFD, renal function deterioration; eGFR, estimated glomerular filtration rate; UACR, urinary albumin-to-creatinine ratio; UAC, urinary albumin concentration; UAER, urinary albumin excretion rate; UAE, urinary albumin excretion; UPCR, urinary protein-to-creatinine ratio; NA, not available; #, median±range; *, median±interquartile range; NA, not available.

Supplementary Table S2. Quality evaluation of the eligible studies with Newcastle–Ottawa scale.

Study	Selection				Comparability		Outcome			NOS	Study	Confounders adjusted
	S1	S2	S3	S4	C1	C2	O1	O2	O3	scores	quality	
Chen 2022	*	*	*	*	-	*	*	*	*	8	high	age, gender
Olores 2023	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, blood pressure
Li 2022	*	*	*	*	-	-	*	*	*	7	high	age, gender, BMI, blood pressure
Kawamoto 2018	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, blood pressure
Suvarna1 2023	*	*	*	*	-	*	*	*	*	8	high	--
Wan 2020	*	*	*	*	-	-	*	*	*	7	high	age, gender, BMI, blood pressure, HbA1c, duration of diabetes
Liu 2023	*	*	*	*	-	*	*	*	*	8	high	gender, BMI
Tutan 2023	*	*	*	*	-	*	*	*	*	8	high	gender, HbA1c, FPG
Zhang 2019	*	*	*	*	-	-	*	*	*	7	high	age, gender, blood pressure, HbA1c
Kamrul-Hasan 2020	*	*	*	*	-	-	*	*	*	7	high	gender, BMI, blood pressure, duration of diabetes
Chollang 2023	*	*	*	*	-	*	*	*	*	8	high	age, gender, HbA1c
Mattared 2019	*	*	*	*	-	*	*	*	*	8	high	age
Ciray 2015	*	*	*	*	-	*	*	*	-	7	high	age, HbA1c, duration of diabetes, eGFR
Singh 2020	*	*	*	*	-	*	*	*	*	8	high	age, gender, HbA1c, duration of diabetes
Jaaban 2021	*	*	*	*	-	*	*	*	*	8	high	gender, BMI
Gurmu 2022	-	-	*	*	-	*	*	*	*	6	moderate	gender, BMI, FPG
Huang 2014	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI
Assulyn 2020	*	*	*	*	-	*	*	*	*	8	high	BMI
Azab 2012	*	*	*	*	-	*	*	*	*	8	high	blood pressure
Huang 2017	*	*	*	*	-	-	*	*	*	7	high	age, gender, BMI, blood pressure, HbA1c, UACR
Akase 2020	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, blood pressure, duration of diabetes, UACR
Bloch 2020	*	*	*	*	-	*	*	*	*	8	high	age, gender, HbA1c

Subramani 2023	*	*	*	*	-	*	*	*	*	8	high	gender, BMI
Khandare 2017	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, HbA1c, FPG
Gupta 2018	*	*	*	*	-	*	*	*	*	8	high	age, BMI, HbA1c
Ge 2023	*	*	*	*	-	*	*	*	*	8	high	age, gender, HbA1c, FPG
Xu 2016	*	*	*	*	-	*	*	*	*	8	high	gender, BMI, blood pressure, Scr
Aao 2017	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, blood pressure, HbA1c, duration of diabetes, Scr
Cao 2020	*	*	*	*	-	*	*	*	*	8	high	gender, BMI, blood pressure, HbA1c
Chen 2024	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI
Chen 2023	*	*	*	*	-	*	*	*	*	8	high	age, gender, blood pressure, HbA1c, duration of diabetes, FPG, Scr
Fan 2022	*	*	*	*	-	*	*	*	*	8	high	age, gender, duration of diabetes
Li 2024	*	*	*	*	-	-	*	*	*	7	high	age, gender, BMI, blood pressure, HbA1c, FPG, eGFR, Scr
Luo 2022	*	*	*	*	-	*	*	*	*	8	high	age, gender, blood pressure, HbA1c, duration of diabetes, FPG
Shao 2022	*	*	*	*	-	*	*	*	*	8	high	age, gender
Su 2024	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, duration of diabetes
Sun 2023	*	*	*	*	-	-	*	*	*	7	high	age, gender, BMI, duration of diabetes
Wang 2022	*	*	*	*	-	*	*	*	*	8	high	age, gender, BMI, blood pressure, HbA1c, FPG
Zhang 2019	*	*	*	*	-	-	*	*	*	7	high	age

"*" indicates that the criterion was met; "-" indicates that the criterion was not met.

S1, representativeness; S2, selection of non-exposed; S3, ascertainment of exposure; S4, outcome not present at start; C1, comparability on main factors; C2, comparability on other factors; O1, assessment of outcome; O2, follow-up ≥6month; O3, adequacy of follow-up.

NOS scores, Newcastle-Ottawa scale scores; BMI, body mass index; HbA1c, hemoglobin A1c; FPG, fasting plasma glucose; eGFR, estimated glomerular filtration rate; UACR, urine albumin-to-creatinine ratio; Scr, serum creatinine.

Supplementary Table S3. Studies contributing to heterogeneity and results after removing the outlier studies

1. NLR (continuous) vs. DN risk				
	Studies contributing to heterogeneity	Results after removing the outlier studies		
		SMD [95%CI]	*P* value	I^2
Overall	Assulyn 2020 B, Chen 2022, Gupta 2018 B, Gurmu 2022, Huang 2014, Jaaban 2021 B, Kamrul-Hasan 2020, Liu 2023 B, Subramani 2023 B	1.08 [0.94, 1.21]	< 0.00001	36%
Region				
South Asia	Gupta 2018 B, Gupta 2018 B, Kamrul-Hasan 2020	1.22 [1.06, 1.39]	< 0.00001	0%
East Asia	Chen 2022, Huang 2014, Li 2022, Liu 2023 B	0.68 [0.38, 0.99]	< 0.0001	NA
west Asia	Assulyn 2020 B, Jaaban 2021 B	0.90 [0.53, 1.27]	< 0.00001	44%
Age, years				
≥ 60	Assulyn 2020 B, Chollangi 2023	1.04 [0.77, 1.32]	< 0.00001	NA
< 60	Gurmu 2022, Gupta 2018 B, Subramani 2023 B, Jaaban 2021 B, Liu 2023 B, Liu 2023 A, Chen 2022, Huang 2014, Kamrul-Hasan 2020	1.19 [1.03, 1.34]	< 0.00001	0%

NLR cut-off				
≥ 2.4	Assulyn 2020 B, Li 2022	0.95 [0.57, 1.33]	< 0.00001	NA
< 2.4	Subramani 2023 B, Jaaban 2021 B, Chen 2022	1.15 [0.91, 1.38]	< 0.00001	0%
BMI, kg/m²				
≥ 25	Subramani 2023 B, Jaaban 2021 B, Assulyn 2020 B, Kamrul-Hasan 2020	1.07 [0.94, 1.20]	< 0.00001	0%
< 25	Gurmu 2022, Gupta 2018 B, Liu 2023 B, Liu 2023 A, Huang 2014	1.30 [1.02, 1.59]	< 0.00001	NA
FPG, mmol/L				
≥ 9	Gurmu 2022, Kamrul-Hasan 2020	1.18 [0.94, 1.43]	< 0.00001	0%
< 9	Liu 2023 A, Liu 2023 B	1.11 [0.95, 1.28]	< 0.00001	NA

NLR, neutrophil-to-lymphocyte ratio; DN, diabetic nephropathy; SMD, standardized mean difference; CI, confidence interval; BMI, body mass index; FPG, fasting plasma glucose; NA, not available.

2. NLR (continuous) vs. deterioration in renal function				
	Studies contributed to heterogeneity	Results after removing the outlier studies		
		SMD [95%CI]	*P* value	I^2
Overall	Su 2024, Li 2022, Cao 2020	1.05 [0.88, 1.22]	< 0.00001	39%
Age, years				
≥ 60	Su 2024, Zhang 2019b, Li 2022	0.87 [0.65, 1.08]	< 0.00001	0%
< 60	Cao 2020	1.08 [0.88, 1.29]	< 0.00001	38%
BMI, kg/m²				
≥ 25	Subramani 2023, Jaaban 2021, Cao 2020	0.65 [0.43, 0.86]	< 0.00001	34%
< 25	Su 2024	0.98 [0.76, 1.20]	< 0.00001	26%
Diagnostic markers				
eGFR	NA	0.83 [0.65, 1.01]	< 0.00001	0%
UACR	Subramani 2023, Jaaban 2021, Cao 2020	0.70 [0.49, 0.92]	< 0.00001	32%

others	NA	1.28 [1.03, 1.53]	< 0.00001	0%

NLR, neutrophil-to-lymphocyte ratio; SMD, standardized mean difference; CI, confience interval; BMI, body mass index; FPG, fasting plasma glucose; eGFR, estimated glomerular filtration rate; UACR, urinary albumin-to-creatinine ratio; NA, not available.

Supplementary Table S4. PRISMA_2020_checklist

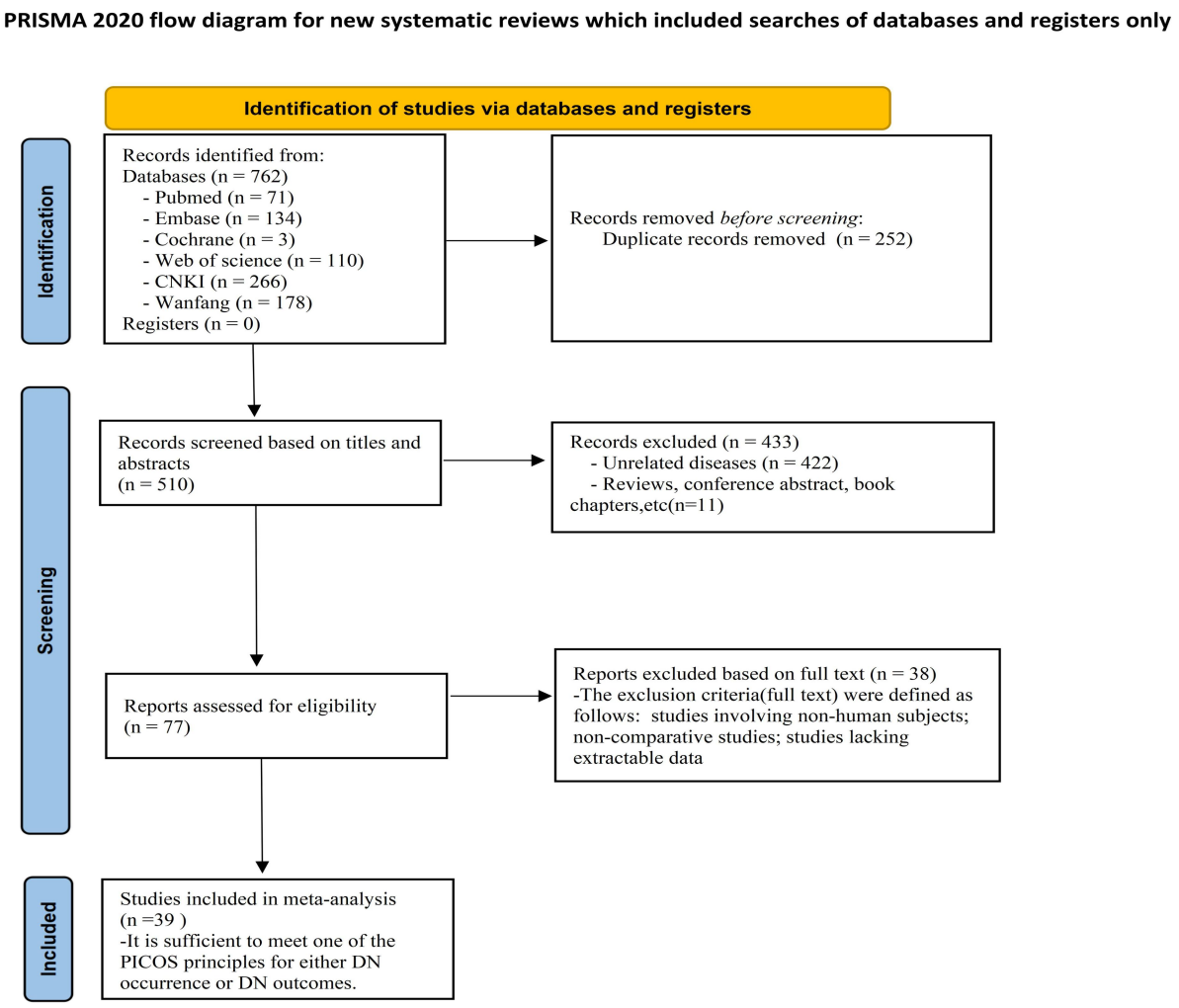
Section and Topic	Item #	Checklist item	Location where item is reported (page)
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	2-3
Objectives	4	**Provide an explicit statement of the objective(s) or question(s) the review addresses.**	3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	3-4
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.	3
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	3
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.	4
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.	4
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	4

Section and Topic	Item #	Checklist item	Location where item is reported (page)
		sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	
	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.	4
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.	4
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.	4
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)).	5, Supplementary Table S2
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	4
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	4
	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.	4
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	4
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	4
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	4
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	4

Section and Topic	Item #	Checklist item	Location where item is reported (page)
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.	5, Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	5
Study characteristics	17	Cite each included study and present its characteristics.	5, Supplementary Table S1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	7
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.	5-6, Table 1-3
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	5-6
	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.	5-6
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	7
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	7, Figure 5
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	7
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	7

Section and Topic	Item #	Checklist item	Location where item is reported (page)
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	7-8
	23b	Discuss any limitations of the evidence included in the review.	10
	23c	Discuss any limitations of the review processes used.	10
	23d	Discuss implications of the results for practice, policy, and future research.	10
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.	3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	3
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	10
Competing interests	26	Declare any competing interests of review authors.	1
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.	10

Supplementary Figure S1. PRISMA_2020_flow diagram



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