

Supplementary Data

Table S1. Information of 88 risk loci associate with gastroesophageal reflux disease.

SNP	EA	NEA	EAF	Beta	SE	P-value	Chr
rs10010963	C	T	0.383567	0.0166	0.0057	4.92E-08	4
rs1011407	A	G	0.878372	0.0327	0.0085	1.09E-08	2
rs10133111	G	A	0.837004	-0.0358	0.0075	1.35E-10	14
rs1021363	A	G	0.358008	0.0255	0.0058	5.1E-10	10
rs10242223	A	G	0.330202	0.0347	0.0059	3.79E-08	7
rs10789931	C	T	0.882356	-0.0426	0.0087	2.09E-08	11
rs10837002	C	G	0.64878	-0.0256	0.0058	4.03E-08	11
rs11645288	G	A	0.808675	-0.0282	0.0071	2.78E-08	16
rs11762636	C	A	0.819718	0.0413	0.0076	1.88E-16	7
rs11953061	C	T	0.661092	-0.0217	0.0062	0.000000031	5
rs12204714	C	T	0.367777	0.0196	0.0058	7.92E-09	6
rs12357321	G	A	0.688913	-0.0219	0.0061	1.33E-09	10
rs12453010	C	T	0.605197	-0.0385	0.0057	1.75E-09	17
rs12598916	C	G	0.725202	0.0322	0.0063	6.87E-10	16
rs12967855	A	G	0.329565	0.0251	0.006	1.09E-12	18
rs12997558	G	A	0.641249	-0.0215	0.0058	3.04E-08	2
rs13107325	C	T	0.925555	-0.0546	0.0106	2.2E-14	4
rs1334297	G	A	0.265751	0.0205	0.0063	1.14E-12	13
rs13409451	A	G	0.607597	0.0144	0.0057	1.93E-08	2
rs1431196	A	G	0.571568	-0.0236	0.0056	2.65E-11	18
rs1479405	C	T	0.6783	-0.0317	0.006	9.85E-10	12
rs1510719	T	C	0.616561	0.0338	0.0057	3.84E-15	4
rs1592757	G	C	0.644228	-0.0143	0.0058	6E-10	5
rs1596747	A	G	0.505864	-0.0274	0.0056	1E-10	2
rs1716171	C	T	0.209976	-0.0265	0.0068	7.82E-11	12
rs17379561	A	T	0.855609	-0.0451	0.0079	1.08E-14	1
rs17701934	T	C	0.562896	0.0256	0.0056	0.000000046	14
rs1883842	T	G	0.720745	-0.0283	0.0062	9.27E-09	20
rs1937450	T	G	0.462261	-0.0323	0.0056	7.07E-11	1
rs1942262	G	A	0.708574	-0.0272	0.0061	2.6E-09	18
rs2016933	C	G	0.269947	0.0263	0.0063	1.04E-08	3
rs2023878	C	T	0.807623	0.0418	0.0071	3.04E-09	19
rs2043539	G	A	0.58134	-0.0177	0.0056	2.24E-08	7
rs205262	A	G	0.732783	-0.0305	0.0063	1.38E-10	6
rs2106353	G	T	0.768549	-0.038	0.0067	1.37E-10	7
rs2145318	T	A	0.513358	-0.0311	0.0059	2.03E-13	6
rs215614	G	A	0.370275	0.0261	0.0058	4.08E-11	7
rs2164300	C	T	0.476721	0.0179	0.0056	4.13E-08	4
rs2183588	A	G	0.350555	-0.0211	0.0058	1.22E-08	21
rs2240326	G	A	0.526225	0.0306	0.0056	1.13E-22	3
rs2358016	C	G	0.501887	-0.0222	0.0056	4.17E-09	2
rs2396133	A	G	0.524671	-0.0266	0.0056	1.11E-09	7
rs2396766	G	A	0.52692	-0.0307	0.0056	2.33E-11	7
rs2734839	C	T	0.393307	0.0185	0.0057	8.79E-09	11
rs2782641	G	A	0.387331	-0.0145	0.0057	4.33E-08	1
rs2815749	A	G	0.199026	-0.0285	0.007	1.07E-10	1
rs2834005	T	C	0.685	-0.0329	0.006	9.42E-09	21
rs2838771	G	C	0.353279	0.023	0.0058	2.91E-08	21
rs324769	C	T	0.550821	0.0173	0.0056	3.05E-08	12
rs329122	G	A	0.580369	0.0196	0.0056	3.05E-09	5
rs3766823	G	A	0.828533	-0.0347	0.0074	7.09E-10	1
rs3793577	A	G	0.461721	-0.0197	0.0056	2.49E-08	9
rs3863241	C	T	0.47304	-0.0304	0.0056	1.49E-11	8
rs4300861	C	T	0.61792	-0.0237	0.0057	5.43E-10	2
rs4382592	T	G	0.300476	0.0172	0.0061	8.2E-09	9
rs4713692	C	T	0.632192	0.0198	0.0058	3.07E-08	6
rs4851239	C	T	0.620419	0.0345	0.0057	3.24E-11	2

rs569356	A	G	0.859165	0.0338	0.008	4.07E-08	1
rs6441814	G	A	0.529368	0.0264	0.0059	3.86E-09	3
rs6711584	G	A	0.547981	-0.0238	0.0056	2.66E-11	2
rs6780459	A	T	0.253378	-0.0303	0.0064	3.14E-08	3
rs6939294	C	T	0.771219	0.0252	0.0066	2.71E-10	6
rs7032155	C	A	0.40815	-0.02	0.0057	1.63E-08	9
rs7206608	C	G	0.677073	-0.029	0.006	1.46E-08	16
rs7241572	G	A	0.790899	-0.0249	0.007	9.49E-10	18
rs7527682	A	G	0.46275	0.0267	0.0056	3.13E-08	1
rs7541875	A	G	0.573931	-0.0301	0.0056	1.61E-08	1
rs7600261	C	T	0.693609	-0.0211	0.0061	9.47E-11	2
rs7612999	G	A	0.754662	-0.0261	0.0065	0.000000049	3
rs761777	A	G	0.745966	-0.0325	0.0068	4.71E-10	10
rs7675588	C	A	0.205365	0.0364	0.0069	0.000000018	4
rs7685686	A	G	0.577647	0.0117	0.0056	1.14E-08	4
rs773109	G	A	0.664731	0.0305	0.0059	8.71E-14	12
rs7942368	C	T	0.785341	0.0277	0.0069	9.54E-09	11
rs861575	T	C	0.575854	-0.0242	0.0057	1.63E-08	1
rs903678	G	A	0.660588	-0.0128	0.0059	4.89E-08	1
rs903959	T	A	0.600738	-0.0248	0.0057	2.99E-09	8
rs920559	C	G	0.849012	-0.0356	0.0078	2.06E-08	4
rs9372625	G	A	0.616958	0.0303	0.0058	2.62E-14	6
rs9373363	A	G	0.746369	0.0294	0.0065	4.13E-09	6
rs942065	G	A	0.365955	-0.0219	0.0058	8.45E-10	14
rs9517313	G	C	0.616783	-0.0241	0.0057	2.05E-11	13
rs9540720	A	G	0.52114	-0.0265	0.0056	3.01E-08	13
rs9542729	C	G	0.79756	0.0275	0.007	1.41E-09	13
rs957345	C	G	0.459765	-0.026	0.0056	1.72E-11	14
rs9615905	C	T	0.541807	-0.0231	0.0056	1.21E-08	22
rs9636202	G	A	0.73337	0.0324	0.0063	1.51E-10	19
rs9940128	G	A	0.578245	-0.0076	0.0056	8.06E-12	16

SNP: single-nucleotide polymorphism; EA: effect allele; NEA: other allele; EAF: effect allele frequency; SE: standard error; Chr: chromosome.

Table S2. Details of studies of some risk factors for chronic chronic respiratory diseases.

Trait	ID	First author	Consortium	Study participants	Sex	Population	Year	PubmedID
Smoking status: Previous	ukb-a-224	Neale	Neale Lab	336024	Males and Females	European	2017	NA
Smoking status: Current	ukb-a-225	Neale	Neale Lab	336024	Males and Females	European	2017	NA
Smoking initiation	ieu-b-4877	Liu M	GSCAN	607291	Males and Females	European	2019	30643251
Exposure to tobacco smoke at home	ukb-a-19	Neale	Neale Lab	305723	Males and Females	European	2017	NA
Exposure to tobacco smoke outside home	ukb-a-20	Neale	Neale Lab	286550	Males and Females	European	2017	NA
Obesity class 1(BMI: 30-34.9 kg/m ²)	ieu-a-90	Berndt SI	GIANT	98697	Males and Females	European	2013	23563607
Obesity class 2(BMI: 35-39.9 kg/m ²)	ieu-a-91	Berndt SI	GIANT	72546	Males and Females	European	2013	23563607
Obesity class 3(BMI:≥ 40 kg/ m ²)	ieu-a-92	Berndt SI	GIANT	50364	Males and Females	European	2013	23563607
Alcohol consumption	ieu-a-1283	Clarke	UK Biobank	112117	Males and Females	European	2017	28937693
Type 2 diabetes	ebi-a-GCST006867	Xue A	NA	61892	Males and Females	European	2018	30054458
Vitamin D deficiency	finn-b-E4_VIT_D_DEF	NA	FinnGen	209789	Males and Females	European	2021	NA
Lung function (FEV1/FVC)	ebi-a-GCST007431	Shrine N	NA	321047	Males and Females	European	2019	30804560

Table S3. F-statistics and power estimations for chronic chronic respiratory diseases.

Trait	Number of cases	Number of controls	Samplesize	Sex	Power	F-statistics
Asthma	56167	352255	408422	Males and Females	1	1398.09
Idiopathic pulmonary fibrosis	4125	20464	24589	Males and Females	1	1387.73
Chronic obstructive pulmonary disease	16410	283589	299999	Males and Females	1	1373.25
Chronic bronchitis	1035	283589	284624	Males and Females	1	1373.25
Bronchiectasis	1967	283589	285556	Males and Females	0.3	1374.25

Table S4. Results of all Mendelian Randomization analyses estimates for associations between GERD and risk of chronic respiratory diseases.

outcome	exposure	method	nsnp	Stand-Error	OR	95% CI		P-value
Asthma	GERD	MR Egger	71	0.20	0.91	0.62	1.33	0.628
Asthma	GERD	Weighted median	71	0.05	1.36	1.23	1.51	<0.001
Asthma	GERD	Inverse variance weighted	71	0.06	1.39	1.25	1.56	<0.001
Asthma	GERD	Simple mode	71	0.15	1.64	1.23	2.20	0.001
Asthma	GERD	Weighted mode	71	0.11	1.20	0.97	1.49	0.097
Idiopathic pulmonary fibrosis	GERD	MR Egger	58	0.53	4.40	1.57	12.34	0.007
Idiopathic pulmonary fibrosis	GERD	Weighted median	58	0.21	1.27	0.84	1.93	0.255
Idiopathic pulmonary fibrosis	GERD	Inverse variance weighted	58	0.16	1.43	1.05	1.95	0.022
Idiopathic pulmonary fibrosis	GERD	Simple mode	58	0.45	1.09	0.45	2.66	0.843
Idiopathic pulmonary fibrosis	GERD	Weighted mode	58	0.43	1.20	0.52	2.78	0.666
Chronic obstructive pulmonary disease	GERD	MR Egger	69	0.28	0.94	0.55	1.61	0.813
Chronic obstructive pulmonary disease	GERD	Weighted median	69	0.09	1.44	1.20	1.73	<0.001
Chronic obstructive pulmonary disease	GERD	Inverse variance weighted	69	0.08	1.65	1.41	1.93	<0.001
Chronic obstructive pulmonary disease	GERD	Simple mode	69	0.23	1.33	0.85	2.09	0.210
Chronic obstructive pulmonary disease	GERD	Weighted mode	69	0.21	1.28	0.84	1.94	0.256
Chronic bronchitis	GERD	MR Egger	69	0.78	2.94	0.63	13.65	0.172
Chronic bronchitis	GERD	Weighted median	69	0.33	1.84	0.97	3.50	0.062
Chronic bronchitis	GERD	Inverse variance weighted	69	0.22	1.78	1.15	2.74	0.009
Chronic bronchitis	GERD	Simple mode	69	0.67	1.60	0.43	5.95	0.484
Chronic bronchitis	GERD	Weighted mode	69	0.62	1.82	0.54	6.09	0.337
Bronchiectasis	GERD	MR Egger	69	0.57	0.86	0.28	2.61	0.785
Bronchiectasis	GERD	Weighted median	69	0.23	0.85	0.54	1.34	0.484
Bronchiectasis	GERD	Inverse variance weighted	69	0.16	0.93	0.68	1.27	0.645
Bronchiectasis	GERD	Simple mode	69	0.50	0.75	0.28	2.00	0.568
Bronchiectasis	GERD	Weighted mode	69	0.46	0.71	0.29	1.74	0.455

OR: Odds ratio; CI: Confidence interval.

Table S5. Results of Mendelian Randomization analyses for associations between genetically predicted potential risk factors and chronic respiratory diseases.

Associations between genetically predicted risk factors and Asthma.							
outcome	exposure	method	nsnp	OR	95% CI		P-value
Asthma	Type 2 diabetes	MR Egger	115	0.99	0.91	1.08	0.786
Asthma	Type 2 diabetes	Weighted median	115	0.99	0.95	1.02	0.426
Asthma	Type 2 diabetes	Inverse variance weighted	115	1.02	0.98	1.06	0.316
Asthma	Type 2 diabetes	Simple mode	115	1.02	0.94	1.10	0.700
Asthma	Type 2 diabetes	Weighted mode	115	1.00	0.96	1.04	0.941
Asthma	Alcohol consumption	MR Egger	4	0.84	0.13	5.57	0.871
Asthma	Alcohol consumption	Weighted median	4	1.05	0.74	1.50	0.789
Asthma	Alcohol consumption	Inverse variance weighted	4	1.04	0.76	1.41	0.808
Asthma	Alcohol consumption	Simple mode	4	1.12	0.72	1.75	0.652
Asthma	Alcohol consumption	Weighted mode	4	1.08	0.73	1.61	0.727
Asthma	Obesity class 1(BMI: 30-34.9 kg/m ²)	MR Egger	17	1.09	0.99	1.19	0.086
Asthma	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted median	17	1.05	1.01	1.10	0.018
Asthma	Obesity class 1(BMI: 30-34.9 kg/m ²)	Inverse variance weighted	17	1.06	1.03	1.09	<0.001
Asthma	Obesity class 1(BMI: 30-34.9 kg/m ²)	Simple mode	17	1.07	1.00	1.13	0.056
Asthma	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted mode	17	1.06	1.01	1.12	0.043
Asthma	Obesity class 2(BMI: 35-39.9 kg/m ²)	MR Egger	11	1.00	0.93	1.08	0.927
Asthma	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted median	11	1.04	1.00	1.07	0.029
Asthma	Obesity class 2(BMI: 35-39.9 kg/m ²)	Inverse variance weighted	11	1.05	1.02	1.08	<0.001
Asthma	Obesity class 2(BMI: 35-39.9 kg/m ²)	Simple mode	11	1.04	0.99	1.10	0.155
Asthma	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted mode	11	1.04	1.00	1.08	0.088
Asthma	Obesity class 3(BMI: ≥ 40 kg/ m ²)	Inverse variance weighted	2	1.02	0.98	1.05	0.329
Asthma	Smoking initiation	MR Egger	84	0.88	0.53	1.44	0.602
Asthma	Smoking initiation	Weighted median	84	1.17	1.06	1.29	0.002
Asthma	Smoking initiation	Inverse variance weighted	84	1.16	1.05	1.28	0.003
Asthma	Smoking initiation	Simple mode	84	1.25	0.99	1.59	0.062
Asthma	Smoking initiation	Weighted mode	84	1.22	0.98	1.52	0.075
Asthma	Exposure to tobacco smoke at home	Wald ratio	1	1.46	0.14	15.09	0.753
Asthma	Exposure to tobacco smoke outside home	Inverse variance weighted	2	1.83	0.32	10.39	0.495
Asthma	Smoking status: Previous	MR Egger	18	0.65	0.01	31.63	0.831
Asthma	Smoking status: Previous	Weighted median	18	1.50	0.82	2.74	0.193
Asthma	Smoking status: Previous	Inverse variance weighted	18	1.01	0.52	1.97	0.978
Asthma	Smoking status: Previous	Simple mode	18	1.72	0.62	4.84	0.314
Asthma	Smoking status: Previous	Weighted mode	18	1.67	0.59	4.72	0.350
Asthma	Smoking status: Current	MR Egger	15	50.28	0.26	9591.88	0.167
Asthma	Smoking status: Current	Weighted median	15	0.93	0.33	2.60	0.887
Asthma	Smoking status: Current	Inverse variance weighted	15	0.78	0.22	2.74	0.693
Asthma	Smoking status: Current	Simple mode	15	0.74	0.13	4.14	0.740
Asthma	Smoking status: Current	Weighted mode	15	0.81	0.13	4.86	0.819
Associations between genetically predicted risk factors and Idiopathic pulmonary fibrosis.							
outcome	exposure	method	nsnp	OR	95% CI		P-value
Idiopathic pulmonary fibrosis	Type 2 diabetes	MR Egger	107	1.16	0.95	1.42	0.146

Idiopathic pulmonary fibrosis	Type 2 diabetes	Weighted median	107	1.10	0.95	1.27	0.190
Idiopathic pulmonary fibrosis	Type 2 diabetes	Inverse variance weighted	107	0.99	0.90	1.08	0.814
Idiopathic pulmonary fibrosis	Type 2 diabetes	Simple mode	107	0.93	0.70	1.23	0.617
Idiopathic pulmonary fibrosis	Type 2 diabetes	Weighted mode	107	1.09	0.95	1.25	0.208
Idiopathic pulmonary fibrosis	Alcohol consumption	MR Egger	240	12.31	0.00	44263.58	0.655
Idiopathic pulmonary fibrosis	Alcohol consumption	Weighted median	240	0.58	0.13	2.51	0.463
Idiopathic pulmonary fibrosis	Alcohol consumption	Inverse variance weighted	240	0.55	0.15	2.04	0.368
Idiopathic pulmonary fibrosis	Alcohol consumption	Simple mode	240	0.43	0.06	2.93	0.477
Idiopathic pulmonary fibrosis	Alcohol consumption	Weighted mode	240	0.67	0.12	3.65	0.685
Idiopathic pulmonary fibrosis	Obesity class 1(BMI: 30-34.9 kg/m ²)	MR Egger	3	1.25	0.78	2.00	0.382
Idiopathic pulmonary fibrosis	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted median	3	1.04	0.84	1.29	0.720
Idiopathic pulmonary fibrosis	Obesity class 1(BMI: 30-34.9 kg/m ²)	Inverse variance weighted	3	1.05	0.88	1.24	0.605
Idiopathic pulmonary fibrosis	Obesity class 1(BMI: 30-34.9 kg/m ²)	Simple mode	3	1.16	0.81	1.67	0.425
Idiopathic pulmonary fibrosis	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted mode	3	1.06	0.81	1.38	0.688
Idiopathic pulmonary fibrosis	Obesity class 2(BMI: 35-39.9 kg/m ²)	MR Egger	14	1.03	0.65	1.64	0.893
Idiopathic pulmonary fibrosis	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted median	14	0.96	0.83	1.12	0.621
Idiopathic pulmonary fibrosis	Obesity class 2(BMI: 35-39.9 kg/m ²)	Inverse variance weighted	14	1.07	0.92	1.23	0.374
Idiopathic pulmonary fibrosis	Obesity class 2(BMI: 35-39.9 kg/m ²)	Simple mode	14	0.96	0.75	1.23	0.768
Idiopathic pulmonary fibrosis	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted mode	14	0.95	0.80	1.13	0.598
Idiopathic pulmonary fibrosis	Obesity class 3(BMI:≥ 40 kg/ m ²)	Inverse variance weighted	11	0.99	0.87	1.13	0.900
Idiopathic pulmonary fibrosis	Smoking initiation	MR Egger	11	0.36	0.05	2.86	0.340
Idiopathic pulmonary fibrosis	Smoking initiation	Weighted median	11	0.87	0.57	1.32	0.504
Idiopathic pulmonary fibrosis	Smoking initiation	Inverse variance weighted	11	1.09	0.73	1.63	0.676
Idiopathic pulmonary fibrosis	Smoking initiation	Simple mode	11	0.60	0.24	1.50	0.276

Idiopathic pulmonary fibrosis	Smoking initiation	Weighted mode	2	0.66	0.29	1.51	0.324
Idiopathic pulmonary fibrosis	Exposure to tobacco smoke at home	Wald ratio	71	26.54	0.00	662036.21	0.526
Idiopathic pulmonary fibrosis	Exposure to tobacco smoke outside home	Inverse variance weighted	71	135.71	0.15	124182.66	0.158
Idiopathic pulmonary fibrosis	Smoking status: Previous	MR Egger	71	0.02	0.00	8094064.47	0.715
Idiopathic pulmonary fibrosis	Smoking status: Previous	Weighted median	71	2.16	0.15	30.62	0.570
Idiopathic pulmonary fibrosis	Smoking status: Previous	Inverse variance weighted	71	2.24	0.21	23.65	0.503
Idiopathic pulmonary fibrosis	Smoking status: Previous	Simple mode	1	0.48	0.00	82.81	0.785
Idiopathic pulmonary fibrosis	Smoking status: Previous	Weighted mode	1	0.55	0.00	72.12	0.811
Idiopathic pulmonary fibrosis	Smoking status: Current	MR Egger	17	0.00	0.00	758.96	0.305
Idiopathic pulmonary fibrosis	Smoking status: Current	Weighted median	17	0.24	0.00	23.17	0.544
Idiopathic pulmonary fibrosis	Smoking status: Current	Inverse variance weighted	17	0.10	0.00	2.25	0.145
Idiopathic pulmonary fibrosis	Smoking status: Current	Simple mode	17	3.21	0.00	46127.99	0.815
Idiopathic pulmonary fibrosis	Smoking status: Current	Weighted mode	17	6.10	0.00	76124.42	0.713
Associations between genetically predicted risk factors and Chronic obstructive pulmonary disease.							
outcome	exposure	method	nsnp	OR	95% CI		P-value
Chronic obstructive pulmonary disease	Type 2 diabetes	MR Egger	113	0.91	0.82	1.00	0.056
Chronic obstructive pulmonary disease	Type 2 diabetes	Weighted median	113	0.95	0.89	1.02	0.161
Chronic obstructive pulmonary disease	Type 2 diabetes	Inverse variance weighted	113	0.99	0.95	1.03	0.515
Chronic obstructive pulmonary disease	Type 2 diabetes	Simple mode	113	0.97	0.84	1.12	0.684
Chronic obstructive pulmonary disease	Type 2 diabetes	Weighted mode	113	0.96	0.89	1.03	0.278
Chronic obstructive pulmonary disease	Alcohol consumption	MR Egger	4	27.01	0.07	10724.85	0.393
Chronic obstructive pulmonary disease	Alcohol consumption	Weighted median	4	0.83	0.41	1.70	0.617
Chronic obstructive pulmonary disease	Alcohol consumption	Inverse variance weighted	4	0.79	0.29	2.15	0.642
Chronic obstructive pulmonary disease	Alcohol consumption	Simple mode	4	0.58	0.19	1.76	0.411
Chronic obstructive pulmonary disease	Alcohol consumption	Weighted mode	4	0.86	0.38	1.92	0.731

Chronic obstructive pulmonary disease	Obesity class 1(BMI: 30-34.9 kg/m ²)	MR Egger	16	1.07	0.88	1.30	0.502
Chronic obstructive pulmonary disease	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted median	16	0.99	0.91	1.09	0.886
Chronic obstructive pulmonary disease	Obesity class 1(BMI: 30-34.9 kg/m ²)	Inverse variance weighted	16	1.03	0.96	1.10	0.479
Chronic obstructive pulmonary disease	Obesity class 1(BMI: 30-34.9 kg/m ²)	Simple mode	16	0.96	0.83	1.11	0.590
Chronic obstructive pulmonary disease	Obesity class 1(BMI: 30-34.9 kg/m ²)	Weighted mode	16	0.99	0.90	1.09	0.836
Chronic obstructive pulmonary disease	Obesity class 2(BMI: 35-39.9 kg/m ²)	MR Egger	11	1.06	0.90	1.26	0.487
Chronic obstructive pulmonary disease	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted median	11	1.02	0.95	1.09	0.675
Chronic obstructive pulmonary disease	Obesity class 2(BMI: 35-39.9 kg/m ²)	Inverse variance weighted	11	1.03	0.98	1.09	0.292
Chronic obstructive pulmonary disease	Obesity class 2(BMI: 35-39.9 kg/m ²)	Simple mode	11	1.06	0.94	1.20	0.358
Chronic obstructive pulmonary disease	Obesity class 2(BMI: 35-39.9 kg/m ²)	Weighted mode	11	1.02	0.94	1.10	0.665
Chronic obstructive pulmonary disease	Obesity class 3(BMI:≥ 40 kg/ m ²)	Inverse variance weighted	2	0.98	0.93	1.04	0.593
Chronic obstructive pulmonary disease	Smoking initiation	MR Egger	83	2.29	1.07	4.88	0.036
Chronic obstructive pulmonary disease	Smoking initiation	Weighted median	83	1.71	1.42	2.05	<0.001
Chronic obstructive pulmonary disease	Smoking initiation	Inverse variance weighted	83	1.72	1.48	2.00	<0.001
Chronic obstructive pulmonary disease	Smoking initiation	Simple mode	83	1.27	0.72	2.25	0.411
Chronic obstructive pulmonary disease	Smoking initiation	Weighted mode	83	1.56	0.95	2.57	0.081
Chronic obstructive pulmonary disease	Exposure to tobacco smoke at home	Wald ratio	1	0.10	0.00	3.75	0.213
Chronic obstructive pulmonary disease	Exposure to tobacco smoke outside home	Inverse variance weighted	2	5.92	1.76	19.93	0.004
Chronic obstructive pulmonary disease	Smoking status: Previous	MR Egger	18	0.02	0.00	2.96	0.142
Chronic obstructive pulmonary disease	Smoking status: Previous	Weighted median	18	0.79	0.26	2.41	0.683
Chronic obstructive pulmonary disease	Smoking status: Previous	Inverse variance weighted	18	0.47	0.19	1.20	0.115
Chronic obstructive pulmonary disease	Smoking status: Previous	Simple mode	18	0.96	0.10	9.33	0.970
Chronic obstructive pulmonary disease	Smoking status: Previous	Weighted mode	18	0.88	0.09	8.32	0.912
Chronic obstructive pulmonary disease	Smoking status: Current	MR Egger	15	1665.23	0.00	2216941 56760.41	0.451

Chronic obstructive pulmonary disease	Smoking status: Current	Weighted median	15	264.52	26.07	2683.99	<0.001
Chronic obstructive pulmonary disease	Smoking status: Current	Inverse variance weighted	15	135.63	5.93	3100.91	0.002
Chronic obstructive pulmonary disease	Smoking status: Current	Simple mode	15	459.29	16.91	12475.81	0.003
Chronic obstructive pulmonary disease	Smoking status: Current	Weighted mode	15	368.10	9.52	14230.92	0.007

Associations between genetically predicted risk factors and Chronic bronchitis.

outcome	exposure	method	nsnp	OR	95% CI		P-value
Chronic bronchitis	Type 2 diabetes	MR Egger	113	1.00	0.73	1.36	0.989
Chronic bronchitis	Type 2 diabetes	Weighted median	113	1.03	0.82	1.30	0.772
Chronic bronchitis	Type 2 diabetes	Inverse variance weighted	113	0.91	0.80	1.03	0.146
Chronic bronchitis	Type 2 diabetes	Simple mode	113	1.14	0.75	1.74	0.539
Chronic bronchitis	Type 2 diabetes	Weighted mode	113	1.05	0.81	1.37	0.694
Chronic bronchitis	Alcohol consumption	MR Egger	4	0.00	0.00	5993.38	0.482
Chronic bronchitis	Alcohol consumption	Weighted median	4	0.34	0.02	5.35	0.441
Chronic bronchitis	Alcohol consumption	Inverse variance weighted	4	0.25	0.03	2.29	0.218
Chronic bronchitis	Alcohol consumption	Simple mode	4	0.83	0.02	28.94	0.923
Chronic bronchitis	Alcohol consumption	Weighted mode	4	0.50	0.03	9.61	0.680
Chronic bronchitis	Obesity class 1(BMI: 30-34.9 kg/m²)	MR Egger	16	0.98	0.52	1.83	0.949
Chronic bronchitis	Obesity class 1(BMI: 30-34.9 kg/m²)	Weighted median	16	0.92	0.67	1.26	0.610
Chronic bronchitis	Obesity class 1(BMI: 30-34.9 kg/m²)	Inverse variance weighted	16	0.89	0.71	1.11	0.286
Chronic bronchitis	Obesity class 1(BMI: 30-34.9 kg/m²)	Simple mode	16	1.04	0.67	1.61	0.856
Chronic bronchitis	Obesity class 1(BMI: 30-34.9 kg/m²)	Weighted mode	16	0.93	0.65	1.33	0.696
Chronic bronchitis	Obesity class 2(BMI: 35-39.9 kg/m²)	MR Egger	11	0.81	0.48	1.37	0.451
Chronic bronchitis	Obesity class 2(BMI: 35-39.9 kg/m²)	Weighted median	11	0.92	0.73	1.17	0.504
Chronic bronchitis	Obesity class 2(BMI: 35-39.9 kg/m²)	Inverse variance weighted	11	0.92	0.77	1.09	0.326
Chronic bronchitis	Obesity class 2(BMI: 35-39.9 kg/m²)	Simple mode	11	1.12	0.77	1.64	0.559
Chronic bronchitis	Obesity class 2(BMI: 35-39.9 kg/m²)	Weighted mode	11	0.93	0.70	1.22	0.602
Chronic bronchitis	Obesity class 3(BMI:≥ 40 kg/ m²)	Inverse variance weighted	2	0.92	0.74	1.13	0.431
Chronic bronchitis	Smoking initiation	MR Egger	83	1.14	0.13	10.10	0.904
Chronic bronchitis	Smoking initiation	Weighted median	83	1.18	0.65	2.14	0.592
Chronic bronchitis	Smoking initiation	Inverse variance weighted	83	1.34	0.87	2.06	0.186
Chronic bronchitis	Smoking initiation	Simple mode	83	0.75	0.16	3.40	0.706
Chronic bronchitis	Smoking initiation	Weighted mode	83	0.61	0.13	2.74	0.518
Chronic bronchitis	Exposure to tobacco smoke at home	Wald ratio	1	0.30	0.00	190832.9	0.861
Chronic bronchitis	Exposure to tobacco smoke outside home	Inverse variance weighted	2	2.07	0.02	183.01	0.750
Chronic bronchitis	Smoking status: Previous	MR Egger	18	92222.1	0.02	5535097	0.170
Chronic bronchitis	Smoking status: Previous	Weighted median	18	2.52	0.06	114.18	0.634
Chronic bronchitis	Smoking status: Previous	Inverse variance weighted	18	2.87	0.18	46.91	0.459
Chronic bronchitis	Smoking status: Previous	Simple mode	18	1.98	0.00	830.00	0.827
Chronic bronchitis	Smoking status: Previous	Weighted mode	18	1.69	0.00	686.30	0.866
Chronic bronchitis	Smoking status: Current	MR Egger	15	971461	0.97	9716816	0.072
				396343.		0888201	

				18		8000000	
						000.00	
Chronic bronchitis	Smoking status: Current	Weighted median	15	0.11	0.00	131.99	0.543
Chronic bronchitis	Smoking status: Current	Inverse variance weighted	15	30.63	0.18	5097.05	0.190
Chronic bronchitis	Smoking status: Current	Simple mode	15	0.04	0.00	3216.19	0.583
Chronic bronchitis	Smoking status: Current	Weighted mode	15	0.03	0.00	2033.19	0.551

Table S6. The exact outcomes of Mendelian randomization pleiotropy test from egger regression.

outcome	exposure	Intercept	Standard error	P-value
Asthma	GERD	0.0118	0.0052	0.0261
Idiopathic pulmonary fibrosis	GERD	-0.0308	0.0138	0.0298
Chronic obstructive pulmonary disease	GERD	0.0155	0.0073	0.0360
Chronic bronchitis	GERD	-0.0139	0.0207	0.5035
Bronchiectasis	GERD	0.0023	0.0150	0.8808

Table S7. MR-PRESSO tests of 5 chronic respiratory diseases.

outcomes	OR	95% CI		P-value	Global Test P-value	Outlier number	Distortion Test P-value
Asthma	1.46	1.33	1.59	<0.0001	<0.0005	2	0.239
Idiopathic pulmonary fibrosis	1.50	1.14	1.99	0.006	0.178	0	NA
Chronic obstructive pulmonary disease	1.62	1.41	1.87	<0.0001	<0.0005	1	0.709
Chronic bronchitis	1.83	1.25	2.67	0.003	0.897	0	NA
Bronchiectasis	0.96	0.73	1.28	0.803	0.829	0	NA

Table S8. The exact outcomes of Mendelian randomization heterogeneity test.

exposure	method	cochran's Q test	degree of Freedom	p-value
GERD	MR Egger	209.5842	69.0000	<0.0001
GERD	Inverse variance weighted	225.2766	70.0000	<0.0001
GERD	MR Egger	58.9945	56.0000	0.3666
GERD	Inverse variance weighted	64.2341	57.0000	0.2380
GERD	MR Egger	115.1888	67.0000	0.0002
GERD	Inverse variance weighted	123.0657	68.0000	<0.0001
GERD	MR Egger	53.0435	67.0000	0.8930
GERD	Inverse variance weighted	53.4958	68.0000	0.9009
GERD	MR Egger	58.0547	67.0000	0.7739
GERD	Inverse variance weighted	58.0774	68.0000	0.7991

Table S9. The associations between individual SNP and risks of five pulmonary diseases.

exposure	Outcome	SNP	Beta	Standard error	P-value
GERD	Asthma	rs10010963	0.73489759	0.404216867	0.069052289
GERD	Asthma	rs1011407	-0.658819572	0.305043731	0.030791679
GERD	Asthma	rs10133111	-0.384184358	0.246280726	0.118772908
GERD	Asthma	rs1021363	0.100482745	0.267159608	0.706831378
GERD	Asthma	rs10837002	0.465710938	0.266629688	0.08069664
GERD	Asthma	rs11762636	0.565312349	0.205877482	0.006035108
GERD	Asthma	rs11953061	0.522976959	0.318452995	0.100539813
GERD	Asthma	rs12204714	0.576193878	0.345118367	0.095007565
GERD	Asthma	rs12357321	0.959424658	0.324173059	0.003080323
GERD	Asthma	rs12453010	0.075311169	0.174086494	0.665299747
GERD	Asthma	rs12598916	-0.215049068	0.227232609	0.343953295
GERD	Asthma	rs12967855	0.563988048	0.277381275	0.042026336
GERD	Asthma	rs12997558	-0.31722186	0.316915349	0.31684268
GERD	Asthma	rs13107325	0.830635531	0.227261905	0.000257212
GERD	Asthma	rs1334297	1.105102439	0.360290244	0.002160337
GERD	Asthma	rs13409451	0.8133125	0.464835417	0.080173818
GERD	Asthma	rs1431196	0.786538136	0.279875847	0.004949367
GERD	Asthma	rs1479405	0.464962145	0.220263407	0.034777739
GERD	Asthma	rs1510719	0.693825444	0.198775444	0.00048212
GERD	Asthma	rs1592757	1.336160839	0.47596014	0.004995936
GERD	Asthma	rs1596747	0.424412409	0.238082482	0.07464694
GERD	Asthma	rs1716171	1.246411321	0.302778113	3.85E-05
GERD	Asthma	rs17379561	0.489751663	0.20583592	0.017344122
GERD	Asthma	rs1883842	-0.159864664	0.257340989	0.534456685
GERD	Asthma	rs1937450	-0.036586997	0.204181424	0.857789563
GERD	Asthma	rs2016933	0.764475285	0.279468441	0.006229279
GERD	Asthma	rs2023878	0.07806244	0.198170096	0.693642801
GERD	Asthma	rs2043539	0.775372881	0.37320678	0.037746593
GERD	Asthma	rs2106353	0.208136053	0.204322105	0.308361394
GERD	Asthma	rs215614	-0.091413793	0.258884291	0.724008406
GERD	Asthma	rs2164300	0.314064246	0.366140782	0.39101998
GERD	Asthma	rs2240326	0.828666667	0.213348366	0.000102709
GERD	Asthma	rs2396133	0.330519549	0.245854135	0.178827948
GERD	Asthma	rs2396766	0.538416938	0.213055049	0.011500026
GERD	Asthma	rs2734839	1.000345946	0.361159459	0.005608764
GERD	Asthma	rs2782641	0.431749655	0.463764138	0.351870025
GERD	Asthma	rs2834005	0.102183587	0.213132827	0.631628366
GERD	Asthma	rs2838771	0.863678261	0.29668087	0.003601176
GERD	Asthma	rs324769	0.095176879	0.379281503	0.801860542
GERD	Asthma	rs329122	0.722591837	0.337781633	0.032417229
GERD	Asthma	rs3766823	0.838244957	0.249340346	0.00077422
GERD	Asthma	rs3793577	1.199045685	0.335312183	0.000349014
GERD	Asthma	rs3863241	0.534769737	0.214736513	0.012761625
GERD	Asthma	rs4300861	0.484738397	0.2835827	0.087388547
GERD	Asthma	rs4382592	0.178649419	0.413618023	0.665800398

GERD	Asthma	rs4713692	0.153009091	0.344163131	0.656621107
GERD	Asthma	rs569356	-0.149159467	0.277188462	0.590497163
GERD	Asthma	rs6711584	0.230660084	0.276373109	0.403944823
GERD	Asthma	rs6780459	0.497046205	0.24759835	0.044699665
GERD	Asthma	rs7032155	1.033475	0.3335835	0.001947658
GERD	Asthma	rs7206608	0.309595172	0.240627586	0.198228353
GERD	Asthma	rs7241572	0.615196787	0.326548193	0.059573264
GERD	Asthma	rs7527682	0.01131603	0.245127715	0.963179685
GERD	Asthma	rs7541875	0.414986711	0.21881794	0.057894873
GERD	Asthma	rs7600261	0.064538863	0.335256398	0.847345882
GERD	Asthma	rs7612999	0.155854789	0.290624521	0.591768211
GERD	Asthma	rs761777	0.308649231	0.229922462	0.179464477
GERD	Asthma	rs7675588	0.120677747	0.221842308	0.586455333
GERD	Asthma	rs7685686	1.760589744	0.56507265	0.001835167
GERD	Asthma	rs773109	-1.725137705	0.226491803	2.60E-14
GERD	Asthma	rs7942368	0.551967509	0.291309386	0.058121413
GERD	Asthma	rs903678	-0.002695086	0.538645313	0.99600784
GERD	Asthma	rs903959	0.658572581	0.268897177	0.014318928
GERD	Asthma	rs9372625	0.140241584	0.222253135	0.528040949
GERD	Asthma	rs9373363	0.534030612	0.25697517	0.037696383
GERD	Asthma	rs942065	0.722484018g	0.310332877	0.019907128
GERD	Asthma	rs9517313	0.280424896	0.277958091	0.313034712
GERD	Asthma	rs9542729	0.181605818	0.295742545	0.539170874
GERD	Asthma	rs9615905	0.067384416	0.283116883	0.811873979
GERD	Asthma	rs9636202	-0.010946235	0.228451543	0.961784059
GERD	Asthma	rs9940128	0.904089474	0.868476316	0.29787254
GERD	Asthma	All - Inverse variance weighted	0.331862132	0.05696878	5.70E-09
GERD	Asthma	All - MR Egger	-0.095414208	0.195961457	0.627870292
GERD	Idiopathic pulmonary fibrosis	rs10010963	1.21686747	1.682426777	0.469507209
GERD	Idiopathic pulmonary fibrosis	rs1011407	4.443425076	1.308508858	0.000684301
GERD	Idiopathic pulmonary fibrosis	rs10133111	2.226256983	0.989132876	0.024403544
GERD	Idiopathic pulmonary fibrosis	rs1021363	0.619607843	1.19855013	0.605180955
GERD	Idiopathic pulmonary fibrosis	rs11762636	0.092009685	0.834441869	0.912199259
GERD	Idiopathic pulmonary fibrosis	rs12204714	0.081632653	1.570092236	0.958534856
GERD	Idiopathic pulmonary fibrosis	rs12357321	-0.410958904	1.33782426	0.758702927
GERD	Idiopathic pulmonary fibrosis	rs12453010	1.233766234	0.785632703	0.116319526
GERD	Idiopathic pulmonary fibrosis	rs12967855	1.665338645	1.146271017	0.146270543
GERD	Idiopathic pulmonary fibrosis	rs12997558	-0.646511628	1.308793675	0.621323688
GERD	Idiopathic pulmonary fibrosis	rs13107325	0.192307692	0.940014828	0.837900733
GERD	Idiopathic pulmonary fibrosis	rs1334297	0.975609756	1.506302321	0.517188563
GERD	Idiopathic pulmonary fibrosis	rs13409451	-1.506944444	2.107795056	0.474646868
GERD	Idiopathic pulmonary fibrosis	rs1431196	-0.101694915	1.156607881	0.929936171
GERD	Idiopathic pulmonary fibrosis	rs1479405	1.479495268	0.914264417	0.105611824
GERD	Idiopathic pulmonary fibrosis	rs1510719	-0.236686391	0.832516686	0.77617874
GERD	Idiopathic pulmonary fibrosis	rs1596747	0.01459854	0.988509725	0.988217085
GERD	Idiopathic pulmonary fibrosis	rs1716171	2.690566038	1.252746118	0.031734854
GERD	Idiopathic pulmonary fibrosis	rs1883842	0.434628975	1.076241645	0.686330688

GERD	Idiopathic pulmonary fibrosis	rs1937450	1.842105263	0.848338568	0.02989891
GERD	Idiopathic pulmonary fibrosis	rs2023878	0.559808612	0.83454565	0.502351467
GERD	Idiopathic pulmonary fibrosis	rs2043539	-0.666666667	1.560006511	0.669125407
GERD	Idiopathic pulmonary fibrosis	rs215614	0.643678161	1.074087136	0.548986665
GERD	Idiopathic pulmonary fibrosis	rs2164300	-2.882681564	1.519025488	0.057733279
GERD	Idiopathic pulmonary fibrosis	rs2240326	0.709150327	0.888580269	0.42482917
GERD	Idiopathic pulmonary fibrosis	rs2396133	1.545112782	1.022201362	0.130647305
GERD	Idiopathic pulmonary fibrosis	rs2396766	-0.377850163	0.892551653	0.672049383
GERD	Idiopathic pulmonary fibrosis	rs2734839	-0.156756757	1.509637	0.917298399
GERD	Idiopathic pulmonary fibrosis	rs2782641	3.082758621	1.918820327	0.108144215
GERD	Idiopathic pulmonary fibrosis	rs2834005	-0.188449848	0.973814129	0.846553885
GERD	Idiopathic pulmonary fibrosis	rs324769	-0.069364162	1.589984132	0.96520277
GERD	Idiopathic pulmonary fibrosis	rs329122	0.183673469	1.403404362	0.895872544
GERD	Idiopathic pulmonary fibrosis	rs3766823	-0.812680115	1.044786022	0.436661224
GERD	Idiopathic pulmonary fibrosis	rs3793577	-0.482233503	1.374881547	0.725779294
GERD	Idiopathic pulmonary fibrosis	rs3863241	1.226973684	0.901359728	0.173435485
GERD	Idiopathic pulmonary fibrosis	rs4300861	1.742616034	1.182855454	0.140689508
GERD	Idiopathic pulmonary fibrosis	rs4382592	-1.76744186	1.703392517	0.29945583
GERD	Idiopathic pulmonary fibrosis	rs4713692	-1.484848485	1.431810278	0.299715929
GERD	Idiopathic pulmonary fibrosis	rs569356	1.00295858	1.153674809	0.384650327
GERD	Idiopathic pulmonary fibrosis	rs6711584	-1.273109244	1.155744768	0.270657885
GERD	Idiopathic pulmonary fibrosis	rs7032155	0.46	1.391144737	0.740899103
GERD	Idiopathic pulmonary fibrosis	rs7241572	-0.144578313	1.375569063	0.916292996
GERD	Idiopathic pulmonary fibrosis	rs7527682	-1.119850187	1.022320074	0.273341101
GERD	Idiopathic pulmonary fibrosis	rs7541875	0.780730897	0.913844701	0.39291856
GERD	Idiopathic pulmonary fibrosis	rs7600261	-1.099526066	1.413521329	0.436649731
GERD	Idiopathic pulmonary fibrosis	rs7612999	0.869731801	1.199262705	0.468315795
GERD	Idiopathic pulmonary fibrosis	rs761777	0.255384615	0.950129156	0.788091775
GERD	Idiopathic pulmonary fibrosis	rs7675588	0.590659341	0.912026707	0.517221817
GERD	Idiopathic pulmonary fibrosis	rs7685686	-4.905982906	2.351002178	0.036909619
GERD	Idiopathic pulmonary fibrosis	rs773109	0.481967213	0.95714628	0.614580424
GERD	Idiopathic pulmonary fibrosis	rs7942368	-0.711191336	1.183256792	0.547809588
GERD	Idiopathic pulmonary fibrosis	rs903678	0.7578125	2.25599396	0.736938822
GERD	Idiopathic pulmonary fibrosis	rs9372625	-0.772277228	0.925203771	0.403880774
GERD	Idiopathic pulmonary fibrosis	rs9373363	-1.506802721	1.075405641	0.161169749
GERD	Idiopathic pulmonary fibrosis	rs942065	2.611872146	1.410009022	0.063971312
GERD	Idiopathic pulmonary fibrosis	rs9615905	-0.329004329	1.177080356	0.779854378
GERD	Idiopathic pulmonary fibrosis	rs9636202	-0.151234568	0.962819964	0.875186049
GERD	Idiopathic pulmonary fibrosis	rs9940128	-2.460526316	3.605438912	0.494955408
GERD	Idiopathic pulmonary fibrosis	All - Inverse variance weighted	0.359869692	0.157484747	0.022306482
GERD	Idiopathic pulmonary fibrosis	All - MR Egger	1.482156814	0.525761529	0.006646258
GERD	Chronic obstructive pulmonary disease	rs10010963	0.144133133	0.757855422	0.849163752
GERD	Chronic obstructive pulmonary disease	rs1011407	0.67717737	0.654730887	0.301003636
GERD	Chronic obstructive pulmonary disease	rs10133111	-0.183776536	0.399695531	0.645666013
GERD	Chronic obstructive pulmonary disease	rs1021363	0.635709804	0.522741176	0.223943727
GERD	Chronic obstructive pulmonary disease	rs10837002	1.734855469	0.494308594	0.000448679
GERD	Chronic obstructive pulmonary disease	rs11762636	-0.247772397	0.323133172	0.443211697

GERD	Chronic obstructive pulmonary disease	rs11953061	2.80497235	0.562497696	6.14E-07
GERD	Chronic obstructive pulmonary disease	rs12204714	0.930928571	0.629438776	0.139145146
GERD	Chronic obstructive pulmonary disease	rs12357321	1.658310502	0.593054795	0.005170451
GERD	Chronic obstructive pulmonary disease	rs12453010	0.291724675	0.317664935	0.358440466
GERD	Chronic obstructive pulmonary disease	rs12598916	0.87107764	0.420950311	0.038516794
GERD	Chronic obstructive pulmonary disease	rs12967855	1.180593625	0.534968127	0.027324643
GERD	Chronic obstructive pulmonary disease	rs12997558	-0.713372093	0.576265116	0.215744451
GERD	Chronic obstructive pulmonary disease	rs13107325	0.87752381	0.916456044	0.338305507
GERD	Chronic obstructive pulmonary disease	rs1334297	0.085132195	0.652585366	0.896207459
GERD	Chronic obstructive pulmonary disease	rs13409451	0.174673611	0.871298611	0.841109088
GERD	Chronic obstructive pulmonary disease	rs1431196	0.357725424	0.511555085	0.484370732
GERD	Chronic obstructive pulmonary disease	rs1479405	0.745492114	0.408498423	0.068007497
GERD	Chronic obstructive pulmonary disease	rs1510719	1.218286982	0.36647929	0.000886409
GERD	Chronic obstructive pulmonary disease	rs1592757	0.366718881	0.871314685	0.673842747
GERD	Chronic obstructive pulmonary disease	rs1596747	0.897733577	0.433890511	0.038543035
GERD	Chronic obstructive pulmonary disease	rs1716171	-1.05969434	0.550539623	0.054250821
GERD	Chronic obstructive pulmonary disease	rs17379561	0.635554324	0.314913525	0.043571809
GERD	Chronic obstructive pulmonary disease	rs1883842	0.92480212	0.537628975	0.085405301
GERD	Chronic obstructive pulmonary disease	rs1937450	1.019551084	0.371916409	0.006118827
GERD	Chronic obstructive pulmonary disease	rs2016933	0.6218327	0.528292776	0.239171253
GERD	Chronic obstructive pulmonary disease	rs2023878	0.828227273	0.324559809	0.010715328
GERD	Chronic obstructive pulmonary disease	rs2043539	0.142484181	0.694350282	0.837411928
GERD	Chronic obstructive pulmonary disease	rs215614	1.091183908	0.504800766	0.030648017
GERD	Chronic obstructive pulmonary disease	rs2164300	1.418592179	0.664145251	0.032682124
GERD	Chronic obstructive pulmonary disease	rs2240326	0.174509477	0.388964052	0.653682758
GERD	Chronic obstructive pulmonary disease	rs2396133	-0.21205188	0.449139098	0.636834259
GERD	Chronic obstructive pulmonary disease	rs2396766	0.499198697	0.388250814	0.198525638
GERD	Chronic obstructive pulmonary disease	rs2734839	1.1954	0.643178378	0.063086357
GERD	Chronic obstructive pulmonary disease	rs2782641	0.838993103	0.838165517	0.316832911
GERD	Chronic obstructive pulmonary disease	rs2834005	0.072642857	0.40562614	0.857868444
GERD	Chronic obstructive pulmonary disease	rs2838771	0.861665217	0.570126087	0.130696998
GERD	Chronic obstructive pulmonary disease	rs324769	1.946965318	0.702179191	0.00555853
GERD	Chronic obstructive pulmonary disease	rs329122	1.843581633	0.612382653	0.002608128
GERD	Chronic obstructive pulmonary disease	rs3766823	-0.035801441	0.41459366	0.931185742
GERD	Chronic obstructive pulmonary disease	rs3793577	0.398302538	0.605055838	0.510351451
GERD	Chronic obstructive pulmonary disease	rs3863241	0.199460197	0.396388158	0.614827786
GERD	Chronic obstructive pulmonary disease	rs4300861	0.8202827	0.506291139	0.105193649
GERD	Chronic obstructive pulmonary disease	rs4382592	1.691965116	0.776581395	0.029351355
GERD	Chronic obstructive pulmonary disease	rs4713692	-0.470481313	0.614742424	0.444074586
GERD	Chronic obstructive pulmonary disease	rs569356	0.549505917	0.51954142	0.290203684
GERD	Chronic obstructive pulmonary disease	rs6711584	0.542882353	0.500613445	0.278172316
GERD	Chronic obstructive pulmonary disease	rs6780459	-0.049421782	0.479613861	0.917927303
GERD	Chronic obstructive pulmonary disease	rs7032155	0.369059	0.61358	0.54751718
GERD	Chronic obstructive pulmonary disease	rs7206608	-0.337955172	0.428244828	0.430016472
GERD	Chronic obstructive pulmonary disease	rs7241572	0.601317269	0.582827309	0.302201153
GERD	Chronic obstructive pulmonary disease	rs7527682	-0.041099251	0.456565543	0.928272678
GERD	Chronic obstructive pulmonary disease	rs7541875	0.405089701	0.404627907	0.31675851

GERD	Chronic obstructive pulmonary disease	rs7600261	0.119096682	0.611943128	0.845690047
GERD	Chronic obstructive pulmonary disease	rs7612999	1.274532567	0.538555556	0.017953495
GERD	Chronic obstructive pulmonary disease	rs761777	0.276477231	0.410803077	0.500936822
GERD	Chronic obstructive pulmonary disease	rs7675588	0.734898352	0.43960989	0.094582373
GERD	Chronic obstructive pulmonary disease	rs7685686	3.310042735	1.017358974	0.00113967
GERD	Chronic obstructive pulmonary disease	rs773109	-0.478055738	0.423131148	0.25855835
GERD	Chronic obstructive pulmonary disease	rs7942368	-0.36868231	0.527151625	0.484311019
GERD	Chronic obstructive pulmonary disease	rs903678	2.597570313	1.018734375	0.010778431
GERD	Chronic obstructive pulmonary disease	rs903959	-0.206941532	0.492637097	0.674435108
GERD	Chronic obstructive pulmonary disease	rs9372625	0.129052475	0.421867987	0.759675267
GERD	Chronic obstructive pulmonary disease	rs9373363	0.923778912	0.428343537	0.031034434
GERD	Chronic obstructive pulmonary disease	rs942065	0.275149315	0.559557078	0.622912359
GERD	Chronic obstructive pulmonary disease	rs9542729	-0.058028727	0.485523636	0.904865122
GERD	Chronic obstructive pulmonary disease	rs9615905	0.204041991	0.516774892	0.692962982
GERD	Chronic obstructive pulmonary disease	rs9636202	0.855561728	0.43987037	0.051771187
GERD	Chronic obstructive pulmonary disease	rs9940128	0.378576316	1.573210526	0.80983467
GERD	Chronic obstructive pulmonary disease	All - Inverse variance weighted	0.499556774	0.079591212	3.46E-10
GERD	Chronic obstructive pulmonary disease	All - MR Egger	-0.065241218	0.275032483	0.813215564
GERD	Chronic bronchitis	rs10010963	0.215690361	2.819331325	0.939018065
GERD	Chronic bronchitis	rs1011407	6.83559633	2.568443425	0.007782176
GERD	Chronic bronchitis	rs10133111	0.920170391	1.490284916	0.536940619
GERD	Chronic bronchitis	rs1021363	-0.959090196	1.951278431	0.6230595
GERD	Chronic bronchitis	rs10837002	2.871535156	1.851625	0.120945076
GERD	Chronic bronchitis	rs11762636	2.040174334	1.20788862	0.091211425
GERD	Chronic bronchitis	rs11953061	-3.204580645	2.113313364	0.129423948
GERD	Chronic bronchitis	rs12204714	0.339076531	2.346234694	0.885090304
GERD	Chronic bronchitis	rs12357321	-1.236552511	2.219890411	0.577504791
GERD	Chronic bronchitis	rs12453010	-0.064213766	1.18578961	0.956813467
GERD	Chronic bronchitis	rs12598916	0.933913043	1.570341615	0.552030873
GERD	Chronic bronchitis	rs12967855	-0.656776892	1.996167331	0.74214136
GERD	Chronic bronchitis	rs12997558	-1.944269767	2.150544186	0.365951558
GERD	Chronic bronchitis	rs13107325	-3.805659341	3.392234432	0.261916051
GERD	Chronic bronchitis	rs1334297	-0.832117073	2.436682927	0.732730339
GERD	Chronic bronchitis	rs13409451	-0.718604167	3.258777778	0.825471338
GERD	Chronic bronchitis	rs1431196	3.235817797	1.909279661	0.090116287
GERD	Chronic bronchitis	rs1479405	1.160675079	1.520451104	0.445239504
GERD	Chronic bronchitis	rs1510719	0.540988166	1.361677515	0.691149665
GERD	Chronic bronchitis	rs1592757	2.125937063	3.255251748	0.51370525
GERD	Chronic bronchitis	rs1596747	0.184632847	1.618540146	0.909179378
GERD	Chronic bronchitis	rs1716171	-0.148414717	2.047592453	0.942217894
GERD	Chronic bronchitis	rs17379561	1.249749446	1.172144124	0.286329625
GERD	Chronic bronchitis	rs1883842	2.199424028	2.009378092	0.273700909
GERD	Chronic bronchitis	rs1937450	0.996795666	1.384928793	0.471681973
GERD	Chronic bronchitis	rs2016933	-0.456775665	1.969193916	0.816568512
GERD	Chronic bronchitis	rs2023878	-0.107474641	1.211763158	0.929326072
GERD	Chronic bronchitis	rs2043539	2.139214689	2.589344633	0.408712957
GERD	Chronic bronchitis	rs215614	0.864616858	1.876984674	0.6450559

GERD	Chronic bronchitis	rs2164300	2.513854749	2.478569832	0.310470155
GERD	Chronic bronchitis	rs2240326	0.075248039	1.449522876	0.958598588
GERD	Chronic bronchitis	rs2396133	1.116992481	1.674353383	0.504696305
GERD	Chronic bronchitis	rs2396766	3.143736156	1.447221498	0.029836329
GERD	Chronic bronchitis	rs2734839	0.976745946	2.404837838	0.684625956
GERD	Chronic bronchitis	rs2782641	-1.720186207	3.125441379	0.582057495
GERD	Chronic bronchitis	rs2834005	-0.683142857	1.510270517	0.65103022
GERD	Chronic bronchitis	rs2838771	-1.607186957	2.125682609	0.449600993
GERD	Chronic bronchitis	rs324769	2.462531792	2.627236994	0.348599848
GERD	Chronic bronchitis	rs329122	0.503817347	2.279423469	0.825070311
GERD	Chronic bronchitis	rs3766823	-0.111741787	1.552409222	0.942618147
GERD	Chronic bronchitis	rs3793577	0.090347716	2.259375635	0.968102763
GERD	Chronic bronchitis	rs3863241	-2.439575658	1.478575658	0.098953197
GERD	Chronic bronchitis	rs4300861	1.059253165	1.892447257	0.575665901
GERD	Chronic bronchitis	rs4382592	-2.153790698	2.899372093	0.457574142
GERD	Chronic bronchitis	rs4713692	-0.513545455	2.291454545	0.822669139
GERD	Chronic bronchitis	rs569356	-2.720352071	1.931378698	0.158982274
GERD	Chronic bronchitis	rs6711584	1.598726891	1.865063025	0.391335884
GERD	Chronic bronchitis	rs6780459	-0.841491749	1.790930693	0.638453028
GERD	Chronic bronchitis	rs7032155	2.025445	2.283175	0.375015525
GERD	Chronic bronchitis	rs7206608	-0.887996552	1.595503448	0.577826739
GERD	Chronic bronchitis	rs7241572	0.728674699	2.17526506	0.737638644
GERD	Chronic bronchitis	rs7527682	0.073043071	1.701269663	0.96575379
GERD	Chronic bronchitis	rs7541875	0.867518272	1.509498339	0.565489916
GERD	Chronic bronchitis	rs7600261	2.651796209	2.27835545	0.244461284
GERD	Chronic bronchitis	rs7612999	2.015183908	2.004444444	0.31472458
GERD	Chronic bronchitis	rs761777	1.564172308	1.532033846	0.30726503
GERD	Chronic bronchitis	rs7675588	1.366662088	1.646706044	0.406574468
GERD	Chronic bronchitis	rs7685686	-0.531588034	3.795196581	0.888605756
GERD	Chronic bronchitis	rs773109	0.855445902	1.578763934	0.587925045
GERD	Chronic bronchitis	rs7942368	3.044841155	1.96631769	0.12150218
GERD	Chronic bronchitis	rs903678	3.19596875	3.813796875	0.402029677
GERD	Chronic bronchitis	rs903959	-2.439923387	1.837233871	0.184164297
GERD	Chronic bronchitis	rs9372625	1.036141914	1.574557756	0.510504296
GERD	Chronic bronchitis	rs9373363	0.647156463	1.598911565	0.685662661
GERD	Chronic bronchitis	rs942065	0.23016895	2.083283105	0.912025729
GERD	Chronic bronchitis	rs9542729	4.766472727	1.826458182	0.009062676
GERD	Chronic bronchitis	rs9615905	-0.365565368	1.923424242	0.849262376
GERD	Chronic bronchitis	rs9636202	0.233526852	1.640546296	0.88680592
GERD	Chronic bronchitis	rs9940128	-5.423118421	5.871013158	0.355636893
GERD	Chronic bronchitis	All - Inverse variance weighted	0.574532787	0.220782904	0.009261373
GERD	Chronic bronchitis	All - MR Egger	1.079665936	0.782819208	0.172419057
GERD	Bronchiectasis	rs10010963	0.498938554	2.058210843	0.808459602
GERD	Bronchiectasis	rs1011407	0.276872171	1.777085627	0.876189681
GERD	Bronchiectasis	rs10133111	-0.068890223	1.086572626	0.949446874
GERD	Bronchiectasis	rs1021363	-2.2974	1.420282353	0.105756229
GERD	Bronchiectasis	rs10837002	-1.558164063	1.350105469	0.248456944

GERD	Bronchiectasis	rs11762636	-1.504094431	0.8751477	0.085673575
GERD	Bronchiectasis	rs11953061	-0.568018433	1.533769585	0.711128102
GERD	Bronchiectasis	rs12204714	1.981464286	1.705719388	0.245374004
GERD	Bronchiectasis	rs12357321	1.05673516	1.613844749	0.512600673
GERD	Bronchiectasis	rs12453010	-0.12916987	0.86345974	0.881083596
GERD	Bronchiectasis	rs12598916	0.508475155	1.142940994	0.656404222
GERD	Bronchiectasis	rs12967855	1.941952191	1.454669323	0.181883401
GERD	Bronchiectasis	rs12997558	0.122748837	1.562674419	0.937390171
GERD	Bronchiectasis	rs13107325	-2.93959707	2.550915751	0.249169339
GERD	Bronchiectasis	rs1334297	-1.813629268	1.76817561	0.305029936
GERD	Bronchiectasis	rs13409451	-1.863451389	2.362486111	0.430248124
GERD	Bronchiectasis	rs1431196	1.277101695	1.388016949	0.357525285
GERD	Bronchiectasis	rs1479405	-0.178281703	1.107946372	0.872162827
GERD	Bronchiectasis	rs1510719	-0.431215976	0.992195266	0.663847005
GERD	Bronchiectasis	rs1592757	0.482394406	2.364097902	0.838314351
GERD	Bronchiectasis	rs1596747	0.334566423	1.177656934	0.776337594
GERD	Bronchiectasis	rs1716171	-0.794143396	1.490411321	0.594147766
GERD	Bronchiectasis	rs17379561	1.675161863	0.85078714	0.048958222
GERD	Bronchiectasis	rs1883842	0.360134276	1.463819788	0.805663931
GERD	Bronchiectasis	rs1937450	-2.157733746	1.007083591	0.032148707
GERD	Bronchiectasis	rs2016933	3.052520913	1.436361217	0.033571899
GERD	Bronchiectasis	rs2023878	-0.377588517	0.877600478	0.667013039
GERD	Bronchiectasis	rs2043539	1.661966102	1.881502825	0.377064254
GERD	Bronchiectasis	rs215614	-0.35706092	1.374961686	0.795104523
GERD	Bronchiectasis	rs2164300	1.661832402	1.798234637	0.355410001
GERD	Bronchiectasis	rs2240326	-0.358117647	1.054124183	0.73405984
GERD	Bronchiectasis	rs2396133	-0.941236842	1.218041353	0.439672592
GERD	Bronchiectasis	rs2396766	-0.789159609	1.051491857	0.452945052
GERD	Bronchiectasis	rs2734839	-1.695189189	1.744827027	0.331273757
GERD	Bronchiectasis	rs2782641	-3.003951724	2.275055172	0.186706069
GERD	Bronchiectasis	rs2834005	-0.101665957	1.096085106	0.926099228
GERD	Bronchiectasis	rs2838771	1.756604348	1.544365217	0.255359379
GERD	Bronchiectasis	rs324769	3.110485549	1.910768786	0.103552191
GERD	Bronchiectasis	rs329122	-0.951877551	1.661561224	0.566724987
GERD	Bronchiectasis	rs3766823	-0.723213256	1.12207781	0.519231553
GERD	Bronchiectasis	rs3793577	-0.486114721	1.643720812	0.767428309
GERD	Bronchiectasis	rs3863241	0.420944079	1.075325658	0.695459245
GERD	Bronchiectasis	rs4300861	0.982848101	1.372054852	0.473785785
GERD	Bronchiectasis	rs4382592	0.334834302	2.107796512	0.873783008
GERD	Bronchiectasis	rs4713692	-0.42979798	1.665585859	0.796371308
GERD	Bronchiectasis	rs569356	1.400943787	1.41483432	0.322085062
GERD	Bronchiectasis	rs6711584	-1.085634454	1.358159664	0.424091964
GERD	Bronchiectasis	rs6780459	1.603419142	1.301132013	0.217827236
GERD	Bronchiectasis	rs7032155	0.083026	1.66387	0.96020261
GERD	Bronchiectasis	rs7206608	-1.038489655	1.159144828	0.370300735
GERD	Bronchiectasis	rs7241572	-0.473261044	1.582180723	0.764848898
GERD	Bronchiectasis	rs7527682	0.011046105	1.242441948	0.992906389

GERD	Bronchiectasis	rs7541875	-1.042302326	1.098152824	0.342548693
GERD	Bronchiectasis	rs7600261	-1.825232227	1.662995261	0.272397942
GERD	Bronchiectasis	rs7612999	1.177088123	1.467371648	0.422452023
GERD	Bronchiectasis	rs761777	0.782206154	1.112892308	0.482143748
GERD	Bronchiectasis	rs7675588	0.808604396	1.190494505	0.497000224
GERD	Bronchiectasis	rs7685686	3.909128205	2.770632479	0.158269542
GERD	Bronchiectasis	rs773109	-0.673183607	1.150295082	0.55839517
GERD	Bronchiectasis	rs7942368	0.883176895	1.429956679	0.536822606
GERD	Bronchiectasis	rs903678	2.379453125	2.763265625	0.389181954
GERD	Bronchiectasis	rs903959	-0.036952742	1.336939516	0.977949437
GERD	Bronchiectasis	rs9372625	-1.019537954	1.142636964	0.37224951
GERD	Bronchiectasis	rs9373363	1.150503401	1.158979592	0.320862753
GERD	Bronchiectasis	rs942065	-2.031114155	1.51483105	0.179979247
GERD	Bronchiectasis	rs9542729	0.791058182	1.315145455	0.547507928
GERD	Bronchiectasis	rs9615905	-0.467350649	1.400952381	0.738685224
GERD	Bronchiectasis	rs9636202	-0.573694444	1.195719136	0.63137651
GERD	Bronchiectasis	rs9940128	-7.388684211	4.270131579	0.083573531
GERD	Bronchiectasis	All - Inverse variance weighted	-0.073932883	0.160493976	0.645043771
GERD	Bronchiectasis	All - MR Egger	-0.156080028	0.569032754	0.784705658