

Supplementary Table 5 (S1): PsRS EN summary results in Individual cohort. Reported value

model	Disease	mean_train_sd_train_sco	mean_test_ssd	test_scor	mean_AUC	
Individual	Asthma	1.1360657	0.0042364	0.201768	0.0063944	0.6298327
Individual	Afib	1.2674272	0.0016018	0.1743056	0.0090871	0.6005107
Individual	BreastC	0.5471684	0.0054114	0.1356357	0.0023041	0.6328753
Individual	CKD	0.951348	0.0036148	0.3071802	0.0092165	0.7181815
Individual	CHD	0.700445	0.0022503	0.1825933	0.0056034	0.6597972
Individual	HyperC	1.0734731	0.0048871	0.30748	0.0052493	0.699084
Individual	ProstateC	1.2072546	0.0040928	0.2652801	0.0143157	0.6644376
Individual	t2d	1.1148175	0.0078408	0.3320073	0.0085203	0.7042444
Individual	t1d	0.2928233	0.0045744	0.1280782	0.0058415	0.6798188
Area	Asthma	1.1581115	0.0047516	0.1390941	0.0136068	0.5935948
Area	Afib	1.2746893	0.0018343	0.1410349	0.0048286	0.5779705
Area	BreastC	0.5642045	0.0055257	0.0520877	0.0064243	0.5
Area	CKD	1.050083	0.0013944	0.0736517	0.0086753	0.5
Area	CHD	0.7327898	0.0030595	0.0550988	0.0098978	0.5
Area	HyperC	1.1721911	0.0049542	0.0750809	0.0104964	0.5
Area	ProstateC	1.1921684	0.0053999	0.3038531	0.0121128	0.6934451
Area	t2d	1.2121502	0.0057784	0.1207215	0.0065405	0.5704198
Area	t1d	0.3065623	0.0047177	0.0351864	0.0041797	0.5
Combined	Asthma	1.1141078	0.0048911	0.243552	0.0058169	0.661553
Combined	Afib	1.2510944	0.0015617	0.2158433	0.0047068	0.6279957
Combined	BreastC	0.5457549	0.0053068	0.1402991	0.0021841	0.6359537
Combined	CKD	0.9485182	0.0033967	0.3112112	0.0085559	0.7204422
Combined	CHD	0.6990989	0.0024348	0.1878485	0.0047893	0.6615586
Combined	HyperC	1.0721876	5.06E-03	0.3100144	0.0047216	0.699873
Combined	ProstateC	1.1235992	0.0070856	0.3841622	0.017194	0.7377813
Combined	t2d	1.1075521	0.0080761	0.3411419	0.0086443	0.7097825
Combined	t1d	0.2925833	0.0046986	0.1291261	0.0064515	0.6799816

s	include the mean and standard deviation of training scores (mean_train_score					
sd_AUC	n_predictors	Predictors	mean_coef	sd_coef	coef_nonzero	Intercept
0.0016021	24	Education,Sex	0.199606	0.0050316	0.05,1,5,3,5,5,5	-2.8756659
0.0047474	24	Education,Sex	-0.022006	-0.0021209	0.03,5,3,3,5,5,5	-0.2970221
0.00825	24	Education,Sex	-0.01669	-0.018321	0.13,5,2,4,5,5,5	-3.2340016
0.0017704	24	Education,Sex	0.207869	-1.048282	0.05,5,5,5,5,5,5	-0.8466934
0.0014382	24	Education,Sex	0.414406	-0.034645	0.05,5,4,3,5,5,5	-1.9177951
0.0010175	24	Education,Sex	0.729076	-1.03451	0.075,5,4,2,5,5,5	0.9744081
0.0044312	24	Education,Sex	-0.6384	-0.1076575	0.05,5,5,4,5,5,3	-0.0744746
0.0031998	24	Education,Sex	0.993743	-0.043732	0.05,5,5,5,5,5,5	-1.1675453
0.0059494	21	Education,Sex	0.713133	-0.067618	0.05,5,4,5,5,5,2	-4.73415
0.0046848	6	assisted_inc	3.088745	-1.0200738	0.15,5,5,5,5,5	-0.6039604
0.0032178	6	assisted_inc	0.029514	0.40181241	0.03,5,5,5,5,5	-0.6896314
0	6	assisted_inc	0.171483	0.10227859	0.13,4,5,2,4,5	-1.8046889
0	6	assisted_inc	-1.068205	0.0146227	0.15,5,5,5,4,5	-1.3243312
0	6	assisted_inc	-0.476185	0.0159111	0.15,5,5,5,5,5	-1.5915427
0	6	assisted_inc	0.006605	0.00157066	0.05,2,5,5,5,5	0.9554069
0.0029219	6	assisted_inc	9.287145	-3.0280907	0.35,5,5,5,5,5	0.1578117
0.0019402	7	assisted_inc	-2.000112	2.012378	0.145,5,5,3,5,5,1	-1.2051196
0	5	assisted_inc	-0.209922	1.0469399	0.31,5,1,1,5	-3.6161382
0.0028769	30	Education,Sex	0.28158	0.010051437	0.05,1,5,4,5,5,5	-2.4334759
0.0020064	30	Education,Sex	-0.049691	-0.0039966	0.05,5,3,4,5,5,5	-0.5271973
0.0065679	27	Education,Sex	-0.009143	-0.0013347	0.13,5,4,4,5,5,5	-2.8651986
0.0012586	30	Education,Sex	0.211346	-1.048363	0.05,5,5,5,5,5,5	-0.5598496
0.0014993	30	Education,Sex	0.42164	-0.90036963	0.05,5,4,1,5,5,5	-1.4857183
8.79E-04	30	Education,Sex	0.723203	-1.036404	0.05,5,4,2,5,5,5	0.9806142
0.0034485	30	Education,Sex	-0.692245	-0.098745	0.05,5,5,5,5,5,4	0.3548259
0.003126	30	Education,Sex	0.9751	-0.68046885	0.05,5,5,5,5,5,5	-0.9240977
0.0061023	29	Education,Sex	0.70023	-0.2006297	0.05,5,5,4,2,5,5,4	-4.7822362

full_data_coef

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-1.063241,0.925143,0.534703,0.693787,0

;,-0.939596,0.216614,1.295125,0.524833,0

Supplementary Table 5 (S2): Logistic regression summary results

Model	Disease	AUC	AUC_CI_Low	AUC_CI_Upper
Base	Asthma	0.7043092	0.6960159	0.7126026
SIRE	Asthma	0.7040388	0.6957453	0.7123323
SES	Asthma	0.705069	0.6967786	0.7133594
Individual	Asthma	0.7146287	0.70656	0.7226973
Area	Asthma	0.7065746	0.6983696	0.7147796
Combined	Asthma	0.7222295	0.7142724	0.7301867
Base	Atrial Fibrillat	0.7046652	0.6946711	0.7146592
SIRE	Atrial Fibrillat	0.7062544	0.6962748	0.7162339
SES	Atrial Fibrillat	0.7054724	0.6954874	0.7154574
Individual	Atrial Fibrillat	0.7062201	0.6962333	0.7162069
Area	Atrial Fibrillat	0.7161042	0.7063	0.7259083
Combined	Atrial Fibrillat	0.7132148	0.7033231	0.7231065
Base	Breast Canc	0.7136544	0.7047529	0.7225559
SIRE	Breast Canc	0.7148903	0.7059921	0.7237885
SES	Breast Canc	0.7175904	0.7087337	0.726447
Individual	Breast Canc	0.7205704	0.7118215	0.7293193
Area	Breast Canc	0.7155766	0.7067392	0.7244141
Combined	Breast Canc	0.721803	0.7130871	0.7305189
Base	Chronic Kidn	0.8638855	0.8576309	0.8701402
SIRE	Chronic Kidn	0.8770502	0.871101	0.8829995
SES	Chronic Kidn	0.8723753	8.66E-01	0.8783838
Individual	Chronic Kidn	0.8662679	0.8600705	0.8724653
Area	Chronic Kidn	0.8662052	0.8600356	0.8723747
Combined	Chronic Kidn	0.866747	0.8605679	0.8729261
Base	Coronary He	0.7999508	0.7945651	0.8053365
SIRE	Coronary He	0.8001358	0.7947599	0.8055116
SES	Coronary He	0.8036813	0.7983884	0.8089742
Individual	Coronary He	0.8008117	0.7954337	0.8061897
Area	Coronary He	0.7999726	0.7945873	0.8053578
Combined	Coronary He	0.8007473	0.7953691	0.8061256
Base	Hypercholes	0.8305252	0.8232508	0.8377996
SIRE	Hypercholes	0.8313223	0.8240611	0.8385835
SES	Hypercholes	0.8341411	0.8269039	0.8413783
Individual	Hypercholes	0.8314138	0.8241599	0.8386676
Area	Hypercholes	0.8322847	0.8250538	0.8395156
Combined	Hypercholes	0.8317432	0.8244995	0.838987
Base	Prostate Car	0.6383231	0.6233305	0.6533157
SIRE	Prostate Car	0.6472552	0.63233	0.6621804
SES	Prostate Car	0.6970582	0.682558	0.7115583
Individual	Prostate Car	0.7067397	0.6924189	0.7210604
Area	Prostate Car	0.7458262	0.7322843	0.7593682
Combined	Prostate Car	0.7677461	0.7546469	0.7808454

Base	Type 2 Diabetes	0.7100627	0.703555	0.7165704
SIRE	Type 2 Diabetes	0.7485824	0.7423537	0.754811
SES	Type 2 Diabetes	0.7672262	0.7613228	0.7731296
Individual	Type 2 Diabetes	0.7704882	0.7646213	0.7763551
Area	Type 2 Diabetes	0.723405	0.717042	0.729768
Combined	Type 2 Diabetes	0.7728424	0.7670047	0.7786801
Base	Type 1 Diabetes	0.6458432	0.623037	0.6686493
SIRE	Type 1 Diabetes	0.6776553	0.6554897	0.6998209
SES	Type 1 Diabetes	0.7049454	0.6841881	0.7257028
Individual	Type 1 Diabetes	0.7350468	0.7158322	0.7542614
Area	Type 1 Diabetes	0.6594799	0.6373615	0.6815983
Combined	Type 1 Diabetes	0.7366608	0.7174323	0.7558893

Supplementary Table 5 (S3): AUC pair-wise comparisons in Individual cohort

Disease	Model1	Model2	AUC1	AUC2	p_value	bonf_p
Afib	Base	SIRE	0.7046652	0.7062544	1.66E-02	3.70E-04
Afib	Base	SES	0.7046652	0.7054724	1.38E-01	3.70E-04
Afib	Base	Individual	0.7046652	0.7062201	2.56E-02	3.70E-04
Afib	Base	Area	0.7046652	0.7161042	7.39E-12	3.70E-04
Afib	Base	Combined	0.7046652	0.7132148	1.86E-08	3.70E-04
Afib	SIRE	SES	0.7062544	0.7054724	4.07E-01	3.70E-04
Afib	SIRE	Individual	7.06E-01	0.7062201	9.70E-01	3.70E-04
Afib	SIRE	Area	0.7062544	0.7161042	8.21E-08	3.70E-04
Afib	SIRE	Combined	0.7062544	0.7132148	2.33E-05	3.70E-04
Afib	SES	Individual	0.7054724	0.7062201	0.4132669	3.70E-04
Afib	SES	Area	0.7054724	0.7161042	9.16E-10	3.70E-04
Afib	SES	Combined	0.7054724	0.7132148	2.46E-06	3.70E-04
Afib	Individual	Area	0.7062201	0.7161042	1.61E-08	3.70E-04
Afib	Individual	Combined	0.7062201	0.7132148	7.13E-11	3.70E-04
Afib	Area	Combined	0.7161042	0.7132148	2.73E-02	3.70E-04
Asthma	Base	SIRE	0.7043092	0.7040388	5.28E-01	3.70E-04
Asthma	Base	SES	0.7043092	0.705069	0.1137587	3.70E-04
Asthma	Base	Individual	0.7043092	0.7146287	1.88E-05	3.70E-04
Asthma	Base	Area	0.7043092	0.7065746	2.57E-01	3.70E-04
Asthma	Base	Combined	0.7043092	0.7222295	1.78E-10	3.70E-04
Asthma	SIRE	SES	7.04E-01	0.705069	1.11E-01	3.70E-04
Asthma	SIRE	Individual	0.7040388	0.7146287	1.19E-05	3.70E-04
Asthma	SIRE	Area	0.7040388	0.7065746	2.03E-01	3.70E-04
Asthma	SIRE	Combined	0.7040388	0.7222295	7.08E-11	3.70E-04
Asthma	SES	Individual	0.705069	0.7146287	5.28E-05	3.70E-04
Asthma	SES	Area	0.705069	0.7065746	4.69E-01	3.70E-04
Asthma	SES	Combined	0.705069	0.7222295	6.85E-10	3.70E-04
Asthma	Individual	Area	0.7146287	0.7065746	6.98E-03	3.70E-04
Asthma	Individual	Combined	0.7146287	0.7222295	3.04E-06	3.70E-04
Asthma	Area	Combined	0.7065746	0.7222295	6.57E-12	3.70E-04
BreastC	Base	SIRE	0.7136544	0.7148903	2.72E-02	3.70E-04
BreastC	Base	SES	0.7136544	0.7175904	3.77E-03	3.70E-04
BreastC	Base	Individual	0.7136544	0.7205704	4.67E-05	3.70E-04
BreastC	Base	Area	0.7136544	0.7155766	3.68E-02	3.70E-04
BreastC	Base	Combined	0.7136544	0.721803	9.23E-06	3.70E-04
BreastC	SIRE	SES	0.7148903	0.7175904	4.26E-02	3.70E-04
BreastC	SIRE	Individual	0.7148903	0.7205704	6.71E-04	3.70E-04
BreastC	SIRE	Area	0.7148903	0.7155766	5.06E-01	3.70E-04
BreastC	SIRE	Combined	0.7148903	0.721803	1.37E-04	3.70E-04
BreastC	SES	Individual	0.7175904	0.7205704	7.18E-02	3.70E-04
BreastC	SES	Area	0.7175904	0.7155766	1.66E-01	3.70E-04
BreastC	SES	Combined	0.7175904	0.721803	1.67E-02	3.70E-04

BreastC	Individual	Area	0.7205704	0.7155766	6.25E-03	3.70E-04
BreastC	Individual	Combined	0.7205704	0.721803	1.44E-02	3.70E-04
BreastC	Area	Combined	0.7155766	0.721803	3.23E-04	3.70E-04
CHD	Base	SIRE	0.7999508	0.8001358	1.58E-01	3.70E-04
CHD	Base	SES	0.7999508	0.8036813	9.70E-12	3.70E-04
CHD	Base	Individual	0.7999508	0.8008117	5.97E-03	3.70E-04
CHD	Base	Area	0.7999508	0.7999726	4.25E-01	3.70E-04
CHD	Base	Combined	0.7999508	0.8007473	9.78E-03	3.70E-04
CHD	SIRE	SES	0.8001358	0.8036813	8.08E-11	3.70E-04
CHD	SIRE	Individual	0.8001358	0.8008117	4.55E-02	3.70E-04
CHD	SIRE	Area	0.8001358	0.7999726	2.20E-01	3.70E-04
CHD	SIRE	Combined	0.8001358	0.8007473	0.0656899	3.70E-04
CHD	SES	Individual	0.8036813	0.8008117	7.64E-07	3.70E-04
CHD	SES	Area	0.8036813	0.7999726	9.46E-12	3.70E-04
CHD	SES	Combined	0.8036813	0.8007473	4.96E-07	3.70E-04
CHD	Individual	Area	0.8008117	0.7999726	7.69E-03	3.70E-04
CHD	Individual	Combined	0.8008117	0.8007473	3.76E-01	3.70E-04
CHD	Area	Combined	0.7999726	0.8007473	1.41E-02	3.70E-04
CKD	Base	SIRE	0.8638855	0.8770502	1.45E-24	3.70E-04
CKD	Base	SES	0.8638855	0.8723753	2.37E-19	3.70E-04
CKD	Base	Individual	0.8638855	0.8662679	6.00E-06	3.70E-04
CKD	Base	Area	0.8638855	0.8662052	2.26E-07	3.70E-04
CKD	Base	Combined	0.8638855	0.866747	5.94E-07	3.70E-04
CKD	SIRE	SES	0.8770502	0.8723753	6.36E-04	3.70E-04
CKD	SIRE	Individual	0.8770502	0.8662679	2.85E-16	3.70E-04
CKD	SIRE	Area	0.8770502	0.8662052	5.32E-17	3.70E-04
CKD	SIRE	Combined	0.8770502	0.866747	3.63E-15	3.70E-04
CKD	SES	Individual	0.8723753	0.8662679	5.56E-12	3.70E-04
CKD	SES	Area	0.8723753	0.8662052	7.16E-10	3.70E-04
CKD	SES	Combined	0.8723753	0.866747	3.22E-10	3.70E-04
CKD	Individual	Area	0.8662679	0.8662052	9.25E-01	3.70E-04
CKD	Individual	Combined	0.8662679	0.866747	4.00E-05	3.70E-04
CKD	Area	Combined	0.8662052	0.866747	3.99E-01	3.70E-04
HyperC	Base	SIRE	0.8305252	0.8313223	0.0053589	3.70E-04
HyperC	Base	SES	0.8305252	0.8341411	1.45E-05	3.70E-04
HyperC	Base	Individual	0.8305252	0.8314138	1.80E-02	3.70E-04
HyperC	Base	Area	0.8305252	0.8322847	0.0010843	3.70E-04
HyperC	Base	Combined	0.8305252	0.8317432	4.33E-03	3.70E-04
HyperC	SIRE	SES	0.8313223	0.8341411	5.92E-04	3.70E-04
HyperC	SIRE	Individual	0.8313223	0.8314138	8.44E-01	3.70E-04
HyperC	SIRE	Area	0.8313223	0.8322847	1.23E-01	3.70E-04
HyperC	SIRE	Combined	0.8313223	0.8317432	4.06E-01	3.70E-04
HyperC	SES	Individual	0.8341411	0.8314138	8.44E-04	3.70E-04
HyperC	SES	Area	0.8341411	0.8322847	5.41E-02	3.70E-04

HyperC	SES	Combined	0.8341411	0.8317432	3.85E-03	3.70E-04
HyperC	Individual	Area	0.8314138	0.8322847	0.1633792	3.70E-04
HyperC	Individual	Combined	0.8314138	0.8317432	6.69E-05	3.70E-04
HyperC	Area	Combined	0.8322847	0.8317432	3.68E-01	3.70E-04
ProstateC	Base	SIRE	0.6383231	0.6472552	1.59E-03	3.70E-04
ProstateC	Base	SES	0.6383231	0.6970582	1.01E-20	3.70E-04
ProstateC	Base	Individual	0.6383231	0.7067397	4.43E-25	3.70E-04
ProstateC	Base	Area	0.6383231	0.7458262	2.86E-50	3.70E-04
ProstateC	Base	Combined	0.6383231	0.7677461	4.18E-65	3.70E-04
ProstateC	SIRE	SES	0.6472552	0.6970582	3.77E-13	3.70E-04
ProstateC	SIRE	Individual	0.6472552	0.7067397	1.63E-16	3.70E-04
ProstateC	SIRE	Area	0.6472552	0.7458262	7.15E-41	3.70E-04
ProstateC	SIRE	Combined	0.6472552	0.7677461	2.73E-52	3.70E-04
ProstateC	SES	Individual	0.6970582	0.7067397	4.90E-03	3.70E-04
ProstateC	SES	Area	0.6970582	0.7458262	3.60E-10	3.70E-04
ProstateC	SES	Combined	0.6970582	0.7677461	3.52E-34	3.70E-04
ProstateC	Individual	Area	0.7067397	0.7458262	4.99E-07	3.70E-04
ProstateC	Individual	Combined	0.7067397	0.7677461	3.21E-35	3.70E-04
ProstateC	Area	Combined	0.7458262	0.7677461	4.81E-07	3.70E-04
t1d	Base	SIRE	0.6458432	0.6776553	3.35E-05	3.70E-04
t1d	Base	SES	0.6458432	0.7049454	1.99E-08	3.70E-04
t1d	Base	Individual	0.6458432	0.7350468	2.24E-16	3.70E-04
t1d	Base	Area	0.6458432	0.6594799	1.19E-02	3.70E-04
t1d	Base	Combined	0.6458432	0.7366608	1.28E-16	3.70E-04
t1d	SIRE	SES	0.6776553	0.7049454	5.28E-03	3.70E-04
t1d	SIRE	Individual	0.6776553	0.7350468	3.60E-08	3.70E-04
t1d	SIRE	Area	0.6776553	0.6594799	8.74E-03	3.70E-04
t1d	SIRE	Combined	0.6776553	0.7366608	9.05E-09	3.70E-04
t1d	SES	Individual	0.7049454	0.7350468	1.55E-06	3.70E-04
t1d	SES	Area	0.7049454	0.6594799	7.02E-06	3.70E-04
t1d	SES	Combined	0.7049454	0.7366608	8.52E-07	3.70E-04
t1d	Individual	Area	0.7350468	0.6594799	5.57E-13	3.70E-04
t1d	Individual	Combined	0.7350468	0.7366608	2.51E-01	3.70E-04
t1d	Area	Combined	0.6594799	0.7366608	1.46E-14	3.70E-04
t2d	Base	SIRE	0.7100627	0.7485824	1.22E-71	3.70E-04
t2d	Base	SES	0.7100627	0.7672262	1.99E-105	3.70E-04
t2d	Base	Individual	0.7100627	0.7704882	2.38E-119	3.70E-04
t2d	Base	Area	0.7100627	0.723405	3.48E-21	3.70E-04
t2d	Base	Combined	0.7100627	0.7728424	3.12E-125	3.70E-04
t2d	SIRE	SES	0.7485824	0.7672262	2.17E-12	3.70E-04
t2d	SIRE	Individual	0.7485824	0.7704882	1.36E-16	3.70E-04
t2d	SIRE	Area	0.7485824	0.723405	3.66E-32	3.70E-04
t2d	SIRE	Combined	0.7485824	0.7728424	7.28E-21	3.70E-04
t2d	SES	Individual	0.7672262	0.7704882	3.54E-02	3.70E-04

t2d	SES	Area	0.7672262	0.723405	5.23E-62	3.70E-04
t2d	SES	Combined	0.7672262	0.7728424	5.72E-04	3.70E-04
t2d	Individual	Area	0.7704882	0.723405	6.05E-73	3.70E-04
t2d	Individual	Combined	0.7704882	0.7728424	3.71E-05	3.70E-04
t2d	Area	Combined	0.723405	0.7728424	1.19E-92	3.70E-04

p_value_bon significant

1	FALSE
1.00E+00	FALSE
1	FALSE
9.98E-10	TRUE
2.51E-06	TRUE
1.00E+00	FALSE
1.00E+00	FALSE
1.11E-05	TRUE
0.0031504	TRUE
1	FALSE
1.24E-07	TRUE
3.33E-04	TRUE
2.18E-06	TRUE
9.62E-09	TRUE
1.00E+00	FALSE
1.00E+00	FALSE
1.00E+00	FALSE
2.54E-03	TRUE
1.00E+00	FALSE
2.41E-08	TRUE
1.00E+00	FALSE
1.60E-03	TRUE
1.00E+00	FALSE
9.56E-09	TRUE
7.13E-03	TRUE
1.00E+00	FALSE
9.25E-08	TRUE
9.42E-01	FALSE
4.10E-04	TRUE
8.86E-10	TRUE
1.00E+00	FALSE
5.09E-01	FALSE
6.30E-03	TRUE
1	FALSE
0.0012462	TRUE
1.00E+00	FALSE
0.0905652	FALSE
1.00E+00	FALSE
1.85E-02	TRUE
1	FALSE
1.00E+00	FALSE
1	FALSE

8.44E-01	FALSE
1.00E+00	FALSE
4.36E-02	TRUE
1.00E+00	FALSE
1.31E-09	TRUE
8.06E-01	FALSE
1.00E+00	FALSE
1	FALSE
1.09E-08	TRUE
1.00E+00	FALSE
1.00E+00	FALSE
1	FALSE
1.03E-04	TRUE
1.28E-09	TRUE
6.70E-05	TRUE
1.00E+00	FALSE
1.00E+00	FALSE
1.96E-22	TRUE
3.20E-17	TRUE
8.10E-04	TRUE
3.06E-05	TRUE
8.02E-05	TRUE
8.58E-02	FALSE
3.85E-14	TRUE
7.18E-15	TRUE
4.90E-13	TRUE
7.51E-10	TRUE
9.67E-08	TRUE
4.34E-08	TRUE
1.00E+00	FALSE
0.0053956	TRUE
1	FALSE
0.7234467	FALSE
0.0019596	TRUE
1	FALSE
0.1463865	FALSE
5.85E-01	FALSE
7.99E-02	FALSE
1.00E+00	FALSE
1.00E+00	FALSE
1.00E+00	FALSE
1.14E-01	FALSE
1	FALSE

5.20E-01	FALSE
1	FALSE
0.0090278	TRUE
1	FALSE
2.15E-01	FALSE
1.36E-18	TRUE
5.98E-23	TRUE
3.87E-48	TRUE
5.64E-63	TRUE
5.09E-11	TRUE
2.20E-14	TRUE
9.65E-39	TRUE
3.69E-50	TRUE
6.62E-01	FALSE
4.87E-08	TRUE
4.75E-32	TRUE
6.74E-05	TRUE
4.33E-33	TRUE
6.50E-05	TRUE
4.53E-03	TRUE
2.69E-06	TRUE
3.03E-14	TRUE
1.00E+00	FALSE
1.73E-14	TRUE
7.12E-01	FALSE
4.86E-06	TRUE
1.00E+00	FALSE
1.22E-06	TRUE
2.09E-04	TRUE
9.47E-04	TRUE
1.15E-04	TRUE
7.53E-11	TRUE
1.00E+00	FALSE
1.97E-12	TRUE
1.65E-69	TRUE
2.69E-103	TRUE
3.21E-117	TRUE
4.70E-19	TRUE
4.21E-123	TRUE
2.93E-10	TRUE
1.84E-14	TRUE
4.95E-30	TRUE
9.83E-19	TRUE
1.00E+00	FALSE

7.06E-60	TRUE
7.73E-02	FALSE
8.16E-71	TRUE
5.01E-03	TRUE
1.60E-90	TRUE

Supplementary Table 5 (S4): PsRS EN summary results in SES cohort. Reported values incl

model	Disease	mean_train_sd_train_sco	mean_test_ssd	test_scor	mean_AUC
Area	Asthma	1.0952981	0.0052313	0.1274257	0.0065306
Area	Afib	1.229052	0.0024484	0.1339067	0.0096113
Area	BreastC	0.4943668	0.0013334	0.0627517	0.0060817
Area	CKD	1.0840384	0.0022987	0.069214	0.0109746
Area	CHD	0.7461801	0.0012701	0.0492593	0.0062174
Area	HyperC	1.1930615	1.79E-03	0.0762674	0.00818
Area	ProstateC	1.2015245	0.0033003	0.3148597	0.0093566
Area	t2d	1.2589407	0.001833	0.1211339	0.0072272
Area	t1d	0.2704555	0.0048867	0.0356646	0.0099541
Combined	Asthma	1.0949276	0.0052488	0.1289902	0.0065373
Combined	Afib	1.2217362	0.0028115	0.1575634	0.011532
Combined	BreastC	0.4882323	0.0011957	0.1003609	0.0064599
Combined	CKD	1.0793369	0.0028125	0.0959865	0.0112007
Combined	CHD	0.744876	0.001335	0.0609125	0.0048792
Combined	HyperC	1.1885866	1.73E-03	0.1048942	0.0035188
Combined	ProstateC	1.1656886	0.0047298	0.3676296	0.0124812
Combined	t2d	1.2077045	0.0013545	0.2543643	0.0076435
Combined	t1d	0.2681933	0.005	0.057872	0.0029063
					0.5

lude the mean and standard deviation of training scores (mean_train_score, sd_	sd_AUC	n_predictors	Predictors	mean_coef	sd_coef	coef_nonzero	Intercept
0.0030342	6 assisted_inc	2.546675,-0.166037,0.15,5,5,5,5,5		-0.7849238			
0.004495	6 assisted_inc	-0.326572,0.184697,0.15,5,5,5,5,5		-0.7531398			
0	6 assisted_inc	0.137515,0.40218656,0.12,5,5,2,5,5		-1.9603606			
0.0170152	6 assisted_inc	-0.853206,0.064125,0.05,5,5,5,2,5		-1.2198138			
0	6 assisted_inc	-0.342312,0.177356,0.05,5,5,5,5,5		-1.5744234			
0	6 assisted_inc	0.219629,0.50069326,0.05,5,5,4,5,5		0.8302984			
0.0032113	6 assisted_inc	9.857014,-4.0.297111,0.15,5,5,5,5,5		0.1862224			
0.0016702	6 assisted_inc	-2.115847,2.0.176047,0.05,5,5,5,5,5		-1.0564801			
0	6 assisted_inc	-1.514091,1.0.297169,0.25,5,4,4,5,5		-3.7595784			
2.39E-03	8 per_poverty_	-0.245058,-0.005998,0.015,5,5,5,5,5,5		-0.6810028			
0.0038313	8 per_poverty_	0.546673,0.300.088866,0.05,5,5,5,5,5,5		-1.242264			
0.002771	8 per_poverty_	1.32938,0.300.039056,0.05,5,1,5,5,5,5		-2.6977502			
0.0081946	7 per_poverty_	-0.554912,-0.070552,0.05,5,5,5,5,5,5		-0.7670755			
0.0244755	8 per_poverty_	0.137638,-0.0.053727,0.05,5,5,5,5,5,5		-1.3068693			
0.0016929	8 per_poverty_	0.587419,-0.0.064423,0.05,5,5,5,5,4,5		1.0899848			
0.0042551	8 per_poverty_	1.879684,0.500.091916,0.05,5,5,5,5,5,5		-0.9378898			
0.0018592	8 per_poverty_	-1.628339,-0.0.035039,0.05,5,5,5,5,3,5		0.2479281			
0	8 per_poverty_	-1.261865,-0.0.148291,0.05,5,5,5,4,4,5		-3.1413368			

full_data_coef

-0.784924,2.616346,-0.787405,-0.537886,-1.712119,-1.467681,0.648704,0
-0.75314,-0.297858,0.107836,0.664835,1.221317,-3.106755,0.847964,0
-1.960361,0.048478,0.53067,-1.176483,0,-1.352305,1.404427,0
-1.219814,-0.807986,0.536753,-0.318718,0.42842,0,1.535463,0
-1.574423,-0.391554,0.758748,-0.905512,0.041318,-0.293353,0.985309,0
0.830298,0.312378,0.528985,0.489146,-0.032399,-2.345186,0.815631,0
0.186222,9.671646,-4.100271,-3.387731,-0.17013,-4.026705,4.322257,0
-1.05648,-2.029071,2.367047,-0.031693,-0.228959,1.335213,1.180548,0
-3.759578,-0.918123,1.119843,0,0,0.657069,0.968933,0
-0.681003,-0.249308,-0.020496,2.67995,-0.865762,-0.580744,-1.681497,-1.556286,0.6336
-1.242264,0.549089,0.374049,-0.317934,0.409285,0.748488,1.105284,-3.023326,1.041734
-2.69775,1.330902,0.277619,0,0.762663,-0.901511,-0.026215,-1.096537,1.431826,0
-0.767075,-0.587445,-0.280151,-0.741059,0.30757,-0.518024,0.427714,0,1.458357,0
-1.306869,0.12632,-0.397367,-0.310826,0.596828,-0.925827,0.099145,-0.417326,0.94776,
1.089985,0.591612,-0.596567,0.336253,0.385627,0.535018,0,-2.353115,0.768825,0
-0.93789,1.845159,0.581793,9.587567,-3.416286,-3.040322,-0.367987,-4.188655,4.467156
0.247928,-1.643719,-0.975866,-1.562434,1.636435,-0.373171,0,0.700305,0.907016,0
-3.141337,-1.272063,-0.315047,-1.172805,1.054586,0,-0.023375,0.54497,0.826126,0

1,0
1,0

0

3,0

Supplementary Table 5 (S5): Logistic regression summary results

Model	Disease	AUC	AUC_CI_Low	AUC_CI_Upper
Base	Asthma	0.6743152	0.6686778	0.6799526
SIRE	Asthma	0.672757	0.667122	0.678392
SES	Asthma	0.6731664	0.6675324	0.6788005
Area	Asthma	0.6740692	0.6685026	0.6796358
Combined	Asthma	0.6745292	0.6689601	0.6800984
Base	Atrial Fibrillat	0.729538	0.7229296	0.7361463
SIRE	Atrial Fibrillat	0.737629	0.7310924	0.7441656
SES	Atrial Fibrillat	0.7298311	0.7232278	0.7364345
Area	Atrial Fibrillat	0.7373093	0.7307838	0.7438347
Combined	Atrial Fibrillat	0.7366476	0.7301183	0.743177
Base	Breast Canc	0.7305938	0.7244339	0.7367537
SIRE	Breast Canc	0.7348288	0.7287263	0.7409314
SES	Breast Canc	0.7399405	0.7338988	0.7459822
Area	Breast Canc	0.7339819	0.7278832	0.7400806
Combined	Breast Canc	0.7427026	0.7366903	0.7487149
Base	Chronic Kidn	0.8642224	0.860091	0.8683538
SIRE	Chronic Kidn	0.8810583	0.8771938	0.8849228
SES	Chronic Kidn	0.8761124	0.8722429	0.8799819
Area	Chronic Kidn	0.8686124	0.8646001	0.8726247
Combined	Chronic Kidn	0.8764225	0.872577	0.880268
Base	Coronary He	0.7966307	0.7930722	0.8001892
SIRE	Coronary He	0.7978642	0.7943328	0.8013956
SES	Coronary He	0.8030433	0.7995831	0.8065034
Area	Coronary He	0.796634	0.7930758	0.8001922
Combined	Coronary He	0.7981727	0.7946375	0.8017078
Base	Hypercholes	0.8416533	0.8369191	0.8463876
SIRE	Hypercholes	0.8426584	0.8379443	0.8473725
SES	Hypercholes	0.8443787	0.8396916	0.8490659
Area	Hypercholes	0.8428815	0.8381689	0.8475941
Combined	Hypercholes	0.8434314	0.8387341	0.8481288
Base	Prostate Car	0.6300935	0.6187972	0.6413897
SIRE	Prostate Car	0.641883	0.6306421	0.6531238
SES	Prostate Car	0.674808	0.6637104	0.6859056
Area	Prostate Car	0.7521136	0.7420287	0.7621986
Combined	Prostate Car	0.7639392	0.7540149	0.7738635
Base	Type 2 Diabe	0.7085451	0.7042938	0.7127964
SIRE	Type 2 Diabe	0.7583601	0.7543707	0.7623495
SES	Type 2 Diabe	0.7717666	0.7679253	0.7756078
Area	Type 2 Diabe	0.7302597	0.7261416	0.7343778
Combined	Type 2 Diabe	0.7745743	0.7707603	0.7783882
Base	Type 1 Diabe	0.6264655	0.6092075	0.6437234
SIRE	Type 1 Diabe	0.6455917	0.6288035	0.6623799

SES	Type 1 Diab�	0.6645067	0.6488102	0.6802032
Area	Type 1 Diab�	0.6465102	0.6301735	0.6628468
Combined	Type 1 Diab�	0.6717248	0.6561201	0.6873295

Supplementary Table 5 (S6): AUC pair-wise comparisons in SES cohort

Disease	Model1	Model2	AUC1	AUC2	p_value	bonf_p
Afib	Base	SIRE	0.729538	0.737629	4.21E-17	5.56E-04
Afib	Base	SES	0.729538	0.7298311	1.92E-01	5.56E-04
Afib	Base	Area	0.729538	0.7373093	4.76E-17	5.56E-04
Afib	Base	Combined	0.729538	0.7366476	2.27E-15	5.56E-04
Afib	SIRE	SES	0.737629	0.7298311	3.99E-18	5.56E-04
Afib	SIRE	Area	0.737629	0.7373093	7.76E-01	5.56E-04
Afib	SIRE	Combined	0.737629	0.7366476	0.3282942	5.56E-04
Afib	SES	Area	0.7298311	0.7373093	6.13E-16	5.56E-04
Afib	SES	Combined	0.7298311	0.7366476	5.88E-18	5.56E-04
Afib	Area	Combined	0.7373093	0.7366476	1.84E-01	5.56E-04
Asthma	Base	SIRE	0.6743152	0.672757	4.97E-08	5.56E-04
Asthma	Base	SES	0.6743152	0.6731664	2.15E-14	5.56E-04
Asthma	Base	Area	0.6743152	0.6740692	8.56E-01	5.56E-04
Asthma	Base	Combined	0.6743152	0.6745292	8.73E-01	5.56E-04
Asthma	SIRE	SES	0.672757	0.6731664	1.17E-01	5.56E-04
Asthma	SIRE	Area	0.672757	0.6740692	3.21E-01	5.56E-04
Asthma	SIRE	Combined	0.672757	0.6745292	0.1803996	5.56E-04
Asthma	SES	Area	0.6731664	0.6740692	5.01E-01	5.56E-04
Asthma	SES	Combined	0.6731664	0.6745292	3.12E-01	5.56E-04
Asthma	Area	Combined	0.6740692	0.6745292	2.92E-02	5.56E-04
BreastC	Base	SIRE	0.7305938	0.7348288	1.51E-06	5.56E-04
BreastC	Base	SES	0.7305938	0.7399405	8.49E-13	5.56E-04
BreastC	Base	Area	0.7305938	0.7339819	8.57E-05	5.56E-04
BreastC	Base	Combined	0.7305938	0.7427026	1.17E-17	5.56E-04
BreastC	SIRE	SES	0.7348288	0.7399405	3.00E-05	5.56E-04
BreastC	SIRE	Area	0.7348288	0.7339819	4.40E-01	5.56E-04
BreastC	SIRE	Combined	0.7348288	0.7427026	3.61E-09	5.56E-04
BreastC	SES	Area	0.7399405	0.7339819	1.83E-05	5.56E-04
BreastC	SES	Combined	0.7399405	0.7427026	3.48E-05	5.56E-04
BreastC	Area	Combined	0.7339819	0.7427026	1.22E-14	5.56E-04
CHD	Base	SIRE	0.7966307	0.7978642	5.39E-09	5.56E-04
CHD	Base	SES	0.7966307	0.8030433	1.39E-40	5.56E-04
CHD	Base	Area	0.7966307	0.796634	9.28E-01	5.56E-04
CHD	Base	Combined	0.7966307	0.7981727	5.15E-11	5.56E-04
CHD	SIRE	SES	0.7978642	0.8030433	1.46E-31	5.56E-04
CHD	SIRE	Area	0.7978642	0.796634	1.08E-08	5.56E-04
CHD	SIRE	Combined	0.7978642	0.7981727	0.2914896	5.56E-04
CHD	SES	Area	0.8030433	0.796634	1.07E-39	5.56E-04
CHD	SES	Combined	0.8030433	0.7981727	8.34E-29	5.56E-04
CHD	Area	Combined	0.796634	0.7981727	1.27E-13	5.56E-04
CKD	Base	SIRE	0.8642224	0.8810583	3.00E-75	5.56E-04
CKD	Base	SES	0.8642224	0.8761124	2.66E-62	5.56E-04

CKD	Base	Area	0.8642224	0.8686124	3.51E-31	5.56E-04
CKD	Base	Combined	0.8642224	0.8764225	7.35E-69	5.56E-04
CKD	SIRE	SES	0.8810583	0.8761124	7.09E-08	5.56E-04
CKD	SIRE	Area	0.8810583	0.8686124	7.64E-44	5.56E-04
CKD	SIRE	Combined	0.8810583	0.8764225	2.75E-07	5.56E-04
CKD	SES	Area	0.8761124	0.8686124	1.26E-23	5.56E-04
CKD	SES	Combined	0.8761124	0.8764225	5.20E-01	5.56E-04
CKD	Area	Combined	0.8686124	0.8764225	1.63E-55	5.56E-04
HyperC	Base	SIRE	0.8416533	0.8426584	9.74E-07	5.56E-04
HyperC	Base	SES	0.8416533	0.8443787	2.16E-09	5.56E-04
HyperC	Base	Area	0.8416533	0.8428815	1.81E-05	5.56E-04
HyperC	Base	Combined	0.8416533	0.8434314	1.08E-06	5.56E-04
HyperC	SIRE	SES	0.8426584	0.8443787	4.78E-05	5.56E-04
HyperC	SIRE	Area	0.8426584	0.8428815	5.55E-01	5.56E-04
HyperC	SIRE	Combined	0.8426584	0.8434314	7.03E-02	5.56E-04
HyperC	SES	Area	0.8443787	0.8428815	5.30E-03	5.56E-04
HyperC	SES	Combined	0.8443787	0.8434314	5.73E-02	5.56E-04
HyperC	Area	Combined	0.8428815	0.8434314	2.92E-02	5.56E-04
ProstateC	Base	SIRE	0.6300935	0.641883	3.17E-06	5.56E-04
ProstateC	Base	SES	0.6300935	0.674808	3.08E-25	5.56E-04
ProstateC	Base	Area	0.6300935	0.7521136	1.17E-104	5.56E-04
ProstateC	Base	Combined	0.6300935	0.7639392	1.62E-120	5.56E-04
ProstateC	SIRE	SES	0.641883	0.674808	2.56E-10	5.56E-04
ProstateC	SIRE	Area	0.641883	0.7521136	1.47E-83	5.56E-04
ProstateC	SIRE	Combined	0.641883	0.7639392	8.21E-92	5.56E-04
ProstateC	SES	Area	0.674808	0.7521136	4.26E-38	5.56E-04
ProstateC	SES	Combined	0.674808	0.7639392	2.34E-82	5.56E-04
ProstateC	Area	Combined	0.7521136	0.7639392	2.04E-06	5.56E-04
t1d	Base	SIRE	0.6264655	0.6455917	5.87E-04	5.56E-04
t1d	Base	SES	0.6264655	0.6645067	5.82E-08	5.56E-04
t1d	Base	Area	0.6264655	0.6465102	1.03E-04	5.56E-04
t1d	Base	Combined	0.6264655	0.6717248	3.21E-09	5.56E-04
t1d	SIRE	SES	0.6455917	0.6645067	0.0042207	5.56E-04
t1d	SIRE	Area	0.6455917	0.6465102	8.63E-01	5.56E-04
t1d	SIRE	Combined	0.6455917	0.6717248	9.60E-05	5.56E-04
t1d	SES	Area	0.6645067	0.6465102	6.68E-03	5.56E-04
t1d	SES	Combined	0.6645067	0.6717248	1.95E-03	5.56E-04
t1d	Area	Combined	0.6465102	0.6717248	1.25E-05	5.56E-04
t2d	Base	SIRE	0.7085451	0.7583601	1.34E-212	5.56E-04
t2d	Base	SES	0.7085451	0.7717666	4.67E-284	5.56E-04
t2d	Base	Area	0.7085451	0.7302597	7.18E-78	5.56E-04
t2d	Base	Combined	0.7085451	0.7745743	1.07E-301	5.56E-04
t2d	SIRE	SES	0.7583601	0.7717666	2.22E-16	5.56E-04
t2d	SIRE	Area	0.7583601	0.7302597	9.04E-77	5.56E-04

t2d	SIRE	Combined	0.7583601	0.7745743	3.22E-24	5.56E-04
t2d	SES	Area	0.7717666	0.7302597	4.74E-130	5.56E-04
t2d	SES	Combined	0.7717666	0.7745743	6.89E-09	5.56E-04
t2d	Area	Combined	0.7302597	0.7745743	7.92E-191	5.56E-04

p_value_bon significant

3.79E-15	TRUE
1.00E+00	FALSE
4.28E-15	TRUE
2.04E-13	TRUE
3.59E-16	TRUE
1.00E+00	FALSE
1	FALSE
5.51E-14	TRUE
5.29E-16	TRUE
1.00E+00	FALSE
4.47E-06	TRUE
1.93E-12	TRUE
1.00E+00	FALSE
1	FALSE
1	FALSE
1.00E+00	FALSE
1.00E+00	FALSE
1.36E-04	TRUE
7.64E-11	TRUE
7.71E-03	TRUE
1.06E-15	TRUE
2.70E-03	TRUE
1.00E+00	FALSE
3.25E-07	TRUE
0.0016438	TRUE
3.14E-03	TRUE
1.10E-12	TRUE
4.85E-07	TRUE
1.25E-38	TRUE
1.00E+00	FALSE
4.63E-09	TRUE
1.32E-29	TRUE
9.72E-07	TRUE
1	FALSE
9.59E-38	TRUE
7.51E-27	TRUE
1.14E-11	TRUE
2.70E-73	TRUE
2.40E-60	TRUE

3.16E-29	TRUE
6.62E-67	TRUE
6.38E-06	TRUE
6.88E-42	TRUE
2.48E-05	TRUE
1.14E-21	TRUE
1	FALSE
1.47E-53	TRUE
8.76E-05	TRUE
1.95E-07	TRUE
0.0016328	TRUE
9.69E-05	TRUE
4.30E-03	TRUE
1	FALSE
1	FALSE
4.77E-01	FALSE
1.00E+00	FALSE
1.00E+00	FALSE
2.85E-04	TRUE
2.77E-23	TRUE
1.05E-102	TRUE
1.46E-118	TRUE
2.30E-08	TRUE
1.32E-81	TRUE
7.38E-90	TRUE
3.83E-36	TRUE
2.11E-80	TRUE
1.84E-04	TRUE
5.28E-02	FALSE
5.24E-06	TRUE
9.25E-03	TRUE
2.89E-07	TRUE
0.3798627	FALSE
1.00E+00	FALSE
8.64E-03	TRUE
6.01E-01	FALSE
1.76E-01	FALSE
1.12E-03	TRUE
1.21E-210	TRUE
4.20E-282	TRUE
6.46E-76	TRUE
9.66E-300	TRUE
2.00E-14	TRUE
8.14E-75	TRUE

2.90E-22	TRUE
4.26E-128	TRUE
6.20E-07	TRUE
7.12E-189	TRUE

Supplementary Table 5 (S7): Stratified EN summary results in SES cohort. Reported values

model	Disease	mean_train_sd_train_sco	mean_test_ssd	test_scor	mean_AUC
Combined	Asthma	1.1001872	0.0039195	0.0786588	0.0104745 0.5184621
Combined	Afib	0.9593086	0.0175737	0.0604375	0.0393904 0.5
Combined	BreastC	0.3629505	0.0034351	0.0813292	0.0068049 0.5
Combined	CKD	1.298328	0.0075729	0.0175434	0.0152661 0.5
Combined	CHD	0.7015063	0.0023024	0.0525051	0.0101127 0.5
Combined	HyperC	1.2337638	0.0051915	0.141063	0.0063466 0.5765492
Combined	ProstateC	1.2275307	0.0161195	0.3571362	0.0336725 0.7024294
Combined	t2d	1.3760515	6.04E-04	0.0754377	0.0125567 0.5358667
Combined	t1d	0.3879107	0.0124346	0.067151	0.0207839 0.5
Combined	Asthma	1.0914594	0.0030173	0.1364843	0.0104806 0.5874956
Combined	Afib	1.3013203	0.0025366	0.1474891	0.0083293 0.5923623
Combined	BreastC	0.5494069	0.0038458	0.0920812	0.002607 0.5747531
Combined	CKD	1.0535331	0.0057117	0.124931	0.0097873 0.5803166
Combined	CHD	0.7750631	0.0013208	0.0934191	0.0049983 0.5520652
Combined	HyperC	1.1629375	2.04E-03	0.1104364	0.0054606 0.5389439
Combined	ProstateC	1.1505171	0.0058789	0.3956257	0.0188356 0.7315657
Combined	t2d	1.1349817	0.0019985	0.2145241	0.0045453 0.6421313
Combined	t1d	0.2449898	0.0042249	0.0505757	0.004006 0.5
Combined	Asthma	1.1012848	0.0061774	0.1768737	0.0158481 0.5938513
Combined	Afib	0.8612913	0.0112665	0.1871727	0.0284868 0.568339
Combined	BreastC	0.3643016	0.011053	0.0728727	0.0098614 0.5
Combined	CKD	0.7862355	0.0059389	0.1381156	0.0150735 0.5417869
Combined	CHD	0.6060171	0.0086854	0.0864684	0.015952 0.5550101
Combined	HyperC	1.2131255	0.0058626	0.2434506	0.0139047 0.6402078
Combined	ProstateC	1.059582	0.0351857	0.4249506	0.0690721 0.759662
Combined	t2d	1.2542357	0.0036658	0.306948	0.0105907 0.6789719
Combined	t1d	0.2824672	0.0046621	0.0648678	0.0325297 0.5

include the mean and standard deviation of training scores (mean_train_score, sd_train_score, n_predictors, Predictors, mean_coef, sd_coef, coef_nonzero, Intercept)

sd_AUC	n_predictors	Predictors	mean_coef	sd_coef	coef_nonzero	Intercept
0.0254622	8	per_poverty_	-0.849362,0.	0.197922,0.15,5,5,5,5,5,5	-0.9704729	
0	8	per_poverty_	0.246461,0.00	0.14963,0.104,4,4,3,4,4,5,5	-1.6585648	
0	8	per_poverty_	1.37944,0.240	0.151232,0.15,5,2,2,2,1,2	-3.1514338	
0	3	per_poverty_	0.855491,0.00	0.151594,0.05,2,5	-0.6238364	
0	8	per_poverty_	-0.359318,-0.01	0.168865,0.05,5,5,5,5,4,2	-1.154031	
0.0070026	8	per_poverty_	1.642872,-0.	0.235811,0.05,5,2,5,5,5,2	0.7971525	
0.0082708	8	per_poverty_	0.986042,0.30	0.430522,0.15,5,5,5,4,4,5	-0.864004	
0.0027857	8	per_poverty_	0.05494,-0.2	0.070361,0.04,5,5,5,4,5,5	0.3707231	
0	8	per_poverty_	-1.091657,0.	0.39379,0.15,5,5,5,5,5,5	-3.405913	
0.0071781	8	per_poverty_	-0.10485,-0.1	0.036231,0.05,5,5,5,5,5,5	-0.6165295	
0.0082699	8	per_poverty_	-0.014963,0.	0.021187,0.02,5,5,5,5,5,5	-0.5708082	
0.0019901	8	per_poverty_	1.063222,0.10	0.036335,0.05,5,5,5,5,5,4	-2.3431885	
0.0065699	8	per_poverty_	-0.75255,-0.1	0.06157,0.02,5,5,5,5,5,5	-0.5386227	
0.0305517	8	per_poverty_	-0.11231,-0.1	0.062176,0.05,5,4,5,5,5,5	-0.9448269	
0.0225691	8	per_poverty_	0.316282,-0.	0.043544,0.05,5,5,3,5,5,5	1.3185815	
0.0055376	8	per_poverty_	1.934543,0.90	0.096955,0.05,5,5,5,5,5,5	-1.3066424	
0.0023776	8	per_poverty_	-1.569955,-0.0	0.020082,0.05,5,5,5,5,2,5	0.2060401	
0	8	per_poverty_	-1.129995,-0.0	0.155454,0.05,5,5,5,4,3,3	-2.8011427	
0.0095013	8	per_poverty_	-0.182398,0.	0.163245,0.05,4,5,5,3,5,5	-0.5210261	
0.062759	8	per_poverty_	1.736356,-0.	0.160971,0.05,5,5,3,5,5,5	-1.994957	
0	8	per_poverty_	1.316217,-0.	0.214449,0.05,5,5,2,5,4,5	-2.7434082	
0.0572364	8	per_poverty_	-1.121685,-0.0	0.381527,0.15,5,1,4,4,4,4	-1.6134825	
0.0503991	7	per_poverty_	0.184784,-0.	0.239706,0.15,5,3,5,5,5,5	-2.1058655	
0.0018477	7	per_poverty_	0.450285,-1.	0.151404,0.05,5,5,5,5,3,5	1.1955002	
0.0228074	8	per_poverty_	1.803826,-1.	0.461361,0.25,5,5,5,5,5,5	0.1020752	
0.0042682	8	per_poverty_	-1.111279,-1.	0.129336,0.05,5,5,5,5,5,5	-0.5881872	
0	7	per_poverty_	-0.931988,-0.0	0.545712,0.05,5,4,3,1,1,5	-4.3001098	

full_data_coef SIRE

-0.970473,-0 NHB
-1.658565,0. NHB
-3.151434,1. NHB
-0.623836,0. NHB
-1.154031,-0 NHB
0.797152,1.5 NHB
-0.864004,1. NHB
0.370723,0,- NHB
-3.405913,-0 NHB
-0.616529,-0 NHW
-0.570808,-0 NHW
-2.343189,1. NHW
-0.538623,-0 NHW
-0.944827,-0 NHW
1.318582,0.3 NHW
-1.306642,1. NHW
0.20604,-1.5 NHW
-2.801143,-1 NHW
-0.521026,-0 HS
-1.994957,1. HS
-2.743408,1. HS
-1.613483,-1 HS
-2.105866,0. HS
1.1955,0.48 HS
0.102075,1.6 HS
-0.588187,-1 HS
-4.30011,-1.0 HS

Supplementary Table 5 (S8): Stratified logistic regression summary results in S

Model	Disease	AUC	AUC_CI_Low	AUC_CI_High	SIRE
Base	Asthma	0.6647862	0.6521743	0.677398	NHB
Combined	Asthma	0.6648991	0.6524276	0.6773706	NHB
Base	Atrial Fibrillat	0.6731076	0.6529293	0.6932859	NHB
Combined	Atrial Fibrillat	0.6764206	0.6563325	0.6965087	NHB
Base	Breast Canc	0.7399162	0.7219986	0.7578338	NHB
Combined	Breast Canc	0.7488504	0.7313341	0.7663668	NHB
Base	Chronic Kidn	0.8632112	0.8540204	0.8724019	NHB
Combined	Chronic Kidn	0.8641547	0.8550026	0.8733068	NHB
Base	Coronary He	0.762069	0.752262	0.7718761	NHB
Combined	Coronary He	0.7687088	0.7590467	0.7783709	NHB
Base	Hypercholest	0.8334364	0.8218509	0.8450219	NHB
Combined	Hypercholest	0.838608	0.8272042	0.8500118	NHB
Base	Prostate Car	0.7086393	0.6762295	0.7410492	NHB
Combined	Prostate Car	0.7982221	0.7700178	0.8264264	NHB
Base	Type 2 Diabe	0.7498137	0.740199	0.7594283	NHB
Combined	Type 2 Diabe	0.7505529	0.7409498	0.7601561	NHB
Base	Type 1 Diabe	0.6606918	0.623136	0.6982475	NHB
Combined	Type 1 Diabe	0.7027502	0.6679015	0.7375989	NHB
Base	Asthma	0.6795104	0.6726143	0.6864064	NHW
Combined	Asthma	0.684242	0.677424	0.6910599	NHW
Base	Atrial Fibrillat	0.715348	0.7076837	0.7230122	NHW
Combined	Atrial Fibrillat	0.7248466	0.7172986	0.7323945	NHW
Base	Breast Canc	0.7160377	0.7089207	0.7231546	NHW
Combined	Breast Canc	0.7264773	0.7194976	0.7334569	NHW
Base	Chronic Kidn	0.8843212	0.87975	0.8888924	NHW
Combined	Chronic Kidn	0.8889604	0.8845527	0.893368	NHW
Base	Coronary He	0.8025211	0.798497	0.8065451	NHW
Combined	Coronary He	0.805382	0.8014193	0.8093447	NHW
Base	Hypercholest	0.8390426	0.8333505	0.8447347	NHW
Combined	Hypercholest	0.842453	0.8368313	0.8480746	NHW
Base	Prostate Car	0.6245738	0.6121193	0.6370282	NHW
Combined	Prostate Car	0.7702428	0.7595261	0.7809596	NHW
Base	Type 2 Diabe	0.7244482	0.7193016	0.7295949	NHW
Combined	Type 2 Diabe	0.7651645	0.7604007	0.7699283	NHW
Base	Type 1 Diabe	0.642054	0.6218029	0.6623052	NHW
Combined	Type 1 Diabe	0.670641	0.6519476	0.6893345	NHW
Base	Asthma	0.669152	0.6539743	0.6843297	HS
Combined	Asthma	0.672777	0.6577992	0.6877547	HS
Base	Atrial Fibrillat	0.7275466	0.7023667	0.7527264	HS
Combined	Atrial Fibrillat	0.7508585	0.727048	0.7746689	HS
Base	Breast Canc	0.7531185	0.7333903	0.7728466	HS
Combined	Breast Canc	0.7683269	0.7490651	0.7875888	HS

Base	Chronic Kidn	0.8500315	0.8351239	0.8649391	HS
Combined	Chronic Kidn	0.8578238	0.8434699	0.8721777	HS
Base	Coronary He	0.8155619	0.8047064	0.8264174	HS
Combined	Coronary He	0.8202192	0.8094986	0.8309398	HS
Base	Hypercholes	0.878433	0.8665743	0.8902918	HS
Combined	Hypercholes	0.8815379	0.8698969	0.8931789	HS
Base	Prostate Car	0.7073307	0.6639297	0.7507316	HS
Combined	Prostate Car	0.8270907	0.7882465	0.8659349	HS
Base	Type 2 Diabe	0.7879999	0.7775004	0.7984993	HS
Combined	Type 2 Diabe	0.8256307	0.8161122	0.8351492	HS
Base	Type 1 Diabe	0.6115717	0.5593653	0.6637782	HS
Combined	Type 1 Diabe	0.6817686	0.634713	0.7288243	HS

Supplementary Table 5 (S9): AUC pair-wise comparisons of stratified results

Disease	Model1	Model2	AUC1	AUC2	p_value	bonf_p
Afib	Base	Combined	0.6731076	0.6764206	0.2415911	0.00555556
Asthma	Base	Combined	0.6647862	0.6648991	0.9599455	0.00555556
BreastC	Base	Combined	0.7399162	0.7488504	5.33E-04	0.00555556
CHD	Base	Combined	0.762069	0.7687088	3.93E-06	0.00555556
CKD	Base	Combined	0.8632112	0.8641547	3.64E-02	0.00555556
HyperC	Base	Combined	0.8334364	0.838608	1.20E-04	0.00555556
ProstateC	Base	Combined	0.7086393	0.7982221	1.59E-11	0.00555556
t1d	Base	Combined	0.6606918	0.7027502	9.19E-03	0.00555556
t2d	Base	Combined	0.7498137	0.7505529	4.18E-01	0.00555556
Afib	Base	Combined	0.715348	0.7248466	5.42E-15	0.00555556
Asthma	Base	Combined	0.6795104	0.684242	6.59E-03	0.00555556
BreastC	Base	Combined	0.7160377	0.7264773	1.86E-09	0.00555556
CHD	Base	Combined	0.8025211	0.805382	4.42E-15	0.00555556
CKD	Base	Combined	0.8843212	0.8889604	6.50E-20	0.00555556
HyperC	Base	Combined	0.8390426	0.842453	8.11E-09	0.00555556
ProstateC	Base	Combined	0.6245738	0.7702428	4.07E-109	0.00555556
t1d	Base	Combined	0.642054	0.670641	2.88E-05	0.00555556
t2d	Base	Combined	0.7244482	0.7651645	2.42E-111	0.00555556
Afib	Base	Combined	0.7275466	0.7508585	1.30E-04	0.00555556
Asthma	Base	Combined	0.669152	0.672777	3.91E-01	0.00555556
BreastC	Base	Combined	0.7531185	0.7683269	1.19E-03	0.00555556
CHD	Base	Combined	0.8155619	0.8202192	1.17E-04	0.00555556
CKD	Base	Combined	0.8500315	0.8578238	3.05E-05	0.00555556
HyperC	Base	Combined	0.878433	0.8815379	0.0102067	0.00555556
ProstateC	Base	Combined	0.7073307	0.8270907	4.43E-08	0.00555556
t1d	Base	Combined	0.6115717	0.6817686	4.92E-03	0.00555556
t2d	Base	Combined	0.7879999	0.8256307	2.02E-33	0.00555556

p_value_bon	significant	SIRE
1	FALSE	NHB
1	FALSE	NHB
0.0048004	TRUE	NHB
3.54E-05	TRUE	NHB
3.27E-01	FALSE	NHB
0.0010785	TRUE	NHB
1.43E-10	TRUE	NHB
8.27E-02	FALSE	NHB
1	FALSE	NHB
4.88E-14	TRUE	NHW
5.94E-02	FALSE	NHW
1.67E-08	TRUE	NHW
3.98E-14	TRUE	NHW
5.85E-19	TRUE	NHW
7.30E-08	TRUE	NHW
3.66E-108	TRUE	NHW
2.59E-04	TRUE	NHW
2.18E-110	TRUE	NHW
1.17E-03	TRUE	HS
1.00E+00	FALSE	HS
1.07E-02	TRUE	HS
1.05E-03	TRUE	HS
2.74E-04	TRUE	HS
0.0918605	FALSE	HS
3.98E-07	TRUE	HS
4.43E-02	TRUE	HS
1.82E-32	TRUE	HS