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Digital Health

Supplementary appendix 1

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Evaluation of risk prediction models to select lung cancer screening participants in Europe: a prospective cohort consortium analysis

Appendix Content

Appendix 1 p 1

Supplementary Table 1. Description of the 10 lung cancer risk prediction models evaluated in this manuscript and the predictors included in each model.

Appendix 1 p 2

Supplementary Table 2. Characteristics of cohort participants in 9 European countries who were aged 45-80 and currently or formerly smoked at enrolment.

Appendix 2 p1 & Appendix 1 p 3

Supplementary Table 3. Calibration of lung cancer risk models in 9 European countries, as measured by the ratio of expected to observed cases, stratified by sex, smoking, age, and education.

Appendix 1 p 4-5

Supplementary Table 4. Discrimination of lung cancer risk models in 9 European countries, as measured by AUC, stratified by sex, smoking, age, and education.

Appendix 1 p 6-7

Supplementary Table 5. Characteristics of cohort participants under different strategies when selecting same number of eligible populations as USPSTF-2021, USPSTF-2013, and NELSON criteria, in pooled data from cohorts in 9 European countries.

Supplementary Table 1. Description of the 10 lung cancer risk prediction models evaluated in this manuscript and the predictors included in each model.

	Bach	PLCO_{m2012}	LCRAT	LCDRAT	LLPv2	LLPv3	HUNT	UCLD	UCLI	OWL
Country of origin	USA	USA	USA	USA	UK	UK	Norway	USA&UK	USA&UK	UK
Type of development data	RCT	RCT	RCT	RCT	Case-control	Case-control	Cohort	RCT & Cohort	RCT & Cohort	Cohort
Population size for developing the model	18,172	36,286	39,180	39,180	579 cases 1157 controls	579 cases 1157 controls	33,521	243,430	243,430	323,344
Age range of participants in development data	45-69	55-74	55-74	55-74	40-84	40-84	20+	40-74	40-74	37-73
Recruitment year for population used to develop the model	1985-1989	1993-2001	1993-2001	1993-2001	1998-2005	1998-2005*	1995-1997	2004-2010	2004-2010	2006-2010
Population smoking status	Ever smokers	Ever Smokers	Ever Smokers	Ever Smokers	Ever and never	Ever and never	Ever Smokers	Ever Smokers	Ever Smokers	Ever and never
Type of the regression model	Cox proportional hazards model	Logistic regression model	Cox proportional hazards model	Cox proportional hazards model	Logistic regression model	Logistic regression model	Logistic regression model	Machine learning (ensemble)	Machine learning (ensemble)	Machine learning (XGBoost)
Time horizon	10 years	6 years	5 years	5 years	5 years	5 years	6 years	5 years	5 years	8 years
Lung cancer outcome	Incident	Incident	Incident	Death	Incident	Incident	Incident	Death	Incident	Incident
Demographics										
Age	√	√	√	√	√	√	√	√	√	√
Sex	√		√	√	√	√	√			√
Race		√	√	√						
Education		√	√	√						√
Body mass index		√	√	√			√			√
Comorbidities										
COPD/ Emphysema/Bronchitis		√	√	√	√	√				√
Pneumonia					√	√				
Cancer		√			√	√				
Daily cough							√			
Smoking										
Smoking status		√								√
Pack-years			√	√			√	√	√	√
Cigarettes per day	√	√	√	√			√			√
Years smoked	√	√	√	√	√	√		√	√	√
Years quit smoking	√	√	√	√			√			√
Age at smoking initiation										√
Smoke exposure hours per day							√			
Other										
Family lung cancer history		√	√	√	√	√				√
Asbestos exposure	√				√	√				
Personal history of diabetes										√

*2017 English age-standard lung cancer incidence was used to adjust the model

Supplementary Table 2. Characteristics of cohort participants in 9 European countries who were aged 45-80 and currently or formerly smoked at enrolment.

Characteristic	ATBC Finland	CONSTANCES France	EPIC Denmark	EPIC Germany	EPIC Italy	EPIC Spain	EPIC Sweden	EPIC The Netherlands	EPIC Norway	HUNT Norway
All participants	N=29,133	N=48,908	N=37,002	N=18,787	N=17,483	N=9499	N=23,425	N=16,583	N=15,567	N=23,750
Cigarettes per day										
Median (Q1-Q3)	20 (15 - 25)	10 (5.0 - 20)	12 (8.0 - 17)	12 (6.5 - 19)	11 (6.0 - 17)	15 (7.7 - 20)	NA (NA - NA)	11 (6.0 - 19)	10 (7.4 - 13)	10 (8.0 - 15)
Missing	0 (0%)	5391 (11.0%)	5815 (15.7%)	1779 (9.5%)	2151 (12.3%)	224 (2.4%)	23425 (100%)	1318 (7.9%)	1024 (6.6%)	3692 (15.5%)
Education level										
Less than grade 12	9911 (34.0%)	1988 (4.1%)	13165 (35.6%)	5532 (29.4%)	8549 (48.9%)	6442 (67.8%)	10117 (43.2%)	3281 (19.8%)	4629 (29.7%)	10487 (44.2%)
High school graduate	17 (0.058%)	3865 (7.9%)	16777 (45.3%)	7206 (38.4%)	6520 (37.3%)	1682 (17.7%)	8408 (35.9%)	10224 (61.7%)	9535 (61.3%)	6028 (25.4%)
Above high school	19205 (65.9%)	42323 (86.5%)	7001 (18.9%)	6041 (32.2%)	2389 (13.7%)	1311 (13.8%)	4827 (20.6%)	3033 (18.3%)	1403 (9.0%)	3267 (13.8%)
Missing	0 (0%)	732 (1.5%)	59 (0.2%)	8 (0.0%)	25 (0.1%)	64 (0.7%)	73 (0.3%)	45 (0.3%)	0 (0%)	3968 (16.7%)
Body mass index										
Median (Q1-Q3)	26 (24 - 29)	25 (23 - 28)	26 (23 - 28)	27 (24 - 29)	26 (24 - 28)	28 (26 - 30)	25 (23 - 28)	25 (23 - 28)	24 (22 - 26)	27 (24 - 29)
Missing	19 (0.1%)	716 (1.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	193 (0.8%)
Personal history of cancer	0 (0%)	3815 (7.8%)	144 (0.39%)	677 (3.6%)	137 (0.78%)	106 (1.1%)	896 (3.8%)	821 (5.0%)	500 (3.2%)	1211 (5.1%)
Missing	0 (0%)	1551 (3.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1489 (6.3%)
First-degree family history of lung cancer	2093 (7.2%)	2743 (5.6%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)
Missing	10574 (36.3%)	0 (0%)	37002 (100%)	18787 (100%)	17483 (100%)	9499 (100%)	23425 (100%)	16583 (100%)	15567 (100%)	23750 (100%)
COPD or emphysema	1899 (6.5%)	1095 (2.2%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)	186 (0.78%)
Missing	0 (0%)	1477 (3.0%)	37002 (100%)	18787 (100%)	17483 (100%)	9499 (100%)	23425 (100%)	16583 (100%)	15567 (100%)	21167 (89.1%)
Asbestos exposure	617 (2.1%)	0 (0%)	7366 (19.9%)	3852 (20.5%)	2006 (11.5%)	2542 (26.8%)	0 (NA%)	0 (NA%)	0 (NA%)	0 (NA%)
Missing	0 (0%)	0 (0%)	60 (0.2%)	5 (0.0%)	9931 (56.8%)	0 (0%)	23425 (100%)	16583 (100%)	15567 (100%)	23750 (100%)

Data are shown prior to imputation of missing data. We excluded EPIC-France (a sub cohort comprised of highly educated female teachers) and EPIC-UK (results published previously [PMC8184952]) from this study.

ATBC: Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study

EPIC: European Prospective Investigation into Cancer and Nutrition

HUNT: Nord-Trøndelag Health Study

*Q: quintile

Supplementary Table 3. Calibration of lung cancer risk models in 9 European countries, as measured by the ratio of expected to observed cases, stratified by sex, smoking, age, and education.

Please see in the Excel supplementary file Appendix 2.

Supplementary Table 4. Discrimination of lung cancer risk models in 9 European countries, as measured by AUC, stratified by sex, smoking, age, and education.

Subgroups	Models	ATBC Finland	CONSTANCES France	EPIC Denmark	EPIC Germany	EPIC Italy	EPIC Spain	EPIC Sweden	EPIC The Netherlands	EPIC Norway	HUNT Norway
		AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)	AUC (95% CI)
Overall	PLCom2012	0.70 (0.68 - 0.72)	0.76 (0.72 - 0.79)	0.71 (0.68 - 0.74)	0.81 (0.77 - 0.84)	0.76 (0.70 - 0.81)	0.81 (0.75 - 0.87)	0.71 (0.64 - 0.78)	0.73 (0.67 - 0.78)	0.78 (0.72 - 0.83)	0.73 (0.70 - 0.77)
	LCDRAT	0.72 (0.69 - 0.74)	0.74 (0.68 - 0.81)	0.73 (0.69 - 0.77)	0.83 (0.78 - 0.89)	0.75 (0.67 - 0.83)	0.80 (0.70 - 0.90)	0.77 (0.73 - 0.82)	0.68 (0.59 - 0.77)	0.74 (0.63 - 0.84)	0.76 (0.72 - 0.80)
	LCRAT	0.71 (0.70 - 0.73)	0.77 (0.74 - 0.80)	0.73 (0.70 - 0.76)	0.80 (0.75 - 0.85)	0.72 (0.65 - 0.78)	0.80 (0.74 - 0.86)	0.79 (0.75 - 0.83)	0.72 (0.66 - 0.78)	0.73 (0.67 - 0.80)	0.76 (0.73 - 0.80)
	Bach	0.70 (0.68 - 0.72)	0.77 (0.74 - 0.80)	0.73 (0.70 - 0.76)	0.81 (0.76 - 0.85)	0.75 (0.69 - 0.81)	0.80 (0.74 - 0.87)	0.78 (0.74 - 0.82)	0.72 (0.66 - 0.78)	0.74 (0.67 - 0.81)	0.77 (0.74 - 0.80)
	HUNT	0.70 (0.68 - 0.72)	0.77 (0.74 - 0.80)	0.72 (0.68 - 0.75)	0.81 (0.78 - 0.85)	0.75 (0.70 - 0.80)	0.79 (0.73 - 0.85)	0.76 (0.71 - 0.81)	0.72 (0.67 - 0.78)	0.76 (0.71 - 0.81)	NA
	LLPv2	0.70 (0.68 - 0.72)	0.75 (0.71 - 0.78)	0.70 (0.67 - 0.73)	0.78 (0.74 - 0.83)	0.71 (0.65 - 0.77)	0.73 (0.65 - 0.81)	0.78 (0.74 - 0.82)	0.68 (0.62 - 0.75)	0.64 (0.57 - 0.72)	0.73 (0.69 - 0.77)
	LLPv3	0.70 (0.68 - 0.72)	0.75 (0.71 - 0.78)	0.70 (0.67 - 0.74)	0.78 (0.73 - 0.82)	0.69 (0.63 - 0.75)	0.72 (0.64 - 0.81)	0.77 (0.74 - 0.81)	0.68 (0.61 - 0.74)	0.64 (0.57 - 0.72)	0.72 (0.69 - 0.76)
	UCLD	0.70 (0.68 - 0.73)	0.75 (0.70 - 0.81)	0.73 (0.69 - 0.77)	0.82 (0.77 - 0.87)	0.76 (0.69 - 0.83)	0.81 (0.72 - 0.91)	0.77 (0.72 - 0.82)	0.69 (0.60 - 0.78)	0.76 (0.65 - 0.86)	0.77 (0.73 - 0.81)
	UCLI	0.71 (0.69 - 0.72)	0.78 (0.75 - 0.81)	0.73 (0.70 - 0.76)	0.81 (0.77 - 0.85)	0.75 (0.69 - 0.81)	0.80 (0.73 - 0.87)	0.78 (0.74 - 0.82)	0.73 (0.67 - 0.79)	0.72 (0.65 - 0.79)	0.76 (0.73 - 0.80)
	OWL	0.70 (0.69 - 0.72)	0.78 (0.75 - 0.81)	0.73 (0.70 - 0.76)	0.82 (0.77 - 0.86)	0.75 (0.69 - 0.81)	0.81 (0.75 - 0.88)	0.78 (0.74 - 0.82)	0.72 (0.66 - 0.79)	0.74 (0.67 - 0.81)	0.77 (0.74 - 0.81)
Men	PLCom2012	0.70 (0.68 - 0.72)	0.73 (0.68 - 0.77)	0.69 (0.64 - 0.74)	0.81 (0.77 - 0.85)	0.74 (0.66 - 0.81)	0.78 (0.71 - 0.85)	0.70 (0.62 - 0.79)	0.68 (0.55 - 0.81)	NA	0.72 (0.67 - 0.77)
	LCDRAT	0.72 (0.69 - 0.74)	0.73 (0.66 - 0.81)	0.73 (0.67 - 0.78)	0.85 (0.79 - 0.90)	0.78 (0.68 - 0.87)	0.77 (0.66 - 0.87)	0.77 (0.71 - 0.83)	0.65 (0.46 - 0.84)	NA	0.76 (0.71 - 0.81)
	LCRAT	0.71 (0.70 - 0.73)	0.76 (0.72 - 0.80)	0.72 (0.68 - 0.77)	0.81 (0.76 - 0.86)	0.71 (0.62 - 0.79)	0.77 (0.70 - 0.84)	0.76 (0.71 - 0.82)	0.69 (0.55 - 0.84)	NA	0.77 (0.73 - 0.81)
	Bach	0.70 (0.68 - 0.72)	0.76 (0.72 - 0.80)	0.72 (0.68 - 0.77)	0.81 (0.76 - 0.86)	0.73 (0.65 - 0.81)	0.76 (0.68 - 0.83)	0.75 (0.69 - 0.81)	0.67 (0.51 - 0.84)	NA	0.76 (0.72 - 0.80)
	HUNT	0.70 (0.68 - 0.72)	0.76 (0.72 - 0.79)	0.70 (0.66 - 0.75)	0.81 (0.77 - 0.85)	0.73 (0.66 - 0.80)	0.75 (0.68 - 0.82)	0.74 (0.68 - 0.80)	0.68 (0.55 - 0.81)	NA	NA
	LLPv2	0.70 (0.68 - 0.72)	0.74 (0.69 - 0.78)	0.72 (0.68 - 0.77)	0.77 (0.72 - 0.82)	0.70 (0.62 - 0.77)	0.70 (0.61 - 0.78)	0.76 (0.71 - 0.81)	0.74 (0.64 - 0.85)	NA	0.73 (0.68 - 0.77)
	LLPv3	0.70 (0.68 - 0.72)	0.74 (0.69 - 0.78)	0.72 (0.68 - 0.77)	0.77 (0.72 - 0.82)	0.70 (0.62 - 0.77)	0.70 (0.61 - 0.78)	0.76 (0.71 - 0.81)	0.74 (0.64 - 0.85)	NA	0.73 (0.68 - 0.77)
	UCLD	0.70 (0.68 - 0.73)	0.73 (0.66 - 0.80)	0.72 (0.66 - 0.77)	0.83 (0.78 - 0.88)	0.79 (0.71 - 0.87)	0.78 (0.68 - 0.88)	0.75 (0.68 - 0.82)	0.59 (0.36 - 0.81)	NA	0.76 (0.71 - 0.81)
	UCLI	0.71 (0.69 - 0.72)	0.76 (0.72 - 0.80)	0.72 (0.67 - 0.77)	0.81 (0.77 - 0.85)	0.74 (0.67 - 0.82)	0.76 (0.68 - 0.83)	0.75 (0.70 - 0.81)	0.70 (0.56 - 0.84)	NA	0.76 (0.72 - 0.80)
	OWL	0.70 (0.69 - 0.72)	0.77 (0.73 - 0.80)	0.71 (0.67 - 0.76)	0.82 (0.78 - 0.86)	0.73 (0.65 - 0.81)	0.78 (0.70 - 0.85)	0.75 (0.70 - 0.81)	0.68 (0.54 - 0.82)	NA	0.77 (0.73 - 0.81)
Women	PLCom2012	NA	0.79 (0.74 - 0.84)	0.74 (0.69 - 0.78)	NA	0.76 (0.67 - 0.85)	NA	0.71 (0.60 - 0.81)	0.74 (0.68 - 0.81)	0.78 (0.72 - 0.83)	0.74 (0.68 - 0.80)
	LCDRAT	NA	0.74 (0.61 - 0.86)	0.74 (0.68 - 0.80)	NA	0.67 (0.56 - 0.78)	NA	0.77 (0.69 - 0.85)	0.69 (0.59 - 0.80)	0.74 (0.63 - 0.84)	0.74 (0.68 - 0.80)
	LCRAT	NA	0.78 (0.74 - 0.83)	0.74 (0.69 - 0.79)	NA	0.72 (0.63 - 0.81)	NA	0.81 (0.75 - 0.87)	0.73 (0.66 - 0.80)	0.73 (0.67 - 0.80)	0.73 (0.67 - 0.79)
	Bach	NA	0.79 (0.74 - 0.84)	0.74 (0.70 - 0.79)	NA	0.75 (0.67 - 0.83)	NA	0.80 (0.74 - 0.86)	0.74 (0.67 - 0.80)	0.74 (0.67 - 0.81)	0.76 (0.71 - 0.82)
	HUNT	NA	0.79 (0.74 - 0.84)	0.73 (0.69 - 0.78)	NA	0.76 (0.68 - 0.84)	NA	0.77 (0.70 - 0.84)	0.74 (0.67 - 0.80)	0.76 (0.71 - 0.81)	NA
	LLPv2	NA	0.76 (0.71 - 0.81)	0.68 (0.62 - 0.73)	NA	0.68 (0.58 - 0.77)	NA	0.79 (0.72 - 0.85)	0.67 (0.59 - 0.74)	0.64 (0.57 - 0.72)	0.70 (0.63 - 0.77)
	LLPv3	NA	0.76 (0.71 - 0.81)	0.68 (0.62 - 0.73)	NA	0.68 (0.58 - 0.77)	NA	0.79 (0.72 - 0.85)	0.67 (0.59 - 0.74)	0.64 (0.57 - 0.72)	0.70 (0.63 - 0.77)
	UCLD	NA	0.79 (0.69 - 0.88)	0.75 (0.70 - 0.81)	NA	0.64 (0.52 - 0.77)	NA	0.77 (0.70 - 0.85)	0.73 (0.64 - 0.82)	0.76 (0.65 - 0.86)	0.76 (0.69 - 0.82)
	UCLI	NA	0.80 (0.76 - 0.84)	0.74 (0.70 - 0.79)	NA	0.74 (0.65 - 0.83)	NA	0.80 (0.74 - 0.86)	0.74 (0.67 - 0.80)	0.72 (0.65 - 0.79)	0.74 (0.68 - 0.81)
	OWL	NA	0.80 (0.76 - 0.84)	0.75 (0.70 - 0.79)	NA	0.77 (0.69 - 0.84)	NA	0.81 (0.75 - 0.87)	0.74 (0.67 - 0.81)	0.74 (0.67 - 0.81)	0.77 (0.71 - 0.83)
Former smoker	PLCom2012	NA	0.74 (0.69 - 0.79)	0.6 (0.52 - 0.68)	0.69 (0.60 - 0.77)	0.71 (0.62 - 0.81)	NA	0.68 (0.55 - 0.82)	0.66 (0.56 - 0.76)	NA	0.76 (0.70 - 0.83)
	LCDRAT	NA	0.70 (0.61 - 0.79)	0.67 (0.59 - 0.75)	0.70 (0.57 - 0.82)	0.65 (0.50 - 0.80)	NA	0.74 (0.64 - 0.83)	0.63 (0.50 - 0.76)	NA	0.81 (0.75 - 0.88)
	LCRAT	NA	0.75 (0.70 - 0.79)	0.67 (0.60 - 0.75)	0.66 (0.57 - 0.76)	0.70 (0.60 - 0.80)	NA	0.78 (0.71 - 0.85)	0.70 (0.61 - 0.80)	NA	0.79 (0.73 - 0.85)
	Bach	NA	0.75 (0.71 - 0.80)	0.65 (0.58 - 0.73)	0.68 (0.59 - 0.77)	0.76 (0.67 - 0.85)	NA	0.75 (0.66 - 0.84)	0.69 (0.59 - 0.79)	NA	0.81 (0.75 - 0.87)
	HUNT	NA	0.74 (0.69 - 0.78)	0.65 (0.58 - 0.72)	0.71 (0.63 - 0.79)	0.73 (0.64 - 0.82)	NA	0.73 (0.63 - 0.82)	0.69 (0.59 - 0.78)	NA	NA
	LLPv2	NA	0.73 (0.69 - 0.77)	0.68 (0.61 - 0.75)	0.66 (0.57 - 0.76)	0.70 (0.61 - 0.79)	NA	0.80 (0.74 - 0.86)	0.72 (0.62 - 0.82)	NA	0.78 (0.72 - 0.84)
	LLPv3	NA	0.73 (0.68 - 0.77)	0.68 (0.61 - 0.75)	0.66 (0.56 - 0.76)	0.68 (0.59 - 0.78)	NA	0.79 (0.72 - 0.85)	0.71 (0.60 - 0.81)	NA	0.78 (0.72 - 0.84)
	UCLD	NA	0.74 (0.66 - 0.81)	0.64 (0.56 - 0.73)	0.69 (0.56 - 0.82)	0.66 (0.53 - 0.80)	NA	0.73 (0.62 - 0.84)	0.61 (0.48 - 0.74)	NA	0.82 (0.76 - 0.89)
	UCLI	NA	0.76 (0.72 - 0.80)	0.65 (0.57 - 0.73)	0.69 (0.61 - 0.78)	0.75 (0.66 - 0.84)	NA	0.78 (0.71 - 0.86)	0.70 (0.60 - 0.79)	NA	0.81 (0.75 - 0.87)
	OWL	NA	0.77 (0.73 - 0.81)	0.66 (0.59 - 0.74)	0.70 (0.61 - 0.78)	0.74 (0.65 - 0.83)	NA	0.77 (0.70 - 0.85)	0.68 (0.58 - 0.78)	NA	0.81 (0.75 - 0.87)
Current smokers	PLCom2012	0.70 (0.68 - 0.72)	0.74 (0.68 - 0.79)	0.69 (0.66 - 0.73)	0.81 (0.77 - 0.85)	0.77 (0.71 - 0.84)	0.78 (0.70 - 0.87)	0.67 (0.6 - 0.74)	0.75 (0.69 - 0.81)	0.70 (0.63 - 0.77)	0.67 (0.62 - 0.72)
	LCDRAT	0.72 (0.69 - 0.74)	0.75 (0.67 - 0.83)	0.73 (0.68 - 0.77)	0.83 (0.77 - 0.88)	0.79 (0.71 - 0.88)	0.82 (0.69 - 0.94)	0.74 (0.68 - 0.81)	0.67 (0.55 - 0.79)	0.66 (0.54 - 0.79)	0.69 (0.63 - 0.74)
	LCRAT	0.71 (0.70 - 0.73)	0.77 (0.73 - 0.81)	0.70 (0.67 - 0.74)	0.81 (0.77 - 0.86)	0.74 (0.66 - 0.82)	0.75 (0.65 - 0.85)	0.74 (0.69 - 0.79)	0.73 (0.65 - 0.81)	0.65 (0.56 - 0.74)	0.69 (0.64 - 0.74)
	Bach	0.70 (0.68 - 0.72)	0.75 (0.71 - 0.80)	0.72 (0.68 - 0.75)	0.81 (0.77 - 0.86)	0.75 (0.67 - 0.83)	0.76 (0.67 - 0.86)	0.73 (0.68 - 0.78)	0.73 (0.65 - 0.80)	0.67 (0.58 - 0.76)	0.70 (0.65 - 0.75)
	HUNT	0.70 (0.68 - 0.72)	0.77 (0.73 - 0.81)	0.67 (0.63 - 0.71)	0.81 (0.77 - 0.85)	0.77 (0.71 - 0.83)	0.76 (0.68 - 0.85)	0.72 (0.66 - 0.78)	0.73 (0.67 - 0.79)	0.66 (0.58 - 0.73)	NA
	LLPv2	0.70 (0.68 - 0.72)	0.73 (0.68 - 0.78)	0.67 (0.63 - 0.71)	0.80 (0.76 - 0.85)	0.70 (0.62 - 0.79)	0.70 (0.60 - 0.81)	0.74 (0.69 - 0.79)	0.64 (0.56 - 0.72)	0.60 (0.52 - 0.69)	0.69 (0.64 - 0.74)
	LLPv3	0.70 (0.68 - 0.72)	0.73 (0.68 - 0.78)	0.67 (0.64 - 0.71)	0.79 (0.74 - 0.84)	0.69 (0.61 - 0.78)	0.69 (0.58 - 0.80)	0.74 (0.69 - 0.79)	0.64 (0.56 - 0.72)	0.60 (0.52 - 0.69)	0.68 (0.63 - 0.73)
	UCLD	0.70 (0.68 - 0.73)	0.72 (0.64 - 0.81)	0.73 (0.69 - 0.77)	0.80 (0.75 - 0.86)	0.79 (0.71 - 0.87)	0.83 (0.74 - 0.93)	0.73 (0.67 - 0.79)	0.70 (0.60 - 0.80)	0.70 (0.58 - 0.82)	0.70 (0.64 - 0.75)
	UCLI	0.71 (0.69 - 0.72)	0.75 (0.71 - 0.80)	0.71 (0.68 - 0.75)	0.81 (0.77 - 0.85)	0.75 (0.68 - 0.83)	0.76 (0.66 - 0.86)	0.73 (0.68 - 0.78)	0.73 (0.66 - 0.80)	0.67 (0.58 - 0.75)	0.70 (0.65 - 0.75)
	OWL	0.70 (0.69 - 0.72)	0.76 (0.72 - 0.81)	0.70 (0.66 - 0.74)	0.82 (0.77 - 0.86)	0.77 (0.7 - 0.84)	0.77 (0.68 - 0.87)	0.73 (0.68 - 0.78)	0.75 (0.68 - 0.82)	0.68 (0.6 - 0.77)	0.71 (0.66 - 0.75)
Age<55	PLCom2012	0.70 (0.65 - 0.74)	0.76 (0.66 - 0.85)	0.75 (0.68 - 0.81)	0.8 (0.71 - 0.89)	0.76 (0.67 - 0.86)	NA	NA	0.81 (0.74 - 0.88)	0.77 (0.71 - 0.83)	0.70 (0.61 - 0.79)
	LCDRAT	0.69 (0.62 - 0.76)	0.77 (0.60 - 0.93)	0.71 (0.62 - 0.79)	0.78 (0.62 - 0.94)	0.72 (0.57 - 0.86)	NA	NA	0.78 (0.66 - 0.89)	0.73 (0.61 - 0.84)	0.78 (0.69 - 0.87)
	LCRAT	0.69 (0.63 - 0.74)	0.75 (0.66 - 0.85)	0.74 (0.68 - 0.80)	0.74 (0.62 - 0.87)	0.70 (0.59 - 0.81)	NA	NA	0.79 (0.70 - 0.89)	0.72 (0.65 - 0.79)	0.77 (0.68 - 0.85)
	Bach	0.68 (0.63 - 0.73)	0.75 (0.65 - 0.84)	0.75 (0.68 - 0.81)	0.76 (0.64 - 0.89)	0.74 (0.64 - 0.84)	NA	NA	0.79 (0.70 - 0.88)	0.73 (0.66 - 0.81)	0.76 (0.68 - 0.84)
	HUNT	0.65 (0.60 - 0.70)	0.78 (0.69 - 0.87)	0.73 (0.67 - 0.78)	0.80 (0.70 - 0.89)	0.75 (0.65 - 0.84)	NA	NA	0.79 (0.71 - 0.87)	0.75 (0.70 - 0.81)	NA
	LLPv2	0.61 (0.55 - 0.67)	0.67 (0.57 - 0.77)	0.65 (0.57 - 0.72)	0.69 (0.58 - 0.80)	0.69 (0.58 - 0.79)	NA	NA	0.72 (0.64 - 0.81)	0.63 (0.56 - 0.71)	0.72 (0.61 - 0.83)

	LLPv3	0.61 (0.55 - 0.67)	0.65 (0.55 - 0.76)	0.68 (0.61 - 0.75)	0.68 (0.57 - 0.79)	0.66 (0.56 - 0.77)	NA	NA	0.72 (0.64 - 0.80)	0.63 (0.56 - 0.71)	0.71 (0.6 - 0.81)
	UCLD	0.69 (0.62 - 0.77)	0.80 (0.63 - 0.97)	0.73 (0.64 - 0.81)	0.82 (0.68 - 0.96)	0.76 (0.62 - 0.89)	NA	NA	0.79 (0.69 - 0.88)	0.74 (0.63 - 0.86)	0.73 (0.63 - 0.82)
	UCLI	0.69 (0.63 - 0.74)	0.74 (0.65 - 0.84)	0.75 (0.68 - 0.82)	0.79 (0.69 - 0.89)	0.75 (0.65 - 0.85)	NA	NA	0.79 (0.70 - 0.88)	0.72 (0.64 - 0.79)	0.75 (0.66 - 0.83)
	OWL	0.67 (0.62 - 0.72)	0.74 (0.65 - 0.84)	0.74 (0.67 - 0.80)	0.79 (0.68 - 0.89)	0.75 (0.64 - 0.85)	NA	NA	0.77 (0.67 - 0.88)	0.73 (0.66 - 0.81)	0.76 (0.67 - 0.85)
Age≥55	PLCom2012	0.66 (0.64 - 0.68)	0.73 (0.69 - 0.76)	0.69 (0.65 - 0.72)	0.77 (0.73 - 0.82)	0.72 (0.64 - 0.79)	0.79 (0.71 - 0.87)	0.67 (0.60 - 0.74)	0.67 (0.60 - 0.75)	NA	0.69 (0.65 - 0.73)
	LCDRAT	0.66 (0.63 - 0.69)	0.70 (0.62 - 0.77)	0.71 (0.67 - 0.76)	0.81 (0.74 - 0.87)	0.73 (0.62 - 0.84)	0.82 (0.74 - 0.90)	0.73 (0.67 - 0.79)	0.61 (0.44 - 0.77)	NA	0.71 (0.67 - 0.76)
	LCRAT	0.66 (0.64 - 0.68)	0.74 (0.70 - 0.77)	0.7 (0.66 - 0.74)	0.77 (0.72 - 0.83)	0.68 (0.58 - 0.77)	0.80 (0.72 - 0.87)	0.72 (0.67 - 0.77)	0.65 (0.56 - 0.75)	NA	0.71 (0.67 - 0.76)
	Bach	0.65 (0.63 - 0.67)	0.74 (0.70 - 0.77)	0.71 (0.67 - 0.75)	0.78 (0.72 - 0.83)	0.71 (0.63 - 0.79)	0.81 (0.74 - 0.88)	0.71 (0.66 - 0.76)	0.66 (0.57 - 0.76)	NA	0.73 (0.69 - 0.77)
	HUNT	0.65 (0.63 - 0.67)	0.74 (0.71 - 0.78)	0.69 (0.65 - 0.73)	0.78 (0.74 - 0.83)	0.70 (0.63 - 0.77)	0.77 (0.68 - 0.85)	0.71 (0.66 - 0.76)	0.66 (0.58 - 0.74)	NA	NA
	LLPv2	0.64 (0.62 - 0.66)	0.71 (0.67 - 0.75)	0.68 (0.65 - 0.72)	0.76 (0.71 - 0.81)	0.65 (0.56 - 0.74)	0.75 (0.67 - 0.83)	0.70 (0.65 - 0.75)	0.68 (0.59 - 0.77)	NA	0.68 (0.63 - 0.72)
	LLPv3	0.64 (0.62 - 0.66)	0.71 (0.67 - 0.75)	0.68 (0.65 - 0.72)	0.75 (0.7 - 0.8)	0.63 (0.53 - 0.72)	0.75 (0.66 - 0.83)	0.7 (0.65 - 0.74)	0.67 (0.58 - 0.76)	NA	0.67 (0.63 - 0.72)
	UCLD	0.64 (0.62 - 0.67)	0.7 (0.63 - 0.77)	0.71 (0.66 - 0.75)	0.77 (0.71 - 0.84)	0.72 (0.62 - 0.82)	0.83 (0.76 - 0.9)	0.72 (0.66 - 0.78)	0.63 (0.47 - 0.80)	NA	0.73 (0.69 - 0.78)
	UCLI	0.65 (0.62 - 0.67)	0.74 (0.7 - 0.77)	0.7 (0.66 - 0.74)	0.76 (0.71 - 0.82)	0.71 (0.62 - 0.79)	0.81 (0.74 - 0.88)	0.7 (0.65 - 0.75)	0.67 (0.58 - 0.77)	NA	0.73 (0.69 - 0.77)
	OWL	0.66 (0.63 - 0.68)	0.75 (0.71 - 0.78)	0.71 (0.67 - 0.74)	0.78 (0.73 - 0.83)	0.7 (0.61 - 0.78)	0.82 (0.76 - 0.89)	0.72 (0.66 - 0.77)	0.66 (0.57 - 0.75)	NA	0.73 (0.69 - 0.77)
Education less than high school	PLCom2012	0.66 (0.63 - 0.69)	NA	0.67 (0.62 - 0.71)	0.80 (0.74 - 0.86)	0.77 (0.71 - 0.84)	0.84 (0.78 - 0.91)	0.69 (0.61 - 0.78)	0.68 (0.59 - 0.78)	0.75 (0.66 - 0.84)	0.67 (0.62 - 0.72)
	LCDRAT	0.68 (0.64 - 0.72)	NA	0.69 (0.63 - 0.75)	0.83 (0.75 - 0.90)	0.82 (0.74 - 0.89)	0.83 (0.74 - 0.92)	0.79 (0.73 - 0.85)	0.65 (0.50 - 0.80)	0.75 (0.58 - 0.93)	0.71 (0.65 - 0.76)
	LCRAT	0.68 (0.65 - 0.71)	NA	0.67 (0.62 - 0.72)	0.81 (0.74 - 0.88)	0.78 (0.70 - 0.85)	0.82 (0.75 - 0.89)	0.78 (0.73 - 0.83)	0.67 (0.58 - 0.77)	0.70 (0.59 - 0.81)	0.71 (0.66 - 0.76)
	Bach	0.67 (0.64 - 0.7)	NA	0.69 (0.64 - 0.74)	0.80 (0.74 - 0.87)	0.80 (0.74 - 0.86)	0.83 (0.76 - 0.90)	0.77 (0.71 - 0.82)	0.69 (0.59 - 0.78)	0.72 (0.61 - 0.83)	0.72 (0.67 - 0.76)
	HUNT	0.66 (0.63 - 0.69)	NA	0.68 (0.63 - 0.72)	0.82 (0.77 - 0.87)	0.78 (0.73 - 0.84)	0.82 (0.74 - 0.89)	0.74 (0.68 - 0.81)	0.71 (0.62 - 0.79)	0.73 (0.66 - 0.81)	NA
	LLPv2	0.66 (0.63 - 0.69)	NA	0.65 (0.60 - 0.70)	0.78 (0.71 - 0.84)	0.77 (0.70 - 0.84)	0.78 (0.69 - 0.87)	0.78 (0.74 - 0.82)	0.62 (0.49 - 0.74)	0.58 (0.47 - 0.69)	0.67 (0.62 - 0.73)
	LLPv3	0.66 (0.63 - 0.69)	NA	0.65 (0.60 - 0.70)	0.77 (0.70 - 0.83)	0.75 (0.68 - 0.82)	0.78 (0.68 - 0.87)	0.78 (0.74 - 0.82)	0.60 (0.48 - 0.73)	0.58 (0.47 - 0.69)	0.67 (0.61 - 0.72)
	UCLD	0.67 (0.62 - 0.71)	NA	0.70 (0.65 - 0.76)	0.79 (0.71 - 0.86)	0.79 (0.71 - 0.87)	0.84 (0.76 - 0.92)	0.78 (0.72 - 0.84)	0.67 (0.51 - 0.82)	0.80 (0.66 - 0.93)	0.71 (0.66 - 0.77)
	UCLI	0.67 (0.64 - 0.7)	NA	0.67 (0.62 - 0.73)	0.80 (0.74 - 0.86)	0.81 (0.74 - 0.87)	0.82 (0.75 - 0.90)	0.78 (0.72 - 0.83)	0.69 (0.59 - 0.79)	0.68 (0.56 - 0.80)	0.71 (0.66 - 0.76)
	OWL	0.68 (0.64 - 0.71)	NA	0.68 (0.63 - 0.73)	0.82 (0.76 - 0.88)	0.78 (0.72 - 0.85)	0.83 (0.76 - 0.90)	0.77 (0.72 - 0.82)	0.68 (0.58 - 0.78)	0.72 (0.60 - 0.84)	0.74 (0.69 - 0.78)
Education high school and above	PLCom2012	0.72 (0.70 - 0.74)	0.75 (0.72 - 0.79)	0.73 (0.68 - 0.77)	0.80 (0.75 - 0.85)	0.73 (0.64 - 0.82)	NA	0.70 (0.60 - 0.80)	0.72 (0.64 - 0.79)	0.78 (0.70 - 0.85)	0.80 (0.74 - 0.86)
	LCDRAT	0.73 (0.71 - 0.76)	0.74 (0.67 - 0.81)	0.74 (0.69 - 0.80)	0.82 (0.74 - 0.90)	0.65 (0.51 - 0.79)	NA	0.73 (0.65 - 0.81)	0.65 (0.53 - 0.77)	0.72 (0.57 - 0.86)	0.82 (0.76 - 0.87)
	LCRAT	0.73 (0.70 - 0.75)	0.77 (0.74 - 0.81)	0.76 (0.72 - 0.80)	0.78 (0.72 - 0.85)	0.63 (0.52 - 0.74)	NA	0.75 (0.68 - 0.83)	0.70 (0.62 - 0.79)	0.73 (0.64 - 0.82)	0.82 (0.77 - 0.87)
	Bach	0.72 (0.70 - 0.75)	0.77 (0.74 - 0.80)	0.75 (0.71 - 0.80)	0.80 (0.73 - 0.86)	0.67 (0.57 - 0.78)	NA	0.76 (0.69 - 0.83)	0.70 (0.62 - 0.79)	0.73 (0.64 - 0.83)	0.83 (0.77 - 0.88)
	HUNT	0.72 (0.70 - 0.74)	0.77 (0.74 - 0.81)	0.73 (0.69 - 0.78)	0.80 (0.75 - 0.86)	0.70 (0.60 - 0.80)	NA	0.76 (0.68 - 0.83)	0.70 (0.62 - 0.78)	0.75 (0.67 - 0.83)	NA
	LLPv2	0.72 (0.69 - 0.74)	0.75 (0.72 - 0.78)	0.72 (0.68 - 0.77)	0.77 (0.71 - 0.84)	0.61 (0.52 - 0.71)	NA	0.73 (0.66 - 0.80)	0.69 (0.62 - 0.77)	0.67 (0.56 - 0.77)	0.78 (0.72 - 0.84)
	LLPv3	0.72 (0.69 - 0.74)	0.75 (0.72 - 0.78)	0.73 (0.68 - 0.77)	0.77 (0.70 - 0.83)	0.60 (0.50 - 0.70)	NA	0.72 (0.65 - 0.80)	0.69 (0.61 - 0.77)	0.67 (0.56 - 0.77)	0.78 (0.72 - 0.84)
	UCLD	0.72 (0.69 - 0.75)	0.75 (0.69 - 0.81)	0.73 (0.68 - 0.79)	0.83 (0.75 - 0.90)	0.70 (0.57 - 0.83)	NA	0.72 (0.64 - 0.80)	0.67 (0.55 - 0.79)	0.72 (0.56 - 0.88)	0.83 (0.78 - 0.88)
	UCLI	0.72 (0.70 - 0.75)	0.78 (0.75 - 0.81)	0.76 (0.71 - 0.80)	0.81 (0.75 - 0.86)	0.67 (0.57 - 0.77)	NA	0.74 (0.67 - 0.82)	0.71 (0.63 - 0.79)	0.74 (0.65 - 0.83)	0.82 (0.76 - 0.87)
	OWL	0.72 (0.69 - 0.74)	0.78 (0.75 - 0.81)	0.75 (0.71 - 0.80)	0.81 (0.75 - 0.87)	0.69 (0.59 - 0.79)	NA	0.77 (0.7 - 0.84)	0.71 (0.62 - 0.80)	0.74 (0.65 - 0.82)	0.81 (0.75 - 0.86)

Higher AUC values indicate better risk discrimination. 15 imputations were used for missing data and Rubin's rule was used to produce pooled AUC estimates from the 15 imputed datasets. The time horizons for each model are as follows: 5 years: LCDRAT, LCRAT, Bach, LLPv2, LLPv3, UCLD, UCLI, and OWL; 6-years: PLCom2012 and HUNT models. "NA" indicates fewer than 20 lung cancer cases or no representation of the group in the corresponding cohort.

ATBC: Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study

EPIC: European Prospective Investigation into Cancer and Nutrition

HUNT: Nord-Trøndelag Health Study

Supplementary Table 5. Characteristics of cohort participants under different strategies when selecting same number of eligible populations as USPSTF-2021, USPSTF-2013, and NELSON criteria, in pooled data from cohorts in 9 European countries.

		USPSTF-2021				USPSTF-2013				NELSON			
Factors	Total population	USPSTF 2021 eligible	PLCom2012 eligible but USPSTF 2021 ineligible	LCDRAT eligible but USPSTF 2021 ineligible	HUNT model eligible but USPSTF 2021 ineligible	USPSTF 2013 eligible	PLCom2012 eligible but USPSTF 2013 ineligible	LCDRAT eligible but USPSTF 2013 ineligible	HUNT model eligible but USPSTF 2013 ineligible	NELSON eligible	PLCom2012 eligible but Nelson ineligible	LCDRAT eligible but Nelson ineligible	HUNT model eligible but Nelson ineligible
Participants, n	216387	73313	11520	19838	15733	30821	8375	8661	10818	64851	13586	20170	16263
Lung cancer risk in 5 years predicted by LCRAT, median (IQR)	0.5% (0.2% to 1.2%)	1.4% (0.8% to 2.5%)	1.0% (0.7% to 1.4%)	1.2% (1.0% to 1.6%)	1.0% (0.7% to 1.6%)	2.5% (1.7% to 3.8%)	2.1% (1.6% to 2.5%)	2.3% (2.0% to 2.8%)	1.7% (1.3% to 2.3%)	1.5% (0.9% to 2.6%)	1.2% (0.8% to 1.8%)	1.4% (1.1% to 1.9%)	1.3% (0.9% to 1.9%)
Lung cancer death risk in 5 years predicted by LCDRAT, median (IQR)	0.3% (0.1 to 0.6%)	0.8% (0.4% to 1.5%)	0.6% (0.4% to 0.8%)	0.7% (0.5% to 0.9%)	0.6% (0.4% to 0.9%)	1.5% (1.0% to 2.4%)	1.1% (0.9% to 1.5%)	1.3% (1.2 to 1.6%)	0.9% (0.7% to 1.3%)	0.8% (0.4% to 1.5%)	0.7% (0.5% to 1.1%)	0.8% (0.6% to 1.1%)	0.7% (0.5% to 1.1%)
LCDRAT < 0.55%	154672 (71.5%)	25740 (35.1%)	5697 (49.5%)	5696 (28.7%)	7598 (48.3%)	1807 (5.9%)	331 (4.0%)	0 (0%)	1537 (14.2%)	21631 (33.4%)	4525 (33.3%)	1675 (8.3%)	5365 (33.8%)
Lung cancer cases in 5 years	1585 (0.7%)	1185 (1.6)	89 (0.8)	164 (0.8)	145 (0.9)	773 (2.5%)	142 (1.7)	177 (2.0)	202 (1.9)	1082 (1.7)	162 (1.2)	230 (1.1)	208 (1.3)
Age													
45-49	39779 (18.4%)	0 (0.0%)	2695 (23.4%)	980 (4.9%)	2445 (15.5%)	0 (0.0%)	142 (1.7%)	20 (0.2%)	122 (1.1%)	0 (0.0%)	1763 (13.0%)	625 (3.1%)	1242 (7.6%)
50-59	116276 (53.7%)	49281 (67.2%)	2878 (25.0%)	6885 (34.7%)	6379 (40.5%)	14513 (47.1%)	4140 (49.4%)	2418 (27.9%)	5199 (48.1%)	45686 (70.4%)	3077 (22.6%)	5396 (26.8%)	4841 (29.8%)
60-69	57912 (26.8%)	23455 (32.0%)	5395 (46.8%)	10887 (54.9%)	6448 (41.0%)	15917 (51.6%)	3767 (45.0%)	5718 (66.0%)	5255 (48.6%)	18767 (28.9%)	8096 (59.6%)	13065 (64.8%)	9536 (58.6%)
70-80	2420 (1.1%)	577 (0.8%)	552 (4.8%)	1086 (5.5%)	461 (2.9%)	391 (1.3%)	326 (3.9%)	505 (5.8%)	242 (2.2%)	398 (0.6%)	650 (4.8%)	1084 (5.4%)	644 (4.0%)
Median (Q1-Q3)	55 (50.5-60)	57 (53-61)	60 (51-64)	61 (57-64)	58 (53-63)	60 (57-63)	59 (53-64)	63 (58-66)	60 (54-64)	56 (52-60)	62 (57-65)	62 (59-65)	61 (56-64)
Sex													
Men	117381 (54.2%)	52577 (71.7%)	5895 (51.2%)	9976 (50.3%)	8911 (56.6%)	24995 (81.1%)	4853 (57.9%)	5449 (62.9%)	7429 (68.7%)	45226 (69.7%)	8310 (61.2%)	11439 (56.7%)	10365 (63.7%)
Women	99006 (45.8%)	20736 (28.3%)	5625 (48.8%)	9862 (49.7%)	6822 (43.4%)	5826 (18.9%)	3522 (42.1%)	3212 (37.1%)	3389 (31.3%)	19625 (30.3%)	5276 (38.8%)	8731 (43.3%)	5898 (36.3%)
Smoking status													
Current smoking	103092 (47.6%)	55324 (75.5%)	6965 (60.5%)	14080 (71.0%)	12725 (80.9%)	23578 (76.5%)	7255 (86.6%)	7913 (91.4%)	10284 (95.1%)	52882 (81.5%)	7725 (56.9%)	14252 (70.7%)	12357 (76.0%)
Former smoking	113295 (52.4%)	17989 (24.5%)	4555 (39.5%)	5758 (29.0%)	3008 (19.1%)	7243 (23.5%)	1120 (13.4%)	748 (8.6%)	534 (4.9%)	11969 (18.5%)	5861 (43.1%)	5918 (29.3%)	3906 (24.0%)
Education													
Less than grade 12	63748 (29.5%)	26765 (36.5%)	4730 (41.1%)	8036 (40.5%)	5051 (32.1%)	11973 (38.8%)	4280 (51.1%)	4470 (51.6%)	4026 (37.2%)	24330 (37.5%)	5376 (39.6%)	8060 (40.0%)	5083 (31.3%)
High-school graduate	64422 (29.8%)	16964 (23.1%)	3781 (32.8%)	6031 (30.4%)	4751 (30.2%)	5312 (17.2%)	2250 (26.9%)	1966 (22.7%)	2716 (25.1%)	15960 (24.6%)	3565 (26.2%)	5346 (26.5%)	4047 (24.9%)
Above high school	88217 (40.8)	29584 (40.4)	3009 (26.1)	5771 (29.1)	5931 (37.7)	13536 (43.9)	1845 (22.0)	2225 (25.7)	4076 (37.7)	24561 (37.9)	4645 (34.2)	6764 (33.5)	7133 (43.9)
BMI, kg/m ²													
<18.5 (underweight)	2358 (1.1%)	781 (1.1%)	229 (2.0%)	603 (3.0%)	531 (3.4%)	317 (1.0%)	206 (2.5%)	450 (5.2%)	512 (4.7%)	740 (1.1%)	235 (1.7%)	549 (2.7%)	502 (3.1%)

18.5-24.9 (normal range)	92153 (42.6%)	28085 (38.3%)	5324 (46.2%)	9417 (47.5%)	9485 (60.3%)	11125 (36.1%)	4281 (51.1%)	4569 (52.8%)	7024 (64.9%)	25778 (39.7%)	5792 (42.6%)	9188 (45.6%)	8639 (53.1%)
25-29.9 (overweight)	89256 (41.2%)	32005 (43.7%)	4562 (39.6%)	7685 (38.7%)	5016 (31.9%)	13716 (44.5%)	3113 (37.2%)	3006 (34.7%)	3005 (27.8%)	27880 (43.0%)	5687 (41.9%)	8098 (40.1%)	5834 (35.9%)
30+ (obesity)	32620 (15.1%)	12442 (17.0%)	1405 (12.2%)	2133 (10.8%)	701 (4.5%)	5663 (18.4%)	775 (9.3%)	636 (7.3%)	277 (2.6%)	10453 (16.1%)	1872 (13.8%)	2335 (11.6%)	1288 (7.9%)
Cigarettes per day													
<10	71158 (32.9%)	895 (1.2%)	2431 (21.1%)	13585 (68.5%)	7895 (50.2%)	0 (0.0%)	517 (6.2%)	3474 (40.1%)	2065 (19.1%)	0 (0.0%)	2527 (18.6%)	11967 (59.3%)	8024 (49.3%)
10-19	87111 (40.3%)	35770 (48.8%)	4673 (40.6%)	3623 (18.3%)	5832 (37.1%)	10211 (33.1%)	4885 (58.3%)	3012 (34.8%)	6711 (62.0%)	33551 (51.7%)	5426 (39.9%)	4543 (22.5%)	5386 (33.1%)
20-29	44928 (20.8%)	27846 (38.0%)	3007 (26.1%)	1489 (7.5%)	1589 (10.1%)	15732 (51.0%)	1721 (20.5%)	1145 (13.2%)	1517 (14.0%)	23844 (36.8%)	3766 (27.7%)	2092 (10.4%)	1817 (11.2%)
30-39	8506 (3.9%)	5937 (8.1%)	784 (6.8%)	622 (3.1%)	310 (2.0%)	3293 (10.7%)	742 (8.9%)	649 (7.5%)	417 (3.9%)	5130 (7.9%)	1058 (7.8%)	859 (4.3%)	593 (3.6%)
40+	4684 (2.2%)	2865 (3.9%)	625 (5.4%)	519 (2.6%)	107 (0.7%)	1585 (5.1%)	510 (6.1%)	381 (4.4%)	108 (1.0%)	2326 (3.6%)	809 (6.0%)	709 (3.5%)	443 (2.7%)
Smoking years													
<10	24642 (11.4%)	0 (0.0%)	114 (1.0%)	173 (0.9%)	2 (0.0%)	0 (0.0%)	5 (0.1%)	12 (0.1%)	0 (0.0%)	0 (0.0%)	67 (0.5%)	112 (0.6%)	9 (0.1%)
10-19	35684 (16.5%)	290 (0.4%)	834 (7.2%)	1008 (5.1%)	133 (0.8%)	24 (0.1%)	43 (0.5%)	75 (0.9%)	3 (0.0%)	0 (0.0%)	618 (4.5%)	703 (3.5%)	159 (1.0%)
20-29	48497 (22.4%)	7750 (10.6%)	3464 (30.1%)	3359 (16.9%)	2075 (13.2%)	781 (2.5%)	567 (6.8%)	469 (5.4%)	225 (2.1%)	2938 (4.5%)	3766 (27.7%)	3175 (15.7%)	2100 (12.9%)
30-39	71027 (32.8%)	36159 (49.3%)	5580 (48.4%)	8649 (43.6%)	9008 (57.3%)	9733 (31.6%)	4107 (49.0%)	2805 (32.4%)	4532 (41.9%)	36492 (56.3%)	5010 (36.9%)	6885 (34.1%)	6148 (37.8%)
40+	36537 (16.9%)	29114 (39.7%)	1528 (13.3%)	6649 (33.5%)	4515 (28.7%)	20283 (65.8%)	3653 (43.6%)	5300 (61.2%)	6058 (56.0%)	25421 (39.2%)	4125 (30.4%)	9295 (46.1%)	7847 (48.3%)
Pack years													
<10	72921 (33.7%)	0 (0.0%)	181 (1.6%)	6275 (31.6%)	888 (5.6%)	0 (0.0%)	6 (0.1%)	1064 (12.3%)	35 (0.3%)	0 (0.0%)	106 (0.8%)	4838 (24.0%)	1409 (8.7%)
10-19	53135 (24.6%)	0 (0.0%)	5872 (51.0%)	10757 (54.2%)	11515 (73.2%)	0 (0.0%)	396 (4.7%)	2269 (26.2%)	1878 (17.4%)	3027 (4.7%)	3405 (25.1%)	8151 (40.4%)	7536 (46.3%)
20-29	38272 (17.7%)	27321 (37.3%)	2246 (19.5%)	403 (2.0%)	1539 (9.8%)	0 (0.0%)	4721 (56.4%)	3077 (35.5%)	6428 (59.4%)	18692 (28.8%)	5786 (42.6%)	3782 (18.8%)	4685 (28.8%)
30-39	26316 (12.2%)	22341 (30.5%)	1867 (16.2%)	1239 (6.2%)	1164 (7.4%)	13493 (43.8%)	1210 (14.4%)	436 (5.0%)	1241 (11.5%)	20559 (31.7%)	2373 (17.5%)	1702 (8.4%)	1442 (8.9%)
40+	25743 (11.9%)	23651 (32.3%)	1354 (11.8%)	1164 (5.9%)	627 (4.0%)	17328 (56.2%)	2042 (24.4%)	1815 (21.0%)	1236 (11.4%)	22573 (34.8%)	1916 (14.1%)	1697 (8.4%)	1191 (7.3%)
COPD or emphysema	3883 (1.8%)	2692 (3.7%)	435 (3.8%)	706 (3.6%)	416 (2.6%)	1785 (5.8%)	608 (7.3%)	841 (9.7%)	530 (4.9%)	2375 (3.7%)	657 (4.8%)	933 (4.6%)	717 (4.4%)
Personal history of cancer	7204 (3.3%)	1798 (2.5%)	1174 (10.2%)	952 (4.8%)	652 (4.1%)	861 (2.8%)	701 (8.4%)	342 (3.9%)	310 (2.9%)	1412 (2.2%)	1282 (9.4%)	977 (4.8%)	781 (4.8%)
Family history of lung cancer	35986 (16.6%)	13906 (19.0%)	5114 (44.4%)	6082 (30.7%)	2724 (17.3%)	5851 (19.0%)	4970 (59.3%)	3724 (43.0%)	2045 (18.9%)	12749 (19.7%)	5113 (37.6%)	5703 (28.3%)	2802 (17.2%)

A single imputed dataset from the ATBC, Constances, and EPIC cohorts was used for the analyses in this table.

USPSTF-2021: age 50-80, at least 20 pack-years, no more than 15 quit years.

USPSTF-2013: age 55-80, at least 30 pack-years, no more than 15 quit years.

NELSON: age 50-74, >15 cigarettes a day for >25 years or >10 cigarettes a day for >30 years, no more than 10 quit years