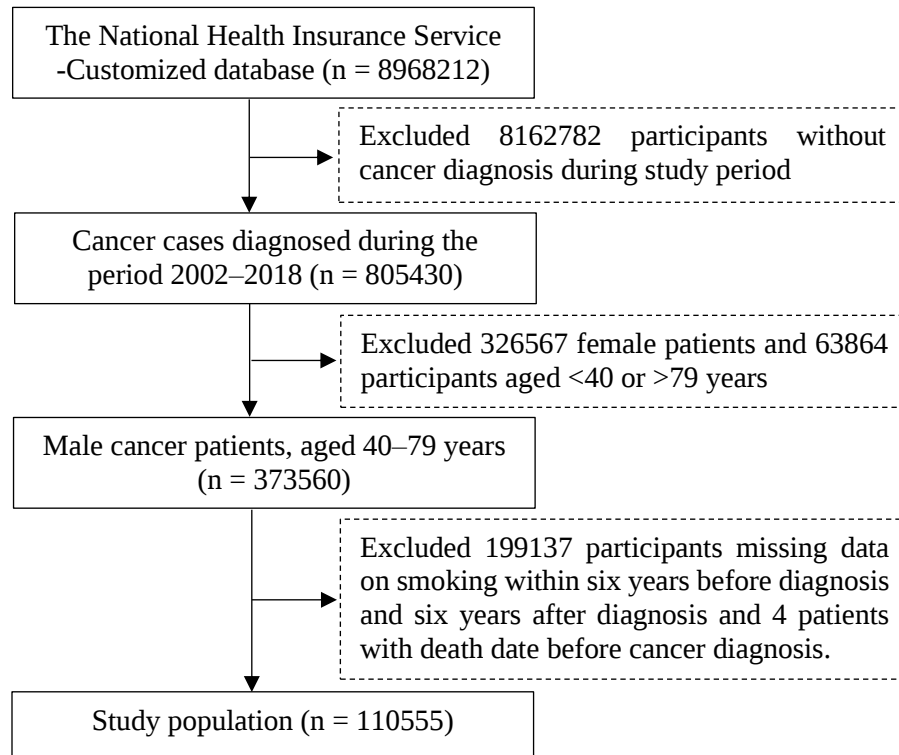
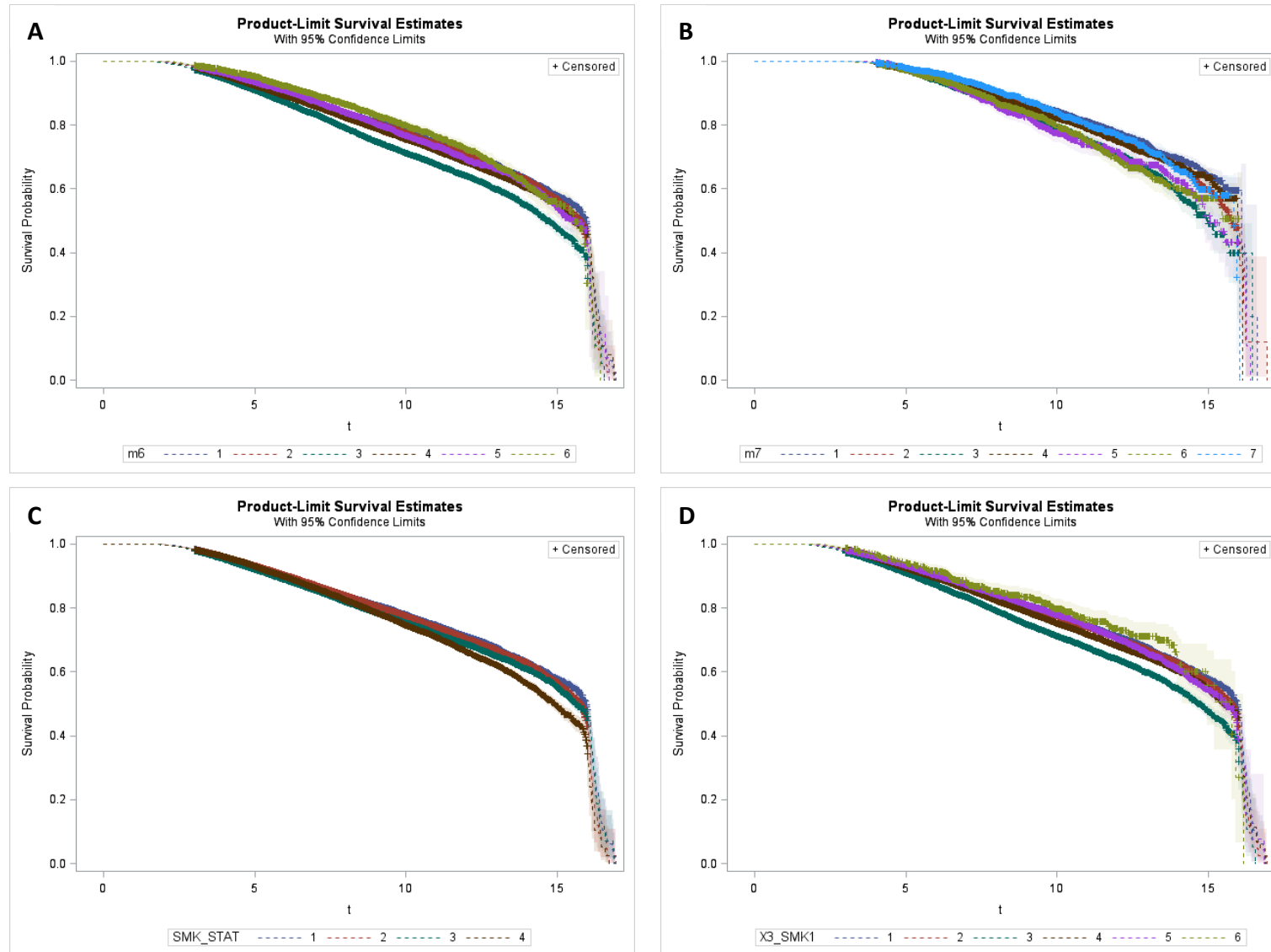


SUPPLEMENTAL MATERIAL

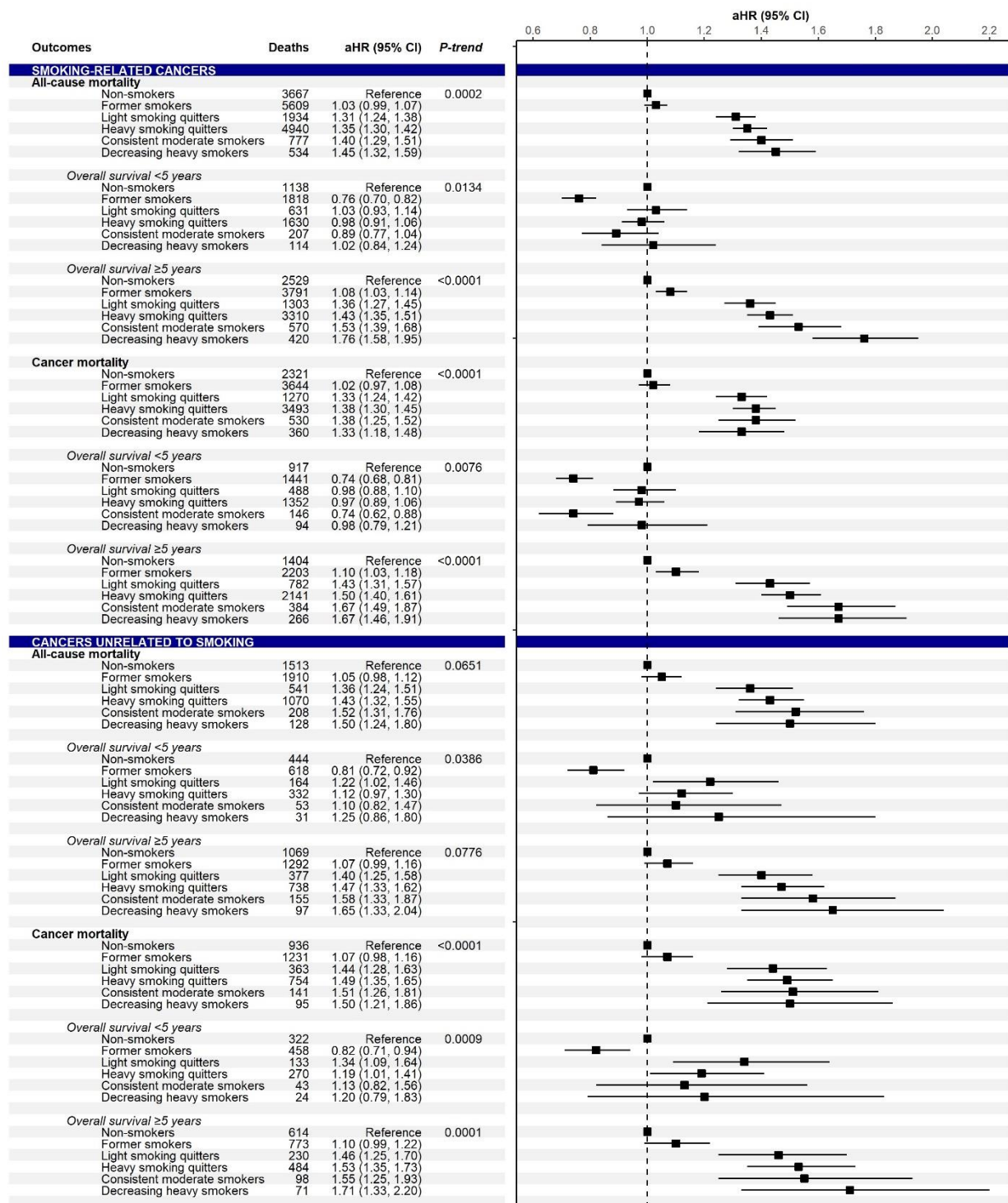
Supplemental Figure S1. Flowchart of the cohort study



Supplemental Figure S2. Survival curves for (A) smoking trajectories for the entire study population, (B) smoking trajectories for the three-measurement subpopulation, (C) smoking status, and (D) baseline smoking levels

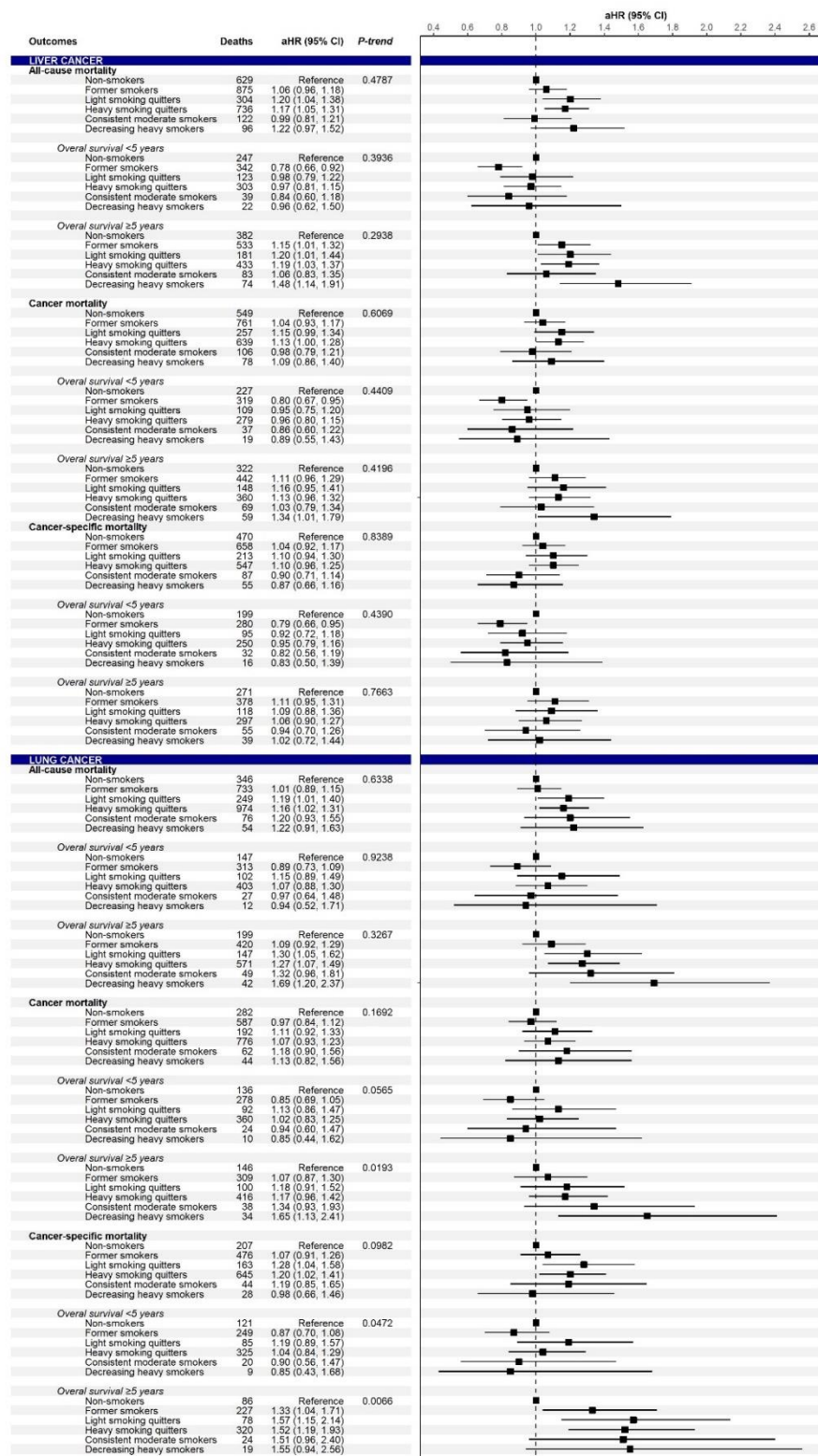


Supplemental Figure S3. Mortality risks according to smoking trajectories for pooled cancer groups: smoking-related cancers and cancers unrelated to smoking



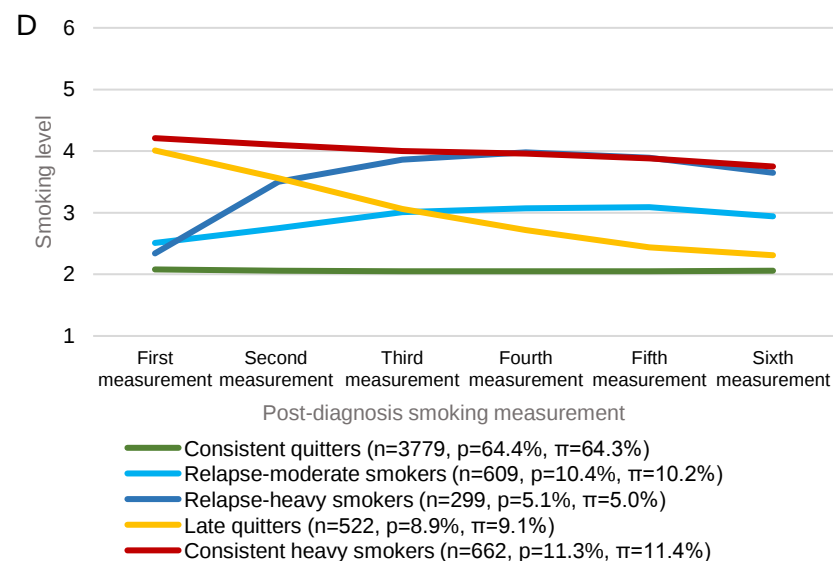
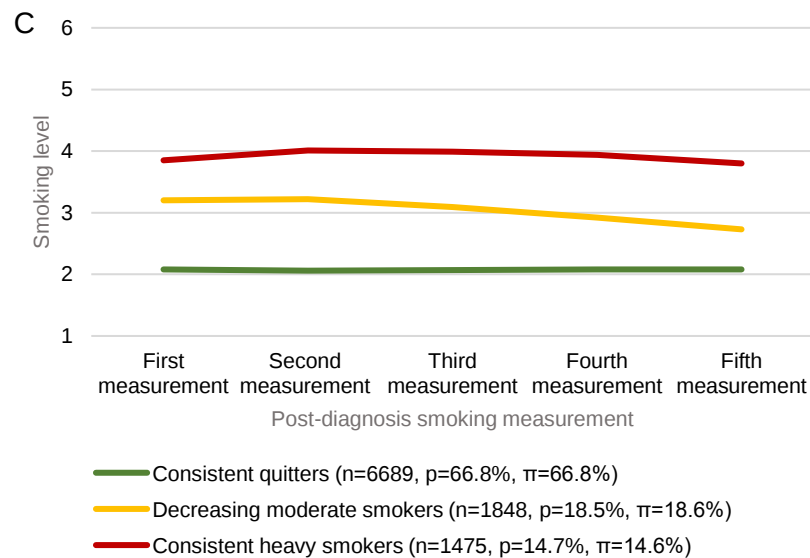
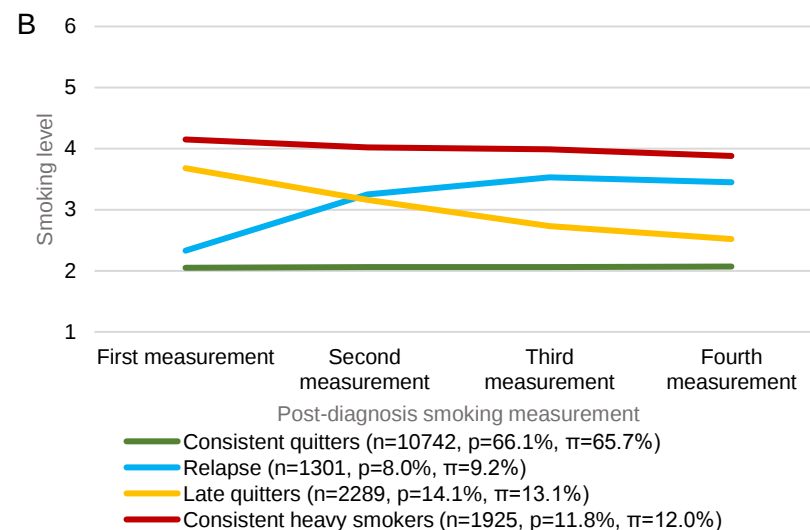
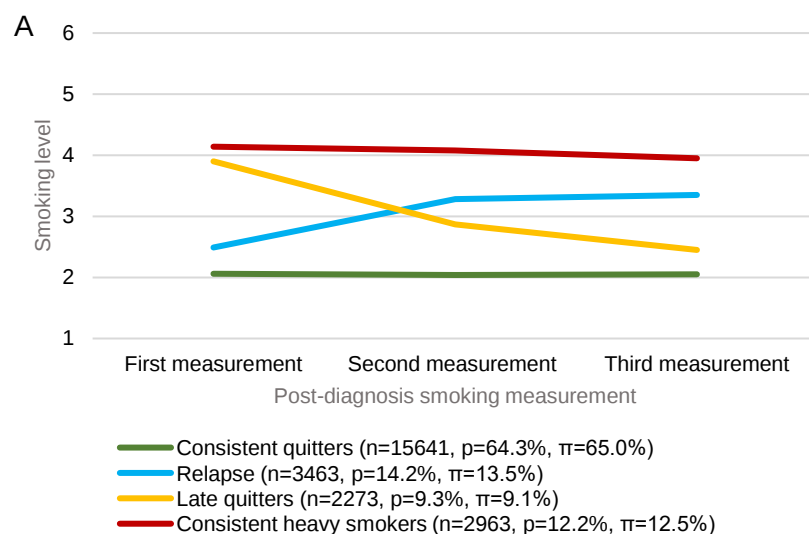
aHR: adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index; CI: confidence interval.

Supplemental Figure S4. Mortality risks according to smoking trajectories for liver cancer (n=7068) and lung cancer (n=6707)



aHR: adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index; CI: confidence interval.

Supplemental Figure S5. Smoking trajectories during post-diagnosis for the subgroups of (A) three post-diagnosis measurements (n=24340), (B) four post-diagnosis measurements (n=16257), (C) five post-diagnosis measurements (n=10012), and (D) six post-diagnosis measurements (n=5871)



π : estimated group membership of the smoking trajectory (%); n: number of participants; p: percentage of participants assigned to the smoking trajectory group (%).

Supplemental Table S1. Model selection for smoking trajectories of pre-diagnosis current smokers during cancer diagnosis

Number of groups	BIC ^a (order = 2)	Selected (Yes/No)	Best fit model	BIC
Pre-diagnosis current smokers in the study population (n^b=45331)-Model A (2,2,2,2)				
1	-160795	No		
2	-122919	No		
3	-115281	No		
4	-111743	Yes	2222	-111743
5	-111742	No		
6	-86337	No		
7	-80684	No		
Pre-diagnosis current smokers in the three-measurement subpopulation (n=18043)-Model B (2,2,2,2,2)				
1	-64213	No		
2	-56245	No		
3	-55020	No		
4	-53306	No		
5	-49746	Yes	22222	-49746
6	-48186	No		
7	-47642	No		

^a Bayesian Information Criterion;

^b number of participants.

Supplemental Table S2. Model details and evaluation for smoking trajectories of pre-diagnosis current smokers during cancer diagnosis

Group	n ^a	p ^b	π^c	AvePP ^d	OCC ^e
Pre-diagnosis current smokers in the study population (n=45331)-Model A (2,2,2,2)					
Light smoking quitters	9668	21.3	22.3	0.99	278.6
Heavy smoking quitters	28133	62.1	60.9	0.98	27.3
Consistent moderate smokers	4218	9.3	9.6	0.98	557.7
Decreasing heavy smokers	3312	7.3	7.2	0.96	301.4
Pre-diagnosis current smokers in the three-measurement subpopulation (n=18043)-Model B (2,2,2,2,2)					
Light smoking quitters	3503	19.4	20.2	0.98	199.5
Heavy smoking quitters	9512	52.7	50.8	0.95	19.9
Late heavy smoking quitters	1272	7.0	6.9	0.95	259.3
Heavy smoking relapse	1890	10.5	11.2	0.94	124.6
Consistent heavy smokers	1866	10.3	10.8	1.00	1802.5

^a number of participants;

^b percentage of participants assigned to the smoking trajectory group (%);

^c estimated group membership of the smoking trajectory (%);

^d average posterior probability;

^e odds of correct classification.

Supplemental Table S3. General characteristics of the three-measurement subpopulation at the study entry (2002-2003) (n=43401)

	Three-measurement subpopulation (n ^a =43401)	Non-smokers (n=8440)	Former smokers (n=16918)	(T2.1) Light smoking quitters ^b (n=3503)	(T2.2) Heavy smoking quitters ^b (n=9512)	(T2.3) Late heavy smoking quitters ^b (n=1272)	(T2.4) Heavy smoking relapse ^b (n=1890)	(T2.5) Consistent heavy smokers ^b (n=1866)
Age, mean (SD)^c	54.5 (8.9)	56.2 (9)	55.6 (8.9)	55.5 (9.2)	52.1 (8.2)	53.4 (8.3)	52.7 (8.5)	50.7 (7.5)
Age group, n (%)								
40–49	14538 (33.5)	2259 (26.8)	4863 (28.7)	1085 (31)	4152 (43.7)	453 (35.6)	794 (42)	932 (49.3)
50–59	15234 (35.1)	2901 (34.4)	5994 (35.4)	1089 (31.1)	3433 (36.1)	516 (40.6)	633 (33.5)	668 (35.3)
60–69	11620 (26.8)	2752 (32.6)	5091 (30.1)	1124 (32.1)	1740 (18.3)	265 (20.8)	402 (21.3)	246 (13)
70–79	2009 (4.6)	528 (6.3)	970 (5.7)	205 (5.9)	187 (2)	38 (3)	61 (3.2)	20 (1.1)
Age at cancer diagnosis, mean (SD)	61.7 (8.8)	63.1 (8.9)	63.1 (8.8)	62.5 (9.1)	59.3 (8.2)	60 (8.1)	59.8 (8.4)	57.4 (7.4)
Income, n (%)								
1 st quintile	4264 (9.8)	765 (9.1)	1602 (9.5)	366 (10.4)	904 (9.5)	153 (12)	241 (12.8)	233 (12.3)
2 nd quintile	4743 (10.9)	872 (10.3)	1773 (10.5)	410 (11.7)	1069 (11.2)	158 (12.4)	234 (12.4)	227 (12)
3 rd quintile	7970 (18.4)	1425 (16.9)	3010 (17.8)	628 (17.9)	1800 (18.9)	305 (24)	418 (22.1)	384 (20.3)
4 th quintile	9240 (21.3)	1757 (20.8)	3525 (20.8)	736 (21)	2127 (22.4)	266 (20.9)	419 (22.2)	410 (21.7)
5 th quintile	16127 (37.2)	3444 (40.8)	6615 (39.1)	1275 (36.4)	3338 (35.1)	356 (28)	530 (28)	569 (30.1)
Missing	1057 (2.4)	177 (2.1)	393 (2.3)	88 (2.5)	274 (2.9)	34 (2.7)	48 (2.5)	43 (2.3)
Body mass index (kg/m²), n (%)								
<18.5	719 (1.7)	103 (1.2)	203 (1.2)	86 (2.5)	202 (2.1)	27 (2.1)	58 (3.1)	40 (2.1)
18.5–22.4	13619 (31.4)	2360 (28)	4780 (28.3)	1266 (36.1)	3358 (35.3)	481 (37.8)	704 (37.2)	670 (35.4)
22.5–24.9	12563 (28.9)	2540 (30.1)	5017 (29.7)	989 (28.2)	2680 (28.2)	349 (27.4)	502 (26.6)	486 (25.7)
≥25	16470 (37.9)	3425 (40.6)	6909 (40.8)	1160 (33.1)	3269 (34.4)	414 (32.5)	623 (33)	670 (35.4)
Missing	30 (0.1)	12 (0.1)	9 (0.1)	2 (0.1)	3 (0)	1 (0.1)	3 (0.2)	0 (0)
Smoking, n (%)								
Non-smoker	8440 (19.4)	8440 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Former smoker	16918 (39)	0 (0)	16918 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
1–9 cigarettes/day	3717 (8.6)	0 (0)	0 (0)	3503 (100)	0 (0)	92 (7.2)	78 (4.1)	44 (2.3)
10–20 cigarettes/day	9538 (22)	0 (0)	0 (0)	0 (0)	6693 (70.4)	735 (57.8)	1264 (66.9)	846 (44.8)
21–40 cigarettes/day	4475 (10.3)	0 (0)	0 (0)	0 (0)	2652 (27.9)	420 (33)	524 (27.7)	879 (46.5)
≥40 cigarettes/day	313 (0.7)	0 (0)	0 (0)	0 (0)	167 (1.8)	25 (2)	24 (1.3)	97 (5.1)

Alcohol drinking frequency, n (%)								
Non-drinking	14639 (33.7)	3979 (47.1)	6098 (36)	953 (27.2)	2278 (23.9)	366 (28.8)	466 (24.7)	499 (26.4)
1–2 times/week	18878 (43.5)	3188 (37.8)	7193 (42.5)	1759 (50.2)	4578 (48.1)	520 (40.9)	873 (46.2)	767 (40.6)
3–4 times/week	5595 (12.9)	681 (8.1)	1977 (11.7)	446 (12.7)	1615 (17)	205 (16.1)	336 (17.8)	335 (17.7)
≥5 times/week	3889 (9)	498 (5.9)	1460 (8.6)	314 (9)	982 (10.3)	173 (13.6)	204 (10.8)	258 (13.7)
Missing	400 (0.9)	94 (1.1)	190 (1.1)	31 (0.9)	59 (0.6)	8 (0.6)	11 (0.6)	7 (0.4)
Physical exercise, n (%)								
0–2 days/week	32986 (76)	6238 (73.9)	12283 (72.6)	2662 (76)	7680 (80.7)	1059 (83.3)	1542 (81.6)	1522 (80.5)
≥3 days/week	9497 (21.9)	2027 (24)	4205 (24.9)	769 (22)	1682 (17.7)	186 (14.6)	314 (16.6)	314 (16.6)
Missing	918 (2.1)	175 (2.1)	430 (2.5)	72 (2.1)	150 (1.6)	27 (2.1)	34 (1.8)	30 (1.6)
Charlson Comorbidity Index, n (%)								
0	295 (0.7)	64 (0.8)	111 (0.7)	24 (0.7)	44 (0.5)	18 (1.4)	12 (0.6)	22 (1.2)
1	335 (0.8)	75 (0.9)	130 (0.8)	28 (0.8)	52 (0.5)	17 (1.3)	16 (0.8)	17 (0.9)
2	10301 (23.7)	2043 (24.2)	3989 (23.6)	809 (23.1)	2289 (24.1)	295 (23.2)	410 (21.7)	466 (24.7)
≥3	32470 (74.8)	6258 (74.1)	12688 (75)	2642 (75.4)	7127 (74.9)	942 (74.1)	1452 (76.8)	1361 (72)

^a number of participants;

^b five groups of the smoking trajectory model for pre-diagnosis current smokers (n=18043) in the three-measurement subpopulation;

^c standard deviation.

Supplemental Table S4. Number of cancer cases and death cases

Cancer types	ICD-10^a	Cancer cases	Death cases
Lip, oral cavity, and pharynx	C00-14	2589 (2.3)	263 (1.1)
Esophagus	C15	1304 (1.2)	404 (1.7)
Stomach	C16	31150 (28.2)	1879 (7.9)
Colon and rectum	C18-20	21069 (19.1)	1747 (7.3)
Liver	C22	7068 (6.4)	2930 (12.3)
Gallbladder and biliary tract	C23-24	1547 (1.4)	693 (2.9)
Pancreas	C25	687 (0.6)	614 (2.6)
Larynx	C32	1464 (1.3)	134 (0.6)
Lung	C33-34	6707 (6.1)	3493 (14.6)
Breast	C50	106 (0.1)	9 (0)
Prostate	C61	13138 (11.9)	1137 (4.8)
Testis	C62	94 (0.1)	0 (0)
Kidney	C64	2934 (2.7)	237 (1)
Bladder	C67	4580 (4.1)	447 (1.9)
Brain	C70-72	636 (0.6)	143 (0.6)
Thyroid gland	C73	6721 (6.1)	66 (0.3)
Hodgkin lymphoma	C81	92 (0.1)	9 (0)
Non-Hodgkin lymphoma	C82-86,96	1639 (1.5)	352 (1.5)
Multiple myeloma, malignant plasma cell neoplasms	C90	437 (0.4)	265 (1.1)
Leukemia	C91-95	676 (0.6)	289 (1.2)
Other cancer types	-	5917 (5.4)	761 (3.2)
Other causes of death	-	-	8016 (33.6)
Total	C00-97	110555	23888

^a International Classification of Diseases, 10th revision.

Supplemental Table S5. All-cause mortality risk according to smoking trajectories for some specific cancers (except gastric, colorectal, liver, and lung cancers)

Smoking trajectories	aHR ^a (95% CI ^b)	Overall survival < 5 years	Overall survival ≥ 5 years
SMOKING-RELATED CANCERS			
Lip, oral cavity, and pharyngeal cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.90, 1.28)	0.84 (0.56, 1.24)	1.10 (0.90, 1.35)
Light smoking quitters	1.35 (1.07, 1.71)	1.66 (0.97, 2.83)	1.37 (1.04, 1.79)
Heavy smoking quitters	1.32 (1.08, 1.60)	0.86 (0.55, 1.36)	1.40 (1.13, 1.75)
Consistent moderate smokers	1.44 (1.04, 1.99)	1.14 (0.51, 2.52)	1.56 (1.09, 2.23)
Decreasing heavy smokers	1.39 (0.92, 2.09)	1.59 (0.46, 5.42)	1.61 (1.03, 2.51)
Esophageal cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	0.88 (0.65, 1.19)	0.62 (0.37, 1.03)	0.98 (0.67, 1.44)
Light smoking quitters	1.23 (0.86, 1.75)	0.98 (0.53, 1.81)	1.38 (0.88, 2.15)
Heavy smoking quitters	1.26 (0.93, 1.71)	0.93 (0.55, 1.55)	1.40 (0.96, 2.06)
Consistent moderate smokers	1.86 (0.97, 3.60)	0.37 (0.12, 1.12)	2.18 (0.94, 5.04)
Decreasing heavy smokers	1.14 (0.52, 2.54)	-	1.76 (0.77, 4.03)
Pancreatic cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	0.71 (0.50, 1.01)	0.42 (0.20, 0.88)	0.58 (0.38, 0.88)
Light smoking quitters	0.77 (0.45, 1.33)	0.62 (0.22, 1.71)	0.57 (0.29, 1.12)
Heavy smoking quitters	1.32 (0.91, 1.92)	0.51 (0.23, 1.10)	1.18 (0.74, 1.87)
Consistent moderate smokers	1.34 (0.75, 2.37)	0.23 (0.07, 0.72)	1.23 (0.59, 2.54)
Decreasing heavy smokers	1.44 (0.75, 2.76)	0.88 (0.16, 4.73)	1.39 (0.65, 2.99)
Laryngeal cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	1.09 (0.77, 1.54)	0.52 (0.25, 1.06)	1.28 (0.85, 1.91)
Light smoking quitters	1.26 (0.84, 1.90)	0.82 (0.34, 1.99)	1.39 (0.86, 2.23)
Heavy smoking quitters	1.38 (0.98, 1.93)	0.90 (0.46, 1.74)	1.40 (0.94, 2.08)
Consistent moderate smokers	2.42 (1.42, 4.11)	0.70 (0.18, 2.73)	2.78 (1.54, 5.02)
Decreasing heavy smokers	1.57 (0.87, 2.82)	1.03 (0.33, 3.26)	1.30 (0.63, 2.69)
Kidney cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	1.00 (0.77, 1.30)	0.79 (0.47, 1.35)	1.02 (0.75, 1.39)
Light smoking quitters	1.64 (1.13, 2.37)	0.51 (0.17, 1.50)	2.15 (1.44, 3.22)
Heavy smoking quitters	1.65 (1.24, 2.20)	1.27 (0.70, 2.28)	1.85 (1.33, 2.59)
Consistent moderate smokers	1.22 (0.72, 2.09)	1.22 (0.41, 3.62)	1.26 (0.68, 2.34)
Decreasing heavy smokers	1.93 (1.06, 3.51)	1.67 (0.46, 6.02)	2.17 (1.09, 4.30)
Bladder cancer			
Non-smokers	Reference	Reference	Reference
Former smokers	0.89 (0.74, 1.06)	0.75 (0.53, 1.08)	0.89 (0.73, 1.09)

Light smoking quitters	1.08 (0.85, 1.35)	1.06 (0.68, 1.66)	1.03 (0.79, 1.35)
Heavy smoking quitters	1.20 (0.99, 1.45)	0.99 (0.67, 1.48)	1.27 (1.02, 1.58)
Consistent moderate smokers	1.22 (0.91, 1.62)	1.29 (0.54, 3.10)	1.38 (1.01, 1.88)
Decreasing heavy smokers	1.65 (1.17, 2.32)	3.20 (1.60, 6.39)	1.56 (1.05, 2.33)

Leukemia

Non-smokers	Reference	Reference	Reference
Former smokers	0.69 (0.46, 1.04)	0.49 (0.28, 0.87)	0.97 (0.52, 1.80)
Light smoking quitters	1.63 (0.96, 2.78)	2.72 (1.22, 6.08)	1.96 (0.87, 4.41)
Heavy smoking quitters	0.69 (0.43, 1.10)	0.74 (0.37, 1.50)	1.10 (0.55, 2.18)
Consistent moderate smokers	0.83 (0.25, 2.71)	0.46 (0.05, 3.97)	1.65 (0.36, 7.46)
Decreasing heavy smokers	1.08 (0.31, 3.79)	3.99 (0.55, 29.13)	0.45 (0.05, 4.00)

CANCERS UNRELATED TO SMOKING

Gallbladder and biliary tract cancer

Non-smokers	Reference	Reference	Reference
Former smokers	0.89 (0.72, 1.11)	0.85 (0.60, 1.2)	0.91 (0.69, 1.21)
Light smoking quitters	0.82 (0.58, 1.16)	1.05 (0.63, 1.77)	0.60 (0.36, 0.99)
Heavy smoking quitters	1.15 (0.89, 1.48)	1.22 (0.82, 1.81)	1.06 (0.75, 1.50)
Consistent moderate smokers	1.19 (0.71, 2.02)	1.17 (0.49, 2.79)	1.24 (0.63, 2.41)
Decreasing heavy smokers	0.68 (0.31, 1.46)	1.12 (0.32, 3.86)	0.57 (0.21, 1.60)

Prostate cancer

Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.97, 1.18)	0.92 (0.76, 1.11)	1.05 (0.94, 1.18)
Light smoking quitters	1.56 (1.36, 1.80)	1.30 (0.98, 1.72)	1.62 (1.38, 1.91)
Heavy smoking quitters	1.45 (1.28, 1.64)	1.21 (0.95, 1.54)	1.42 (1.23, 1.64)
Consistent moderate smokers	1.98 (1.60, 2.45)	1.64 (1.05, 2.55)	1.96 (1.53, 2.51)
Decreasing heavy smokers	2.06 (1.54, 2.74)	1.79 (1.00, 3.19)	2.09 (1.50, 2.92)

Brain cancer

Non-smokers	Reference	Reference	Reference
Former smokers	0.97 (0.66, 1.42)	0.62 (0.31, 1.25)	1.01 (0.63, 1.65)
Light smoking quitters	0.88 (0.45, 1.70)	0.15 (0.04, 0.63)	0.87 (0.38, 2.01)
Heavy smoking quitters	1.11 (0.74, 1.67)	1.09 (0.51, 2.34)	1.12 (0.67, 1.86)
Consistent moderate smokers	0.89 (0.39, 2.00)	0.49 (0.11, 2.28)	0.96 (0.36, 2.54)
Decreasing heavy smokers	1.38 (0.62, 3.08)	2.81 (0.31, 25.58)	1.74 (0.71, 4.25)

Thyroid cancer

Non-smokers	Reference	Reference	Reference
Former smokers	1.43 (1.01, 2.02)	0.91 (0.43, 1.93)	1.46 (0.99, 2.16)
Light smoking quitters	1.46 (0.87, 2.43)	1.37 (0.46, 4.06)	1.42 (0.79, 2.54)
Heavy smoking quitters	2.23 (1.52, 3.26)	1.75 (0.77, 4.01)	2.23 (1.45, 3.45)
Consistent moderate smokers	1.65 (0.83, 3.29)	1.44 (0.38, 5.53)	1.56 (0.69, 3.53)
Decreasing heavy smokers	1.96 (0.95, 4.01)	4.45 (1.16, 17.09)	1.62 (0.68, 3.86)

Non-Hodgkin lymphoma

Non-smokers	Reference	Reference	Reference
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Former smokers	0.80 (0.59, 1.08)	0.51 (0.29, 0.9)	0.91 (0.63, 1.30)
Light smoking quitters	0.70 (0.42, 1.15)	1.34 (0.57, 3.19)	0.60 (0.31, 1.14)
Heavy smoking quitters	1.08 (0.78, 1.51)	0.56 (0.30, 1.06)	1.13 (0.75, 1.69)
Consistent moderate smokers	0.70 (0.30, 1.61)	0.39 (0.08, 1.87)	0.68 (0.24, 1.92)
Decreasing heavy smokers	0.70 (0.28, 1.76)	-	1.12 (0.44, 2.86)

Multiple myeloma and malignant plasma cell neoplasms

Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.74, 1.51)	0.64 (0.37, 1.11)	1.23 (0.77, 1.98)
Light smoking quitters	1.99 (1.18, 3.36)	1.46 (0.67, 3.18)	2.00 (0.92, 4.35)
Heavy smoking quitters	1.07 (0.70, 1.65)	0.73 (0.36, 1.45)	1.21 (0.68, 2.13)
Consistent moderate smokers	1.18 (0.45, 3.08)	3.98 (1.03, 15.39)	0.55 (0.12, 2.48)
Decreasing heavy smokers	3.67 (1.06, 12.75)	1.34 (0.38, 4.76)	1.15 (0.10, 12.82)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S6. Mortality risk according to smoking trajectories for pooled cancer groups and liver and lung cancers in the three-measurement subpopulation

Smoking trajectories	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
SMOKING-RELATED CANCERS			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.12 (1.04, 1.22)	1.00 (0.81, 1.23)	1.16 (1.06, 1.27)
Light smoking quitters	1.42 (1.27, 1.59)	0.93 (0.69, 1.25)	1.51 (1.34, 1.70)
Heavy smoking quitters	1.53 (1.40, 1.68)	1.12 (0.90, 1.41)	1.58 (1.43, 1.75)
Late heavy-smoking quitters	1.57 (1.34, 1.84)	1.17 (0.70, 1.94)	1.73 (1.47, 2.05)
Heavy smoking relapse	1.67 (1.46, 1.91)	1.05 (0.73, 1.53)	1.79 (1.55, 2.07)
Consistent heavy smokers	1.57 (1.36, 1.82)	0.81 (0.55, 1.22)	1.67 (1.43, 1.96)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.12 (1.01, 1.25)	0.92 (0.73, 1.17)	1.19 (1.05, 1.34)
Light smoking quitters	1.52 (1.32, 1.75)	0.93 (0.67, 1.30)	1.65 (1.42, 1.93)
Heavy smoking quitters	1.58 (1.41, 1.77)	1.13 (0.87, 1.45)	1.65 (1.45, 1.88)
Late heavy-smoking quitters	1.63 (1.34, 1.99)	1.01 (0.56, 1.84)	1.89 (1.53, 2.33)
Heavy smoking relapse	1.68 (1.42, 2.00)	0.81 (0.52, 1.28)	1.93 (1.60, 2.32)
Consistent heavy smokers	1.70 (1.42, 2.03)	0.74 (0.47, 1.17)	1.90 (1.56, 2.30)
CANCERS UNRELATED TO SMOKING			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.10 (0.97, 1.24)	0.79 (0.54, 1.14)	1.10 (0.97, 1.26)
Light smoking quitters	1.28 (1.06, 1.55)	1.29 (0.76, 2.18)	1.25 (1.01, 1.54)
Heavy smoking quitters	1.35 (1.15, 1.60)	0.87 (0.54, 1.40)	1.36 (1.14, 1.63)
Late heavy-smoking quitters	1.64 (1.27, 2.12)	1.05 (0.52, 2.12)	1.59 (1.21, 2.10)
Heavy smoking relapse	1.62 (1.24, 2.11)	0.62 (0.29, 1.31)	1.62 (1.21, 2.15)
Consistent heavy smokers	1.78 (1.37, 2.31)	1.11 (0.51, 2.41)	1.82 (1.38, 2.41)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.20 (1.02, 1.42)	0.63 (0.40, 0.97)	1.27 (1.06, 1.52)
Light smoking quitters	1.52 (1.19, 1.93)	1.47 (0.82, 2.61)	1.46 (1.11, 1.91)
Heavy smoking quitters	1.48 (1.20, 1.82)	0.71 (0.40, 1.25)	1.56 (1.24, 1.96)
Late heavy-smoking quitters	1.66 (1.20, 2.31)	1.22 (0.57, 2.59)	1.56 (1.08, 2.26)
Heavy smoking relapse	1.50 (1.06, 2.13)	0.46 (0.18, 1.18)	1.55 (1.06, 2.27)
Consistent heavy smokers	1.89 (1.38, 2.59)	1.01 (0.41, 2.48)	1.99 (1.42, 2.80)
LIVER CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference

Former smokers	1.04 (0.85, 1.27)	1.02 (0.65, 1.60)	1.07 (0.85, 1.34)
Light smoking quitters	1.14 (0.87, 1.50)	1.29 (0.72, 2.32)	1.10 (0.80, 1.51)
Heavy smoking quitters	1.11 (0.89, 1.39)	1.35 (0.80, 2.26)	1.05 (0.81, 1.37)
Late heavy-smoking quitters	1.09 (0.74, 1.62)	1.42 (0.55, 3.65)	1.09 (0.70, 1.69)
Heavy smoking relapse	1.27 (0.91, 1.77)	2.50 (1.00, 6.24)	1.42 (0.99, 2.04)
Consistent heavy smokers	1.23 (0.87, 1.75)	0.95 (0.36, 2.53)	1.34 (0.92, 1.98)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.86, 1.33)	1.06 (0.66, 1.69)	1.11 (0.86, 1.42)
Light smoking quitters	1.14 (0.85, 1.53)	1.26 (0.68, 2.32)	1.11 (0.79, 1.57)
Heavy smoking quitters	1.09 (0.86, 1.39)	1.36 (0.79, 2.32)	1.03 (0.78, 1.37)
Late heavy-smoking quitters	1.04 (0.68, 1.61)	0.98 (0.32, 2.99)	1.13 (0.70, 1.82)
Heavy smoking relapse	1.22 (0.85, 1.75)	2.31 (0.85, 6.23)	1.41 (0.95, 2.10)
Consistent heavy smokers	1.21 (0.83, 1.76)	0.81 (0.28, 2.33)	1.37 (0.90, 2.07)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.08 (0.85, 1.36)	1.07 (0.66, 1.73)	1.12 (0.85, 1.47)
Light smoking quitters	1.11 (0.80, 1.53)	1.25 (0.67, 2.35)	1.06 (0.72, 1.56)
Heavy smoking quitters	1.07 (0.82, 1.39)	1.24 (0.71, 2.17)	1.02 (0.75, 1.39)
Late heavy-smoking quitters	0.90 (0.54, 1.49)	0.76 (0.21, 2.66)	1.00 (0.57, 1.76)
Heavy smoking relapse	1.22 (0.83, 1.81)	2.44 (0.90, 6.64)	1.43 (0.93, 2.20)
Consistent heavy smokers	0.97 (0.62, 1.51)	0.88 (0.30, 2.53)	1.05 (0.63, 1.73)

LUNG CANCER

All-cause mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.89 (0.69, 1.17)	1.58 (0.87, 2.87)	1.04 (0.77, 1.42)
Light smoking quitters	1.14 (0.81, 1.60)	0.48 (0.19, 1.21)	1.38 (0.94, 2.02)
Heavy smoking quitters	1.08 (0.83, 1.40)	1.34 (0.70, 2.57)	1.34 (0.99, 1.82)
Late heavy-smoking quitters	1.46 (0.89, 2.38)	3.20 (0.47, 21.9)	1.87 (1.10, 3.18)
Heavy smoking relapse	1.51 (0.96, 2.36)	1.30 (0.55, 3.04)	1.34 (0.77, 2.35)
Consistent heavy smokers	0.90 (0.52, 1.56)	0.74 (0.16, 3.42)	1.12 (0.62, 2.03)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.77 (0.58, 1.03)	1.38 (0.73, 2.61)	0.89 (0.63, 1.26)
Light smoking quitters	0.98 (0.67, 1.44)	0.50 (0.19, 1.32)	1.17 (0.75, 1.81)
Heavy smoking quitters	0.95 (0.71, 1.26)	1.25 (0.62, 2.49)	1.17 (0.84, 1.64)
Late heavy-smoking quitters	1.45 (0.86, 2.47)	6.03 (0.99, 36.89)	1.84 (1.03, 3.28)
Heavy smoking relapse	1.32 (0.80, 2.19)	1.06 (0.41, 2.76)	1.26 (0.68, 2.35)
Consistent heavy smokers	0.83 (0.45, 1.51)	0.43 (0.05, 3.46)	1.09 (0.57, 2.08)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.89 (0.63, 1.27)	1.85 (0.93, 3.70)	1.03 (0.67, 1.58)
Light smoking quitters	1.20 (0.77, 1.88)	0.58 (0.20, 1.65)	1.49 (0.88, 2.53)

Heavy smoking quitters	1.17 (0.83, 1.64)	1.50 (0.71, 3.16)	1.52 (1.00, 2.30)
Late heavy-smoking quitters	1.40 (0.72, 2.73)	6.25 (0.70, 55.45)	1.93 (0.93, 4.01)
Heavy smoking relapse	1.75 (1.00, 3.08)	1.64 (0.60, 4.48)	1.62 (0.79, 3.36)
Consistent heavy smokers	0.58 (0.25, 1.38)	-	0.89 (0.36, 2.16)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S7. Mortality risk according to the smoking status for pooled cancers, pooled cancer groups, and four leading cancers (gastric, colorectal, liver, and lung cancers)

Smoking status	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (1.00, 1.08)	0.78 (0.73, 0.83)	1.08 (1.04, 1.13)
Light smoking quitters	1.35 (1.31, 1.41)	1.09 (1.02, 1.16)	1.39 (1.32, 1.45)
Heavy smoking quitters	1.44 (1.38, 1.51)	0.98 (0.90, 1.07)	1.59 (1.51, 1.67)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (1.00, 1.09)	0.77 (0.72, 0.83)	1.10 (1.04, 1.17)
Light smoking quitters	1.41 (1.35, 1.48)	1.11 (1.03, 1.19)	1.47 (1.38, 1.56)
Heavy smoking quitters	1.40 (1.32, 1.48)	0.90 (0.82, 1.00)	1.62 (1.52, 1.74)
SMOKING-RELATED CANCERS			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.03 (0.99, 1.07)	0.76 (0.70, 0.82)	1.08 (1.03, 1.14)
Light smoking quitters	1.33 (1.27, 1.39)	1.02 (0.94, 1.10)	1.37 (1.30, 1.45)
Heavy smoking quitters	1.40 (1.33, 1.48)	0.91 (0.83, 1.01)	1.57 (1.48, 1.67)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.02 (0.97, 1.08)	0.74 (0.68, 0.81)	1.10 (1.03, 1.18)
Light smoking quitters	1.36 (1.29, 1.44)	1.01 (0.93, 1.10)	1.45 (1.36, 1.55)
Heavy smoking quitters	1.36 (1.27, 1.45)	0.82 (0.73, 0.91)	1.64 (1.51, 1.77)
CANCERS UNRELATED TO SMOKING			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.05 (0.98, 1.12)	0.81 (0.72, 0.92)	1.07 (0.99, 1.16)
Light smoking quitters	1.37 (1.26, 1.48)	1.16 (1.01, 1.34)	1.39 (1.27, 1.53)
Heavy smoking quitters	1.53 (1.40, 1.68)	1.13 (0.95, 1.34)	1.62 (1.46, 1.81)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.98, 1.16)	0.82 (0.71, 0.94)	1.10 (0.99, 1.22)
Light smoking quitters	1.48 (1.35, 1.63)	1.28 (1.09, 1.50)	1.50 (1.33, 1.69)
Heavy smoking quitters	1.47 (1.31, 1.65)	1.12 (0.92, 1.37)	1.56 (1.36, 1.79)
GASTRIC CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.03 (0.95, 1.11)	0.76 (0.66, 0.89)	1.08 (0.99, 1.18)

Light smoking quitters	1.38 (1.27, 1.49)	1.04 (0.9, 1.21)	1.42 (1.29, 1.56)
Heavy smoking quitters	1.64 (1.50, 1.79)	1.00 (0.84, 1.2)	1.79 (1.61, 1.99)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.95, 1.18)	0.76 (0.64, 0.91)	1.16 (1.01, 1.34)
Light smoking quitters	1.51 (1.35, 1.69)	1.05 (0.87, 1.25)	1.65 (1.44, 1.90)
Heavy smoking quitters	1.71 (1.51, 1.94)	0.85 (0.68, 1.07)	2.14 (1.83, 2.50)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.91 (0.78, 1.06)	0.73 (0.59, 0.90)	0.97 (0.78, 1.21)
Light smoking quitters	1.17 (1.00, 1.37)	0.94 (0.76, 1.16)	1.19 (0.95, 1.49)
Heavy smoking quitters	1.08 (0.89, 1.30)	0.73 (0.56, 0.96)	1.24 (0.95, 1.63)

COLORECTAL CANCER

All-cause mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.98, 1.17)	0.73 (0.62, 0.86)	1.12 (1.01, 1.24)
Light smoking quitters	1.29 (1.17, 1.43)	0.93 (0.78, 1.11)	1.35 (1.19, 1.52)
Heavy smoking quitters	1.38 (1.23, 1.55)	0.80 (0.64, 0.99)	1.59 (1.38, 1.82)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.10 (0.98, 1.24)	0.69 (0.57, 0.82)	1.23 (1.06, 1.43)
Light smoking quitters	1.37 (1.21, 1.55)	0.88 (0.73, 1.08)	1.54 (1.31, 1.81)
Heavy smoking quitters	1.34 (1.15, 1.55)	0.66 (0.50, 0.85)	1.74 (1.45, 2.09)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.99 (0.86, 1.15)	0.64 (0.52, 0.78)	1.15 (0.93, 1.43)
Light smoking quitters	1.17 (1.00, 1.38)	0.80 (0.64, 0.99)	1.35 (1.07, 1.70)
Heavy smoking quitters	0.77 (0.62, 0.95)	0.49 (0.36, 0.67)	0.94 (0.70, 1.28)

LIVER CANCER

All-cause mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.96, 1.18)	0.78 (0.66, 0.92)	1.15 (1.01, 1.32)
Light smoking quitters	1.13 (1.01, 1.26)	0.94 (0.79, 1.12)	1.12 (0.97, 1.29)
Heavy smoking quitters	1.23 (1.08, 1.39)	0.99 (0.80, 1.22)	1.34 (1.14, 1.57)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (0.93, 1.17)	0.80 (0.67, 0.95)	1.11 (0.96, 1.29)
Light smoking quitters	1.09 (0.97, 1.22)	0.93 (0.77, 1.11)	1.07 (0.92, 1.25)
Heavy smoking quitters	1.17 (1.02, 1.34)	0.98 (0.79, 1.22)	1.27 (1.06, 1.51)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (0.92, 1.17)	0.79 (0.66, 0.95)	1.11 (0.95, 1.31)

Light smoking quitters	1.05 (0.92, 1.19)	0.91 (0.75, 1.10)	1.01 (0.85, 1.19)
Heavy smoking quitters	1.09 (0.94, 1.27)	0.96 (0.77, 1.21)	1.14 (0.94, 1.39)
LUNG CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.01 (0.89, 1.15)	0.89 (0.73, 1.09)	1.09 (0.92, 1.29)
Light smoking quitters	1.14 (1.01, 1.30)	1.08 (0.89, 1.30)	1.24 (1.05, 1.46)
Heavy smoking quitters	1.28 (1.09, 1.51)	1.08 (0.82, 1.43)	1.53 (1.24, 1.88)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	0.97 (0.84, 1.12)	0.85 (0.69, 1.05)	1.07 (0.87, 1.30)
Light smoking quitters	1.08 (0.94, 1.23)	1.04 (0.86, 1.28)	1.15 (0.95, 1.39)
Heavy smoking quitters	1.14 (0.95, 1.38)	0.98 (0.73, 1.31)	1.40 (1.1, 1.79)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.91, 1.26)	0.87 (0.70, 1.08)	1.33 (1.04, 1.71)
Light smoking quitters	1.23 (1.05, 1.44)	1.07 (0.86, 1.32)	1.54 (1.21, 1.96)
Heavy smoking quitters	1.11 (0.89, 1.38)	0.99 (0.72, 1.35)	1.46 (1.07, 2.00)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S8. Mortality risk according to the pre-diagnosis smoking levels for pooled cancers, pooled cancer groups, and four leading cancers (gastric, colorectal, liver, and lung cancers)

Pre-diagnosis smoking levels	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
All-cause mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.04 (1.00, 1.08)	0.78 (0.73, 0.83)	1.08 (1.04, 1.13)
1–9 cigarettes/day	1.34 (1.28, 1.40)	1.11 (1.02, 1.21)	1.38 (1.30, 1.46)
10–20 cigarettes/day	1.39 (1.33, 1.44)	0.98 (0.91, 1.05)	1.45 (1.39, 1.53)
21–40 cigarettes/day	1.43 (1.36, 1.51)	1.21 (1.11, 1.33)	1.54 (1.45, 1.64)
≥40 cigarettes/day	1.35 (1.15, 1.58)	1.53 (1.13, 2.05)	1.47 (1.21, 1.77)
Cancer mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.04 (1.00, 1.09)	0.77 (0.72, 0.83)	1.10 (1.04, 1.17)
1–9 cigarettes/day	1.37 (1.29, 1.46)	1.09 (0.99, 1.20)	1.45 (1.35, 1.57)
10–20 cigarettes/day	1.41 (1.34, 1.48)	0.97 (0.90, 1.05)	1.51 (1.42, 1.61)
21–40 cigarettes/day	1.44 (1.35, 1.53)	1.19 (1.07, 1.32)	1.61 (1.49, 1.74)
≥40 cigarettes/day	1.34 (1.11, 1.62)	1.49 (1.08, 2.07)	1.50 (1.19, 1.89)
SMOKING-RELATED CANCERS			
All-cause mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.03 (0.99, 1.07)	0.76 (0.70, 0.82)	1.08 (1.03, 1.14)
1–9 cigarettes/day	1.31 (1.24, 1.39)	1.03 (0.94, 1.14)	1.37 (1.28, 1.46)
10–20 cigarettes/day	1.35 (1.29, 1.42)	0.91 (0.84, 0.99)	1.44 (1.36, 1.52)
21–40 cigarettes/day	1.40 (1.32, 1.49)	1.14 (1.03, 1.27)	1.52 (1.42, 1.63)
≥40 cigarettes/day	1.31 (1.10, 1.57)	1.58 (1.14, 2.18)	1.45 (1.18, 1.80)
Cancer mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.02 (0.97, 1.08)	0.74 (0.68, 0.81)	1.10 (1.03, 1.18)
1–9 cigarettes/day	1.33 (1.24, 1.42)	0.98 (0.88, 1.10)	1.44 (1.32, 1.57)
10–20 cigarettes/day	1.36 (1.29, 1.44)	0.88 (0.81, 0.97)	1.51 (1.41, 1.62)
21–40 cigarettes/day	1.40 (1.30, 1.50)	1.10 (0.98, 1.24)	1.59 (1.46, 1.74)
≥40 cigarettes/day	1.29 (1.05, 1.59)	1.50 (1.05, 2.15)	1.50 (1.16, 1.93)
CANCERS UNRELATED TO SMOKING			
All-cause mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.05 (0.98, 1.12)	0.81 (0.72, 0.92)	1.07 (0.99, 1.16)
1–9 cigarettes/day	1.37 (1.24, 1.51)	1.24 (1.04, 1.48)	1.41 (1.26, 1.59)
10–20 cigarettes/day	1.44 (1.33, 1.57)	1.08 (0.93, 1.26)	1.47 (1.33, 1.62)
21–40 cigarettes/day	1.46 (1.30, 1.64)	1.22 (0.98, 1.53)	1.58 (1.38, 1.81)

≥40 cigarettes/day	1.37 (0.95, 2.00)	1.17 (0.55, 2.47)	1.45 (0.94, 2.24)
Cancer mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.07 (0.98, 1.16)	0.82 (0.71, 0.94)	1.10 (0.99, 1.22)
1–9 cigarettes/day	1.46 (1.29, 1.64)	1.37 (1.12, 1.67)	1.48 (1.28, 1.72)
10–20 cigarettes/day	1.49 (1.34, 1.65)	1.16 (0.98, 1.37)	1.49 (1.31, 1.69)
21–40 cigarettes/day	1.49 (1.30, 1.71)	1.21 (0.94, 1.57)	1.67 (1.41, 1.97)
≥40 cigarettes/day	1.41 (0.90, 2.20)	1.25 (0.55, 2.82)	1.46 (0.86, 2.49)
GASTRIC CANCER			
All-cause mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.03 (0.95, 1.11)	0.76 (0.66, 0.89)	1.08 (0.99, 1.19)
1–9 cigarettes/day	1.37 (1.25, 1.52)	1.06 (0.88, 1.28)	1.41 (1.25, 1.58)
10–20 cigarettes/day	1.48 (1.37, 1.61)	0.97 (0.83, 1.14)	1.56 (1.42, 1.72)
21–40 cigarettes/day	1.53 (1.38, 1.71)	1.14 (0.92, 1.41)	1.66 (1.47, 1.89)
≥40 cigarettes/day	1.35 (0.96, 1.89)	1.63 (0.77, 3.47)	1.57 (1.08, 2.30)
Cancer mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.06 (0.95, 1.18)	0.76 (0.64, 0.92)	1.16 (1.01, 1.34)
1–9 cigarettes/day	1.47 (1.28, 1.69)	0.99 (0.78, 1.24)	1.65 (1.39, 1.96)
10–20 cigarettes/day	1.60 (1.43, 1.80)	0.92 (0.76, 1.12)	1.85 (1.60, 2.14)
21–40 cigarettes/day	1.64 (1.42, 1.89)	1.15 (0.90, 1.48)	1.91 (1.60, 2.29)
≥40 cigarettes/day	1.49 (0.97, 2.30)	2.14 (1.00, 4.58)	1.77 (1.05, 2.98)
Cancer-specific mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	0.91 (0.78, 1.06)	0.73 (0.59, 0.90)	0.97 (0.78, 1.21)
1–9 cigarettes/day	1.19 (0.98, 1.45)	0.83 (0.63, 1.11)	1.39 (1.06, 1.84)
10–20 cigarettes/day	1.17 (0.99, 1.38)	0.87 (0.69, 1.08)	1.17 (0.92, 1.49)
21–40 cigarettes/day	1.00 (0.80, 1.25)	0.91 (0.67, 1.23)	1.03 (0.75, 1.42)
≥40 cigarettes/day	1.28 (0.71, 2.28)	2.28 (1.00, 5.19)	1.42 (0.62, 3.23)
COLORECTAL CANCER			
All-cause mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.07 (0.98, 1.17)	0.73 (0.62, 0.86)	1.12 (1.01, 1.25)
1–9 cigarettes/day	1.28 (1.13, 1.44)	1.01 (0.81, 1.26)	1.32 (1.13, 1.54)
10–20 cigarettes/day	1.28 (1.15, 1.42)	0.76 (0.63, 0.92)	1.41 (1.24, 1.60)
21–40 cigarettes/day	1.46 (1.27, 1.68)	1.01 (0.78, 1.30)	1.61 (1.36, 1.90)
≥40 cigarettes/day	2.08 (1.42, 3.06)	2.06 (1.06, 4.02)	2.36 (1.47, 3.78)
Cancer mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.10 (0.99, 1.24)	0.69 (0.57, 0.82)	1.24 (1.06, 1.43)
1–9 cigarettes/day	1.28 (1.09, 1.50)	0.91 (0.71, 1.18)	1.41 (1.15, 1.74)

10–20 cigarettes/day	1.33 (1.16, 1.52)	0.69 (0.55, 0.86)	1.63 (1.37, 1.93)
21–40 cigarettes/day	1.51 (1.27, 1.79)	0.94 (0.71, 1.25)	1.82 (1.47, 2.26)
≥40 cigarettes/day	1.98 (1.24, 3.18)	2.17 (1.07, 4.40)	2.18 (1.16, 4.11)

Cancer-specific mortality

Non-smoker	Reference	Reference	Reference
Former smoker	0.99 (0.86, 1.15)	0.64 (0.52, 0.78)	1.15 (0.93, 1.43)
1–9 cigarettes/day	1.18 (0.97, 1.45)	0.91 (0.69, 1.20)	1.29 (0.95, 1.74)
10–20 cigarettes/day	0.93 (0.78, 1.12)	0.55 (0.43, 0.71)	1.15 (0.89, 1.48)
21–40 cigarettes/day	1.05 (0.84, 1.32)	0.79 (0.57, 1.09)	1.20 (0.87, 1.67)
≥40 cigarettes/day	1.55 (0.85, 2.83)	1.56 (0.64, 3.81)	1.98 (0.87, 4.50)

LIVER CANCER

All-cause mortality

Non-smoker	Reference	Reference	Reference
Former smoker	1.06 (0.96, 1.18)	0.78 (0.66, 0.92)	1.15 (1.01, 1.32)
1–9 cigarettes/day	1.16 (1.01, 1.33)	0.93 (0.75, 1.16)	1.17 (0.98, 1.39)
10–20 cigarettes/day	1.16 (1.03, 1.30)	0.93 (0.78, 1.11)	1.19 (1.03, 1.38)
21–40 cigarettes/day	1.19 (1.03, 1.39)	1.09 (0.85, 1.39)	1.24 (1.02, 1.51)
≥40 cigarettes/day	0.87 (0.49, 1.54)	5.66 (1.39, 23.1)	1.10 (0.58, 2.06)

Cancer mortality

Non-smoker	Reference	Reference	Reference
Former smoker	1.04 (0.93, 1.17)	0.80 (0.67, 0.95)	1.11 (0.96, 1.29)
1–9 cigarettes/day	1.12 (0.97, 1.30)	0.91 (0.72, 1.14)	1.14 (0.94, 1.38)
10–20 cigarettes/day	1.11 (0.98, 1.26)	0.93 (0.77, 1.12)	1.12 (0.95, 1.31)
21–40 cigarettes/day	1.14 (0.97, 1.34)	1.03 (0.80, 1.34)	1.20 (0.97, 1.48)
≥40 cigarettes/day	0.87 (0.48, 1.59)	5.68 (1.39, 23.22)	1.11 (0.57, 2.15)

Cancer-specific mortality

Non-smoker	Reference	Reference	Reference
Former smoker	1.04 (0.92, 1.17)	0.79 (0.66, 0.95)	1.11 (0.95, 1.30)
1–9 cigarettes/day	1.07 (0.91, 1.26)	0.88 (0.69, 1.13)	1.06 (0.86, 1.32)
10–20 cigarettes/day	1.08 (0.94, 1.23)	0.92 (0.75, 1.12)	1.07 (0.90, 1.27)
21–40 cigarettes/day	1.04 (0.87, 1.25)	1.04 (0.79, 1.36)	1.02 (0.81, 1.30)
≥40 cigarettes/day	0.46 (0.19, 1.11)	3.07 (0.43, 22.04)	0.57 (0.21, 1.55)

LUNG CANCER

All-cause mortality

Non-smoker	Reference	Reference	Reference
Former smoker	1.01 (0.89, 1.15)	0.89 (0.73, 1.09)	1.09 (0.92, 1.29)
1–9 cigarettes/day	1.18 (1.01, 1.39)	1.16 (0.90, 1.50)	1.29 (1.04, 1.59)
10–20 cigarettes/day	1.20 (1.05, 1.37)	1.03 (0.84, 1.26)	1.29 (1.08, 1.53)
21–40 cigarettes/day	1.11 (0.95, 1.29)	1.11 (0.86, 1.42)	1.32 (1.09, 1.60)
≥40 cigarettes/day	0.97 (0.66, 1.42)	1.33 (0.73, 2.41)	1.08 (0.66, 1.78)

Cancer mortality

Non-smoker	Reference	Reference	Reference
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Former smoker	0.97 (0.84, 1.12)	0.85 (0.69, 1.05)	1.07 (0.87, 1.30)
1–9 cigarettes/day	1.10 (0.91, 1.32)	1.12 (0.86, 1.46)	1.17 (0.91, 1.50)
10–20 cigarettes/day	1.15 (0.99, 1.33)	1.00 (0.81, 1.24)	1.23 (1.01, 1.51)
21–40 cigarettes/day	0.99 (0.84, 1.18)	1.04 (0.80, 1.35)	1.18 (0.94, 1.48)
≥40 cigarettes/day	0.80 (0.51, 1.25)	1.05 (0.53, 2.08)	0.92 (0.51, 1.66)
Cancer-specific mortality			
Non-smoker	Reference	Reference	Reference
Former smoker	1.07 (0.91, 1.26)	0.87 (0.70, 1.08)	1.33 (1.04, 1.71)
1–9 cigarettes/day	1.26 (1.03, 1.55)	1.17 (0.89, 1.55)	1.55 (1.14, 2.10)
10–20 cigarettes/day	1.26 (1.07, 1.49)	0.99 (0.79, 1.24)	1.59 (1.23, 2.04)
21–40 cigarettes/day	1.10 (0.91, 1.34)	1.12 (0.86, 1.47)	1.45 (1.10, 1.93)
≥40 cigarettes/day	0.82 (0.49, 1.36)	1.05 (0.51, 2.17)	1.01 (0.49, 2.09)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S9. Competing risk analysis: Mortality risk according to smoking trajectories for pooled cancers, pooled cancer groups, and four leading cancers (gastric, colorectal, liver, and lung cancers)

Smoking trajectories	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.03 (0.98, 1.07)	0.78 (0.73, 0.84)	1.08 (1.02, 1.15)
Light smoking quitters	1.32 (1.25, 1.41)	1.06 (0.96, 1.17)	1.39 (1.29, 1.50)
Heavy smoking quitters	1.38 (1.31, 1.45)	1.06 (0.98, 1.14)	1.45 (1.37, 1.54)
Consistent moderate smokers	1.39 (1.28, 1.51)	0.81 (0.69, 0.94)	1.62 (1.46, 1.79)
Decreasing heavy smokers	1.32 (1.19, 1.45)	1.03 (0.85, 1.25)	1.58 (1.41, 1.78)
SMOKING-RELATED CANCERS			
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.01 (0.96, 1.06)	0.75 (0.69, 0.82)	1.08 (1.01, 1.16)
Light smoking quitters	1.28 (1.20, 1.38)	0.96 (0.86, 1.07)	1.38 (1.27, 1.51)
Heavy smoking quitters	1.33 (1.26, 1.41)	0.97 (0.89, 1.05)	1.44 (1.34, 1.55)
Consistent moderate smokers	1.35 (1.23, 1.48)	0.71 (0.59, 0.84)	1.64 (1.47, 1.84)
Decreasing heavy smokers	1.27 (1.13, 1.42)	0.97 (0.78, 1.19)	1.57 (1.38, 1.79)
CANCERS UNRELATED TO SMOKING			
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.05 (0.96, 1.14)	0.82 (0.71, 0.95)	1.08 (0.97, 1.20)
Light smoking quitters	1.40 (1.24, 1.59)	1.33 (1.09, 1.63)	1.41 (1.20, 1.64)
Heavy smoking quitters	1.44 (1.31, 1.59)	1.20 (1.02, 1.42)	1.47 (1.30, 1.66)
Consistent moderate smokers	1.48 (1.23, 1.77)	1.13 (0.82, 1.56)	1.51 (1.21, 1.87)
Decreasing heavy smokers	1.43 (1.16, 1.77)	1.18 (0.77, 1.82)	1.61 (1.25, 2.06)
GASTRIC CANCER			
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (0.93, 1.16)	0.78 (0.65, 0.93)	1.14 (0.99, 1.31)
Light smoking quitters	1.40 (1.21, 1.61)	0.93 (0.73, 1.17)	1.58 (1.32, 1.88)
Heavy smoking quitters	1.51 (1.35, 1.69)	1.04 (0.86, 1.25)	1.68 (1.46, 1.95)
Consistent moderate smokers	1.75 (1.45, 2.11)	0.74 (0.52, 1.04)	2.19 (1.75, 2.74)
Decreasing heavy smokers	1.53 (1.22, 1.92)	0.94 (0.61, 1.46)	1.96 (1.50, 2.55)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	0.90 (0.77, 1.05)	0.74 (0.60, 0.92)	0.95 (0.76, 1.19)
Light smoking quitters	1.14 (0.94, 1.40)	0.77 (0.58, 1.03)	1.37 (1.03, 1.81)
Heavy smoking quitters	1.13 (0.96, 1.32)	0.94 (0.76, 1.17)	1.09 (0.86, 1.38)

Consistent moderate smokers	0.91 (0.67, 1.25)	0.57 (0.37, 0.88)	0.93 (0.58, 1.48)
Decreasing heavy smokers	0.84 (0.58, 1.22)	0.71 (0.41, 1.22)	1.00 (0.61, 1.65)

COLORECTAL CANCER

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.08 (0.96, 1.21)	0.68 (0.57, 0.82)	1.21 (1.04, 1.41)
Light smoking quitters	1.23 (1.05, 1.45)	0.88 (0.68, 1.13)	1.33 (1.07, 1.66)
Heavy smoking quitters	1.34 (1.18, 1.53)	0.80 (0.65, 0.98)	1.58 (1.33, 1.86)
Consistent moderate smokers	1.36 (1.10, 1.70)	0.46 (0.28, 0.75)	1.94 (1.50, 2.49)
Decreasing heavy smokers	1.44 (1.10, 1.87)	0.99 (0.61, 1.62)	1.81 (1.31, 2.50)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.97 (0.84, 1.13)	0.63 (0.52, 0.78)	1.13 (0.91, 1.40)
Light smoking quitters	1.16 (0.95, 1.43)	0.87 (0.66, 1.15)	1.24 (0.91, 1.69)
Heavy smoking quitters	1.06 (0.90, 1.25)	0.66 (0.52, 0.83)	1.28 (1.01, 1.63)
Consistent moderate smokers	0.44 (0.28, 0.69)	0.25 (0.13, 0.50)	0.55 (0.31, 1.00)
Decreasing heavy smokers	0.76 (0.50, 1.14)	0.69 (0.38, 1.26)	0.84 (0.47, 1.49)

LIVER CANCER

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.03 (0.92, 1.15)	0.81 (0.69, 0.97)	1.09 (0.94, 1.26)
Light smoking quitters	1.12 (0.96, 1.31)	0.92 (0.73, 1.17)	1.13 (0.93, 1.39)
Heavy smoking quitters	1.10 (0.98, 1.24)	0.94 (0.79, 1.12)	1.09 (0.93, 1.27)
Consistent moderate smokers	0.99 (0.80, 1.22)	0.88 (0.62, 1.24)	1.03 (0.79, 1.34)
Decreasing heavy smokers	1.03 (0.81, 1.30)	0.84 (0.53, 1.32)	1.23 (0.93, 1.63)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.02 (0.91, 1.15)	0.81 (0.68, 0.97)	1.09 (0.93, 1.27)
Light smoking quitters	1.06 (0.90, 1.26)	0.89 (0.69, 1.13)	1.05 (0.84, 1.31)
Heavy smoking quitters	1.06 (0.93, 1.20)	0.94 (0.77, 1.13)	1.01 (0.85, 1.21)
Consistent moderate smokers	0.90 (0.71, 1.13)	0.81 (0.55, 1.20)	0.92 (0.69, 1.23)
Decreasing heavy smokers	0.82 (0.62, 1.08)	0.78 (0.49, 1.24)	0.91 (0.65, 1.28)

LUNG CANCER

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.96 (0.83, 1.11)	0.83 (0.68, 1.01)	1.05 (0.86, 1.28)
Light smoking quitters	1.07 (0.88, 1.29)	1.10 (0.85, 1.42)	1.10 (0.85, 1.42)
Heavy smoking quitters	1.04 (0.90, 1.19)	0.98 (0.80, 1.19)	1.12 (0.92, 1.35)
Consistent moderate smokers	1.18 (0.90, 1.55)	0.96 (0.62, 1.47)	1.34 (0.94, 1.92)
Decreasing heavy smokers	1.10 (0.82, 1.48)	0.81 (0.44, 1.50)	1.57 (1.10, 2.23)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
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Former smokers	1.07 (0.90, 1.26)	0.84 (0.68, 1.05)	1.34 (1.04, 1.73)
Light smoking quitters	1.27 (1.03, 1.56)	1.16 (0.88, 1.52)	1.53 (1.12, 2.09)
Heavy smoking quitters	1.18 (1.00, 1.39)	0.99 (0.80, 1.23)	1.49 (1.17, 1.91)
Consistent moderate smokers	1.17 (0.84, 1.62)	0.91 (0.57, 1.46)	1.51 (0.95, 2.39)
Decreasing heavy smokers	0.95 (0.65, 1.39)	0.76 (0.40, 1.46)	1.47 (0.90, 2.41)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S10. All-cause mortality risk according to smoking trajectories with the decreasing heavy smokers as the reference

Smoking trajectories	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
Non-smokers	0.68 (0.63, 0.74)	0.92 (0.77, 1.09)	0.57 (0.52, 0.63)
Former smokers	0.71 (0.65, 0.76)	0.72 (0.61, 0.85)	0.62 (0.57, 0.68)
Light smoking quitters	0.90 (0.83, 0.99)	1.01 (0.85, 1.21)	0.79 (0.71, 0.87)
Heavy smoking quitters	0.94 (0.87, 1.02)	0.97 (0.82, 1.15)	0.83 (0.76, 0.91)
Consistent moderate smokers	0.97 (0.88, 1.08)	0.88 (0.72, 1.08)	0.89 (0.79, 0.99)
Decreasing heavy smokers	Reference	Reference	Reference
SMOKING-RELATED CANCERS			
Non-smokers	0.69 (0.63, 0.76)	0.98 (0.81, 1.19)	0.57 (0.51, 0.63)
Former smokers	0.71 (0.65, 0.78)	0.74 (0.61, 0.90)	0.62 (0.56, 0.68)
Light smoking quitters	0.90 (0.82, 0.99)	1.01 (0.82, 1.23)	0.77 (0.69, 0.86)
Heavy smoking quitters	0.93 (0.85, 1.02)	0.96 (0.80, 1.17)	0.81 (0.73, 0.90)
Consistent moderate smokers	0.97 (0.86, 1.08)	0.87 (0.70, 1.10)	0.87 (0.77, 0.99)
Decreasing heavy smokers	Reference	Reference	Reference
CANCERS UNRELATED TO SMOKING			
Non-smokers	0.67 (0.56, 0.80)	0.80 (0.55, 1.16)	0.61 (0.49, 0.75)
Former smokers	0.70 (0.58, 0.84)	0.65 (0.45, 0.93)	0.65 (0.53, 0.80)
Light smoking quitters	0.91 (0.75, 1.11)	0.98 (0.66, 1.44)	0.85 (0.68, 1.07)
Heavy smoking quitters	0.96 (0.80, 1.15)	0.90 (0.62, 1.30)	0.89 (0.72, 1.11)
Consistent moderate smokers	1.01 (0.81, 1.26)	0.88 (0.57, 1.38)	0.96 (0.74, 1.23)
Decreasing heavy smokers	Reference	Reference	Reference
GASTRIC CANCER			
Non-smokers	0.58 (0.49, 0.68)	0.99 (0.67, 1.45)	0.48 (0.40, 0.58)
Former smokers	0.59 (0.50, 0.69)	0.75 (0.52, 1.10)	0.52 (0.44, 0.62)
Light smoking quitters	0.78 (0.66, 0.93)	1.01 (0.68, 1.50)	0.68 (0.56, 0.82)
Heavy smoking quitters	0.83 (0.70, 0.97)	1.01 (0.69, 1.46)	0.73 (0.61, 0.87)
Consistent moderate smokers	1.03 (0.85, 1.25)	1.07 (0.70, 1.65)	0.88 (0.71, 1.10)
Decreasing heavy smokers	Reference	Reference	Reference
COLORECTAL CANCER			
Non-smokers	0.64 (0.52, 0.79)	1.14 (0.73, 1.78)	0.52 (0.41, 0.67)
Former smokers	0.69 (0.56, 0.85)	0.83 (0.54, 1.29)	0.58 (0.46, 0.74)
Light smoking quitters	0.81 (0.64, 1.02)	1.15 (0.72, 1.83)	0.67 (0.52, 0.88)
Heavy smoking quitters	0.85 (0.68, 1.05)	0.95 (0.61, 1.48)	0.75 (0.58, 0.95)
Consistent moderate smokers	0.90 (0.69, 1.16)	0.99 (0.58, 1.69)	0.81 (0.60, 1.09)
Decreasing heavy smokers	Reference	Reference	Reference
LIVER CANCER			

Non-smokers	0.82 (0.66, 1.03)	1.04 (0.67, 1.61)	0.68 (0.52, 0.88)
Former smokers	0.88 (0.71, 1.09)	0.81 (0.52, 1.25)	0.78 (0.61, 1.00)
Light smoking quitters	0.99 (0.78, 1.24)	1.01 (0.64, 1.60)	0.81 (0.62, 1.07)
Heavy smoking quitters	0.97 (0.78, 1.20)	1.00 (0.65, 1.55)	0.80 (0.63, 1.03)
Consistent moderate smokers	0.81 (0.62, 1.07)	0.87 (0.51, 1.47)	0.72 (0.52, 0.98)
Decreasing heavy smokers	Reference	Reference	Reference
LUNG CANCER			
Non-smokers	0.82 (0.61, 1.10)	1.06 (0.58, 1.92)	0.59 (0.42, 0.83)
Former smokers	0.83 (0.63, 1.10)	0.94 (0.53, 1.69)	0.65 (0.47, 0.89)
Light smoking quitters	0.98 (0.72, 1.31)	1.22 (0.67, 2.24)	0.77 (0.54, 1.09)
Heavy smoking quitters	0.95 (0.72, 1.25)	1.13 (0.63, 2.01)	0.75 (0.55, 1.03)
Consistent moderate smokers	0.98 (0.69, 1.40)	1.03 (0.52, 2.04)	0.78 (0.51, 1.18)
Decreasing heavy smokers	Reference	Reference	Reference

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S11. Mortality risks according to smoking trajectories for the entire study population with time-dependent covariates

Pre-diagnosis smoking levels	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.04 (1.01, 1.08)	0.85 (0.80, 0.91)	1.07 (1.03, 1.12)
Light smoking quitters	1.33 (1.27, 1.40)	1.03 (0.94, 1.12)	1.37 (1.29, 1.45)
Heavy smoking quitters	1.41 (1.36, 1.47)	1.03 (0.96, 1.11)	1.45 (1.39, 1.52)
Consistent moderate smokers	1.43 (1.34, 1.54)	0.88 (0.76, 1.01)	1.52 (1.40, 1.65)
Decreasing heavy smokers	1.50 (1.38, 1.63)	1.05 (0.88, 1.26)	1.73 (1.58, 1.90)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (1.01, 1.11)	0.85 (0.79, 0.92)	1.10 (1.04, 1.16)
Light smoking quitters	1.38 (1.30, 1.47)	1.02 (0.92, 1.13)	1.45 (1.35, 1.57)
Heavy smoking quitters	1.46 (1.40, 1.54)	1.05 (0.97, 1.14)	1.53 (1.44, 1.62)
Consistent moderate smokers	1.45 (1.33, 1.58)	0.78 (0.66, 0.92)	1.64 (1.48, 1.82)
Decreasing heavy smokers	1.44 (1.30, 1.59)	1.05 (0.86, 1.27)	1.71 (1.52, 1.92)
GASTRIC CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.02 (0.95, 1.11)	0.80 (0.68, 0.94)	1.07 (0.98, 1.17)
Light smoking quitters	1.36 (1.23, 1.51)	0.99 (0.81, 1.21)	1.41 (1.25, 1.58)
Heavy smoking quitters	1.44 (1.32, 1.56)	0.97 (0.83, 1.14)	1.49 (1.36, 1.64)
Consistent moderate smokers	1.74 (1.51, 2.00)	0.99 (0.75, 1.29)	1.75 (1.49, 2.07)
Decreasing heavy smokers	1.72 (1.45, 2.03)	0.95 (0.64, 1.40)	2.00 (1.67, 2.41)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.95, 1.18)	0.80 (0.66, 0.97)	1.16 (1.01, 1.33)
Light smoking quitters	1.47 (1.28, 1.70)	0.93 (0.72, 1.19)	1.66 (1.39, 1.97)
Heavy smoking quitters	1.59 (1.42, 1.79)	1.02 (0.84, 1.23)	1.73 (1.51, 2.00)
Consistent moderate smokers	1.83 (1.51, 2.21)	0.73 (0.51, 1.05)	2.19 (1.74, 2.74)
Decreasing heavy smokers	1.63 (1.30, 2.05)	0.94 (0.60, 1.47)	2.03 (1.56, 2.65)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	0.91 (0.78, 1.07)	0.75 (0.60, 0.94)	0.99 (0.79, 1.23)
Light smoking quitters	1.23 (1.01, 1.51)	0.78 (0.58, 1.06)	1.52 (1.16, 2.00)
Heavy smoking quitters	1.21 (1.03, 1.42)	0.95 (0.76, 1.18)	1.15 (0.91, 1.44)
Consistent moderate smokers	0.91 (0.66, 1.27)	0.56 (0.36, 0.87)	0.89 (0.55, 1.42)
Decreasing heavy smokers	0.90 (0.62, 1.31)	0.72 (0.41, 1.26)	1.04 (0.63, 1.71)

COLORECTAL CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.08 (0.98, 1.18)	0.82 (0.69, 0.98)	1.10 (0.98, 1.22)
Light smoking quitters	1.22 (1.07, 1.39)	0.87 (0.69, 1.11)	1.24 (1.07, 1.45)
Heavy smoking quitters	1.37 (1.23, 1.52)	0.87 (0.72, 1.06)	1.42 (1.26, 1.61)
Consistent moderate smokers	1.36 (1.13, 1.63)	0.78 (0.53, 1.15)	1.47 (1.19, 1.82)
Decreasing heavy smokers	1.61 (1.29, 2.00)	1.02 (0.64, 1.63)	1.89 (1.48, 2.42)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.11 (0.99, 1.25)	0.77 (0.63, 0.93)	1.20 (1.03, 1.39)
Light smoking quitters	1.22 (1.03, 1.45)	0.78 (0.59, 1.03)	1.33 (1.07, 1.64)
Heavy smoking quitters	1.45 (1.28, 1.66)	0.86 (0.69, 1.06)	1.59 (1.35, 1.88)
Consistent moderate smokers	1.41 (1.12, 1.77)	0.49 (0.29, 0.82)	1.84 (1.42, 2.39)
Decreasing heavy smokers	1.53 (1.16, 2.00)	1.08 (0.66, 1.77)	1.83 (1.32, 2.54)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.01 (0.87, 1.18)	0.74 (0.60, 0.92)	1.09 (0.88, 1.34)
Light smoking quitters	1.09 (0.88, 1.36)	0.76 (0.56, 1.04)	1.15 (0.84, 1.57)
Heavy smoking quitters	1.17 (0.99, 1.39)	0.74 (0.59, 0.95)	1.28 (1.01, 1.62)
Consistent moderate smokers	0.47 (0.30, 0.74)	0.27 (0.13, 0.56)	0.54 (0.30, 0.98)
Decreasing heavy smokers	0.76 (0.49, 1.16)	0.74 (0.40, 1.38)	0.79 (0.44, 1.44)
LIVER CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.12 (1.00, 1.24)	0.89 (0.74, 1.06)	1.19 (1.04, 1.36)
Light smoking quitters	1.24 (1.08, 1.43)	0.95 (0.75, 1.21)	1.26 (1.06, 1.51)
Heavy smoking quitters	1.23 (1.10, 1.37)	0.93 (0.77, 1.12)	1.22 (1.06, 1.41)
Consistent moderate smokers	0.99 (0.81, 1.21)	0.71 (0.49, 1.02)	1.06 (0.83, 1.35)
Decreasing heavy smokers	1.31 (1.05, 1.63)	0.93 (0.60, 1.46)	1.55 (1.20, 2.00)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.10 (0.98, 1.23)	0.91 (0.76, 1.10)	1.15 (0.99, 1.33)
Light smoking quitters	1.20 (1.03, 1.40)	0.92 (0.72, 1.18)	1.21 (1.00, 1.48)
Heavy smoking quitters	1.20 (1.06, 1.35)	0.93 (0.76, 1.12)	1.17 (1.00, 1.37)
Consistent moderate smokers	0.99 (0.79, 1.22)	0.73 (0.50, 1.06)	1.05 (0.80, 1.36)
Decreasing heavy smokers	1.20 (0.94, 1.52)	0.86 (0.53, 1.40)	1.42 (1.07, 1.89)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.09 (0.96, 1.23)	0.89 (0.73, 1.09)	1.15 (0.98, 1.35)
Light smoking quitters	1.15 (0.97, 1.36)	0.89 (0.68, 1.15)	1.16 (0.93, 1.44)
Heavy smoking quitters	1.15 (1.01, 1.31)	0.89 (0.73, 1.10)	1.11 (0.94, 1.32)

Consistent moderate smokers	0.91 (0.71, 1.15)	0.68 (0.45, 1.02)	0.96 (0.72, 1.30)
Decreasing heavy smokers	0.94 (0.71, 1.26)	0.81 (0.48, 1.36)	1.08 (0.77, 1.52)
LUNG CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.02 (0.90, 1.17)	1.01 (0.82, 1.24)	1.10 (0.93, 1.31)
Light smoking quitters	1.26 (1.06, 1.49)	1.27 (0.98, 1.66)	1.34 (1.08, 1.67)
Heavy smoking quitters	1.21 (1.07, 1.38)	1.13 (0.92, 1.39)	1.36 (1.16, 1.61)
Consistent moderate smokers	1.18 (0.91, 1.53)	0.88 (0.56, 1.38)	1.33 (0.97, 1.83)
Decreasing heavy smokers	1.23 (0.91, 1.65)	0.90 (0.47, 1.73)	1.72 (1.22, 2.41)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	0.97 (0.84, 1.13)	0.96 (0.77, 1.20)	1.06 (0.87, 1.30)
Light smoking quitters	1.18 (0.98, 1.42)	1.24 (0.94, 1.64)	1.23 (0.95, 1.60)
Heavy smoking quitters	1.11 (0.97, 1.28)	1.06 (0.86, 1.32)	1.25 (1.03, 1.51)
Consistent moderate smokers	1.14 (0.86, 1.52)	0.81 (0.50, 1.31)	1.34 (0.93, 1.93)
Decreasing heavy smokers	1.15 (0.83, 1.60)	0.86 (0.43, 1.72)	1.67 (1.15, 2.45)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.07 (0.90, 1.27)	0.98 (0.78, 1.24)	1.32 (1.02, 1.69)
Light smoking quitters	1.36 (1.10, 1.68)	1.31 (0.98, 1.75)	1.62 (1.19, 2.22)
Heavy smoking quitters	1.25 (1.06, 1.47)	1.09 (0.87, 1.36)	1.62 (1.27, 2.07)
Consistent moderate smokers	1.09 (0.77, 1.54)	0.73 (0.43, 1.24)	1.45 (0.91, 2.31)
Decreasing heavy smokers	0.99 (0.66, 1.48)	0.85 (0.41, 1.75)	1.57 (0.95, 2.59)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S12. Mortality risks according to smoking trajectories for the three-measurement subpopulation with time-dependent covariates

Smoking trajectories	aHR ^a (95% CI ^b)		
	Overall	Subgroup: Overall survival <5 years	Subgroup: Overall survival ≥5 years
ALL CANCERS			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.11 (1.03, 1.19)	0.95 (0.78, 1.14)	1.14 (1.06, 1.23)
Light smoking quitters	1.39 (1.27, 1.53)	0.83 (0.64, 1.08)	1.45 (1.31, 1.60)
Heavy smoking quitters	1.52 (1.41, 1.65)	1.06 (0.86, 1.30)	1.56 (1.44, 1.70)
Late heavy-smoking quitters	1.67 (1.46, 1.91)	1.04 (0.69, 1.56)	1.77 (1.54, 2.04)
Heavy smoking relapse	1.65 (1.47, 1.87)	0.80 (0.57, 1.11)	1.74 (1.53, 1.98)
Consistent heavy smokers	1.62 (1.43, 1.85)	0.85 (0.58, 1.24)	1.73 (1.51, 1.98)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.13 (1.03, 1.24)	0.88 (0.71, 1.09)	1.19 (1.08, 1.31)
Light smoking quitters	1.52 (1.35, 1.71)	0.90 (0.67, 1.21)	1.59 (1.40, 1.82)
Heavy smoking quitters	1.60 (1.45, 1.76)	1.11 (0.88, 1.40)	1.66 (1.49, 1.85)
Late heavy-smoking quitters	1.71 (1.45, 2.03)	1.03 (0.65, 1.64)	1.86 (1.55, 2.23)
Heavy smoking relapse	1.67 (1.43, 1.94)	0.67 (0.45, 1.00)	1.84 (1.56, 2.17)
Consistent heavy smokers	1.78 (1.52, 2.07)	0.82 (0.54, 1.26)	1.96 (1.66, 2.31)
GASTRIC CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.20 (1.04, 1.38)	0.82 (0.53, 1.25)	1.26 (1.08, 1.48)
Light smoking quitters	1.58 (1.30, 1.91)	0.77 (0.43, 1.38)	1.67 (1.36, 2.05)
Heavy smoking quitters	1.80 (1.53, 2.11)	0.82 (0.53, 1.28)	1.87 (1.57, 2.21)
Late heavy-smoking quitters	1.87 (1.40, 2.49)	0.30 (0.09, 1.02)	2.13 (1.58, 2.87)
Heavy smoking relapse	1.98 (1.57, 2.49)	0.61 (0.28, 1.34)	2.20 (1.73, 2.80)
Consistent heavy smokers	1.99 (1.52, 2.60)	0.53 (0.20, 1.44)	2.26 (1.70, 2.99)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.24 (0.99, 1.55)	0.86 (0.48, 1.54)	1.35 (1.05, 1.72)
Light smoking quitters	1.87 (1.41, 2.48)	1.07 (0.51, 2.25)	2.01 (1.48, 2.74)
Heavy smoking quitters	2.20 (1.74, 2.77)	1.24 (0.70, 2.21)	2.28 (1.76, 2.96)
Late heavy-smoking quitters	2.57 (1.75, 3.79)	0.55 (0.15, 2.00)	3.01 (2.00, 4.54)
Heavy smoking relapse	2.26 (1.62, 3.15)	0.38 (0.11, 1.35)	2.79 (1.96, 3.96)
Consistent heavy smokers	2.44 (1.69, 3.53)	0.59 (0.16, 2.13)	2.97 (2.01, 4.40)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.76, 1.48)	0.95 (0.47, 1.92)	1.13 (0.76, 1.66)

Light smoking quitters	1.47 (0.95, 2.28)	0.77 (0.28, 2.12)	1.72 (1.05, 2.82)
Heavy smoking quitters	1.58 (1.11, 2.24)	1.34 (0.67, 2.68)	1.43 (0.93, 2.19)
Late heavy-smoking quitters	0.44 (0.14, 1.41)	0.26 (0.03, 2.08)	0.43 (0.10, 1.79)
Heavy smoking relapse	1.69 (1.01, 2.83)	0.38 (0.08, 1.75)	2.29 (1.31, 4.00)
Consistent heavy smokers	0.74 (0.33, 1.64)	0.63 (0.13, 3.01)	0.78 (0.30, 1.99)
COLORECTAL CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.18 (0.99, 1.42)	1.31 (0.77, 2.23)	1.16 (0.96, 1.41)
Light smoking quitters	1.47 (1.14, 1.89)	0.67 (0.28, 1.61)	1.61 (1.23, 2.10)
Heavy smoking quitters	1.52 (1.23, 1.89)	1.35 (0.73, 2.47)	1.51 (1.20, 1.91)
Late heavy-smoking quitters	1.56 (1.07, 2.29)	5.35 (1.45, 19.77)	1.67 (1.12, 2.50)
Heavy smoking relapse	1.85 (1.35, 2.51)	1.09 (0.38, 3.11)	2.02 (1.46, 2.79)
Consistent heavy smokers	2.02 (1.48, 2.76)	1.92 (0.86, 4.28)	1.96 (1.39, 2.77)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.33 (1.04, 1.70)	1.28 (0.69, 2.38)	1.31 (1.00, 1.73)
Light smoking quitters	1.66 (1.18, 2.33)	1.02 (0.40, 2.58)	1.83 (1.26, 2.64)
Heavy smoking quitters	1.55 (1.16, 2.08)	1.35 (0.67, 2.74)	1.53 (1.11, 2.12)
Late heavy-smoking quitters	1.68 (1.02, 2.76)	3.77 (0.79, 18.01)	1.88 (1.11, 3.21)
Heavy smoking relapse	2.09 (1.41, 3.11)	1.21 (0.37, 3.95)	2.36 (1.54, 3.61)
Consistent heavy smokers	2.61 (1.79, 3.79)	2.09 (0.85, 5.16)	2.66 (1.75, 4.04)
Cancer-specific mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.10 (0.79, 1.54)	1.27 (0.62, 2.59)	1.01 (0.68, 1.48)
Light smoking quitters	1.16 (0.71, 1.89)	1.31 (0.49, 3.51)	1.12 (0.63, 1.98)
Heavy smoking quitters	1.29 (0.88, 1.88)	1.23 (0.55, 2.76)	1.18 (0.75, 1.84)
Late heavy-smoking quitters	1.09 (0.51, 2.31)	-	1.44 (0.67, 3.11)
Heavy smoking relapse	0.79 (0.39, 1.62)	1.07 (0.27, 4.23)	0.71 (0.30, 1.69)
Consistent heavy smokers	0.77 (0.38, 1.59)	1.10 (0.32, 3.74)	0.59 (0.23, 1.51)
LIVER CANCER			
All-cause mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.03 (0.84, 1.25)	1.40 (0.85, 2.31)	1.05 (0.84, 1.31)
Light smoking quitters	1.11 (0.85, 1.46)	1.22 (0.66, 2.27)	1.08 (0.79, 1.47)
Heavy smoking quitters	1.08 (0.86, 1.36)	1.46 (0.86, 2.47)	1.03 (0.79, 1.33)
Late heavy-smoking quitters	1.03 (0.69, 1.53)	1.54 (0.62, 3.81)	0.93 (0.59, 1.47)
Heavy smoking relapse	1.21 (0.87, 1.70)	1.97 (0.81, 4.78)	1.29 (0.89, 1.87)
Consistent heavy smokers	1.12 (0.79, 1.59)	1.07 (0.41, 2.80)	1.21 (0.83, 1.79)
Cancer mortality			
Non-smokers	Reference	Reference	Reference
Former smokers	1.06 (0.85, 1.31)	1.49 (0.89, 2.49)	1.08 (0.84, 1.38)

Light smoking quitters	1.11 (0.83, 1.50)	1.27 (0.67, 2.40)	1.08 (0.77, 1.52)
Heavy smoking quitters	1.07 (0.84, 1.36)	1.52 (0.88, 2.62)	1.00 (0.75, 1.32)
Late heavy-smoking quitters	1.01 (0.65, 1.55)	1.23 (0.43, 3.45)	0.98 (0.60, 1.60)
Heavy smoking relapse	1.17 (0.81, 1.68)	1.81 (0.70, 4.67)	1.27 (0.85, 1.91)
Consistent heavy smokers	1.09 (0.74, 1.60)	0.91 (0.32, 2.57)	1.22 (0.81, 1.86)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	1.08 (0.85, 1.36)	1.52 (0.89, 2.58)	1.11 (0.84, 1.45)
Light smoking quitters	1.11 (0.81, 1.54)	1.28 (0.66, 2.48)	1.07 (0.73, 1.57)
Heavy smoking quitters	1.05 (0.81, 1.37)	1.43 (0.81, 2.53)	1.00 (0.74, 1.37)
Late heavy-smoking quitters	0.83 (0.50, 1.40)	0.85 (0.24, 3.02)	0.87 (0.49, 1.55)
Heavy smoking relapse	1.21 (0.82, 1.80)	1.95 (0.75, 5.07)	1.34 (0.86, 2.08)
Consistent heavy smokers	0.89 (0.57, 1.39)	1.02 (0.36, 2.90)	0.96 (0.58, 1.59)

LUNG CANCER

All-cause mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.93 (0.71, 1.21)	2.18 (1.20, 3.94)	1.08 (0.79, 1.47)
Light smoking quitters	1.23 (0.87, 1.73)	0.48 (0.18, 1.26)	1.45 (0.99, 2.14)
Heavy smoking quitters	1.19 (0.92, 1.54)	1.38 (0.75, 2.55)	1.47 (1.09, 1.98)
Late heavy-smoking quitters	1.66 (1.02, 2.71)	1.67 (0.27, 10.28)	2.08 (1.22, 3.54)
Heavy smoking relapse	1.52 (0.96, 2.40)	2.14 (0.86, 5.32)	1.34 (0.77, 2.35)
Consistent heavy smokers	1.02 (0.61, 1.71)	0.85 (0.18, 4.14)	1.21 (0.69, 2.13)

Cancer mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.77 (0.57, 1.04)	1.83 (0.97, 3.44)	0.90 (0.63, 1.27)
Light smoking quitters	1.07 (0.73, 1.57)	0.48 (0.17, 1.32)	1.25 (0.81, 1.94)
Heavy smoking quitters	1.03 (0.78, 1.37)	1.27 (0.66, 2.45)	1.29 (0.93, 1.80)
Late heavy-smoking quitters	1.52 (0.88, 2.61)	1.80 (0.27, 12.00)	1.87 (1.04, 3.39)
Heavy smoking relapse	1.43 (0.86, 2.37)	1.79 (0.66, 4.84)	1.30 (0.70, 2.42)
Consistent heavy smokers	0.89 (0.50, 1.60)	0.45 (0.05, 3.74)	1.13 (0.61, 2.11)

Cancer-specific mortality

Non-smokers	Reference	Reference	Reference
Former smokers	0.89 (0.62, 1.27)	2.43 (1.22, 4.86)	1.02 (0.66, 1.58)
Light smoking quitters	1.26 (0.80, 1.97)	0.53 (0.18, 1.58)	1.51 (0.89, 2.57)
Heavy smoking quitters	1.26 (0.90, 1.77)	1.60 (0.77, 3.30)	1.65 (1.10, 2.50)
Late heavy-smoking quitters	1.38 (0.69, 2.76)	1.41 (0.12, 15.92)	1.82 (0.85, 3.89)
Heavy smoking relapse	1.77 (0.99, 3.15)	2.70 (0.95, 7.70)	1.47 (0.69, 3.13)
Consistent heavy smokers	0.58 (0.25, 1.37)	2.43 (1.22, 4.86)	0.84 (0.35, 2.04)

^a adjusted hazard ratio, adjusted for age at cancer diagnosis, income, body mass index, alcohol drinking, physical activity, and Charlson Comorbidity Index;

^b confidence interval.

Supplemental Table S13. Model details and evaluation for smoking trajectories of pre-diagnosis current smokers with three to six post-diagnosis smoking measurements

Group	n ^a	p ^b	π ^c	AvePP ^d	OCC ^e	Consistent post-diagnosis smoking behavior, n (%)
Subgroup of three post-diagnosis measurements (n=24340, 53.7% of pre-diagnosis current smokers)-Model A (2,2,2,2)						
Consistent quitters	15641	64.3	65.0	1.00	150.1	18604 (76.4)
Relapse	3463	14.2	13.5	0.92	75.7	
Late quitters	2273	9.3	9.1	0.90	87.7	
Consistent heavy smokers	2963	12.2	12.5	0.98	354.8	
Subgroup of four post-diagnosis measurements (n=16257, 35.9% of pre-diagnosis current smokers)-Model B (2,2,2,2,2)						
Consistent quitters	10742	66.1	65.7	0.99	40.5	12667 (77.9)
Relapse	1301	8.0	9.2	0.96	216.3	
Late quitters	2289	14.1	13.1	0.87	43.5	
Consistent heavy smokers	1925	11.8	12.0	0.87	48.1	
Subgroup of five post-diagnosis measurements (n=10012, 22.1% of pre-diagnosis current smokers)-Model C (2,2,2)						
Consistent quitters	6689	66.8	66.8	0.99	39.1	8164 (81.5)
Decreasing moderate smokers	1848	18.5	18.6	0.92	49.6	
Consistent heavy smokers	1475	14.7	14.6	0.95	107.5	
Subgroup of six post-diagnosis measurements (n=5871, 13.0% of pre-diagnosis current smokers)-Model D (2,2,2,2,2)						
Consistent quitters	3779	64.4	64.3	0.99	53.9	4441 (75.6)
Relapse-moderate smokers	609	10.4	10.2	0.87	60.8	
Relapse-heavy smokers	299	5.1	5.0	0.87	130.1	
Late quitters	522	8.9	9.1	0.93	139.0	
Consistent heavy smokers	662	11.3	11.4	0.96	196.9	

^a number of participants;

^b percentage of participants assigned to the smoking trajectory group (%);

^c estimated group membership of the smoking trajectory (%);

^d average posterior probability;

^e odds of correct classification.