

Supplementary Table 1. Incidence of chronic respiratory disease by time to first cigarette after waking (TTFC) in the CHARLS cohort study, China, 2011-2020 (n = 5,198).

TTFC	n/N(%)	Person-years	Incidence rate per 1,000 person-years (95% CI)
Non-smoker	224/1586 (14.1%)	13561	16.51 (14.49, 18.83)
>60 min	262/1642 (16.0%)	13978	18.74 (16.61, 21.16)
31-60 min	54/299 (18.1%)	2502	21.58 (16.53, 28.18)
6-30 min	105/585 (18.0%)	4899	21.43 (17.70, 25.95)
<6 min	211/1086 (19.4%)	9166	23.02 (20.11, 26.35)
Total	856/5198 (16.5%)	44106	19.41 (18.15, 20.75)

Abbreviations: TTFC, time to first cigarette after waking; CHARLS, China Health and Retirement Longitudinal Study; CI, confidence interval.

Supplementary Table 2. Subgroup analysis of the association between time to first cigarette after waking (TTFC) and chronic respiratory disease in the CHARLS cohort study, China, 2011-2020 (n = 5,198).

Subgroup	TTFC ^a					<i>P</i> for interaction
	Non-smoker	>60 min	31-60 min	6-30 min	<5 min	
Age						0.332
middle-aged adults	1 (Reference)	1.29 (1.02, 1.63)	1.43 (0.99, 2.08)	1.43 (1.06, 1.95)	1.38 (1.04, 1.84)	
older adults	1 (Reference)	0.75 (0.52, 1.09)	0.99 (0.50, 1.96)	0.79 (0.43, 1.47)	1.19 (0.94, 1.91)	
Education level						0.322
Illiterate	1 (Reference)	0.8 (0.48, 1.33)	0.79 (0.3, 2.12)	0.93 (0.45, 1.93)	0.85 (0.44, 1.64)	
Primary school and below	1 (Reference)	1.15 (0.86, 1.53)	1.34 (0.83, 2.17)	1.27 (0.85, 1.89)	1.65 (1.17, 2.34)	
Middle school and above	1 (Reference)	1.17 (0.85, 1.6)	1.36 (0.83, 2.24)	1.37 (0.9, 2.09)	1.11 (0.74, 1.66)	
Area of residence						0.325
Village	1 (Reference)	1.04 (0.81, 1.33)	1.02 (0.66, 1.57)	0.99 (0.7, 1.42)	1.13 (0.83, 1.55)	
Urban	1 (Reference)	1.09 (0.9, 1.33)	1.27 (0.92, 1.75)	1.23 (0.94, 1.61)	1.3 (1.02, 1.66)	
Marital status						0.555
Other	1 (Reference)	1.11 (0.9, 1.37)	1.25 (0.89, 1.76)	1.27 (0.96, 1.68)	1.27 (0.98, 1.65)	
Married	1 (Reference)	0.93 (0.49, 1.74)	1.42 (0.49, 4.12)	0.89 (0.36, 2.23)	1.54 (0.74, 3.2)	
Alcohol consumption						0.609
Never drinker	1 (Reference)	1 (0.72, 1.41)	1.49 (0.88, 2.54)	1.55 (1.01, 2.37)	1.41 (0.94, 2.12)	
Former drinker	1	1.12 (0.63, 1.72)	1.43 (0.63, 3.24)	1.39 (0.6, 3.24)	1.72 (0.85, 3.47)	

	(Reference)	1.98)	3.24)	3.22)	3.51)	
Current drinker	1	1.08 (0.82,	1.04 (0.64,	0.99 (0.67,	1.13 (0.8,	
	(Reference)	1.41)	1.67)	1.45)	1.59)	
BMI						0.350
<18.5	1	1.1 (0.52,	1.71 (0.52,	1.03 (0.37,	0.66 (0.25,	
	(Reference)	2.33)	5.64)	2.89)	1.79)	
18.5-24	1	1.01 (0.78,	1.02 (0.66,	1.11 (0.78,	1.09 (0.79,	
	(Reference)	1.31)	1.57)	1.58)	1.52)	
>24	1	1.2 (0.87,	1.52 (0.87,	1.38 (0.86,	1.8 (1.21, 2.7)	
	(Reference)	1.66)	2.66)	2.23)		
CWMI						0.826
< 1.3	1	1.05 (0.78,	1.03 (0.63,	1.12 (0.75,	1.25 (0.86,	
	(Reference)	1.42)	1.69)	1.68)	1.81)	
≥ 1.3	1	1.09 (0.84,	1.42 (0.91,	1.22 (0.84,	1.28 (0.92,	
	(Reference)	1.42)	2.19)	1.77)	1.78)	
Pack years of smoking						0.149
< 20	1	1.09 (0.88,	1.58 (0.98,	0.83 (0.51,	1.22 (0.82,	
	(Reference)	1.35)	2.52)	1.35)	1.82)	
≥ 20	1	0.82 (0.64,	0.83 (0.57,	1.01 (0.78,	1.02 (0.83,	
	(Reference)	1.04)	1.19)	1.31)	1.34)	

^a Model was adjusted for adjusted for age, education, marital status, BMI, alcohol consumption, CWMI, and pack years of smoking, except for the stratification variable itself.

Abbreviations: TTFC, time to first cigarette after waking; CHARLS, China Health and Retirement Longitudinal Study; BMI, body mass index; CWMI, Chinese Multimorbidity-Weighted Index.

Supplementary Table 3. Joint effect of time to first cigarette after waking (TTFC) and smoking pack-years on incident chronic respiratory disease in the CHARLS cohort study, China, 2011-2020 (n = 5,198).

Joint exposure		N	Chronic respiratory disease		
TTFC	pack years of smoking		n	HR ^a (95% CI)	P
Late	Low	2618	394	Reference	
Early	Low	310	48	1.04 (0.86, 1.27)	0.645
Late	Higher	909	146	1.02 (0.75, 1.38)	0.906
Early	Higher	1361	268	1.30 (1.10, 1.51)	0.001

^a Adjusted for age, education, marital status, BMI, alcohol consumption, CWMI, and pack years of smoking.

Abbreviations: TTFC, time to first cigarette after waking; CHARLS, China Health and Retirement Longitudinal Study; HR, hazard ratio; CI, confidence interval.

Supplementary Table 4. Estimates and 95% confidence intervals for measures of additive interaction in the CHARLS cohort study, China, 2011–2020 (n = 5,198)

Measure	Estimate	Lower	Upper
Relative excess risk due to interaction (RERI)	0.229	-0.002	0.460
the attributable proportion (AP)	0.177	0.005	0.349
the synergy index (S)	4.568	0.115	182.020

Abbreviations: CHARLS, China Health and Retirement Longitudinal Study; RERI, Relative excess risk due to interaction; AP, the attributable proportion; S, the synergy index.

Supplementary Table 5. Hazard ratios (HRs), 95% confidence intervals (CIs), and 50th percentile differences (PDs) in years for chronic respiratory disease according to time to first cigarette after waking (TTFC) in male: results from Cox and Laplace regression models in the CHARLS cohort study, China, 2011-2020 (n = 6852)..

TTFC	n/N(%)	HR (95% CI)		
		Model 1 ^a	Model 2 ^b	Model 3 ^c
Non-smoker	801/6542 (12.2%)	1 (Reference)	1 (Reference)	1 (Reference)
>60 min	32/169 (18.9%)	1.6(1.12, 2.28)	1.49(1.05, 2.13)	1.43(0.97, 2.09)
31-60 min	5/20 (25.0%)	2.29(0.95, 5.53)	2.03(0.84, 4.91)	1.91(0.78, 4.7)
6-30 min	8/38 (21.1%)	1.86(0.93, 3.74)	1.63(0.81, 3.28)	1.47(0.69, 3.13)
<6 min	21/83 (25.3%)	2.24(1.45, 3.46)	2.21(1.43, 3.42)	1.94(1.09, 3.43)
P for trend	867/6852 (12.7%)	0.001	0.001	0.014

^a Model 1 was adjusted for age, education, and marital status.

^b Model 2 was adjusted for age, education, marital status, BMI, alcohol consumption, and CWMI.

^c Model 3 was adjusted for age, education, marital status, BMI, alcohol consumption, CWMI, and pack years of smoking.

Abbreviations: HR, hazard ratio; CI, confidence interval; PD, percentile difference; TTFC, time to first cigarette after waking; CHARLS, China Health and Retirement Longitudinal Study.

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