



Figure S1 Flow chart of participant recruitment.

Table S1 Type and definition of the variable in the questionnaire

Variable	Types of variables	Definition
Age	Quantitative	Years of age; date of interview minus date of birth
Sex	Qualitative	
Male		Male
Female		Female
Educational level	Qualitative	
None + Primary school education		Without any education experience, primary school education
Middle school education or higher		Middle school education or higher
Marriage status	Qualitative	
Unmarried		Unmarried
Married		Married
Region	Qualitative	
Urban		Urban regions defined by the administrative regions in China
Rural		Rural regions defined by the administrative regions in China
Biomass fuel exposure	Qualitative	
No		Not eligible for the definition of biomass fuel exposure
Yes		Household use of biomass fuels (including wood, grass, crop residues, and animal dung), or coal fuels (including coal, lignite, and kerosene) for cooking for more than 14 days a year, or heating throughout winter
Smoking status	Qualitative	
No		Not smoke every day or occasionally
Yes		Having smoked every day or occasionally
Chronic bronchitis	Qualitative	
No		Not eligible for the definition of chronic bronchitis.
Yes		Coughing up phlegm for at least three months in two consecutive years
Cough	Qualitative	
No		Not eligible for the definition of cough
Yes		Coughing on most days (≥ 4 days per week) for at least three months each year in the absence or presence of cold (participants answers to several items on coughing)
Phlegm	Qualitative	
No		Not eligible for the definition of phlegm
Yes		Sputum production on most days (≥ 4 days per week) for at least three months each year in the absence or presence of cold (participants responding 'yes' to this question item).
Dust	Qualitative	
No		No occupational exposure to dust, gas, vapor and fume
Yes		Participants exposed with dust for more than 1 year over their lifetime
Gas, vapor and fumes	Qualitative	
No		No occupational exposure to dust, gas, vapor and fume
Yes		Participants exposed with gas, vapor and fume for more than 1 year over their lifetime
dust and gas/vapor/fume	Qualitative	
No		No occupational exposure to dust, gas, vapor and fume
Yes		Participants exposed with any one of the dust, gas, vapor and fume for more than 1 year over their lifetime

**Table S2** The association between occupational exposure to VGDF and respiratory symptoms

Occupational exposure	Models	Chronic bronchitis		Cough		Phlegm	
		OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Dust	Model 1	1.22 (0.72, 1.97)	0.43	1.61 (1.25, 2.06)	<b>&lt;0.001</b>	1.58 (1.28, 1.94)	<b>&lt;0.001</b>
	Model 2	1.27 (0.74, 2.07)	0.36	1.56 (1.20, 2.01)	<b>&lt;0.001</b>	1.50 (1.20, 1.85)	<b>&lt;0.001</b>
	Model 3	1.34 (0.78, 2.22)	0.26	1.60 (1.22, 2.08)	<b>0.001</b>	1.49 (1.19, 1.85)	<b>&lt;0.001</b>
Gas/vapor/fume	Model 1	1.04 (0.54, 1.86)	0.89	1.52 (1.13, 2.03)	<b>0.01</b>	1.20 (0.92, 1.55)	0.17
	Model 2	1.03 (0.53, 1.86)	0.91	1.53 (1.12, 2.05)	<b>0.01</b>	1.25 (0.95, 1.63)	0.10
	Model 3	1.00 (0.49, 1.83)	0.99	1.53 (1.11, 2.07)	<b>0.008</b>	1.18 (0.89, 1.56)	0.24
Dust and gas/vapor/fume	Model 1	1.99 (1.40, 2.81)	<b>&lt;0.001</b>	1.64 (1.34, 2.01)	<b>&lt;0.001</b>	1.61 (1.36, 1.90)	<b>&lt;0.001</b>
	Model 2	1.80 (1.26, 2.56)	<b>0.001</b>	1.50 (1.21, 1.84)	<b>&lt;0.001</b>	1.51 (1.27, 1.80)	<b>&lt;0.001</b>
	Model 3	1.74 (1.20, 2.52)	<b>0.004</b>	1.43 (1.15, 1.79)	<b>0.001</b>	1.49 (1.24, 1.79)	<b>&lt;0.001</b>

**Model 1:** Occupational exposure to dust, gas/vapor/fume or dust/gas/vapor/fume; **Model 2:** Model 1 adjusted with the age, sex, education level, marriage status and region of residence; **Model 3:** Model 2 adjusted with the body-mass index, smoking status, biomass fuel. VGDF: vapors, gases, dust and fumes; OR: odds ratio; CI: confidence interval.

**Table S3** The association between occupational exposure to VGDF and respiratory symptoms by sex

Occupational exposure	Models	Chronic bronchitis		Cough		Phlegm	
		OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Dust (in males)	Model 1	1.07 (0.61, 1.78)	0.81	1.42 (1.06, 1.88)	<b>0.02</b>	1.40 (1.09, 1.77)	<b>0.007</b>
	Model 2	1.28 (0.73, 2.17)	0.37	1.55 (1.15, 2.07)	<b>0.003</b>	1.47 (1.15, 1.88)	<b>0.002</b>
	Model 3	1.38 (0.77, 2.35)	0.26	1.62 (1.19, 2.19)	<b>0.002</b>	1.46 (1.13, 1.88)	<b>0.004</b>
Dust (in females)	Model 1	0.97 (0.15, 3.57)	0.97	1.52 (0.85, 2.56)	0.13	1.53 (1.00, 2.34)	<b>0.049</b>
	Model 2	1.08 (0.17, 4.07)	0.91	1.57 (0.88, 2.66)	0.11	1.55 (0.99, 2.34)	<b>0.045</b>
	Model 3	1.05 (0.16, 3.92)	0.95	1.52 (0.83, 2.62)	0.15	1.55 (1.00, 2.40)	<b>0.048</b>
Gas/vapor/fume (in males)	Model 1	0.81 (0.36, 1.61)	0.58	1.41 (0.97, 1.99)	0.06	1.05 (0.75, 1.44)	0.78
	Model 2	0.82 (0.36, 1.64)	0.61	1.39 (0.96, 1.98)	0.07	1.08 (0.77, 1.49)	0.65
	Model 3	0.76 (0.31, 1.58)	0.50	1.46 (1.00, 2.10)	<b>0.05</b>	1.01 (0.70, 1.41)	0.97
Gas/vapor/fume (in females)	Model 1	2.24 (0.62, 6.49)	0.16	1.87 (1.07, 3.13)	<b>0.02</b>	1.58 (1.00, 2.43)	<b>0.04</b>
	Model 2	1.96 (0.53, 5.91)	0.26	1.91 (1.07, 3.24)	<b>0.02</b>	1.69 (1.05, 2.63)	<b>0.02</b>
	Model 3	1.99 (0.53, 6.10)	0.26	1.64 (0.89, 2.87)	0.10	1.56 (0.95, 2.47)	0.07
Dust and gas/vapor/fume (in males)	Model 1	1.65 (1.12, 2.41)	<b>0.01</b>	1.46 (1.16, 1.85)	<b>0.002</b>	1.38 (1.13, 1.68)	<b>0.002</b>
	Model 2	1.67 (1.13, 2.46)	<b>0.009</b>	1.45 (1.14, 1.84)	<b>0.002</b>	1.41 (1.15, 1.72)	<b>0.001</b>
	Model 3	1.62 (1.07, 2.44)	<b>0.02</b>	1.38 (1.07, 1.77)	<b>0.01</b>	1.37 (1.10, 1.69)	<b>0.004</b>
Dust and gas/vapor/fume (in females)	Model 1	2.60 (1.10, 6.06)	<b>0.03</b>	1.63 (1.05, 2.46)	<b>0.02</b>	1.80 (1.30, 2.47)	<b>&lt;0.001</b>
	Model 2	2.54 (1.05, 6.01)	<b>0.03</b>	1.63 (1.05, 2.48)	<b>0.03</b>	1.85 (1.33, 2.56)	<b>&lt;0.001</b>
	Model 3	2.32 (0.94, 5.62)	0.06	1.59 (1.01, 2.47)	<b>0.04</b>	1.88 (1.34, 2.64)	<b>&lt;0.001</b>

**Model 1:** Occupational exposure to dust, gas/vapor/fume or dust and gas/vapor/fume; **Model 2:** Model 1 adjusted with the age, sex, education level, marriage status and region of residence; **Model 3:** Model 2 adjusted with the body-mass index, smoking status, biomass fuel. VGDF: vapors, gases, dust and fumes; OR: odds ratio; CI: confidence interval.

**Table S4** Effects of occupational exposure to VGDF on lung function

Occupational exposure	Models	FVC (L)		FEV <sub>1</sub> (L)		FEV <sub>1</sub> /FVC		MMEF (L/min)	
		β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Dust	Model 1	0.20 (0.14, 0.26)	<b>&lt;0.001</b>	0.16 (0.11, 0.21)	<b>&lt;0.001</b>	-0.08 (-0.81, 0.65)	0.83	0.12 (0.04, 0.20)	<b>0.003</b>
	Model 2	0.03 (0.00, 0.06)	0.08	0.02 (-0.01, 0.05)	0.26	-0.31 (-0.95, 0.34)	0.35	-0.02 (-0.09, 0.05)	0.55
	Model 3	0.02 (-0.01, 0.06)	0.16	0.02 (-0.01, 0.05)	0.25	-0.16 (-0.82, 0.49)	0.63	-0.01 (-0.08, 0.06)	0.80
Gas/vapor/fume	Model 1	0.03 (-0.04, 0.1)	0.44	-0.02 (-0.08, 0.04)	0.49	-1.37 (-2.25, -0.48)	<b>0.002</b>	-0.16 (-0.25, -0.06)	<b>0.003</b>
	Model 2	0.01 (-0.03, 0.05)	0.57	-0.03 (-0.07, 0.01)	0.13	-1.18 (-1.97, -0.39)	<b>0.003</b>	-0.16 (-0.24, -0.07)	<b>&lt;0.001</b>
	Model 3	0.01 (-0.03, 0.05)	0.61	-0.03 (-0.06, 0.01)	0.18	-1.05 (-1.85, -0.26)	<b>0.01</b>	-0.15 (-0.23, -0.07)	<b>&lt;0.001</b>
Dust and gas/vapor/fume	Model 1	0.10 (0.05, 0.15)	<b>&lt;0.001</b>	0.03 (-0.01, 0.07)	0.16	-1.53 (-2.12, -0.94)	<b>&lt;0.001</b>	-0.09 (-0.15, -0.03)	<b>0.01</b>
	Model 2	0.05 (0.02, 0.07)	<b>0.001</b>	0.01 (-0.02, 0.03)	0.60	-0.91 (-1.44, -0.39)	<b>0.001</b>	-0.07 (-0.13, -0.02)	<b>0.01</b>
	Model 3	0.04 (0.01, 0.07)	<b>0.004</b>	0.01 (-0.02, 0.03)	0.61	-0.74 (-1.28, -0.20)	<b>0.01</b>	-0.06 (-0.12, -0.01)	<b>0.03</b>

**Model 1:** Occupational exposure to dust, gas/vapor/fume or dust and gas/vapor/fume; **Model 2:** Model 1 adjusted with the age, sex, height, education level, marriage status and region of residence; **Model 3:** Model 2 adjusted with the body-mass index, height, smoking status, biomass fuel. **VGDF:** vapors, gases, dust and fumes; **CI:** confidence interval; **FVC:** forced vital capacity; **FEV<sub>1</sub>:** forced expiratory volume in one second; **MMEF:** predicted value for maximal mid-expiratory flow.

**Table S5** Effects of occupational exposure to VGDF on lung function in males by sex

Occupational exposure	Models	FVC (L)		FEV <sub>1</sub> (L)		FEV <sub>1</sub> /FVC		MMEF (L/min)	
		β (95% CI)	P	β (95% CI)	P	β (95% CI)	P	β (95% CI)	P
Dust (in males)	Model 1	0.10 (0.03, 0.17)	<b>0.004</b>	0.11 (0.05, 0.18)	<b>0.001</b>	1.08 (0.04, 2.12)	0.04	0.14 (0.02, 0.26)	<b>0.03</b>
	Model 2	0.03 (-0.03, 0.08)	0.31	0.02 (-0.03, 0.07)	0.38	0.03 (-0.92, 0.98)	0.95	-0.02 (-0.12, 0.08)	0.73
	Model 3	0.02 (-0.04, 0.07)	0.49	0.02 (-0.03, 0.07)	0.38	0.21 (-0.77, 1.20)	0.67	0.00 (-0.10, 0.10)	0.96
Dust (in females)	Model 1	0.10 (0.04, 0.16)	<b>0.001</b>	0.07 (0.02, 0.12)	<b>0.006</b>	-0.38 (-1.26, 0.49)	0.39	0.07 (-0.04, 0.17)	0.22
	Model 2	0.03 (-0.01, 0.07)	0.10	0.01 (-0.03, 0.04)	0.69	-0.83 (-1.67, 0.00)	0.05	-0.03 (-0.12, 0.06)	0.48
	Model 3	0.03 (-0.01, 0.07)	0.13	0.01 (-0.03, 0.04)	0.71	-0.75 (-1.59, 0.09)	0.08	-0.03 (-0.12, 0.06)	0.59
Gas/vapor/fume (in males)	Model 1	-0.02 (-0.11, 0.07)	0.69	-0.06 (-0.15, 0.02)	0.14	-1.23 (-2.57, 0.10)	0.07	-0.19 (-0.34, -0.04)	<b>0.01</b>
	Model 2	0.02 (-0.05, 0.08)	0.61	-0.03 (-0.09, 0.03)	0.40	-0.94 (-2.18, 0.30)	0.14	-0.14 (-0.27, -0.02)	<b>0.03</b>
	Model 3	0.01 (-0.05, 0.08)	0.69	-0.02 (-0.08, 0.04)	0.50	-0.72 (-1.99, 0.54)	0.26	-0.13 (-0.26, 0.00)	<b>0.04</b>
Gas/vapor/fume (in females)	Model 1	0.02 (-0.05, 0.08)	0.58	-0.01 (-0.07, 0.04)	0.68	-1.14 (-2.13, -0.16)	<b>0.02</b>	-0.13 (-0.25, -0.01)	<b>0.03</b>
	Model 2	0.01 (-0.03, 0.05)	0.67	-0.03 (-0.06, 0.01)	0.20	-1.36 (-2.30, -0.41)	<b>0.005</b>	-0.16 (-0.26, -0.06)	<b>0.002</b>
	Model 3	0.01 (-0.03, 0.06)	0.60	-0.02 (-0.06, 0.02)	0.24	-1.34 (-2.30, -0.39)	<b>0.006</b>	-0.17 (-0.27, -0.06)	<b>0.002</b>
Dust and gas/vapor/fume (in males)	Model 1	0.04 (-0.02, 0.10)	0.17	0.00 (-0.06, 0.05)	0.89	-0.87 (-1.73, -0.02)	<b>0.045</b>	-0.07 (-0.17, 0.02)	0.13
	Model 2	0.07 (0.03, 0.11)	<b>0.001</b>	0.02 (-0.02, 0.06)	0.27	-0.85 (-1.64, -0.06)	<b>0.035</b>	-0.06 (-0.14, 0.02)	0.16
	Model 3	0.06 (0.02, 0.11)	<b>0.006</b>	0.02 (-0.02, 0.06)	0.31	-0.64 (-1.46, 0.18)	0.13	-0.05 (-0.13, 0.04)	0.28
Dust and gas/vapor/fume (in females)	Model 1	-0.03 (-0.07, 0.02)	0.26	-0.05 (-0.09, -0.01)	<b>0.008</b>	-1.25 (-1.93, -0.57)	<b>&lt;0.001</b>	-0.15 (-0.23, -0.07)	<b>&lt;0.001</b>
	Model 2	0.01 (-0.02, 0.04)	0.39	-0.02 (-0.05, 0.01)	0.17	-1.12 (-1.78, -0.46)	<b>0.001</b>	-0.1 (-0.17, -0.03)	<b>0.003</b>
	Model 3	0.01 (-0.02, 0.05)	0.37	-0.01 (-0.04, 0.01)	0.29	-0.95 (-1.62, -0.28)	<b>0.006</b>	-0.09 (-0.16, -0.02)	<b>0.01</b>

**Model 1:** Occupational exposure to dust, gas/vapor/fume or dust and gas/vapor/fume; **Model 2:** Model 1 adjusted with the age, sex, height, education level, marriage status and region of residence; **Model 3:** Model 2 adjusted with the body-mass index, height, smoking status, biomass fuel. **VGDF:** vapors, gases, dust and fumes; **CI:** confidence interval; **FVC:** forced vital capacity; **FEV<sub>1</sub>:** forced expiratory volume in one second; **MMEF:** predicted value for maximal mid-expiratory flow.

**Table S6** The association between occupational exposure to VGDF and respiratory symptoms using propensity scores

Occupational exposure	Models	Chronic bronchitis		Cough		Phlegm	
		OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Dust	Model 1	1.25 (0.73, 2.04)	0.39	1.53 (1.18, 1.97)	<b>0.001</b>	1.48 (1.20, 1.83)	<b>&lt;0.001</b>
	Model 2	1.20 (0.71, 2.02)	0.49	1.48 (1.14, 1.92)	<b>0.003</b>	1.43 (1.15, 1.78)	<b>0.001</b>
Gas/vapor/fume	Model 1	1.05 (0.53, 1.88)	0.88	1.54 (1.13, 2.06)	<b>0.005</b>	1.23 (0.94, 1.61)	0.12
	Model 2	0.93 (0.48, 1.81)	0.83	1.42 (1.04, 1.94)	<b>0.03</b>	1.19 (0.90, 1.58)	0.23
Dust and gas/vapor/fume	Model 1	1.71 (1.19, 2.44)	<b>0.003</b>	1.43 (1.16, 1.76)	<b>&lt;0.001</b>	1.49 (1.25, 1.76)	<b>&lt;0.001</b>
	Model 2	1.70 (1.19, 2.45)	<b>0.004</b>	1.45 (1.16, 1.79)	<b>&lt;0.001</b>	1.51 (1.27, 1.80)	<b>&lt;0.001</b>

**Model 1:** Adjusted with propensity score scores; **Model 2:** Inverse probability of treatment weighting. **VGDF:** vapors, gases, dust and fumes; **OR:** odds ratio; **CI:** confidence interval.

**Table S7** Effects of occupational exposure to VGDF on lung function using propensity scores

Occupational exposure	Models	FVC (L)		FEV <sub>1</sub> (L)		FEV <sub>1</sub> /FVC		MMEF (L/min)	
		$\beta$ (95% CI)	P	$\beta$ (95% CI)	P	$\beta$ (95% CI)	P	$\beta$ (95% CI)	P
Dust	Model 1	0.04 (-0.01, 0.08)	0.15	0.02 (-0.02, 0.06)	0.24	-0.22 (-0.95, 0.51)	0.56	-0.01 (-0.08, 0.07)	0.83
	Model 2	0.04 (-0.02, 0.10)	0.17	0.03 (-0.03, 0.08)	0.33	-0.37 (-1.14, 0.40)	0.35	-0.01 (-0.09, 0.07)	0.80
Gas/vapor/fume	Model 1	0.01 (-0.07, 0.08)	0.86	-0.04 (-0.10, 0.02)	0.17	-1.44 (-2.34, -0.55)	<b>0.002</b>	-0.19 (-0.28, -0.09)	<b>&lt;0.001</b>
	Model 2	0.02 (-0.06, 0.09)	0.64	-0.03 (-0.09, 0.02)	0.25	-1.56 (-2.48, -0.64)	<b>0.001</b>	-0.20 (-0.30, -0.11)	<b>&lt;0.001</b>
Dust and gas/vapor/fume	Model 1	0.00 (-0.04, 0.05)	0.91	-0.03 (-0.07, 0.01)	0.17	-0.88 (-1.46, -0.29)	<b>0.003</b>	-0.1 (-0.16, -0.03)	<b>0.003</b>
	Model 2	0.00 (-0.05, 0.05)	0.96	-0.03 (-0.07, 0.01)	0.14	-0.84 (-1.43, -0.26)	<b>0.01</b>	-0.1 (-0.16, -0.04)	<b>0.001</b>

**Model 1:** Adjusted with propensity score scores; **Model 2:** Inverse probability of treatment weighting. **VGDF:** vapors, gases, dust and fumes; **CI:** confidence interval; **FVC:** forced vital capacity; **FEV<sub>1</sub>:** forced expiratory volume in one second; **MMEF:** predicted value for maximal mid-expiratory flow.