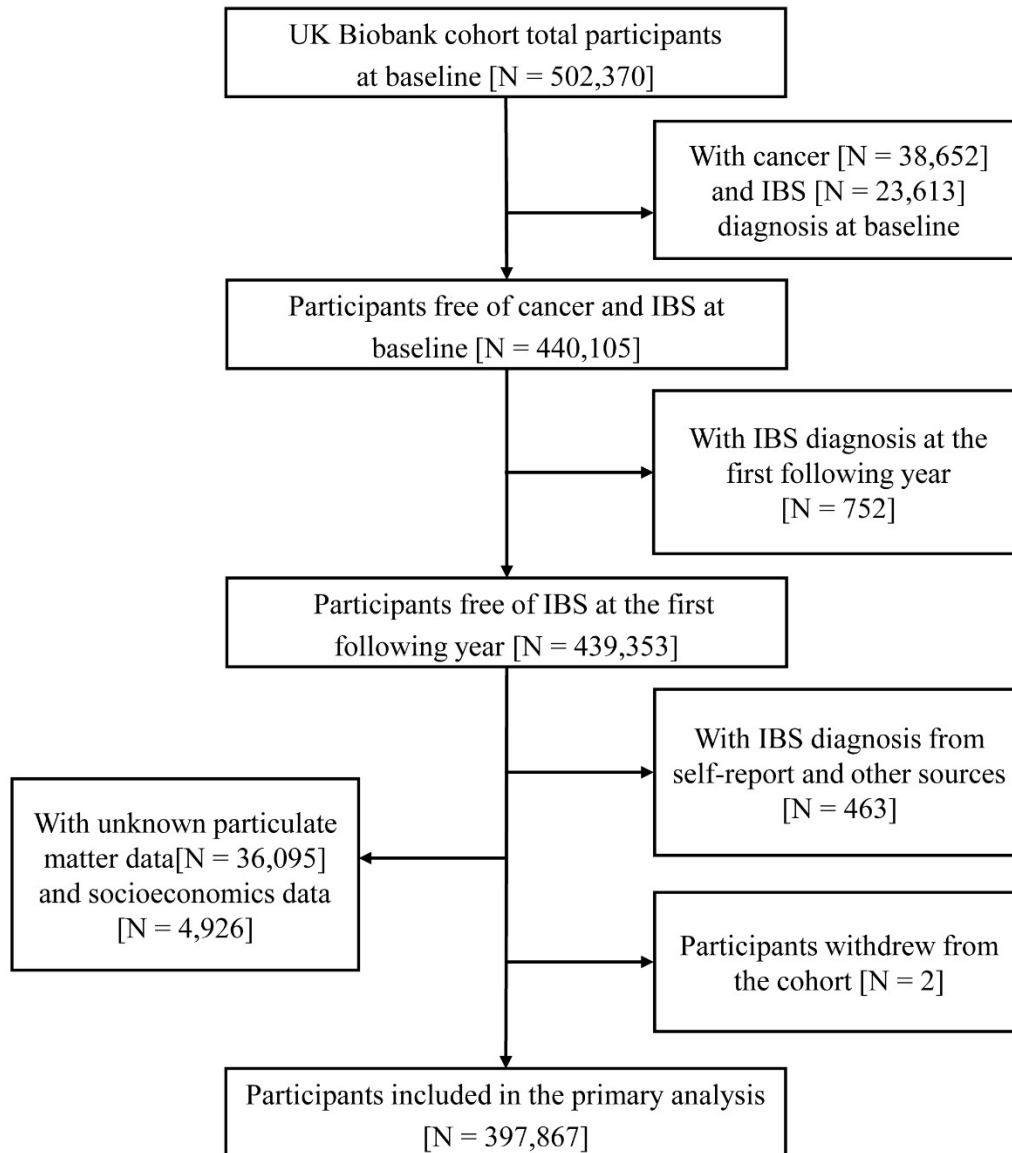


**Figure S1 Directed acyclic graph for the associations between particulate matter exposure and IBS.**

Abbreviation: IBS, irritable bowel syndrome.



**Figure S2 The flowchart of participants included in this study.**

Abbreviation: IBS, irritable bowel syndrome.

**Table S1 The Pearson correlation results among the size-specific ambient particulate matter**

	PM <sub>10</sub>	PM <sub>2.5-10</sub>	PM <sub>2.5</sub>
PM <sub>10</sub>	1.00	0.57	0.56
PM <sub>2.5-10</sub>	0.57	1.00	0.62
PM <sub>2.5</sub>	0.56	0.62	1.00

Abbreviation: PM<sub>10</sub>, inhalable particulate matter; PM<sub>2.5-10</sub>, coarse particulate matter; PM<sub>2.5</sub>, fine particulate matter.

**Table S2 The sensitivity analyses result of the associations between particulate matter exposure and IBS occurrence.**

	PM <sub>2.5</sub>	PM <sub>10</sub>
Main model	1.33 (1.04, 1.68)	1.14 (1.01, 1.29)
Sensitivity analysis 1	1.37 (1.05, 1.80)	1.15 (1.00, 1.33)
Sensitivity analysis 2	1.32 (1.03, 1.69)	1.15 (1.01, 1.31)
Sensitivity analysis 3	1.30 (1.01, 1.69)	1.15 (1.00, 1.31)

Main model: adjusted for age, sex, ethnicity, education level, Townsend Deprivation Index and assessment center.

Sensitivity analysis 1: on the basis of the main model, add other covariates (including body mass index, smoking status, alcohol drinking, diet, physical activity and mental disorders).

Sensitivity analysis 2: exclude the participants who diagnosed IBS within 2 years from baseline.

Sensitivity analysis 3: exclude the participants who diagnosed IBS within 3 years from baseline.

Abbreviation: IBS, irritable bowel syndrome. PM<sub>10</sub>, inhalable particulate matter; PM<sub>2.5</sub>, fine particulate matter.

**Table S3 Associations between long-term PM<sub>2.5</sub> and PM<sub>10</sub> exposure and IBS occurrence.**

Particulate matter	Annual average of concentration (µg/m <sup>3</sup> )	HRs (95%CI)	<i>P</i> value	<i>P</i> for trend
PM <sub>2.5</sub>				0.04
Q1	8.17 – 9.29	Reference	-	
Q2	9.29 – 9.93	1.09 (1.02, 1.16)	0.01	
Q3	9.93 – 10.57	1.09 (1.02, 1.16)	0.01	
Q4	10.57 – 21.31	1.07 (1.00, 1.15)	0.07	
PM <sub>10</sub>				0.04
Q1	11.78 – 15.25	Reference	-	
Q2	15.25 – 16.03	1.08 (1.02, 1.16)	0.01	
Q3	16.03 – 17.01	1.03 (0.97, 1.10)	0.33	
Q4	17.01 – 31.39	1.08 (1.01, 1.16)	0.02	

Notes: Model was adjusted for age, sex, ethnicity, education level, Townsend Deprivation Index and assessment center.

Abbreviation: IBS, irritable bowel syndrome; PM<sub>10</sub>, inhalable particulate matter; PM<sub>2.5</sub>, fine particulate matter; HRs, hazards ratios; Q1, first percentile; Q2, second percentile; Q3, third percentile; Q4, fourth percentile.

**Table S4 The stratified analysis for the associations between PM<sub>2.5</sub> and PM<sub>10</sub> exposure and IBS occurrence.**

Strata	PM <sub>2.5</sub>		PM <sub>10</sub>	
	HRs (95%CI)	<i>P</i> for difference	HRs (95%CI)	<i>P</i> for difference
Main model	1.33 (1.04, 1.68)		1.14 (1.01, 1.29)	
Sex				
Male	1.13 (0.73, 1.75)	Reference	0.99 (0.79, 1.25)	Reference
Female	1.42 (1.07, 1.89)	0.28	1.21 (1.04, 1.40)	0.12
Age (years)				
< 60	1.33 (0.99, 1.78)	0.89	1.24 (1.06, 1.45)	0.05
≥ 60	1.29 (0.86, 1.93)	Reference	0.99 (0.80, 1.21)	Reference
Body mass index (kg/m <sup>2</sup> )				
< 25	1.52 (1.00, 2.31)	0.22	1.18 (0.95, 1.46)	0.55
≥ 25	1.20 (0.90, 1.61)	Reference	1.10 (0.94, 1.28)	Reference
Education level				
Low	0.83 (0.49, 1.4)	Reference	1.15 (0.88, 1.51)	0.77
High	1.45 (1.10, 1.89)	0.04	1.10 (0.96, 1.27)	Reference
Townsend Deprivation Index <sup>1</sup>				
Low economic level	1.33 (0.98, 1.8)	0.88	1.22 (1.02, 1.45)	0.28
High economic level	1.29 (0.87, 1.91)	Reference	1.08 (0.91, 1.28)	Reference
Smoking status				
Never smoking	1.26 (0.9, 1.77)	Reference	1.10 (0.93, 1.30)	Reference
Previous/current smoking	1.28 (0.91, 1.81)	0.95	1.14 (0.95, 1.37)	0.74

Notes: Model was adjusted for age, sex, ethnicity, education level, Townsend Deprivation Index and assessment center.

<sup>1</sup>, High economic level was defined as Townsend Deprivation Index < -2.17 (median value) while low economic level was defined as Townsend Deprivation Index  $\geq$  -2.17.

Abbreviation: HRs, hazards ratios; PM<sub>10</sub>, inhalable particulate matter; PM<sub>2.5</sub>, fine particulate matter; IBS, irritable bowel syndrome.

**Table S5 The results of the associations between particulate matter exposure and incidence risks of traffic accidents (negative outcome control).**

	HRs (95%CI)	<i>P</i> value
Particulate matter		
PM <sub>2.5</sub>	0.83 (0.61, 1.14)	0.25
PM <sub>2.5-10</sub>	0.78 (0.56, 1.09)	0.14
PM <sub>10</sub>	0.87 (0.74, 1.02)	0.08

Notes: Transport accidents (ICD-10: V01 – V99) was chosen as the negative outcome control and the model was adjusted for age, sex, ethnicity, education level, Townsend Deprivation Index and assessment center.

Abbreviation: HRs, hazards ratios; PM<sub>10</sub>, inhalable particulate matter; PM<sub>2.5-10</sub>, coarse particulate matter; PM<sub>2.5</sub>, fine particulate matter.