

Figure S1 Flow chart. MAFLD, metabolic dysfunction-associated fatty liver disease.

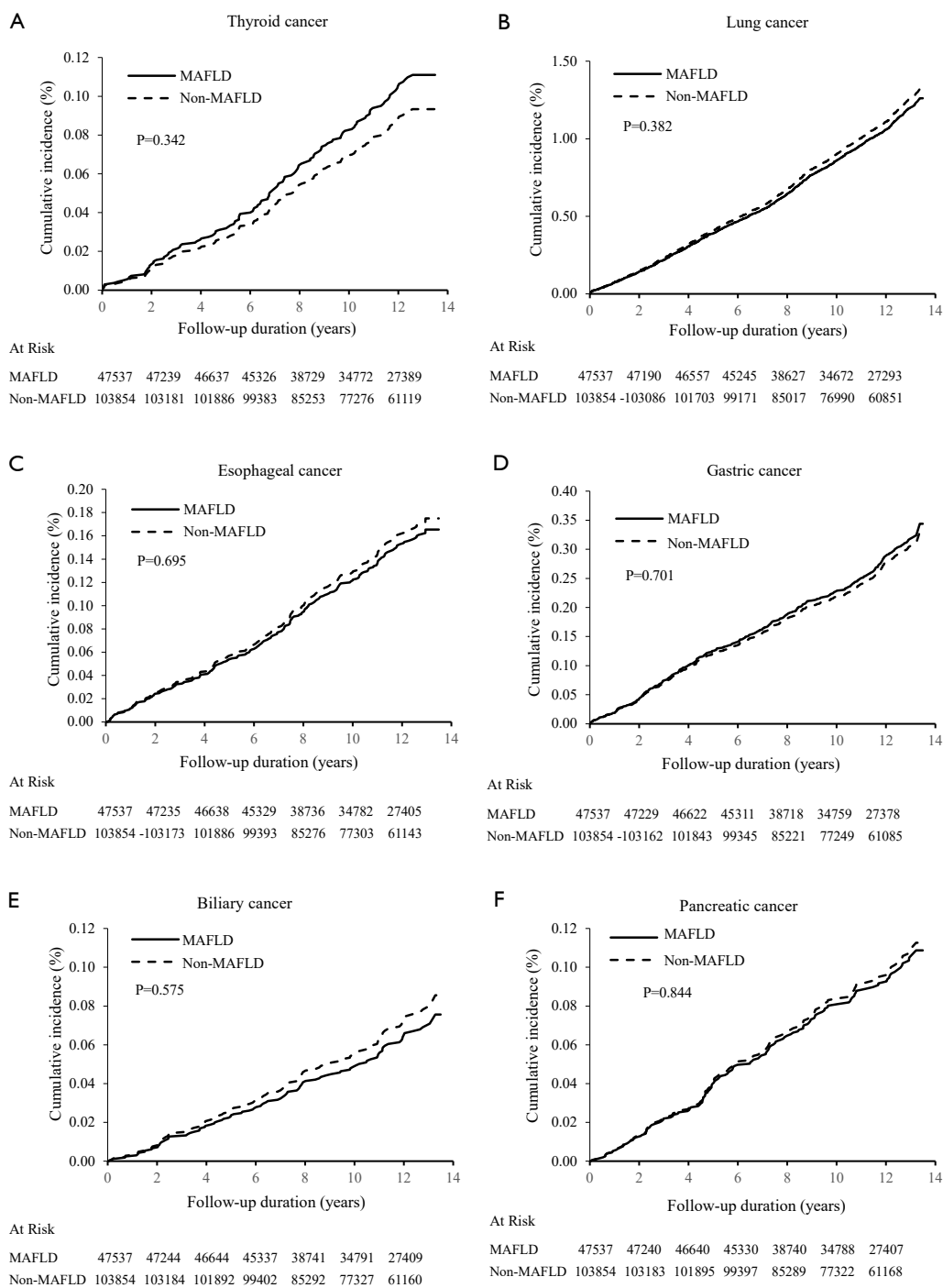


Figure S2 Cumulative incidence of the thyroid (A), lung (B), esophageal (C), gastric (D), biliary (E), and pancreatic cancer (F) after adjusting competing risk of death. MAFLD, metabolic dysfunction-associated fatty liver disease.

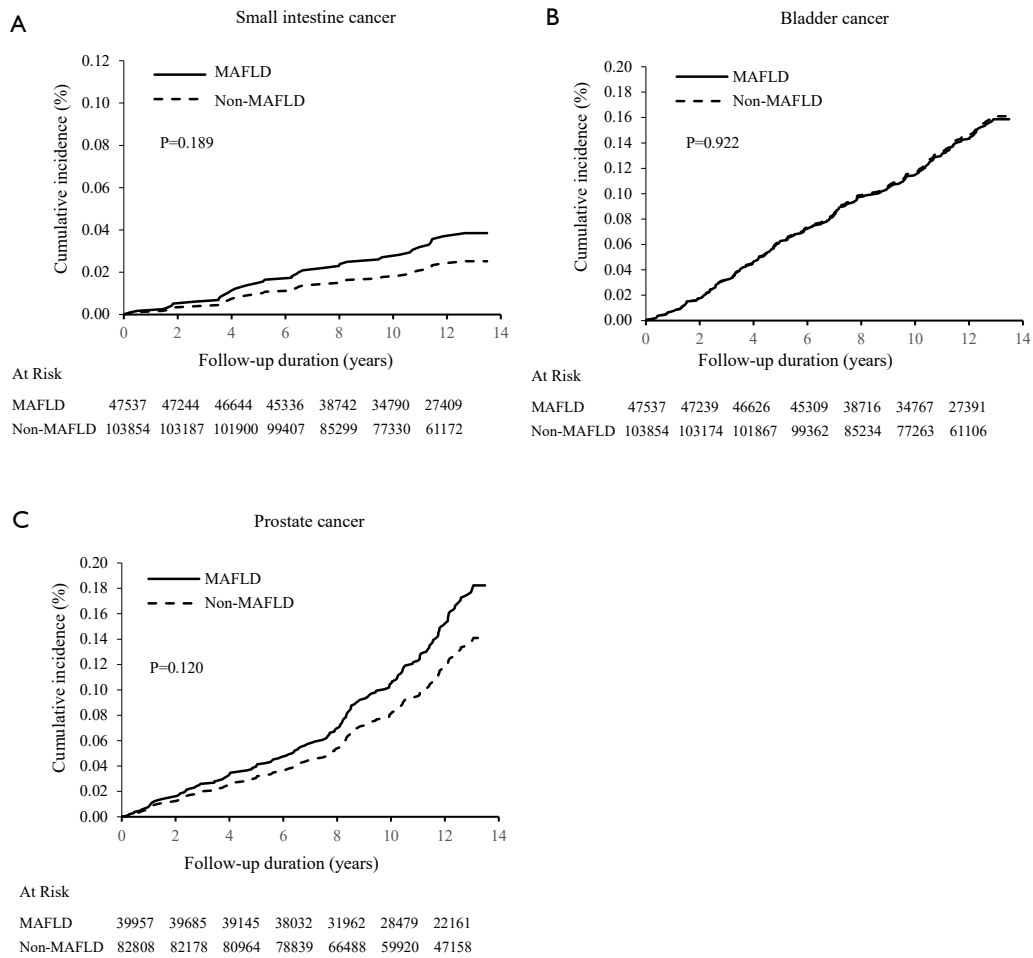


Figure S3 Cumulative incidence of the small intestine (A), bladder (B), and prostate cancer (C) after adjusting competing risk of death. MAFLD, metabolic dysfunction-associated fatty liver disease.

Table S1 Missing covariate rates

Variables	Total	Missing	Percentage
Age, years	151,391	1,003	0.7
Male	151,391	541	0.4
Education level	151,391	4,030	2.7
Smoking	151,391	2,952	1.9
Alcohol	151,391	21,090	13.9
Physical activity	151,391	3,883	2.6
Family history of cancers	151,391	51,548	34.0
BMI, kg/m ²	151,391	2,403	1.6
WC, cm	151,391	4,753	3.1
SBP, mmHg	151,391	1,239	0.8
DBP, mmHg	151,391	1,239	0.8
FBG, mmol/L	151,391	1,416	0.9
TG, mmol/L	151,391	1,767	1.2
TC, mmol/L	151,391	1,383	0.9
LDL-C, mmol/L	151,391	1,621	1.1
HDL-C, mmol/L	151,391	4,168	2.8
hs-CRP, mg/dL	151,391	5,847	3.9
ALT, U/L	151,391	1,748	1.2
HBsAg positive	151,391	3,087	2.0

ALT, alanine aminotransferase; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S2 Baseline characteristics in the participants with and without MAFLD by sex

Characteristics	Male subjects			Female subjects		
	Non-MAFLD	MAFLD	P	Non-MAFLD	MAFLD	P
n	82,808	39,957		21,046	7,580	
Age, years	49.8±14.8	50.5±12.9	<0.001	44.6±12.5	53.3±10.6	<0.001
Education level			0.915			<0.001
Junior high school or below	63,793 (77.0)	30,770 (77.0)		12,907 (61.3)	5,652 (74.6)	
Senior high school or higher	19,015 (23.0)	9,187 (23.0)		8,139 (38.7)	1,928 (25.4)	
Past/current smoking	40,928 (49.4)	20,356 (50.9)	<0.001	360 (1.7)	235 (3.1)	<0.001
Excessive alcohol consumption	13,675 (16.5)	8,329 (20.8)	<0.001	77 (0.4)	44 (0.6)	0.014
Physical activity			<0.001			<0.001
Inactive	12,825 (15.5)	6,145 (15.4)		2,225 (10.6)	734 (9.7)	
Moderately active	56,843 (68.6)	27,884 (69.8)		16,507 (78.4)	5,571 (73.5)	
Active	13,140 (15.9)	5,928 (14.8)		2,314 (11.0)	1,275 (16.8)	
Family history of cancers			<0.001			<0.001
Yes	3,508 (4.2)	1,986 (5.0)		861 (4.1)	522 (6.9)	
No	50,734 (61.3)	23,504 (58.8)		13,614 (64.7)	5,114 (64.5)	
Unknown	28,566 (34.5)	14,467 (36.2)		6,571 (31.2)	1,944 (25.7)	
BMI, kg/m ²	23.9±3.0	27.4±3.1	<0.001	23.2±3.2	27.5±3.5	<0.001
WC, cm	85.2±8.9	93.0±9.0	<0.001	79.4±10.0	89.6±9.6	<0.001
SBP, mmHg	128.7±19.9	136.1±20.2	<0.001	118.5±18.9	134.1±21.6	<0.001
DBP, mmHg	82.6±11.1	87.8±11.7	<0.001	76.9±10.3	84.2±11.1	<0.001
FBG, mmol/L	5.3±1.4	5.9±1.9	<0.001	5.1±1.2	5.9±2.2	<0.001
TG, mmol/L	1.4±1.1	2.2±1.5	<0.001	1.2±0.8	2.0±1.3	<0.001
TC, mmol/L	4.8±1.1	5.1±1.2	<0.001	4.8±1.0	5.2±1.2	<0.001
LDL-C, mmol/L	2.4±0.9	2.5±0.9	<0.001	2.3±0.9	2.4±1.0	<0.001
HDL-C, mmol/L	1.5±0.3	1.4±0.4	<0.001	1.6±0.3	1.5±0.4	<0.001
hs-CRP, mg/dL	0.8 (0.3–2.0)	1.3 (0.6–3.0)	<0.001	0.7 (0.3–1.9)	1.8 (0.8–4.2)	<0.001
ALT, U/L	18.0 (13.0–24.0)	23.0 (17.0–33.0)	<0.001	14.0 (10.0–20.0)	19.0 (14.0–27.0)	<0.001
HBsAg positive	2575 (3.1)	925 (2.3)	<0.001	411 (2.0)	136 (1.8)	0.391

Data are presented as mean ± standard deviation, median (interquartile range), or number (%) of participants with a condition. ALT, alanine aminotransferase; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; MAFLD, metabolic associated fatty liver disease; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S3 Associations between MAFLD and extrahepatic cancers by sex and age

Cancer types	Sex		P for interaction	Age		P for interaction
	Male	Female		<50 years	≥50 years	
Extrahepatic cancers	1.04 (0.98–1.11)	1.23 (1.07–1.40)	0.867	1.12 (1.04–1.20)	1.04 (0.95–1.14)	0.095
Thyroid	1.92 (1.13–3.25)	1.25 (0.70–2.22)	0.058	1.39 (0.95–2.02)	2.18 (0.55–8.68)	0.640
Lung	0.91 (0.82–1.02)	1.06 (0.75–1.49)	0.635	0.98 (0.85–1.12)	0.87 (0.73–1.03)	0.306
Esophageal	0.89 (0.66–1.18)	0.94 (0.16–5.51)	0.985	1.08 (0.77–1.52)	0.53 (0.30–0.94)	0.097
Gastric	1.07 (0.86–1.33)	0.70 (0.34–1.46)	0.284	1.12 (0.86–1.47)	0.89 (0.63–1.25)	0.502
Biliary	0.79 (0.49–1.27)	1.53 (0.48–4.89)	0.229	0.91 (0.47–1.76)	0.82 (0.46–1.47)	0.581
Pancreatic	0.89 (0.60–1.31)	1.77 (0.56–5.56)	0.527	0.94 (0.57–1.55)	1.02 (0.61–1.72)	0.664
Small intestine	1.43 (0.71–2.87)	1.74 (0.34–8.78)	0.519	1.23 (0.54–2.82)	2.13 (0.75–6.10)	0.866
Colorectal	1.13 (0.95–1.33)	1.14 (0.76–1.71)	0.490	1.09 (0.89–1.33)	1.27 (0.99–1.61)	0.341
Kidney	1.50 (1.13–1.98)	2.10 (0.89–4.96)	0.408	1.69 (1.23–2.32)	1.39 (0.87–2.22)	0.439
Bladder	0.98 (0.73–1.32)	0.94 (0.22–4.03)	0.416	0.95 (0.60–1.50)	0.97 (0.66–1.42)	0.512
Prostate [§]	1.49 (1.07–2.08)	–	–	1.40 (0.73–2.67)	1.44 (0.98–2.12)	0.627
Breast [¶]	–	1.31 (1.04–1.66)	–	1.51 (1.18–1.95)	1.33 (0.76–2.31)	0.640

Data were presented as hazard ratio (95% confidence interval). The model was adjusted for age, education level, smoking status, alcohol consumption, physical activity, and family history of cancers. [§], only for men; [¶], only for women. MAFLD, metabolic dysfunction-associated fatty liver disease.

Table S4 Baseline characteristics in the participants with and without NAFLD

Characteristics	Non-NAFLD	NAFLD	P
n	112082	39309	
Age, years	48.8±14.2	51.2±12.9	<0.001
Male	91,018 (81.2)	31,747 (80.8)	0.053
Education level			<0.001
Junior high school or below	83,013 (74.1)	30,109 (76.6)	
Senior high school or higher	29,069 (25.9)	9,200 (23.4)	
Past/current smoking	48,220 (43.0)	13,659 (34.7)	<0.001
Excessive alcohol consumption	22,125 (19.7)	0 (0.0)	<0.001
Physical activity			<0.001
Inactive	16,978 (15.1)	4,951 (12.6)	
Moderately active	78,116 (69.7)	28,689 (73.0)	
Active	16,988 (15.2)	5,669 (14.4)	
Family history of cancers			<0.001
Yes	4,837 (4.3)	2,040 (5.2)	
No	68,590 (61.2)	24,376 (62.0)	
Unknown	38,655 (34.5)	12,893 (32.8)	
BMI, kg/m ²	24.1±3.2	27.4±3.3	<0.001
WC, cm	84.8±9.7	92.1±9.4	<0.001
SBP, mmHg	127.5±20.3	135.3±20.6	<0.001
DBP, mmHg	82.0±11.4	86.7±11.6	<0.001
FBG, mmol/L	5.3±1.5	5.9±2.0	<0.001
TG, mmol/L	1.4±1.1	2.1±1.5	<0.001
TC, mmol/L	4.9±1.1	5.1±1.2	<0.001
LDL-C, mmol/L	2.4±0.9	2.5±0.9	<0.001
HDL-C, mmol/L	1.5±0.3	1.4±0.4	<0.001
hs-CRP, mg/dL	0.8 (0.3–2.1)	1.4 (0.6–3.2)	<0.001
ALT, U/L	17.0 (12.0–24.0)	22.0 (16.0–31.0)	<0.001
HBsAg positive	4,047 (3.6)	0(0.0)	<0.001

Data are presented as mean ± standard deviation, median (interquartile range), or number (%) of participants with a condition. ALT, alanine aminotransferase; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; NAFLD, nonalcoholic fatty liver disease; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S5 Associations between NAFLD and extrahepatic cancers in all participants

Cancer types	NAFLD		Non-NAFLD		Unadjusted		Age-, sex-adjusted		Multivariate-adjusted [†]	
	No. of events	Incidence rate (/10 ⁵ PYs)	No. of events	Incidence rate (/10 ⁵ PYs)	HR (95% CI)	P	HR (95% CI)	P	HR (95% CI)	P
Extrahepatic	1,495	346.40	3910	317.81	1.08 (1.02–1.15)	0.008	1.01 (0.95–1.08)	0.661	1.07 (1.01–1.14)	0.027
Thyroid	44	10.06	87	6.99	1.43 (1.00–2.06)	0.052	1.56 (1.08–2.26)	0.019	1.58 (1.09–2.30)	0.016
Lung	393	90.07	1240	99.92	0.90 (0.80–1.00)	0.057	0.87 (0.77–0.97)	0.014	0.94 (0.84–1.06)	0.304
Esophageal	50	11.43	176	14.15	0.80 (0.59–1.10)	0.173	0.80 (0.58–1.09)	0.158	1.05 (0.75–1.18)	0.765
Gastric	102	23.34	308	24.77	0.94 (0.75–1.17)	0.570	0.91 (0.72–1.13)	0.388	0.94 (0.74–1.18)	0.590
Biliary	26	5.95	75	6.03	0.98 (0.63–1.53)	0.932	0.94 (0.60–1.46)	0.774	0.93 (0.59–1.46)	0.751
Pancreatic	39	8.92	105	8.44	1.05 (0.73–1.52)	0.784	1.02 (0.70–1.47)	0.935	1.03 (0.70–1.50)	0.880
Small intestine	13	2.97	26	2.09	1.42 (0.73–2.76)	0.305	1.35 (0.70–2.62)	0.375	1.31 (0.66–2.60)	0.439
Colorectal	209	47.87	507	40.81	1.17 (0.99–1.37)	0.062	1.11 (0.94–1.30)	0.209	1.21 (1.02–1.43)	0.026
Kidney	83	18.99	149	11.98	1.58 (1.21–2.06)	0.001	1.53 (1.17–2.01)	0.002	1.55 (1.17–2.05)	0.002
Bladder	56	12.81	157	12.62	1.01 (0.74–1.37)	0.947	1.01 (0.74–1.37)	0.973	1.13 (0.82–1.56)	0.459
Prostate [§]	50	14.33	102	10.20	1.40 (1.00–1.96)	0.052	1.44 (1.03–2.02)	0.035	1.44 (1.01–2.06)	0.042
Breast [¶]	117	133.58	220	90.57	1.46 (1.17–1.83)	<0.001	1.26 (0.99–1.59)	0.057	1.28 (1.01–1.62)	0.042

[†], adjusted for age, sex, education level, smoking status, alcohol consumption, physical activity, and family history of cancers; [§], only for men; [¶], only for women. CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease.

Table S6 Difference in extrahepatic cancers of MAFLD vs. NAFLD by generalized estimating equation model

Cancer types	OR (95% CI)*	
	Unadjusted	Multivariate-adjusted**
Extrahepatic	0.78 (0.58–1.04)	0.67 (0.27–1.02)
Thyroid [†]	–	–
Lung	0.97 (0.53–1.76)	0.85 (0.46–1.56)
Esophageal	0.24 (0.10–0.55)	0.19 (0.08–0.45)
Gastric	0.71 (0.226–1.92)	0.60 (0.22–1.64)
Biliary	0.62 (0.08–4.58)	0.57 (0.08–4.27)
Pancreatic	0.95 (0.13–6.87)	0.85 (0.12–6.19)
Small intestine [†]	–	–
Colorectal	0.60 (0.31–1.16)	0.52 (0.27–1.02)
Kidney	2.11 (0.29–15.14)	2.07 (0.29–14.88)
Bladder	0.35 (0.13–0.97)	0.33 (0.12–0.95)
Prostate ^{§†}	–	–
Breast [¶]	1.29 (0.32–5.25)	0.82 (0.22–1.64)

*, ORs were estimated using NAFLD as the reference; **, the model was adjusted for age, sex, education level, smoking status, alcohol consumption, physical activity, and family history of cancers. [§], only for men; [¶], only for women; [†], generalized estimating equation was failed as no cancer of NAFLD in this group. CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease; MAFLD, metabolic dysfunction-associated fatty liver disease.

Table S7 Baseline characteristics in the participants according to NAFLD and MAFLD

Characteristics	Neither FLD	NAFLD-only	MAFLD-only	MAFLD-NAFLD	P
n	102,832	1,022	9,250	38,287	
Age, years	48.8±14.5	48.9±13.1	49.6±10.9	51.3±12.9	<0.001
Male	81,948 (79.7)	860 (84.1)	9,070 (98.1)	30,887 (80.7)	<0.001
Education level					<0.001
Junior high school or below	75,953 (73.9)	747 (73.1)	7,060 (76.3)	29,362 (76.7)	
Senior high school or higher	26,879 (26.1)	275 (26.9)	2,190 (23.7)	8,925 (23.3)	
Past/current smoking	40,878 (39.8)	410 (40.1)	7,342 (79.4)	13,249 (34.6)	<0.001
Excessive alcohol consumption	13,752 (13.4)	0 (0.0)	8,373 (90.5)	0 (0.0)	<0.001
Physical activity					<0.001
Inactive	14,900 (14.5)	150 (14.7)	2,078 (22.5)	4,801 (12.5)	
Moderately active	72,608 (70.6)	742 (72.6)	5,508 (59.5)	27,947 (73.0)	
Active	15,324 (14.9)	130 (12.7)	1,664 (18.0)	5,539 (14.5)	
Family history of cancers					<0.001
Yes	4,337 (4.2)	32 (3.1)	500 (5.4)	2,008 (5.2)	
No	63,760 (62.0)	588 (57.5)	4,830 (52.2)	23,788 (62.1)	
Unknown	34,735 (33.8)	402 (39.3)	3,920 (42.4)	12,491 (32.6)	
BMI, kg/m ²	23.8±3.1	21.6±1.3	27.0±3.1	27.5±3.2	<0.001
WC, cm	84.1±9.5	80.4±6.9	92.5±9.0	92.5±9.2	<0.001
SBP, mmHg	126.7±20.1	121.7±17.0	136.5±20.2	135.6±20.5	<0.001
DBP, mmHg	81.4±11.2	79.5±9.6	88.6±11.8	86.9±11.6	<0.001
FBG, mmol/L	5.3±1.4	5.0±0.6	5.9±1.8	5.9±2.0	<0.001
TG, mmol/L	1.4±1.0	1.2±0.7	2.2±1.6	2.1±1.5	<0.001
TC, mmol/L	4.8±1.1	4.9±1.0	5.3±1.2	5.1±1.2	<0.001
LDL-C, mmol/L	2.4±0.9	2.4±0.7	2.6±0.9	2.5±0.9	<0.001
HDL-C, mmol/L	1.5±0.3	1.6±0.3	1.5±0.4	1.4±0.4	<0.001
hs-CRP, mg/dL	0.8 (0.3–2.0)	0.6 (0.3–1.2)	1.3 (0.6–2.8)	1.4 (0.6–3.2)	<0.001
ALT, U/L	17.0 (12.0–23.0)	19.0 (14.0–26.0)	24.0 (17.9–35.0)	22.0 (16.0–31.0)	<0.001
HBsAg positive	2986 (2.9)	0 (0.0)	1061 (11.5)	0 (0.0)	<0.001

Data are presented as mean ± standard deviation, median (interquartile range), or number (%) of participants with a condition. ALT, alanine aminotransferase; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; FLD, fatty liver disease; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; MAFLD, metabolic dysfunction-associated fatty liver disease; NAFLD, nonalcoholic fatty liver disease; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S8 Baseline characteristics in the participants MAFLD subgroup stratified by risk factors

Characteristics	Non-MAFLD	MAFLD subgroups							P
		Overweight-only	DB-only	MD-only	Overweight and DB	Overweight and MD	DB and MD	Three risk factors [†]	
n	103,854	6,492	155	1,940	808	31,773	382	5,987	
Age, years	48.8±14.5	46.3±12.4	54.9±9.9	53.4±12.3	52.7±9.6	50.8±12.7	57.3±10.7	55.6±10.6	<0.001
Male	82,808 (79.7)	5,815 (89.6)	146 (94.2)	1,562 (80.5)	743 (92.0)	26,561 (83.6)	295 (77.2)	4,835 (80.8)	<0.001
Education level									<0.001
Junior high school or below	76,700 (73.9)	4,685 (72.2)	141 (91.0)	1,595 (82.2)	671 (83.0)	24,073 (75.8)	317 (83.0)	4,940 (82.5)	
Senior high school or higher	27,154 (26.1)	1,807 (27.8)	14 (9.0)	345 (17.8)	137 (17.0)	7,700 (24.2)	65 (17.0)	1,047 (17.5)	
Past/current smoking	41,288 (39.8)	2,913 (44.9)	78 (50.3)	852 (43.9)	338 (41.8)	13,805 (43.4)	155 (40.6)	2,450 (40.9)	<0.001
Excessive alcohol consumption	13,752 (13.2)	1,131 (17.4)	40 (25.8)	487 (25.1)	138 (17.1)	5,595 (17.6)	74 (19.4)	908 (15.2)	<0.001
Physical activity									<0.001
Inactive	15,050 (14.5)	972 (15.0)	30 (19.4)	306 (15.8)	98 (12.1)	4,667 (14.7)	52 (13.6)	754 (12.6)	
Moderately active	73,350 (70.6)	4,680 (72.1)	105 (67.7)	1,367 (70.5)	572 (70.8)	22,344 (70.3)	268 (70.2)	4,119 (68.8)	
Active	15,454 (14.9)	840 (12.9)	20 (12.9)	267 (13.8)	138 (17.1)	4,762 (15.0)	62 (16.2)	1,114 (18.6)	
Family history of cancers									<0.001
Yes	4,369 (4.2)	234 (3.6)	3 (1.9)	95 (4.9)	28 (3.5)	1,778 (5.6)	20 (5.2)	350 (5.8)	
No	64,348 (62.0)	3,920 (60.4)	88 (56.8)	1,043 (53.8)	547 (67.7)	19,068 (60.0)	204 (53.4)	3,748 (62.6)	
Unknown	35,137 (33.8)	2,338 (36.0)	64 (41.3)	802 (41.3)	233 (28.8)	10,927 (34.4)	158 (41.4)	1,889 (31.6)	
BMI, kg/m ²	23.8±3.1	26.4±2.4	21.8±1.0	21.7±1.3	26.1±2.1	28.0±2.9	21.8±1.2	28.0±3.1	<0.001
WC, cm	84.0±9.5	86.8±7.0	81.9±5.9	85.1±9.3	86.7±6.8	93.9±8.7	86.4±8.7	95.0±9.5	<0.001
SBP, mmHg	126.6±20.1	122.3±16.3	127.6±19.2	136.6±20.1	128.4±19.8	137.3±19.9	140.2±20.5	143.2±20.8	<0.001
DBP, mmHg	81.4±11.2	80.5±9.5	81.9±9.5	86.5±11.2	82.7±11.6	88.4±11.5	87.3±11.3	89.5±11.8	<0.001
FBG, mmol/L	5.3±1.4	5.0±0.5	10.3±3.5	5.3±0.8	9.4±2.7	5.3±0.7	9.9±3.3	9.3±2.8	<0.001
TG, mmol/L	1.4±1.0	1.3±0.8	1.5±1.2	2.2±1.5	1.5±1.1	2.3±1.5	2.6±1.7	2.6±1.8	<0.001
TC, mmol/L	4.8±1.1	4.9±1.0	5.3±1.5	5.2±1.2	5.2±1.2	5.1±1.2	5.5±1.4	5.3±1.4	<0.001
LDL-C, mmol/L	2.4±0.9	2.5±0.7	2.6±1.0	2.4±1.0	2.7±0.8	2.5±0.9	2.6±1.1	2.6±1.0	<0.001
HDL-C, mmol/L	1.5±0.3	1.5±0.3	1.6±0.4	1.5±0.4	1.5±0.3	1.4±0.4	1.5±0.4	1.4±0.4	<0.001
hs-CRP, mg/dL	0.8 (0.3–2.0)	0.8 (0.4–1.3)	0.7 (0.3–1.4)	1.6 (0.6–3.6)	0.8 (0.4–1.3)	1.6 (0.7–3.5)	2.1 (0.8–4.4)	2.0 (0.9–4.3)	<0.001
ALT, U/L	17.0 (12.0–23.0)	22.0 (16.0–29.8)	20.9 (13.0–26.0)	20.3 (14.1–29.0)	22.0 (16.0–29.0)	23.0 (17.0–32.0)	20.0 (15.0–27.0)	23.0 (16.0–33.0)	<0.001
HBsAg positive	2,986 (2.9)	179 (2.8)	6 (3.9)	36 (1.9)	19 (2.4)	695 (2.2)	10 (2.6)	116 (1.9)	<0.001

Data are presented as mean ± standard deviation, median (interquartile range), or number (%) of participants with a condition. [†], overweight/obesity, DB, and MD. ALT, alanine aminotransferase; BMI, body mass index; DB, diabetes; DBP, diastolic blood pressure; FBG, fasting blood glucose; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; MAFLD, metabolic dysfunction-associated fatty liver disease; MD, metabolic dysregulation; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S9 Baseline characteristics in the MAFLD participants according to HBsAg and alcohol consumption

Characteristics	MAFLD without positive HBsAg and excessive alcohol consumption	MAFLD with positive HBsAg only	MAFLD with excessive alcohol consumption only	MAFLD with excessive alcohol consumption and positive HBsAg	P
N (%)	142,141 (93.9)	877 (0.58)	8,189 (5.4)	184 (0.12)	
Age, years	49.4±14.1	48.4±11.9	49.7±10.8	47.9±9.6	0.007
Male	113,695 (80.0)	741 (84.5)	8,145 (99.5)	184 (100.0)	<0.001
Education level					<0.001
Junior high school or below	106,062 (74.6)	654 (74.6)	6,275 (76.6)	131 (71.2)	
Senior high school or higher	36,079 (25.4)	223 (25.4)	1,914 (23.4)	53 (28.8)	
Past/current smoking	54,537 (38.4)	314 (35.8)	6,869 (83.9)	159 (86.4)	<0.001
Excessive alcohol consumption	13,752 (9.7)	-	8,189 (100.0)	184 (100.0)	<0.001
Physical activity					<0.001
Inactive	19,851 (14.0)	124 (14.1)	1,911 (23.3)	43 (23.4)	
Moderately active	101,297 (71.3)	636 (72.5)	4,755 (58.1)	117 (63.6)	
Active	20,993 (14.8)	117 (13.3)	1,523 (18.6)	24 (13.0)	
Family history of cancers					<0.001
Yes	2,008 (5.2)	43 (4.9)	444 (5.4)	13 (7.1)	
No	23,788 (62.1)	552 (62.9)	4,184 (51.1)	94 (51.1)	
Unknown	12,491 (32.6)	282 (32.2)	3,561 (43.5)	77 (41.8)	
BMI, kg/m ²	24.8±3.5	27.7±3.3	26.9±3.1	27.5±3.2	<0.001
WC, cm	86.3±10.1	92.7±9.1	92.4±8.9	94.4±13.2	<0.001
SBP, mmHg	129.1±20.6	134.1±19.4	136.7±20.2	137.4±20.4	<0.001
DBP, mmHg	82.9±11.5	86.8±11.6	88.7±11.8	89.9±12.3	<0.001
FBG, mmol/L	5.5±1.6	5.9±2.1	5.9±1.8	5.8±1.7	<0.001
TG, mmol/L	1.6±1.2	1.9±1.4	2.3±1.6	2.0±1.6	<0.001
TC, mmol/L	4.9±1.1	4.9±1.3	5.3±1.2	5.0±1.2	<0.001
LDL-C, mmol/L	2.4±0.9	2.5±0.9	2.7±0.9	2.6±1.0	<0.001
HDL-C, mmol/L	1.5±0.4	1.4±0.4	1.5±0.4	1.5±0.4	<0.001
hs-CRP, mg/dL	0.9 (0.4–2.3)	1.3 (0.6–2.9)	1.3 (0.6–2.8)	1.0 (0.4–2.3)	0.005
ALT, U/L	18.0 (13.0–25.0)	26.0 (18.0–38.0)	24.0 (17.0–34.0)	29.0 (21.0–44.0)	<0.001
HBsAg positive	2,986 (2.1)	877 (100.0)	-	184 (100.0)	<0.001

Data are presented as mean ± standard deviation, median (interquartile range), or number (%) of participants with a condition. ALT, alanine aminotransferase; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; FLD, fatty liver disease; HBsAg, hepatitis B surface antigen; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; MAFLD, metabolic dysfunction-associated fatty liver disease; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides; WC, waist circumference.

Table S10 Associations between MAFLD and extrahepatic cancers after excluding the incident cancers within the first 3 years of follow-up

Cancer types	MAFLD		Non-MAFLD		Univariate model		Age-, sex-adjusted		Multivariate model [†]	
	No. of events	Incidence rate (/10 ⁵ PYs)	No. of events	Incidence rate (/10 ⁵ PYs)	HR (95% CI)	P	HR (95% CI)	P	HR (95% CI)	P
Extrahepatic	1,372	265.09	2,783	244.13	1.09 (1.02–1.16)	0.013	1.04 (0.98–1.11)	0.193	1.04 (0.98–1.11)	0.200
Thyroid	34	6.48	69	5.98	1.09 (0.72–1.64)	0.697	1.39 (0.91–2.11)	0.129	1.39 (0.91–2.13)	0.123
Lung	385	73.57	906	78.73	0.93 (0.83–1.05)	0.256	0.90 (0.80–1.02)	0.095	0.90 (0.80–1.02)	0.086
Esophageal	53	10.10	122	10.57	0.96 (0.69–1.32)	0.783	0.92 (0.67–1.27)	0.613	0.90 (0.65–1.24)	0.507
Gastric	97	18.50	204	17.69	1.05 (0.82–1.33)	0.720	1.01 (0.79–1.29)	0.935	1.01 (0.80–1.29)	0.906
Biliary	2	4.38	57	4.94	0.89 (0.55–1.44)	0.627	0.88 (0.54–1.42)	0.596	0.89 (0.55–1.45)	0.651
Pancreatic	32	6.10	78	6.76	0.90 (0.60–1.36)	0.620	0.88 (0.58–1.32)	0.527	0.90 (0.60–1.36)	0.611
Small intestine	14	2.67	18	1.56	1.71 (0.85–3.44)	0.132	1.65 (0.82–3.31)	0.162	1.69 (0.85–3.40)	0.137
Colorectal	207	39.53	387	33.59	1.18 (0.99–1.39)	0.060	1.14 (0.96–1.35)	0.137	1.14 (0.96–1.35)	0.131
Kidney	78	14.88	91	7.89	1.88 (1.39–2.55)	<0.001	1.82 (1.34–2.46)	<0.001	1.85 (1.36–2.50)	<0.001
Bladder	49	9.34	115	9.97	0.94 (0.67–1.31)	0.702	0.93 (0.67–1.30)	0.680	0.92 (0.66–1.29)	0.621
Prostate [§]	48	11.01	77	8.46	1.31 (0.91–1.88)	0.142	1.44 (1.00–2.08)	0.049	1.49 (1.03–2.15)	0.033
Breast [¶]	86	98.10	171	70.53	1.37 (1.06–1.78)	0.017	1.23 (0.94–1.62)	0.136	1.24 (0.95–1.63)	0.120

[†], adjusted for age, sex, education level, smoking status, alcohol consumption, and physical activity. [§], only for men; [¶], only for women. CI, confidence interval; HR, hazard ratio; MAFLD, metabolic associated fatty liver disease; PYs, person-years.

Table S11 Associations between MAFLD and extrahepatic cancers in all participants before imputation

Cancer types	MAFLD		Non-MAFLD		Univariate model		Age-, sex-adjusted model		Multivariate model [†]	
	No. of events	Incidence rate (/10 ⁵ PYs)	No. of events	Incidence rate (/10 ⁵ PYs)	HR (95% CI)	P	HR (95% CI)	P	HR (95% CI)	P
Extrahepatic	1,372	265.08	2,783	244.13	1.09 (1.02–1.17)	0.011	1.06 (1.00–1.14)	0.069	1.06 (0.99–1.13)	0.096
Thyroid	46	8.80	85	7.34	1.28 (0.88–1.87)	0.199	1.58 (1.07–2.34)	0.021	1.60 (1.08–2.36)	0.019
Lung	494	94.73	1,139	98.56	0.94 (0.83–1.05)	0.260	0.90 (0.80–1.01)	0.082	0.90 (0.80–1.01)	0.077
Esophageal	68	13.01	158	13.64	0.87 (0.64–1.19)	0.389	0.84 (0.61–1.14)	0.264	0.81 (0.59–1.11)	0.199
Gastric	130	24.89	280	24.18	1.08 (0.86–1.35)	0.502	1.04 (0.83–1.30)	0.726	1.04 (0.83–1.30)	0.708
Biliary	28	5.36	73	6.30	0.92 (0.58–1.45)	0.714	0.90 (0.57–1.41)	0.639	0.91 (0.58–1.43)	0.679
Pancreatic	44	8.42	100	8.63	0.96 (0.65–1.41)	0.823	0.92 (0.63–1.36)	0.682	0.94 (0.64–1.39)	0.774
Small intestine	16	3.06	23	1.99	1.76 (0.89–3.46)	0.102	1.68 (0.85–3.31)	0.133	1.72 (0.88–3.37)	0.116
Colorectal	249	47.72	467	40.37	1.18 (1.00–1.40)	0.049	1.14 (0.97–1.35)	0.122	1.14 (0.96–1.35)	0.128
Kidney	96	18.38	136	11.74	1.49 (1.13–1.98)	0.005	1.43 (1.08–1.90)	0.012	1.44 (1.09–1.91)	0.011
Bladder	66	12.63	147	12.69	0.97 (0.71–1.33)	0.858	0.97 (0.71–1.34)	0.874	0.97 (0.70–1.33)	0.841
Prostate [§]	57	13.15	95	10.42	1.38 (0.96–1.98)	0.078	1.54 (1.07–2.21)	0.021	1.59 (1.11–2.30)	0.013
Breast [¶]	119	136.80	217	89.45	1.54 (1.23–1.94)	<0.001	1.32 (1.03–1.68)	0.028	1.32 (1.04–1.69)	0.024

[†], adjusted for age, sex, education level, smoking status, alcohol consumption, and physical activity; [§], only for men; [¶], only for women. CI, confidence interval; HR, hazard ratio; MAFLD, metabolic associated fatty liver disease; PYs, person-years.