

Table 1. Estimated* mean values (95% CI) and adjusted* proportions (95% CI) of the baseline characteristics of study participants with respect to fatty liver disease category (n = 246,424)

Characteristics	Neither NAFLD nor MAFLD	NAFLD-only	MAFLD
Number of participants	184,146	5,439	56,839
Age (years)	36.6 (36.6-36.7)	38.3 (38.1-38.5)	39.1 (39.1-39.2)
Men (%)	41.2 (41.0-41.4)	71.5 (70.3-72.7)	82.1 (81.7-82.4)
Alcohol intake (%) [†]	29.1 (28.9-29.3)	23.9 (22.9-24.8)	30.1 (29.7-30.4)
Current smoker (%)	16.7 (16.5-16.9)	16.5 (15.7-17.3)	18.6 (18.4-18.9)
Education level (%) [‡]	85.7 (85.6-85.9)	88.5 (87.6-89.4)	83.3 (82.9-83.7)
HEPA (%) [§]	16.2 (16.0-16.4)	11.3 (10.5-12.1)	12.9 (12.6-13.1)
History of hypertension (%)	4.2 (4.1-4.3)	2.2 (1.9-2.6)	8.9 (8.7-9.1)
History of CVD (%)	0.7 (0.7-0.8)	0.8 (0.5-1.0)	0.7 (0.7-0.8)
Lipid-lowering medication use (%)	1.0 (1.0-1.1)	1.4 (1.1-1.7)	2.3 (2.2-2.4)
Family history of diabetes (%)	13.5 (13.3-13.6)	16.5 (15.5-17.5)	18.1 (17.8-18.5)
Obesity (%)	13.8 (13.6-13.9)	-	58.8 (58.4-59.2)
Body mass index (kg/m ²)	22.1 (22.1-22.1)	21.3 (21.3-21.4)	25.9 (25.9-25.9)
Waist circumference (cm)	78.2 (78.2-78.2)	77.5 (77.4-77.7)	87.8 (87.7-87.9)
SBP (mmHg)	106.8 (106.7-106.8)	105.3 (105.0-105.5)	112.4 (112.3-112.5)
DBP (mmHg)	68.0 (68.0-68.1)	67.4 (67.2-67.6)	72.1 (72.0-72.1)
Fasting glucose (mg/dL)	91.9 (91.9-92.0)	91.7 (91.5-92.0)	95.4 (95.3-95.5)
HbA1c (%)	5.5 (5.5-5.5)	5.5 (5.5-5.5)	5.6 (5.6-5.6)
Total cholesterol (mg/dL)	188.1 (188.0-188.3)	194.4 (193.5-195.2)	202.4 (202.1-202.6)
LDL-C (mg/dL)	115.6 (115.5-115.8)	123.5 (122.7-124.3)	131.7 (131.4-131.9)
HDL-C (mg/dL)	62.0 (62.0-62.1)	59.4 (59.1-59.8)	51.7 (51.6-51.8)
Triglycerides (mg/dL)	90.4 (90.1-90.7)	94.8 (93.2-96.4)	148.6 (148.0-149.1)
GTP (U/L)	22.5 (22.4-22.7)	24.9 (24.2-25.6)	38.7 (38.4-38.9)
ALT (U/L)	18.4 (18.3-18.5)	22.8 (22.3-23.2)	34.9 (34.8-35.1)
AST (U/L)	20.0 (20.0-20.1)	20.9 (20.6-21.2)	25.3 (25.2-25.4)
hs-CRP (mg/L)	8.66 (8.53-8.80)	7.01 (6.24-7.78)	14.59 (14.34-14.84)
HOMA-IR	1.17 (1.16-1.17)	1.24 (1.21-1.27)	2.16 (2.15-2.16)

*Adjusted for age; [†]≥10 g/day; [‡]≥college graduate; [§] health-enhancing physical activity; ^{||} BMI ≥25 kg/m²

Abbreviations: ALT, alanine aminotransferase; AST, aspartate transaminase; GTP, glutamyl transpeptidase; BMI, body mass index; CI, confidence interval; CVD, cardiovascular disease; DBP, diastolic blood pressure; HbA1c, glycated hemoglobin; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; hs-CRP, high-sensitivity C-reactive protein; HOMA-IR, homeostasis model assessment of insulin resistance; NAFLD, nonalcoholic fatty liver disease; SBP, systolic blood pressure

Table 2. Absolute and relative estimates of diabetes incidence with respect to fatty liver disease category

Fatty liver disease category	PY	Incident cases	Incidence rate (/10 ³ PY)	Age-adjusted HR (95% CI)	Multivariable-adjusted HR* (95% CI)	HR (95% CI) [†] in model 2 with time-dependent variables
Total						
Neither NAFLD nor MAFLD	993,873	2,885	2.9	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	29,943	152	5.1	1.62 (1.38-1.91)	1.79 (1.49-2.14)	1.57 (1.27-1.93)
MAFLD	294,968	5,365	18.2	5.69 (5.43-5.95)	3.16 (2.99-3.34)	3.30 (3.11-3.50)
Women						
Neither NAFLD nor MAFLD	576,185	1,001	1.7	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	7,926	34	4.3	2.19 (1.56-3.09)	2.39 (1.63-3.51)	1.46 (0.90-2.37)
MAFLD	47,614	1,050	22.1	10.59 (9.70-11.57)	5.75 (5.17-6.36)	5.46 (4.92-6.06)
Men						
Neither NAFLD nor MAFLD	417,688	1,884	4.5	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	22,017	118	5.4	1.16 (0.96-1.40)	1.53 (1.25-1.88)	1.45 (1.15-1.83)
MAFLD	247,354	4,315	17.4	3.71 (3.51-3.92)	2.60 (2.44-2.76)	2.66 (2.49-2.84)

The *p*-value for the interaction of sex and fatty liver disease category with the risk of diabetes was <0.001 (multivariable model).

* Estimated from Cox proportional hazards models; the multivariable model was adjusted for age, center, year of screening examination, alcohol consumption, smoking status, physical activity, education level, use of lipid-lowering medication, family history of diabetes, prediabetes and history of hypertension.

[†]Estimated from Cox proportional hazard models with group status according to the changes in NAFLD or MAFLD status, smoking status, alcohol consumption, physical activity, hyperlipidemia medication, prediabetes and history of hypertension as time-dependent categorical variables; baseline age, center, year of screening examination, family history of diabetes, and education level as time-fixed variables

Abbreviations: CI, confidence interval; HR, hazard ratio; MAFLD, metabolic dysfunction-associated fatty liver disease; NAFLD, nonalcoholic fatty liver disease; PY, person-years

Table 3. Development of diabetes in nonalcoholic fatty liver disease among restricted subgroups.

Fatty liver disease category	Lean participants (n=132,529)	Participants without metabolic dysregulation (n=166,356)	Lean participants without metabolic dysregulation (n=115,171)	Participants without prediabetes (n=152,563)
Total				
Neither NAFLD nor MAFLD	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	2.06 (1.70-2.49)	1.92 (1.59-2.31)	2.19 (1.79-2.67)	1.61 (1.21-2.13)
Women				
Neither NAFLD nor MAFLD	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	2.91 (1.96-4.31)	3.39 (2.29-5.03)	3.50 (2.35-5.23)	3.49 (1.95-6.23)
Men				
Neither NAFLD nor MAFLD	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
NAFLD-only	1.83 (1.47-2.27)	1.69 (1.37-2.09)	1.95 (1.56-2.44)	1.31 (0.95-1.80)
<i>p</i> for interaction	<0.001	0.002	0.012	<0.001

* Estimated from Cox proportional hazards models; the multivariable model was adjusted for age, center, year of screening examination, alcohol consumption, smoking status, physical activity, education level, medication for hyperlipidemia, family history of diabetes, prediabetes and history of hypertension.
Abbreviations: MAFLD, metabolic dysfunction-associated fatty liver disease; NAFLD, nonalcoholic fatty liver disease