

Supplementary Material to

Prevalence and Characteristics of Steatotic Liver Disease in Germany - Magnetic Resonance Imaging in the German National Cohort (NAKO)

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Supplementary Texts

Supplementary Text S1: Covariate assessment

Information on previous Hepatitis B or C infection, smoking status, alcohol consumption, and use of antihypertensive, antidiabetic, and lipid-lowering medications was self-reported.

Body height and weight were measured in light clothing with a stadiometer 274 and a medical Body Composition Analyzer (mBCA) 515 (seca GmbH & Co. KG, Hamburg), respectively. BMI was calculated as weight in kg divided by squared height in meter. Body surface area (for indexation of liver volume) was calculated by duBois formula as $0.007184 \times \text{height in cm}^{0.725} \times \text{weight in kg}^{0.425}$. Waist circumference was measured with an inelastic tape (seca 201) halfway between the lowest rib and the iliac crest.

Blood pressure was measured on the right arm in seating position. After an initial waiting period of 5 minutes, 2 consecutive measurements were taken with 2 minutes in between. The second value was used as final.

Glucose, total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides were measured from serum by enzymatic photometry (Dimension VISTA 1500, Siemens Healthineers, Erlangen, Deutschland). HbA1c was measured from EDTA whole blood by HPLC (Tosoh G8 HPLC Analyzer, Tosoh Bioscience, Inc., San Francisco, USA).

Menopause was defined as age greater than 60 years, no menstrual bleeding for more than 6 consecutive months in women aged 45 years or older or permanent cessation of menstruation due to illness.

ASAT, ALAT, GGT, and AP were measured in serum by enzymatic photometry (Dimension VISTA 1500, Siemens Healthineers, Erlangen, Deutschland).

Supplementary Tables

Supplementary Table S1: Prevalence of steatotic liver disease and its subcategories by different cutoffs

	Overall	Women	Men
SLD: PDFF \geq 5.75%	28.5	21.3	35.7
MASLD	25.0	19.7	30.4
MetALD	2.3	1.2	3.4
ALD	1.1	0.5	1.8
SLD: PDFF \geq 5%	32.1	24.3	39.8
MASLD	28.1	22.4	33.8
MetALD	2.7	1.4	3.9
ALD	1.3	0.5	2.1
SLD: PDFF \geq 5.56%	29.3	22	36.6
MASLD	25.7	20.3	31.2
MetALD	2.4	1.2	3.5
ALD	1.2	0.5	1.9
SLD: PDFF \geq 6.4%	25.6	18.8	32.4

MASLD	22.4	17.3	27.5
MetALD	2.1	1.1	3.2
ALD	1.1	0.4	1.7

Supplementary Table S2: Characteristics of the study sample, according to steatotic liver disease (PDFF $\geq 5.75\%$)

	without SLD	With SLD
% of total sample	71.5	28.5
Sociodemographics		
Age, years	43.3 (13.8)	51.3 (12.5)
Male sex	45.0	62.5
Geographic region		
East	39.8	43.6
North	20.2	16.9
South	40.0	39.5
Socioeconomic status		
low	9.8	16.0
medium	55.5	58.6
high	34.7	25.5
Anthropometry		
Body height, cm	171.6 (9.5)	172.0 (10.0)
Body weight, kg	73.9 (14.4)	90.5 (17.4)
BMI, kg/m ²	25.0 (4.2)	30.6 (5.4)
BMI category		
Underweight	1.6	0.5
Normal weight	54.2	10.9
Overweight	33.5	40.6
Obesity class 1/2	9.8	41.8
Obesity class 3	0.9	6.2
Medication intake		
Lipid-lowering	5.2	12.3
Glucose-lowering	1.8	9.1
Antihypertensive	12.9	36.0
Behavioral risk factors		
Smoking behaviour		
Never	47.8	40.1
Former	27.2	35.4
Current	24.9	24.5
Alcohol consumption		
No consumption	10.4	12.7
Low: <20 (women) or 30 (men) g/day	82.0	74.3
Moderate: <50 (women) or 60 (men) g/day	6.0	8.7
High: ≥ 50 (women) or 60 (men) g/day	1.6	4.2

Cardiometabolic risk factors for SLD subcategory definition		
Obesity	52.9	92.3
Diabetes	3.0	14.3
Low HDL Cholesterol	10.9	27.9
High Cholesterol	35.4	69.9
Hypertension	40.5	74.9
Sum of risk factors (zero to max 5)		
0	24.8	2.1
1	31.5	10.1
2	25.8	26.7
3	14.4	37.4
4	3.3	18.3
5	0.2	5.3
Hepatic Characteristics		
PDFF, % (median [Q1, Q3])	2.7 [2.1, 3.6]	11.0 [7.5, 16.6]
Liver volume, ml	1492.2 (276.6)	1917.3 (451.8)
Liver volume, ml/m ²	800.2 (97.1)	939.2 (165.0)
R2* as a proxy for liver iron, 1/s (median [Q1, Q3])	40.6 [36.3, 47.2]	54.4 [47.2, 64.1]
ASAT, UL (median [Q1, Q3])	21.0 [17.4, 25.2]	25.2 [20.4, 31.2]
ALAT, UL (median [Q1, Q3])	23.4 [19.2, 30.0]	34.8 [27.0, 49.2]
GGT, UL (median [Q1, Q3])	23.4 [18.0, 31.2]	36.6 [27.0, 55.8]
Self-reported Hepatitis B	1.1	1.7
Self-reported Hepatitis C	0.3	0.6

Data are weighted mean (standard deviation) or weighted median [Q1, Q3] for continuous variables, and weighted percentage for categorical variables. BMI categories: underweight: <18.5 kg/m², normal weight: [18.5, 25.0) kg/m², overweight: [25.0, 30.0) kg/m², Obesity class 1/2: [30.0, 40.0) kg/m², Obesity class 3: above 40 kg/m²

Supplementary Table S3: Women: Prevalence of steatotic liver disease and its subcategories by age groups.

	Overall	[20,25)	[25,30)	[30,35)	[35,40)	[40,45)	[45,50)	[50,55)	[55,60)	[60,65)	[65,70)	>70
% of total sample	100	6	9.7	9.7	8.9	7.2	10.7	13.1	11.7	11.3	9.6	2
SLD: PDFF \geq 5.75%	21.3	7.5	8	8	14.4	14.7	17.8	21.2	32.6	36.7	35.9	43.7
MASLD	19.7	7	8	7	13	13.5	16.7	19.1	30.9	33.9	32.3	41.8
MetALD	1.2	0.4	0	0.5	0.3	1.2	0.7	1.7	1	2.6	2.6	1.3
ALD	0.5	0	0	0.5	1.1	0	0.4	0.5	0.7	0.2	0.9	0.6
SLD: PDFF \geq 5%	24.3	8	8.8	9.5	17.6	17.2	20.6	24.7	36.7	40.5	42	46.5
MASLD	22.4	7.6	8.7	8.5	16	15.9	19.2	22.3	34.5	36.9	37.7	44.5
MetALD	1.4	0.5	0.1	0.5	0.5	1.2	1	1.8	1.5	3.4	3.1	1.5
ALD	0.5	0	0	0.5	1.1	0	0.4	0.5	0.7	0.2	1.1	0.6
SLD: PDFF \geq 5.56%	22	7.5	8.1	8.1	14.8	15.3	18.4	22.6	33	37.7	37.2	44.5
MASLD	20.3	7	8.1	7.1	13.5	14.1	17.1	20.5	31.3	34.8	33.1	42.7
MetALD	1.2	0.4	0	0.5	0.3	1.2	0.8	1.7	1	2.6	2.9	1.3
ALD	0.5	0	0	0.5	1.1	0	0.4	0.5	0.7	0.2	1.1	0.6
SLD: PDFF \geq 6.4%	18.8	6.7	7.2	5.7	12.9	11.7	15.7	18.5	29.2	32.8	31.8	43.2
MASLD	17.3	6.3	7.1	5	11.5	10.5	14.7	16.5	27.6	30.2	28.4	41.6
MetALD	1.1	0.4	0	0.2	0.3	1.2	0.6	1.5	1	2.4	2.4	1
ALD	0.4	0	0	0.5	1.1	0	0.4	0.4	0.6	0.1	0.9	0.6

Subcategory "Other" not shown because of negligible prevalence.

Supplementary Table S4: Men: Prevalence of steatotic liver disease and its subcategories by age groups.

	Overall	[20,25)	[25,30)	[30,35)	[35,40)	[40,45)	[45,50)	[50,55)	[55,60)	[60,65)	[65,70)	>70
% of total sample	100	6.5	10.6	13.3	9.8	9	11.3	12.6	9.8	8.5	7.2	1.3
SLD: PDFF \geq 5.75%	39.8	11.9	21.5	25.1	31	40.7	46.5	48.6	54.6	59.8	55.4	68.1
MASLD	33.8	11.5	19.7	21.6	27.7	33.7	41.5	40.5	44.7	48.5	45.2	61.1
MetALD	3.9	0.4	0.8	2.7	2.2	4	3.8	5.3	6.3	6.7	6.7	4.8
ALD	2.1	0	1	0.8	1.2	2.9	1.2	2.8	3.6	4.5	3.5	2.2
SLD: PDFF \geq 5%	36.6	11.1	19	22.9	28.2	36.9	42.3	44.6	51.6	56	50.2	65.8
MASLD	31.2	10.9	17.4	20	24.9	31.4	37.7	37.3	42.1	45.5	40.7	59.6
MetALD	3.5	0.2	0.6	2.5	2.1	3.6	3.5	4.6	6	6.3	6.1	4
ALD	1.9	0	1	0.4	1.2	2	1.1	2.6	3.5	4.2	3.3	2.2
SLD: PDFF \geq 5.56%	35.7	10.7	18.3	21.6	27.3	36.4	40.8	43.7	50.9	55	49.6	63.7
MASLD	30.4	10.7	17.2	18.8	24.2	30.9	36.3	36.5	41.5	44.7	40.3	57.8
MetALD	3.4	0	0.6	2.5	1.9	3.4	3.4	4.6	6	6.2	6	3.7
ALD	1.8	0	0.5	0.4	1.2	2	1.1	2.6	3.4	4.1	3.2	2.2
SLD: PDFF \geq 6.4%	32.4	8.2	16.7	19	25.2	32.1	37.8	39.6	47.1	51.5	45.7	52.1
MASLD	27.5	8.2	15.6	16.3	22.1	27	33.7	32.8	38.4	41.8	37.7	46.6
MetALD	3.2	0	0.6	2.4	1.9	3.2	3.1	4.4	5.4	5.7	5	3.5
ALD	1.7	0	0.5	0.3	1.2	1.9	0.9	2.3	3.3	4	2.9	2.1

Subcategory "Other" not shown because of negligible prevalence.

Supplementary Table S5: Women: Prevalence of steatotic liver disease and its subcategories by BMI category.

	underweight	normal weight	overweight	Obesity class 1/2	Obesity class 3
% of total sample	1.7	48	29.2	17.9	3.2
SLD: PDFF \geq 5.75%	8.6	5.3	23.4	53.5	69.5
MASLD	6.8	4.5	21.3	50.9	65.5
MetALD	1.8	0.6	1.5	2.3	0.7
ALD	0	0.2	0.6	0.3	3.4
SLD: PDFF \geq 5%	10	6.5	27.3	59.8	74.4
MASLD	8.2	5.4	24.8	56.8	70.3
MetALD	1.8	0.8	1.9	2.6	0.7
ALD	0	0.3	0.6	0.4	3.4
SLD: PDFF \geq 5.56%	8.6	5.5	24.3	54.9	70.8
MASLD	6.8	4.6	22.1	52.1	66.7
MetALD	1.8	0.6	1.6	2.4	0.7
ALD	0	0.2	0.6	0.4	3.4
SLD: PDFF \geq 6.4%	8.6	4.5	19.8	48.2	64.7
MASLD	6.8	3.7	17.9	45.8	60.6
MetALD	1.8	0.5	1.4	2.1	0.7
ALD	0	0.2	0.5	0.3	3.4

Supplementary Table S6: Men: Prevalence of steatotic liver disease and its subcategories by BMI category

	underweight	normal weight	overweight	Obesity class 1/2	Obesity class 3
% of total sample	0.9	35.7	41.8	20	1.6
SLD: PDFF \geq 5.75%	18.7	13.2	44.2	75.3	85.6
MASLD	18.4	10.8	37.1	65	82.5
MetALD	0.2	1.2	4.7	7.2	2.1
ALD	0	1.3	2.3	3.2	1.1
SLD: PDFF \geq 5%	18.7	10.8	40.2	72.1	83.9
MASLD	18.4	8.9	33.7	62.1	80.8
MetALD	0.2	1	4.2	6.9	2.1
ALD	0	0.9	2.2	3.1	1.1
SLD: PDFF \geq 5.56%	18.7	10.2	38.9	71.3	82.4
MASLD	18.4	8.5	32.6	61.5	79.3
MetALD	0.2	0.9	4.1	6.7	2.1
ALD	0	0.8	2.1	3.1	1.1
SLD: PDFF \geq 6.4%	18.4	8.5	35	66.8	76.8
MASLD	18.4	6.9	29.2	57.6	73.7
MetALD	0	0.8	3.8	6.3	2.1
ALD	0	0.8	1.9	3	1.1

Supplementary Figures

Supplementary Figure S1: Effects of weighting on the distribution of age, sex, and socioeconomic status in the sample.

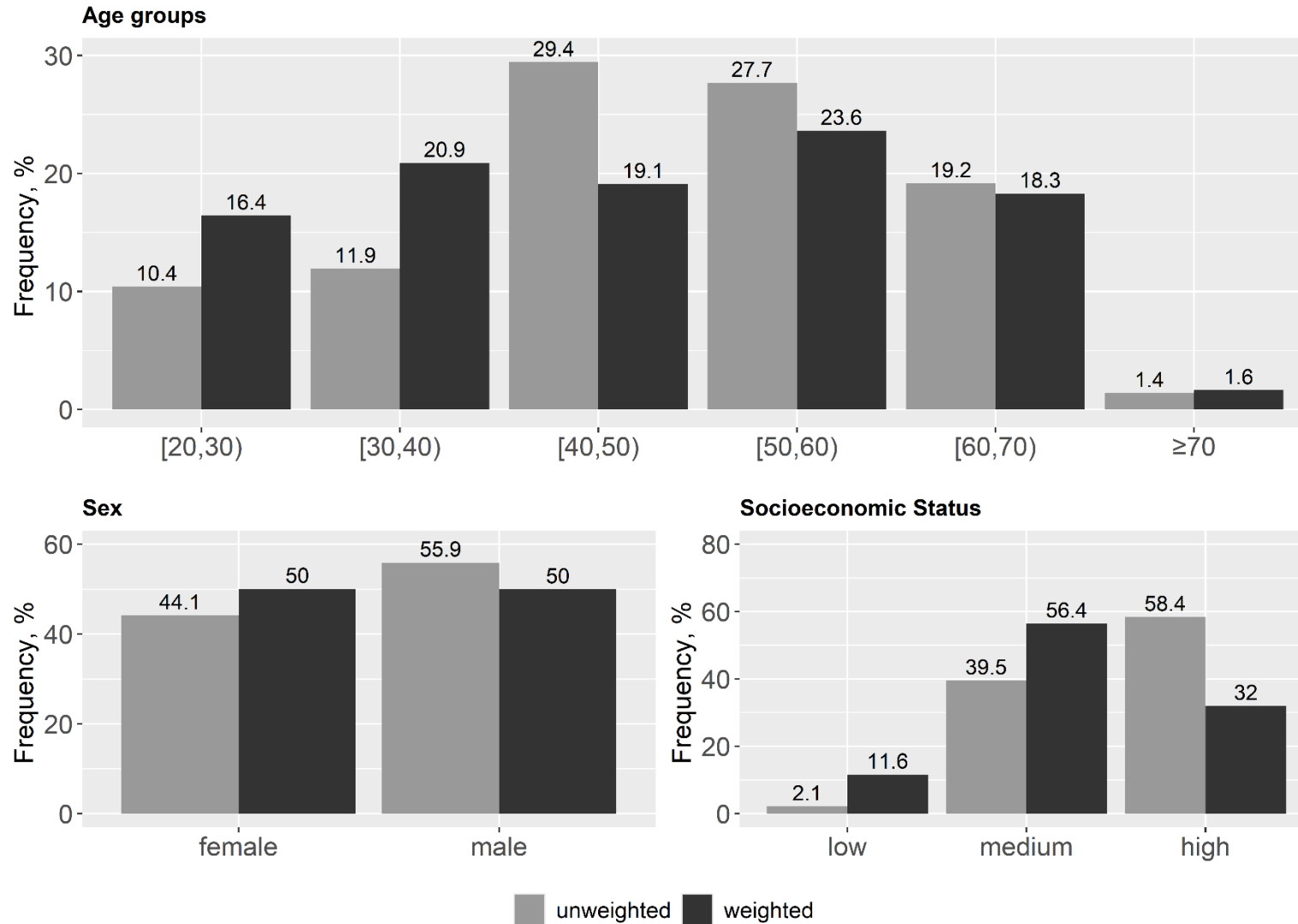
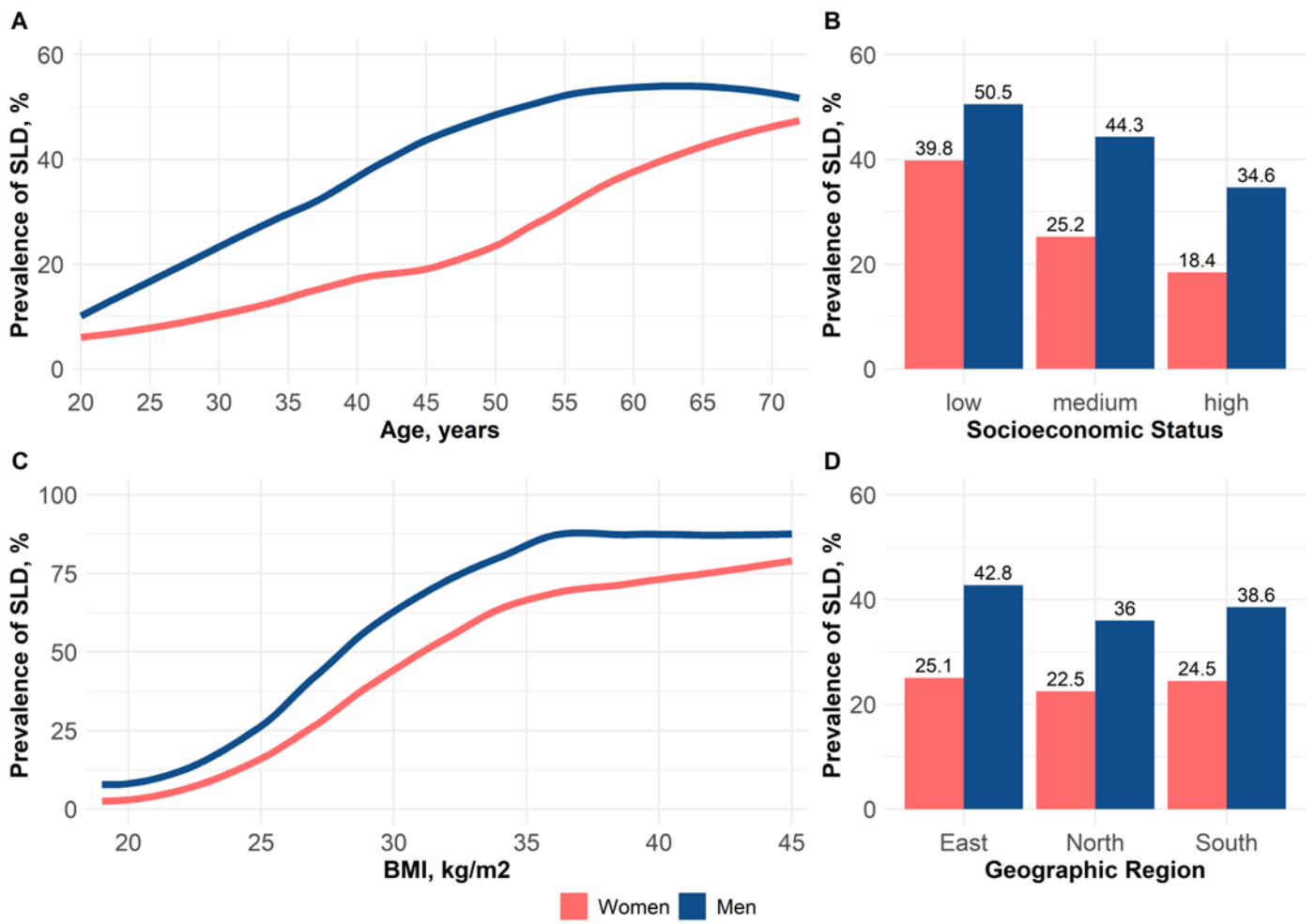
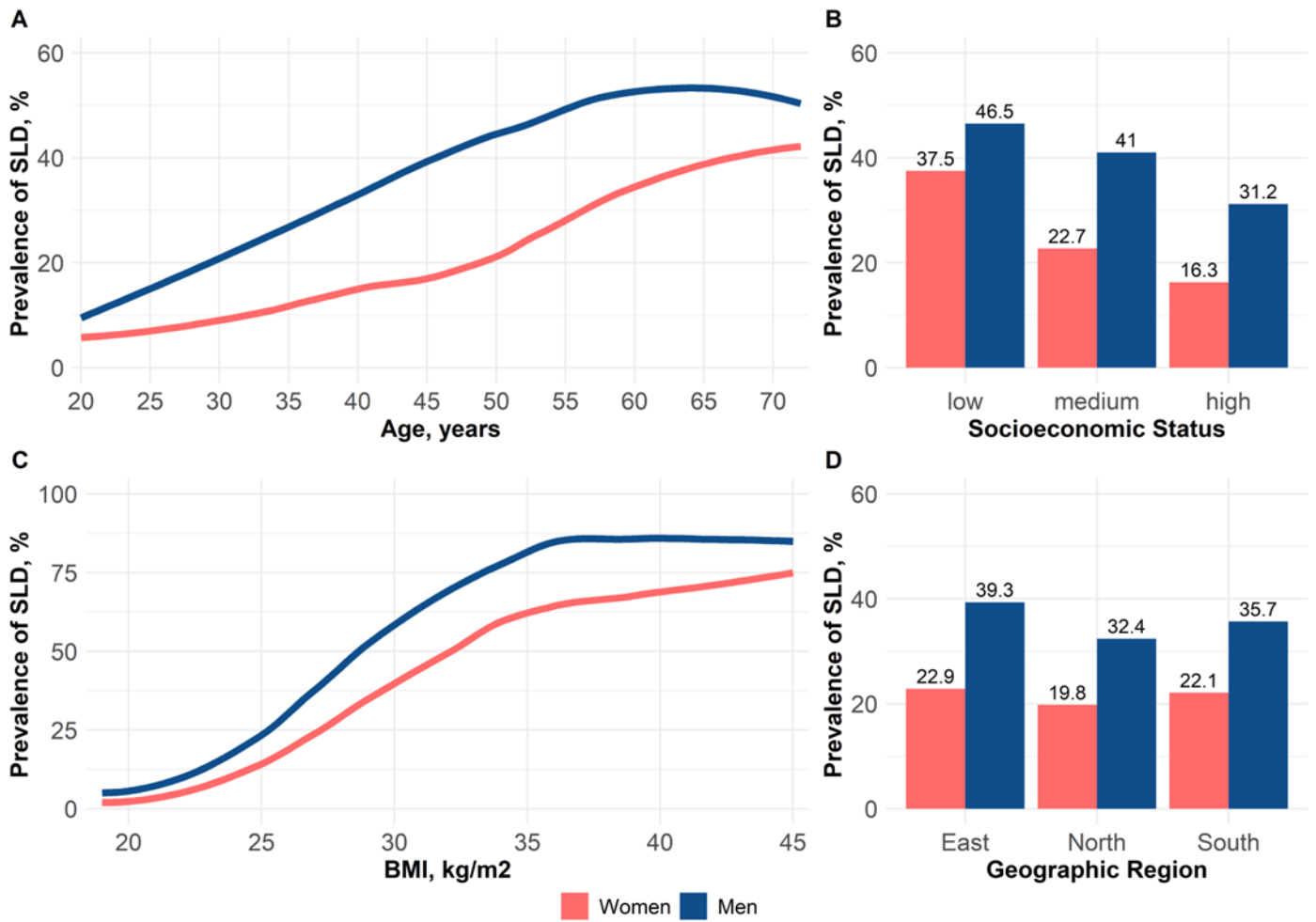


Figure shows unweighted sample frequencies (grey) and weighted population prevalences (black).

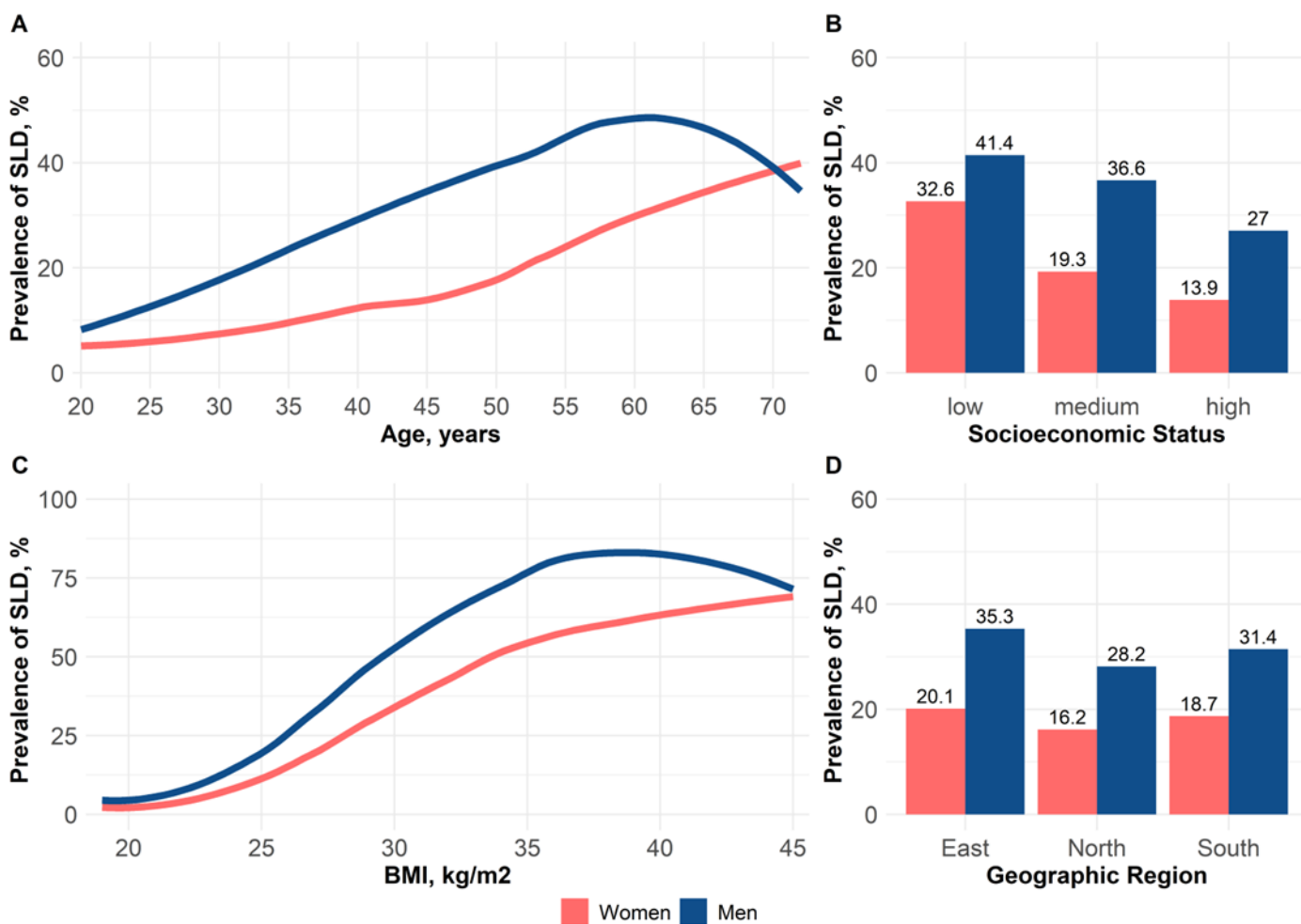
Supplementary Figure S2: Prevalence of SLD (steatotic liver disease), defined as PDFF \geq 5%.



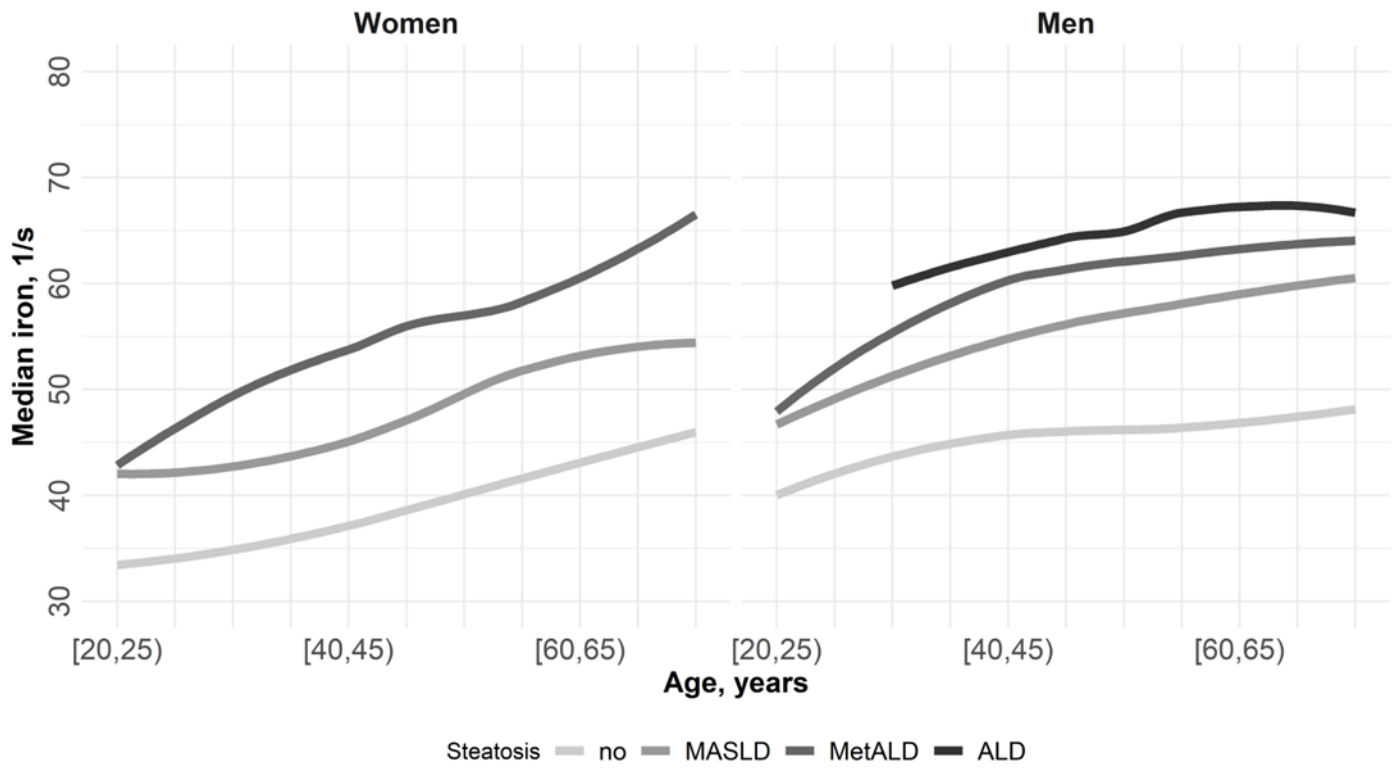
Supplementary Figure S3: Prevalence of SLD (steatotic liver disease), defined as PDFFF $\geq 5.56\%$.



Supplementary Figure S4: Prevalence of SLD (steatotic liver disease), defined as PDFF $\geq 6.4\%$.



Supplementary Figure S5: Hepatic iron according to SLD subcategories.



Subcategory ALD for women not shown due to low prevalence.