

## SUPPLEMENTARY METHODS

### Calculation of NCI comorbidity index

NCI comorbidity index was calculated to measure noncancer comorbidity as follows:  $\text{NCI index} = 1.14 * (\text{Acute Myocardial Infarction}) + 1.08 * (\text{History of Myocardial Infarction}) + 1.91 * (\text{Congestive Heart Failure}) + 1.30 * (\text{Peripheral Vascular Disease}) + 1.32 * (\text{Cerebrovascular Disease}) + 1.69 * (\text{Chronic Obstructive Pulmonary Disease}) + 2.06 * (\text{Dementia}) + 1.49 * (\text{Hemiplegia or Paraplegia}) + 1.60 * (\text{Moderate-Severe Renal Disease}) + 1.08 * (\text{Peptic Ulcer Disease}) + 1.25 * (\text{Rheumatologic Disease}) + 1.79 * (\text{AIDS})$ .

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**SUPPLEMENTARY TABLES**

**Supplementary Table 1. International Classification of Diseases (ICD)-9 and 10 codes for defining the etiologies of HCC, cirrhosis and its complications.**

<b>Etiology</b>	<b>ICD-9 codes</b>	<b>ICD-10 codes</b>	<b>ICD-9 Description</b>	<b>ICD-10 Description</b>
<b>HCV</b>	07041	B1711	Acute hepatitis C with hepatic coma	Acute hepatitis C with hepatic coma
	07044	B182	Chronic hepatitis C with hepatic coma	Chronic viral hepatitis C
	07051	B1710	Acute hepatitis C without mention of hepatic coma	Acute hepatitis C without hepatic coma
	07054	B182	Chronic hepatitis C without mention of hepatic coma	Chronic viral hepatitis C
	0707	NA	Unspecified viral hepatitis C without hepatic coma	NA
	07070	B1920	Unspecified viral hepatitis C without hepatic coma	Unspecified viral hepatitis C without hepatic coma
	07071	B1921	Unspecified viral hepatitis C with hepatic coma	Unspecified viral hepatitis C with hepatic coma
	V0262	Z2252	Hepatitis C carrier	Carrier of viral hepatitis C
<b>HBV</b>	0702	NA	Viral hepatitis b with hepatic coma	NA
	07020	B162 B1911	Viral hepatitis B with hepatic coma, acute or unspecified, without mention of hepatitis delta	Acute hepatitis B without delta-agent with hepatic coma Unspecified viral hepatitis B with hepatic coma
	07021	B160	Viral hepatitis B with hepatic coma, acute or unspecified, with hepatitis delta	Acute hepatitis B with delta-agent with hepatic coma
	07022	B181	Chronic viral hepatitis B with hepatic coma without hepatitis delta	Chronic viral hepatitis B without delta-agent
	07023	B180	Chronic viral hepatitis B with hepatic coma with hepatitis delta	Chronic viral hepatitis B with delta-agent
	0703	NA	Viral hepatitis b without mention of hepatic coma	NA
	07030	B169 B1910	Viral hepatitis B without mention of hepatic coma, acute or unspecified, without mention of hepatitis delta	Acute hepatitis B without delta-agent and without hepatic coma Unspecified viral hepatitis B without hepatic coma
	07031	B161	Viral hepatitis B without mention of hepatic coma, acute or unspecified, with hepatitis delta	Acute hepatitis B with delta-agent without hepatic coma
	07032	B181	Chronic viral hepatitis B without mention of hepatic coma without mention of hepatitis delta	Chronic viral hepatitis B without delta-agent
	07033	B180	Chronic viral hepatitis B without mention of hepatic coma with hepatitis delta	Chronic viral hepatitis B with delta-agent
V0261	Z2251	Hepatitis B carrier	Carrier of viral hepatitis B	
<b>ALD</b>	291	NA	Alcohol-induced mental disorders	NA
	2910	F10231	Alcohol withdrawal delirium	Alcohol dependence with withdrawal delirium
	2911	F1096	Alcohol-induced persisting amnesic disorder	Alcohol use, unspecified with alcohol-induced persisting amnesic disorder
	2912	F1027	Alcohol-induced persisting dementia	Alcohol dependence with alcohol-induced persisting dementia

	2913	F10951	Alcohol-induced psychotic disorder with hallucinations	Alcohol use, unspecified with alcohol-induced psychotic disorder with hallucinations
	2914	F10929	Idiosyncratic alcohol intoxication	Alcohol use, unspecified with intoxication, unspecified
	2915	F10950	Alcohol-induced psychotic disorder with delusions	Alcohol use, unspecified with alcohol-induced psychotic disorder with delusions
	2919	F1099	Unspecified alcohol-induced mental disorders	Alcohol use, unspecified with unspecified alcohol-induced disorder
	3575	G621	Alcoholic polyneuropathy	Alcoholic polyneuropathy
	4255	I426	Alcoholic cardiomyopathy	Alcoholic cardiomyopathy
	5710	K700	Alcoholic fatty liver	Alcoholic fatty liver
	5711	K7010	Acute alcoholic hepatitis	Alcoholic hepatitis without ascites
	5712	K7030	Alcoholic cirrhosis of liver	Alcoholic cirrhosis of liver without ascites
	5713	K709	Alcoholic liver damage, unspecified	Alcoholic liver disease, unspecified
	7903	R780	Excessive blood level of alcohol	Finding of alcohol in blood
	9808	T518X1A	Toxic effect of other specified alcohols	Toxic effect of other alcohols, accidental (unintentional), initial encounter
	9808	T518X2A	Toxic effect of other specified alcohols	Toxic effect of other alcohols, intentional self-harm, initial encounter
	9808	T518X3A	Toxic effect of other specified alcohols	Toxic effect of other alcohols, assault, initial encounter
	9808	T518X4A	Toxic effect of other specified alcohols	Toxic effect of other alcohols, undetermined, initial encounter
	9809	T5191XA	Toxic effect of unspecified alcohol	Toxic effect of unspecified alcohol, accidental (unintentional), initial encounter
	9809	T5192XA	Toxic effect of other specified alcohols	Toxic effect of unspecified alcohol, intentional self-harm, initial encounter
	9809	T5193XA	Toxic effect of other specified alcohols	Toxic effect of unspecified alcohol, assault, initial encounter
	9809	T5194XA	Toxic effect of other specified alcohols	Toxic effect of unspecified alcohol, undetermined, initial encounter
	29181	F10239	Alcohol withdrawal	Alcohol dependence with withdrawal, unspecified
	29182	F10182	Alcohol induced sleep disorders	Alcohol abuse with alcohol-induced sleep disorder
	29182	F10282	Alcohol induced sleep disorders	Alcohol dependence with alcohol-induced sleep disorder
	29182	F10982	Alcohol induced sleep disorders	Alcohol use, unspecified with alcohol-induced sleep disorder
	29189	F10159	Other alcohol-induced mental disorders	Alcohol abuse with alcohol-induced psychotic disorder, unspecified
	29189	F10180	Other alcohol-induced mental disorders	Alcohol abuse with alcohol-induced anxiety disorder
	29189	F10181	Other alcohol-induced mental disorders	Alcohol abuse with alcohol-induced sexual dysfunction
	29189	F10188	Other alcohol-induced mental disorders	Alcohol abuse with other alcohol-induced disorder
	29189	F10259	Other alcohol-induced mental disorders	Alcohol dependence with alcohol-induced psychotic disorder, unspecified
	29189	F10280	Other alcohol-induced mental disorders	Alcohol dependence with alcohol-induced anxiety disorder

	29189	F10281	Other alcohol-induced mental disorders	Alcohol dependence with alcohol-induced sexual dysfunction
	29189	F10288	Other alcohol-induced mental disorders	Alcohol dependence with other alcohol-induced disorder
	29189	F10959	Other alcohol-induced mental disorders	Alcohol use, unspecified with alcohol-induced psychotic disorder, unspecified
	29189	F10980	Other alcohol-induced mental disorders	Alcohol use, unspecified with alcohol-induced anxiety disorder
	303	NA	Alcohol dependence syndrome	NA
	30300	F10229	Acute alcoholic intoxication in alcoholism, unspecified	Alcohol dependence with intoxication, unspecified
	30301	F10229	Acute alcoholic intoxication in alcoholism, continuous	Alcohol dependence with intoxication, unspecified
	30302	F10229	Acute alcoholic intoxication in alcoholism, episodic	Alcohol dependence with intoxication, unspecified
	30303	F10229	Acute alcoholic intoxication in alcoholism, in remission	Alcohol dependence with intoxication, unspecified
	3039	NA	Other and unspecified alcohol dependence	NA
	30390	F1020	Other and unspecified alcohol dependence, unspecified	Alcohol dependence, uncomplicated
	30391	F1020	Other and unspecified alcohol dependence, continuous	Alcohol dependence, uncomplicated
	30392	F1020	Other and unspecified alcohol dependence, episodic	Alcohol dependence, uncomplicated
	30393	F1021	Other and unspecified alcohol dependence, in remission	Alcohol dependence, in remission
	30500	F1010	Alcohol abuse, unspecified	Alcohol abuse, uncomplicated
	30501	F1010	Alcohol abuse, continuous	Alcohol abuse, uncomplicated
	30502	F1010	Alcohol abuse, episodic	Alcohol abuse, uncomplicated
	30503	F1011	Alcohol abuse, in remission	Alcohol abuse, in remission
	53530	K2920	Alcoholic gastritis, without mention of hemorrhage	Alcoholic gastritis without bleeding
	53531	K2921	Alcoholic gastritis, with hemorrhage	Alcoholic gastritis with bleeding
	E8600	NoDx	Accidental poisoning by alcoholic beverages	NA
	E8608	NoDx	Accidental poisoning by other specified alcohols	NA
	E8609	NoDx	Accidental poisoning by unspecified alcohol	NA
	V113	Z658	Personal history of alcoholism	Other specified problems related to psychosocial circumstances
<b>Others</b>				
Alpha-1-antitrypsin deficiency	2734	E8801	Alpha-1-antitrypsin deficiency	Alpha-1-antitrypsin deficiency
Disorders of iron metabolism	2750	NA	Disorders of iron metabolism	NA
Disorders of copper metabolism	2751	E8300 E8301 E8309	Disorders of copper metabolism	Disorder of copper metabolism, unspecified Wilson's disease Other disorders of copper metabolism
Disorders of porphyrin metabolism	2771	E800 E8020 E8029	Disorders of porphyrin metabolism	Hereditary erythropoietic porphyria Unspecified porphyria Other porphyria

Hereditary hemochromatosis	27501	E83110	Hereditary hemochromatosis	Hereditary hemochromatosis
Hemochromatosis due to repeated red blood cell transfusions	27502	E83111	Hemochromatosis due to repeated red blood cell transfusions	Hemochromatosis due to repeated red blood cell transfusions
Other hemochromatosis	27503	E83118 E83119	Other hemochromatosis	Other hemochromatosis Hemochromatosis, unspecified
Other specified diseases of liver	NA	K7689	NA	Other specified diseases of liver
Autoimmune hepatitis	571.42	K75.2-4	Autoimmune hepatitis	Autoimmune hepatitis
a1 antitrypsin	273.4	E88	a1 antitrypsin	a1 antitrypsin
Primary sclerosing cholangitis	NA	K83.01	NA	Primary sclerosing cholangitis
<b>NAFLD*</b>	NA	K760	NA	Fatty (change of) liver, not elsewhere classified
	NA	K7581	NA	nonalcoholic steatohepatitis
	2724	E784	Other and unspecified hyperlipidemia	Other hyperlipidemia
	2724	E785	Other and unspecified hyperlipidemia	Hyperlipidemia, unspecified
	4010	I10	Malignant essential hypertension	Essential (primary) hypertension
	4011	I10	Benign essential hypertension	Essential (primary) hypertension
	4019	I10	Unspecified essential hypertension	Essential (primary) hypertension
	4019	I169	Unspecified essential hypertension	Hypertensive crisis, unspecified
	40501	I150	Malignant renovascular hypertension	Renovascular hypertension
	40511	I150	Benign renovascular hypertension	Renovascular hypertension
	40519	I158	Other benign secondary hypertension	Other secondary hypertension
	40591	I150	Unspecified renovascular hypertension	Renovascular hypertension
	40599	I158	Other unspecified secondary hypertension	Other secondary hypertension
	278	NA	Overweight, obesity and other hyperalimentation	NA
	2501	NA	Diabetes with ketoacidosis	NA
	2502	NA	Diabetes with hyperosmolarity	NA
	2503	NA	Diabetes with other coma	NA
	2504	NA	Diabetes with renal manifestations	NA
	2505	NA	Diabetes with ophthalmic manifestations	NA
	2506	NA	Diabetes with neurological manifestations	NA
	2507	NA	Diabetes with peripheral circulatory disorders	NA
	2508	NA	Diabetes with other specified manifestations	NA
	2509	NA	Diabetes with unspecified complication	NA
	2777	E8881	Dysmetabolic syndrome X	Metabolic syndrome
	2780	NA	Overweight and obesity	NA

	25000	E119	Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus without complications
	25002	E1165	Diabetes mellitus without mention of complication, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25010	E1110	Diabetes with ketoacidosis, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with ketoacidosis without coma
	25010	E1169	Diabetes with ketoacidosis, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other specified complication
	25010	E1310	Diabetes with ketoacidosis, type II or unspecified type, not stated as uncontrolled	Other specified diabetes mellitus with ketoacidosis without coma
	25012	E1110	Diabetes with ketoacidosis, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with ketoacidosis without coma
	25012	E1165	Diabetes with ketoacidosis, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25012	E1169	Diabetes with ketoacidosis, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with other specified complication
	25012	E1310	Diabetes with ketoacidosis, type II or unspecified type, uncontrolled	Other specified diabetes mellitus with ketoacidosis without coma
	25020	E1100	Diabetes with hyperosmolarity, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
	25020	E1101	Diabetes with hyperosmolarity, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with hyperosmolarity with coma
	25022	E1100	Diabetes with hyperosmolarity, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC)
	25022	E1165	Diabetes with hyperosmolarity, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25030	E1111	Diabetes with other coma, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with ketoacidosis with coma
	25030	E11641	Diabetes with other coma, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with hypoglycemia with coma
	25032	E1101	Diabetes with other coma, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperosmolarity with coma
	25032	E1165	Diabetes with other coma, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25040	E1129	Diabetes with renal manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other diabetic kidney complication
	25042	E1121	Diabetes with renal manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with diabetic nephropathy
	25042	E1165	Diabetes with renal manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25050	E11311	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema

	25050	E11319	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema
	25050	E1136	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with diabetic cataract
	25050	E1139	Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other diabetic ophthalmic complication
	25052	E11311	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with unspecified diabetic retinopathy with macular edema
	25052	E11319	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with unspecified diabetic retinopathy without macular edema
	25052	E1136	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with diabetic cataract
	25052	E1139	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with other diabetic ophthalmic complication
	25052	E1165	Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25060	E1140	Diabetes with neurological manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with diabetic neuropathy, unspecified
	25062	E1140	Diabetes with neurological manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with diabetic neuropathy, unspecified
	25062	E1165	Diabetes with neurological manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25070	E1151	Diabetes with peripheral circulatory disorders, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene
	25072	E1151	Diabetes with peripheral circulatory disorders, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene
	25072	E1165	Diabetes with peripheral circulatory disorders, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25080	E11618	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other diabetic arthropathy
	25080	E11620	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with diabetic dermatitis
	25080	E11621	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with foot ulcer
	25080	E11622	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other skin ulcer
	25080	E11628	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other skin complications
	25080	E11630	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with periodontal disease
	25080	E11638	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other oral complications

	25080	E11649	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with hypoglycemia without coma
	25080	E1165	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25080	E1169	Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with other specified complication
	25082	E1165	Diabetes with other specified manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25082	E1169	Diabetes with other specified manifestations, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with other specified complication
	25090	E118	Diabetes with unspecified complication, type II or unspecified type, not stated as uncontrolled	Type 2 diabetes mellitus with unspecified complications
	25092	E1165	Diabetes with unspecified complication, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with hyperglycemia
	25092	E118	Diabetes with unspecified complication, type II or unspecified type, uncontrolled	Type 2 diabetes mellitus with unspecified complications
	27800	E669	Obesity, unspecified	Obesity, unspecified
	27801	E6601	Morbid obesity	Morbid (severe) obesity due to excess calories
	27803	E662	Obesity hypoventilation syndrome	Morbid (severe) obesity with alveolar hypoventilation
	V4586	Z9884	Bariatric surgery status	Bariatric surgery status
	V8530	Z6830	Body Mass Index 30.0-30.9, adult	Body mass index (BMI) 30.0-30.9, adult
	V8531	Z6831	Body Mass Index 31.0-31.9, adult	Body mass index (BMI) 31.0-31.9, adult
	V8532	Z6832	Body Mass Index 32.0-32.9, adult	Body mass index (BMI) 32.0-32.9, adult
	V8533	Z6833	Body Mass Index 33.0-33.9, adult	Body mass index (BMI) 33.0-33.9, adult
	V8534	Z6834	Body Mass Index 34.0-34.9, adult	Body mass index (BMI) 34.0-34.9, adult
	V8535	Z6835	Body Mass Index 35.0-35.9, adult	Body mass index (BMI) 35.0-35.9, adult
	V8536	Z6836	Body Mass Index 36.0-36.9, adult	Body mass index (BMI) 36.0-36.9, adult
	V8537	Z6837	Body Mass Index 37.0-37.9, adult	Body mass index (BMI) 37.0-37.9, adult
	V8538	Z6838	Body Mass Index 38.0-38.9, adult	Body mass index (BMI) 38.0-38.9, adult
	V8539	Z6839	Body Mass Index 39.0-39.9, adult	Body mass index (BMI) 39.0-39.9, adult
	V854	NA	Body mass index 40 and over, adult	NA
	V8541	Z6841	Body Mass Index 40.0-44.9, adult	Body mass index (BMI) 40.0-44.9, adult
	V8542	Z6842	Body Mass Index 45.0-49.9, adult	Body mass index (BMI) 45.0-49.9, adult
	V8543	Z6843	Body Mass Index 50.0-59.9, adult	Body mass index (BMI) 50-59.9 , adult
	V8544	Z6844	Body Mass Index 60.0-69.9, adult	Body mass index (BMI) 60.0-69.9, adult
	V8545	Z6845	Body Mass Index 70 and over, adult	Body mass index (BMI) 70 or greater, adult
<b>Clinical characteristics</b>	<b>ICD-9 codes</b>	<b>ICD-10 codes</b>	<b>ICD-9 Description</b>	<b>ICD-10 Description</b>
<b>Cirrhosis</b>	5712	K7030	Alcoholic cirrhosis of liver	Alcoholic cirrhosis of liver without ascites
	5715	K7460 K7469	Cirrhosis of liver without mention of alcohol	Unspecified cirrhosis of liver Other cirrhosis of liver
	5716	K743	Biliary cirrhosis	Primary biliary cirrhosis



		K744 K745		Secondary biliary cirrhosis Biliary cirrhosis, unspecified
	5724	K767	Hepatorenal syndrome	Hepatorenal syndrome
	7824	R17	Jaundice, unspecified, not of newborn	Unspecified jaundice
	56723	K652	Spontaneous bacterial peritonitis	Spontaneous bacterial peritonitis
	5723	K766	Portal hypertension	Portal hypertension
	456	NA	Varicose veins of other sites	NA
	4560	I8501	Esophageal varices with bleeding	Esophageal varices with bleeding
	4561	I8500	Esophageal varices without mention of bleeding	Esophageal varices without bleeding
	4562	NA	Esophageal varices in diseases classified elsewhere	NA
	45620	I8511	Esophageal varices in diseases classified elsewhere, with bleeding	Secondary esophageal varices with bleeding
	45621	I8510	Esophageal varices in diseases classified elsewhere, without mention of bleeding	Secondary esophageal varices without bleeding
	NA	K717	NA	Toxic liver disease with fibrosis and cirrhosis of liver
	NA	K721	NA	Chronic hepatic failure
	NA	K729	NA	Hepatic failure, unspecified
	NA	I982	NA	Oesophageal varices without bleeding in diseases classified elsewhere
	NA	I983	NA	Oesophageal varices with bleeding in diseases classified elsewhere
<b>Ascites</b>	78951	R180	Malignant ascites	Malignant ascites
	78959	R188	Other ascites	Other ascites
<b>Hepatic encephalopathy</b>	5722	K7290 K7291	Hepatic encephalopathy	Hepatic failure, unspecified without coma Hepatic failure, unspecified with coma

\*NAFLD was defined with ICD-10 codes (K760, K7581). As NAFLD is often under-coded, it was also defined with ICD-9 or 10 code for obesity, diabetes, history of bariatric surgery or both dyslipidemia and hypertension in the absence of HBV, HCV, alcohol abuse, and other known liver disease.

ALD, alcoholic liver disease; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; NAFLD, nonalcoholic fatty liver disease.



Metro 250k to 1 million	0.79 (0.64 to 0.97)	0.03	0.84 (0.67 to 1.05)	0.13	1.00 (0.84 to 1.20)	0.96	1.06 (0.87 to 1.28)	0.58
Metro < 250k	0.58 (0.41 to 0.83)	0.002	0.70 (0.49 to 1.01)	0.06	1.06 (0.81 to 1.39)	0.67	1.19 (0.90 to 1.59)	0.22
Non-Metro/Rural	0.57 (0.43 to 0.77)	<0.001	0.78 (0.57 to 1.06)	0.11	0.78 (0.63 to 0.97)	0.03	0.98 (0.77 to 1.24)	0.85
<b>NCI comorbidity index</b>								
Low (0 to 2)	ref	ref	ref	ref	ref	Ref	ref	ref
Moderate (>2 to 4)	0.75 (0.58 to 0.96)	0.02	0.82 (0.63 to 1.07)	0.15	1.15 (0.94 to 1.42)	0.18	1.27 (1.03 to 1.58)	0.03
High (>4)	0.88 (0.67 to 1.15)	0.34	1.10 (0.82 to 1.47)	0.53	1.38 (1.08 to 1.76)	0.009	1.63 (1.26 to 2.11)	<0.001
<b>Etiology</b>								
HCV	ref	ref	ref	ref	ref	Ref	ref	ref
NAFLD	0.22 (0.17 to 0.28)	<0.001	0.24 (0.19 to 0.32)	<0.001	0.38 (0.32 to 0.45)	<0.001	0.34 (0.28 to 0.41)	<0.001
ALD	0.47 (0.38 to 0.59)	<0.001	0.56 (0.44 to 0.71)	<0.001	0.66 (0.54 to 0.80)	<0.001	0.65 (0.53 to 0.80)	<0.001
HBV	0.87 (0.62 to 1.21)	0.41	0.77 (0.54 to 1.10)	0.15	0.69 (0.49 to 0.96)	0.03	0.71 (0.50 to 1.01)	0.054
Others/None	0.33 (0.22 to 0.51)	<0.001	0.39 (0.25 to 0.60)	<0.001	0.38 (0.29 to 0.51)	<0.001	0.44 (0.32 to 0.59)	<0.001
<b>Diabetes</b>	1.02 (0.86 to 1.22)	0.79	1.24 (1.02 to 1.51)	0.03	1.37 (1.18 to 1.59)	<0.001	1.60 (1.35 to 1.89)	<0.001
<b>Ascites</b>	0.81 (0.69 to 0.96)	0.01	0.78 (0.65 to 0.93)	0.005	0.75 (0.65 to 0.86)	<0.001	0.69 (0.59 to 0.80)	<0.001
<b>Hepatic encephalopathy</b>	1.68 (1.40 to 2.00)	<0.001	1.67 (1.37 to 2.03)	<0.001	1.56 (1.31 to 1.86)	<0.001	1.40 (1.16 to 1.69)	<0.001

ALD, alcoholic liver disease; API, Asian/Pacific Islander; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; Metro, metropolitan; NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.



Metro 250k to 1 million	1.03 (0.62 to 1.71)	0.91	1.08 (0.64 to 1.83)	0.77	0.99 (0.78 to 1.25)	0.91	1.03 (0.81 to 1.31)	0.81
Metro < 250k	0.52 (0.21 to 1.33)	0.17	0.48 (0.19 to 1.26)	0.14	1.08 (0.78 to 1.51)	0.64	1.14 (0.80 to 1.60)	0.47
Non-Metro/Rural	0.83 (0.45 to 1.54)	0.56	0.82 (0.43 to 1.59)	0.56	0.87 (0.66 to 1.13)	0.29	0.93 (0.70 to 1.23)	0.60
<b>NCI comorbidity index</b>								
Low (0 to 2)	ref	ref	ref	ref	ref	Ref	ref	ref
Moderate (>2 to 4)	0.87 (0.48 to 1.56)	0.63	0.87 (0.47 to 1.60)	0.65	1.39 (1.08 to 1.79)	0.01	1.40 (1.08 to 1.83)	0.01
High (>4)	1.11 (0.61 to 2.00)	0.73	1.11 (0.60 to 2.07)	0.74	1.49 (1.12 to 1.97)	0.006	1.50 (1.12 to 2.01)	0.006
<b>Diabetes</b>	1.07 (0.60 to 1.92)	0.81	0.82 (0.44 to 1.50)	0.51	1.34 (1.04 to 1.73)	0.02	1.21 (0.93 to 1.57)	0.17
<b>Cirrhosis</b>	6.02 (3.19 to 11.37)	<0.001	4.93 (2.44 to 9.97)	<0.001	1.70 (1.41 to 2.05)	<0.001	1.80 (1.40 to 2.32)	<0.001
<b>Ascites</b>	2.13 (1.41 to 3.21)	<0.001	0.91 (0.57 to 1.44)	0.68	1.20 (0.99 to 1.45)	0.07	0.73 (0.56 to 0.94)	0.02
<b>Hepatic encephalopathy</b>	3.11 (1.89 to 5.11)	<0.001	1.76 (1.03 to 2.98)	0.04	1.93 (1.39 to 2.67)	<0.001	1.44 (1.02 to 2.04)	0.04

API, Asian/Pacific Islander; HCC, hepatocellular carcinoma; Metro, metropolitan; NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

**Supplementary Table 4. Factors associated with early-stage HCC detection and curative treatment receipt among NAFLD patients.**

Characteristics	Early-stage HCC (Single & ≤5 cm tumor)				Curative treatments			
	Univariate analysis		Multivariable analysis		Univariate analysis		Multivariable analysis	
	OR (95% CI)	P value	aOR (95% CI)	P value	OR (95% CI)	P value	aOR (95% CI)	P value
<b>Female Sex</b> (Ref. Male)	1.44 (1.09 to 1.90)	0.01	1.42 (1.06 to 1.89)	0.02	1.09 (0.85 to 1.40)	0.52	1.06 (0.81 to 1.39)	0.67
<b>Age</b>	0.97 (0.94 to 0.99)	0.002	0.97 (0.94 to 0.99)	0.003	0.94 (0.92 to 0.96)	<0.001	0.94 (0.92 to 0.96)	<0.001
<b>Race/ethnicity</b>								
Non-Hispanic White	ref	ref	ref	ref	ref	ref	ref	ref
Non-Hispanic Black	0.30 (0.09 to 0.96)	0.04	0.26 (0.08 to 0.83)	0.02	0.50 (0.23 to 1.10)	0.08	0.49 (0.21 to 1.11)	0.09
Non-Hispanic API/Others	0.77 (0.48 to 1.25)	0.29	0.73 (0.45 to 1.20)	0.21	1.04 (0.71 to 1.52)	0.84	1.14 (0.76 to 1.70)	0.54
Hispanic	1.56 (1.07 to 2.30)	0.02	1.32 (0.88 to 1.98)	0.19	0.99 (0.68 to 1.45)	0.96	0.82 (0.54 to 1.24)	0.35
<b>Census Poverty Level</b>								
<5%	ref	ref	ref	ref	ref	Ref	ref	ref
5% to <10%	1.07 (0.70 to 1.64)	0.76	1.13 (0.73 to 1.75)	0.57	0.74 (0.52 to 1.05)	0.09	0.72 (0.50 to 1.05)	0.08
10% to <20%	1.27 (0.85 to 1.90)	0.24	1.29 (0.85 to 1.95)	0.23	0.70 (0.50 to 0.98)	0.04	0.63 (0.44 to 0.91)	0.01
20% to 100%	1.17 (0.76 to 1.79)	0.47	1.20 (0.76 to 1.90)	0.42	0.86 (0.61 to 1.22)	0.41	0.84 (0.57 to 1.23)	0.37
<b>Rural-Urban</b>								
Metro > 1 million	ref	ref	ref	ref	ref	ref	Ref	ref

Metro 250k to 1 million	1.12 (0.80 to 1.57)	0.52	1.10 (0.78 to 1.55)	0.60	1.00 (0.74 to 1.36)	0.99	0.95 (0.69 to 1.31)	0.74
Metro < 250k	0.60 (0.34 to 1.07)	0.08	0.54 (0.30 to 0.97)	0.04	0.92 (0.60 to 1.43)	0.72	0.98 (0.62 to 1.56)	0.94
Non-Metro/Rural	0.85 (0.56 to 1.28)	0.44	0.77 (0.50 to 1.18)	0.23	0.88 (0.62 to 1.26)	0.50	0.85 (0.58 to 1.26)	0.42
<b>NCI comorbidity index</b>								
Low (0 to 2)	ref	ref	ref	ref	Ref	Ref	ref	ref
Moderate (>2 to 4)	0.70 (0.46 to 1.05)	0.08	0.72 (0.47 to 1.10)	0.13	0.75 (0.53 to 1.05)	0.09	0.83 (0.58 to 1.18)	0.30
High (>4)	0.91 (0.60 to 1.37)	0.64	0.99 (0.65 to 1.53)	0.98	0.41 (0.26 to 0.65)	<0.001	0.43 (0.27 to 0.70)	0.001
<b>Diabetes</b>	1.05 (0.72 to 1.54)	0.80	1.00 (0.67 to 1.49)	0.99	0.96 (0.69 to 1.34)	0.83	1.01 (0.71 to 1.43)	0.97
<b>Cirrhosis</b>	1.13 (0.85 to 1.49)	0.40	1.44 (1.02 to 2.02)	0.04	0.93 (0.73 to 1.19)	0.58	1.14 (0.83 to 1.56)	0.42
<b>Ascites</b>	0.68 (0.50 to 0.93)	0.01	0.51 (0.35 to 0.73)	<0.001	0.64 (0.49 to 0.84)	0.001	0.61 (0.43 to 0.86)	0.004
<b>Hepatic encephalopathy</b>	1.14 (0.74 to 1.77)	0.55	1.09 (0.68 to 1.76)	0.71	0.95 (0.63 to 1.43)	0.81	1.02 (0.65 to 1.59)	0.95
<b>Early-stage HCC (Single &amp; ≤5 cm tumor)</b>	N/A	N/A	N/A	N/A	3.68 (2.74 to 4.96)	<0.001	3.45 (2.53 to 4.70)	<0.001

API, Asian/Pacific Islander; HCC, hepatocellular carcinoma; Metro, metropolitan; NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

**Supplementary Table 5. Factors associated with overall survival among NAFLD patients.**

Characteristics	Univariate analysis		Multivariable analysis	
	HR (95% CI)	P value	aHR (95% CI)	P value
<b>Female Sex</b> (Ref. Male)	0.93 (0.83 to 1.04)	0.22	1.00 (0.88 to 1.13)	0.99
<b>Age</b>	1.02 (1.01 to 1.03)	<0.001	1.01 (1.00 to 1.02)	0.005
<b>Race/ethnicity</b>				
Non-Hispanic White	ref	ref	ref	ref
Non-Hispanic Black	1.17 (0.87 to 1.57)	0.31	1.02 (0.75 to 1.39)	0.89
Non-Hispanic API/Others	0.89 (0.74 to 1.06)	0.20	0.85 (0.71 to 1.03)	0.09
Hispanic	0.93 (0.78 to 1.10)	0.38	0.82 (0.68 to 0.98)	0.03
<b>Census Poverty Level</b>				
<5%	Ref	ref	ref	ref
5% to <10%	1.12 (0.95 to 1.32)	0.18	1.11 (0.94 to 1.32)	0.21
10% to <20%	1.12 (0.96 to 1.32)	0.15	1.09 (0.92 to 1.28)	0.31
20% to 100%	1.11 (0.94 to 1.32)	0.22	1.22 (1.02 to 1.47)	0.03
<b>Rural-Urban</b>				
Metro > 1 million	ref	ref	ref	ref
Metro 250k to 1 million	1.09 (0.95 to 1.26)	0.21	1.13 (0.98 to 1.31)	0.09
Metro < 250k	0.95 (0.78 to 1.17)	0.64	0.84 (0.68 to 1.03)	0.09



Non-Metro/Rural	1.10 (0.94 to 1.30)	0.22	1.01 (0.85 to 1.19)	0.93
<b>NCI comorbidity index</b>				
Low (0 to 2)	Ref	ref	ref	Ref
Moderate (>2 to 4)	1.18 (1.01 to 1.37)	0.04	1.06 (0.91 to 1.24)	0.43
High (>4)	1.40 (1.18 to 1.66)	<0.001	1.11 (0.93 to 1.33)	0.24
<b>Diabetes</b>	1.05 (0.90 to 1.22)	0.52	1.05 (0.89 to 1.22)	0.58
<b>Cirrhosis</b>	1.23 (1.10 to 1.38)	<0.001	1.01 (0.87 to 1.17)	0.87
<b>Ascites</b>	1.79 (1.59 to 2.01)	<0.001	1.86 (1.59 to 2.17)	<0.001
<b>Hepatic encephalopathy</b>	1.69 (1.41 to 2.03)	<0.001	1.66 (1.36 to 2.02)	<0.001
<b>Surveillance</b>				
No	ref	ref	Ref	ref
Inconsistent	0.69 (0.61 to 0.77)	<0.001	0.75 (0.67 to 0.85)	<0.001
Consistent	0.53 (0.41 to 0.68)	<0.001	0.53 (0.40 to 0.69)	<0.001
<b>Early-stage HCC (Single &amp; ≤5 cm tumor)</b>	0.44 (0.37 to 0.52)	<0.001	0.54 (0.45 to 0.64)	<0.001
<b>Curative treatments</b>	0.24 (0.20 to 0.28)	<0.001	0.25 (0.21 to 0.30)	<0.001

API, Asian/Pacific Islander; HCC, hepatocellular carcinoma; Metro, metropolitan; NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.



Metro 250k to 1 million	0.73 (0.58 to 0.91)	0.005	0.83 (0.65 to 1.05)	0.12	0.88 (0.75 to 1.04)	0.13	0.96 (0.80 to 1.14)	0.63
Metro < 250k	0.50 (0.35 to 0.72)	<0.001	0.62 (0.42 to 0.91)	0.01	0.89 (0.70 to 1.13)	0.34	1.01 (0.79 to 1.30)	0.93
Non-Metro/Rural	0.54 (0.40 to 0.73)	<0.001	0.75 (0.54 to 1.04)	0.08	0.68 (0.56 to 0.83)	<0.001	0.83 (0.67 to 1.04)	0.10
<b>NCI comorbidity index</b>								
Low (0 to 2)	ref	ref	ref	ref	ref	Ref	ref	ref
Moderate (>2 to 4)	0.75 (0.59 to 0.96)	0.02	0.82 (0.63 to 1.08)	0.16	1.17 (0.98 to 1.40)	0.09	1.30 (1.07 to 1.57)	0.008
High (>4)	0.80 (0.61 to 1.05)	0.11	0.99 (0.74 to 1.33)	0.96	1.25 (1.02 to 1.53)	0.03	1.45 (1.17 to 1.81)	0.001
<b>Etiology</b>								
NAFLD without co-existing liver disease	ref	ref	ref	ref	ref	Ref	ref	ref
NAFLD with HCV	6.89 (5.43 to 8.75)	<0.001	4.37 (3.38 to 5.65)	<0.001	3.39 (2.88 to 3.98)	<0.001	2.63 (2.19 to 3.16)	<0.001
NAFLD with HBV	6.09 (4.15 to 8.93)	<0.001	3.44 (2.27 to 5.23)	<0.001	2.50 (1.79 to 3.50)	<0.001	1.92 (1.33 to 2.75)	<0.001
NAFLD with ALD	3.28 (2.47 to 4.35)	<0.001	2.50 (1.85 to 3.37)	<0.001	2.37 (1.97 to 2.85)	<0.001	1.91 (1.56 to 2.33)	<0.001
NAFLD with Others/None	3.03 (1.83 to 5.02)	<0.001	2.38 (1.41 to 4.02)	0.001	2.46 (1.68 to 3.61)	<0.001	2.20 (1.49 to 3.26)	<0.001
<b>Diabetes</b>	1.03 (0.83 to 1.29)	0.77	1.03 (0.81 to 1.31)	0.84	1.12 (0.95 to 1.33)	0.18	1.09 (0.91 to 1.31)	0.34
<b>Cirrhosis</b>	6.28 (4.49 to 8.78)	<0.001	3.32 (2.30 to 4.79)	<0.001	2.62 (2.27 to 3.02)	<0.001	1.93 (1.60 to 2.32)	<0.001
<b>Ascites</b>	1.48 (1.25 to 1.75)	<0.001	0.83 (0.68 to 1.01)	0.06	1.33 (1.17 to 1.52)	<0.001	0.74 (0.62 to 0.87)	<0.001
<b>Hepatic encephalopathy</b>	2.42 (2.00 to 2.93)	<0.001	1.76 (1.42 to 2.17)	<0.001	2.23 (1.84 to 2.70)	<0.001	1.54 (1.25 to 1.90)	<0.001

ALD, alcoholic liver disease; API, Asian/Pacific Islander; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; Metro, metropolitan;

NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

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Metro > 1 million	ref	ref	ref	ref	ref	ref	Ref	ref
Metro 250k to 1 million	0.90 (0.74 to 1.09)	0.28	0.92 (0.75 to 1.13)	0.45	1.02 (0.85 to 1.22)	0.83	1.07 (0.88 to 1.30)	0.50
Metro < 250k	0.71 (0.53 to 0.96)	0.03	0.74 (0.54 to 1.02)	0.07	0.74 (0.56 to 0.97)	0.03	0.87 (0.65 to 1.18)	0.38
Non-Metro/Rural	0.71 (0.54 to 0.91)	0.008	0.76 (0.57 to 1.00)	0.048	0.71 (0.56 to 0.91)	0.006	0.79 (0.60 to 1.03)	0.09
<b>NCI comorbidity index</b>								
Low (0 to 2)	ref	ref	ref	ref	Ref	Ref	ref	ref
Moderate (>2 to 4)	0.74 (0.59 to 0.93)	0.009	0.80 (0.63 to 1.01)	0.06	0.64 (0.52 to 0.80)	<0.001	0.77 (0.61 to 0.96)	0.02
High (>4)	0.92 (0.73 to 1.17)	0.52	1.07 (0.83 to 1.38)	0.59	0.39 (0.30 to 0.52)	<0.001	0.47 (0.35 to 0.63)	<0.001
<b>Etiology</b>								
NAFLD without co-existing liver disease	Ref	ref	ref	ref	ref	Ref	ref	ref
NAFLD with HCV	2.15 (1.79 to 2.59)	<0.001	1.91 (1.55 to 2.36)	<0.001	1.80 (1.52 to 2.14)	<0.001	1.34 (1.09 to 1.65)	0.005
NAFLD with HBV	2.41 (1.70 to 3.42)	<0.001	2.07 (1.42 to 3.03)	<0.001	3.07 (2.25 to 4.20)	<0.001	1.93 (1.34 to 2.77)	<0.001
NAFLD with ALD	1.82 (1.46 to 2.27)	<0.001	1.79 (1.41 to 2.28)	<0.001	1.26 (1.02 to 1.55)	0.03	1.08 (0.85 to 1.37)	0.52
NAFLD with Others/None	2.30 (1.55 to 3.42)	<0.001	2.08 (1.39 to 3.13)	<0.001	2.51 (1.75 to 3.60)	<0.001	1.97 (1.34 to 2.91)	0.001
<b>Diabetes</b>	0.92 (0.76 to 1.13)	0.44	0.97 (0.79 to 1.19)	0.78	0.86 (0.72 to 1.03)	0.11	0.94 (0.77 to 1.14)	0.52
<b>Cirrhosis</b>	1.73 (1.42 to 2.11)	<0.001	1.69 (1.34 to 2.13)	<0.001	1.22 (1.02 to 1.44)	0.03	1.21 (0.97 to 1.50)	0.09
<b>Ascites</b>	0.77 (0.66 to 0.90)	0.001	0.56 (0.47 to 0.67)	<0.001	0.60 (0.52 to 0.70)	<0.001	0.56 (0.47 to 0.67)	<0.001
<b>Hepatic encephalopathy</b>	1.10 (0.90 to 1.34)	0.34	1.00 (0.81 to 1.24)	1.00	0.77 (0.63 to 0.93)	0.008	0.77 (0.62 to 0.97)	0.02

<b>Early-stage HCC (Single &amp; ≤5 cm tumor)</b>	N/A	N/A	N/A	N/A	3.66 (3.11 to 4.31)	<0.001	3.28 (2.75 to 3.90)	<0.001
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ALD, alcoholic liver disease; API, Asian/Pacific Islander; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; Metro, metropolitan;

NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

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**Supplementary Table 8. Factors associated with overall survival among patients with NAFLD alone vs. NAFLD with coexisting liver diseases.**

Characteristics	Univariate analysis		Multivariable analysis	
	HR (95% CI)	P value	aHR (95% CI)	P value
<b>Female Sex</b> (Ref. Male)	0.89 (0.82 to 0.96)	0.004	0.93 (0.86 to 1.01)	0.10
<b>Age</b>	1.02 (1.02 to 1.03)	<0.001	1.01 (1.01 to 1.02)	<0.001
<b>Race/ethnicity</b>				
Non-Hispanic White	ref	ref	ref	ref
Non-Hispanic Black	0.98 (0.85 to 1.14)	0.82	0.99 (0.84 to 1.15)	0.86
Non-Hispanic API/Others	0.65 (0.58 to 0.72)	<0.001	0.83 (0.74 to 0.93)	0.001
Hispanic	0.93 (0.83 to 1.03)	0.18	0.85 (0.76 to 0.95)	0.004
<b>Census Poverty Level</b>				
<5%	ref	ref	ref	ref
5% to <10%	1.14 (1.02 to 1.27)	0.02	1.06 (0.95 to 1.18)	0.30
10% to <20%	1.13 (1.01 to 1.25)	0.03	1.08 (0.97 to 1.20)	0.17
20% to 100%	1.11 (1.00 to 1.24)	0.06	1.11 (0.98 to 1.24)	0.09
<b>Rural-Urban</b>				
Metro > 1 million	ref	ref	ref	ref
Metro 250k to 1 million	1.17 (1.07 to 1.29)	0.001	1.18 (1.08 to 1.30)	0.001
Metro < 250k	1.26 (1.10 to 1.43)	0.001	1.06 (0.93 to 1.22)	0.37



Non-Metro/Rural	1.31 (1.17 to 1.46)	<0.001	1.12 (0.99 to 1.26)	0.07
<b>NCI comorbidity index</b>				
Low (0 to 2)	ref	ref	ref	ref
Moderate (>2 to 4)	1.24 (1.12 to 1.37)	<0.001	1.09 (0.99 to 1.21)	0.08
High (>4)	1.57 (1.40 to 1.76)	<0.001	1.26 (1.12 to 1.41)	<0.001
<b>Etiology</b>				
NAFLD without co-existing liver disease	ref	ref	ref	ref
NAFLD with HCV	0.75 (0.69 to 0.82)	<0.001	0.84 (0.76 to 0.93)	0.001
NAFLD with HBV	0.61 (0.51 to 0.74)	<0.001	0.88 (0.72 to 1.07)	0.20
NAFLD with ALD	0.98 (0.89 to 1.08)	0.71	0.91 (0.81 to 1.01)	0.08
NAFLD with Others/None	0.58 (0.46 to 0.73)	<0.001	0.66 (0.52 to 0.83)	<0.001
<b>Diabetes</b>	1.14 (1.03 to 1.25)	0.009	1.05 (0.95 to 1.16)	0.35
<b>Cirrhosis</b>	1.05 (0.97 to 1.15)	0.22	1.00 (0.90 to 1.11)	0.95
<b>Ascites</b>	1.80 (1.67 to 1.93)	<0.001	1.81 (1.66 to 1.98)	<0.001
<b>Hepatic encephalopathy</b>	1.57 (1.44 to 1.73)	<0.001	1.47 (1.33 to 1.63)	<0.001
<b>Surveillance</b>				
No	ref	ref	Ref	ref
Inconsistent	0.68 (0.63 to 0.74)	<0.001	0.75 (0.69 to 0.82)	<0.001
Consistent	0.51 (0.46 to 0.57)	<0.001	0.66 (0.58 to 0.75)	<0.001

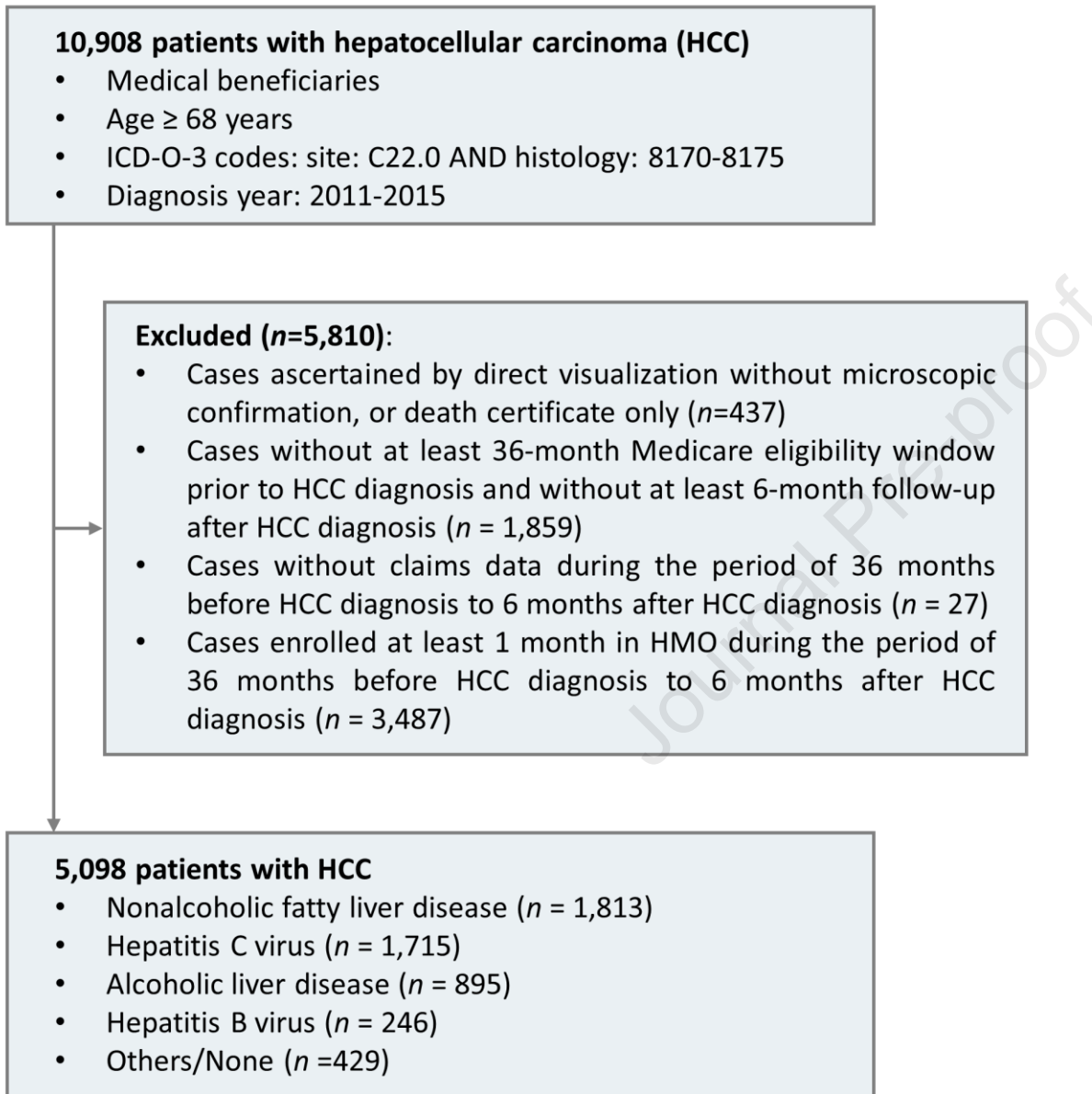
<b>Early-stage HCC (Single &amp; ≤5 cm tumor)</b>	0.46 (0.42 to 0.51)	<0.001	0.58 (0.52 to 0.64)	<0.001
<b>Curative treatments</b>	0.27 (0.25 to 0.30)	<0.001	0.31 (0.28 to 0.34)	<0.001

ALD, alcoholic liver disease; API, Asian/Pacific Islander; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; Metro, metropolitan;

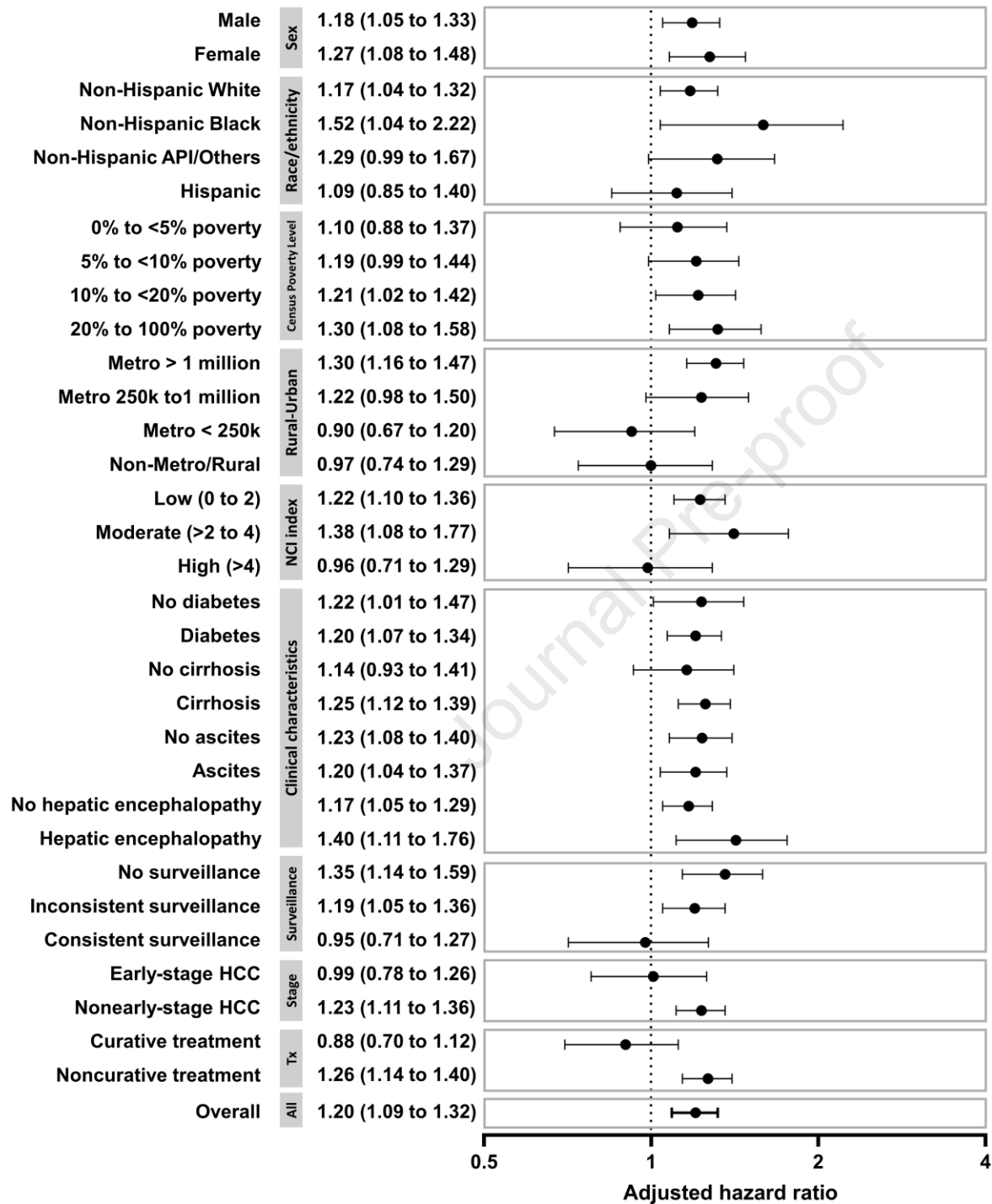
NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

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## SUPPLEMENTARY FIGURES



Supplementary Figure 1. Study flow of the hepatocellular carcinoma (HCC) cohort selection, SEER-Medicare database.



Adjusted hazard ratio

**Supplementary Figure 2. NAFLD as a predictor of overall survival in various subgroups.**

NAFLD was associated with worse survival across most examined subgroups.

aHR of NAFLD with HCV as a reference group. Error bars represent the 95% confidence intervals of aHR

API, Asian/Pacific Islander; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; Metro, metropolitan; NAFLD, nonalcoholic fatty liver disease; NCI, National Cancer Institute.

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