

Supplemental Online Content

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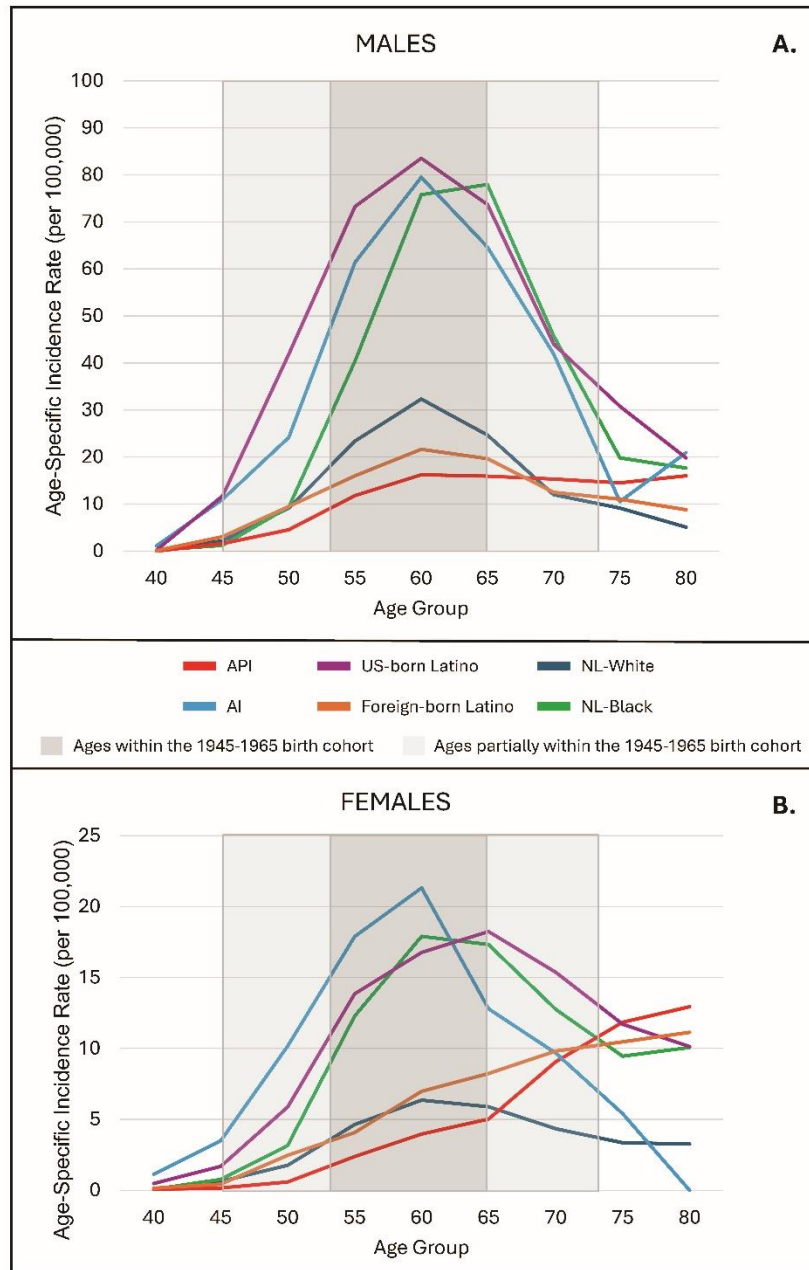
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This supplemental material has been provided by the authors to give readers additional information about their work.

Supplementary Figure 1. Age-specific incidence rate (per 100,000) for HCV-HCC with birth cohort information. California, 2008-2018. A. Males by race/ethnicity; B. Females by race/ethnicity. *Abbreviations: AI, American Indian; API, Asian/Pacific Islander; HCC, hepatocellular carcinoma; NL, non-Latino; US, United States.*



SUPPLEMENTARY TABLES:

Supplementary Table 1. Diagnostic code definitions for HCC California data, 2010–2018.		
Category	ICD-9-CM Codes	ICD-10-CM Codes
HCC Etiology		
Chronic Hepatitis C Virus Infection	070.41, 070.44, 070.51, 070.54, 070.7, V02.62, 070.70, 070.71	B17.10, B17.11, B18.2, B19.20, B19.21
Chronic Hepatitis B Virus Infection	070.20, 070.22, 070.23, 070.30, 070.31, 070.32, 070.33, 070.42, 070.52, V02.61, 070.21	B16.X, B17.0, B18.0, B18.1, B19.1X
Alcohol-Related Liver Conditions	571.0, 571.1, 571.2, 571.3, 291, 291.0-291.5, 291.8, 291.81, 291.82, 291.89, 291.9, 303, 303.0, 303.00-303.03, 303.9, 303.90-303.93, 305.0, 305.00-305.03, 357.5, 425.5, 535.3, 535.30, 535.31, 790.3, 980, 980.0, 980.8, 980.9, V11.3, V79.1	F10.X, F10.XX, F10.XXX, G62.1, I42.6, K29.2X, K70.X, K70.XX, R78.0, T51.0X1, T51.0X2, T51.0X3, T51.0X4, T51.8X1, T51.8X2, T51.8X3, T51.8X4, T51.91X, T51.92X, T51.93X, T51.94X
Metabolic/MASLD-Related Conditions	250.00, 250.02, 250.10, 250.12, 250.20, 250.22, 250.30, 250.32, 250.40, 250.42, 250.50, 250.52, 250.60, 250.62, 250.70, 250.72, 250.80, 250.82, 250.90, 250.92, 272.0, 272.1, 272.2, 272.4, 272.5, 272.7, 272.9, 277.7, 278, 278.0, 278.00-278.03, 278.1, 278.8, 401-404, 571.8, 783.1, 790.2, 790.21, 790.22, 790.29, V45.86, V77.8, V85.4, V85.30-V85.45, 401.X - 404X, 401.XX - 404.XX	E11.X, E11.XX, E11.XXX, E13.X, E13.XX, E13.XXX, E66.X, E66.XX, E67.0, E67.8, E68.0, E75.21, E75.22, E75.249, E77.0, E77.1, E78.X, E78.XX, E88.81X, I10.0, I11.X, I12.X, I13.X, I13.XX, I15.X, I16.X, K75.81, K76.0, K76.89, R63.5, R73.X, R73.XX, Z68.3X, Z68.4X, Z98.84, I10
Autoimmune Conditions	242.40, 242.41, 242.80, 242.81, 242.90, 242.91, 250.01, 250.03, 250.11, 250.13, 250.21, 250.23, 250.31, 250.33, 250.41, 250.43, 250.51, 250.53, 250.61, 250.63, 250.71, 250.73, 250.81, 250.83, 250.91, 250.93, 274.00-274.03, 274.10, 274.19, 274.81, 274.82, 274.89, 274.90, 555.0, 555.1, 555.2, 555.9, 556.0-556.9, 571.42, 577.1, 579.0, 710.0, 711.10-711.19, 714.0, 714.2, 714.30-714.33	E05.3X, E05.4X, E05.8X, E05.9X, E10.1X, E10.21, E10.29, E10.31X, E10.36, E10.37, E10.39, E10.40, E10.51, E10.618, E10.62X, E10.63X, E10.64X, E10.65, E10.69, E10.8, E10.9, K50.00, K50.10, K50.80, K50.90, K51.00, K51.20, K51.30, K51.40, K51.50, K51.80, K51.90, K75.2- K75.4, K86.1, K90.0, M02.3X, M02.3XX, M05.3X, M05.3XX, M05.6X, M05.6XX, M06.X, M06.XX, M06.XXX, M08.X, M08.XX, M08.XXX, M10.00, M10.30, M10.40, M10.9, M1A.00X1, M1A.20X1, M1A.30X1, M1A.40X1, M1A.9XX0, M1A.9XX1, M32.10, N20.0
Genetic Conditions	270.2, 271.0, 273.4, 275.0, 275.01, 275.1, 277.1	E70.21, E70.29, E70.30, E70.5, E70.8, E74.00, E74.01, E74.04, E74.09, E74.4, E80.0, E80.20, E80.29, E83.0X, E83.11X, E88.01
Cryptogenic	571.42, 576.1, 275.01	K75.4, K83.0, K83.01, E83110
Cirrhosis		
Cirrhosis	275.01 (hereditary hemochromatosis), 456, 456.0-456.2, 456.21 (esophageal varices), 571.2 (Alcoholic cirrhosis of liver), 571.5 (Cirrhosis of liver without mention of alcohol), 571.6 (Biliary cirrhosis), 572.3 (Portal hypertension), 572.4 (Hepatorenal syndrome), 777.8 (Other specified perinatal disorders of digestive system), 789.5 (Ascites), 789.51 (Malignant ascites), 789.59 (Other ascites)	E83.110 (Hereditary hemochromatosis), I85.X, I85.XX (Esophageal varices), K70.3X (Alcoholic cirrhosis of liver), K71.7 (Toxic liver disease with fibrosis and cirrhosis of liver), K74.3-K74.5 (Biliary cirrhosis), K74.6X (Unspecified cirrhosis of liver), K76.6 (Portal hypertension), K76.7 (Hepatorenal syndrome), K76.82 (Hepatic encephalopathy), K70.11 (Alcoholic hepatitis with ascites), K70.31 (Alcoholic cirrhosis of liver with ascites), K71.51 (Toxic liver disease with chronic active hepatitis with ascites), R18.0 (Ascites), R18.8 (Other ascites)
Abbreviations: HCC, hepatocellular carcinoma; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification; MASLD, metabolic dysfunction-associated steatotic liver disease.		

Supplementary Table 2. Patient region of residence defined by county of residence at the time of HCC diagnosis.	
Category	Counties
Northern	Monterey, San Benito, Santa Clara, Santa Cruz, Alpine, Amador, Calaveras, El Dorado, Nevada, Placer, Sacramento, San Joaquin, Sierra, Solano, Sutter, Yolo, Yuba, Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Napa, Plumas, Shasta, Siskiyou, Sonoma, Tehama, Trinity, Alameda, Contra Costa, Marin, San Francisco, San Mateo.
Southern	San Luis Obispo, Santa Barbara, Ventura, San Diego, Los Angeles, Orange.
Inland	Fresno, Kern, Kings, Madera, Mariposa, Merced, Stanislaus, Tulare, Tuolumne, Inyo, Mono, Riverside, San Bernardino, Imperial.
Abbreviations: HCC, hepatocellular carcinoma.	

Supplementary Table 3. Stage at diagnosis by detailed race/ethnicity ^a of HCC cases. California, 2010–2018.						
Level I Race/ethnicity	Level II Race/ethnicity	Total N	Localized n (%) ^b	Regional n (%) ^b	Remote n (%) ^b	Unknown n (%) ^b
American Indian		413	197 (47.7)	93 (22.5)	60 (14.5)	63 (15.3)
Asian/Pacific Islander^c		6,561	3,424 (52.2)	1,501 (22.9)	812 (12.4)	824 (12.6)
	Chinese	1,713	933 (54.5)	331 (19.3)	190 (11.1)	259 (15.1)
	Filipino	1,167	562 (48.2)	298 (25.5)	163 (14.0)	144 (12.3)
	Japanese	305	163 (53.4)	74 (24.3)	35 (11.5)	33 (10.8)
	Korean	628	308 (49.0)	152 (24.2)	78 (12.4)	90 (14.3)
	Pacific Islander	201	111 (55.2)	51 (25.4)	24 (11.9)	15 (7.5)
	South Asian ^d	257	134 (52.1)	64 (24.9)	41 (16.0)	18 (7.0)
	Vietnamese	1,634	892 (54.6)	376 (23.0)	184 (11.3)	182 (11.1)
	Other Southeastern Asian ^e	455	202 (44.4)	111 (24.4)	77 (16.9)	65 (14.3)
	<i>Cambodian</i>	193	87 (45.1)	51 (26.4)	29 (15.0)	26 (13.5)
	<i>Hmong</i>	47	22 (46.8)	x	x	x
	<i>Laotian</i>	128	52 (40.6)	32 (25.0)	26 (20.3)	18 (14.1)
	<i>Thai</i>	87	41 (47.1)	18 (20.7)	14 (16.1)	14 (16.1)
Latino^c		9,992	4,951 (49.5)	2,310 (23.1)	1,286 (12.9)	1,445 (14.5)
	US-born	5,097	2,516 (49.4)	1,184 (23.2)	655 (12.9)	741 (14.5)
	Foreign-born	4,895	2,435 (49.7)	1,126 (23.0)	631 (12.9)	704 (14.4)
Non-Latino Black		2,419	1,103 (45.6)	590 (24.4)	346 (14.3)	380 (15.7)
Non-Latino White		12,190	5,860 (48.1)	2,896 (23.8)	1,609 (13.2)	1,825 (15.0)
a. Small number of observations not shown for confidentiality protection and indicated with x; b. Percentage calculated based on row total; c. All race-ethnicities combined only includes those listed here (excludes multiracial, other, and unknown race); d. Includes all cases of races related to Bangladesh, India, Nepal, Pakistan, and Sri Lanka; e. Includes all cases of races related to Cambodia, Laos, and Thailand, plus Hmong people. Abbreviations: HCC, hepatocellular carcinoma; N, number; US, United States.						

Supplementary Table 4. Insurance type by detailed race/ethnicity ^a of HCC cases. California, 2010–2018.							
Level I Race/ethnicity	Level II Race/ethnicity	Total N	Medicaid n (%) ^b	Medicare n (%) ^b	Private n (%) ^b	Uninsured n (%) ^b	Unknown n (%) ^b
American Indian		413	85 (20.6)	158 (38.3)	121 (29.3)	x	x
Asian/Pacific Islander ^c		6,561	1,151 (17.5)	2,624 (40.0)	2,237 (34.1)	127 (1.9)	422 (6.4)
	Chinese	1,713	271 (15.8)	640 (37.4)	663 (38.7)	19 (1.1)	120 (7.0)
	Filipino	1,167	166 (14.2)	466 (39.9)	445 (38.1)	21 (1.8)	69 (5.9)
	Japanese	305	15 (4.9)	152 (49.8)	110 (36.1)	x	x
	Korean	628	95 (15.1)	282 (44.9)	166 (26.4)	20 (3.2)	65 (10.4)
	Pacific Islander	201	38 (18.9)	76 (37.8)	70 (34.8)	x	x
	South Asian ^d	257	63 (24.5)	99 (38.5)	78 (30.4)	x	x
	Vietnamese	1,634	331 (20.3)	697 (42.7)	494 (30.2)	22 (1.3)	90 (5.5)
	Other Southeastern Asian ^e	455	123 (27.0)	150 (33.0)	133 (29.2)	12 (2.6)	37 (8.1)
	Cambodian	193	60 (31.1)	66 (34.2)	49 (25.4)	x	x
	Hmong	47	15 (31.9)	16 (34.0)	11 (23.4)	x	x
	Laotian	128	24 (18.8)	47 (36.7)	37 (28.9)	x	x
	Thai	87	24 (27.6)	21 (24.1)	36 (41.4)	x	x
Latino ^c		9,992	2,250 (22.5)	3,704 (37.1)	3,040 (30.4)	226 (2.3)	772 (7.7)
	US-born	5,097	1,051 (20.6)	1,880 (36.9)	1,672 (32.8)	85 (1.7)	408 (8.0)
	Foreign-born	4,895	1,199 (24.5)	1,824 (37.3)	1,368 (28.0)	141 (2.9)	364 (7.4)
Non-Latino Black		2,419	476 (19.7)	979 (40.5)	716 (29.6)	45 (1.9)	203 (8.4)
Non-Latino White		12,190	1,547 (12.7)	5,354 (43.9)	4,030 (33.1)	189 (1.6)	1,070 (8.8)
a. Small number of observations not shown for confidentiality protection and indicated with x; b. Percentage calculated based on row total; c. All race-ethnicities combined only includes those listed here (excludes multiracial, other, and unknown race); d. Includes all cases of races related to Bangladesh, India, Nepal, Pakistan, and Sri Lanka; e. Includes all cases of races related to Cambodia, Laos, and Thailand, plus Hmong people. Abbreviations: HCC, hepatocellular carcinoma; N, number; US, United States.							

Supplementary Table 5. Age-adjusted^a incidence rates (AAIR) per 100,000 and temporal trends annual percent change (APC) for HCC by detailed race/ethnicity and sex. California, 2010–2018.

Level I Race/ethnicity	Level II Race/ethnicity	AAIR Trends		All HCC Cases	
		2010–2011	2017–2018	Trend Period	APC (95%CI)
MALES					
Asian/Pacific Islander ^b		20.2	14.6	2010–2018	-4.1 (-5.7 to -2.5)
	Chinese	19.9	14.3	2010–2018	-4.6 (-6.0 to -3.2)
	Filipino	16.1	11.2	2010–2018	-5.2 (-9.6 to -0.5)
	Japanese	10.6	7.0	2010–2018	-4.1 (-11.3 to + 3.8)
	Korean	26.7	14.6	2010–2018	-7.9 (-13.7 to -2.4)
	Pacific Islander	17.6	22.5	2010–2018	+3.6 (-3.1 to +10.8)
	South Asian ^c	8.3	8.2	2010–2018	+0.5 (-4.8 to +7.0)
	Vietnamese	47.8	34.8	2010–2018	-4.1 (-7.1 to -1.0)
	Other Southeastern Asian ^d	51.7	32.1	2010–2018	-6.2 (-12.4 to +0.7)
Latino ^b		18.9	17.7	2010–2018	-0.9 (-1.6 to -0.1)
	US-born	29.3	24.1	2010–2018	-2.7 (-4.6 to -0.8)
	Foreign-born	12.7	13.6	2010–2018	+1.3 (-0.1 to +2.7)
FEMALES					
Asian/Pacific Islander ^b		6.7	4.4	2010–2018	-5.5 (-7.7 to -3.3)
	Chinese	6.3	3.9	2010–2018	-6.4 (-9.6 to -3.2)
	Filipino	5.4	4.4	2010–2018	-3.8 (-12.6 to +6.2)
	Japanese	4.8	3.1	2010–2018	-6.5 (-12.9 to -0.1)
	Korean	7.9	5.4	2010–2018	-6.5 (-11.4 to -1.5)
	Pacific Islander	8.6	8.9	2010–2018	+0.7 (-13.6 to +18.0)
	South Asian ^c	3.3	1.5	2010–2018	-5.3 (-16.5 to +7.6)
	Vietnamese	14.9	8.0	2010–2018	-8.1 (-12.8 to -3.1)
	Other Southeastern Asian ^d	14.9	8.0	2010–2018	-6.6 (-17.2 to +5.1)
Latino ^b		6.1	6.8	2010–2018	+1.1 (-1.5 to +4.0)
	US-born	6.7	7.4	2010–2018	+1.4 (-1.2 to +4.1)
	Foreign-born	5.6	6.2	2010–2018	+0.4 (-2.6 to +3.8)

a. Age-adjusted to the 2000 US standard population; b. Includes all cases of this race and/or ethnicity, not just listed groups; c. Includes all cases of races related to Bangladesh, India, Nepal, Pakistan, and Sri Lanka; d. Includes all cases of races related to Cambodia, Laos, and Thailand, plus Hmong people. *Abbreviations: AAIR, age-adjusted incidence rate; APC, annual percent change; CI, confidence interval; HCC, hepatocellular carcinoma; US, United States.*

Supplementary Table 6. Temporal trends annual percent change (APC) for HCC by age group and etiology. California, 2010–2018.						
Age Group	Trend Period	Total ^a	HCV	HBV	MASLD	ALD
		APC (95%CI)				
<49	2010–2018	-6.0 (-9.6 to -2.5)	-12.4 (-18.6 to -7.0)	-4.8 (-10.8 to +1.1)	+2.1 (-5.0 to +9.4)	+2.5 (-6.7 to +12.4)
50-69	2010–2014	+2.3 (+0.6 to +4.6)	+2.6 (+1.2 to +4.2)	-2.7 (-4.7 to -0.6)	+3.3 (+2.0 to +4.6)	+2.6 (+0.7 to +4.7)
	2014–2018	-4.6 (-6.8 to -3.2)	-7.5 (-8.9 to -6.1)			
70+	2010–2018	+0.5 (-1.1 to +2.1)	-1.0 (-3.3 to +1.5)	-2.8 (-5.8 to +0.4)	+2.2 (+1.2 to +3.4)	+1.7 (0.0 to +3.6)
a. Includes all listed as well as Cryptogenic and Others (e.g. genetic, auto-immune). Abbreviations: ALD, alcoholic liver disease; APC, annual percent change; CI, confidence interval; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; HBV, hepatitis B virus; MASLD, metabolic dysfunction-associated steatotic liver disease;.						