

SUPPLEMENTARY MATERIALS

Supplementary Tables

Supplementary Table 1. Cohort and lung cancer case characteristics overall and by smoking status among males in the Sutter Health + Kaiser Hawai'i cohort, 2000-2013

Characteristic	Male Cohort			Male Incident Lung Cancer Cases		
	Total No. (%) ^d	Smoking Status		Total No. (%) ^d	Smoking Status	
		Never No. (%)	Ever No. (%)		Never No. (%)	Ever No. (%)
Total	896,251 (100.0)	545,543 (60.9)	350,708 (39.1)	2,892 (100.0)	429 (14.8)	2,463 (85.2)
Age at baseline/diagnosis ^a						
18-29	219,715 (24.5)	150,322 (68.4)	69,393 (31.6)	8 (0.3)	5 (62.5)	—
30-39	194,061 (21.7)	131,728 (67.9)	62,333 (32.1)	13 (0.4)	10 (76.9)	—
40-49	172,213 (19.2)	109,640 (63.7)	62,573 (36.3)	78 (2.7)	19 (24.4)	59 (75.6)
50-59	141,021 (15.7)	77,277 (54.8)	63,744 (45.2)	351 (12.1)	58 (16.5)	293 (83.5)
60-69	90,562 (10.1)	42,114 (46.5)	48,448 (53.5)	765 (26.5)	87 (11.4)	678 (88.6)
70-79	52,180 (5.8)	22,263 (42.7)	29,917 (57.3)	974 (33.7)	121 (12.4)	853 (87.6)
80+	26,499 (3.0)	12,199 (46.0)	14,300 (54.0)	703 (24.3)	129 (18.3)	574 (81.7)
Baseline Year						
2000-2004	239,821 (26.8)	136,958 (57.1)	102,863 (42.9)	1,526 (52.8)	208 (13.6)	1,318 (86.4)
2005-2009	293,141 (32.7)	178,939 (61.0)	114,202 (39.0)	843 (29.1)	134 (15.9)	709 (84.1)
2010-2013	363,289 (40.5)	229,646 (63.2)	133,643 (36.8)	523 (18.1)	87 (16.6)	436 (83.4)
Race/Ethnicity						
Any AANHPI	180,171 (20.1)	115,573 (64.1)	64,598 (35.9)	511 (17.7)	97 (19.0)	414 (81.0)
Any NHPI	37,719 (4.2)	19,225 (51.0)	18,494 (49.0)	169 (5.8)	14 (8.3)	155 (91.7)
Native Hawaiian ^b	23,031 (2.6)	11,565 (50.2)	11,466 (49.8)	133 (4.6)	10 (7.5)	123 (92.5)
Pacific Islander ^c	14,688 (1.6)	7,660 (52.2)	7,028 (47.8)	36 (1.2)	—	32 (88.9)
Asian (single or multiple group)	142,452 (15.9)	96,348 (67.6)	46,104 (32.4)	342 (11.8)	83 (24.3)	259 (75.7)
Asian (single group)	122,290 (13.6)	84,033 (68.7)	38,257 (31.3)	260 (9.0)	65 (25.0)	195 (75.0)
Asian Indian	34,127 (3.8)	27,100 (79.4)	7,027 (20.6)	8 (0.3)	—	5 (62.5)
Chinese	26,836 (3.0)	20,918 (77.9)	5,918 (22.1)	50 (1.7)	23 (46.0)	27 (54.0)
Japanese	14,096 (1.6)	7,860 (55.8)	6,236 (44.2)	69 (2.4)	13 (18.8)	56 (81.2)
Filipinx	25,945 (2.9)	14,114 (54.4)	11,831 (45.6)	88 (3.0)	16 (18.2)	72 (81.8)
Korean	3,497 (0.4)	1,990 (56.9)	1,507 (43.1)	11 (0.4)	—	10 (90.9)
Vietnamese	2,338 (0.3)	1,495 (63.9)	843 (36.1)	5 (0.2)	(0.0)	—
Other Asian (single group)	15,451 (1.7)	10,556 (68.3)	4,895 (31.7)	30 (1.0)	9 (30.0)	21 (70.0)
Asian (multiple group)	20,162 (2.2)	12,315 (61.1)	7,847 (38.9)	82 (2.8)	18 (22.0)	64 (78.0)
Asian only multiple	5,005 (0.6)	3,227 (64.5)	1,778 (35.5)	7 (0.2)	(0.0)	7 (100.0)
Asian & non-Asian	15,157 (1.7)	9,088 (60.0)	6,069 (40.0)	75 (2.6)	18 (24.0)	57 (76.0)
Non-Hispanic White	370,092 (41.3)	216,568 (58.5)	153,524 (41.5)	982 (34.0)	127 (12.9)	855 (87.1)
Black	21,230 (2.4)	12,119 (57.1)	9,111 (42.9)	66 (2.3)	13 (19.7)	53 (80.3)
Hispanic	66,216 (7.4)	41,585 (62.8)	24,631 (37.2)	72 (2.5)	17 (23.6)	55 (76.4)
Non-AANHPI multiple	23,410 (2.6)	13,224 (56.5)	10,186 (43.5)	117 (4.0)	15 (12.8)	102 (87.2)

Other (incl AIAN)	17,924 (2.0)	10,861 (60.6)	7,063 (39.4)	35 (1.2)	6 (17.1)	29 (82.9)
Unknown	217,208 (24.2)	135,613 (62.4)	81,595 (37.6)	1,109 (38.3)	154 (13.9)	955 (86.1)

^a Age at baseline among cohort, age at diagnosis among cases. AANHPI = Asian American, Native Hawaiian, and Pacific Islander; NHPI = Native Hawaiian and Pacific Islander; AIAN = American Indian and Alaska Native. The symbol '—' indicates censoring due to low numbers (<5 individuals).

^b Individuals indicating *any* Native Hawaiian, even if also indicating other races/ethnicities, are categorized as 'Native Hawaiian'.

^c Pacific Islander, not indicating Native Hawaiian

^d Column percentages are provided in 'Total' columns. All other columns with proportions present row percentages.

Supplementary Table 2: Age-adjusted incidence rates for overall lung cancer (not stratified by smoking status) among females and males.^a

Race/Ethnicity	Females			Males		
	Person-years	Cases	AAIR (95% CI)	Person-years	Cases	AAIR (95% CI)
Any AANHPI	1,567,336	613	32.9 (30.3-35.6)	1,132,268	615	46.8 (43.1, 50.6)
Any NHPI	374,861	201	53.5 (46.0-61.4)	306,072	208	73.2 (62.8, 84.4)
Native Hawaiian ^b	247,380	160	59.3 (50.2-69.2)	200,091	168	81.5 (68.8, 95.3)
Pacific Islander ^c	127,480	41	35.9 (25.0-48.7)	105,982	40	51.1 (35.1, 70.1)
Any Asian	1,192,475	412	27.8 (25.1-30.7)	826,196	407	39.4 (35.7, 43.4)
Asian (single group)	970,734	296	25.0 (22.0-28.2)	699,321	307	36.7 (32.7, 41.0)
Chinese	220,199	75	26.2 (20.5-32.5)	151,851	56	28.2 (21.2, 36.1)
Japanese	164,836	74	19.1 (14.8-24.0)	122,202	86	33.4 (26.6, 41.0)
Filipinx	240,640	80	29.0 (22.7-36.1)	176,600	103	46.6 (37.5, 56.7)
Other Asian	345,059	67	27.4 (20.4-35.5)	248,668	62	38.2 (28.9, 48.7)
Asian (multiple group)	221,741	116	40.3 (33.1-48.1)	126,874	100	52.8 (42.9, 63.8)
Non-Hispanic White	3,022,262	1,489	28.6 (27.2-30.1)	2,139,162	1,125	30.6 (28.8, 32.4)
Black	166,412	91	37.5 (30.0-45.8)	100,545	69	57.4 (43.9, 72.8)
Hispanic	521,802	81	15.7 (12.4-19.3)	341,721	79	22.2 (17.4, 27.5)
Non-AANHPI multiple	210,757	125	44.0 (36.5-52.2)	133,497	139	59.4 (49.8, 69.9)
Unknown	2,048,203	1,445	59.7 (56.5-62.9)	1,619,942	1,339	70.3 (66.5, 74.2)

^a These overall incidence rates are provided in order to compare our results to those from previous studies in which lung cancer incidence rates were not stratified by smoking status; Sutter Health + Kaiser Hawai'i cohort, 2000-2013. AANHPI = Asian American, Native Hawaiian, or Pacific Islander; NHPI = Native Hawaiian or Pacific Islander; AIAN = American Indian or Alaska Native.

^b Individuals indicating *any* Native Hawaiian, even if also indicating other races/ethnicities, are categorized as 'Native Hawaiian'.

^c Pacific Islander, not indicating Native Hawaiian

Supplementary Table 3: Age-adjusted incidence rates (AAIRs) and 95% confidence intervals (CIs) for non-small cell lung cancer (NSCLC) among females and males; Sutter Health + Kaiser Hawai'i cohort, 2000-2013.

Race/ethnicity	Non-small cell lung cancer incidence					
	Never-smoking			Ever-smoking		
	Person-years	Cases	AAIR (95% CI)	Person-years	Cases	AAIR (95% CI)
Females						
Any AANHPI	1,176,244	208	15.2 (13.1, 17.4)	363,277	210	45.8 (39.7, 52.3)
Any NHPI	207,462	30	14.8 (9.8, 20.7)	161,166	98	60.3 (48.0, 74.0)
Native Hawaiian ^a	130,770	22	16.1 (10.0, 23.6)	114,497	81	65.8 (51.2, 82.3)
Pacific Islander ^b	—	—	—	46,669	17	41.1 (23.0, 64.4)
Any Asian	968,782	178	15.5 (13.1, 18.1)	202,111	112	38.1 (31.3, 45.5)
Asian (single group)	807,753	138	14.7 (12.0, 17.6)	144,445	74	33.8 (26.5, 42.0)
Chinese	200,961	53	20.6 (15.3, 26.6)	—	—	—
Japanese	118,253	16	5.9 (3.2, 9.5)	44,423	27	28.4 (18.4, 40.5)
Filipinx	186,809	37	16.4 (11.2, 22.5)	50,043	25	42.7 (27.2, 61.5)
Other Asian	301,730	32	16.0 (10.0, 23.5)	34,627	16	38.2 (21.1, 60.2)
Asian (multiple group)	161,030	40	19.6 (13.9, 26.3)	57,666	38	50.6 (35.8, 68.0)
Non-Hispanic White	1,953,948	257	8.5 (7.5, 9.6)	983,234	725	35.7 (33.1, 38.4)
Black	—	—	—	51,882	48	47.4 (34.6, 62.3)
Hispanic	392,387	25	6.8 (4.4, 9.7)	113,548	37	27.6 (19.1, 37.6)
Non-AANHPI multiple	—	—	—	70,097	56	50.9 (38.2, 65.4)
Unknown	1,369,363	192	13.0 (11.2, 15.0)	490,087	522	70.6 (64.5, 76.9)
Males						
Any AANHPI	665,468	74	11.7 (9.1, 14.6)	453,135	313	46.7 (41.6, 52.1)
Any NHPI	—	—	—	154,753	113	71.9 (57.8, 87.6)
Native Hawaiian ^a	—	—	—	102,894	87	75.6 (58.9, 94.2)
Pacific Islander [†]	—	—	—	51,858	26	61.9 (37.6, 92.1)
Any Asian	515,973	64	12.2 (9.4, 15.5)	298,382	200	39.7 (34.4, 45.4)
Asian (single group)	444,462	50	11.5 (8.5, 15.0)	244,254	147	36.9 (31.1, 43.1)
Chinese	114,458	20	15.9 (9.6, 23.8)	35,191	19	26.4 (15.9, 39.6)
Japanese	—	—	—	56,860	41	28.1 (20.0, 37.7)
Filipinx	—	—	—	83,711	55	40.4 (30.0, 52.4)
Other Asian	—	—	—	68,492	32	51.1 (34.5, 70.8)
Asian (multiple group)	—	—	—	54,128	53	51.4 (38.4, 66.2)
Non-Hispanic White	1,201,296	101	6.4 (5.2, 7.8)	872,667	615	31.2 (28.7, 33.8)
Black	—	—	—	42,308	45	67.3 (48.1, 89.6)
Hispanic	—	—	—	128,613	38	21.0 (14.7, 28.2)
Non-AANHPI multiple	—	—	—	60,603	71	56.1 (43.1, 70.8)
Unknown	919,115	105	12.8 (10.3, 15.5)	569,301	589	66.6 (61.3, 72.2)

^a Individuals indicating *any* Native Hawaiian, even if also indicating other races/ethnicities, are categorized as 'Native Hawaiian'. AANHPI = Asian American, Native Hawaiian, or Pacific Islander; NHPI = Native Hawaiian or Pacific Islander; AIAN = American Indian or Alaska Native; AAIR = age-adjusted incidence rate; CI = confidence interval. The symbol '—' indicates censoring of incidence rate due to low numbers (<16 individuals).

^b Pacific Islander, not indicating Native Hawaiian

Supplementary Table 4: Age-adjusted incidence rates (AAIRs) and 95% confidence intervals (CIs) for lung cancer among never-smoking females for sensitivity analyses addressing potential smoking misclassification and loss to follow-up; Sutter Health + Kaiser Hawai'i cohort, 2000-2013.^a

Race/Ethnicity	Main analysis ^a		Sensitivity analyses					
			Smoking misclassification ^d			Loss to follow-up ^e		
	Cases	AAIR (95% CI)	Cases	AAIR (95% CI)	% Difference ^f	Cases	AAIR (95% CI)	% Difference ^f
Any AANHPI	235	17.1 (14.9, 19.4)	240	17.4 (15.2-19.8)	2.2	235	17.2 (15.0-19.5)	0.7
Any NHPI	31	15.2 (10.2, 21.2)	33	16.1 (11.0-22.3)	6.1	31	15.3 (10.3-21.3)	0.8
Native Hawaiian ^b	23	16.7 (10.5, 24.3)	25	18.1 (11.6-25.9)	8.0	23	16.8 (10.6-24.5)	0.7
Pacific Islander ^c	—	—	—	—	—	—	—	—
Any Asian	204	17.5 (15.0, 20.2)	207	17.8 (15.3-20.5)	1.5	204	17.7 (15.1-20.3)	0.7
Asian (single group)	158	16.7 (13.9, 19.8)	159	16.8 (14.0-19.9)	0.5	158	16.8 (14.0-19.9)	0.7
Chinese	59	22.8 (17.3, 29.1)	59	22.8 (17.3-29.1)	0.0	59	22.9 (17.4-29.2)	0.4
Japanese	18	6.4 (3.6, 10.0)	18	6.4 (3.6-10.0)	0.0	18	6.4 (3.6-10.0)	0.6
Filipina	42	20.1 (14.1, 27.1)	43	20.4 (14.4-27.4)	1.5	42	20.3 (14.2-27.4)	1.1
Other Asian	39	20.3 (13.4, 28.5)	39	20.3 (13.4-28.5)	0.0	39	20.4 (13.5-28.6)	0.5
Asian (multiple group)	46	22.2 (16.1, 29.3)	48	23.2 (16.9-30.4)	4.3	46	22.4 (16.2-29.5)	0.7
Non-Hispanic White	306	10.1 (9.0, 11.3)	312	10.3 (9.2-11.5)	2.0	306	10.2 (9.0-11.3)	0.8
Black	—	—	—	—	—	—	—	—
Hispanic	31	8.5 (5.7, 11.8)	32	8.7 (5.9-12.0)	2.5	31	8.5 (5.7-11.8)	0.5
Non-AANHPI multiple	—	—	17	10.5 (6.0-16.2)	—	—	—	—
Unknown	281	18.1 (15.9, 20.4)	284	18.4 (16.2-20.7)	1.4	281	18.9 (16.6-21.3)	4.5

^a AAIRs for never-smoking lung cancer among females in the main analysis (presented in **Figure 1**) are provided for comparison. AANHPI = Asian American, Native Hawaiian, or Pacific Islander; NHPI = Native Hawaiian or Pacific Islander; AIAN = American Indian or Alaska Native; AAIR = age-adjusted incidence rate; CI = confidence interval. The symbol '—' indicates censoring of incidence rate due to low numbers (<16 individuals).

^b Individuals indicating *any* Native Hawaiian, even if also indicating other races/ethnicities, are categorized as 'Native Hawaiian'.

^c Pacific Islander, not indicating Native Hawaiian

^d To account for differential misclassification of smoking by lung cancer status, we conducted a sensitivity analysis whereby AAIRs were recalculated with ever/never smoking status defined using two smoking status values that were *at least three months prior* to the date of diagnosis among cases.

^e To account for potential loss to follow-up by state cancer registries due to an out-of-state move, we conducted a sensitivity analysis whereby non-cases whose last known address in the EHR was out-of-state were censored at the date of the first out-of-state address.

^f The percent difference in AAIR of the sensitivity analysis compared to the main analysis (AAIR sensitivity analysis/AAIR main analysis*100%)

Supplementary Table 5: Standardized incidence rate ratios of lung cancer among never-smoking and ever-smoking females; Sutter Health + Kaiser Hawai'i cohort, 2000-2013.^a

Smoking status	Person-years	Observed	With Unknown/missing race/ethnicity		Without Unknown/missing or Other race/ethnicity	
			Expected	SIR (95% CI)	Expected	SIR (95% CI)
Never-smoking						
Any AANHPI	1,176,244	235	181	1.30 (1.14-1.48)	161	1.46 (1.28, 1.66)
Any NHPI	207,462	31	27	1.16 (0.79-1.65)	24	1.29 (0.88, 1.84)
Native Hawaiian ^b	130,770	23	19	1.24 (0.78-1.85)	17	1.38 (0.88, 2.07)
Pacific Islander ^c		—		—		—
Asian (single or multiple)	968,782	204	154	1.32 (1.15-1.52)	137	1.49 (1.29, 1.71)
Asian single group	807,753	158	126	1.25 (1.06-1.46)	112	1.40 (1.19, 1.64)
Chinese	200,961	59	32	1.84 (1.40-2.38)	29	2.07 (1.57, 2.67)
Japanese	118,253	18	38	0.48 (0.28-0.76)	33	0.55 (0.33, 0.87)
Filipinx	186,809	42	28	1.50 (1.08-2.03)	25	1.67 (1.20, 2.25)
Other Asian	301,730	39	29	1.36 (0.97-1.86)	26	1.5 (1.06, 2.05)
Asian multiple	161,030	46	28	1.66 (1.21-2.21)	24	1.88 (1.38, 2.51)
Non-Hispanic White	1,953,948	306	394	0.78 (0.69-0.87)	349	0.88 (0.78, 0.98)
Black		—		—		—
Hispanic	392,387	31	48	0.64 (0.44-0.91)	43	0.72 (0.49, 1.02)
Non-AANHPI multiple	136,193	14	23	0.61 (0.34-1.03)	20	0.69 (0.38, 1.16)
Unknown/missing	1,369,363	281	205	1.37 (1.22-1.54)	n/a	
Ever-smoking						
Any AANHPI	363,277	300	300	1.0 (0.89-1.12)	237	1.27 (1.13, 1.42)
Any NHPI	161,166	147	105	1.40 (1.18-1.65)	83	1.77 (1.49, 2.08)
Native Hawaiian [*]	114,497	121	82	1.48 (1.23-1.76)	65	1.87 (1.55, 2.23)
Pacific Islander [†]	46,669	26	23	1.13 (0.74-1.65)	18	1.41 (0.92, 2.07)
Asian (single or multiple)	202,111	153	196	0.78 (0.66-0.92)	154	0.99 (0.84, 1.17)
Asian single group	144,445	103	145	0.71 (0.58-0.86)	114	0.90 (0.74, 1.09)
Chinese		—		—		—
Japanese	44,423	39	66	0.59 (0.42-0.81)	52	0.75 (0.54, 1.03)
Filipinx	50,043	34	38	0.89 (0.61-1.24)	30	1.12 (0.78, 1.57)
Other Asian	34,627	22	23	0.95 (0.60-1.44)	18	1.20 (0.75, 1.81)
Asian multiple	57,666	50	50	1.0 (0.74-1.32)	40	1.26 (0.94, 1.67)
Non-Hispanic White	983,234	991	1,343	0.74 (0.69-0.79)	1,052	0.94 (0.88, 1.00)
Black	51,882	69	62	1.12 (0.87-1.42)	48	1.43 (1.11, 1.81)
Hispanic	113,548	41	92	0.45 (0.32-0.60)	73	0.56 (0.41, 0.77)
Non-AANHPI multiple	70,097	80	76	1.05 (0.83-1.31)	60	1.33 (1.06, 1.66)
Unknown/missing	490,087	918	509	1.80 (1.69-1.92)	n/a	

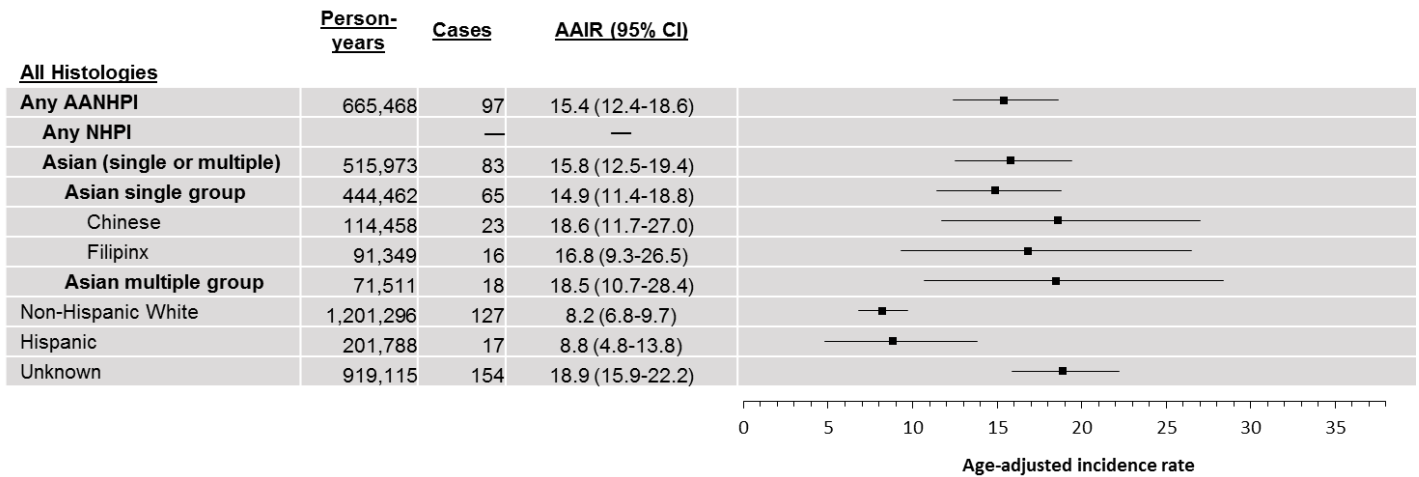
^a The incidence rate among all females who never smoked (combined) or all females who ever smoked (combined) is the reference group. AANHPI = Asian American, Native Hawaiian, or Pacific Islander; NHPI = Native Hawaiian or Pacific Islander; AIAN = American Indian or Alaska Native; AAIR = age-adjusted incidence rate; CI = confidence interval. The symbol '—' indicates censoring of incidence rate due to low numbers (<16 individuals).

^b Individuals indicating *any* Native Hawaiian, even if also indicating other races/ethnicities, are categorized as 'Native Hawaiian'.

^c Pacific Islander, not indicating Native Hawaiian

Supplementary Figure 1: Person-years of follow-up, lung cancer case frequencies, age-adjusted incidence rates per 100,000, 95% confidence intervals, and corresponding forest plots for (A) males who have never smoked (all histologies combined) and (B) males who ever smoked, by detailed race/ethnicity, Sutter Health + Kaiser Hawai'i cohort, 2000-2013. Age-adjusted incidence rates are not reported for Any NHPI, Any Native Hawaiian, Any other Pacific Islander, Japanese, Other Asian, Black, or non-AANHPI multiple males who never smoked due to low frequencies of cases (<16). AAIR = Age-adjusted incidence rate; AANHPI = Asian American, Native Hawaiian, or Pacific Islander; NHPI = Native Hawaiian or Pacific Islander; AIAN = American Indian or Alaska Native.

A



B

