

Supplemental Material

eTable 1. Retrospective survival analysis results for validated thyroid disease, combined cohorts*

Table 14. Relative Health Care Utilization and Quality Results for Validated Thyroid Disease, Combined Cohort																	
Outcome	Metric	# of cases	Overall**				# of cases	Females				# of cases	Males				
			HR	LCI	UCI	p-value		HR	LCI	UCI	p-value		HR	LCI	UCI	P-value	
Cumulative Exposure Estimates																	
Functional thyroid disease	Quintile 1	395	1				352	1				43	1				
	Quintile 2	398	1.21	1.01	1.45	0.041	322	1.24	1.02	1.51	0.031	76	1.12	0.69	1.79	0.650	
	Quintile 3	387	1.17	0.97	1.41	0.093	328	1.27	1.04	1.55	0.019	59	0.83	0.51	1.37	0.470	
	Quintile 4	415	1.27	1.06	1.52	0.008	338	1.36	1.12	1.66	0.002	77	1.01	0.63	1.62	0.965	
	Quintile 5	413	1.28	1.06	1.53	0.010	292	1.37	1.11	1.68	0.003	121	1.05	0.66	1.66	0.836	
	Log Linear	2008	1.03	1.00	1.06	0.092	1632	1.04	1.00	1.08	0.028	376	1.01	0.94	1.07	0.853	
Hyper-thyroidism	Quintile 1	89	1				70	1				19	1				
	Quintile 2	64	0.94	0.62	1.42	0.776	51	1.04	0.65	1.67	0.855	13	0.71	0.29	1.74	0.460	
	Quintile 3	75	1.12	0.75	1.68	0.580	64	1.33	0.84	2.11	0.219	11	0.57	0.23	1.43	0.230	
	Quintile 4	80	1.22	0.82	1.82	0.315	66	1.45	0.92	2.28	0.113	14	0.70	0.30	1.66	0.425	
	Quintile 5	76	1.20	0.80	1.81	0.381	53	1.39	0.86	2.26	0.178	23	0.74	0.33	1.65	0.459	
	Log Linear	384	1.05	0.98	1.13	0.148	304	1.08	0.99	1.17	0.074	80	0.99	0.86	1.13	0.858	
Hypo-thyroidism	Quintile 1	252	1				230	1				22	1				
	Quintile 2	283	1.31	1.06	1.63	0.014	232	1.32	1.04	1.67	0.020	51	1.43	0.77	2.66	0.262	
	Quintile 3	268	1.27	1.01	1.58	0.037	228	1.33	1.05	1.69	0.019	40	1.12	0.59	2.14	0.724	
	Quintile 4	273	1.30	1.04	1.62	0.019	221	1.34	1.06	1.70	0.016	52	1.32	0.71	2.45	0.382	
	Quintile 5	292	1.40	1.12	1.75	0.003	212	1.47	1.15	1.88	0.002	80	1.36	0.74	2.48	0.325	
	Log Linear	1368	1.03	0.99	1.07	0.151	1123	1.04	1.00	1.08	0.076	245	1.02	0.94	1.10	0.684	
Yearly Exposure Estimates																	
Functional thyroid disease	Quintile 1	388	1				334	1				54	1				
	Quintile 2	380	1.23	1.05	1.44	0.010	316	1.26	1.06	1.50	0.008	64	1.13	0.76	1.67	0.547	
	Quintile 3	415	1.24	1.06	1.45	0.007	340	1.28	1.08	1.52	0.005	75	1.11	0.76	1.62	0.584	
	Quintile 4	393	1.10	0.94	1.29	0.245	306	1.11	0.93	1.33	0.236	87	1.06	0.73	1.54	0.749	
	Quintile 5	432	1.28	1.10	1.50	0.002	336	1.38	1.16	1.64	0.000	96	1.04	0.73	1.50	0.816	
	Log Linear	2008	1.03	1.00	1.06	0.037	1632	1.04	1.01	1.08	0.008	376	1.00	0.94	1.06	0.970	
Hyper-thyroidism	Quintile 1	74	1				57	1				17	1				
	Quintile 2	65	1.21	0.83	1.76	0.323	53	1.35	0.88	2.06	0.168	12	0.89	0.40	2.00	0.781	
	Quintile 3	79	1.36	0.95	1.95	0.098	64	1.54	1.02	2.34	0.040	15	0.95	0.44	2.04	0.892	
	Quintile 4	83	1.33	0.93	1.92	0.121	67	1.55	1.02	2.35	0.039	16	0.85	0.39	1.82	0.666	
	Quintile 5	83	1.42	0.99	2.03	0.056	63	1.72	1.13	2.61	0.011	20	0.81	0.40	1.67	0.575	
	Log Linear	384	1.08	1.01	1.15	0.023	304	1.11	1.03	1.19	0.006	80	0.98	0.86	1.12	0.766	
Hypo-thyroidism	Quintile 1	254	1				224	1				30	1				
	Quintile 2	271	1.28	1.06	1.55	0.011	228	1.28	1.04	1.58	0.019	43	1.34	0.81	2.22	0.254	
	Quintile 3	288	1.27	1.05	1.54	0.013	237	1.27	1.04	1.57	0.022	51	1.36	0.84	2.22	0.216	
	Quintile 4	258	1.07	0.88	1.30	0.503	199	1.03	0.83	1.28	0.771	59	1.28	0.79	2.07	0.308	
	Quintile 5	297	1.28	1.06	1.55	0.010	235	1.35	1.10	1.66	0.004	62	1.20	0.74	1.93	0.462	
	Log Linear	1368	1.02	0.99	1.06	0.244	1123	1.03	0.99	1.07	0.110	245	1.00	0.92	1.08	0.993	

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for exposure estimates are with addition of background exposure, lag 0, starting in 1952 or at age 20 years (whichever is latest), excluding people born before 1920. The referent group for the quintile analysis is the quintile 1. Quintiles for cumulative exposure had the following cut points (in µg/ml·yr): 0.0001-<0.1147, 0.1147-<0.2022, 0.2022-<0.4973, 0.4973-<2.676, 2.676-97.396. Quintiles for yearly exposure had the following cut points (in ng/ml): 0.1061-<4.7424, 4.7424-<8.4889, 8.4889 -<21.583, 21.583-<100.14, 100.14-3303.3.

**controlling for gender and interaction between gender and time.

eTable 2. Retrospective survival analysis results for validated thyroid disease, community cohort only*

Outcome	Metric	# of cases	Overall**				# of cases	Females				# of cases	Males			
			HR	LCI	UCI	p-value		HR	LCI	UCI	p-value		HR	LCI	UCI	p-value
Cumulative Exposure Estimates																
Functional thyroid disease	Quintile 1	386	1				347	1				39	1			
	Quintile 2	395	1.24	1.03	1.49	0.026	321	1.24	1.02	1.52	0.033	74	1.06	0.62	1.80	0.831
	Quintile 3	384	1.21	1.00	1.46	0.054	326	1.27	1.04	1.56	0.019	58	0.80	0.46	1.40	0.438
	Quintile 4	377	1.32	1.09	1.59	0.004	311	1.36	1.11	1.66	0.003	66	1.02	0.59	1.75	0.940
	Quintile 5	305	1.36	1.11	1.66	0.003	248	1.36	1.10	1.69	0.005	57	1.21	0.69	2.12	0.508
	Log Linear	1847	1.04	1.01	1.08	0.013	1553	1.04	1.00	1.08	0.033	294	1.06	0.97	1.15	0.190
Hyper-thyroidism	Quintile 1	85	1				67	1				18	1			
	Quintile 2	64	0.96	0.62	1.47	0.835	51	1.07	0.66	1.73	0.784	13	0.60	0.22	1.64	0.323
	Quintile 3	75	1.13	0.74	1.73	0.568	64	1.36	0.85	2.18	0.201	11	0.47	0.17	1.32	0.150
	Quintile 4	74	1.23	0.81	1.88	0.337	62	1.45	0.91	2.33	0.119	12	0.57	0.21	1.58	0.284
	Quintile 5	57	1.28	0.81	2.01	0.289	47	1.45	0.88	2.40	0.146	10	0.70	0.24	2.06	0.515
	Log Linear	355	1.07	1.00	1.16	0.066	291	1.09	1.00	1.18	0.053	64	1.00	0.82	1.22	0.984
Hypo-thyroidism	Quintile 1	248	1				229	1				19	1			
	Quintile 2	280	1.34	1.07	1.68	0.010	231	1.31	1.03	1.66	0.027	49	1.53	0.76	3.11	0.235
	Quintile 3	265	1.31	1.04	1.64	0.022	226	1.32	1.04	1.68	0.025	39	1.26	0.60	2.61	0.541
	Quintile 4	245	1.35	1.07	1.70	0.011	202	1.33	1.04	1.69	0.024	43	1.55	0.75	3.18	0.234
	Quintile 5	215	1.49	1.17	1.89	0.001	176	1.43	1.10	1.84	0.006	39	1.89	0.90	3.97	0.090
	Log Linear	1253	1.04	1.00	1.09	0.041	1064	1.03	0.99	1.08	0.132	189	1.10	0.99	1.22	0.075
Yearly Exposure Estimates																
Functional thyroid disease	Quintile 1	379	1				329	1				50	1			
	Quintile 2	371	1.23	1.04	1.44	0.013	312	1.26	1.06	1.51	0.009	59	1.04	0.69	1.57	0.847
	Quintile 3	405	1.25	1.06	1.46	0.006	334	1.28	1.08	1.53	0.005	71	1.08	0.73	1.60	0.700
	Quintile 4	351	1.09	0.92	1.28	0.322	289	1.11	0.92	1.33	0.266	62	0.95	0.64	1.43	0.821
	Quintile 5	341	1.35	1.14	1.59	0.000	289	1.38	1.15	1.65	0.000	52	1.18	0.78	1.80	0.431
	Log Linear	1847	1.04	1.01	1.08	0.009	1553	1.05	1.01	1.08	0.010	294	1.02	0.94	1.11	0.588
Hyper-thyroidism	Quintile 1	70	1				54	1				16	1			
	Quintile 2	65	1.26	0.86	1.85	0.233	53	1.42	0.92	2.19	0.112	12	0.85	0.37	1.94	0.693
	Quintile 3	78	1.41	0.97	2.04	0.072	63	1.61	1.05	2.46	0.029	15	0.89	0.41	1.96	0.781
	Quintile 4	77	1.37	0.94	2.01	0.100	66	1.65	1.07	2.52	0.022	11	0.65	0.28	1.52	0.325
	Quintile 5	65	1.53	1.04	2.26	0.031	55	1.79	1.15	2.77	0.009	10	0.84	0.35	1.99	0.689
	Log Linear	355	1.09	1.02	1.17	0.014	291	1.11	1.03	1.20	0.005	64	0.97	0.81	1.15	0.710
Hypo-thyroidism	Quintile 1	250	1				222	1				28	1			
	Quintile 2	263	1.26	1.04	1.53	0.020	225	1.28	1.03	1.57	0.023	38	1.18	0.69	2.01	0.538
	Quintile 3	280	1.27	1.05	1.54	0.014	232	1.27	1.03	1.57	0.024	48	1.33	0.80	2.22	0.273
	Quintile 4	228	1.04	0.85	1.28	0.676	188	1.03	0.83	1.29	0.776	40	1.10	0.65	1.87	0.723
	Quintile 5	232	1.33	1.09	1.63	0.005	197	1.32	1.06	1.64	0.012	35	1.44	0.84	2.48	0.182
	Log Linear	1253	1.03	0.99	1.07	0.108	1064	1.03	0.99	1.07	0.161	189	1.05	0.95	1.16	0.381

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for exposure estimates are with addition of background exposure, lag 0, starting in 1952 or at age 20 years (whichever is latest), excluding people born before 1920. The referent group for the quintile analysis is the quintile 1. Quintiles for cumulative exposure had the following cut points (in µg/ml·yr): 0.0001-<0.1147, 0.1147-<0.2022, 0.2022-<0.4973, 0.4973-<2.676, 2.676-97.396. Quintiles for yearly exposure had the following cut points (in ng/ml): 0.1061-<4.7424, 4.7424-<8.4889, 8.4889-<21.583, 21.583-<100.14, 100.14-3303.3.

**controlling for gender and interaction between gender and time.

Table 3. Retrospective survival analysis results for validated thyroid disease starting in qualifying year, combined cohorts*

Outcome	Metric	# of cases	Overall**				Females				Males					
			HR	LCI	UCI	P-value	# of cases	HR	LCI	UCI	P-value	# of cases	HR	LCI	UCI	P-value
Cumulative Exposure Estimates																
Functional thyroid disease	Quintile 1	356	1				303	1				53	1			
	Quintile 2	343	0.94	0.79	1.11	0.444	279	0.99	0.82	1.19	0.934	64	0.72	0.48	1.08	0.116
	Quintile 3	359	1.04	0.89	1.23	0.604	303	1.13	0.94	1.36	0.178	56	0.73	0.48	1.10	0.132
	Quintile 4	352	0.98	0.83	1.16	0.833	285	1.07	0.89	1.28	0.492	67	0.71	0.48	1.06	0.096
	Quintile 5	364	1.03	0.87	1.22	0.722	254	1.10	0.91	1.34	0.317	110	0.81	0.55	1.18	0.265
	Log Linear	1774	1.01	0.98	1.05	0.396	1424	1.03	0.99	1.06	0.179	350	1.00	0.94	1.07	0.983
Hyper-thyroidism	Quintile 1	78	1				59	1				19	1			
	Quintile 2	55	0.81	0.55	1.20	0.287	45	0.91	0.59	1.42	0.689	10	0.48	0.20	1.16	0.104
	Quintile 3	69	1.06	0.73	1.53	0.761	59	1.24	0.82	1.88	0.315	10	0.52	0.22	1.22	0.134
	Quintile 4	68	1.03	0.71	1.49	0.875	56	1.22	0.80	1.85	0.357	12	0.54	0.24	1.22	0.140
	Quintile 5	68	1.07	0.73	1.56	0.733	47	1.22	0.78	1.91	0.380	21	0.60	0.29	1.27	0.183
	Log Linear	338	1.04	0.96	1.11	0.342	266	1.06	0.98	1.15	0.170	72	0.96	0.84	1.11	0.605
Hypo-thyroidism	Quintile 1	238	1				209	1				29	1			
	Quintile 2	243	0.99	0.81	1.21	0.915	201	1.03	0.83	1.28	0.780	42	0.83	0.49	1.40	0.475
	Quintile 3	245	1.07	0.88	1.31	0.504	206	1.12	0.90	1.39	0.309	39	0.91	0.54	1.55	0.734
	Quintile 4	230	0.95	0.78	1.16	0.619	184	0.99	0.79	1.23	0.920	46	0.85	0.51	1.41	0.526
	Quintile 5	255	1.08	0.88	1.32	0.479	183	1.13	0.90	1.42	0.275	72	0.95	0.58	1.54	0.824
	Log Linear	1211	1.02	0.98	1.05	0.421	983	1.02	0.98	1.07	0.279	228	1.02	0.94	1.10	0.684
Yearly Exposure Estimates																
Functional thyroid disease	Quintile 1	331	1				278	1				53	1			
	Quintile 2	354	1.15	0.98	1.34	0.080	285	1.14	0.96	1.35	0.128	69	1.21	0.84	1.74	0.311
	Quintile 3	354	1.08	0.93	1.27	0.308	290	1.10	0.93	1.31	0.269	64	1.05	0.72	1.52	0.806
	Quintile 4	356	1.03	0.88	1.20	0.735	278	1.03	0.87	1.23	0.701	78	1.02	0.71	1.47	0.906
	Quintile 5	379	1.12	0.96	1.31	0.150	293	1.18	1.00	1.40	0.056	86	1.01	0.70	1.44	0.966
	Log Linear	1774	1.01	0.98	1.05	0.364	1424	1.03	0.99	1.06	0.141	350	0.99	0.93	1.06	0.765
Hyper-thyroidism	Quintile 1	60	1				44	1				16	1			
	Quintile 2	60	1.14	0.79	1.65	0.489	49	1.32	0.86	2.01	0.204	11	0.77	0.35	1.69	0.513
	Quintile 3	73	1.27	0.89	1.82	0.186	60	1.48	0.98	2.23	0.063	13	0.81	0.38	1.74	0.591
	Quintile 4	70	1.16	0.81	1.67	0.416	56	1.36	0.90	2.07	0.149	14	0.71	0.33	1.51	0.370
	Quintile 5	75	1.27	0.89	1.82	0.186	57	1.57	1.04	2.38	0.034	18	0.66	0.32	1.35	0.254
	Log Linear	338	1.06	0.99	1.13	0.111	266	1.09	1.01	1.18	0.031	72	0.95	0.83	1.10	0.502
Hypo-thyroidism	Quintile 1	221	1				194	1				27	1			
	Quintile 2	248	1.19	0.99	1.43	0.066	198	1.12	0.91	1.37	0.288	50	1.70	1.06	2.74	0.029
	Quintile 3	240	1.10	0.91	1.33	0.326	200	1.08	0.88	1.33	0.447	40	1.30	0.79	2.14	0.307
	Quintile 4	243	1.04	0.86	1.26	0.669	186	0.98	0.79	1.21	0.842	57	1.46	0.91	2.33	0.117
	Quintile 5	259	1.12	0.93	1.36	0.223	205	1.15	0.94	1.42	0.175	54	1.24	0.77	2.00	0.384
	Log Linear	1211	1.01	0.97	1.04	0.776	983	1.01	0.97	1.06	0.489	228	1.00	0.92	1.08	0.911

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for exposure estimates with addition of background exposure, lag 0, starting in 1952 or at qualifying year or at age 20 years (whichever is latest), excluding people born before 1920. The referent group for the quintile analysis is the quintile 1. Quintiles for cumulative exposure had the following cut points (in µg/ml·yr): 0.0006-<0.1450, 0.1450-<0.2567, 0.2567-<0.6523, 0.6523-<3.382, 3.382-97.396. Quintiles for yearly exposure had the following cut points (in ng/ml): 0.3184-<5.4263, 5.4263-<11.072, 11.0720-<28.223, 28.223-<125.36, 125.36-3303.3.

**controlling for gender and interaction between gender and time.

Table 4. Retrospective survival analysis results for validated thyroid disease starting in qualifying year, community cohort only*

Outcome	Metric	# of cases	Overall**				Females				Males					
			HR	LCI	UCI	P-value	# of cases	HR	LCI	UCI	P-value	# of cases	HR	LCI	UCI	P-value
Cumulative Exposure Estimates																
Functional thyroid disease	Quintile 1	355	1				303	1				52	1			
	Quintile 2	342	0.95	0.80	1.13	0.542	279	1.00	0.83	1.20	0.962	63	0.66	0.43	1.02	0.064
	Quintile 3	349	1.05	0.89	1.25	0.563	298	1.14	0.95	1.37	0.170	51	0.64	0.41	1.00	0.052
	Quintile 4	311	1.01	0.85	1.20	0.943	253	1.04	0.86	1.26	0.650	58	0.75	0.49	1.16	0.198
	Quintile 5	266	1.09	0.91	1.31	0.353	218	1.11	0.91	1.36	0.295	48	0.89	0.56	1.40	0.604
	Log Linear	1623	1.03	1.00	1.07	0.084	1351	1.03	0.99	1.07	0.178	272	1.05	0.96	1.15	0.260
Hyper-thyroidism	Quintile 1	78	1				59	1				19	1			
	Quintile 2	55	0.81	0.54	1.20	0.288	45	0.91	0.58	1.43	0.692	10	0.43	0.17	1.10	0.079
	Quintile 3	68	1.05	0.72	1.54	0.800	59	1.25	0.82	1.90	0.302	9	0.42	0.16	1.07	0.069
	Quintile 4	61	1.03	0.70	1.51	0.894	51	1.19	0.77	1.83	0.428	10	0.50	0.20	1.24	0.133
	Quintile 5	51	1.14	0.76	1.73	0.525	42	1.26	0.80	2.01	0.320	9	0.66	0.25	1.76	0.406
	Log Linear	313	1.06	0.98	1.14	0.180	256	1.07	0.98	1.17	0.133	57	0.98	0.79	1.20	0.812
Hypo-thyroidism	Quintile 1	236	1				209	1				27	1			
	Quintile 2	242	1.01	0.82	1.24	0.937	201	1.04	0.83	1.29	0.759	41	0.80	0.46	1.40	0.440
	Quintile 3	236	1.08	0.88	1.33	0.458	201	1.12	0.90	1.40	0.320	35	0.86	0.49	1.52	0.608
	Quintile 4	200	0.98	0.79	1.21	0.849	161	0.96	0.77	1.21	0.761	39	0.98	0.56	1.70	0.941
	Quintile 5	186	1.14	0.92	1.42	0.241	154	1.13	0.89	1.43	0.325	32	1.14	0.63	2.04	0.667
	Log Linear	1100	1.03	0.99	1.08	0.128	926	1.02	0.98	1.07	0.370	174	1.10	0.99	1.23	0.074
Yearly Exposure Estimates																
Functional thyroid disease	Quintile 1	328	1				276	1				52	1			
	Quintile 2	347	1.14	0.98	1.34	0.090	282	1.15	0.97	1.36	0.115	65	1.12	0.77	1.62	0.551
	Quintile 3	345	1.09	0.93	1.28	0.268	286	1.11	0.94	1.32	0.221	59	0.99	0.67	1.45	0.949
	Quintile 4	306	1.00	0.85	1.18	0.982	256	1.03	0.86	1.23	0.774	50	0.86	0.57	1.28	0.451
	Quintile 5	297	1.18	1.00	1.39	0.046	251	1.19	0.99	1.42	0.058	46	1.13	0.75	1.70	0.550
	Log Linear	1623	1.03	0.99	1.06	0.136	1351	1.03	0.99	1.06	0.139	272	1.01	0.93	1.10	0.844
Hyper-thyroidism	Quintile 1	60	1				44	1				16	1			
	Quintile 2	60	1.15	0.79	1.67	0.461	49	1.34	0.87	2.04	0.179	11	0.73	0.33	1.62	0.441
	Quintile 3	71	1.27	0.88	1.82	0.200	59	1.49	0.98	2.25	0.060	12	0.71	0.33	1.56	0.399
	Quintile 4	64	1.17	0.81	1.70	0.401	55	1.41	0.93	2.15	0.108	9	0.56	0.24	1.31	0.181
	Quintile 5	58	1.34	0.91	1.95	0.136	49	1.57	1.02	2.42	0.040	9	0.72	0.31	1.68	0.450
	Log Linear	313	1.07	0.99	1.15	0.082	256	1.09	1.01	1.18	0.030	57	0.94	0.78	1.13	0.482
Hypo-thyroidism	Quintile 1	218	1				192	1				26	1			
	Quintile 2	241	1.18	0.98	1.43	0.078	195	1.12	0.91	1.38	0.268	46	1.57	0.96	2.56	0.071
	Quintile 3	234	1.12	0.92	1.35	0.257	197	1.10	0.89	1.35	0.366	37	1.26	0.75	2.10	0.383
	Quintile 4	205	1.01	0.82	1.23	0.952	170	0.97	0.79	1.21	0.818	35	1.20	0.71	2.02	0.497
	Quintile 5	202	1.19	0.97	1.45	0.090	172	1.14	0.92	1.42	0.222	30	1.50	0.88	2.57	0.139
	Log Linear	1100	1.02	0.98	1.06	0.399	926	1.01	0.97	1.06	0.550	174	1.04	0.94	1.15	0.468

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for exposure estimates with addition of background exposure, lag 0, starting in 1952 or at qualifying year or at age 20 years (whichever is latest), excluding people born before 1920. The referent group for the quintile analysis is the quintile 1. Quintiles for cumulative exposure had the following cut points (in µg/ml·yr): 0.0006-<0.1450, 0.1450-<0.2567, 0.2567-<0.6523, 0.6523-<3.382, 3.382-97.396. Quintiles for yearly exposure had the following cut points (in ng/ml): 0.3184-<5.4263, 5.4263-<11.072, 11.0720-<28.223, 28.223-<125.36, 125.36-3303.3.

**controlling for gender and interaction between gender and time.

eTable 5. Prospective survival analysis results for validated thyroid disease, combined cohorts*

Outcome	Metric	# of cases	Overall**				Females					Males				
			HR	LCI	UCI	p-value	# of cases	HR	LCI	UCI	p-value	# of cases	HR	LCI	UCI	p-value
Cumulative Exposure Estimates, using Bayesian Calibration, Time Varying																
Functional thyroid disease	Quintile 1	75	1				63	1				12	1			
	Quintile 2	92	1.23	0.91	1.67	0.183	74	1.23	0.88	1.73	0.229	18	1.35	0.65	2.82	0.419
	Quintile 3	90	1.00	0.74	1.37	0.978	65	0.93	0.66	1.32	0.702	25	1.37	0.68	2.74	0.375
	Quintile 4	103	1.06	0.79	1.44	0.688	75	1.00	0.71	1.40	0.982	28	1.44	0.73	2.85	0.299
	Quintile 5	94	1.12	0.82	1.52	0.484	67	0.96	0.68	1.36	0.820	27	1.85	0.93	3.68	0.080
	Log Linear	454	1.01	0.94	1.09	0.726	344	0.97	0.89	1.06	0.549	110	1.14	0.98	1.33	0.087
Hyper-thyroidism	Quintile 1	8	1				7	1				1	1			
	Quintile 2	12	1.53	0.62	3.75	0.356	9	1.32	0.49	3.56	0.583	3	2.76	0.28	26.94	0.382
	Quintile 3	21	2.25	0.99	5.10	0.053	16	2.07	0.85	5.07	0.110	5	2.93	0.34	25.45	0.331
	Quintile 4	14	1.32	0.55	3.18	0.529	11	1.24	0.48	3.22	0.662	3	1.75	0.18	17.15	0.629
	Quintile 5	17	1.81	0.77	4.25	0.172	14	1.70	0.68	4.29	0.257	3	2.30	0.23	22.59	0.474
	Log Linear	72	1.09	0.91	1.30	0.351	57	1.12	0.92	1.36	0.268	15	0.93	0.60	1.45	0.760
Hypo-thyroidism	Quintile 1	52	1				44	1				8	1			
	Quintile 2	67	1.30	0.90	1.87	0.161	57	1.37	0.92	2.03	0.122	10	1.12	0.44	2.85	0.811
	Quintile 3	57	0.93	0.63	1.36	0.698	41	0.86	0.56	1.32	0.479	16	1.32	0.56	3.11	0.521
	Quintile 4	65	1.00	0.69	1.45	0.992	47	0.92	0.61	1.40	0.711	18	1.45	0.63	3.37	0.383
	Quintile 5	61	1.07	0.73	1.56	0.731	42	0.89	0.57	1.36	0.580	19	2.02	0.87	4.65	0.100
	Log Linear	302	1.00	0.92	1.10	0.948	231	0.94	0.84	1.04	0.247	71	1.24	1.03	1.49	0.021
Yearly Exposure Estimates, using Bayesian Calibration, Time Varying																
Functional thyroid disease	Quintile 1	93	1				83	1				10	1			
	Quintile 2	78	0.80	0.59	1.08	0.152	63	0.74	0.53	1.04	0.081	15	1.32	0.59	2.95	0.496
	Quintile 3	92	0.91	0.68	1.22	0.537	63	0.76	0.54	1.06	0.102	29	2.09	1.01	4.32	0.046
	Quintile 4	95	0.93	0.70	1.25	0.643	67	0.82	0.59	1.14	0.242	28	1.83	0.88	3.79	0.105
	Quintile 5	96	0.91	0.68	1.23	0.554	68	0.80	0.57	1.11	0.182	28	1.76	0.85	3.67	0.130
	Log Linear	454	0.99	0.92	1.08	0.855	344	0.97	0.88	1.07	0.533	110	1.05	0.90	1.23	0.544
Hyper-thyroidism	Quintile 1	11	1				8	1				3	1			
	Quintile 2	8	0.68	0.27	1.71	0.418	6	0.75	0.26	2.18	0.599	2	0.62	0.10	3.78	0.607
	Quintile 3	22	1.70	0.82	3.54	0.156	17	2.01	0.86	4.72	0.109	5	0.93	0.22	3.94	0.918
	Quintile 4	13	0.94	0.42	2.11	0.875	11	1.24	0.49	3.12	0.652	2	0.33	0.05	2.02	0.231
	Quintile 5	18	1.18	0.55	2.54	0.674	15	1.51	0.63	3.65	0.356	3	0.46	0.09	2.35	0.354
	Log Linear	72	1.08	0.90	1.30	0.406	57	1.17	0.96	1.44	0.120	15	0.70	0.42	1.15	0.158
Hypo-thyroidism	Quintile 1	66	1				61	1				5	1			
	Quintile 2	52	0.75	0.52	1.09	0.130	44	0.70	0.47	1.03	0.072	8	1.43	0.47	4.37	0.534
	Quintile 3	60	0.86	0.60	1.23	0.413	41	0.68	0.45	1.02	0.062	19	2.99	1.11	8.09	0.031
	Quintile 4	62	0.89	0.63	1.28	0.542	42	0.73	0.48	1.09	0.120	20	2.83	1.05	7.62	0.040
	Quintile 5	62	0.88	0.61	1.26	0.489	43	0.72	0.48	1.08	0.116	19	2.57	0.95	7.01	0.064
	Log Linear	302	0.97	0.88	1.08	0.601	231	0.93	0.82	1.05	0.216	71	1.12	0.92	1.36	0.262
Measured Value at the time of the C8 Health Project, Not Time Varying																
Functional thyroid disease	Quintile 1	76	1				67	1				9	1			
	Quintile 2	82	0.87	0.64	1.20	0.400	72	0.94	0.67	1.32	0.729	10	0.60	0.24	1.49	0.271
	Quintile 3	94	1.02	0.75	1.38	0.903	63	0.89	0.63	1.26	0.504	31	1.60	0.76	3.38	0.215
	Quintile 4	97	0.89	0.65	1.21	0.445	72	0.88	0.63	1.24	0.475	25	0.99	0.46	2.12	0.972
	Quintile 5	103	1.02	0.75	1.39	0.891	68	0.95	0.67	1.34	0.760	35	1.32	0.63	2.77	0.461
	Log Linear	452	1.00	0.93	1.08	0.991	342	0.98	0.89	1.07	0.590	110	1.06	0.92	1.23	0.411
Hyper-thyroidism	Quintile 1	8	1				4	1				4	1			
	Quintile 2	15	1.39	0.59	3.29	0.455	13	2.61	0.85	8.06	0.094	2	0.25	0.04	1.40	0.114
	Quintile 3	15	1.37	0.58	3.25	0.478	11	2.33	0.73	7.36	0.151	4	0.38	0.09	1.60	0.188
	Quintile 4	16	1.19	0.50	2.80	0.699	14	2.45	0.79	7.54	0.119	2	0.16	0.03	0.86	0.033
	Quintile 5	18	1.37	0.59	3.21	0.467	15	2.72	0.89	8.35	0.081	3	0.21	0.05	0.97	0.046
	Log Linear	72	1.06	0.89	1.27	0.492	57	1.18	0.97	1.43	0.100	15	0.67	0.44	1.04	0.075
Hypo-thyroidism	Quintile 1	59	1				55	1				4	1			
	Quintile 2	51	0.72	0.50	1.05	0.092	45	0.73	0.49	1.09	0.126	6	0.82	0.23	2.91	0.758
	Quintile 3	60	0.87	0.61	1.25	0.460	42	0.74	0.49	1.12	0.152	18	2.14	0.72	6.37	0.169
	Quintile 4	65	0.82	0.57	1.18	0.284	46	0.73	0.49	1.09	0.128	19	1.80	0.61	5.31	0.290
	Quintile 5	65	0.90	0.62	1.30	0.566	41	0.75	0.49	1.14	0.184	24	2.15	0.74	6.26	0.159
	Log Linear	300	0.98	0.89	1.08	0.690	229	0.92	0.83	1.03	0.149	71	1.16	0.97	1.38	0.097

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for lag 0, starting at the age at the C8 Health Project, excluding people born before 1920. The referent group for the quintile analysis is quintile 1. Quintiles for cumulative exposure had the following cut points (in $\mu\text{g/ml}\cdot\text{yr}$): 0.0954- <0.2170, 0.2170-<0.3526, 0.3526-<0.7066, 0.7066-<2.3292, 2.3292-27.516. Quintiles for yearly exposure had the following cut points (in ng/ml): 2.662-<5.366, 5.366-<9.222, 9.222-<17.075, 17.075-<40.859, 40.859-991.25. Quintiles for measured values at the time of the C8 Health project had the following cut points (in ng/ml): 0.8-<9.6, 9.6-<17.4, 17.4-<32.2, 32.2-<84.7, 84.7-3167.9

**controlling for gender and interaction between gender and time.

eTable 6. Prospective survival analysis results for validated thyroid disease, community cohort only*

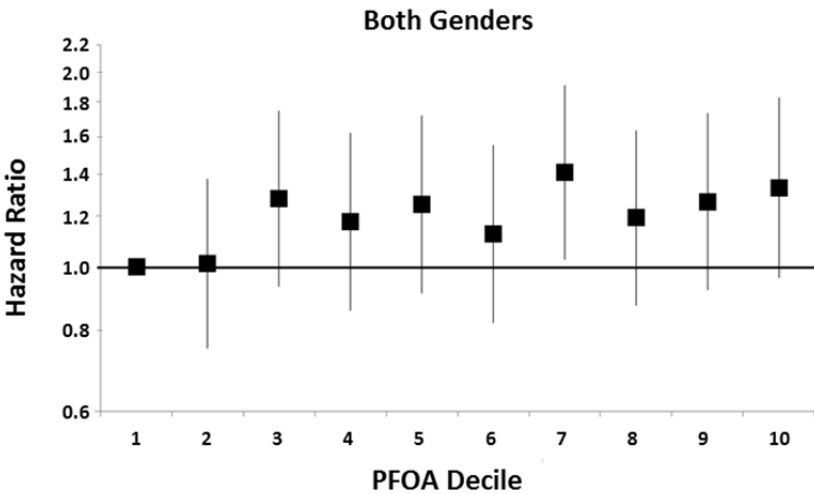
Outcome	Metric	# of cases	Overall**				Females					Males				
			HR	LCI	UCI	p-value	# of cases	HR	LCI	UCI	p-value	# of cases	HR	LCI	UCI	p-value
Cumulative Exposure Estimates, using Bayesian Calibration, Time Varying																
Functional thyroid disease	Quintile 1	75	1				63	1				12	1			
	Quintile 2	86	1.19	0.87	1.63	0.272	73	1.23	0.88	1.73	0.227	13	1.06	0.48	2.34	0.876
	Quintile 3	82	1.01	0.73	1.38	0.967	61	0.91	0.64	1.30	0.606	21	1.47	0.72	3.01	0.286
	Quintile 4	92	1.03	0.76	1.41	0.835	71	0.98	0.69	1.38	0.906	21	1.31	0.64	2.67	0.463
	Quintile 5	94	1.13	0.83	1.54	0.435	67	0.97	0.68	1.37	0.855	27	1.88	0.95	3.75	0.072
	Log Linear	429	1.02	0.95	1.10	0.629	335	0.98	0.90	1.07	0.614	94	1.15	0.99	1.35	0.072
Hyper-thyroidism	Quintile 1	8	1				7	1				1	1			
	Quintile 2	12	1.55	0.63	3.81	0.336	9	1.34	0.50	3.61	0.564	3	3.02	0.31	29.30	0.341
	Quintile 3	21	2.42	1.07	5.49	0.034	16	2.15	0.88	5.25	0.094	5	3.72	0.43	32.28	0.234
	Quintile 4	14	1.42	0.59	3.40	0.434	11	1.28	0.49	3.32	0.616	3	2.10	0.22	20.40	0.524
	Quintile 5	17	1.81	0.77	4.25	0.171	14	1.71	0.68	4.30	0.255	3	2.26	0.23	22.13	0.485
	Log Linear	72	1.08	0.91	1.29	0.372	57	1.11	0.92	1.35	0.279	15	0.92	0.60	1.41	0.700
Hypo-thyroidism	Quintile 1	52	1				44	1				8	1			
	Quintile 2	61	1.23	0.85	1.78	0.277	56	1.37	0.92	2.04	0.121	5	0.61	0.20	1.88	0.393
	Quintile 3	50	0.90	0.61	1.33	0.593	37	0.81	0.52	1.25	0.336	13	1.40	0.58	3.41	0.454
	Quintile 4	57	0.95	0.65	1.40	0.812	44	0.90	0.59	1.38	0.640	13	1.30	0.53	3.15	0.566
	Quintile 5	61	1.09	0.75	1.59	0.649	42	0.90	0.59	1.39	0.637	19	2.08	0.90	4.80	0.087
	Log Linear	281	1.01	0.92	1.11	0.782	223	0.95	0.85	1.05	0.315	58	1.28	1.06	1.55	0.012
Yearly Exposure Estimates, using Bayesian Calibration, Time Varying																
Functional thyroid disease	Quintile 1	92	1				82	1				10	1			
	Quintile 2	78	0.81	0.60	1.09	0.168	63	0.76	0.54	1.05	0.098	15	1.29	0.58	2.87	0.537
	Quintile 3	90	0.91	0.68	1.22	0.535	62	0.76	0.54	1.06	0.108	28	2.04	0.99	4.24	0.055
	Quintile 4	87	0.92	0.68	1.24	0.572	64	0.82	0.59	1.15	0.256	23	1.64	0.77	3.49	0.197
	Quintile 5	82	0.87	0.64	1.18	0.361	64	0.80	0.57	1.12	0.191	18	1.39	0.63	3.05	0.413
	Log Linear	429	0.98	0.90	1.07	0.644	335	0.97	0.88	1.07	0.518	94	1.01	0.84	1.20	0.955
Hyper-thyroidism	Quintile 1	11	1				8	1				3	1			
	Quintile 2	8	0.68	0.27	1.70	0.408	6	0.75	0.26	2.18	0.596	2	0.61	0.10	3.71	0.593
	Quintile 3	22	1.70	0.82	3.54	0.157	17	2.01	0.85	4.73	0.109	5	0.94	0.22	4.00	0.934
	Quintile 4	13	0.97	0.43	2.20	0.950	11	1.26	0.50	3.19	0.620	2	0.37	0.06	2.23	0.276
	Quintile 5	18	1.27	0.59	2.73	0.547	15	1.56	0.65	3.77	0.320	3	0.55	0.11	2.82	0.477
	Log Linear	72	1.11	0.92	1.33	0.284	57	1.18	0.97	1.45	0.100	15	0.74	0.45	1.22	0.236
Hypo-thyroidism	Quintile 1	65	1				60	1				5	1			
	Quintile 2	52	0.77	0.53	1.11	0.157	44	0.71	0.48	1.06	0.094	8	1.39	0.45	4.27	0.564
	Quintile 3	58	0.86	0.60	1.24	0.424	40	0.69	0.46	1.03	0.070	18	2.92	1.07	7.95	0.036
	Quintile 4	55	0.87	0.60	1.26	0.454	39	0.72	0.47	1.09	0.120	16	2.57	0.93	7.12	0.070
	Quintile 5	51	0.82	0.56	1.20	0.307	40	0.73	0.48	1.11	0.140	11	1.87	0.64	5.47	0.256
	Log Linear	281	0.96	0.86	1.07	0.436	223	0.93	0.82	1.05	0.225	58	1.08	0.87	1.34	0.499
Measured Value at the time of the C8 Health Project, Not Time Varying																
Functional thyroid disease	Quintile 1	76	1				67	1				9	1			
	Quintile 2	82	0.87	0.64	1.19	0.395	72	0.94	0.68	1.32	0.736	10	0.59	0.24	1.45	0.251
	Quintile 3	91	0.99	0.73	1.35	0.971	61	0.86	0.61	1.23	0.413	30	1.53	0.72	3.24	0.268
	Quintile 4	94	0.90	0.66	1.23	0.527	71	0.90	0.64	1.27	0.542	23	0.98	0.45	2.12	0.952
	Quintile 5	84	0.96	0.70	1.33	0.822	62	0.91	0.64	1.31	0.625	22	1.15	0.53	2.52	0.722
	Log Linear	427	0.99	0.91	1.07	0.742	333	0.98	0.89	1.07	0.586	94	1.02	0.86	1.20	0.855
Hyper-thyroidism	Quintile 1	8	1				4	1				4	1			
	Quintile 2	15	1.38	0.58	3.26	0.469	13	2.60	0.84	8.02	0.096	2	0.25	0.04	1.41	0.116
	Quintile 3	15	1.36	0.57	3.23	0.486	11	2.33	0.74	7.37	0.151	4	0.39	0.09	1.62	0.195
	Quintile 4	16	1.23	0.52	2.91	0.639	14	2.50	0.81	7.70	0.111	2	0.17	0.03	0.97	0.047
	Quintile 5	18	1.53	0.65	3.58	0.326	15	2.84	0.92	8.72	0.069	3	0.28	0.06	1.32	0.107
	Log Linear	72	1.10	0.92	1.32	0.288	57	1.19	0.98	1.45	0.075	15	0.72	0.46	1.13	0.158
Hypo-thyroidism	Quintile 1	59	1				55	1				4	1			
	Quintile 2	51	0.73	0.50	1.06	0.095	45	0.74	0.50	1.10	0.132	6	0.79	0.22	2.80	0.713
	Quintile 3	57	0.84	0.58	1.22	0.362	40	0.72	0.47	1.08	0.111	17	1.98	0.66	5.93	0.221
	Quintile 4	62	0.83	0.58	1.20	0.323	45	0.75	0.50	1.12	0.157	17	1.70	0.57	5.09	0.341
	Quintile 5	50	0.81	0.55	1.20	0.288	36	0.71	0.46	1.10	0.126	14	1.75	0.57	5.37	0.327
	Log Linear	279	0.96	0.87	1.06	0.388	221	0.92	0.82	1.03	0.144	58	1.11	0.90	1.37	0.330

*All models are stratified by birth year and control for non-white race, education, current and former smoking (time varying), and current and former alcohol consumption (time varying). Results are for lag 0, starting at the age at the C8 Health Project, excluding people born before 1920. The referent group for the quintile analysis is quintile 1. Quintiles for cumulative exposure had the following cut points (in µg/ml-yr): 0.0954-<0.2170, 0.2170-<0.3526, 0.3526-<0.7066, 0.7066-<2.3292, 2.3292-27.516. Quintiles for yearly exposure had the following cut points (in ng/ml): 2.662-<5.366, 5.366-<9.222, 9.222-<17.075, 17.075-<40.859, 40.859-991.25. Quintiles for measured values at the time of the C8 Health project had the following cut points (in ng/ml): 0.8-<9.6, 9.6-<17.4, 17.4-<32.2, 32.2-<84.7, 84.7-3167.9

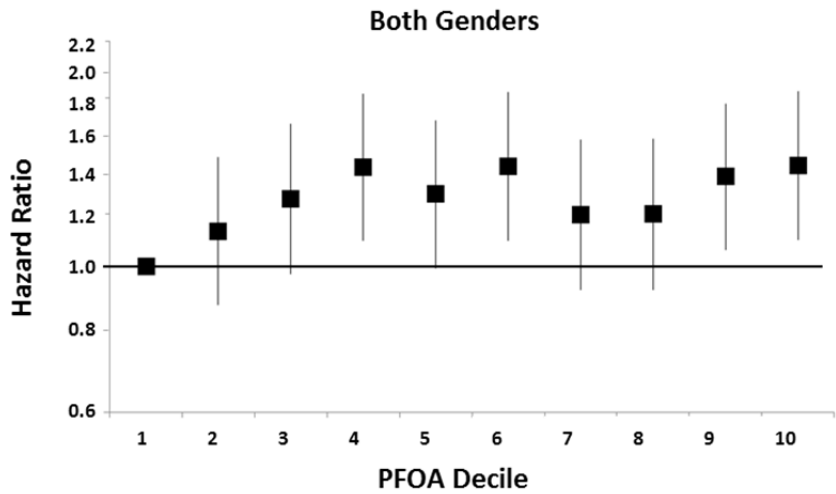
**controlling for gender and interaction between gender and time.

Figure S1. Examination of dose-response curve shape for association between PFOA and functional thyroid disease in retrospective analyses.

A. Cumulative Exposure



B. Yearly Exposure



Deciles for cumulative exposure had the following cut points (in $\mu\text{g/ml}\cdot\text{yr}$): 0.0001-<0.0658, 0.0658-<0.1147, 0.1147-<0.1521, 0.1521-<0.2022, 0.2022-<0.2855, 0.2855-<0.4973, 0.4973-<0.9754, 0.9754-<2.676, 2.676-<6.704, 6.704-97.396. Quintiles for yearly exposure had the following cut points (in ng/ml): 0.1061-<3.8204, 3.8204-<4.7424, 4.7424-<5.9782, 5.9782-<8.4889, 8.4889 -<13.243, 13.243-<21.583, 21.583-<42.751, 42.751-<100.14, 100.14-<280.45, 280.45-3303.3.