Tobacco Use Data and Surveys

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NIH **NATIONAL CANCER INSTITUTE**

Employment and funding

Since 2004 I have been a US government employee in the Intramural Research Program of the National Cancer Institute (NCI).

My research funding is provided by the NCI.

Additionally, I have one project that has funds which are partly provided through an Interagency Agreement with FDA-CTP, however I will not talk about it today.

Disclaimers

Any opinions and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Census Bureau, the U.S. Food and Drug Administration, and National Cancer Institute.

This presentation is released to inform interested parties of research and to encourage discussion. Any views expressed on statistical, methodological, technical, or operational issues are those of the authors and do not represent the U.S. Census Bureau, NIH, and FDA position or policy.

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All results have been reviewed to ensure that no confidential information is disclosed.

Prevalence of different tobacco products in the United States

	Any	Cigs	Cigars	Hookah /pipe	E-cig	Smoke-less	≥2 types
Adults	20.8%	14.0%	3.6%	1.0%	4.5%	2.4%	3.9%
High school	23.6%	4.6%	5.0%	3.4%	19.6%	3.1%	8.2%

Gentzke *et al, MMWR*, 2020
Cornelius *et al, MMWR*, 2020

Table 1 Selected prospective studies of cigar smoking and mortality

Author	Publication year	Country	Cohort name	Follow-up		Total participants	Total current cigar and/pipe smokers	Age range	Effect measure reported
Kahn [28]	1966	US	Dorn study	1954-1957	to 1962	248,195	N/A	31 to 84	SMR
Best [15]	1966	Canada	Canadian Study of Smoking and Health	1956	to 1962	92,000	1,594	30 to 90	SMR
Cole [19]	1974	Denmark		1958	to 1972	183	N/A	55 to 64	Calculated IRR
Gordon [36]	1974	US	Framingham	1948-1953	to 1966-1970	2,336	311	29 to 62	Calculated IRR
Doll [22]	1976	UK	Male British Doctors	1951	to 1971	34,440	N/A	20 and older	Calculated SMR
Jajich [27]	1984	US	Cook County, IL	1965	to 1970	2,674	265 (18 females)	65 to 74	IRR
Carstensen [17]	1987	Sweden	Swedish Census Cohort	1963	to 1979	25,129	N/A	18 to 69	SMR
Sandler [29]	1989	US	Washington, County, MD	1963	to 1975	46,926	1,671 (10 females)	25 and older	IRR, 95% CI
Hsing [25]	1990	US	Dorn study	1954-1957	to 1980	249,829	N/A	31 to 84	IRR, 95% CI
Strachan [34]	1991	UK	Nested case–control within Whitehall study cohort	1967-1969	to 1987	18,403	N/A	40 to 64 years	OR, 95% CI
Lange [30]	1992	Denmark	Copenhagen City Heart Study	1976	to 1989	14,214	808 (770 females)	20 and older	HR, 95% CI
Chow [21]	1992	US	Lutheran Brotherhood Insurance Society	1966	to 1986	17,818	N/A	35 years and older	IRR, 95% CI
Chow [20]	1993	US	Dorn study	1954-1957	to 1980	248,046	N/A	31 to 84	IRR, 95% CI
Ben-Shlomo [16]	1994	UK	Whitehall study	1967-1969	to 1987	19,018	763	40 to 69	Calculated IRR
Heineman [24]	1995	US	Dorn study	1954-1957	to 1980	248,046	N/A	31 to 84	IRR, 95% CI
Haheim [23]	1996	Finland	Oslo study	1972	to 1992	16,173	1,623	40 to 49	HR, 95% CI
Wald [35]	1997	UK	British United Provident Association	1975-1982	to 1993	21,520	1,831	35 to 64	HR, 95% CI
Shanks [31]	1998	US	CPS-I	1959-1960	to 1972	442,455	15,191 (primary)	30 and older	IRR, 95% CI
Jacobs [26]	1999	US	CPS-II	1982	to 1991	121,278	6,914	30 years or older	HR, 95% CI
Shapiro [33]	2000	US	CPS-II	1982	to 1994	508,353	7,888	30 years or older	HR, 95% CI
Chao [18]	2002	US	CPS-II	1982	to 1996	467,788	6,945	30 years or older	HR, 95% CI
Shaper [32]	2003	UK	British Regional Heart Study	1978-1989	to 2000	7,121	730	40 to 59	HR, 95% CI

Table 15 Current cigar smoking and lung cancer

Study	Cohort name	Sex	Cigar smoker deaths	Effect estimate	95% CI	Measure	Primary/ secondary*	Adjustment	ICD codes
Current Cigar									
Kahn1966	Dorn study		25	1.59	(1.03, 2.35)	SMR		Age	ICD 7: 162-163
Carstensen1987	Swedish Census Cohort		11	7.6	(3.77, 13.65)	SMR		Age, residence	ICD 8: 162
Lange1992	Copenhagen City Heart Study	Men	47	6	(2.20, 17.00)	HR		Age	ICD 8: 162
Lange1992	Copenhagen City Heart Study	Women	14	4.9	(3.00,12.00)	HR		Age	ICD 8: 162
Ben-Shlomo1994	Whitehall study		1	1.8	(0.24, 13.31)	IRR	Primary	Age	ICD 8: 162
Ben-Shlomo1994	Whitehall study		20	7.64	(4.22, 13.83)	IRR	Secondary	Age	ICD 8: 162
Shanks1998	CPS-I		73	2.1	(1.63, 2.65)	IRR	Primary	Age	
Shanks1998	CPS-I		83	6.29	(5.01, 7.79)	IRR	Secondary	Age	
Shapiro2000	CPS-II		88	5.1	(4.00, 6.60)	HR	Primary	Age, alcohol, smokeless tobacco	ICD 9: 162
Current Cigar and/or Pipe									
Chow1992	Dorn study		4	3.5	(1.00, 12.60)	HR		Age, occupation	
Wald1997	British United Provident Association		6	3.19	(1.07, 9.50)	HR	Primary	Age	ICD 9: 162
Wald1997	British United Provident Association		9	8.64	(3.19, 23.30)	HR	Secondary	Age	ICD 9: 162

*Primary cigar smoking: current, exclusive cigar smoking with no previous history of cigarette or pipe smoking; primary cigar and/or pipe smoking: current, exclusive cigar and/or pipe smoking with no previous history of cigarette smoking; secondary cigar smoking: current, exclusive cigar smoking with previous history of cigarette or pipe smoking; secondary cigar and/or pipe smoking: current, exclusive cigar and/or pipe smoking with previous history of cigarette smoking.

Chang et al, *BMC Public Health*, 2015

Motivation

Clear that cigars increase risk for a number of cancer types and diseases (*IARC monograph).*

But, most prior studies were conducted many years ago

Few cohorts have information about intensity, duration, cessation

Lack of information about cigar type

Little information about dual use (and/ or marijuana)

Little information about whether associations vary by race/ethnicity, sex, age, or SES

Agricultural Health Study

ABOUT THE STUDY · STUDY PARTICIPANTS · SCIENTIFIC COLLABORATION · NEWS & FINDINGS · CONTACT US

The Agricultural Health Study works to understand how agricultural, lifestyle, and genetic factors affect the health of farming populations.

LEARN MORE

Methods

84,015 participants including licensed private pesticide applicators and their spouses who live in Iowa and North Carolina

Enrolled between 1993-1997, with follow-up through 2011

Cox Proportional Hazards Regression

Adjusted for age, gender, race, state, education, alcohol

Unfortunately, only assessed ever/never use of cigars for six months or longer (same for all non-cigarette tobacco products)

Andreotti et al, *CEBP*, 2017

Exclusive ever cigarettes or exclusive ever cigars with incident cancer

	Cigarette		Cigar	
	# of cases	HR (95%CI)	# of cases	HR (95%CI)
Total cancers	2,746	1.5 (1.4-1.6)	76	1.5 (1.2-1.9)
Smoking cancers	1,233	2.9 (2.6-3.3)	24	1.9 (1.2-2.8)
Lung	401	15.5 (12.0-20.1)	3	--
GI	428	1.6 (1.3-2.0)	10	1.6 (0.8-3.0)
Urinary	223	2.3 (1.7-3.0)	9	2.5 (1.3-4.9)
Head and neck	88	2.5 (1.6-4.0)	2	

Andreotti et al, *CEBP*, 2017

The NCI Cohort Consortium is an extramural-intramural partnership to pool the large quantity of data and biospecimens necessary to conduct a wide range of cancer studies. The Consortium, through its collaborative network of investigators, provides a coordinated, interdisciplinary approach to tackling important scientific questions, economies of scale, and opportunities to quicken the pace of research.

OUR MISSION IS TO:

foster communication among investigators leading cohort studies of cancer, promote collaborative research projects for topics not easily addressed in a single study, and identify and address common challenges in cohort research.

2018-2021 STRATEGIC INITIATIVES: Advancing our Mission Together!				
GOALS				
Communication	Career Development	Research Facilitation	Leverage Cohorts to Fill Scientific Gaps	Address Common Challenges
Increase the exchange of information and enhance member engagement	Provide networking and educational opportunities for early career investigators	Advance cohort consortia specific research	Promote collaborative research, particularly on cancer incidence and outcomes for rare cancers, cancer subtypes, and rare exposures, not easily addressed in a single cohort study	Identify and address common methodologic challenges in cohort research

Methods

Participants from five cohorts (Netherlands Cohort Study, Melbourne Collaborative Cohort Study, VITamins AND Lifestyle (VITAL) cohort, NIH-AARP, and PLCO

Enrolled in cohorts between 1986 and 2002

~525,000 participants
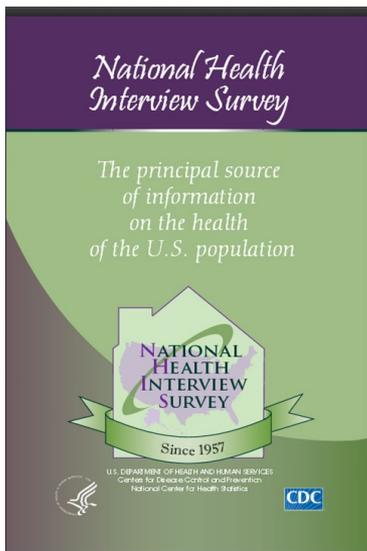
Cox Proportional Hazards Regression

Adjusted for age, gender, BMI, race/ethnicity, SES, alcohol, family history

Unfortunately, 3/5 studies only had ever/never use

Malhotra et al, *Cancer Prevention Research,* **2017**

Cancer group	Never smokers[a] Cases	Ever cigar smokers only Cases	HR (95% CI)
Smoking-related cancers[b]	5,257	331	1.47 (1.34–1.61)
Head and neck	386	38	1.40 (0.98–2.00)
Esophageal	166	12	1.01 (0.56–1.84)
Lung	365	87	2.73 (2.06–3.60)
Gastric	262	27	1.06 (0.64–1.76)
Pancreas	453	34	1.10 (0.75–1.63)
Liver	145	10	0.76 (0.34–1.71)
Kidney	667	22	1.18 (0.88–1.58)
Bladder	841	63	1.14 (0.88–1.48)
Colorectal	1,974	139	0.96 (0.80–1.16)
Prostate	4,453	311	0.94 (0.79–1.11)
All cancers[c]	20,478	1,422	1.07 (1.02–1.16)

Malhotra et al, *Cancer Prevention Research,* **2017**

National Health Interview Survey (NHIS)

- Annual household survey

- Nationally representative

- Tobacco data collected in Supplements since 1965

- Linkage to mortality data from National Death Index (NDI)

National Health Interview Survey

Detailed smoking data collected in the NHIS

	1965	1966	1970	1974	1976	1977	1978	1979	1980	1983	1985	1987	1988	1990	1991	1992	1993	1994	1995	1996
Smoking Status Recode (cigarettes only)																				
Current/Former/Never			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Everyday/Someday/Former/Never															X	X	X	X	X	
Current Cigarette Smoker																				
Smoked at least 100 cigarettes	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Now smokes cigarettes (yes/no)[1]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Now smokes every day, some days, not at all															X	X	X	X	X	
Number of days smoked in past 30 days[2]															X	X	X	X	X	
Number of cigarettes per day[3]: now	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Number of cigarettes per day: 12 months ago	X	X	X																	
Number of cigarettes per day: when smoked most/longest	X	X	X				X	X	X											
Type of cigarette[4]			X				X	X	X			X								
Brand of cigarette							X	X	X			X								
Time before first cigarette, after awakening												X								
Age first TRIED a cigarette																			X	
Age first smoked fairly regularly/every day			X				X	X	X			X	X			X			X	
Ever smoked every day[5]															X	X			X	
Smoking status one year ago																X	X	X	X	
Number of years (total) a regular smoker												X				X				
Reasons for smoking												X								
Quitting:																				
Desire to quit smoking																	X	X	X	
Believe you could quit												X								
Reasons for trying to quit												X			X	X				
Reasons for starting again												X								
Plans/intentions to quit																X	X	X	X	
Ever tried to quit				X	X		X	X	X	X[6]		X		X	X	X				
Tried to quit in past year																X	X	X	X	
Number of quit attempts: past 12 months							X	X	X			X			X	X		X		
Number of quit attempts: lifetime							X	X	X			X			X	X				
Time since last quit attempt							X	X	X			X		X	X	X				
Duration of last quit attempt							X	X	X			X		X	X	X				
Duration of longest quit attempt												X								
Quit methods: ever used												X				X				
Quit methods: last used												X				X				
Ever been asked not to smoke in a public place																X				
Smoking behavior in public places												X								
Complementary Alternative Medicine Quit Methods																				

Source: https://www.cdc.gov/nchs/data/nhis/tobacco/TobHistTopics_65_forward.pdf

Methods

Harmonized together data from the 1991, 1992, 1998, 2000, 2005, and 2010 surveys

Follow-up through Dec 31, 2015

165,335 participants

Cox Proportional Hazards Regression (accounting for weighting)

Exclusive ever cigar use (>50 times in life)

Adjusted for age, sex, education, race/ethnicity, survey year

Inoue-Choi et al, *JNCI Cancer Spectrum*, 2019

Association of exclusive cigarettes and exclusive cigars with all-cause mortality

	Cigarette		Cigar	
	# of deaths	HR (95%CI)	# of deaths	HR (95%CI)
Never tobacco	12,713	(ref)	12,713	(ref)
Former	7,505	1.32 (1.27-1.36)	117	0.82 (0.64-1.05)
Current daily	5,885	2.32 (2.21-2.42)	42	1.49 (1.03-2.14)
Current non-daily	891	1.70 (1.54-1.87)	45	0.97 (0.67-1.42)

Inoue-Choi et al, *JNCI Cancer Spectrum*, 2019

The Tobacco Use Supplement to the Current Population Survey

Behavioral Research Program / Tobacco Control Research Branch (TCRB) / TUS CPS

Tobacco Use Supplement
Current Population Survey

The **Tobacco Use Supplement to the Current Population Survey (TUS-CPS)** is an NCI-sponsored survey of tobacco use that has been administered as part of the U.S. Census Bureau's Current Population Survey approximately every 3-4 years since 1992-93. The most recent publicly released data are for the 2018-2019 TUS-CPS (July 2018, January 2019, and May 2019).

Tobacco Control Funding Opportunities

News

- Revised 2018-2019 TUS-CPS Technical Documentation, now with Source & Accuracy Statement
- Revised 2018-2019 TUS-CPS Questionnaire
- 2018-2019 TUS-CPS Data Brief (PDF, 1.5 MB)
- *Physician's Weekly* interview with Dr. Maki Inoue-Choi⌐, lead author of June 2020 publication on "Dose-Response Association of Low-Intensity and Nondaily Smoking With Mortality in the United States"⌐

Fact Sheet

Get an overview of the TUS-CPS and its uses and linkages

Download Fact Sheet

https://cancercontrol.cancer.gov/brp/tcrb/tus-cps

Methods: population and exposures

Harmonized tobacco use data in the 1985 CPS and 1992-1993, 1995-1996, 1998-1999, 2000, 2001-2002, 2003, 2006-2007, and 2010-2011 TUS-CPS

357,400 NLMS participants (aged 35-80 years at survey)

Follow-up through December 31, 2011

Exclusive use of cigarettes, cigars, and pipes

  Former/current; daily/non-daily (some day)

All-cause mortality (n = 51,150)

Cause-specific mortality: tobacco-related cancer; circulatory disease; cardiovascular disease; cerebrovascular disease; respiratory disease; diabetes

Methods: Analysis

Cox proportional hazards regression

Age as the underlying time metric

Covariates: sex, race/ethnicity, education, CPS survey year

Reference: never use of cigarettes, cigars, pipes, or smokeless tobacco

NLMS survey weights set to the non-institutional US population

Association of exclusive cigarettes and exclusive cigars with all-cause mortality

	Cigarette		Cigar	
	# of deaths	HR (95%CI)	# of deaths	HR (95%CI)
Never tobacco	21,700	(ref)	21,700	(ref)
Former	15,400	1.32 (1.29-1.35)	250	1.11 (0.99-1.25)
Current daily	11,900	2.03 (1.99-2.08)	140	1.22 (1.04-1.44)
Current non-daily	1,300	1.60 (1.52-1.69)	40	1.12 (0.82-1.53)

Christensen et al, *JAMA Internal Medicine*, **2018**

Association of Exclusive Cigarette, Cigar, and Pipe Use with Tobacco-related Cancer Mortality

	Exclusive cigarette		Exclusive cigar	
	Non-daily	Daily	Non-daily	Daily
Total, n	9,400	57,300	600	530
Death, n	240	3,000	*	*
Hazard Ratio	2.31 (2.01-2.65)	4.33 (4.09-4.58)	1.08 (0.45-2.61)	1.80 (1.20-2.69)

Christensen et al, *JAMA Internal Medicine*, 2018

Prevalence of different tobacco products in the United States

	Any	Cigs	Cigars	Hookah /pipe	E-cig	Smoke-less	≥2 types
Adults	20.8%	14.0%	3.6%	1.0%	4.5%	2.4%	3.9%
High school	23.6%	4.6%	5.0%	3.4%	19.6%	3.1%	8.2%

Gentzke *et al, MMWR*, 2020
Cornelius *et al, MMWR*, 2020

National Health Interview Survey (NHIS)

- Annual household survey

- Nationally representative

- Tobacco data collected in Supplements since 1965

- Linkage to mortality data from National Death Index (NDI)

National Health Interview Survey

Methods

Harmonized together data from the 1991, 1992, 1998, 2000, 2005, and 2010 surveys

Follow-up through Dec 31, 2015

118,144 participants

Cox Proportional Hazards Regression (accounting for weighting)

Adjusted for age, sex, race/ethnicity, education, survey year

Choi et al, *AJE,* **2019**

Tobacco usage pattern in exclusive cigarette smokers and dual and poly tobacco users

	Current cigarette and other tobacco use			
	Exclusive cigarette	Cigarettes and cigar or pipe	Cigarettes and smokeless tobacco	Poly-use: Cigarettes, cigar/pipe and smokeless tobacco
Number of participants (%)	32,038 (26.5)	1,291 (1.1)	612 (0.6)	231 (0.2)
Age when started smoking cigarettes regularly, median (IQR)	17 (15-20)	16 (14-18)	17 (15-19)	16 (13-18)
Daily cigarette use, %	81.4	79.3	74.4	78.3
Number of cigarettes smoked in the past 30 days, median (IQR)	**450 (300-600)**	**600 (300-600)**	**510 (210-600)**	**600 (300-900)**
Daily other tobacco use, %	-	16.1	33.2	28.5

Mortality risks among dual and poly-users and exclusive cigarette smokers

		Never tobacco use	Exclusive cigarette use	Cigarettes and cigar or pipe	Cigarettes and smokeless tobacco	Poly-use: cigarettes, cigar/pipe and smokeless
All-cause	Death	12,713	6,776	302	78	51
	HR	**1.00**	**2.26**	**2.36**	**2.28**	**2.49**
	95% CI	Ref.	2.16-2.37	1.99-2.80	1.79-2.90	1.76-3.53

Choi et al, *AJE,* 2019

Interaction of cigarettes and pipe/cigar with overall mortality relative to never tobacco use

	Non-daily cigarette		Daily cigarette	
	# of deaths	HR (95%CI)	# of deaths	HR (95%CI)
Non-daily cigar or pipe	32	1.29 (0.64-2.59)	205	2.53 (2.11-3.02)
Daily cigar or pipe	15	2.44 (1.29-4.60)	50	2.88 (2.03-3.09)

Choi et al, *AJE,* 2019

Conclusions

Cigar smoking increases risk of overall mortality and a number of diseases including cancer(s)

Existing cohorts tend to lack substantial numbers of exclusive cigar users or dual-users of cigarettes and cigars

Also tend to lack information about key metrics, *eg* duration, cessation, frequency, cigar type

Limited ability to examine associations with specific diseases or causes of deaths

Limited ability to stratify by sex, race/ethnicity

Into the future with the Tobacco Longitudinal Mortality Study (TLMS)

Unique nationally-representative cohort for asking pressing public health and regulatory questions (Census, FDA-CTP, NIH)

Substantially larger sample size (4-6x bigger) and more survey years

Longer follow-up (more deaths)

Information on types of cigars, brands, flavors, days of month

Linkage is occurring now

Acknowledgements

www.cancer.gov   www.cancer.gov/espanol