

The Tobacco Checkbox: A Potential Tool for Measuring Tobacco-related Mortality

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Introduction

According to the Centers for Disease Control and Prevention (CDC), tobacco is the leading cause of preventable death, with smokers having three times the risk of death and dying an average of 10 years earlier than nonsmokers.¹ In 2015, 19.0 percent of North Carolina adults reported that they are current smokers and 25.8 percent report being former smokers.² This means that nearly half of North Carolina adults may be at risk for tobacco-related death. Despite the mortality risks associated with tobacco use, until recently, there has been no standardized method for collecting information regarding tobacco use through death certificates. Beginning in January 2014, North Carolina implemented the revised U.S. Standard Death Certificate that included a new checkbox field to indicate whether tobacco use contributed to a death. This report examines reporting from the tobacco checkbox for adult resident deaths occurring during the first two years that the checkbox was available, 2014–15.

Data and Definitions

On the current U.S. Standard Death Certificate, the National Center for Health Statistics specifies that the medical certifier should:

“Check ‘yes’ if, in your opinion, the use of tobacco contributed to death. Tobacco use may contribute to deaths due to a wide variety of diseases; for example, tobacco use contributes to many deaths due to emphysema or lung cancer and some heart disease and cancers of the head and neck. Check ‘no’ if, in your clinical judgment, tobacco use did not contribute to this particular death.”³

DID TOBACCO USE CONTRIBUTE TO DEATH?

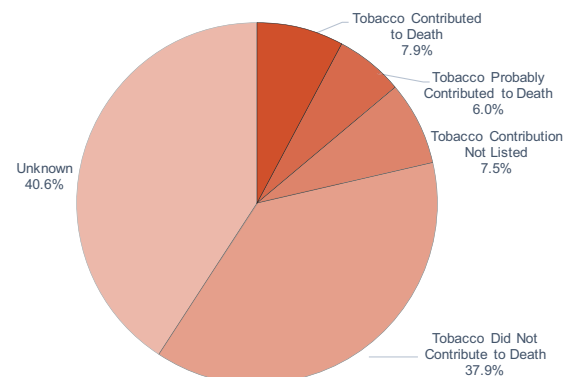
- Yes Probably
 No Unknown

This report will examine the quality of reporting from the tobacco checkbox on the revised death certificate and describe demographic characteristics associated with reporting.

Results

As presented in **Chart 1**, medical certifiers reported that tobacco use contributed or probably contributed to approximately 14 percent of North Carolina resident deaths occurring in 2014–15 (N=23,958). The medical certifier did not know the tobacco use history of the decedent at the time the death certificate was completed in 40.6 percent of deaths, and the certifier left the tobacco contribution field blank in another 7.5 percent of resident deaths.

Chart 1. 2014–2015 North Carolina Resident Adult Deaths (Ages 18+): Tobacco Use Recorded as Contributing to Death



Note: Figure may not sum to 100 percent due to rounding.

Tobacco-related deaths by demographic group are presented in **Table 1**. Among 2014–15 North Carolina resident tobacco-related deaths:

- Males were more likely than females to have tobacco listed as a probable or contributing cause (17.1% of deaths to males compared with 10.8% of deaths to females).
- Non-Hispanic American Indians had the highest percentage of records with tobacco recorded (15.8%)
- Among residents ages 55 to 74, tobacco use was recorded on 21.4 percent of all death certificates. Tobacco-related mortality was lowest among younger adults, ages 18 to 34.

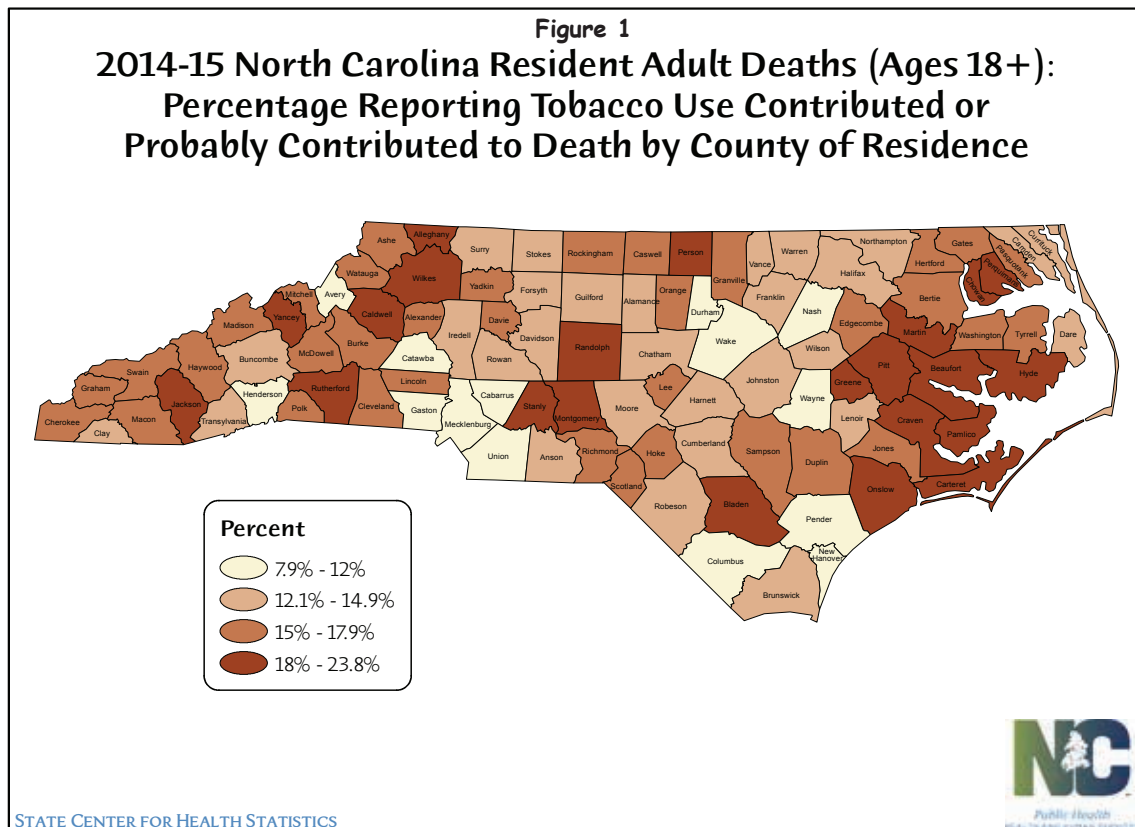
**Table 1: 2014-15 NC Resident Adult Deaths (Ages 18+):
Certifier Reports of Tobacco Use by Demographic Characteristics**

	Total Deaths #	Medical Certifier Report:					
		Any Tobacco Contribution		Tobacco Did Not Contribute		Missing Information	
		#	%	#	%	#	%
Total Deaths	171,684	23,953	14.0	65,122	37.9	82,609	48.1
Gender:							
Female	85,876	9,308	10.8	36,798	42.9	39,770	46.3
Male	85,807	14,645	17.1	28,324	33.0	42,838	49.9
Race/Ethnicity:							
Non-Hispanic White	132,210	19,263	14.6	49,881	37.7	63,066	47.7
Non-Hispanic Black	34,302	4,210	12.3	13,097	38.2	16,995	49.5
Non-Hispanic American Indian	1,709	270	15.8	592	34.6	847	49.6
Non-Hispanic Other	1,402	96	6.8	588	41.9	718	51.2
Hispanic	2,061	114	5.5	964	46.8	983	47.7
Education:							
< High School	48,570	7,955	16.4	17,092	35.2	23,523	48.4
High School/GED	64,446	9,350	14.5	23,932	37.1	31,164	48.4
Some college	32,741	4,313	13.2	12,642	38.6	15,786	48.2
Bachelor's Degree	16,539	1,554	9.4	7,220	43.7	7,765	46.9
Masters/Doctorate/ Professional Degree	8,311	628	7.6	3,961	47.7	3,722	44.8
Unknown	1,077	153	14.2	275	25.5	649	60.3
Age Group:							
Ages 18 to 34	4,731	86	1.8	2,800	59.2	1,845	39.0
Ages 35 to 54	17,105	2,422	14.2	6,226	36.4	8,457	49.4
Ages 55 to 74	58,576	12,524	21.4	17,403	29.7	28,649	48.9
Ages 75+	91,272	8,921	9.8	38,693	42.4	43,658	47.8
Veteran Status:							
Non-Veteran	132,627	17,841	13.5	52,407	39.5	62,379	47.0
Unknown Veteran Status	1,549	169	10.9	340	21.9	1,040	67.1
Veteran	37,508	5,943	15.8	12,375	33.0	19,190	51.2

* Any Tobacco Contribution includes Tobacco as Contributing combined with Probable Tobacco records.
Missing information combines cases where tobacco use was listed as unknown and cases with missing data.

- Tobacco was more likely to be listed for decedents with lower levels of education. Among those with masters, doctorate or professional degrees, only 7.6 percent of deaths were listed as tobacco-related compared with 16.4 percent of those with less than a high school education.
- Veterans were more likely to have tobacco listed as contributing to their death (15.8%) compared with non-veterans (13.5%).

Figure 1 presents the percentage of North Carolina deaths with tobacco listed as a contributing or probable contributing cause by county of residence. North Carolina counties with tobacco-related percentages greater than 20 percent include Beaufort (23.8%), Pitt (22.9%), Martin (21.9%), Craven (21.0%), Yancey (20.3%) and Chowan (20.3%) counties. Only four counties had tobacco related death percentages less than 10 percent: New Hanover (9.6%), Mecklenburg (9.4%), Wake (9.0%) and Columbus (7.9%).



**Table 2. 2014–15 North Carolina Resident Adult Deaths (Ages 18+):
Leading Causes of Tobacco Related Deaths**

Rank	Cause of Death	Number of Deaths	Percent of all Tobacco-Related Deaths	Percent of all Deaths to this Cause
1	Cancer	7,611	31.8%	19.8%
2	Chronic lower respiratory diseases	5,106	21.3%	49.9%
3	Diseases of the heart	4,814	20.1%	13.4%
4	Diabetes mellitus	829	3.5%	15.3%
5	Cerebrovascular disease	699	2.9%	7.2%
	All other causes (Residual)	4,894	20.4%	6.8%
	Total Deaths	23,953		

As presented in **Table 2**, cancer, respiratory disease, heart disease, diabetes and cerebrovascular disease were the five leading causes of death recorded among decedents with a tobacco contribution listed. Cancer, respiratory disease and heart disease together accounted for nearly three quarters of tobacco-contribution deaths (73.2%). These causes are consistent with other tobacco-related mortality estimates.⁴ Tobacco-related deaths comprised half (49.9%) of all resident deaths due to chronic lower respiratory disease. With regard to cancer, one in five cancer deaths (19.8%) involved tobacco as a contributory cause, according to certifier reports.

Overall, nearly half (48.1%) of 2014–15 North Carolina resident adult deaths had missing or unknown tobacco use information recorded on their death certificate. **Chart 2** presents the percentage of death records with missing or unknown tobacco contribution information by certifier type. Among certifier types, death certificates completed by nurses (Nurse Practitioners or Family Nurse Practitioners) had the highest rates of missing tobacco information (61.4% of all death certificates registered). Death certificates completed by Physician Assistants had the lowest percentage of missing tobacco information (43.4%). With regard to reporting by place of death, there was little variation in the percentage missing tobacco information, with the exception of hospice facilities; from which 61.3 percent of all death certificates had missing or unknown tobacco information.

Limitations

Reporting: This report is limited by inadequate reporting of the tobacco use checkbox on death certificates. As noted, nearly half (48.1%) of death certificates had missing tobacco information (the certifier did not check anything in the tobacco checkbox or reported that decedent tobacco use was unknown). Despite such extensive failure to report, medical certifiers indicated that tobacco use contributed or probably contributed to 14 percent of 2014–15 resident deaths; and among males, 17.1 percent of all deaths were documented as tobacco related. The scope of tobacco-related deaths would likely further increase if full reporting was available.

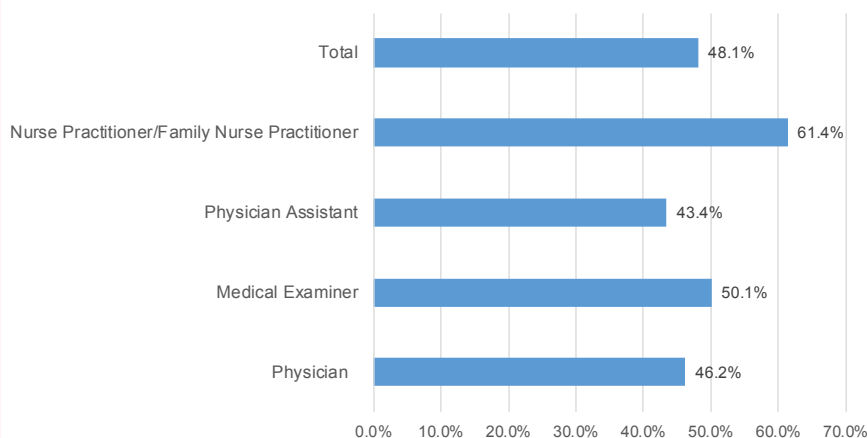
Need for Additional Information:

Additional tobacco information, beyond a single checkbox, would be helpful in better understanding the magnitude of tobacco-related deaths. For example, the tobacco checkbox does not distinguish between a personal history of smoking and second hand smoke exposure during the decedent’s lifetime. Information regarding the type of tobacco product exposure used would also be helpful; such as making a distinction between cigarettes, cigars, pipes, hookahs, smokeless tobacco and e-cigarettes. Furthermore, the checkbox does not indicate if the decedent smoked prior to death, or was a former smoker who quit. This information would be

helpful in order to assess the latency period between tobacco exposure and death. Further, it would also be helpful to have information regarding the number of years of smoking and the number of cigarettes and/or packs smoked per day, which would enable mortality researchers to calculate pack years.⁵ However, the fact that the information on the death certificate is, by its nature, reported secondhand likely makes reporting of specific tobacco use history less feasible.

Alternative Estimates: Other alternative methods for estimating tobacco related and associated deaths have also been established. Most estimates utilize smoking prevalence estimates and/or estimates of deaths due to tobacco related illnesses.^{5,6,7,8} Smoking attributable mortality (SAM) is one of the most widely reported statistical methodologies for estimating tobacco-related deaths. SAM estimates calculate smoking attributable fractions (SAF) for causes determined to be smoking related according to the U.S. Surgeon General, such as chronic lung disease and lung cancer.⁹ For the period 2005–2009, SAM estimated 40,359 deaths in North Carolina could be attributable to smoking annually.¹⁰ The SAM estimate for this earlier time period was 68 percent higher than 2014–15 tobacco checkbox figures presented in this report (N=23,953). However, with improved tobacco checkbox reporting, death certificate figures could approximate SAM estimates.

**Chart 2: 2014–15 North Carolina Resident Adult (Ages 18+)
Deaths with Missing/Unknown Tobacco Checkbox
Information by Medical Certifier Type**



Discussion

Tobacco information now being collected on North Carolina death certificates can serve as a useful tool for assessing the magnitude of tobacco-related deaths in our state; however, improvements in reporting are needed. In order to help facilitate this, information on prior tobacco use should be included in patient medical records and made available to medical certifiers completing death certificates in order to ensure an accurate assessment of the impact of tobacco as a contributing cause of North Carolina resident deaths. Provider education regarding the importance of completion of all fields on the death certificate should also be required.

Conclusion

The addition of the tobacco checkbox on the North Carolina death certificate gives us an initial snapshot of the magnitude of tobacco's contribution to deaths in our state. In 2014–15, 14 percent of all North Carolina resident death certificates indicated that tobacco was a contributory factor. However, nearly half of all death certificates contained missing or unknown tobacco use information. Significant improvements in reporting are needed before we can fully understand the extent of tobacco-related deaths in our state.

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