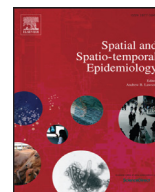




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Original Research

Regional variation in lung and bronchus cancer survival in the US using mortality-to-incidence ratios

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ABSTRACT

Despite major achievements aimed at reducing smoking over the last 50 years in the U.S., lung cancer remains the leading cause of cancer death. This study used mortality-to-incidence rate ratios (MIR) calculated from 2008 to 2012 National Cancer Institute data to highlight state-level variations in relative lung and bronchus cancer survival. In an *ad hoc* sensitivity analysis, we calculated a correlation between our state-level MIRs and five-year 1-survival rates for states reporting incident lung and bronchus cancer cases (2004–2008) to the Surveillance, Epidemiology, and End Results (SEER) Program database. Differences were observed in state lung and bronchus cancer MIRs, with the highest MIR values (poor relative survival) in southern states and the lowest MIRs primarily in northeastern states. In our sensitivity analysis, state-level MIRs were highly correlated with 1-survival rates. Examining regional variation in survival using MIRs can be a useful tool for identifying areas of health disparities and conducting surveillance activities.

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1. Introduction

Although smoking prevalence has steadily decreased since the Surgeon General's Report on Smoking and Health of 1964 (Islami et al., 2015), lung cancer remains the leading cause of cancer death in the US and worldwide (Siegel et al., 2017; Hébert et al., 2009), with over 70% of cases being diagnosed at late stage (Hébert et al., 2009). Early detection of the disease is critical for improving prognosis, as more than 50% of patients diagnosed at early stages survive at least 5 years (Wagner et al., 2012). Previous studies have shown regional disparities in rates of lung cancer incidence and mortality rates; however, less is known about regional variation in lung cancer survival.

(Siegel et al., 2017; Hébert et al., 2009; Wagner et al., 2012) The mortality-to-incidence rate ratio (MIR) has been used to quantify cancer mortality in relation to incidence for a specified geographic region or population. (Hébert et al., 2009; Asadzadeh Vostakolaei et al., 2011; Sunkara and Hébert, 2016; Sunkara and Hébert, 2015) The objective of this study was to construct and compare state-level MIRs to evaluate geographic disparities in lung and bronchus cancer survival in the United States. National MIRs were also stratified by sex, race and ethnicity to further explore existing disparities.

2. Materials and methods

MIRs were calculated for all U.S. states (including D.C.) and counties for which data were available in the National Cancer Institute (NCI) State Cancer Profiles website. (State Cancer Profiles, 2016) Calculations were based upon 5-year averages of incidence and mortality rates of lung and bronchus cancer from 2008 to 2012. Incidence and

Abbreviations: MIR, mortality-to-incidence rate ratios.

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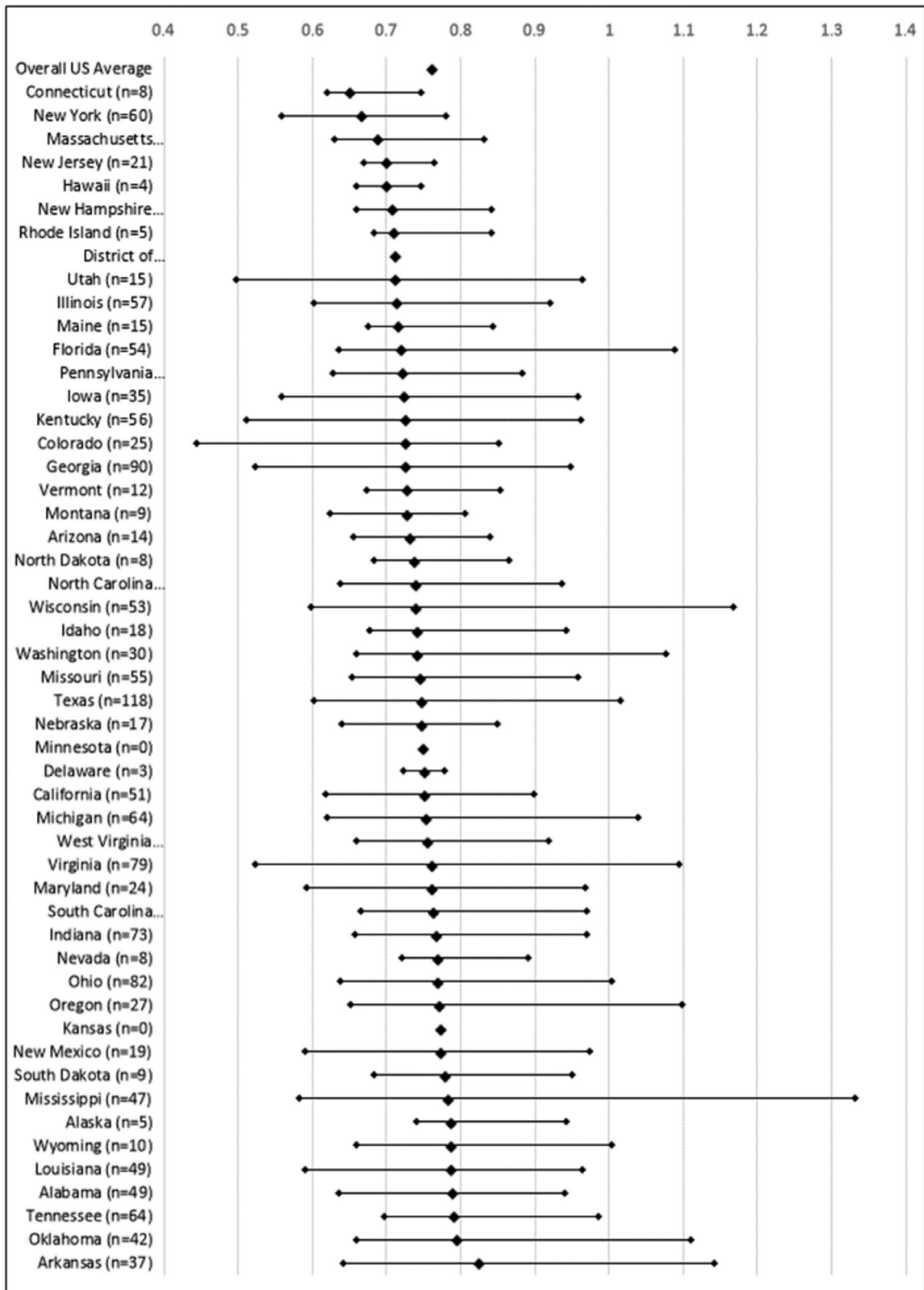


Fig. 1. State and county level variation in lung and bronchus cancer MIRs, 2008–2012. The bars surrounding each state's MIR value represent the range of MIR values for the state's respective counties with the far left and far right endpoints representing the minimum and maximum county MIR value within each respective state (n = counties with a population $\geq 20,000$, as reported in the U.S. 2010 Decennial Census). Counties with populations $< 20,000$ were excluded to ensure rate stability.

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