

Examining Factors that Increase Risk for Lung Cancer in Rural Populations: A Literature

Review

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**Research Question**

What are the risk factors of developing lung cancer for people living in rural areas in the United States?

**Abstract**

Lung cancer is one of the most common types of cancer worldwide. While some lung cancer can be attributed to genetics, much of it is caused by lifestyle habits. This means that, compared to other cancers and chronic diseases, lung cancer is more preventable. Living in a rural area has proven to increase the presence of risk factors associated with lung cancer. This literature review explains a few of the main risk factors for patients in rural communities: smoking, lack of healthcare education, lack of access to quality healthcare, and lack of access to or knowledge of technology. Literature used in this review was gathered through PubMed and Gale Academic OneFile, with supporting statistics and map tools from the CDC and WHO. Literature gathered was limited to a 2015 to 2025 scope. The literature reviewed exposed that despite growth in urban areas to lessen the diagnosis and mortality rates of lung cancer, rural areas still experience the highest levels of these rates. Through the literature, it becomes clear that the risk factors for lung cancer when living in a rural community all stem from access to resources. This underscores the reason why prevention in urban areas as opposed to rural areas is more successful, thus perpetuating the need for an increased allocation of resources to rural areas.

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## **Introduction**

Not only is lung cancer currently the world's most common type of cancer, it is also the most deadly, causing 1 out of 5 cancer-related deaths (WHO IARC). In the United States alone, lung cancer is both the third most common and the most deadly type of cancer (CDC). Unlike other forms of cancer that are largely caused by genetic mutations or predispositions, lung cancer is one of the most common preventable types of cancer that exists. Smoking is currently the leading cause of lung disease and lung cancer, as it is responsible for about 80-90% of deaths (CDC). In terms of diagnosis trends, a 2016 study found that from 2007-2016, lung cancer incidence rates declined in both nonmetropolitan and metropolitan counties. The study noted that metropolitan areas experienced a sharper decline in lung cancer cases than that of nonmetropolitan areas (O'Neil, 2016).

While there is not a significant amount of research for what specifically makes lung cancer incidence and death higher in rural areas compared to urban areas, there are some behavioral factors that have the potential to increase risk. Smoking is not only a risk factor for causing cancer, but it can worsen a cancer outcome (Grobman, 2023). For example, if someone is genetically predisposed to having cancer, smoking is a habit that could contribute to having the cancer or increasing the severity of the disease. A factor that is highly connected between lung disease and smoking is living in a rural area. Living in a rural area has statistically proven to put people at a disadvantage due to their lack of access to quality healthcare, lack of health education and other public health services, and less technological acceptance and access.

As mentioned, smoking is one of the most prevalent risk factors that causes lung disease in rural areas, especially as smoking is more prevalent in these areas than urban areas in the US and many other countries around the world (NIH). A 2023 study pooled statistics of smoking, lung disease and lung cancer reports, and lung disease and cancer deaths in rural areas versus

urban areas and found that on average, there was a higher mortality rate from lung disease in rural areas than urban areas (Gaddam, 2023). Both of these facts together display that there is a significant problem with smoking in rural areas.

There are a few maps that have been created visualizing

smoking concentrations across the United States. The map made by ARCGIS of 2017 smoking trends is especially compelling as it visualizes this problem. The highest concentrations of smokers in the US are in rural areas that surround cities. The most common listed in research are the lack of education surrounding disease prevention and risks (such as smoking), lack of access to quality health care (including disease screening), and a lack of cultural acceptance and access to technology.

To begin, lack of access is an important key phrase when discussing why rural populations are statistically at a higher risk of developing and dying from lung cancer. Two issues are particularly supported within the research: the lack of access to quality healthcare and to technology. Quality health care in itself is a stretch, as some areas have little to no access to health care at all. Many factors play a role in making this a challenge for rural populations, such as the transportation to the nearest health care facility, making time to attend an appointment far away, childcare services while a parent or guardian is away at an appointment, and staying somewhere if spending the night is needed. Not only are these physical, logistical, and geographical challenges, but they are financial as well. Lack of cancer screening is a significant contributing factor to cancer deaths around the world. If someone does not have the access or the financial or insurance means to go to a health care facility to get screened for diseases such as cancer, they could live years with the disease progressing and not even know it.

The next access problem is technology. Many rural areas do not have the wifi or cellular data capabilities to support the kinds of devices needed to conduct virtual appointments, not to mention the expense of the item itself or the services needed to connect it online. Technology

poses an additional challenge as it is a fairly new invention. Statistically, rural populations are older, thus these areas have strong traditions that rely less on technology than an urban area. People are intrinsically scared of things they are not familiar with, so asking rural populations to put their trust in a device they know virtually nothing about is not a fair assessment of a solution to this problem.

Lastly, there is a clear gap within the literature regarding what works to form healthier habits surrounding lung disease prevention in rural communities. There is plenty of literature examining what does not work, and a need for discussion on scientifically proven, successful prevention solutions. The lack of health education and public health services in rural areas around the world undoubtedly contributes to the formation of poor health habits and a lack of knowledge of diseases and their risks, prevention and implementation, but it would be shortsighted to not also recognize that this literature gap is negatively perpetuating this problem. This paper analyzes the risk factors for developing lung cancer in rural areas, examining how disparities in healthcare access, technology, and health education contribute to this problem.

## **Methods**

To effectively research the risk factors for lung cancer occurrence in rural areas, it is important to use databases that not only hold validity, but also reliability. The two databases used to source peer-reviewed, relevant journals were PubMed and Gale Academic OneFile. PubMed is a database that contains literature surrounding thousands of topics related to biomedical, chemical sciences, behavioral sciences, bioengineering and life science studies. There are over 38 million citations and abstracts that have been added to the database since its beginning in 1996. It is currently managed and updated by the National Center for Biotechnology Information and the National Library of Medicine (NIH NLM).

Gale Academic OneFile is a database that anyone can access. Some articles can be accessed without signing up, while others will only appear if the user is registered with an account. Accounts are free and only require an email, which does not have to be associated with any institution or company. According to their website, Gale OneFile allows users instant access to relevant content. It is a leader in global research databases as it has content that can be translated into over 60 languages (Gale Academic OneFile).

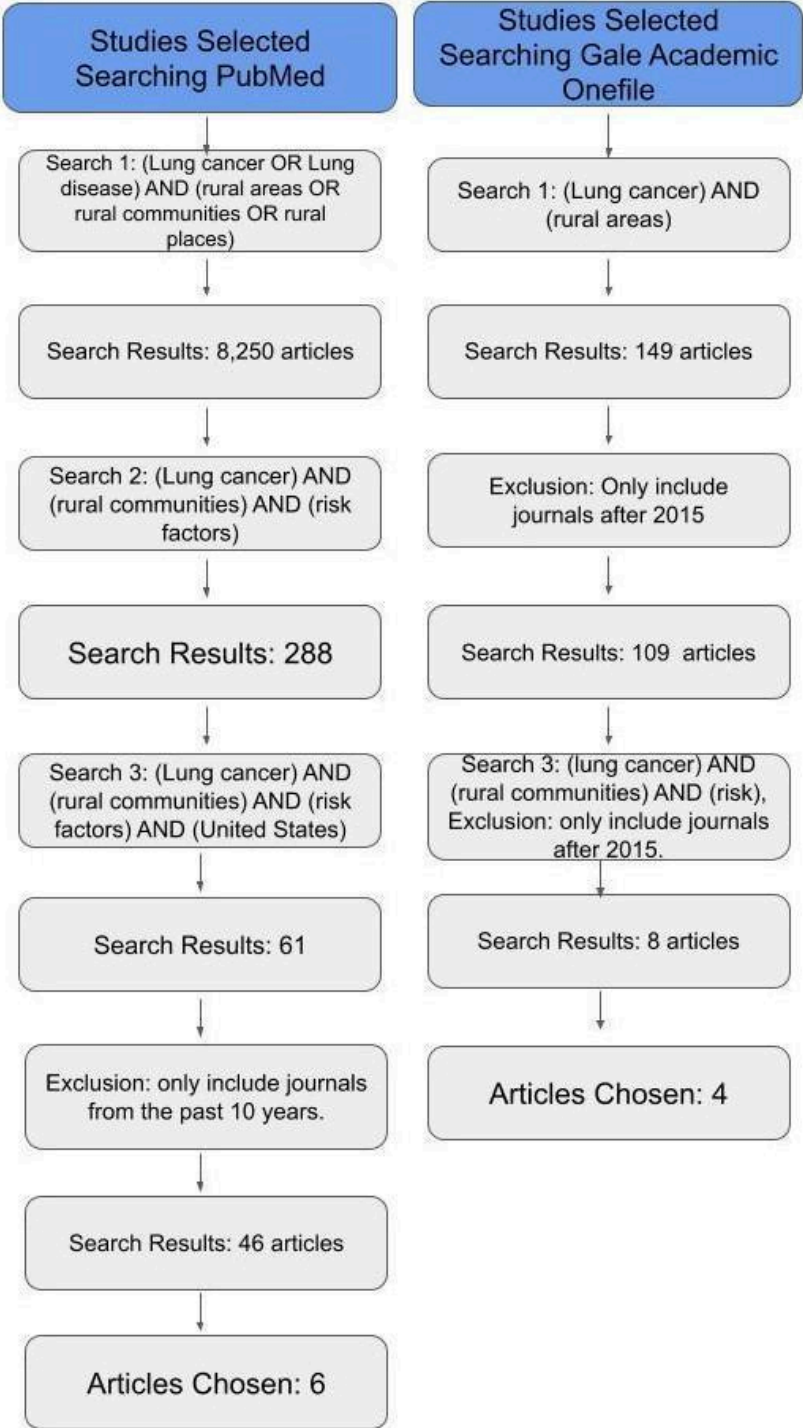
For PubMed, the first search term used was “(Lung cancer OR lung disease) AND (Rural areas OR rural communities OR rural places).” This first search yielded 8,250 articles. To narrow the pool of articles, a second search was conducted using the terms “(lung cancer) AND (rural communities) AND (risk factors).” The second search came up with 288 articles.. The next search term used was “(lung cancer) AND (risk factors) AND (United

States).” These results yielded 61 articles, which was then simplified to 46 articles after adding the exclusion term of “articles only from the past 10 years.” 6 relevant journals or case studies were chosen for this literature review from PubMed using this search process.

Gale Academic OneFile is a smaller database than PubMed, but became a great resource for this literature review as it has excellent Public Health journals that PubMed did not have. The first search term used on Gale Academic OneFile was “(lung cancer) AND (rural areas),” which yielded 149 articles. Restricting publication dates to 2015-2025 resulted in 109 articles. To focus the search further, a third search was conducted using the terms, “(lung cancer) AND (rural communities) AND (risk),”. This search yielded 8 articles . Of these, 4 were chosen for use in this literature review.

Some general problems encountered when researching through these databases, as the search was resulting in global studies, even when specifying “United States.” There was also a lack of studies from the past ten years compared to the past 20 years, and smoking was the only risk factor that would come up during initial searches. Additionally, excluding the word “smoking,” did not improve the results. The factor that made the biggest impact was using the right database. Out of five databases used to research, only 2 provided results relevant to the target topic. Occasionally during the research process, a change in wording was used to provide a wider range of articles to choose from, where both “(lung cancer) AND (lung disease)” were used together.

Figure 1. Process for Article Selection



## **Results**

There is a clear, positive correlation between lung cancer and living in a rural area. This literature review will identify factors that increase the risk of lung cancer for rural communities, such as lack of health education, inability to access quality health care and lack of access to and knowledge of technology. It will furthermore discuss intervention strategies to lessen the impact of lung cancer on rural communities. See Table 1 below for a more detailed summary of the articles reviewed.

## **Community Education**

People who live in rural areas are discouraged from cancer screenings, also about increased risk in rural populations and increased presence of tobacco advertising. Cigarette and other tobacco product brands purposefully target rural populations to advertise their products to. Without someone telling them and showing evidence of the correlation between smoking and lung cancer, the likelihood of these populations smoking is significantly higher (Duan, 2023). There are cancer registries that help to track where cancer becomes the most prevalent, when, and what types. This is an incredibly useful tool as it directly shows cancer trends and could be a good source for proving the effectiveness of a proposed intervention (O'Neil, 2016 & Parker, 2022). There is an underrepresentation of rural communities in this registry program as it is

voluntary, and many people in these communities do not participate because they are never told why it is important (Thompson, 2021). If these communities are not aware of why something matters, especially if it could help their health outcomes improve, then they are not going to do it. This is why education matters for disease prevention (Gaddam, 2021).

### **Access to Technology**

Technology is a growing field within medicine. The COVID-19 Pandemic forced the medical field to rely more heavily on, research, and develop online platforms and programs that could be used in lieu of in-person doctors appointments (Lyu, 2022). While it is not a perfect or even ideal solution for everyone, it actually increased cancer screening and appointment scheduling for oncology centers in certain areas across the country (Shaffer 2023). With increased screenings and appointments, even if online, comes increased early diagnosis and the ability to begin treatment and intervention at the earliest stages of cancer.

Sources suggest that people felt more comfortable to have online appointments as they could log on from their own homes, without having to find transportation to and from a healthcare facility. It was also efficient time-wise for many people with busy schedules, who may have been unable to meet with a doctor otherwise (Shaffer, 2023). Though this solution has proven to be successful in many areas, most of them are urban. There are significant challenges that come along with bringing an online solution to rural areas. Some of the most common concerns are that rural areas may lack access to wifi or internet services or

access to technology, and that elderly people may not know how to use the technology needed for online platforms, such as Telehealth. Additionally, there is concern growing with online care in both rural and urban areas that people would not be able to find a secure place within their homes to have private and honest conversations that are vital to providing accurate care (Lyu, 2022).

### **Access to Quality Health Care and Cancer Screening**

Because rural populations are more limited in their access to screening centers, they are less likely to receive lung cancer screenings. Because of this, lung cancer incidence, advanced disease, and mortality rates are higher in rural areas (Copeland, 2023). There are many reasons why access to screening centers or other facilities that have these capabilities are not accessible to rural communities. One reason is that they are often located in or around larger cities, which could be hours away from certain rural communities. With this, comes the problem of transportation. In urban areas, patients may have the ability to walk to their appointment or use other forms of transportation such as ride share apps or taxis, whereas there may be little to no access to these options in rural areas. If someone does not have the access or ability to get themselves to an appointment, they will not be able to attend a cancer screening. Some places have started foundations or funds that support people financially in paying for transportation costs for cancer screenings and treatments that help alleviate this problem (Welch, 2024).

**Table 1. Detailed Summary of Articles Reviewed**

	Author(s)	Year	Article Title & Journal	Purpose of Article	Sample Info	Type of Research	Research Findings	Limitations of Articles
1	Duan, Z., Levine, H., Bar-Zeev, Y., Cui, Y., LoParco, C. R., Wang, Y., Abrams, L. C., Khayat, A., & Berg, C. J.	2023	The impacts of electronic cigarette health warning labels on use intentions and perceptions: A cross-sectional study of US and Israeli adults who use tobacco. <i>Journal of Public Health Research</i>	To educate on the impacts of health warning labels on e-cigarette use.	Using 2021 survey data from 927 US and Israeli adults reporting past-month tobacco use, multivariate analyses examined: sociodemographics in relation to self-reported impact of e-cigarette HWLs and HWL impacts in relation to use intentions and perceived addictiveness.	Cross-sectional study	Among those who noticed HWLs. 34.1% reported HWLs resulted in greater concern about e-cigarette use, 45.5% no effect, and 20.4% reassurance.	Findings could have limited generalizability because participants were recruited via panels in the US and Israel, who may not be representative of the tobacco-using population. Also, the X-sectional design restricts the ability to establish causal relationships between HWL exposure and use. Finally, self reporting reliance could introduce recall bias.

2	Gaddam, S. J.	2021	<p>Engaging rural communities in cancer prevention and control research: Development and preliminary insights from a community-based research registry. Cancer medicine.</p>	<p>To identify the disparities between different population groups to further decrease lung cancer-related mortality. This was done through analyzing the outcome variances between urban and rural populations.</p>	<p>Used mortality data from CDC WONDER, multiple causes of death database and analyzed age-adjusted mortality rates per 100,000 population. From this, temporal trends in the average percent change of AAMRs were assessed by applying the simplest model with a maximum of 3 joinpoints. Nonparallel pairwise comparisons were conducted to assess differences in trends between metropolitan and rural areas using average annual percentage change differences.</p>	<p>Longitudinal Study</p>	<p>We noted a decline in the AAMR overall and across large metropolitan, small/medium metropolitan, and rural areas (table). However, the decline in AAMR was significantly higher among large metropolitan areas as compared to small/medium metropolitan and rural areas.</p>	<p>The data gathered could have been slightly skewed due to the population size collected from the metropolitan group being significantly larger than that of the rural group.</p>
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3	Grobman, B., Mansur, A., & Lu, C. Y.	2023	Disparities in Lung Cancer Death Among People with Chronic Lower Respiratory Diseases in the United States. Lung, 203(1).	Patients with chronic lower respiratory diseases (CLRD) are at a higher risk of lung cancer. Less is known regarding how the risk of CLRD-associated lung cancer death might have changed on a national scale over the past 20 years across demographic and regional groups.	Calculated age-adjusted mortality rates (AAMR) for lung cancer death among people with CLRD using 1999–2020 data from the CDC WONDER multiple cause of death database. Rates were compared between demographic groups and time periods.	Longitudinal Study	Rates of lung cancer death among people with CLRD were highest among White Americans compared to other racial groups.	The study focused primarily on white men, leaving a significant research gap for other demographic groups.
4	Lyu M;Zhao Q;Yang Y;Hao X;Qin Y;Li K	2022	Benefits of and barriers to telehealth for the informal caregivers of elderly individuals in rural areas: A scoping review. The Australian journal of rural health.	To identify the benefits of and barriers in telehealth engagement for rural caregivers to provide evidence for service improvement.	Review using PRISMA-ScR guidelines and Arksey and O'Malley's five-stage framework. Five databases were searched. Two authors independently assessed the eligibility of studies.	Systematic Review	4220 studies; 19 articles met inclusion criteria. Four subthemes identified as benefits of using telehealth for caregivers.	Only the elderly population in rural areas is included. No comparison to urban population. Only discusses one online caregiving platform: Telehealth.

5	O'Neil ME;Henley SJ;Rohan EA;Ellington TD;Galloway MS	2016	Lung cancer incidence in nonmetropolitan and Metropolitan Counties - United States. MMWR. Morbidity and mortality weekly report.	To examine whether lung cancer incidence trends among nonmetropolitan and metropolitan counties differed based on their exposure to risk factors.	Data on cases of invasive lung cancers diagnosed during 2007-2016 were obtained and calculated for annual incidence rates per 100,00 people. Rate ratios were then created, grouping demographically . A two-sided t-test was used to determine significance.	Cohort Study	From 2007-2016, lung cancer incidence rates declined in both nonmetropolitan and metropolitan counties. The rate of decline differed by sex and rural-urban status. Metropolitan areas experienced a sharper decline in lung cancer cases than that of nonmetropolitan areas.	Delays in cancer reporting could result in an underestimating of incidence. Incidence was not determinable by county classification for all states, so the states excluded are not comparable to the results gathered.
6	Parker, M. A., Weinberger, A. H., Eggers, E. M., Parker, E. S., & Villanti, A. C.	2022	Trends in rural and urban cigarette smoking quit ratios in the US from 2010 to 2020. JAMA network open.	To examine self-reported smoking patterns of adult participants in the US National Survey on Drug Use and Health (NSDUH)	Deidentified data was gathered from the 2010-2020 NSDUH. There were 161,348 lifetime smokers analyzed, with the minimum requirement being adults who smoked at least 100 or more cigarettes. Participants represented a diverse demographic background.	Cross-sectional study	In 2020, smoking prevalence was higher in rural than urban areas, whereas the quit ratios were similar in both areas. From 2010-2020, the odds of quitting smoking were lower in rural areas than in urban areas.	The cross-sectional design could be limiting, despite multiple years of data gathered. Measurement error from self-reporting could also be a limitation.

7	Shaffer KM;Turner KL;Siwik C;Gonzalez BD;Upasani R;Glazer JV;Ferguson RJ;Joshua C;Low CA	2023	Digital Health and Telehealth in cancer care: A scoping review of reviews. The Lancet. Digital health.	To review the model of remote cancer care delivery.	Literature was gathered from five different databases, with 134 reviews meeting eligibility requirements.	Systematic review	Each review discussed a different cancer stage during the remote care delivery. Access to this delivery model at any stage of cancer proved to be useful in increasing access to care.	None of the reviews addressed older adults, bereavement, or sustainability of interventions. Only two reviews focused on comparing telehealth to in person interviews.
8	Thompson JR;Walker CJ;Flunker JC;Christian WJ;Sanderson WT;Schoenberg NE;Brownings SR;	2025	Identifying risk factors for adverse lung health outcomes among rural Appalachian women. The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association.	Describe the prevalence of demographic, behavioral, and economic characteristics among a cohort of rural Appalachian women and ascertain the association between these risk factors and lung function.	Using a cross-sectional study format of two rural Appalachian Kentucky counties (2015-2017), prevalence ratios of the association between individual-level characteristics and lung function were estimated through the use of log binomial regression. This estimation was out of 456 cases.	Cross-Sectional study	Reduced lung function was high among the sample, with varying levels of restrictive function. Smokers experienced an increased restriction to their lungs than nonsmokers.	The study is cross sectional, so it could be limiting. Additionally, only women are included, leaving little room for comparison.

9	Thomson MD, Williams AR, Sutton AL, Tossas KY, Garrett C, Sheppard VB	2021	Rural-urban disparities in lung cancer-related mortality in the United States. JCO oncology practice.	To report on the development and preliminary findings of a community-based cancer registry, including the community-engaged approach to recruitment, participant profile, and distribution of cancer risk factors by race/ethnicity and geography.	Sample of rural Virginia residents; 595 participants; 73% rural; 46% AA/Black	Cross-sectional study	Cancer mortality is higher in rural areas than urban areas in the US. Due to resources being more available in urban areas.	Convenience sampling and use of self-report individual level data. Identification and recruitment methods likely influenced some findings pertaining to rural versus urban comparisons.
10	Welch, A. C., Gorden, J. A., Mooney, S. J., Wilshire, C. L., & Zeliadt, S. B.	2024	Understanding Washington State's Low Uptake of Lung Cancer Screening in Two Steps; A Geospatial Analysis of Patient Travel Time and Health Care Availability of Imaging Sites. Chest, 166(3), 622.	In Washington State, lung cancer screening is limited, despite the fact that early detection reduces cancer mortality. This study examines what proportion of the eligible population for lung cancer screening has access to screening facilities in the state.	The population observed was residents of Washington state who are eligible to visit a lung cancer screening center (have a referral from a doctor). 549 radiologic technologists were identified across the accredited screening facilities.	Cross-Sectional Study	95% of the population was observed to be geographically proximal to a screening facility, however there remained a significant problem with access. The review concluded by noting that rural and low SES places face disparities.	This study was limited to Washington State, meaning that while they are compelling, it must not be assumed that these results are representative of the entire nation.
11	Zahnd, W. E., Mueller, G. S., Fogleman, A. J., & Jenkins, W. D.	2016	Intrastate Variations in Rural Cancer Risk and Incidence: An Illinois Case Study.	To explore intrastate rural cancer risk and incidence differences within Illinois.	Illinois's 83 rural counties were categorized into northern, central, and southern regions (IL-N, IL-C, and IL-S, respectively).	Brief Report	Socioeconomic deprivation and smoking history both varied significantly across rural regions within the	This source did not compare to metropolitan areas of Illinois, so the significance of the data from rural regions

			Journal of Public Health Management and Practice, 22(5), 472+.		Chi-square tests for independence and analysis of variance calculations were performed to assess regional differences in demographic characteristics, socioeconomic deprivation, smoking history, obesity, cancer-screening adherence, and density of general practitioners. Age-adjusted incidence rates were calculated for 5 cancer categories		same state.	may not come across as impactful.
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**Discussion**

Lung cancer is a very dangerous disease, and part of what makes it so tragic is that it is largely preventable. The majority of lung cancer diagnoses can be attributed to poor health habits such as smoking. While smoking is a known cause of lung cancer, a risk factor that goes largely unnoticed, is living in a rural area. There are significant challenges that rural communities must overcome to meet the prevention level of urban areas. Some of these challenges include, but are not limited to: lack of health education and public health services, lack of access to or knowledge of technology, and lastly, an inability to access quality healthcare. While this is a multifaceted issue without a simple solution, there are steps that other countries or rural communities in the US have taken that are lowering the risk of lung disease in these rural areas.

The research suggests that education reduces lung cancer risk. Many people do not know that they are at a greater risk of developing cancer, because they live in a rural area. That fact alone could be a starting point for people to assess their risk. Community education, specifically, is a proven helpful intervention that ultimately results in being a cheaper and more sustainable option for decreasing disease risk. Another reason why community health education has proven to be successful for other disease intervention programs is that people are more likely to trust, be comfortable and honest around people they know rather than an outside public health representative who is a stranger to them and their community.

Telehealth and other virtual physician appointments are the next steps in improving access to quality health care in rural communities. People are more likely to seek care if it is more accessible and they are comfortable. Among many other studies that support

that access to online healthcare increases the probability that someone will make a doctor's appointment, a 2022 study showed that online appointments decreased patient psychological distress, increased care efficiency, and increased health care resources (Lyu, 2022). A result of increasing doctor's appointments is increasing cancer screening rates could increase the presence of early detection, which helps to increase the effectiveness of cancer treatments (Welch, 2024).

Quality health care is a necessity to improving cancer outcomes as it encourages screening, open conversations, lifestyle change suggestions. Quality health care access is defined as a practice that would make preventing diseases impossible without the presence of skilled, quality health care. The presence of public health information has proven to lower risk of disease. An example of this is when cigarette sales went down in rural counties after being educated on the targeted advertising of tobacco companies and the actual health risks of smoking (Duan, 2023). In rural areas, access to public health education is inversely related to lung cancer risk. If rural areas implemented more public health education, the risk of lung cancer is likely to decrease (Parker, 2022).

These findings are consistent with successful intervention programs that have used community health education, Telehealth, and family medicine in rural areas (Shaffer, 2023). These components are not mutually exclusive. It is imperative that someone ensures that there is access to power, the internet, technology, and a secure meeting space. Community education may be needed to teach neighbors how to use the platform, or the technology itself. Furthermore, if screenings for certain cancers happen virtually and a physician needs a patient to come in to have further testing, there needs to be access to a hospital or a trained, local physician who can provide this type of care. Additionally, transportation could be needed to these sites if a patient does not have the ability or access to get themselves to their appointment, whereas someone who lives in an urban area may be able to walk to their appointment (Lyu, 2022).

**Limitations**

While there are significant scientific findings that support the correlation between living in a rural area and increased risk for lung cancer, this review only provided evidence from 10 articles. Additionally, many of the studies reviewed included data that was self-reported, meaning that recall bias is a possibility. Moreover, many of the studies reviewed were a cross-sectional design, which does not provide a large timeline in order to effectively measure the impact of certain risk factors. In the time this review was written, other research may have been conducted, some research is waiting on publication. The topic is much broader and more complicated than can be addressed by these 10 articles alone.

## **Implications**

### **Future Research**

In terms of research, more is needed to understand certain issues such as where the funding for rural healthcare comes from, where it goes specifically, and how it could be redistributed to fund interventions such as a lung cancer prevention program. An implementation problem that would benefit from further research is understanding rural access to the internet and technology (Lyu, 2022). There is currently little assessment on how to make online health platforms such as Telehealth more feasible in these rural areas. Progress can be made within rural populations to educate on the risks, prevention, and implementation of intervention strategies to reduce lung disease and lung cancer occurrence (Thompson, 2025). With an increase in risk education, access to quality health care, and increased technology use, the gap between the high rates of lung disease in rural versus urban populations can become smaller.

### **Future Practice**

In terms of practice that would be needed to create a change, medical settings such as cancer care centers would need to be encouraged to focus funding and intervention resources on social support of patients in addition to their clinical support (Thomson, 2021). An example of this could be encouraging places of work or places people frequent in rural areas to put up

flyers or have discussions about these risk factors.

### **Future Policy**

Another implication is policy. The research identifies the gap within healthcare for rural communities for this disease and for many others. It proves that part of the reason disease prevalence such as lung cancer is so high in these communities as opposed to urban communities, is the lack of services that are available to people living in rural areas (O'Neil, 2016).

### **Conclusion**

These findings support much of the research that is in existence about the risk factors of lung cancer, but it further identifies a gap within rural public health services and rural communities' knowledge of their risk for the disease. It exposes the discrepancy between health services in urban areas versus health services in rural areas. These findings together, display the most plausible solutions to improving disease outcomes based on what has worked in similar places or interventions.

## **References**

*Adult Smokers in the US - 2017 500 Cities - Overview*. ArcGIS. (n.d.).

<https://www.arcgis.com/home/item.html?id=8cf6f59d03e149df8642fb4c536be1ac>

Centers for Disease Control and Prevention. (n.d.-a). *Lung cancer risk factors*. Centers for Disease Control and Prevention. <https://www.cdc.gov/lung-cancer/risk-factors/index.html>

Centers for Disease Control and Prevention. (n.d.-b). *Lung cancer statistics*. Centers for Disease Control and Prevention. <https://www.cdc.gov/lung-cancer/statistics/index.html>

Duan, Z., Levine, H., Bar-Zeev, Y., Cui, Y., LoParco, C. R., Wang, Y., Abrams, L. C., Khayat, A., & Berg, C. J. (2023). The impacts of electronic cigarette health warning labels on use intentions and perceptions: A cross-sectional study of US and Israeli adults who use tobacco.

*Journal of Public Health Research*, 12(4). <https://doi.org/10.1177/22799036231214396>

Gaddam, S. J. (n.d.). Rural-urban disparities in lung cancer-related mortality in the United States. *JCO oncology practice*. [https://ascopubs.org/doi/10.1200/OP.2023.19.11\\_suppl.186](https://ascopubs.org/doi/10.1200/OP.2023.19.11_suppl.186)

Gale onefile. (n.d.-b). <https://www.gale.com/databases/gale-onefile>

Grobman, B., Mansur, A., & Lu, C. Y. (2025). Disparities in Lung Cancer Death Among People with Chronic Lower Respiratory Diseases in the United States. *Lung*, 203(1).

<http://dx.doi.org/10.1007/s00408-024-00756-5>

Lyu M;Zhao Q;Yang Y;Hao X;Qin Y;Li K; (n.d.). *Benefits of and barriers to telehealth for the informal caregivers of elderly individuals in rural areas: A scoping review*. The Australian journal of rural health. <https://pubmed.ncbi.nlm.nih.gov/35460580/>

O'Neil ME;Henley SJ;Rohan EA;Ellington TD;Gallaway MS; (n.d.). *Lung cancer incidence in nonmetropolitan and Metropolitan Counties - United States, 2007-2016*. MMWR. Morbidity and mortality weekly report. <https://pubmed.ncbi.nlm.nih.gov/31697655/>

Parker, M. A., Weinberger, A. H., Eggers, E. M., Parker, E. S., & Villanti, A. C. (2022, August 1). *Trends in rural and urban cigarette smoking quit ratios in the US from 2010 to 2020*. JAMA network open. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9350718/>

Shaffer KM;Turner KL;Siwik C;Gonzalez BD;Upasani R;Glazer JV;Ferguson RJ;Joshua C;Low CA; (n.d.). *Digital Health and Telehealth in cancer care: A scoping review of reviews*. The Lancet. Digital health. <https://pubmed.ncbi.nlm.nih.gov/37100545/>

Thompson JR;Walker CJ;Flunker JC;Christian WJ;Sanderson WT;Schoenberg NE;Browning SR; (n.d.). *Identifying risk factors for adverse lung health outcomes among rural Appalachian women*. The Journal of rural health : official journal of the American Rural Health Association and the National Rural Health Care Association. <https://pubmed.ncbi.nlm.nih.gov/40361270/>

Thomson MD;Williams AR;Sutton AL;Tossas KY;Garrett C;Sheppard VB; (n.d.). *Engaging rural communities in cancer prevention and control research: Development and preliminary insights from a community-based research registry*. Cancer medicine. <https://pubmed.ncbi.nlm.nih.gov/34647436/>

U.S. National Library of Medicine. (n.d.). *About - pubmed*. National Center for Biotechnology Information. <https://pubmed.ncbi.nlm.nih.gov/about/>

Welch, A. C., Gorden, J. A., Mooney, S. J., Wilshire, C. L., & Zeliadt, S. B. (2024). *Understanding Washington State's Low Uptake of Lung Cancer Screening in Two Steps; A Geospatial Analysis of Patient Travel Time and Health Care Availability of Imaging Sites*.

*Chest*, 166(3), 622. <http://dx.doi.org/10.1016/j.chest.2024.04.021>

World Health Organization. (n.d.). *Lung Cancer Awareness month 2024*. World Health Organization.

<https://www.iarc.who.int/featured-news/lung-cancer-awareness-month-2024/#%3A~%3Atext%3>

DLung%20cancer%20is%20the%20most%2Ccommon%20cause%20of%20cancer%20death

Zahnd, W. E., Mueller, G. S., Fogleman, A. J., & Jenkins, W. D. (2016). Intrastate Variations in Rural Cancer Risk and Incidence: An Illinois Case Study. *Journal of Public Health*

*Management and Practice*, 22(5), 472+. <http://dx.doi.org/10.1097/PHH.0000000000000310>