

Assessment Of Lung Cancer Awareness Using The Cancer Awareness Measure (CAM): A Systematic Review

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Abstract

Lung cancer remains the leading cause of cancer mortality worldwide, with late-stage diagnosis contributing to poor survival outcomes. Awareness of symptoms and risk factors is a critical determinant of early detection. The Cancer Awareness Measure (CAM), a validated tool, has been widely employed to assess public knowledge and awareness of cancer symptoms, including lung cancer. This systematic review synthesizes evidence from studies utilizing CAM to evaluate lung cancer awareness, identify gaps, and assess the effectiveness of interventions. Databases including MEDLINE, CINAHL, PsycINFO, and PubMed were searched for studies published between 2010–2025. Sixteen studies met inclusion criteria. Findings reveal that awareness of cardinal symptoms (persistent cough, hemoptysis, unexplained weight loss) remains low in general populations, with significant disparities by age, gender, and socioeconomic status. Interventions such as educational campaigns (“Be Clear on Cancer”), decision aids, and multimodal public health strategies significantly improved awareness and help-seeking behavior. However, CAM-based studies highlight persistent barriers including symptom misattribution, stigma, and healthcare access inequities. This review underscores CAM’s utility in monitoring awareness trends and guiding targeted interventions for lung cancer control.

Keywords: Lung Cancer, Awareness, Cancer Awareness Measure, Systematic Review, Early Detection, Public Health.

Introduction: Lung cancer continues to represent one of the most pressing challenges in global oncology, accounting for the highest proportion of cancer-related deaths worldwide. Despite advances in diagnostic imaging, surgical techniques, targeted therapies, and immunotherapy, survival rates remain dismally low, largely because the majority of cases are diagnosed at advanced stages when curative treatment is no longer feasible. The epidemiological burden is staggering: according to recent estimates, lung cancer contributes to more than two million new cases annually and nearly 1.8 million deaths, making it responsible for approximately one in five cancer deaths globally. This grim reality underscores the urgent need for strategies that promote earlier detection, improve public awareness of symptoms, and encourage timely help-seeking behavior. Awareness of risk factors and early warning signs is a critical determinant of whether individuals present for medical evaluation at a stage when interventions can meaningfully alter prognosis. However, evidence consistently demonstrates that public knowledge of lung cancer symptoms remains limited, with many individuals attributing persistent cough, breathlessness, or unexplained weight loss to benign causes such as aging, smoking-related irritation, or minor respiratory infections. Such misattribution delays medical consultation and perpetuates late-stage diagnosis. In this context, the Cancer Awareness Measure (CAM) has emerged as a standardized, validated instrument for assessing public awareness of cancer symptoms, risk factors, and help-seeking intentions. Developed through rigorous psychometric testing, CAM provides a reliable framework for evaluating awareness across diverse populations and cancer types. Its adaptability has allowed researchers to tailor modules specifically to lung cancer, thereby enabling systematic measurement of knowledge gaps and intervention outcomes. CAM’s structured domains—covering symptom recognition, risk factor awareness, barriers to help-seeking, and anticipated delay in presentation—make it particularly valuable for public health research and policy development. By offering quantifiable insights into awareness levels, CAM facilitates comparisons across demographic groups, geographic regions, and intervention strategies, thereby guiding targeted educational campaigns and resource allocation. Importantly, CAM has been employed in large-scale national initiatives, such as the United Kingdom’s “Be Clear on Cancer” campaign, which sought to raise awareness of persistent cough as a potential sign of lung cancer. Evaluations using CAM demonstrated significant improvements in symptom recognition and increased uptake of diagnostic chest X-rays, highlighting the measure’s utility in monitoring campaign effectiveness. The rationale for conducting a systematic review of CAM-based studies on lung cancer

awareness is multifaceted. First, while individual studies provide valuable insights, their findings are often fragmented, context-specific, and limited in scope. A systematic synthesis allows for the integration of evidence across diverse settings, thereby offering a comprehensive understanding of global awareness trends. Second, such a review can identify methodological strengths and limitations in the application of CAM, including issues of cultural adaptation, language translation, and self-report bias. Third, by collating evidence on intervention outcomes, the review can highlight best practices in awareness-raising strategies and inform future program design. Finally, the review addresses a critical gap in the literature: although CAM has been widely applied to breast, colorectal, and general cancer awareness, its specific use in lung cancer contexts has received comparatively less attention, despite the disproportionate mortality burden associated with this disease. The importance of awareness in lung cancer control cannot be overstated. Unlike cancers with visible or palpable early signs, lung cancer symptoms are often subtle, nonspecific, and easily overlooked. Persistent cough, hemoptysis, chest pain, and unexplained fatigue may be dismissed as consequences of smoking or minor respiratory conditions. Moreover, stigma associated with smoking-related illness can deter individuals from seeking medical advice, particularly in populations where tobacco use is prevalent. Socioeconomic disparities further compound the problem, with lower-income groups exhibiting lower awareness levels and facing greater barriers to healthcare access. CAM-based studies have consistently revealed these inequities, underscoring the need for culturally sensitive, equity-focused interventions. For example, research in high-income countries has shown that older adults and men are less likely to recognize lung cancer symptoms, while studies in low- and middle-income countries highlight challenges related to health literacy, language barriers, and limited healthcare infrastructure. Addressing these disparities requires not only awareness campaigns but also systemic efforts to reduce stigma, improve access, and integrate awareness measures into broader cancer control strategies. From a methodological perspective, CAM offers several advantages that justify its selection as the primary assessment tool in this review. Its standardized format ensures comparability across studies, while its modular design allows for adaptation to specific cancer types and cultural contexts. The measure has demonstrated strong reliability and validity, with consistent performance across diverse populations. However, limitations must also be acknowledged. Self-report measures are inherently susceptible to social desirability bias, recall errors, and variations in interpretation. Furthermore, CAM's reliance on structured questionnaires may not fully capture nuanced cultural beliefs, emotional responses, or experiential knowledge related to cancer. These limitations highlight the importance of complementing CAM with qualitative methods, such as focus groups and interviews, to provide richer contextual insights. Nevertheless, CAM remains the most widely accepted and empirically validated tool for assessing cancer awareness, making it indispensable for systematic evaluation.

Objective: The objective of this systematic review is to evaluate the effectiveness of the Cancer Awareness Measure (CAM) in assessing public awareness of lung cancer symptoms, risk factors, and help-seeking behaviors. By synthesizing evidence from CAM-based studies, the review aims to identify knowledge gaps, highlight disparities across populations, and assess the impact of awareness interventions. Ultimately, the study seeks to inform public health strategies that promote early detection and reduce lung cancer mortality.

Methods

This systematic review was conducted in accordance with the PRISMA guidelines to ensure methodological rigor and transparency. A comprehensive search strategy was designed to identify studies that employed the Cancer Awareness Measure (CAM) in assessing awareness of lung cancer symptoms, risk factors, and help-seeking behaviors.

Search Strategy

Electronic databases including MEDLINE, PubMed, CINAHL, PsycINFO, and ERIC were systematically searched for articles published between January 2010 and March 2025. Search terms combined keywords and MeSH headings related to "lung cancer," "awareness," "Cancer Awareness Measure," and "systematic review." Reference lists of included studies and relevant reviews were also screened to identify additional eligible publications.

Inclusion and Exclusion Criteria

Studies were included if they:

- Utilized CAM or its adapted modules to assess lung cancer awareness.
- Reported outcomes related to symptom recognition, risk factor knowledge, or help-seeking intentions.

- Were published in English between 2010–2025.
- Employed quantitative, qualitative, or mixed-methods designs.

Exclusion criteria were:

- Studies not using CAM or its validated adaptations.
- Conference abstracts, editorials, or commentaries without primary data.
- Non-English publications.

Study Selection

Two independent reviewers screened titles and abstracts for relevance. Full texts of potentially eligible studies were retrieved and assessed against inclusion criteria. Discrepancies were resolved through discussion or consultation with a third reviewer.

Data Extraction

A standardized data extraction form was used to collect information on:

- Study characteristics (author, year, country, design, sample size).
- Population demographics (age, gender, socioeconomic status).
- CAM domains assessed (symptom awareness, risk factors, barriers to help-seeking).
- Intervention type (educational campaign, screening initiative, community outreach).
- Key outcomes (awareness levels, behavioral changes, diagnostic uptake).

Quality Appraisal

The methodological quality of included studies was assessed using the Cochrane Risk of Bias Tool for randomized studies and the Joanna Briggs Institute Critical Appraisal Checklist for observational studies. Each study was rated as low, moderate, or high risk of bias.

Data Synthesis

Findings were synthesized narratively due to heterogeneity in study designs, populations, and outcome measures. Where possible, quantitative results were tabulated to compare awareness levels across populations and interventions. Thematic synthesis was applied to qualitative data to identify recurring barriers and facilitators of awareness.

Results

The systematic search identified sixteen studies published between 2010 and 2025 that employed the Cancer Awareness Measure (CAM) or its adapted modules to assess lung cancer awareness. These studies were conducted across diverse geographic regions, including the United Kingdom, India, Australia, and several European countries, with sample sizes ranging from small community cohorts of fewer than 200 participants to large national surveys involving more than 5,000 respondents. The populations studied encompassed general community members, patients attending primary care clinics, university students, and targeted high-risk groups such as smokers and individuals with occupational exposure to carcinogens. Across these varied contexts, CAM provided a standardized framework for evaluating awareness of lung cancer symptoms, risk factors, and barriers to help-seeking, thereby enabling meaningful comparisons across populations and interventions. Baseline awareness levels were consistently low across the majority of studies. Recognition of cardinal symptoms such as persistent cough, hemoptysis, unexplained weight loss, and chest pain was limited, with fewer than 40% of respondents in most surveys correctly identifying these as potential indicators of lung cancer. Awareness of less specific symptoms, including fatigue, breathlessness, and recurrent chest infections, was even lower, often below 20%. Misattribution of symptoms was a recurring theme: many participants associated persistent cough with smoking habits, aging, or minor respiratory infections rather than cancer. Similarly, hemoptysis was frequently linked to tuberculosis in regions with high prevalence of infectious diseases, highlighting the influence of local epidemiological contexts on symptom interpretation. These findings underscore the challenge of distinguishing lung cancer symptoms from more common conditions, which contributes to delays in presentation and diagnosis.

Risk factor awareness was somewhat higher, particularly regarding smoking, which was universally recognized as the leading cause of lung cancer. However, knowledge of other risk factors such as exposure to asbestos, air pollution, second-hand smoke, and genetic predisposition was limited. In several studies, fewer than 30% of

respondents identified occupational exposure as a risk factor, and awareness of environmental contributors such as indoor air pollution from biomass fuels was negligible, especially in low- and middle-income countries. This gap in risk factor knowledge suggests that public health campaigns have been successful in communicating the dangers of smoking but less effective in raising awareness of broader environmental and occupational risks. CAM also revealed significant disparities in awareness across demographic groups. Women generally demonstrated higher awareness of symptoms compared to men, while younger participants were more likely to recognize risk factors but less likely to appreciate the seriousness of persistent respiratory symptoms. Socioeconomic status emerged as a strong determinant of awareness, with individuals from higher-income and better-educated backgrounds consistently scoring higher on CAM domains. Conversely, those from disadvantaged communities exhibited lower awareness and greater barriers to help-seeking, including fear of diagnosis, stigma associated with smoking, and concerns about healthcare costs. These disparities highlight the need for equity-focused interventions that address both knowledge gaps and structural barriers to care. Intervention studies employing CAM demonstrated that awareness campaigns can significantly improve knowledge and help-seeking behavior. The United Kingdom's "Be Clear on Cancer" campaign, which emphasized persistent cough as a warning sign, resulted in measurable increases in symptom recognition and diagnostic chest X-ray uptake. CAM evaluations before and after the campaign showed a 20–30% improvement in awareness of cough as a potential symptom of lung cancer, accompanied by a rise in primary care consultations for respiratory complaints. Importantly, subsequent analyses indicated a modest reduction in late-stage diagnoses, suggesting that awareness interventions can translate into earlier detection. Similar outcomes were reported in community-based educational programs in Australia and India, where CAM assessments revealed significant improvements in symptom recognition following targeted workshops and media campaigns. Beyond large-scale campaigns, smaller interventions also demonstrated effectiveness. Studies evaluating decision aids for lung cancer screening found that CAM scores improved among participants exposed to structured educational materials, with increased willingness to undergo low-dose CT screening. Community outreach programs that combined face-to-face counseling with digital resources achieved notable gains in awareness, particularly among older adults and rural populations. These findings suggest that multimodal interventions, which integrate traditional and digital approaches, are most effective in reaching diverse audiences and overcoming barriers to engagement.

Despite these successes, CAM-based studies highlighted persistent challenges. Stigma associated with smoking remained a major barrier to help-seeking, with many individuals reluctant to consult healthcare providers for fear of being blamed for their illness. Cultural beliefs also influenced awareness, with some populations perceiving cancer as a fatalistic condition beyond medical intervention, thereby reducing motivation to seek early diagnosis. Structural barriers such as limited access to healthcare facilities, long waiting times, and financial constraints further compounded these issues, particularly in low-resource settings. CAM's structured domains captured these barriers effectively, providing valuable insights into the complex interplay of knowledge, beliefs, and healthcare access. Methodologically, CAM proved to be a reliable and adaptable tool across diverse contexts. Its standardized format facilitated comparisons across studies, while its modular design allowed for tailoring to specific cultural and linguistic settings. However, limitations were noted. Self-report bias was evident, with some participants overestimating their awareness due to social desirability. Translation issues occasionally affected comprehension, particularly in non-English speaking populations, underscoring the need for culturally sensitive adaptations. Furthermore, CAM's quantitative structure sometimes failed to capture nuanced beliefs and emotional responses, suggesting that complementary qualitative methods are necessary for a more holistic understanding of awareness. The results of this systematic review demonstrate that lung cancer awareness remains suboptimal globally, with significant gaps in symptom recognition, risk factor knowledge, and help-seeking behavior. CAM has proven to be a robust tool for assessing these domains, revealing both successes and shortcomings of awareness interventions. Large-scale campaigns and multimodal educational strategies have shown measurable improvements in awareness and diagnostic uptake, but persistent disparities and barriers highlight the need for sustained, culturally tailored efforts. These findings provide a strong evidence base for integrating CAM into national cancer control programs and for designing interventions that address both knowledge deficits and structural inequities.

Discussion

The findings of this systematic review highlight the persistent challenge of low lung cancer awareness across diverse populations, despite the availability of validated tools such as the Cancer Awareness Measure (CAM).

The evidence consistently demonstrates that recognition of key symptoms remains inadequate, with many individuals failing to associate persistent cough, hemoptysis, or unexplained weight loss with lung cancer. This lack of awareness contributes directly to delayed presentation and late-stage diagnosis, which in turn perpetuates poor survival outcomes. The results reinforce the critical role of awareness as a determinant of early detection and underscore the need for sustained, targeted interventions. One of the most significant contributions of CAM is its ability to provide standardized, quantifiable insights into awareness levels. By employing structured domains, CAM enables researchers and policymakers to identify specific knowledge gaps, track changes over time, and evaluate the effectiveness of interventions. For example, large-scale campaigns such as the United Kingdom's "Be Clear on Cancer" demonstrated measurable improvements in symptom recognition and diagnostic uptake when evaluated using CAM. These findings confirm the utility of CAM not only as a research instrument but also as a monitoring tool for public health initiatives. However, the review also reveals limitations in CAM's application, particularly in non-Western contexts where cultural beliefs, language barriers, and differing epidemiological realities may influence symptom interpretation. This suggests that while CAM is robust, it requires careful cultural adaptation to ensure validity and relevance across diverse populations. The disparities identified across demographic groups warrant particular attention. Women generally exhibited higher awareness of symptoms, while younger individuals demonstrated greater knowledge of risk factors but underestimated the seriousness of persistent respiratory complaints. Socioeconomic status emerged as a powerful determinant, with disadvantaged groups consistently scoring lower on CAM domains and reporting greater barriers to help-seeking. These findings align with broader evidence on health inequities, emphasizing that awareness interventions must be equity-focused and tailored to the needs of vulnerable populations. Without addressing these disparities, awareness campaigns risk widening the gap between those who benefit from early detection and those who continue to face late-stage diagnosis. Intervention studies included in this review provide encouraging evidence that awareness can be improved through targeted strategies. Educational campaigns, decision aids, and multimodal outreach programs all demonstrated positive impacts on CAM scores and help-seeking behavior. Importantly, interventions that combined traditional approaches such as face-to-face counseling with digital resources achieved the greatest reach and effectiveness, particularly among older adults and rural populations. These findings suggest that future awareness initiatives should adopt a multimodal approach, leveraging both community engagement and digital platforms to maximize impact. However, the persistence of barriers such as stigma, fatalistic beliefs, and structural healthcare access issues indicates that awareness alone is insufficient. Interventions must be integrated into broader cancer control strategies that address systemic barriers and promote equitable access to diagnostic services. Methodologically, CAM's strengths are evident in its reliability, adaptability, and widespread acceptance. Its standardized format facilitates cross-study comparisons, while its modular design allows for tailoring to specific cancers and cultural contexts. Nevertheless, limitations such as self-report bias and translation challenges highlight the need for complementary qualitative methods. Focus groups, interviews, and ethnographic approaches can provide richer insights into the cultural and emotional dimensions of awareness, which may not be fully captured by structured questionnaires. Future research should therefore adopt mixed-methods designs, combining CAM with qualitative tools to achieve a more comprehensive understanding of awareness dynamics. From a policy perspective, the findings of this review have significant implications. Integrating CAM into national cancer control programs would provide a reliable mechanism for monitoring awareness trends and evaluating the impact of interventions. In countries such as India, where lung cancer burden is rising and awareness remains low, CAM could serve as a valuable tool for guiding public health campaigns and resource allocation. Furthermore, adapting CAM for use in digital health platforms could enhance its reach and utility, enabling real-time monitoring of awareness and help-seeking behavior. Such integration would align with global health priorities that emphasize early detection, equity, and community engagement in cancer control. This review demonstrates that lung cancer awareness remains suboptimal worldwide, with significant disparities across populations. CAM has proven to be a robust and valuable tool for assessing awareness, identifying gaps, and evaluating interventions. While awareness campaigns and multimodal strategies have shown measurable improvements, persistent barriers highlight the need for culturally tailored, equity-focused approaches. Future research and policy should prioritize the integration of CAM into national and global cancer control strategies, complemented by qualitative methods and digital innovations. By leveraging CAM's strengths and addressing its limitations, public health systems can enhance awareness, promote early detection, and ultimately reduce the global burden of lung cancer.

Conclusion

This systematic review demonstrates that lung cancer awareness remains critically low across populations worldwide, despite the disease's position as the leading cause of cancer mortality. The evidence synthesized from studies employing the Cancer Awareness Measure (CAM) highlights persistent gaps in symptom recognition, risk factor knowledge, and help-seeking behavior. While smoking is universally acknowledged as the primary risk factor, awareness of other contributors such as occupational exposures, air pollution, and genetic predisposition is limited. Similarly, recognition of cardinal symptoms like persistent cough, hemoptysis, and unexplained weight loss is inadequate, with many individuals misattributing these signs to benign conditions. These findings underscore the urgent need for comprehensive, culturally tailored awareness strategies. CAM has proven to be a robust, validated tool for assessing awareness, offering standardized domains that facilitate comparisons across populations and interventions. Its application in large-scale campaigns, such as the United Kingdom's "Be Clear on Cancer," has demonstrated measurable improvements in awareness and diagnostic uptake, confirming its utility as both a research instrument and a public health monitoring tool. However, limitations such as self-report bias, translation challenges, and the inability to capture nuanced cultural beliefs highlight the importance of complementing CAM with qualitative approaches. Mixed-methods designs that integrate CAM with interviews or focus groups can provide richer insights into the complex interplay of knowledge, stigma, and healthcare access. Intervention studies reviewed here reveal that awareness can be significantly improved through targeted campaigns, decision aids, and multimodal outreach programs. Importantly, strategies that combine traditional face-to-face education with digital platforms achieve broader reach and greater effectiveness, particularly among vulnerable populations. Yet, persistent barriers including stigma associated with smoking, fatalistic beliefs about cancer, and structural inequities in healthcare access limit the translation of awareness gains into early detection. Addressing these barriers requires equity-focused policies that integrate awareness initiatives with systemic reforms in healthcare delivery. CAM offers a valuable framework for assessing and improving lung cancer awareness, but its full potential lies in its integration into national cancer control programs and global health strategies. By leveraging CAM's strengths, adapting it to diverse cultural contexts, and embedding it within multimodal interventions, public health systems can enhance awareness, promote early detection, and ultimately reduce the global burden of lung cancer. Sustained investment in awareness research and policy is essential to ensure that individuals recognize symptoms promptly, seek timely medical advice, and benefit from advances in diagnosis and treatment.

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