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Barriers and facilitators to lung cancer screening in the United States: A systematic review of the qualitative literature

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Abstract

Introduction: Lung cancer is the second most common cancer and the leading cause of cancer-associated mortality in men and women in the United States. We sought to identify factors associated with Lung Cancer Screening (LCS) participation.
Methods: To identify barriers and facilitators to lung cancer screening, we systematically reviewed the literature for qualitative research studies evaluating lung cancer screening conducted in the United States. Articles were analyzed using a grounded approach (open coding, axial coding, and selective coding). Findings are discussed using the Socio-ecological Model (SEM), a theoretical model of health behaviors. Themes were identified and organized by their relevance to the SEM: individual patient, individual provider, interpersonal, cultural, and organizational levels.
Results: Themes facilitating participation include: prioritizing patient education, quality of communication, quality of provider-initiated encounter/coordination of care (individual patient and provider levels), quality of the patient-provider relationship (interpersonal level); perception of a life's value and purpose (cultural level); and, quality of tools and care coordination (organizational level). Themes coded as barriers include: knowledge/capacity, behavior/attitude, comorbidities, and perception (individual patient level); education, pitfalls, process, and policies (provider level); patient-provider relationship, patient education, and quality communication (interpersonal level); distrust in the system, fatalistic beliefs, perception of aging (cultural level); and, access to resources, care coordination, and implementing lung cancer screening (LCS; organizational level).
Conclusion: Few qualitative research studies are available evaluating barriers and facilitators to LCS participation in the US. Major facilitators of lung cancer screening include patient education, high-quality communication, perception of life's value, and decision-making tools. Major barriers to lung cancer screening include knowledge, patient-provider rapport, distrust in the system, and access to resources. More qualitative studies are required to determine if these identified barriers and facilitators are transferrable to all LCS eligible population.

KEY WORDS: Lung cancer screening; participation; qualitative; narrative review.

INTRODUCTION

In the United States, lung cancer is the second most common cancer in both sexes and the leading cause of cancer-associated mortality [1]. The National Lung Screening Trial (NLST) showed that early detection of lung cancer with low-dose CT (LDCT) could reduce cancer-associated mortality by 20% [2]. On March 9, 2021, US Preventive Services Task Force (USPSTF) published new guidelines on Lung Cancer Screening (LCS), which will likely result in an 80-90% increase in the number of eligible patients [3]. These new guidelines may broadly improve the health outcomes for women and racial/ethnic minorities who are developing lung cancer with lower smoking histories and at an earlier age [4, 5]. However, many experts find that lung cancer screening disparities in the United States are not simply due to eligibility; instead, they result from low cancer screening participation rates [3, 4].

The widespread implementation of LCS outside clinical trials presents challenges, including participation in programs as well as adherence to follow-up. Survey data from the Behavioral Risk Factor Surveillance System (BRFSS) in 2016 estimated that fewer than 5% of eligible patients under the previous USPSTF recommendation receive LDCT screening [5]. Therefore, a better understanding of both barriers and facilitators to lung cancer screening appears necessary to support lung cancer screening implementation in the United States.

Rates of LCS vary significantly based on sociodemographic factors, including race, ethnicity, sex, and socioeconomic status (SES) [6]. Healthcare disparities further impair LCS participation considering that high-risk populations for lung cancer are disproportionately composed of minority and low-SES groups [3, 4, 6, 7]. Though the recently updated USPSTF recommendations should address disparities, the significant increase in eligible patients may exacerbate implementation challenges.

To optimize participation, LCS programs

TAKE-HOME MESSAGE

Culturally responsive patient education, provider education, and care coordination are critical opportunities for healthcare systems to improve lung cancer screening participation.

Competing interests - none declared.

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need to be familiar with the factors impacting patient participation at various levels when designing implementation efforts. Qualitative research is well suited to identify the nuanced perspectives of individuals within systems since most of the literature on LCS participation has used quantitative techniques to evaluate barriers and facilitators [7–10]. Such methods risk overlooking the complexity between the patient and providers' perspectives. We sought to review and summarize the available qualitative literature to identify themes addressing barriers and facilitators to lung cancer screening participation within a theoretical model of health behaviors.

METHODS

We conducted a systematic literature review for qualitative studies that focused on the barriers and facilitators to lung cancer screening participation in the United States. We identified themes regarding barriers and facilitators to LCS participation and present these factors in a narrative review.
Our eligibility criteria included: 1) a qualitative or mixed-methods published article, 2) studies conducted within the United States, 3) articles published in English, and 4) studies that examined the barriers or facilitators of LCS and LCS participation. We focused on studies performed in the US to ensure applicability to LCS programs utilizing USPSTF recommendations.

Review approach

A multifaceted search for acceptable publications was conducted from March to June 31, 2021. Three major electronic databases were utilized: PubMed (1945–2021), Cochrane Library, and OVID via MEDLINE without revisions (1947-2021). The database search was supplemented with Google Scholar searches and manually extracting relevant articles on the publication reference lists. Search terms were "((lung cancer) AND (screening))) AND (facilitator or barrier)". The search resulted in 1,712 studies using the above-mentioned keywords. To exclude duplicates or irrelevant titles unrelated to LCS, we first, we performed a rapid/title screening. Second, we scrutinized the remaining titles and full abstracts and ensured the articles met the methodology requirement (qualitative analysis). Third, we ensured the articles were conducted in the US and were published in English. Finally, we reviewed full-text versions of the 27 remaining articles to ensure these met the eligibility requirements and appraised the quality of the sample. Our appraisal resulted in 13 articles accepted for the qualitative systematic review (Figure 1).

Data extraction and synthesis

The methodology for this review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines and checklist. All de-duplicated title and abstracts was screened by two reviewers (AR, HGZ) based on the defined inclusion/exclusion criteria. Two authors (AR, HGZ) appraised the quality of included studies by using the guidelines and the Critical Appraisal Skills Program (CASP) tools. Results are presented according to the PRISMA guidelines.

Data analysis

We analyzed the articles using a grounded approach (open coding [initial coding], axial coding [grouping into descriptive themes], and selective coding [generating analytical themes]). Grounded theory methods provide general principles, guidelines, strategies, and heuristic devices instead of formulaic prescriptions for handling data [11]. Codes are qualitative (textual) and attached to data segments that depict what that piece of data is describing. Figure 2. Illustrates the coding process and development of analytical themes. Since both an individual's relationship and their environment influence health behaviors, we found the Social Ecological Model (SEM), which is well-studied behavioral health theoretical model, to be a helpful tool in organizing and interpreting the data [12]. The SEM has four primary levels: the individual level (related to the patient's knowledge and skills), the interpersonal level (related to

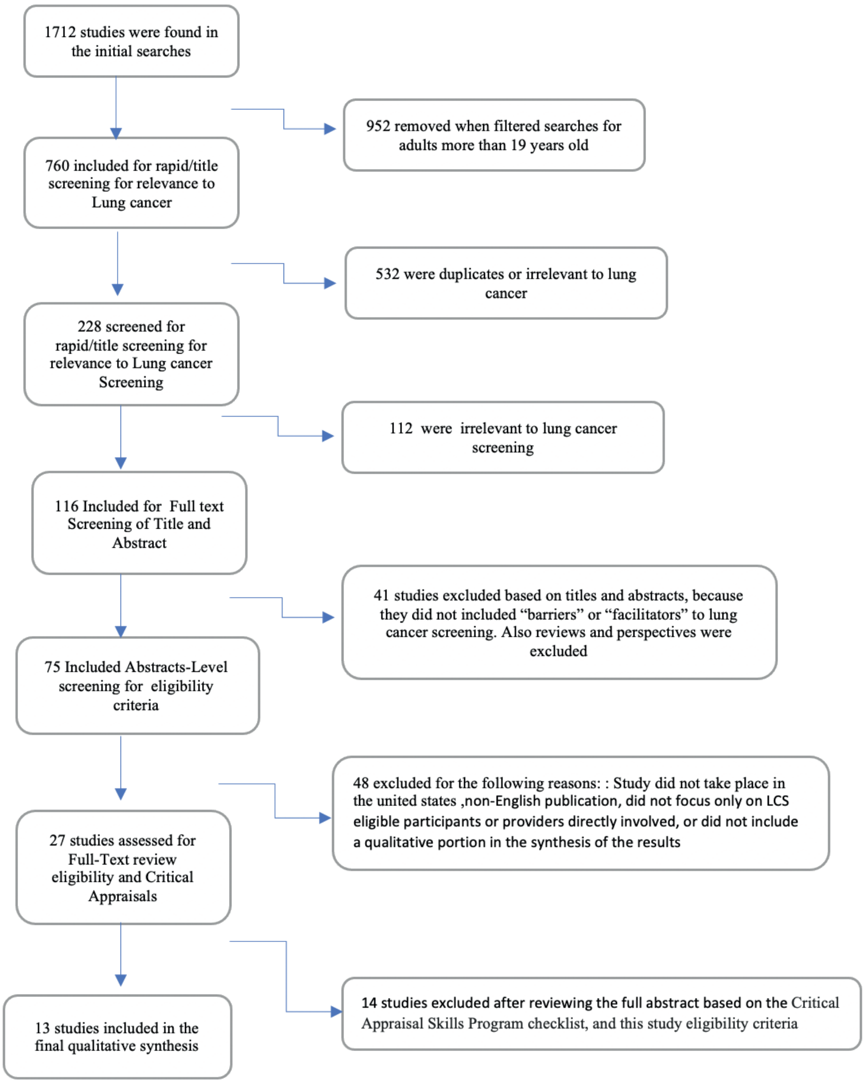

Figure 1. Flow diagram of screening process and outcomes.

the patient's relationship to other people; e.g., patient-provider), the organizational level (institutions that have the structural capacity to promote health), and the social/cultural level (related to a social/cultural norms and a patents' health determinants) [12]. Interactions between each level and the influential factors within a level are treated with equal importance [12]. The analysis process resulted in the documentation of factors that were either coded as facilitators or barriers within these four levels and were associated with lung cancer screening participation. By organizing data using the SEM, we were able to develop a new perspective not previously found in quantitative studies [13, 14]. Two qualitative researchers (AR & HZ) performed the selective coding and discussed data, and any disagreements were resolved through consensus.

RESULTS

Our findings are presented in two sections. The first section details a summary of the individual articles reviewed (Table 1). The second section details the themes identified across the studies associated with facilitators and barriers to LCS participation. The barriers and facilitators are organized within the Social-ecological Model (SEM) and presented within a table (Tables 2 and 3). Of the 116 articles that were discovered by full-text

Table 1. Summary of the articles included in the review (*n* = 13).

Author Year	Study aim	Qualitative Design and Sample	Findings	Conclusion
Abubaker-Sharif et al. 2020	Provider perceptions of shared decision making in LCS	N=16 Primary care providers. Data: semi-structured interviews: Analysis: Thematic	Facilitators include: providers' and patients' knowledge; shared decision making implementation/practice. Barriers include: Patients' fears and health literacy; LCS practice/decision support for providers; integrating decision counseling in practice.	PCPs play an important role in disseminating information about LCS and understand the importance of SDM. At the organizational level more needs to be done to ensure providers are trained in SDM and there is time allotted for the practice.
Carter-Harris et. al. 2017	Exploring why long-term smokers opt out of lung cancer screening	Exploratory approach with, N=18 participants aged 55-77 (male 7; female 11). Data: Semi-structured qualitative telephone interviews. Analysis: Thematic content analysis.	Patient-provider discussion about LC and reasons for opting out of LCS (e.g. knowledge avoidance, perceived low value; false positive worry; patient misunderstanding).	Distrust and stigma must be addressed as more people are eligible for LCS. Distrust/stigma may hinder implementation efforts. Shared-decision-making process between providers and high-risk patients is key.
Crothers et al. 2016	Determine the perspectives of vulnerable patients' understanding and preference of LCS decision aids.	45 patients averaging 61 years old who were racially diverse. Data: focus groups, surveys (pre/post). Analysis: Thematic analysis.	(1) Lack of knowledge re LCS purpose; (2) desire for more information; (3) desire for quality communication between patient-provider; (4) found decision aids helpful and influential for decision-making about screening; and (5) wanted the discussion to be personalized and tailored.	LCS decision aids are helpful and improve patient knowledge.
Gressard et al. 2017	Describe smokers' perceptions around LCS.	Descriptive study with N=105 current smokers ages 41-67, mean smoking history 38.9 pack-yrs. Data: Gender specific focus groups (N=12). Analysis: Constant comparative methods.	Majority of participants were unaware of LCS tests and those that were screened did not remember information regarding the test. Many expressed a desire for LCS.	Need clear patient-friendly educational tools to improve patient understanding of screening risks and benefits.
Hoffman et al. 2015	Describe attitudes and beliefs of primary care providers re: LCS using LDCT.	Ten providers (6 M; 4 F), practicing in urban (6) and rural (4) settings. Data: in-depth semi structured interviews: Analysis: content-driven immersion and crystallization.	Identified barriers to LCS participation including: inadequate knowledge of provider to interpret results, current guideline recommendations; communication challenges with patient; skepticism of results; low-efficacy of infrastructure; providers' perspectives conflicting with the SDM discussion.	For LCS programs to be effective, both providers and patients need to be educated and organizational structures need to allow for shared decision making process and infrastructure efficacy.
Melzer et al. 2020	Describe clinician perspectives on LCS and their experience with the implementation process.	Qualitative study with N=24 participants. Data: semi-structured interviews. Analysis: content analysis	Barriers include: lack of provider knowledge, enthusiasm; systematic gaps in screening intervals; limited time with patients; poor informatics.	Barriers can be addressed by bolstering provider education and improved health record systems.
Mejia et al 2020	Perceptions of adoption of screening and appropriate referral practices across 15 community health centers.	Qualitative study with (n=53) key informants (admin/clinical staff). Data: interviews: Analysis: Inductive thematic analysis.	Major barriers/facilitators related to: (1) Allocation of resources and services coverage; (2) need for a collaborative process to engage stakeholders and identify champions; and (3) stakeholders need different types of evidence to support implementation.	Results may inform interventions, especially organizational-level supports.
Mishra et al. 2016	Describe patient perspectives on LDCT for LCS	Descriptive study with N=22 (13 M; 9 F) participants ages 50-80 w/ history of heavy smoking. Data: semi-structured interviews. Analysis: systematic iterative analytic process	Most patients were unaware of LDCT screening for LC but were receptive to the test. Some would consider quitting if test were positive. Barriers to LCS were costs, fear of radiation exposure, and transpiration. Facilitators included quality communication between patient-providers, decision-making aids.	Participation in LCS among sociodemographically diverse patients requires shared-decision making process and decision aids designed for people with low literacy.

Table 1. Continued.

Author Year	Study aim	Qualitative Design and Sample	Findings	Conclusion
Mo-Kyung Sin et al. 2016	Explore barriers and facilitators to LCS among Korean immigrant men	Exploratory qualitative study with N=24 men aged 55-79. Data: Focus groups. Analysis: Content analysis.	Barriers included: cost, time, knowledge re LC and screening, attitudes about prevention, and lack of provider recommendation. Facilitators include: recommendations from various interpersonal relationships including provider, self-efficacy/motivation, existing conditions.	Training for providers and the design of interventions should be cultural responsive/relevant to increase effectiveness.
Schiffelbein et al. 2020	Identify barriers/facilitators to LCS and interventions in a rural population.	Mixed methods study with N=23 rural-residing adults. Data: Focus groups and survey. Analysis: Mixed deductive/inductive approach.	Barriers include: lack of knowledge regarding LCS, limited information or recommendations from providers, lack of transportation. Facilitators include: provider recommendation and patient motivation. Interventions: increase providers' awareness/understanding, community outreach campaigns.	Addressing patient-level barriers will increase LCS participation.
Sharf et al. 2005	Identify perspectives on refusing diagnosis or treatment to LC	Grounded Approach with N=9 males ages 48-80 from a VA hospital. Data: In-depth interviews. Analysis: Thematic content analysis.	Self-efficacy, minimizing threat, fatalism or faith, and distrust of medical authority; explanations were often multi-dimensional	Results raise understanding of patient perspectives/decision making process; while findings have implications for clinical communication. Efforts should be made to increase trust and the quality of communication between patient-provider
Wiener et al. 2018	Describe patient-clinician perspectives and barriers to Shared Decision-Making (SDM) related to Early Adopting Lung Cancer Screening Programs	Qualitative approach with, clinicians N=36 and patients N=49. Data: semi-structured interviews and focus groups. Analysis: Content analysis.	Clinicians – varied in information shared with patients and inconsistently employed decision aids. Patients – received little information about screening or trade-offs and were uneducated about the purpose of the CT and LC screening. Both parties did not experience enough interaction/communication occurred due to organizational barriers.	Multiple barriers result in poor quality communication between patient-provider and a lack of implementation of the guideline-recommended shared decision-making supported by a decision aid; resulting in lack of patient knowledge.
Williams et al. 2020	Identify +/- factors specific to LCS via LDCT and develop value statements about the screening test for future research with African Americans.	Qualitative approach with providers and patients (n=9). Data: semi-structured interviews. Analysis: Thematic content analysis.	Study identified +/- factors related to LCS via LDCT and grouped data into categories (mortality benefit, psychological effects, interpersonal relationships, burden of test itself, hierarchy of life priorities, fear/fatalism, limitations of screening, stigma). This lead to a 12-itme measure with very good internal consistency.	Tools developed like the one in this study are promising and may inform clarification tools which ultimately promote informed and shared decision-making.

Table 2. Themes for facilitators to lung cancer screening.

Patient Individual-Level	Interpersonal- Level (Provider-Patient)	Cultural Level Barriers	Organizational Level (Institution/Policy)
• Education • High Motivation to know the LCS results • Openness to be screened • Self-determination • Low Perceived Risk of LDCT • High Perceived Benefits	• Receiving a screening recommendation from a healthcare provider • Shared Decision Making interaction between Discussion • Rapport with Care Coordinator rapport with patient • Good Doctor–patient relationships	• The value of life and perceptions of age • Altruism	• A decision-making aid • Reduced costs in specific facilities (VA and some Federally qualified) • Already established health-care (VA setting)

abstract screening, only 13 studies were appropriate for our review. Themes identified as participation facilitators include: prioritizing patient education, quality of communication, quality of provider-initiated encounter/coordination of care (individual patient and provider levels), quality of the patient-provider relationship (interpersonal level); perception of a life's value and purpose (cultural level); and, quality of tools and care coordination (organizational level). Themes identified as participation barriers include: knowledge/capacity, behavior/attitude, comorbidities, and perception (individual patient level); education, pitfalls, process, and policies (provider level); patient-provider relationship, patient education, and quality communication (interpersonal level); distrust in the system, fatalistic beliefs, perception of aging (cultural level); and, access to resources, care coordination, and implementing lung cancer screening (LCS; organizational level). More qualitative studies are required to determine if these identified barriers and facilitators affect lung cancer screening participation.

Main findings of the studies included

The 13 reviewed and analyzed articles help shed light on patient and provider perspectives (Table 1). Seven studies included a sample that captured multiple perspectives from patients, including patients' families or community members. Four studies contained perspectives of providers' only, incorporating a sample of primary care providers, pulmonologists, physician assistants, nurse practitioners, and nurse coordinators. Only one study included both patient and provider per-

Table 3. Themes for barriers to lung cancer screening.

Barriers				
Individual-Level		**Interpersonal- Level (Provider-Patient)**	**Cultural Level Barriers**	**Organizational Level (Institution/Policy)**
Patient Level	**Provider's Level**			
Knowledge/Capacity • Language or literacy problems • Insufficient input from the provider • Self-efficacy Behavior/Attitude • Postpone: puts off having treatment without refusing; delays seeking medical treatment after self-recognition of symptoms • Dislikes Hospital, healthcare system, Scans and tests) Comorbidities • Patient's other Comorbidities Perception • Knowledge avoidance • Fear and anxiety from taking part or results • Low Perceived Benefit (Feeling healthy) • High Perceived Risk of LDCT • Futility: denies or questions utility of treatment or procedure • A negative or false-positive screening result	Education • PCP inadequate Knowledge LCS (screening method, locations, eligibility criteria, and insurance coverage) Pitfalls • Primary care's competing priorities • Fear of causing misunderstand during a risk-benefit conversation Processes • Discontinuity of care • Shared Decision Making process Policies • Inadequate dedicated time for SDM	Patient-Provider Relationship • Lack of established relationship • Poor rapport • Patient Education • False-Positive worry after discussion with the provider • Decision Aid tool is confusing Communication Quality • Patient Misunderstanding • Inadequate encounter time	• Distrust in the system • Fatalistic beliefs • Perception of Aging	Access to Resources: • Transportation • Costs and copays • Lack of insurance coverage • Inadequate infrastructure Care Coordination: • Discontinuity of care • Lack of care coordinators, • Communication between providers, • EHR support Implementing LCS: • Inadequate staff assistance • Lack of institutional policy, • Long wait times • Public awareness • Patient empowerment

spectives. Three qualitative studies specifically sampled the veteran population. Three studies were mainly focused on minority groups but only sampled particular groups (Korean American, Hispanic, African American population, respectively).

Facilitators to lung cancer screening

Themes facilitating participation include: prioritizing patient education, quality of communication, and quality of provider-initiated encounter/coordination of care (individual patient and provider levels); quality of the patient-provider relationship (interpersonal level); perception of a life's value and purpose (cultural level); and, quality of tools designed and care coordination (organizational level). Most of these factors were articulated at the individual level (*n* = 6) and the interpersonal level (*n* = 4). A few factors were identified at the societal/cultural and organizational levels (*n* = 2 and 3 respectively). Table 2 shows a visual description.

Barriers to lung cancer screening

Themes coded as barriers include: knowledge/capacity, behavior/attitude, comorbidities, and perception (individual patient level); education, pitfalls, process, and policies (individual provider level); patient-provider relationship, patient education, and quality communication (interpersonal level); distrust in the system, fatalistic beliefs, perception of aging (social/cultural level); and, access to resources, care coordination, and implementing lung cancer screening (LCS; organizational level). The identified barriers can be seen in Table 3.

DISCUSSION

Despite the importance of lung cancer screening participation, our literature review found few qualitative literature studies addressing barriers and facilitators in eligible patients. We found that major factors influencing participation include knowledge, education, communication, patient-provider relationship, and organizational readiness. Identified facilitators and barriers differ by several patient factors, particularly disparities: socioeconomic status, access to care, sex, and culture/race.

Although recently updated USPSTF guidelines are expected to increase eligibility and participation, lung cancer screening uptake in the United States has been sluggish at best. National data reports less than 6% of USPSTF criteria-eligible smokers participated in LCS in 2015 [16]. Richards et al. analyzed the 2015 National Health Interview Survey data and found only a 4.4% uptake [15]. Subsequently, the prevalence of screening in the 2017 BRFSS only improved to 12.5% [16]. Since lung cancer screening produces a favorable stage shift and improves mortality, contributing factors to improve uptake need to be identified and leveraged. In a systematic review in 2018, Schütte et al. analyzed the socio-demographic profile of participants in LCS programs and identified significant gender and social differences (over-representation of male participants and higher SES) in the participation in various screening programs [17]. Existing gender and social differences highlight the importance of further qualitative research to identify strategies for engaging women and individuals with low SES.

By organizing data using a socioecological model, we were able to identify essential patient and provider themes influencing participation in LCS (Figure 2). Themes include, but are not limited to, the providers' knowledge of LCS, and patients' perceived benefits of LCS (individual factors), quality of the patient-provider relationship, and communication quality (interpersonal factors), and decision-making aid and access to resources (organizational factors). Addressing these factors will help fill gaps in the systematic implementation of the recently published USPSTF guidelines (2021) for LCS. The SES model helped us identify facilitators and barriers to lung cancer screening that were not observable in quantitative studies. Much of the focus of previously reported investigations were at the patient and provider level (individual and interpersonal). Only a few studies could elaborate on structural level barriers with a qualitative lens [13, 14].

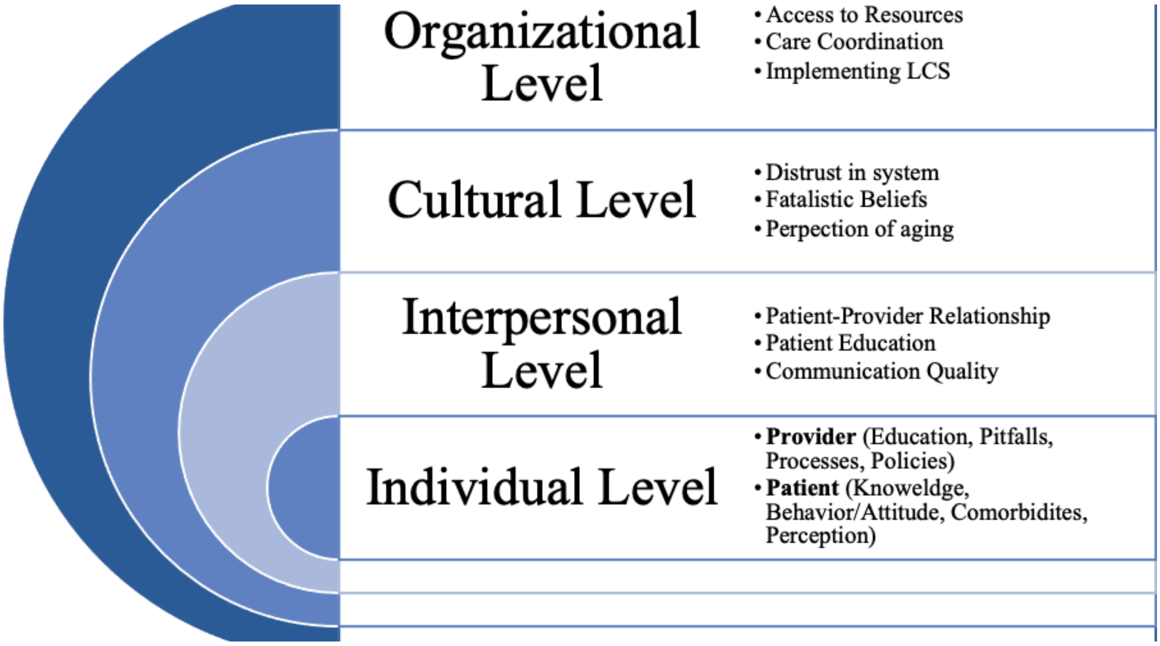

Figure 2. Socio-ecological Model of the Barriers and Facilitators based on categorization of the major analytical themes.

Individual level barriers and facilitators to LCS

At an individual level, the most common identified themes were related to knowledge and education. Knowledge regarding LCS in the United States is low [18, 19]. Amongst participants in LCS, patient education in the context of a brief discussion or pamphlet did not promote engagement in their subsequent evaluation [19]. However, these issues are not limited to the United States and the pressing need to increase LCS awareness emphasized globally in the past decade [10], which lead to many awareness campaigns about LCS, early detection and diagnosis of lung cancer in the United States [20], UK [21, Australia [22]. As a result of awareness campaigns, qualified patients have initiated requests for imaging with their primary care providers [21]. For instance, Jessup et al. 2018 assessed the effectiveness of an LCS digital awareness campaign in the US on the utilization of low-dose computed tomography (LDCT) and visits to institutional online educational content [23]. Results demonstrated a statistically significant increase in patients visiting the institutional LCS web pages during the campaign (mean 823.9, SD 905.8 vs. mean 51, SD 22.3, P =.001) and scheduled LDCT exams (mean before campaign 17.4, SD 7.5; during campaign 20.4, SD 5.4; and after campaign 26.2, SD 6.4, P =.001). Social media and marketing campaigns may also be leveraged to influence individual patient's behavior and knowledge [21, 23].

Another aspect of knowledge relates to the providers' capacity. Four studies demonstrated that some primary care physicians' (PCP) admitted they have limited knowledge of LCS screening in different areas including: methods, test locations, eligibility, criteria, and insurance coverage [24–27]. Hoffman et al. studied the attitudes and beliefs from several PCP in New Mexico and reported there were challenges with limited knowledge among primary care providers regarding current guidelines, as well as 'skepticism of results' considering the high false-positive rate. Skepticism and the possibility of false-positive results were reported as essential themes provider-level barriers in five studies [14, 19, 25, 28, 29].

Interpersonal level barriers and facilitators to LCS

At the interpersonal level, issues related to the quality of communication during the shared decision-making process and providers' ability to manage their time/competing priorities [30, 31]. The quality of the patient-provider relationship is strained due to either the lack of an established relationship, poor rapport [18, 32]. The provider's ability to deliver the information could be challenging for several reasons. When the patient's health education/knowledge is low, it is complicated to explain possible false positives, manage a patient's worries, or deal with a decision aid tool that is not palatable for laypeople or clear due to medical jargon [17, 21, 24, 25]. In some cases, providers may avoid the conversation about LCS out of fear of causing a misunderstanding during a 'risk-benefit conversation' [19] or 'ethical consideration' [25] considering financial burden.

Providers must know how to operate under policies and processes; otherwise, they will not have adequate time for shared decision-making processes [14, 31, 33]. The tension between policy and process was highlighted in two studies that demonstrated that communication quality became a barrier leading to misunderstandings because of the lack of cultural competency, poor bedside manner, not being straightforward with the patient or inadequate time to communicate the message [14, 33]. As seen in this review and other studies, the quality of communication can greatly impact the patients' knowledge, attitude, and ultimately participation in LCS.

Cultural level barriers and facilitators to LCS

Some patients' belief system precludes them from taking a passive approach to their health. This behavior may be demonstrated in not showing up to follow-up visits, referrals, or difficulty communicating with the patient. Sharf et al. reported examples of such challenges that may adversely affect patients' receptivity to providers' recommendations to LCS [32]. Gressard et al. called these issues 'fatalistic beliefs' and reported some patients said: 'If it's my time, I don't want to know about it', or 'if I have it, I am going to die', 'if they have in mind, body will have it, and I don't want to die' [29, 32]. Lastly, the perception of aging and the value of one's life was a barrier when patients held the cultural belief that they were 'too old' for screening [19, 20, 32, 33].

Compounded by these beliefs is the issue of trust in the medical system. Our society functions on various levels of trust, but many patients distrust the medical system, including providers and the screening process in general [18, 29, 32]. Studies reported various aspects of patient distrust, including suspicion of health information, medical procedures, motives of doctors or other health authorities [18, 32, 34]. However, Sharf et al. discussed that this distrust in the medical system might be a limitation to research as well, as distrust in health authorities may predispose the participants to be 'unenthusiastic about speaking with medical researchers' [32]. Powell et al. examined associations between medical mistrust, perceived racism in healthcare, and preventive health screening delays. They concluded that African American men report high levels of medical mistrust [35]. It is crucial to consider the historical issues concerning African American patients, including the nefarious history of the mistreatment of Black people by the medical community, most notably the Tuskegee Study of Untreated Syphilis [36]. These events highlight the importance of trust in the medical environment, especially among individuals known to have low LCS adherence. Further studies need to be conducted to identify practical ways the US medical system can build trust in the medical system and address systematic and perceived racism in healthcare.

When looking at consumer perspectives, there is an essential relationship between a patient's trust in medical advice (individual level) and a provider's respect for their patients (interpersonal level) [37]. Patients who feel disrespected are less likely to trust a provider overall and are less likely to adhere to medical advice, which has critical implications for healthcare quality, outcomes, and costs. However, there are practical ways to address these issues at the societal/cultural and organizational levels. Some hospitals employ patient-centered care models such as the Planetree model, a philosophy to care that has been around for only 40 years. Cost benefits analysis demonstrates that the Planetree model's revenues are greater than the cost of implementing it [38]. Patient-centered models are beneficial to patients and can have a positive impact on employee retention rates, positive working environment, and employee satisfaction [38, 30].

Organizational level barriers and facilitators to LCS

The shared decision-making process and decision-making aids were considered significant facilitators to LCS participation. However, Wiener's study showed that majority of providers inconsistently incorporated decision aids [40]. Other issues related to tangible resources are more related to the patients' perspective, which include transportation (to/from the hospital, facility, etc.), the patients' inability to afford copays, the patients' lack of insurance coverage, and the providers' inadequate infrastructure in some rural settings [18, 25, 26, 29].

The coordination of care and the continuity of care, including the communication between providers and EHR support, are all other organizational-level supports that can be leveraged for LCS participation [14, 31]. Some studies showed that a follow-up session with a nurse screening coordinator provided a more thorough discussion and was preferred by the patients and subsequently favored by clinicians by freeing their time [41]. Modifying organizational system practice and policy can be leveraged to ensure capable nurse screening coordinators can be utilized in the LCS educational process and addressing interpersonal-level barriers.

A limitation of the current literature is the lack of heterogeneity within qualitative sampling. Such methodological constraints will fail to produce a dynamic understanding of the phenomenon being investigated [42]. Although none of the studies in this review intentionally sought out female participants, few purposefully sought out people from diverse cultural backgrounds (e.g., Korean Immigrant [33], Hispanic [25] or African American [29, 43]), and a few looked at people who were veterans [30–32] and those from rural communities [28]. However, research on the topic of LCS demonstrates that patients with these salient characteristics may exhibit low adherence rates [9, 34, 44, 45]. For instance, Japuntich et al. investigated LCS utilization among Black vs. non-Black. They found that eligible non-Black patients were 2.8 times more likely to have had LCS than eligible Black counterparts [46].

Some possible explanatory factors for low adherence rate among African Americans could be fatalism, lack of perceived risk, fear of discovering cancer and history of cancer (individual level), mistrust of medical providers (interpersonal and cultural level), logistical barriers, and suboptimal health care (organizational level) [46, 47]. Applying the SEM into qualitative data that illustrate barriers and facilitators to LCS among vulnerable groups with low adherence rates, supports can be implemented at the cultural and organizational levels to improve competency, awareness, and capacity of institutions and providers. The results of this study address gaps in the literature and could potentially inform the systematic implementation of the recently published USPSTF guidelines (2021) for LCS.

Optimal LCS implantation should be designed using a resilience process-oriented approach that bolsters against barriers and capitalizes on facilitators [48]. Resilience approaches identify protective factors that contribute to resilience from a socio-ecological perspective. Resilience in this context considers the multilevel dynamics linking an individual's adaptation, behavior, environmental context, and specific interplays. This review highlights the importance of incorporating multidisciplinary, culturally competent providers particularly when providing screening to underserved and marginalized communities [49]. Such a design would focus on raising awareness about LCS, with both the referring providers and the eligible marginalized subpopulations. Ideal implementation needs to include: open communication, prioritizing shared decision-making discussions between patient-provider, and organization of care. Subsequently, marketing strategies need to target at risk populations including African Americans and other minority communities. Fundamental to this design is ensuring that every aspect of the program uses culturally responsive educational materials. Decision making aids should incorporate patient testimonials from all socio-demographics highlighting stories of those that have been screened, had an early stage lung cancer detected, and were treated with the excellent outcome.

Study limitations

This review did not incorporate various methodologies (quantitative, qualitative, and mixed methods) on LCS participation. Instead, our review analyzed qualitative studies conducted only in the United States. The purpose was to identify key themes related to patients' and providers' perceived barriers/facilitators to lung cancer screening. Qualitative research may be transferable, though findings are not generalizable. Therefore, we limited our sample articles to studies conducted in the US as the country has a unique medical system compared to other countries. Here distinctiveness may contribute to challenges in LCS implementation at the cultural and organizational levels [50, 51]. Though we found the SEM helpful in organizing these data and interpreting the findings, we acknowledge that these factors are interconnected, as the dynamic interrelations among various personal and environmental factors are inherent in this theoretical framework.

CONCLUSION

There is a paucity of available literature regarding lung cancer screening participation in the US. Facilitators of lung cancer screening include patient education, high-quality communication, perception of life's value, and decision-making tools. Barriers to lung cancer screening include knowledge, patient-provider rapport, distrust in the system, and access to resources. The facilitators and the barriers identified within this narrative review could be targeted by screening programs to boost participation (or follow-up). For instance, improved communication can optimize the shared decision-making process, community outreach to improve provider-patient knowledge, and dedicated resources to bolster organizational support are all practical approaches to enhance participation in LCS. However, more qualitative studies are required to determine if these identified barriers and facilitators affect lung cancer screening participation.

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