

Reviewer A

Family caregivers and the intersection with the social determinants of health in lung cancer is an understudied topic.

Comment 1: Whereas the level of data extraction is detailed, my main concern is the theoretical constructs used to synthesize the literature. I am unclear at times which framework is used - social, political economic determinants of health? Is there a diagram the authors can provide to guide the reader. I am also unclear how the extraction domains linked to the thematic findings - how does SDH data extraction link to the 4 themes which seem quite disparate and not unified by an overarching analysis.

Reply 1: As discussed in the introduction, we used the social determinants of health framework which includes 5 broad domains (lines 61-64 on page 4 of the revised document): economic stability, education access and quality, neighborhood and built environment, healthcare access and quality, and social and community context. We further define each of the domains in the results section focused on the three primary domains of the articles reviewed. Furthermore, FCGs may share many aspects of SDH. If they live in the same household, they will have a common neighborhood and built environment. Other areas may overlap to varying degrees, such as social and community context and other domains may be quite different. We've developed a figure to summarize the SDH framework that guided the themes for the manuscript.

Changes in text: Page 4, line 65 and Figure 1. The SDH framework (**Figure 1**) includes five broad domains: economic stability, education access and quality, neighborhood and built environment, healthcare access and quality, and social and community context^{1,2}.

Comment 2: I am unclear why spirituality is mentioned multiple times in the paper - it does not seem tightly linked with any guiding theory, or extraction or analysis - perhaps it might be useful to leave it as a separate topic?

Reply 2: Spirituality is an understudied sub-factor within the social and community context domain (please see lines 77-82 on pages 4-5 of the revised document).

Changes in text: None.

Comment 3: Please refrain from using terms such as devastating or detrimental - as they sound opinionated rather than factual.

Reply 3: We have updated the manuscript according to reviewer comments.

Changes in text: Please see track changes throughout document using the terms: disparate and disadvantage instead of devastating or detrimental.

Comment 4: Why was search limited to the period 2010 to 2020?

Reply 4: This review began in 2019. Due to the COVID-19 pandemic we experienced significant delays with review of the current manuscript. Our inclusion criteria for this review were from 2010-2020 at the start of the project.

Changes in text: None.

Comment 5: What was the reason for 25% caregiver cutoff?

Reply 5: SDH is an understudied topic in lung cancer research. Most of the studies reviewed included other malignancies and lung cancer. As a result, and based on the average number of lung cancer

participants, the research team elected to use the 25% cut off number for the studies included in this review.

Changes in text: None.

Comment 6: Using a guiding framework to synthesis findings can help the authors communicate their findings.

Reply 6: The SDH framework was used to guide the synthesis of the findings for this review.

Changes in text: None.

Reviewer B

I found the manuscript well-written and relatively easy to read overall, dealing with a very salient and important topic. However, there are a few ways in which I believe the manuscript could be improved. I have noted these below:

Comment 1: The title and running title could be refined to be a little clearer – social determinants of health appears unrelated to what follows due to the “and”. Rephrasing this would be useful (eg using “among”).

Reply 1: Thank you for the comment, we replaced the word “and” with “among” as suggested in both the main title and the running head.

Changes in text: Updated title (see page 1) “Social determinants of health among family caregiver centered outcomes in lung cancer: A systematic review”; Update running head: “Social determinants of health among lung cancer family caregivers”.

Comment 2: It would be useful to more clearly define social determinants of health and the sub-domains you identify of importance.

Reply 2: We have modified our text based on reviewer’s feedback (see page 4, lines 64-65).

Changes in text: The US Department of Health Human Services defines SDH as the social and physical environmental conditions in which people live, work, age, play, and pray³.

Comment 3: Can you comment more on your development of your search terms? This is quite underdeveloped in the text but the search terms in the appendix seem quite comprehensive.

Reply 3: We have modified our text based on reviewer’s feedback (see page 5, lines 102-107).

Changes in text: The keywords were combined with synonyms, alternate spellings/word endings, and controlled vocabulary, such as MeSH, to retrieve relevant results. Social determinants of health factors were broken down into individual keywords such as education, economic status, healthcare disparities, etcetera. The complete list of search strategies, including MESH terms, can be found in **Appendix A**. The librarian performed all searches, with inputs from three authors (DT, VS, JK).

Comment 4: The searches were done up to December 2020. This is nearly two years out of date. As such, an updated search is warranted. There may be key articles published since that time that have been published. A related query is why articles published before January 2010 are excluded as this does not seem to be an updated review?

Reply 4: This review began in 2019. Due to the COVID-19 pandemic we experienced significant delays with review of the current manuscript. Our inclusion criteria for this review were from 2010-2020 at the start of the project. An updated search is warranted but is however out of scope of the current manuscript.

Changes in text: None.

Comment 5: Why did you eliminate studies not published in the US? This seems like a major omission and is undefended. Different health systems throughout the world would surely further inform the issues of importance here?

Reply 5: Thank you for this important comment. We discussed the inclusion of non-U.S. studies at the beginning of the project. We opted, for this review, to focus exclusively on studies published in the US. The primary scope of the current review focused on articles in the US due to the broad nature of SDH and the meaning of the domains varies throughout the world. We do provide articles from a global perspective that were noted in **Appendix C** of the current review. Please also note the information provided on Page 6, line 119-120 about the scope of the project.

Changes in text: Due to the complexity of SDH and lung cancer outcomes among FCGs, we chose to limit the scope of this review to the United States.

Comment 6: The summary of articles by themes was useful in the results. However, the results section should not draw conclusions about the state of the art, these should be reserved for the discussion, eg page 10, line 8-11.

Reply 6: We have revised the statement to not draw conclusions about the literature.

Changes in text: As discussed by Grant, Sun, Fujinami, Sidhu, Otis-Green, Juarez, Klein and Ferrell⁴ interventions to improve caregiver outcomes should include a holistic model of care that incorporates QOL domains (physical, psychological, social, spiritual well-being), addresses caregiver burden, provides skills training, and a self-care plan.

Comment 7: The implications for future studies presented in the discussion in the opening paragraph should be reserved for the end of the section. The opening paragraph of the discussion should instead focus on summarizing the key results.

Reply 7: We have moved the statement on future research on unmet needs to the end of the discussion section as recommended (line 313-315 on page 14).

Changes in text: Moved statement to end of discussion section prior to limitations/strengths information.

Comment 8: Regarding the following point in the discussion, it would be useful to further unpack this process earlier in the method section: “We also acknowledge that the process of assigning studies to their respective domains may not have been devoid of selection bias despite the considerable actions taken by the authors to reach consensus in appropriately assigning studies”

Reply 8: We discuss the process of assigning articles to each SDH domain in the methods section and discuss the limitations of the process in the discussion section.

Changes in text: None

Reviewer C

Comment 1: This is an important review of the association of social determinants of health on family caregivers for adults with lung cancer. The review was well-explained and appears rigorous; the themes and implications are important and will contribute important knowledge to advance research in this area and highlight areas where research is critically needed. The tables of studies and measures of social determinants of health should be particularly helpful to readers. There is very little studied or known about family members providing care to adults with lung cancer. This is a salient paper.

Reply: Thank you for your review of the manuscript.

Changes in text: None