Author’s response to reviews

Title: Increasing Health Policy and Systems Research Capacity in Low-and-Middle Income Countries: Results from a Bibliometric Analysis

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Response to Reviewers

We are grateful to the editor and the reviewers for their insightful and thorough comments. These critiques have helped us to improve the content of the manuscript. Please find below, our point-by-point responses to these critiques.

Reviewer #1:

Line 127
Unclear where the direct quote is from as two sources are cited.

Line 152
Spelling of custodian
Corrected in the manuscript.

Line 184
This should be cited.
References have been added to the manuscript.

Line 197
More explanation of your search strategy is needed. What broad keywords were used and why were they chosen?

Many HPSR related bibliometric analysis were reviewed prior to the design of this study. Our study is intended to stand independently and is not a reproduction of previous work. Our review showed that the results of previous bibliometric analyses vary greatly depending on the different keywords, search strategies and/or scopes were employed. In addition, the number of resulting publications is not an indicator of the quality of a search strategy. This number varies significantly depending the strategy and extensive keyword lists do not necessarily correlate with results that accurately represent the intended subject matter.

In the literature, disciplinary inclusion can be broad while exclusion is more well-defined. Therefore, to ensure inclusivity of publications related to HPSR, a high-level keyword search strategy was applied.

There are 5 components for the search strategy, the details of which are outlined in the Methods. This high-level keyword strategy assumes that publications related to HPSR would, at the very least, have the words health AND policy OR “health system(s)” somewhere in the text. Once
these publications were identified, additional keywords can be added to refine the definition (i.e. building blocks).

The syntax (health AND policy) implies both terms are required in a single paper for inclusion. Alternatively, if a paper had the specific term “health system” or “health systems” either independently or in combination with (health AND policy), it was also eligible for inclusion.

Line 199-201
This is mentioned earlier (lines 162-164).

The duplication was removed.

Line 207
Should this read (Health AND Policy) OR "health system(s)"? The next few lines imply these were grouped together in that way, but this should be made clearer upfront

This has been corrected.

Line 223
I would be concerned that by limiting to Humans in this instance that theoretical papers would also be excluded, and many policy papers are likely to be theoretical in nature. The Human tag is somewhat inconsistently applied and using it as a limit is likely to miss unindexed articles or poorly indexed articles as well.

The reviewer raises an important point. HPSR publications address this issue differently. Each bibliometric strategy reviewed used different search strategies – from a single MeSH term, to an extensive set of keywords, all with varying degrees of inclusion or exclusion criteria. The inclusion of the human species tag, was identified from a previous HPSR bibliometric analysis
(Adam et al., 2011, Annex S1). The same keyword search strategy was used by authors of other bibliometric analysis publications, while Adam indicated the human subjects filter was applied, others did not explicitly mention it in the text. In the discussion section, we mention the importance of having a more standardized criterion for defining HPSR, and indeed, a broad agreement on the scope and use of the “human” filter should be part of this standardization.

Lines 251-254

Over the years there have been changes in how the affiliation field has been used (see: https://www.nlm.nih.gov/bsd/mms/medlineelements.html#ad) Please expand your description to explain how your search accommodated these changes.

Since 1988 the address of the first author’s affiliation has been included in PubMed. Since 2014 subsequent author’s affiliation is requested but not required. Our search strategy uses the country indicated in the first author’s affiliation. A sentence has been added to the manuscript on Line 255 to clarify this issue.

Line 297

You mention here that LMIC articles increased exponentially after 2000. What role does the creation of PubMed Central play into this increase? Because it also began in 2000, authors could submit their own articles for inclusion in PubMed Central, ones that weren't previously eligible for inclusion in PubMed. The result being that journals previously considered out of scope for indexing by Medline/PubMed are now seeing select articles found in PMC. (See: https://www.nlm.nih.gov/pubs/factsheets/dif_med_pub.html) As an example, consider the Journal of Hospital Librarianship. There are 7 articles available by searching Pubmed, all of which are PMC articles added by the authors themselves. A search of the same title in CINAHL shows 850 articles, as the journal is indexed by this database back to its inception in 2001. If LMIC authors are publishing more in allied health, management or other journals not traditionally covered by Pubmed, an increase in 2000 may be more indicative of a change in policy as to what articles are included in Pubmed rather than an increase in real publishing.

While we appreciate the reviewer’s comment, we are unsure how this would impact our results. The reviewer suggests that the increase in published articles post-2000 might be due to authors having access to add their own articles at this time. We concluded that the number of individual
authors adding their own publications would likely be quite small since it is typically the
publisher that would deposit publications. Therefore, if a publisher has access to deposit in PMC,
they would likely deposit all articles (including retroactive) within their purview.

The potential for loss due to changes in requirements/access over time would be a limitation of
any database. Since we are searching retroactively and this update occurred nearly 2 decades
ago, one might expect that by now the database is updated to the capacity where there is
willingness to do so.

Figure 1 corresponds to the text indicating that “first authors from LMICs have participated
exponentially in the life and biomedical sciences (PubMed) since the early 2000s”. This figure
and statement are significant because each individual component was examined independently to
understand its contribution to any topic in PubMed over time before moving on to the cumulative
analysis. This is a direct comparison of all HPSR publications in PubMed, all publications in
PubMed with a topic relevant to LMIC, and all LMIC authors that publish on any topic in
PubMed. The first two categories do not increase with nearly the same vigor as the latter. HPSR
publications as well as publications with a topic relevant to LMIC each had just over 1000 per
year in 1990, and increased to approximately 5000 in 2015. The increase was marginal and fairly
uniform over the 26-year study period. In contrast, publication with a first author from an LMIC
(on any topic in PubMed) increased almost 10-fold over the same period with an obvious
transition beginning in the early 2000s. At this time the trajectory changed to a new and
consistently steeper slope. If this increase was due to the reasons suggested by the reviewer, we
would expect similar increases in all categories since LMIC authors participate in all areas of the
life and biomedical sciences, but this did not happen. Figure 1 was included to specifically
highlight this point and we have added comments to the manuscript at Line 324-327 to further
highlight this point. In addition, we performed a normalized comparison that confirmed the result
(due to a limit on the number of figures, the normalized figure was not included in the
manuscript).

A similar assessment was also reported in: A. Mills, S. Bennet, G. Bloom, M González-Block &
I Pathmanathan, Strengthening Health Systems. The Role and Promise of Health Policy and
different search strategies, the authors note that there has been exponential growth in publication
in health systems research since the beginning of the 20th century. While we absolutely agree,
we also acknowledge that the rate is only slightly higher than the general increase in PubMed
publications over all. In this manuscript, we have attempted to add to this understanding by
showing that the slight increase over PubMed may be driven by the generalized and significant increase in participation by authors from LMIC participating in HPSR.

In response to the reviewer’s comment regarding the 850 papers published in the Journal of Hospital Librarianship (JHL), it is unclear how this might impact our results. To illustrate the point, below, is the screenshot from a CINAHL search results using (Health AND Policy) OR "health system*", published between 1990 – 2015, and appeared in JHL as search conditions. Even before restricting the search to LMIC titles, LMIC first-authors and human filter, only 33 papers satisfy the conditions.

Adding the “LMIC titles” filter (by visual inspection of this small list) to the above search results in only 2 publications, suggesting that JHL may not be a primary forum for our search strategy.

Line 330

Again, this may reflect changes in how affiliation is indexed. Given that authors with multiple affiliations have only seen the first one included until December 2014, it may be that authors with multiple affiliations listed the higher income countries' affiliation first, as this was perceived as more prestigious.

We agree with the reviewer that an author’s representation by a single affiliation in the database poses some limitations. For instance, as the reviewer has suggested, it is difficult to assess whether LMIC authors might be under-represented in favor of HIC affiliation (if available to them). To better assess this proposition, we would have to have some knowledge about how many LMIC authors have this dual affiliation (both LMIC and HIC), and among these, how many would opt to indicate their HIC affiliation when writing about and for LMIC. To our knowledge, this information is not readily available but would be an interesting future study. We added a sentence to the paragraph, where limitations are described, to reflect this point.

Line 587

Just to confirm, I checked the Humans/Animals tag. Performing a simple keyword search for polic*.mp and limiting to humans, and using the NOT to remove them from the search, then
limiting to animals and again NOT-ing them out, leaves approximately 25% of articles given neither a human or animal species. This would include articles that are not yet indexed, but also ones that are policy or theoretical in nature.

Please see response to Line 233.

Line 598
Correct, as NLM did not have a searchable author-supplied keywords prior to 2013 (see: https://www.nlm.nih.gov/pubs/techbull/jf13/jf13_pm_keywords.html) I couldn't find a link to the policy prior to that date but it is possible that author-supplied keywords were temporary until MeSH could be applied? An earlier NLM Bulletin suggests it was editors/publishers who requested keywords, not NLM (see; https://www.nlm.nih.gov/pubs/techbull/ja03/ja03_technote.html)

Keywords were applied erratically over the 26-year period but appear to better represent the papers’ topic. There were trends over time where keywords were often, or seldom applied. Unfortunately, the gaps in applying keywords rendered that analysis uninformative. We acknowledge that PubMed policy changes over time and were unable to identify documentation to justify the variability. We, therefore, made the best use of information available. MeSH were consistently applied, yet more generic, and not well-correlated with author-assigned keywords (where available).

Line 624
Changing definitions of terms and addition of new terms also applies. Health Care Reform was only added as a MeSH term in 1994, so the reflection that research in the area increased in 1995 may simply be due to the use of this new term by indexers. While indexers do go back and reindex in some cases, this is not done consistently. Of course, terms are also created in response to new areas of research, so Health Care Reform added in 1994 may reflect a true increase around that time. It also might reflect US government policy issues, surrounding Hilary Clinton's Health Care Reform bill of 1993. It is worth noting that indexers feel the need to clarify that Health Care Reform is not strictly for the United States!

We have added a comment in the manuscript on Line 647 to clarify this.
A few other notes

Overall this is a topic worthy of study and some improvement to the search would be beneficial. Looking only at articles from 1990 to 2014 would eliminate much of the issues brought up by changes in the affiliation field and limiting to only articles indexed by Medline would reduce many of the changes from PubMed Central. You could take your list of frequently used MeSH terms and only search for those that have had a stable definition from the 1990 to 2014 time frame. These changes will bring about their own limitations: Are LMIC authors more/less likely to publish in journals that are not indexed for Medline, either due to language barriers, or strict restrictions from NLM on what is included for Medline? Does relying on stable MeSH only mean that emerging research in new disciplines gets missed, and are LMIC authors more / less likely to publish in emerging areas?

A couple options for methods that might meet your needs are found in:


The date range of 1990-2015 was specifically selected as this review corresponds to 20 year of the Alliance for HPSR. We reviewed a few years beyond the 20-year period to establish a baseline. As mentioned previously, since our research encompassed 1990-2015, changes in the affiliation field would not alter our results as there was consistency in terms of providing the affiliation of the first author since 1988. https://www.nlm.nih.gov/bsd/mms/medlineelements.html#ad

One must choose a database and while some are indexed, some are not. It has been included in the manuscript (line 694) that there is a possibility that LMIC are over-represented in unindexed journals due to language barriers, restrictions by NLM etc, but there is no way to know what proportion this might represent and whether it is significant. This might be an issue in HIC as
well, and might be ubiquitous across all regions. Determining appropriateness of inclusion in Medline based on LMIC authorship and/or MeSH term trends is outside the current scope.

Our analysis examined scientific production of HPSR using a high-level keyword strategy in PubMed over time. A unique feature of our research is that we used a high-level search strategy for inclusion and only relied on MeSH terms for one aspect of this analysis. Presumably the relevance of “health” and “policy” to the discipline would not have changed much over time. Given this high-level strategy, it is unlikely that emerging research in the health policy space would be missed due to the keywords. If a paper is relevant to this space, it is likely to contain these keywords somewhere in the text. Alternatively, lengthy, highly specific search strategies may exclude relevant research and be subject to exclusion given emerging and evolving definitions over time. Our high-level search strategy was also employed to limit variability in identifying the building blocks. The difference being that the building block themselves have had variable definitions over time and per author. The building block related to Health Information Evidence and Research, would be most relevant to Deshazo 2009, and had the most variable nomenclature and definition among all building blocks. We have added both citations indicated above to the manuscript.

Reviewer #2:

The background exclusively addresses HPSR and health systems definitions and superficially reviews international documents making statements on the importance of HPSR.

No mention is made in the background to the purpose and objective of the paper.

No mention is made to past literature analysing HPSR publication trends based on bibliometrics.

No mention is made to papers analysing the impact of HPSR on decision-making.
The background has been significantly revised to address your important suggestions. It intends to provide the history of HPSR as it related to the inception of the Alliance HPSR. As this is the 20th anniversary of a meeting that gave rise to the Alliance, it is an opportunity to identify the progress in the discipline over this period. It is strongly acknowledged that local participation in HPSR is important. One measure of contribution can be demonstrated through participation of knowledge production relevant to LMICs. Providing strong evidence is key to the longevity of this support allowing this cycle to continue.

Bibliometric studies of HPSR were reviewed and a sub-set were cited in the manuscript. We initially reproduced a search strategy that used only building blocks to define inclusion criteria. Based on the limitations observed in the resulting literature, we opted for our high-level search strategy to identify relevant HPSR publications.

Our intention was to imply that that local decision-making is supported by increased local capacity, for which LMIC authorship was used as a proxy. This research allows us to better understand the change in this type of participation in HSPR over time. Results of this research show that LMIC participation is relatively low but increasing. These results are used to support high-level decision-making for continued funding of HPSR in LMIC to enhance participation and build capacity among the populations it intends to support. Incidentally, if decision-making is top-down, it may lead to policy change but not necessarily to capacity building.

In the methods section the authors state that HPSR is defined as research on specific health system functions, leaving out human resources, information research, technology and pharmaceutical production. Were these functions excluded? Line 413 suggests otherwise, but it is not clear.

We used a high-level search strategy inclusive of all topics mentioned. The main analysis examined all HPSR papers as per the syntax on line 210. A subsequent analysis examined the breakdown of the 6 health system building blocks within the HPSR publications.

The search strategy is oversimplified. The key words proposed are too broad. No mention is made to specific MeSH terms in PubMed that have been used by previous authors to search for HPSR in a more comprehensive and detailed manner. The approach to delimit LMIC based on country words in title and abstract is insufficient. PubMed offers other fields codified for country
relevance, regardless if the title or abstract mention the country. The approach to identify LMIC participation through the affiliation of the lead author is insufficient. Meaningful LMIC participation could have been had by a non-lead author from LMIC.

We respect the reviewer’s opinion and would hope that the reviewer would agree that there may be more than one way to reach a desired outcome. Previous bibliometric analysis of HPSR had been reviewed and the search terms and strategies were carefully examined. We discovered a variety of methods and search strategies, that were highly variable across the literature. For example, one study used a single MeSH term strategy (Paganini, José María, and S. Raiher. "A bibliometric analysis of health services research publications: trends and characteristics." Argentina: Facultad de Ciencias Médicas Universidad Nacional de La Plata and Centro Interdisciplinario Universitario para la Salud (2006)). While, others (Adam 2011, Yao 2014), with non-overlapping authors, appear to have adopted a uniform set of search terms (but inconsistent search strategies i.e. dates, species filter etc.). Yet, these methods omit the rationale, process and logic for how the terms and strategy were derived. Reviewing references available did not indicate how/why the combination of terms was selected. These strategies presumed the 6 building blocks most accurately defined HPSR and the nomenclature and definitions, as per the terms used to define the building blocks, were extensive for some and underdeveloped for others. The numerous and specific terms were combined using Boolean operators in a way indiscernible to our Liberian (Cox DA, McGeoch CC. Logic, Sets, and Proofs. Amherst College). The list of search terms used to identify HPSR publications was extensive and consisted of more than 10 pages, yet counterintuitively excluded “health policy” as a major topic. Lengthiness or brevity of search terms do not indicate accuracy of inclusiveness or exclusiveness.

In addition, and of great importance, clinical studies were not excluded. PubMed has a prescribed script to identify these studies (https://www.ncbi.nlm.nih.gov/books/NBK3827/#pubmedhelp.Clinical_Queries_Filters) and their equivalent was not captured by the term in previous search strategies. A reproduction of the extensive above-mentioned strategy resulted in a high yield of publications but they were largely unrepresentative of HPSR (as per our definition). Depending on the strategy used, between 1/3 and 1/2 were clinical studies.

Due to the incompatibility between the resulting literature from previous bibliometric analysis with the definition of HPSR that guided our research, we began with a high-level inclusive search strategy. We aimed for the highest level of inclusion (and exclusion) within HPSR, with the understanding that the resulting literature could be further analyzed based on any other relevant topics (i.e. building blocks). Subsequent high-level terms were used to stratify by
building blocks. It is worth noting that the resulting papers may not be mutually exclusive (if a similar strategy is employed and clinical studies are excluded using PubMed’s prescribed script). It is possible that there could be a significant overlap in the resulting papers despite different use of key terms (high-level vs extensive keyword strategy). Comparative analysis of different search strategies reported to date, including ours, would be a beneficial undertaking towards standardization of HPSR bibliometric analysis, the results of which may constitute the content of a separate publication in the future.

This analysis identifies the collection of papers with its main topic focused on an issue relevant to a LMIC (referred to in the figures as “LMIC Topic”). The title and abstract sections, denoted by the tag “Title/Abstract [TIAB]”, are intended to most concisely describe the main focus and purpose of a paper. Therefore, these papers can be efficiently identified by limiting the search to the list of 135 LMIC and synonyms for “developing country” that appear in the title and abstract (http://www.ncbi.nlm.nih.gov/books/NBK3827/#pubmedhelp.TitleAbstract_TIAB) Key words may also be identified but without mention of an LMIC, it would be difficult to determine if the topic is specifically relevant to LMIC of a more general HPSR issue relevant to HIC.

We absolutely agree that non-lead authors from LMIC could have meaningful participated but prior to 2014 only the first authors affiliation was included in PubMed (https://www.nlm.nih.gov/bsd/mms/medlineelements.html#ad). We have added a comment and reference on Line 254.

The approach to codify for building blocks as defined in L426 of the results is not clear, given the MeSH terms are not identified. The analysis of top-ten MeSH terms is not related to building-blocks, so it is unclear how the two approaches relate.

The high-level key terms are outlined in Additional File 1.

The analysis of the top 10 MeSH terms is separate from the building blocks. Its inclusion was intended to challenge the status quo, i.e. why these particular building blocks?; are they relevant?, is sub-division necessary?, is it possible that a different subdivision of HPSR may better represent HPSR? We propose an option to consider the possibility that grouping the most frequently used MeSH terms over a decade, so some other period, may more accurately represent the subdivision of HPSR.
While the authors state they will analyse connectedness, no results are presented on the topic.

The reviewer is correct. We used the results from the high-level search strategy to conduct a network analysis in parallel to this bibliometric analysis. A separate manuscript summarizing the network analysis results was submitted to Health Research Policy and Systems, simultaneously.

The discussion section is poor, not covering the relation across topics, the implications for capacity strengthening and the fields than need. No effort is made to relate the results to previous analyse, particularly those undertaken by the Alliance HPSR in previous decades. Among others:


This body of work is intended to stand independently and is not a reproduction of previous work. As mentioned above, many other bibliometric analysis were reviewed. Our intended focus was to look at HPSR publications over the life span of the Alliance for HPSR and not necessarily the relationships between topics or building blocks, in fact we argue that there is a significant overlap between topics and we hope to draft a future manuscript examining this area using network analysis.

In conclusion, I reiterative that there are many way to arrive at the desired result. Therefore, we would caution against comparing the results between bibliometric analyses, when different keywords, search strategies and/or scopes were employed. We would also caution against using the number of resulting publications as an indicator of the quality of a search strategy. This number varies significantly depending the strategy and extensive keyword lists do not necessarily correlate with results that accurately represent the intended subject matter. Many strategies that we reproduced did not explicitly exclude clinical studies, thus resulting in a higher number of papers. Meanwhile, PubMed has a specific script to identify clinical studies, as cited in the manuscript. We employed this specific exclusion criterion as part of our strategy. When
this was applied to other studies with a high number of resulting papers, several- to tens of thousands of papers, among those, may then be removed.