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Systematic Review

Search Terms for Conducting Systematic and Scoping Reviews in the Middle East and North Africa (MENA) Region and the Arab World: An Example on COVID-19

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ABSTRACT

Introduction: In the field of scientific research, it is well recognized that the starting point for such efforts necessitates a proper and thorough literature search using reliable databases. Objectives: The aim of this article is to present future researchers with a guide that provides a well-defined set of search terms (MeSH terms and keywords) for the Middle East and North Africa (MENA) region, the Arab world, and countries within them.

Methods: Selecting the proper search terms for the 26 countries and COVID-19 required a systematic approach for building a search strategy. MeSH and keyword searching was initially conducted in Medline (OVID) and replicated in PubMed. Results: Based on the described methodology, we extracted and compiled an extensive and comprehensive collection of search terms pertaining to the countries of the Arab world, MENA region, and COVID-19.

Conclusion: This guide will facilitate conducting systematic and scoping reviews, using Medline (OVID) and PubMed, on medical and health topics including COVID-19 as an example. It acts as a reference that includes the appropriate terms to conduct a literature search, facilitates the search process, and ensures its breadth and completeness.

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Keywords: Search Terms; Middle East; North Africa; Arab; Systematic Reviews; COVID-19

INTRODUCTION

Approaching a scientific work requires a number of steps that have been established over the years to ensure the quality of research and scholarly works. In the field of scientific research, it is well recognized that the starting point for such efforts necessitates a

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Faculty of Medicine, American University of Beirut, Beirut, Lebanon Email: ka28@aub.edu.lb proper and thorough literature search.^{2,3} This step proved to ensure concepts of relevance and rigor of any research output.⁴ Relevance guarantees that the research work will not delve into information that has been previously well investigated or proven.² Rigor reflects the extent of precise use and sorting of retrieved resources.⁵ Maximizing both concepts is significant for research especially in the fields of medicine, public health, and allied health sciences.

Literature search for information retrieval entails the use of databases that are deemed reliable.⁶ Many factors are involved in the selection of databases and search terms. Nevertheless, there is no single database that can provide the user with full coverage of the topic at hand.⁷ Therefore, a number of different databases must be considered, as each possesses its own set of searching techniques.⁸

The most commonly used bibliographic

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biomedical databases enable the user to perform a search using either "keywords" as search terms or both "keywords" and "controlled vocabulary".6 Keywords broadly encompass text words, ordinary words, official, and other terminologies that are mentioned in the retrieved document. These also include synonyms for any terms the researcher finds relevant.9 Controlled vocabulary reflects the subject content of each article where indexers assign at least ten headings to each article. 10 Each paper discusses its assigned Medical Subject Headings (MeSHes) that accurately define its content.¹¹ In databases such as Medline (OVID) and PubMed, , the controlled vocabulary is referred to as "MeSH" terms. A comprehensive search strategy must include a combination of keywords and/or MeSHes. This is achieved by the use of Boolean operators (AND, OR, NOT) to connect search concepts together by either narrowing or broadening the set of results retrieved.

Improper literature search might yield irrelevant results that are usually subsequently excluded manually by the researcher.¹² Conversely, this might also omit important publications that are essential for the literature search.¹³ These strategies are vital for research proposals, original articles, and systematic and scoping reviews.

Given the current political, social and economic instabilities of the Middle East and North Africa (MENA) region and the Arab world,, many researchers are studying the effects of these issues on health and medicine. Moreover, with the recent COVID-19 pandemic, more comprehensive searches and reviews must be performed to guide knowledge on COVID-19 related issues in the region. The objective of this article is to present future researchers with a tool that provides a systematic and well-defined set of search terms (MeSHes and keywords) that define the MENA region, the Arab world, and the countries within them; with COVID-19 as an example

MATERIALS AND METHODS

The Arab world consists of 22 countries that are members of the Arab League. These are Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates (UAE), and Yemen. Adding Cyprus, Iran, Israel,

and Turkey will constitute the MENA region.

Selecting the proper search terms for these 26 countries requires a systematic approach for building a search strategy. A medical and health librarian was consulted to set this search strategy. MeSH and keyword searching was initially conducted in Medline (OVID) and replicated in PubMed. Where applicable, MeSHes and keywords were grouped together in an "OR" Boolean operation. In addition, proper keyword searching techniques, like adjacency and truncation, were used for broadening the search and characterizing it with sensitivity. MeSHes and keywords for the Middle East, North Africa, Arab, and Mediterranean Region were added as well.

To highlight the utility of our search strategy in current times, we similarly extracted the proper search terms for COVID-19.

RESULTS

Based on the described methodology, we extracted and compiled an extensive and comprehensive collection of search terms pertaining to the countries of the Arab world, MENA region, and COVID-19. Table 1 and Table 2 present the search terms classified across Medline (OVID) and PubMed respectively. Any researcher interested in locating articles on a specific country can use the presented search terms of that country on the corresponding database, and add the subject-of-interest terms as desired (example in Table 3). In addition, any researcher conducting a regional review can use all the presented search terms on Medline (OVID) or PubMed using Boolean operator "OR". Terms specific to the topic of interest must be added to the search term using Boolean operator "AND" (example in Table 4). In order to verify our search strategy, we conducted a search for COVID-19 in the MENA region on Medline and PubMed using the terms a regular researcher might use versus the search terms that our paper proposed (Table 5). The number of results clearly illustrates the distinct and quantitative advances of following the strategy outlined in this paper. It is worth mentioning that a medical librarian should be consulted in order to retrieve a comprehensive set of search terms for the topic of interest. This would maximize the efficiency of the search and retrieval of relevant results.

When conducting systematic reviews on the

Table 1 Search terms for Medline (OVID)

Medline

Arab Countries

Algeria Algeria*
Bahrain Bahrain/ or Bahrain
Comoros Comoros/ or Comoros*

Djibouti / or (Djibouti* or Somaliland*)
Egypt / Egypt/ or (Egypt* or United Arab Republic*)

Iraq/ or Iraq*
Jordan Jordan/ or Jordan*

Kuwait/ or (kuwait* or kuweit*)

Lebanon Lebanon/ or (leban* or liban* or lubnan* or lobnan*)

Libya Libya/ or Libya*

Mauritania Mauritania/ or Mauritan*.mp.

Morocco/ or (Morocco* or Moroccan* or ifni*)

Oman/ or (Oman* or Muscat*)

Palestin* or Gaza or (West* adj2 Bank))

Somalia Somalia/ or Somal*
Sudan Sudan/ or Sudan*
Syria Syria/ or Syria*
Tunisia Tunisia/ or Tunis*

UAE United Arab Emirates/ or (Emirat* or UAE

or (Abu adj Dhabi) or (Trucial adj state*))

Yemen Yemen/ or (Yemen* or Aden or Sanaa)

Additional MENA Countries

Cyprus or (Cyprus or Cypriot*)

Iran Iran/ or Iran*
Israel Israel/ or Israel*

Turkey Turkey or (Turkey or Turkish)

Additional Terms

North Africa Africa, Northern/ or (North* adj2 Africa*) Middle East Middle East/ or (Middle adj2 East*).mp.

Mediterranean* Mediterranean*

Arabs/ or (Arab* or MENA or EMRO or orient or levant)

COVID-19

(("2019" adj (novel or new) adj corona*) or ("2019" adj (CoV or nCoV)) or (coronavirus adj (disease adj "2019")) or COVID19 or COVID-19 or ((Novel or New) adj Corona*) or SARS2 or SARS-CoV-2 or (SARS adj2 (coronavirus)) or ((sars or Coronavirus) adj "2") or nCov or 2019ncov)

adj2 = terms within two words of each other (any order)

^{/ =} indexing term

^{* =} a wildcard character used to substitute one or more characters in a string mp = multi-purpose searches in title, original title, abstract, subject heading

Table 2 Search terms for Medline (OVID)

PubMed

Arab Countries

Algeria Algeria[Mesh:noexp] or Algeria*[tw]
Bahrain Bahrain[Mesh:noexp] or Bahrain*[tw]
Comoros
Comoros[Mesh:noexp] or Comoros*[tw]

Djibouti Djibouti[Mesh:noexp] or Djibouti*[tw] or Somaliland*[tw]

Egypt [Mesh:noexp] or Egypt*[tw] or "United Arab Republic*"[tw]

IraqIraq[Mesh:noexp] or Iraq*[tw]JordanJordan[Mesh:noexp] or Jordan*[tw]KuwaitKuwait[Mesh:noexp] or Kuwait*[tw]

Lebanon [Mesh:noexp] or Lebanon[tw] or Lebanese[tw]

Libya [Mesh:noexp] or Libya*[tw]

Mauritania Mauritania [Mesh:noexp] or Mauritan*[tw]

Morocco Morocco [Mesh:noexp] or (Morocco*[tw]) or Moroccan*[tw] or ifni*[tw]

Oman [Mesh:noexp] or Oman*[tw] or Muscat*[tw]

Palestine Palestin*[tw] or (Gazza[tw] or Gaza[tw] or "West Bank"[tw])

Qatar Qatar[Mesh:noexp] or Qatar*[tw] or Katar[tw] or Quatar*[tw]

Saudi Arabia "Saudi Arabia" [Mesh:noexp] or Saud*[tw] or KSA[tw]

Somalia Somalia[Mesh:noexp] or Somal*[tw]
Sudan Sudan[Mesh:noexp] or Sudan*[tw]
Syria Syria[Mesh:noexp] or Syria*[tw]
Tunisia Tunisia[Mesh:noexp] or Tunis*[tw]

UAE "United Arab Emirates" [Mesh:noexp] or Emirat*[tw] or UAE[tw] or "Abu

Dahbi"[tw] or "Trucial state*"[tw]

Yemen Yemen[Mesh:noexp] or Yemen*[tw] or Aden[tw] or Sanaa[tw]

Additional MENA Countries

Cyprus [mesh:noexp] or Cyprus[tw] or Cypriot*[tw]

Iran Iran[Mesh:noexp] or Iran*[tw]
Israel Israel[Mesh:noexp] or Israel*[tw]

Turkey[Mesh:noexp] or Turkey[tw] or Turkish[tw]

Additional Terms

North Africa "africa, northern" [MeSH Terms] or "Northern Africa*" [tw]

Middle East "middle east"[MeSH Terms] or "Middle East*"[tw] or "Near East*"[tw]

Mediterranean Mediterranean*[tw]

Arab Arabs[Mesh:noexp] or Arab*[tw] or MENA[tw] or EMRO[tw] or levant[tw]

or orient[tw]

COVID-19

"2019-novel-corona*"[tw] or "2019-new-corona*"[tw] or "novel-corona*"[tw] or "new-corona*"[tw] or "2019-Cov"[tw] or "2019-nCov"[tw] or "nCov"[tw] or "coronavirus disease-2019"[tw] or "SARS2"[tw] or "SARS-2"[tw] or "SARS-CoV-2"[tw] or "sars corona*"[tw] or "Coronavirus-2"[tw] or "2019ncov"[tw] or "COVID-19"[tw] or "CO

^{*:} a wildcard character used to substitute one or more characters in a string tw: text word search in title or abstract fields

Table 3 Example: Search terms for COVID-19 in Lebanon

Medline

(Lebanon/ or (leban* or liban* or lubnan* or lobnan*)) AND (("2019" adj (novel or new) adj corona*) or ("2019" adj (CoV or nCoV)) or (coronavirus adj (disease adj "2019")) or COVID19 or COVID-19 or ((Novel or New) adj Corona*) or SARS2 or SARS-CoV-2 or (SARS adj2 (coronaviridae or coronavirus)) or ((sars or Coronavirus) adj "2") or nCov or 2019ncov)

PubMed

(Lebanon[Mesh:noexp] or Lebanon[tw] or Lebanese[tw]) AND ("2019-novel-corona*"[tw] or "2019-new-corona*"[tw] or "novel-corona*"[tw] or "2019-Cov"[tw] or "2019-nCov"[tw] or "nCov"[tw] or "nCov"[tw] or "coronavirus disease-2019"[tw] or "SARS2"[tw] or "SARS-2"[tw] or "SARS-CoV-2"[tw] or "sars corona*"[tw] or "Covinavirus-2"[tw] or "2019ncov"[tw] or "COVID-19"[tw] or "COVID19"[tw])

/: indexing term

*: a wildcard character used to substitute one or more characters in a string mp: multi-purpose searches in title, original title, abstract, subject heading

adj2: terms within two words of each other (any order)

tw: text word search in title or abstract fields

regions, it is advisable to use more databases such as Embase, Cochrane Library, Scopus, Web of Science, Global Health Library (GHL), Index Medicus for the Eastern Mediterranean Region (IMEMR), and African Index Medicus (AIM). It is also advisable to search the grey literature utilizing databases such as Google Scholar, ProQuest, and Open Grey.

DISCUSSION

Research practices have recently shifted towards making use of published literature to suggest directions for new relevant and impactful research.¹⁴ Additionally, the daily increase in the global number of discoveries has made it hard for healthcare professionals in particular to remain upto-date. 15 Also, the emergence of the COVID-19 pandemic has created a massive expansion and accelerated pace in the number of articles being published after rapid peer-review.¹⁶ All this has led to an unprecedented increase in the production of reviews, with a 500-fold increase in the number of systematic reviews performed globally during the past decade.¹⁷ According to the 2010 estimate, 11 systematic reviews are being published per day.¹⁸ Notably, "researchers conducting systematic reviews use explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making." In addition to that, statistical methods can be used to further examine and summarize the findings resulting in a meta-analysis.19

Given the importance of reviews and systematic reviews in providing evidence and a comprehensive view on the current situation of any specific topic²⁰, it is imperative that researchers located in the MENA region and the Arab world aim more at producing this type of research to reflect the reality of the region in the fields of health and medicine.

Initiating regional reviews and literature searches using our proposed strategy will provide quality evidence useful in answering a specific question, guiding the development of practice guidelines, and identifying research gaps.

CONCLUSIONS

We provided a reliable set of search terms that directly targets every researcher aiming to perform literature searches/reviews on the MENA region or the Arab world, whether COVID-19 related or not, while saving precious time developing a search strategy from scratch. Employing the search terms presented in this work as part of the search strategy of any literature search and particularly the search strategy of systematic and scoping reviews will provide a thorough, reliable, and representative coverage of all publications in the literature pertaining to the MENA region and/or the Arab world. This practice will facilitate the retrieval of the appropriate publications, thus enabling generation of high quality reviews, providing the needed evidence for decision making, as well as maximizing the researchers' impact in the scientific community.

Table 4 Example: search terms for COVID-19 in the MENA region

Medline

(Algeria/ or Algeria* OR Bahrain/ or Bahrain OR Comoros/ or Comoros* OR Djibouti/ or (Djibouti* or Somaliland*) OR Egypt/ or (Egypt* or United Arab Republic*) OR Iraq/ or Iraq* OR Jordan/ or Jordan* OR Kuwait/ or (kuwait* or kuweit*) OR Lebanon/ or (leban* or liban* or lubnan* or lobnan*) OR Libya/ or Libya* OR Mauritania/ or Mauritan*.mp. OR Morocco/ or (Morocco* or Moroccan* or ifni*) OR Oman/ or (Oman* or Muscat*) OR (Palestin* or Gaza or (West* adj2 Bank)) OR Qatar/ or (Qatar* or Katar*) OR Saudi Arabia/ or (Saud* or KSA) OR Somalia/ or Somal* OR Sudan/ or Sudan* OR Syria/ or Syria* OR Tunisia/ or Tunis* OR United Arab Emirates/ or (Emirat* or UAE or (Abu adj Dhabi) or (Trucial adj state*)) OR Yemen/ or (Yemen* or Aden or Sanaa) OR Cyprus/ or (Cyprus or Cypriot*) OR Iran/ or Iran* OR Israel/ or Israel* OR Turkey/ or (Turkey or Turkish) OR Africa, Northern/ or (North* adj2 Africa*) OR Middle East/ or (Middle adj2 East*).mp. OR Mediterranean* OR Arabs/ or (Arab* or MENA or EMRO or orient or levant)) AND ((("2019" adj (novel or new) adj corona*) or ("2019" adj (CoV or nCoV)) or (coronavirus adj (disease adj "2019")) or COVID-19 or ((Novel or New) adj Corona*) or SARS2 or SARS-CoV-2 or (SARS adj2 (coronaviridae or coronavirus)) or ((sars or Coronavirus) adj "2") or nCov or 2019ncov))

PubMed

(Algeria [Mesh:noexp] or Algeria [tw] OR Bahrain [Mesh:noexp] or Bahrain [tw] OR Comoros [Mesh:noexp] or Comoros*[tw] OR Djibouti[Mesh:noexp] or Djibouti*[tw] or Somaliland*[tw] OR Egypt[Mesh:noexp] or Egypt*[tw] or "United Arab Republic*"[tw] OR Iraq[Mesh:noexp] or Iraq*[tw] OR Jordan[Mesh:noexp] or Jordan*[tw] OR Kuwait[Mesh:noexp] or Kuwait*[tw] OR Lebanon[Mesh:noexp] or Lebanon[tw] or Lebanese[tw] OR Libya[Mesh:noexp] or Libya*[tw] OR Mauritania[Mesh:noexp] or Mauritan*[tw] OR Morocco[Mesh:noexp] or (Morocco*[tw]) or Moroccan*[tw] or ifni*[tw] OR Oman[Mesh:noexp] or Oman*[tw] or Muscat*[tw] OR Palestin*[tw] or (Gazza[tw] or Gaza[tw] or "West Bank"[tw]) OR Qatar[Mesh:noexp] or Qatar*[tw] or Katar[tw] or Quatar*[tw] OR "Saudi Arabia"[Mesh:noexp] or Saud*[tw] or KSA[tw] OR Somalia[Mesh:noexp] or Somal*[tw] OR Sudan[Mesh:noexp] or Sudan*[tw] OR Syria[Mesh:noexp] or Syria*[tw] OR Tunisia[Mesh:noexp] or Tunis*[tw] OR "United Arab Emirates" [Mesh:noexp] or Emirat*[tw] or UAE[tw] or "Abu Dahbi" [tw] or "Trucial state*"[tw] OR Yemen[Mesh:noexp] or Yemen*[tw] or Aden[tw] or Sanaa[tw] OR Cyprus[mesh:noexp] or Cyprus[tw] or Cypriot*[tw] OR Iran[Mesh:noexp] or Iran*[tw] OR Israel[Mesh:noexp] or Israel*[tw] OR Turkey[Mesh:noexp] or Turkey[tw] or Turkish[tw] OR "africa, northern"[MeSH Terms] or "Northern Africa*"[tw] OR "middle east" [MeSH Terms] or "Middle East*" [tw] or "Near East*" [tw] OR Mediterranean* [tw] OR Arabs[Mesh:noexp] or Arab*[tw] or MENA[tw] or EMRO[tw] or levant[tw] or orient[tw]) AND ("2019-novelcorona*"[tw] or "2019-new-corona*"[tw] or "novel-corona*"[tw] or "new-corona*"[tw] or "2019-Cov"[tw] or "2019-nCov"[tw] or "nCov"[tw] or "coronavirus disease-2019"[tw] or "SARS2"[tw] or "SARS-2"[tw] or "SARS-CoV-2"[tw] or "sars corona*"[tw] or "Coronavirus-2"[tw] or "2019ncov"[tw] or "COVID-19"[tw] or "COVID19"[tw])

Table 5 Comparison between a regular search and our proposed terms on Medline and PubMed

| | | Results on Medline | Results on PubMed | Remarks |
|-----------------------------|--|-----------------------|-------------------|---|
| COVID-19 in the MENA Region | Regular Terms (COVID-19 and MENA Region) | 16 | 63 | When using the regular search for a large geographical region, researchers tend to miss 99% of articles available in the literature |
| | Using the Paper Search Term | 6,764 | 10,631 | |

^{* =} a wildcard character used to substitute one or more characters in a string mp = multi-purpose searches in title, original title, abstract, subject heading adj2 = terms within two words of each other (any order) tw = text word search in title or abstract fields

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