

RESEARCH ARTICLE

Efficient searching for NICE public health guidelines: Would using fewer sources still find the evidence?

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Abstract

Systematic searches are integral to identifying the evidence that is used in National Institute for Health and Care Excellence (NICE) public health guidelines (PHGs). This study analyses the sources, including bibliographic databases and other techniques, required for PHGs. The aims were to analyse the sources used to identify the publications included in NICE PHGs; and to assess whether fewer sources could have been searched to retrieve these publications. Data showing how the included publications had been identified was collated using search summary tables. Three scenarios were created to test various combinations of sources to determine whether fewer sources could have been used. The sample included 29 evidence reviews, compiled using 13 searches, to support 10 PHG topics. Across the PHGs, 23 databases and six other techniques retrieved included publications. A mean reduction in total results of 6.5% could have been made if the minimum set of sources plus Cochrane Library, Embase, and MEDLINE were searched. On average, Cochrane Library, Embase, and MEDLINE contributed 76.8% of the included publications, with other databases adding 11% and other techniques 12.2%. None of the searches had a minimum set that was comprised entirely of databases. There was not a core set of sources for PHGs. A range of databases and techniques, covering a multi-disciplinary evidence base, was required to identify all included publications. It would be possible to reduce the number of sources searched and make some gains in productivity. It is important to create a tailored set of sources to do an efficient search.

KEYWORDS

bibliographic database searching, citation searching, information retrieval, literature searching, public health guidance, website searching

Highlights**What is already known**

- NICE public health guidelines (PHGs) are supported by systematic searches of the evidence but there are no instructions on which sources to use.

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What is new

- Sources had, on the whole, been well chosen by NICE information specialists to make the searches efficient.
- NICE could have reduced the number of sources searched and made gains in productivity equivalent to about a day per PHG.
- The Cochrane Library, Embase, and MEDLINE are important but not sufficient sources to support PHGs.
- Tailored lists of additional databases and other techniques were required to find all the included publications for the PHGs.

Potential impact

- It is not possible to define a core list of sources and searches have to be planned carefully to cover a multi-disciplinary evidence base without retrieving an unmanageable volume of results.
- It is important to include topic-specific databases and other search techniques (such as reference checking, citation searching and website searching) to support PHGs efficiently.

1 | BACKGROUND

1.1 | NICE public health guidelines

Systematic searches for published studies and unpublished data are an integral part of the process for developing recommendations in evidence-based guidelines. The National Institute for Health and Care Excellence (NICE) produces guidelines in England on promoting healthy living and preventing ill health. NICE public health guidelines (PHGs) cover a wide range of topics on health improvement, health protection, and improving services. These public health recommendations are based on the best available evidence identified and analysed through the rigorous and transparent methods set out in the NICE methods manual.¹ The manual states that searches should include a range of bibliographic databases, websites and other sources depending on the subject of the review question and the type of evidence sought.^{1(sec5.3)} This study examines the mix of sources required to identify the evidence for PHGs.

The NICE manual lists potentially useful sources but it does not provide instructions on when to use them. The manual allows information specialists, in consultation with review teams, to tailor the sources when writing the search protocol. The manual observes that, although there has to be ‘adequate coverage of the relevant literature’, sources should only be searched if they are ‘likely to yield relevant results’.^{1(sec5.3)} There are significant costs to NICE of searching a wide range of sources, including the costs of database access and administration. The more sources searched, the more staff time required to plan and run searches, download the results and remove the duplicates.

There would also be an increase in the resources required to screen the results, such as the time spent resolving disagreements and the cost of ordering more full-text papers.² It is important to select the most efficient set of sources possible.

NICE has previously analysed the sources required to find the evidence for PHGs on obesity, spatial planning, and tuberculosis.³ This pilot study suggested that it was important to search a range of sources tailored to the review question, in order to cover a multi-disciplinary evidence base.³ The pilot was unable to progress to a full study, as the data required had not been collected at the time and it could not be generated retrospectively. NICE started to retain search data from that point and the current paper analyses these records.

1.2 | Searching for public health evidence

Public health is defined by the Faculty of Public Health (FPH) in the UK as ‘promoting and protecting health and well-being, preventing ill health and prolonging life through the organised efforts of society’.⁴ Reviews of public health interventions, in comparison to clinical questions, can require a ‘broader more epistemologically and methodologically diverse evidence base’, as they are concerned with populations or communities, rather than individuals.^{5(p1059)} This means that the search must contend with ‘multiple levels of analysis and operation’ to understand complex relationships between interventions and outcomes.^{5(p1059)} A systematic review on a public health topic may need to configure the evidence into new

concepts, models or theories, rather than just aggregate the data from clinical trials.⁶ This, in turn, may entail an iterative search that is developed through an ongoing process, instead of being planned at the beginning. This approach requires the searcher to pick ‘pieces of information a bit at a time’ through a series of actions.^{7(p583)} The search results are retrieved and processed, the remaining gaps in the evidence are identified, and then the next steps are planned.

The NICE manual warns against retrieving an unmanageable volume of results, even though it requires adequate coverage of the best available evidence.^{1(sec5.1)} This can be particularly challenging in public health topics that are difficult to define at the outset, require a range of terminology and must draw on multi-disciplinary sources.⁸ Similarly, authors of social, behavioural, and educational science reviews for the Campbell Collaboration are advised that searches must be ‘thorough’ and ‘identify as many relevant studies as possible’ while being done ‘within resource limits’.^{9(sec2.1.1)} The potential demand for resources is clear from the standards for conducting Cochrane reviews of health interventions, where it is mandatory to search the Central Register of Controlled Trials (CENTRAL), Embase, and MEDLINE, as well as trials registers and the reference lists of relevant studies and reviews. It is also highly desirable for Cochrane authors to search national, regional or subject-specific databases, contact relevant individuals or organisations, and undertake additional work to identify reports, dissertations and other grey literature.^{10(secs24–31)}

The number of databases searched in systematic reviews increased between 1994 and 2014,¹¹ which might be related to the need to search a range of sources. It has been estimated that PubMed, one of the largest biomedical databases, may only index about three quarters of the primary studies included in systematic reviews on preventing obesity.¹² Limiting the number of sources has been found to affect the conclusions and certainty of the evidence in reviews,^{13,14} particularly in public health.^{15–17}

It is difficult to create a definitive list of sources, as the topic of the review and type of evidence required will inform decisions on where to search.^{18–20}

It is important to search beyond databases, as other search techniques have been shown to increase the likelihood of finding more relevant studies.^{21–23} The NICE pilot study found that non-database techniques contributed between 5% and 42% of the included publications in the three reviews analysed.³ Citation searching was found to be an efficient method in a different NICE PHG that used minimal database searching.²⁴ One study of a public health review found that the key search techniques included citation searching, website searching and contacting experts, as well as focused database strategies.²⁵ Cochrane reviews have also successfully used website searching to find

additional relevant studies.²⁶ Other search techniques that might be useful include contacting study authors, handsearching and searching trial registers.²⁷ The importance of these techniques suggests that they might be more helpful in public health or other configurative reviews, where the key concepts are uncertain and cannot be expressed in well-defined subject headings.²⁸

1.3 | Modelling efficient searches

Booth recommended in 2010 that searchers should collect data on how often sources contribute to reviews.^{29(p433)} The NICE pilot study was an attempt to apply this to public health.³ More recently, a template has been developed to facilitate data collection through search summary tables.³⁰

There has been some work to understand whether searches could be made more efficient. A study of optimal sets in musculoskeletal diseases recommends combining three databases with two other techniques.³¹ An investigation into a range of health domains found that Embase, MEDLINE, Web of Science Core Collection and Google Scholar perform well, with specialised databases also required in some topics.³² Further work has been done to establish which database combinations have the highest likelihood of contributing to reviews on diabetes,³³ while a core set of databases and reference checking has been recommended for reviews on dementia care.³⁴ There has also been an attempt to define an optimal set for overviews of reviews.³⁵

A literature review by the authors of the current paper identified a lack of research into approaches to public health searching, suggesting that further work modelling different scenarios was needed.⁸ This study takes up the challenge and shows the contribution of the sources that were used and then provides scenarios modelling whether a more efficient selection could have been used in a sample of NICE PHGs.

2 | AIMS AND OBJECTIVES

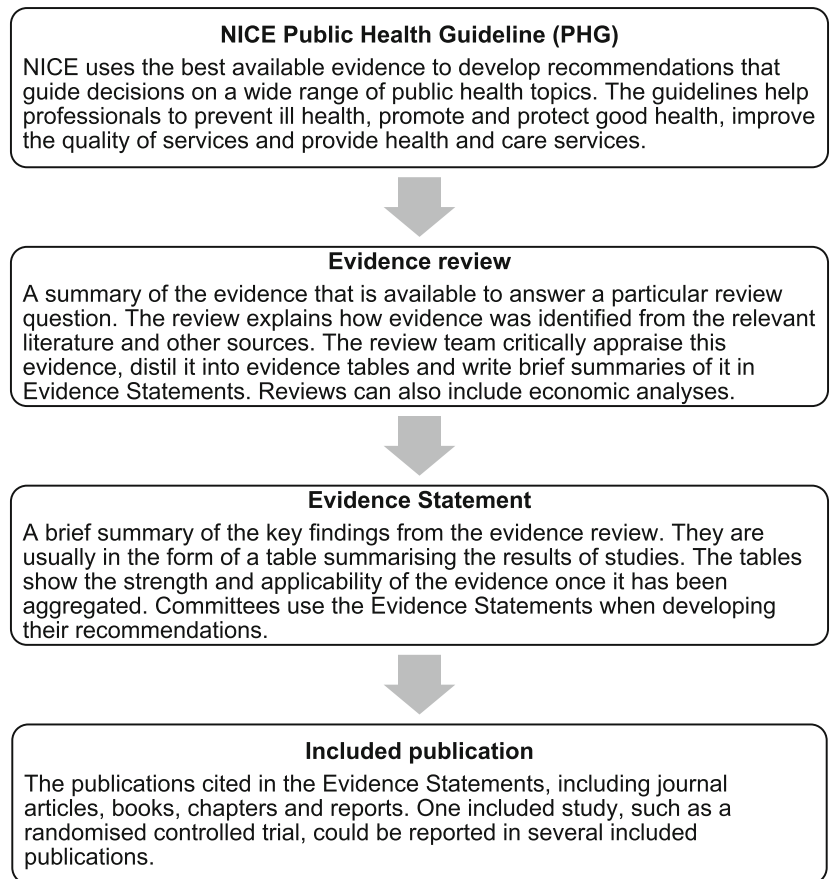
The aims were to:

- analyse the sources used to identify the publications included in NICE PHG Evidence Statements; and
- assess whether fewer sources could have been searched to retrieve these publications.

The objectives were to:

- identify the sources for each publication included in the Evidence Statements from a sample of PHG evidence reviews;

FIGURE 1 Definitions of NICE terminology used in the study



- assess a range of scenarios modelling the effects of searching fewer sources;
- establish whether any sources could have been removed from the searches without missing any publications included in the PHGs; and
- consider the implications for source selection in future PHGs.

3 | METHODS

3.1 | Collecting data from the sample

The NICE methods manual, introduced in 2014 and updated several times since, covers NICE guidelines on clinical, public health and social care topics.¹ This study uses the FPH definition of public health⁴ to be consistent with the NICE pilot study.³

PHG recommendations are based on an evidence review that identifies, critically appraises and summarises the evidence answering the review question. The evidence reviews contain Evidence Statements, which tabulate the results of studies to show the strength and applicability of the aggregated evidence. An included publication is one cited in an Evidence Statement. Background, epidemiological or

methodological references in an evidence review are not considered included publications. A study, such as a clinical trial, could be reported in several places but the unit of analysis in this study is the included publication, as no attempt was made to establish whether there were multiple reports of the same study in the Evidence Statements. Figure 1 sets out the definitions of NICE terminology used in this study.

The criteria for selecting the study sample were:

- NICE Guidelines meeting the FPH definition of public health; and
- Evidence reviews conducted by NICE information specialists since the methods manual¹ was introduced in 2014; and
- Evidence reviews that had been completed and had a finalised list of included publications from the Evidence Statements.

The data on the sources used to identify each included publication in the sample was extracted using a search summary table,³⁰ as previously described in a conference report.³⁶ A source is any database or other resource (including websites, emails, directories, registries or pre-print servers) 'searched or browsed as part of the search'.³⁷(Glossary)

‘Search’ is the ‘overall term for the entire information retrieval process’ in an evidence review.^{37(Glossary)}

To complete the search summary table, the list of included publications, the sources used for the search and the full search results (including duplicates) were required. Once completed, the table was used to cross check each included publication against the sources searched. A unique included publication is one retrieved by a single source and no other sources used in that search.

A search summary table was completed for each evidence review in the sample. The included publications were listed in the final versions of the evidence reviews. The lists of sources were obtained from the review protocols and related search history documents. Any discrepancies between the review protocol and the methods reported in the evidence review were discussed with the information specialist who conducted the search. Files containing the full results from each source, including the duplicates, were saved in EndNote (v7.3). Each record had been tagged in EndNote at the time of the search with the name of its source. Additional information was collected from the contemporary search records, such as the results of website searches.

3.2 | Modelling the scenarios

Three scenarios were created to test the most efficient sets of sources that could have been used retrieve the included publications. Duplicates were removed from the included publications, where they had been cited in more than one evidence review for the same PHG, before creating the scenarios. ‘Efficient’ meant the fewest sources that could be combined to find the largest number of included publications.^{38(p3)}

The three scenarios present different ways in which some of the sources that were searched could be removed without any of the included publications being missed. The scenarios were based on the number of searches done for the PHGs in the sample, rather than the number of evidence reviews. The figures in Appendix A were used to calculate each scenario. All three scenarios were calculated using the total number of results from each source. Duplicates were not removed from the number of results used in these scenarios as the time and resources were not available. The scenarios are therefore estimates of the impact, as the number of results to be screened has not been calculated. The baseline comparison for the scenarios is the search that was originally completed for the PHG. Figure 2 illustrates how the scenarios were constructed.

Scenario 1 analyses the effect of excluding sources that did not retrieve any included publications. This is the

simplest method of showing the effect of searching fewer sources without missing any of the included publications. The total number of results from each source that did not contribute any included publications was subtracted from the total number of results for that search.

Scenario 2 examines the effect of excluding all sources beyond the minimum set required to retrieve all the included publications. This shows the most efficient combination of sources that would not miss any included publications. The sources contributing unique included publications always form part of the minimum set. Each included publication only needs to be found once. Therefore, some sources could be removed if they only found included publications that had already been retrieved from another source. In order to identify which other sources to include in the minimum set, those retrieving the same included publication were reviewed and the one with the lowest number of results was chosen. Note that MEDLINE and MEDLINE-in-Process (MIP) were never separated in the scenarios as it was unlikely that one would be searched without the other in practice. The number of results in the minimum set in Scenario 2 was calculated by adding the number of results from:

- the sources contributing unique included publications.
- the source with the lowest volume, where an included publication had been retrieved by more than one source.

Scenario 3 tests the effect of always searching Cochrane Library, Embase and MEDLINE (CLEM) in PHGs to reflect current searching practice.^{1,10} This builds on a study assessing the cumulative contribution of CENTRAL, Embase, and MEDLINE,³¹ as these are the core databases specified for Cochrane reviews of interventions.^{10(secC24)} It was more appropriate to use the whole Cochrane Library, rather than CENTRAL, in this scenario, as PHGs are not just concerned with evidence from randomised controlled trials.^{1(sec4.4)} In addition, MIP was included in this analysis. Therefore, in Scenario 3, CLEM refers to searching:

- Cochrane Database of Systematic Reviews (CDSR).
- Cochrane CENTRAL.
- Cochrane Database of Abstracts of Reviews of Effectiveness (DARE).
- Cochrane Health Technology Assessment (HTA).
- Cochrane NHS Economic Evaluation Database (NHS EED).
- Embase.
- MEDLINE.
- MIP.

The shading indicates that the total number of results from each source in this category was used to calculate the volume of results that would have been downloaded in this scenario.

Baseline: sources searched for the NICE PHGs

	CLEM	Other databases	Other techniques
Source contributing a unique included publication			
Source with the lowest volume when an included publication was retrieved by more than one source			
Other source retrieving an included publication that did not have the lowest volume			
Source only retrieving excluded publications			

Scenario 1: excluding sources that did not retrieve any included publications

	CLEM	Other databases	Other techniques
Source contributing a unique included publication			
Source with the lowest volume when an included publication was retrieved by more than one source			
Other source retrieving an included publication that did not have the lowest volume			
Source only retrieving excluded publications			

Scenario 2: the minimum set of sources required

	CLEM	Other databases	Other techniques
Source contributing a unique included publication			
Source with the lowest volume when an included publication was retrieved by more than one source			
Other source retrieving an included publication that did not have the lowest volume			
Source only retrieving excluded publications			

Scenario 3: the minimum set of sources required plus CLEM

	CLEM	Other databases	Other techniques
Source contributing a unique included publication			
Source with the lowest volume when an included publication was retrieved by more than one source			
Other source retrieving an included publication that did not have the lowest volume			
Source only retrieving excluded publications			

FIGURE 2 Visualisation showing how the scenarios were calculated

Scenario 3 assesses the effect of searching the minimum set required plus CLEM before excluding the other sources that were searched. In Scenario 3, the number of results in CLEM plus the minimum set required to find all included publications was calculated by adding the number of results from:

- The components of CLEM used in that search.
- All other sources that contributed unique included publications.
- The source with the lowest volume, where an included publication had been retrieved by more than one source, but not by one of the previous steps in this scenario.

4 | RESULTS

At the time of data collection in June 2018, there were 10 PHG topics meeting the criteria for the sample. There were 29 evidence reviews, compiled using 13 searches, associated with these 10 PHG topics (see Table 1). The four evidence reviews on Flu Vaccination (FLV) each had a separate search, whereas the other nine PHGs used a single search to cover all reviews. Data was

collated for Workplace Health Long Term Conditions (WLTC) as it met the criteria of having a finalised list of included publications, although the PHG was subsequently discontinued.

4.1 | Results from the evidence reviews

Table 1 shows that the number of databases used ranged from 11 in Stop Smoking Interventions and Services (SSIS) to 16 in the Physical Activity and the Environment Update (PAEU). All searches incorporated at least two other search techniques. The number of results after removing duplicates ranged from 695 for FLV1 to 20,258 for Suicide Prevention (SUP).

Across the evidence reviews, 28 different databases were used (see Table 2). The databases covered multiple disciplines, such as general medical sources (e.g., MEDLINE and Embase), nursing (e.g., CINAHL), health management (e.g., HMIC), psychology (PsycINFO), general social science (e.g., ASSIA), economics (e.g., EconLit) and a range of topic-specialised sources, including education (ERIC) and environment (Greenfile). Table 2 shows that seven of the databases were used in all 13 searches. Full details are provided in the appendices: Appendix A shows the number of

TABLE 1 (Continued)

NICE PHG topic	Evidence review	Type of evidence review	Search approach	No. of databases searched	No. of other techniques used	No. of results before duplicates removed	No. of results after duplicates removed	No. of included publications
Suicide prevention (NG105) ⁶²	SUP1 ⁶³	Effectiveness and Cost effectiveness	Single search covering 9 reviews	15	2	38,693	20,258	11
	SUP2 ⁶⁴	Effectiveness and Cost effectiveness						6
	SUP3 ⁶⁵	Effectiveness and Cost effectiveness						3
	SUP4 ⁶⁶	Effectiveness and Cost effectiveness						41
	SUP5 ⁶⁷	Effectiveness and Cost effectiveness						16
	SUP6 ⁶⁸	Effectiveness and Cost effectiveness						23
	SUP7 ⁶⁹	Effectiveness and Cost effectiveness						9
	SUP8 ⁷⁰	Effectiveness and Cost effectiveness						11
	SUP9 ⁷¹	Effectiveness and Cost effectiveness						4
Transport related air pollution (NG70) ⁷²	TRAP1 ⁷³	Effectiveness and Cost effectiveness	Single search covering 3 reviews	13	3	17,134	1316	29
	TRAP2 ⁷⁴	Effectiveness and Cost effectiveness						23
	TRAP3 ⁷⁵	Effectiveness and Cost effectiveness						9
Workplace health long term conditions (PHG discontinued)	WLTC ⁷⁶	Effectiveness	Single search covering 1 PHG	15	2	15,177	11,950	42

TABLE 2 Number of searches in which the sources retrieved included publications and unique included publications

Sources		No. of searches in which the source retrieved an included publication Number (percentage of searches used)	No. of searches in which the source retrieved a unique included publication Number (percentage of searches used)	No. of searches in which the source was used
Databases	Cochrane CDSR	1 (8%)	1 (8%)	13
	Cochrane CENTRAL	8 (62%)	2 (15%)	13
	Cochrane DARE	2 (15%)	0	13
	Embase	13 (100%)	11 (85%)	13
	MEDLINE	13 (100%)	7 (54%)	13
	MIP	7 (54%)	5 (38%)	13
	SPP	3 (23%)	1 (8%)	13
	Cochrane NHS EED	4 (40%)	0	10
	EconLit	2 (20%)	1 (10%)	10
	HMIC	7 (70%)	2 (20%)	10
	PsycINFO	9 (100%)	7 (78%)	9
	Cochrane HTA	0	0	7
	ASSIA	3 (60%)	0	5
	BNI	2 (40%)	2 (40%)	5
	ERIC	2 (40%)	1 (20%)	5
	EPPI Trophi	2 (40%)	0	5
	EconPapers	1 (33%)	0	3
	EPPI Dopher	1 (33%)	0	3
	Sociological Abstracts	0	0	3
	EPPI Bibliomap	1 (50%)	1 (50%)	2
	Greenfile	2 (100%)	2 (100%)	2
	Transport	2 (100%)	2 (100%)	2
	Social Care Online	1 (50%)	0	2
AMED	1 (100%)	1 (100%)	1	
CINAHL	1 (100%)	1 (100%)	1	
Community Pharmacy Future	0	0	1	
HealthEvidence	0	0	1	
Social Welfare	0	0	1	
Techniques	Website searching	8 (67%)	7 (58%)	12
	Contact experts	3 (50%)	3 (50%)	6
	Reference checking	5 (83%)	4 (67%)	6
	Analyst actions	5 (100%)	5 (100%)	5
	Call for Evidence	2 (50%)	1 (25%)	4
	Citation searching	4 (100%)	4 (100%)	4

results from each source; Appendix B the included publications; Appendix C the unique included publications; and Appendix D lists the abbreviations used for the PHGs and sources.

There were 23 databases that retrieved an included publication in at least one search and 16 of these retrieved unique included publications (Table 2). MEDLINE contributed included publications to all

TABLE 3 Scenario 1: the effect of excluding sources that did not retrieve any included publications

Search	Total results	Results from sources contributing included publications	Results from sources not contributing any included publications	Percentage of total results required to retrieve all included publications (%)	Potential reduction in total results (%)	Sources contributing included publications	Sources not contributing included publications
CP	18,282	18,166	116	99.37	0.63	ASSIA, CINAHL, CENTRAL, Embase, MEDLINE, MIP, PsycINFO, Analyst, Citation, Web	CDSR, DARE, Comm Pharm, EconLit, EconPapers, SPP, Call
DMP	25,998	25,346	652	97.49	2.51	CENTRAL, Embase, MEDLINE, MIP, PsycINFO, SCO, SPP, Citation, Ref Check	CDSR, DARE, HTA, Dopher, Trophi, HealthEv, Web
FLV1	1668	1436	232	86.09	13.91	Embase, MEDLINE, MIP, Contact	BNI, CDSR, CENTRAL, DARE, HTA, NHS EED, EconLit, HMIC, SPP, Web
FLV2	14,874	14,485	389	97.38	2.62	CENTRAL, Embase, ERIC, HMIC, MEDLINE, MIP, PsycINFO, Web	BNI, CDSR, DARE, HTA, NHS EED, EconLit, Soc Abs, SPP, Call
FLV3	13,523	13,278	245	98.19	1.81	BNI, CENTRAL, NHS EED, Embase, HMIC, MEDLINE, MIP, PsycINFO, Analyst, Contact	CDSR, DARE, HTA, EconLit, ERIC, Soc Abs, SPP, Web
FLV4	10,393	10,148	245	97.64	2.36	BNI, CENTRAL, DARE, Embase, HMIC, MEDLINE, MIP, PsycINFO, Web	CDSR, HTA, NHS EED, EconLit, ERIC, Soc Abs, SPP, Contact
HIV	28,231	27,982	249	99.12	0.88	CENTRAL, NHS EED, Embase, HMIC, MEDLINE, MIP, PsycINFO, Web	CDSR, DARE, EconLit, Bibliomap, SPP, Call
PAEU	20,711	19,059	1652	92.02	7.98	ASSIA, NHS EED, EconPapers, Embase, Trophi, Greenfile, HMIC, MEDLINE, MIP, Transport, Analyst, Contact, Ref Check, Web	CDSR, CENTRAL, DARE, HTA, EconLit, SPP

(Continues)

TABLE 3 (Continued)

Search	Total results	Results from sources contributing included publications	Results from sources not contributing any included publications	Percentage of total results required to retrieve all included publications (%)	Potential reduction in total results (%)	Sources contributing included publications	Sources not contributing included publications
SHC	7208	6621	587	91.86	8.14	CENTRAL, NHS EED, Embase, HMIC, MEDLINE, MIP, PsycINFO, Ref Check, Web	BNI, CDSR, DARE, EconLit, Trophi, ERIC, SPP, Contact
SSIS	8234	7435	799	90.30	9.70	CDSR, DARE, Embase, Dopher, MEDLINE, MIP, Analyst, Citation	ASSIA, CENTRAL, NHS EED, HMIC, SPP, Ref Check, Web
SUP	38,693	38,203	490	98.73	1.27	ASSIA, CENTRAL, EconLit, Embase, Trophi, ERIC, MEDLINE, MIP, PsycINFO, SPP, Analyst, Citation	CDSR, DARE, HTA, NHS EED, EconPapers, Web
TRAP	17,134	17,005	129	99.25	0.75	EconLit, Embase, Bibliomap, Greenfile, MEDLINE, MIP, SPP, Transport, Call, Ref Check, Web	CDSR, CENTRAL, DARE, NHS EED, HMIC
WLTC	15,177	14,464	713	95.30	4.70	AMED, Embase, HMIC, MEDLINE, MIP, PsycINFO, Call, Ref Check	ASSIA, CDSR, CENTRAL, DARE, Dopher, Trophi, SCO, Soc Welfare, SPP
Mean	16,933	16,433	500	97.05	2.95		

TABLE 4 Scenario 2: the effect of searching only the minimum set of sources required to retrieve all included publications

Search	Total results	Results from sources in the minimum set	Results from sources not in the minimum set	Percentage of total results in the minimum set required (%)	Potential reduction in total results (%)	Sources in the minimum set	Sources searched but not in the minimum set
CP	18,282	16,652	1630	91.08	8.92	CINAHL, CENTRAL, Embase, MEDLINE, MIP, Analyst, Citation, Web	ASSIA, CDSR, DARE, Comm Pharm, EconLit, EconPapers, PsycINFO, SPP, Call
DMP	25,998	15,695	10,303	60.37	39.63	Embase, PsycINFO, SCO, Citation, Ref Check	CDSR, CENTRAL, DARE, HTA, Dopher, Trophi, HealthEv, MEDLINE, MIP, SPP, Web
FLV1	1668	672	996	40.29	59.71	MEDLINE, MIP, Contact	BNI, CDSR, CENTRAL, DARE, HTA, NHS EED, EconLit, Embase, HMIC, SPP, Web
FLV2	14,874	13,264	1610	89.18	10.82	Embase, ERIC, MEDLINE, MIP, PsycINFO, Web	BNI, CDSR, CENTRAL, DARE, HTA, NHS EED, HMIC, EconLit, Soc Abs, SPP, Contact
FLV3	13,523	12,994	529	96.09	3.91	BNI, CENTRAL, Embase, MEDLINE, MIP, PsycINFO, Analyst, Contact	CDSR, DARE, NHS EED, HTA, EconLit, ERIC, HMIC, Soc Abs, SPP, Web
FLV4	10,393	9534	859	91.73	8.27	BNI, Embase, MEDLINE, MIP, PsycINFO, Web	CDSR, CENTRAL, DARE, HTA, NHS EED, HMIC, EconLit, ERIC, Soc Abs, SPP, Contact
HIV	28,231	27,752	479	98.30	1.70	CENTRAL, Embase, MEDLINE, MIP, Web	CDSR, DARE, NHS EED, EconLit, Bibliomap, HMIC, PsycINFO, SPP, Call
PAEU	20,711	17,110	3601	82.61	17.39	Embase, Greenfile, MEDLINE, MIP, Transport, Analyst, Contact, Web	ASSIA, CDSR, CENTRAL, DARE, HTA, NHS EED, EconLit, EconPapers, Trophi, HMIC, SPP, Ref Check
SHC	7208	2756	4452	38.24	61.76	Embase, HMIC, Ref Check, Web	BNI, CDSR, CENTRAL, DARE, NHS EED, EconLit, Trophi, ERIC, MEDLINE, MIP, PsycINFO, SPP, Contact
SSIS	8234	3367	4867	40.89	59.11	CDSR, Dopher, Analyst, Citation	ASSIA, CENTRAL, DARE, NHS EED, Embase, HMIC, MEDLINE, MIP, SPP, Ref Check, Web

(Continues)

TABLE 4 (Continued)

Search	Total results	Results from sources in the minimum set	Results from sources not in the minimum set	Percentage of total results in the minimum set required (%)	Potential reduction in total results (%)	Sources in the minimum set	Sources searched but not in the minimum set
SUP	38,693	35,963	2730	92.94	7.06	ASSIA, Embase, MEDLINE, MIP, PsycINFO, SPP, Analyst, Citation, Web	CDSR, CENTRAL, DARE, HTA, NHS EED, EconLit, EconPapers, Trophi, ERIC
TRAP	17,134	16,426	708	95.87	4.13	EconLit, Embase, Bibliomap, Greenfile, MEDLINE, MIP, Transport, Ref Check, Web	CDSR, CENTRAL, DARE, NHS EED, HMIC, SPP, Call
WLTC	15,177	13,809	1368	90.99	9.01	AMED, Embase, MEDLINE, MIP, PsycINFO, Call, Ref Check	ASSIA, CDSR, CENTRAL, DARE, Dopher, Trophi, HMIC, SCO, Soc Welfare, SPP
Mean	16,933	14,307	2626	84.49	15.51		

13 searches, with seven of these having unique included publications. Embase also contributed to all 13 searches and provided unique included publications in 11 of these. Greenfile, Transport, AMED, and CINAHL contributed unique publications each time they were used (Table 2). Five databases did not retrieve any included publications.

Six other search techniques were used, in addition to databases, and they all contributed unique included publications (Table 2). Website searching was used in 12 searches and it contributed unique included publications in seven of them. Citation searching retrieved unique included publications all four times it was used. Reference checking contributed unique items in four of the six searches in which it was used. Analyst actions (steps taken by the review team after the main searches had been completed to ensure no relevant evidence was missed^{1(sec6.1)}) were required in five of the 13 searches.

4.2 | Results from the scenarios

The scenarios were based on the 13 searches that were done for the 10 PHG topics. Scenario 1 shows the effect of excluding sources that did not retrieve any included publications (Table 3). For example, in FLV1 1668 results were downloaded and 1436 (86%) of these came from Embase, MEDLINE, MIP and contact with experts, which all provided included publications. On the other hand, 232 results (14%) came from BNI, CDSR, CENTRAL, DARE, HTA, NHS EED, EconLit, HMIC, SPP and website searching, which could all be removed without any included publications being missed.

In Scenario 1, a mean reduction of 3% in the total number of results downloaded could have been achieved (Table 3). The highest reduction, in absolute numbers, was in PAEU, with a cut of 1652 from 20,711 to 19,059 results (8%). The highest percentage decrease was 14% in FLV1 (from 1668 to 1436 results). The lowest reduction (in both absolute and percentage terms) was in Community Pharmacies (CP), which could have cut 116 of 18,282 results (0.6%).

Scenario 2 establishes the minimum set of sources required for each search (Table 4). Across the 13 searches, the volume, including duplicates, could have been reduced by a mean of 15.5%, from 16,933 to 14,307 (see Table 4). This indicates that 84.5% of the results were required to avoid missing any of the included publications. The potential reductions ranged from 1.7% in the HIV Testing search (HIV) to 61.8% in Sexual Health Condom Distribution (SHC).

FLV1, with three, had the lowest number of sources in the minimum set (Table 4). SUP and Transport Related Air Pollution (TRAP) required the largest

TABLE 5 Scenario 3: the effect of searching the minimum set of sources required to retrieve all included publications plus CLEM

Search	Total results	Results from sources in the minimum set required plus CLEM	Results from sources not in the minimum set plus CLEM	Percentage of total results in the minimum set required plus CLEM (%)	Potential reduction in total results (%)	Sources in the minimum set required plus CLEM	Sources searched but not in the minimum set required plus CLEM
CP	18,282	16,660	1622	91.13	8.87	CLEM, CINAHL, Analyst, Citation, Web	ASSIA, Comm Pharm, EconLit, EconPapers, PsycINFO, SPP, Call
DMP	25,998	25,044	954	96.33	3.67	CLEM, PsycINFO, SCO, Citation, Ref Check	Dopher, Trophi, HealthEv, SPP, Web
FLV1	1668	1478	190	88.61	11.39	CLEM, Contact	BNI, EconLit, HMIC, SPP, Web
FLV2	14,874	14,316	558	96.25	3.75	CLEM, ERIC, PsycINFO, Web	BNI, EconLit, HMIC, Soc Abs, SPP, Contact
FLV3	13,523	13,034	489	96.38	3.62	CLEM, BNI, PsycINFO, Analyst, Contact	EconLit, ERIC, HMIC, Soc Abs, SPP, Web
FLV4	10,393	9732	661	93.64	6.36	CLEM, BNI, PsycINFO, Web	EconLit, ERIC, HMIC, Soc Abs, SPP, Contact
HIV	28,231	27,826	405	98.57	1.43	CLEM, PsycINFO, Web	EconLit, Bibliomap, HMIC, SPP, Call
PAEU	20,711	17,989	2722	86.86	13.14	CLEM, Greenfile, Transport, Analyst, Contact, Web	ASSIA, EconLit, EconPapers, Trophi, HMIC, SPP, Ref Check
SHC	7208	5588	1620	77.52	22.48	CLEM, HMIC, Ref Check, Web	BNI, EconLit, Trophi, ERIC, PsycINFO, SPP, Contact
SSIS	8234	7348	886	89.24	10.76	CLEM, Analyst, Citation	ASSIA, Dopher, HMIC, SPP, Ref Check, Web
SUP	38,693	36,504	2189	94.34	5.66	CLEM, ASSIA, PsycINFO, SPP, Analyst, Citation	EconLit, EconPapers, Trophi, ERIC, Web
TRAP	17,134	16,490	644	96.24	3.76	CLEM, EconLit, Bibliomap, Greenfile, Transport, Ref Check, Web	HMIC, SPP, Call
WLTC	15,177	13,862	1315	91.34	8.66	CLEM, AMED, PsycINFO, Call, Ref Check	ASSIA, Dopher, Trophi, HMIC, SCO, Soc Welfare, SPP
Mean	16,933	15,836	1097	93.52	6.48		

TABLE 6 The incremental value of searching other databases and other techniques in Scenario 3

Search	Total no. of de-duplicated included publications	Phase 1: Included publications retrieved from CLEM	Phase 2: Included publications retrieved from other databases	Phase 3: Included publications retrieved from other techniques
CP	50	40 (80%)	1 (2%)	9 (18%)
DMP	47	17 (36.17%)	9 (19.15%)	21 (44.68%)
FLV1	3	2 (66.67%)	0	1 (33.33%)
FLV2	21	16 (76.19%)	2 (9.52%)	3 (14.29%)
FLV3	33	26 (78.79%)	4 (12.12%)	3 (9.09%)
FLV4	39	35 (89.74%)	3 (7.69%)	1 (2.56%)
HIV	65	63 (96.92%)	1 (1.54%)	1 (1.54%)
PAEU	71	48 (67.61%)	13 (18.31%)	10 (14.08%)
SHC	22	19 (86.36%)	1 (4.55%)	2 (9.09%)
SSIS	17	14 (82.35%)	0	3 (17.65%)
SUP	110	88 (79.28%)	12 (10.81%)	11 (9.91%)
TRAP	61	41 (67.21%)	16 (26.23%)	4 (6.56%)
WLTC	42	38 (90.48%)	2 (4.76%)	2 (4.76%)
Mean	44.69	34.38 (76.80%)	4.92 (11.0%)	5.46 (12.2%)

number of sources, each having nine in the minimum set. Nine searches required both MEDLINE and Embase. There were three searches where either MEDLINE or Embase were required but not both. For the SSIS search, neither MEDLINE nor Embase were required. All 13 minimum sets contained other techniques and none comprised only databases. From the other techniques, website searching was in the minimum set the most times, finding included publications in eight searches.

In Scenario 3, the CLEM databases were always included to show the cuts that could be made with usual searching practice.^{1,10} For example, in Scenario 2 it would be possible to reduce the number of results in Drugs Misuse Prevention (DMP) by 40% from 25,998 to 15,695, as Embase, PsycINFO, Social Care Online, citation searching and reference checking retrieved the included publications. In Scenario 3, all CLEM components are required and so CDSR, CENTRAL, DARE, HTA MEDLINE, and MIP are restored to DMP. This results in a potential reduction of 4% from 25,998 to 25,044 results, as only Dopher, Trophi, Health Evidence, SPP and website searching can now be removed. This difference between Scenario 2 and Scenario 3 in DMP is largely explained by the fact that the 8390 MEDLINE and MIP results (Appendix A) contributed no unique included publications.

In Scenario 3, the total number of results could have been reduced by a mean of 6.5%, ranging from 1.4% in HIV Testing to 22.5% in SHC (Table 5). None of the 13 searches had a minimum set comprised of

CLEM alone. FLV1, which also needed contact with experts, was the only search that did not require any other databases beyond CLEM. In contrast, the other three FLV searches required various combinations of CLEM, BNI, ERIC, and PsycINFO, as well as other techniques.

Table 6 expands on Scenario 3 and shows the incremental value of adding more databases and techniques once CLEM has been searched. These figures show the value of adding other databases to CLEM and then using other techniques after the databases, they do not show the absolute contribution of the other databases and techniques. Searching CLEM first would find, on average, 76.8% of the included publications (Table 6). Searching other databases second in the sequence would add a further 11%. Taken together, 87.8% of included publications would be retrieved from database searching. Other search techniques would be required to identify the remaining 12.2% (Table 6).

5 | DISCUSSION

5.1 | Multi-disciplinary evidence base

The NICE methods manual states that sources should only be included if they are 'likely to yield relevant results' and the scenarios show that, on the whole, the sources were well chosen.^{1(sec5.3)} The searches were planned, conducted

and peer reviewed by NICE information specialists, suggesting that these processes had been worthwhile.

Restricting the searches to the minimum set in Scenario 2 would have saved about 16% of the volume downloaded, on average (see Table 4). This represents the maximum reduction that could have been made to still retrieve the included publications. There is no way of knowing in advance whether a source will retrieve included publications. Some potential savings are to be expected when performing this kind of retrospective analysis. Overall, there is no indication of long lists of sources being searched without them retrieving anything relevant.

The searches in this analysis were conducted prior to changes to the Cochrane Library, which will need to be reflected in future reviews. DARE, NHS EED and the HTA database were removed from the Cochrane Library platform in August 2018.⁷⁷ Cochrane CDSR contributed unique included publications to one and CENTRAL to two searches (Table 2) so these are likely to remain core sources, in line with current recommendations.^{1,10}

There is not a clear pattern to the minimum sets established in Scenario 2 (Table 4). For example, MEDLINE was an essential source in 10 searches but not in DMP, SHC or SSIS. Embase was needed in three FLV reviews but not in the fourth (FLV1). It is unlikely that the combination required in DMP (Embase, PsycINFO, Social Care Online, citation searching, and reference checking) would have been chosen at the outset. Scenario 2 could only be created retrospectively, once the included publications had been identified from the search results. Scenario 3, which includes CLEM to reflect current practice,^{1,10} shows more realistically the improvements in efficiency that might be achievable.

None of the searches in Scenario 2 had a minimum set that was comprised entirely of CLEM (Table 4). A PHG search that used just CLEM would, on average, miss about a quarter of the included publications (Table 6). The other databases in the minimum sets included CIN-AHL, Social Care Online, BNI, Greenfile, Transport, ASSIA and SPP, illustrating the value of the multi-disciplinary approach. A core list could not be created, as there were no databases beyond CLEM contributing to each search. Identifying specialised or new sources appropriate to the topic should be an important part of writing a search protocol.

Other search techniques in addition to databases were needed in all 13 searches in Scenario 2. Six other techniques contributed to the minimum sets (Table 4). The other techniques could not entirely replace database searching in these scenarios. The scenarios suggest that sufficient time and resources should be allowed to use other techniques effectively when planning a search. Other techniques need to be tested to ensure they are

used efficiently alongside databases.⁷⁸ This would involve ensuring they target evidence from other disciplines or in different formats (such as grey literature) to avoid retrieving duplicate content from databases.²⁴

5.2 | Efficiency savings

It would be possible to reduce the number of sources used and so cut the amount of time spent searching and screening the results. In Scenario 3 (Table 5), reflecting current search practice, an average of 1097 results, including duplicates, could have been saved. There would be time savings from having fewer files to manage, reducing the number of duplicates to remove and needing to report fewer search strategies.³⁷ There would be related savings in the number of full-text articles to order, discrepancies to resolve and other screening decisions to make.² The maximum saving of 1097 results is in line with the estimate that 500–1000 titles and abstracts can be screened in 8 h.^{79(sec4.4.3)}

There was potential for each PHG to have saved up to a day's time from screening and the related search, administration and reporting activities. A day is a relatively small amount of time, when NICE PHGs can take up to 2 years to produce. Multiplied over the number of guidelines developed each year, this would represent some gain in productivity.

Removing a database from a search does not necessarily lead to time savings when other sources on the same platform are still required. For example, the same strategy is used for all sources on the Cochrane Library platform and so removing CDSR and DARE from SHC (see Table 3) would not have saved time, as a strategy for CENTRAL still had to be developed.

The results suggest that, although small databases are worth retaining, they should be used as efficiently as possible. SPP was used in all 13 searches (Table 2) and only featured in the minimum set for SUP, while HMIC was searched 10 times and was only in the minimum set for SHC (Table 4). The size of these databases means a simpler method of translating strategies can be used, which retains the databases and widens the evidence base, without retrieving a high number of results.⁸⁰

5.3 | Planning future searches

The data presented in this study demonstrates the value of analysing the sources²⁹ and of using search summary tables.³⁰ The findings could be used to prioritise the sources required if NICE were to update these reviews or

produce new reviews on similar topics. For example, BNI did not retrieve any included publications for FLV1 or FLV2 but it did in FLV3 and FLV4 (Table 3). It would be worth testing BNI when scoping, say, reviews on uptake of other vaccinations or other flu prevention measures. Greenfile and Transport contributed unique included publications in both TRAP and PAEU and would probably be valuable in other environmental health topics.

Sources should be tested at the beginning of a review to indicate whether the extra time and resources required to search them is likely to be rewarded with unique content that would otherwise be missed. Five databases, including Sociological Abstracts, did not contribute any included publications and their value might be questioned (see Table 2). On the other hand, ASSIA, Social Care Online and Trophi found some included publications but contributed no unique included publications (Table 2). The key is to test and plan a tailored list of sources, even if it is not possible to know in advance exactly where the evidence might be identified.

6 | LIMITATIONS AND FURTHER RESEARCH

It would be valuable to undertake a full cost effectiveness analysis, showing how the decisions affect the time and resources required to complete a PHG search. It would be necessary to remove the duplicates and recalculate Scenario 3 to obtain a more precise estimate of the number of results that could have been saved. This would need to establish standard timings of search processes, such as strategy translations, de-duplication, and reporting.

It was not possible to establish how the papers used in citation searching and reference checking had been identified in the DMP search, which was developed iteratively. A paper might be used for citation searching and reference checking, even if it does not become an included publication in its own right. It was not possible to establish how these base papers had been identified in the first place. The results presented in this study show how each source contributed to the final list of included publications and not how useful they had been in the earlier steps. It is helpful to record the papers that are used for reference checking and citation searching⁸¹ and this finding suggests it is particularly important in iterative searches.

The review teams were sometimes including additional publications after the searches had been completed to ensure no relevant evidence was missed.^{1(sec6.1)} The technique used by the review team was recorded where it could be established, for example reference checking if they had included a paper from the bibliography of another search result (which would be in line

with the steps in the protocol). The category 'analyst actions' had to be used where a more specific method had not been recorded in EndNote. This accounts for 13 included publications across five searches (Appendix B). NICE has subsequently amended its processes to record these actions more accurately.

The 10 PHG topics assessed here are not fully representative of the entire NICE portfolio, as around 70 PHGs have been published and eight were ongoing in May 2022.⁸² It was not possible to examine the impact of the type of review on the sources required. Table 1 shows that there were 19 combined reviews of effectiveness and cost effectiveness evidence, seven reviews of effectiveness, one review of cost effectiveness and two reviews of barriers and facilitators. There were insufficient numbers of each type to make meaningful comparisons.

The scenarios were calculated using the number of included publications. The value of each included publication has not been measured. Further research would be required to examine the relative impact of each included publication on the Evidence Statement and whether failing to find it would have affected the recommendations. It would also be possible to investigate whether there were multiple publications reporting the same study in any of the Evidence Statements, which might mean the minimum set required could be reduced.

The analysis was based on where the included publications had been retrieved and it could be helpful to investigate alternative approaches to what was done. It was beyond the scope of this study to check the effectiveness of search strategies and whether this could have affected the minimum sets required. Search summary tables could be used to record whether included publications were present in a source but missed by the strategy.³⁰

There was no attempt to measure overlap between databases. The benefits of a multi-disciplinary evidence base have been stressed and further research into the role of multi-disciplinary sources, such as Web of Science or Scopus, would be welcome. Prospective research would be required to show the most effective way of using these sources and whether they would replace or supplement topic-specific sources.

The data was not analysed according to which provider platforms were used, as NICE searched the same one each time a database was accessed. The search summary table could be used to collect the data required to compare different versions of a database.

The results confirm that website searching is important.²⁶ The number of websites used in each search was not assessed and it would require further research to understand how to create an efficient list of sources.

NICE has adopted EPPI-Reviewer version 5 for evidence management since completion of the searches in this study. EPPI-Reviewer 5 incorporates some features of the search summary table³⁰ in a report.³⁶ The data is automatically retained and the reports can be generated quickly, making the process quicker than the manual methods described above. Ongoing analysis of these reports would facilitate more comparisons between different types of review and provide a representative sample of the PHG programme. There is potential for organisations to share this data to create a much richer data set to inform practice, using the established format of the search summary table.

7 | CONCLUSIONS

The sources for these PHGs had been chosen because they were 'likely to yield relevant results'¹ and this led to efficient searches. It would have been possible to search fewer sources without missing any publications included in these PHGs. On average, the volume in the minimum set required to retrieve all the included publications was 15.5% lower than the search results downloaded for the PHG (Scenario 2, Table 4). The potential reduction was 6.5% in the scenario reflecting current searching practice that combines the minimum set with CLEM (Scenario 3, Table 5). The choice of sources had an average impact of around a day on each NICE PHG.

There was no consistent pattern to which sources could be removed from the PHGs. Equally, a core set of databases could not be established, as topic-specific and multi-disciplinary sources were required in addition to the relevant components of the Cochrane Library, Embase, and MEDLINE. The PHGs were also likely to draw on evidence obtained from using other search techniques, such as citation searching and website searching. Sufficient time and resources should be planned to use these techniques effectively at the optimal point in the search process. The key is to test a range of databases and search techniques to create a tailored set of sources that ensures coverage of a multi-disciplinary evidence base.

AUTHOR CONTRIBUTIONS

Paul Levay: conceptualization, methodology, investigation, writing original draft, writing - review and editing. **Andrea Heath:** conceptualization, methodology, investigation, writing - original draft, Writing - review and editing. **Daniel Tuvey:** conceptualization, methodology, investigation, writing - original draft, writing - review and editing.

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CONFLICT OF INTEREST

The authors have no interests to declare.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

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APPENDIX A

A.1 | TOTAL NUMBER OF RESULTS FROM EACH SOURCE (BEFORE DUPLICATES REMOVED)

	Source	CP	DMP	FLV1	FLV2	FLV3	FLV4	HIV	PAEU	SHC	SSIS	SUP	TRAP	WLTC
Databases	AMED (Ovid)													1133
	ASSIA (ProQuest)	644							1428		21	1964		36
	BNI (ProQuest)			46	82	589	294			136				
	CINAHL (EBSCOhost)	540												
	Cochrane CDSR (Wiley)	2	13	2	29	31	7	35	70	17	276	73	9	23
	Cochrane CENTRAL (Wiley)	805	703	38	978	643	187	971	785	201	21	597	55	14
	Cochrane DARE (Wiley)	6	238	0	6	3	3	11	11	5	196	34	0	16
	Cochrane HTA (Wiley)		5	1	2	1	0		4			7		
	Cochrane NHS EED (Wiley)			1	37	5	1	28	9	5	0	6	0	
	Community Pharmacy Future.org.uk	1												
	EconLit (Ovid)	14		0	17	10	8	37	565	42		85	2397	
	EconPapers (repec.org)	9							95			194		
	Embase (Ovid)	7761	4941	764	6384	6863	5007	11,066	5117	2587	2182	7958	5488	4018
	EPPI Bibliomap (EPPI)							10					23	
	EPPI Dopher (EPPI)		262								108			36
	EPPI Trophi (EPPI)		2						149	16		102		51
	ERIC (ProQuest)				69	69	69			306		1632		
	Greenfile (EBSCOhost)								1394				1681	
	HealthEvidence.org		104											
	HMIC (Ovid)			66	243	279	424	202	175	78	46		65	655
	MEDLINE (Ovid)	5377	8390	629	5960	4082	3487	9840	6687	2422	1420	9640	3215	5598
	MIP (Ovid)	586		28	261	226	164	811	1029	182	270	3201	1818	214
	PsycINFO (Ovid)	870	6426		575	575	575	4851		1055		8573		2843
	Social Care Online (SCIE)		274											316
	Social Welfare (British Library)													164

(Continues)

Source	CP	DMP	FLV1	FLV2	FLV3	FLV4	HIV	PAEU	SHC	SSIS	SUP	TRAP	WLTC
Sociological Abstracts (ProQuest)				66	66	66							
SPP (Ovid)	36	558	65	65	65	65	130	217	63	7	912	541	57
Transport (Ovid)								2598				1626	
Techniques													
Analyst actions	63				1			24		24	2		
Call for Evidence	48						26					38	2
Citation searching	1459	1003								2959	3537		
Contact experts			15	15	15	15		2	2				
Reference checking		3051						93	1	7		2	1
Website searching	61	28	13	85	0	21	213	259	90	697	176	176	
Total no. of results before duplicates removed	18,282	25,998	1668	14,874	13,523	10,393	28,231	20,711	7208	8234	38,693	17,134	15,177

Note: Shading indicates that the source was used in that search.

APPENDIX B

B.1 | NUMBER OF INCLUDED PUBLICATIONS RETRIEVED FROM EACH SOURCE

Sources	CP1	CP2	CP3	CP4	DMP1	DMP2	FLV1	FLV2	FLV3	FLV4	HIV1a	HIV1b	HIV2	PAEU	SHC
Databases															
AMED	1 (17%)	5 (26%)	1 (5%)	0	0	0	0	0	6 (18%)	3 (8%)				14 (20%)	0
ASSIA															
BNI															
CINAHL	3 (50%)	6 (32%)	3 (14%)	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane CDSR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane CENTRAL	1 (17%)	4 (21%)	7 (32%)	0	6 (17%)	1 (5%)	0	9 (43%)	12 (36%)	3 (8%)	21 (45%)	2 (17%)	0	0	8 (36%)
Cochrane DARE	0	0	0	0	0	0	0	0	0	3 (8%)	0	0	0	0	0
Cochrane HTA															
Cochrane NHS EED															
Community Pharmacy Future	0	0	0	0	0	0	0	0	0	0	0	6 (50%)	0	2 (3%)	2 (9%)
EconLit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EconPapers	0	0	0	0	0	0	0	0	0	0	0	0	0	2 (3%)	0
Embase	1 (17%)	3 (16%)	7 (32%)	3 (60%)	7 (20%)	5 (25%)	2 (67%)	15 (71%)	23 (70%)	30 (77%)	34 (72%)	9 (75%)	4 (67%)	25 (35%)	19 (86%)
EPPi Bibliomap															
EPPi Dopher	0	0	0	0	0	0	0	0	0	0	0	0	0	1 (1%)	0
EPPi Trophi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERIC															
Greenfile														3 (4%)	0
HealthEvidence															
HMIC															
MEDLINE	2 (33%)	11 (58%)	13 (59%)	0	9 (25%)	5 (25%)	2 (67%)	12 (57%)	15 (45%)	29 (74%)	35 (74%)	9 (75%)	5 (83%)	37 (52%)	16 (73%)
MIP	0	2 (11%)	2 (9%)	2 (40%)	0	0	0	3 (14%)	0	5 (13%)	4 (9%)	0	2 (33%)	8 (11%)	0
PsycINFO	1 (17%)	6 (32%)	6 (27%)	0	13 (37%)	9 (45%)	1 (5%)	1 (5%)	2 (6%)	1 (3%)	16 (34%)	3 (25%)	4 (67%)	8 (36%)	0
Social Care Online															
Social Welfare															
Sociological Abs															
SPP	0	0	0	0	0	3 (15%)	0	0	0	0	0	0	0	0	0
Transport															
Techniques															
Analyst actions	1 (17%)	1 (5%)	0	2 (40%)	0	0	0	0	0	0	0	0	0	16 (23%)	0
Call for Evidence	0	0	0	0	0	0	0	0	1 (3%)	0	0	0	0	5 (7%)	0
Citation searching	0	2 (11%)	2 (9%)	0	11 (31%)	5 (25%)	1 (33%)	0	2 (6%)	0	0	0	0	0	0
Contact experts															
Reference checking	0	1 (5%)	0	0	21 (60%)	6 (30%)	0	3 (14%)	0	1 (3%)	0	1 (8%)	1 (17%)	4 (6%)	1 (5%)
Website searching	0	1 (5%)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total no. of included publications	6	19	22	5	35	20	3	21	33	39	47	12	6	71	22

(Continues)

Sources	SSIS	SUPI	SUP2	SUP3	SUP4	SUP5	SUP6	SUP7	SUP8	SUP9	TRAP1	TRAP2	TRAP3	WLTC
Databases														
AMED														
ASSIA	0	2 (18%)	2 (33%)	0	5 (12%)	0	6 (26%)	4 (44%)	1 (9%)	1 (2.5%)				6 (14%)
BNI														0
CINAHL														
Cochrane CDSR	13 (76%)	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane CENTRAL	0	1 (9%)	0	0	10 (24%)	1 (6%)	0	0	1 (9%)	0	0	0	0	0
Cochrane DARE	1 (6%)	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane HTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane NHS EED	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Community Pharmacy Future														
EconLit		1 (9%)	0	0	0	0	0	0	0	0	2 (7%)	4 (17%)	3 (33%)	
EconPapers		0	0	0	0	0	0	0	0	0				
Embase	1 (6%)	6 (55%)	1 (17%)	0	14 (34%)	2 (13%)	12 (52%)	5 (56%)	2 (18%)	1 (2.5%)	20 (69%)	13 (57%)	1 (11%)	25 (60%)
EPPi Bibliomap														
EPPi Doppher														
EPPi Trophi		1 (9%)	0	0	4 (10%)	0	1 (4%)	0	2 (18%)	0				0
ERIC		0	0	0	7 (17%)	2 (13%)	1 (4%)	0	2 (18%)	1 (2.5%)	15 (52%)	5 (22%)	1 (11%)	0
Greenfile														
HealthEvidence														
HMIC	0													
MEDLINE	1 (6%)	9 (82%)	3 (50%)	2 (67%)	25 (61%)	9 (56%)	16 (70%)	4 (44%)	9 (82%)	2 (50%)	15 (52%)	7 (30%)	2 (22%)	33 (79%)
MIP	0	1 (9%)	0	1 (33%)	7 (17%)	0	5 (22%)	1 (11%)	0	0	1 (3%)	0	0	0
PsycINFO		8 (73%)	2 (33%)	3 (100%)	28 (68%)	12 (75%)	17 (74%)	5 (56%)	8 (73%)	4 (100%)				8 (19%)
Social Care Online														0
Social Welfare														0
Sociological Abs														0
SPP	0	0	1 (17%)	0	3 (7%)	1 (6%)	0	1 (11%)	1 (9%)	1 (2.5%)	0	1 (4%)	0	0
Transport														
Analyst actions	1 (6%)							2 (22%)			2 (7%)	3 (13%)	0	
Call for Evidence														
Citation searching	2 (12%)	10 (91%)	2 (33%)	0	30 (73%)	10 (63%)	16 (70%)	3 (33%)	7 (64%)	1 (2.5%)	0	0	2 (22%)	2 (5%)
Contact experts														
Reference checking	0													
Website searching	0	0	0	0	0	0	0	0	0	0	0	0	2 (22%)	1 (2%)
Total no. of included publications	17	11	6	3	41	16	23	9	11	4	29	23	9	42

APPENDIX C

C.1 | NUMBER OF UNIQUE PUBLICATIONS RETRIEVED FROM EACH SOURCE

Sources	CP1	CP2	CP3	CP4	DMP1	DMP2	FLV1	FLV2	FLV3	FLV4	HIV1a	HIV1b	HIV2	PAEU	SHC
Databases															
AMED															
ASSIA	0	0	0	0	0	0	0	0	2 (15%)	2 (20%)				0	0
BNI															0
CINAHL	1 (33%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane CDSR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane CENTRAL	0	0	0	0	0	0	0	0	2 (15%)	0	5 (56%)	1 (50%)	0	0	0
Cochrane DARE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane HTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cochrane NHS EED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Community Pharmacy Future	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EconLit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EconPapers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Embase	1 (33%)	2 (29%)	3 (30%)	1 (33%)	1 (6%)	1 (9%)	0	1 (14%)	4 (31%)	1 (10%)	1 (11%)	0	0	2 (6%)	1 (25%)
EPPI Bibliomap															
EPPI Dopher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EPPI Trophi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERIC															
Greenfile															
HealthEvidence															
HMIC															
MEDLINE	0	1 (14%)	5 (50%)	0	0	0	0	0	1 (8%)	3 (30%)	0	0	0	8 (24%)	0
MIP	0	0	0	0	0	0	0	1 (14%)	0	2 (20%)	2 (22%)	0	0	4 (12%)	0
PsycINFO	0	0	0	0	2 (11%)	2 (18%)	1 (14%)	1 (14%)	1 (8%)	1 (10%)	1 (11%)	0	0	0	0
Social Care Online															
Social Welfare															
Sociological Abs															
SPP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(Continues)

Sources	SSIS	SUPI1	SUP2	SUP3	SUP4	SUP5	SUP6	SUP7	SUP8	SUP9	TRAP1	TRAP2	TRAP3	WLTC
HMIC	0										0	0	0	0
MEDLINE	0	0	0	0	1 (10%)	0	0	1 (25%)	2 (67%)	0	3 (25%)	2 (17%)	0	8 (47%)
MIP	0	0	0	0	3 (30%)	0	3 (75%)	0	0	0	0	0	0	0
PsycINFO	0	0	0	0	3 (30%)	2 (33%)	0	0	0	0				1 (6%)
Social Care Online														0
Social Welfare														0
Sociological Abs														0
SPP	0	0	1 (100%)	0	0	0	0	0	0	0	0	0	0	0
Transport											1 (8%)	1 (8%)	0	
Techniques	1 (6%)							2 (50%)						
Analyst actions														
Call for Evidence											0	0	0	1 (6%)
Citation searching	2 (13%)	0	0	0	3 (30%)	4 (67%)	0	1 (25%)	1 (33%)	0				
Contact experts														
Reference checking	0										0	0	2 (29%)	1 (6%)
Website searching	0	0	0	0	0	0	0	0	0	0	0	1 (8%)	1 (14%)	
Total no. of unique included publications	16	0	1	0	10	6	4	4	3	0	12	12	7	17
Total no. of included publications	17	11	6	3	41	16	23	9	11	4	29	23	9	42
% of included publications which are unique	94%	0%	17%	0%	24%	38%	17%	44%	27%	0%	41%	52%	78%	40%

APPENDIX D

D.1 | ABBREVIATIONS USED IN THE TEXT

NICE Public Health Guidelines (PHGs)

Abbreviation	Topic	NICE PHG
CP	Community Pharmacies	Community pharmacies: promoting health and wellbeing. NICE guideline 102 ³⁹
DMP	Drugs Misuse Prevention	Drugs misuse: targeted interventions. NICE guideline 64 ⁴⁴
FLV	Flu Vaccination	Flu vaccination: increasing uptake. NICE guideline 103 ⁴⁷
HIV	HIV Testing	HIV testing: increasing uptake among people who may have undiagnosed HIV. NICE guideline 60 ⁵²
PAEU	Physical Activity and the Environment Update	Physical activity and the environment. NICE guideline 90 ⁵⁶
SHC	Sexual Health Condom Distribution	Sexually transmitted infections: condom distribution schemes. NICE guideline 68 ⁵⁸
SSIS	Stop Smoking Interventions and Services	Stop smoking interventions and services. NICE guideline 92 ⁶⁰
SUP	Suicide Prevention	Preventing suicide in community and custodial settings. NICE guideline 105 ⁶²
TRAP	Transport Related Air Pollution	Air pollution: outdoor air quality and health. NICE guideline 70 ⁷²
WLTC	Workplace Health Long Term Conditions	Workplace health support for employees with disabilities and long-term conditions (PHG discontinued)

Sources: databases

Abbreviation	Database
AMED	Allied and Complementary Medicine
ASSIA	Applied and Social Sciences Index and Abstracts
BNI	British Nursing Index
CLEM	Cochrane Library, Embase, MEDLINE Cochrane Library (Cochrane CDSR, Cochrane CENTRAL, Cochrane DARE, Cochrane HTA, Cochrane NHS EED), Embase, MEDLINE, MEDLINE-in-Process
CDSR	Cochrane Database of Systematic Reviews
CENTRAL	Cochrane Central Register of Controlled Trials
DARE	Cochrane Database of Abstracts of Reviews of Effectiveness
HTA	Cochrane Health Technology Assessment
NHS EED	Cochrane NHS Economic Evaluation Database
Comm Pharm	Community Pharmacy Future
Bibliomap	EPPI Centre Bibliomap
Dopher	EPPI Centre Database of Promoting Health Effectiveness Reviews
Trophi	EPPI Centre Trials Register of Promoting Health Interventions
ERIC	Educational Resources Information Centre
Greenfile	Greenfile
HealthEv	Heath Evidence http://healthevidence.org/
HMIC	Health Management Information Consortium
MIP	MEDLINE-in-Process

Abbreviation	Database
SCO	Social Care Online
Soc Abs	Sociological Abstracts
Soc Welfare	Social Welfare at the British Library
SPP	Social Policy and Practice
Transport	TRANSPORT database

Sources: other techniques

Abbreviation	Other technique
Analyst	Analyst actions taken after the main searches had been completed to ensure no relevant evidence was missed ^{1(sec6.1)}
Call	Call for evidence
Citation	Citation searching
Contact	Contact with experts
Ref Check	Reference checking
Web	Website searching