Investigating the trustworthiness of research evidence used to inform public health policy: A descriptive and qualitative study on the use of predatory journal citations in public health policy documents

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Abstract

Background: The evidence-based approach to policymaking has greatly facilitated policymakers' capacity to make scientifically informed policy decisions, especially in the medical and public health contexts. However, this approach is most beneficial for policy development when trustworthy research is used. Predatory journals and publishers pose a potential threat to evidence-based policy making, since they are more likely than traditional academic journals to publish unreliable evidence.

Research Objectives: The purpose of this thesis is to advance knowledge on what factors contribute to the citation of predatory journal articles in policy documents by answering the following research questions: 1) How do people preparing public health documents consider the trustworthiness of research evidence? 2) How do they source and evaluate the research evidence they cite?

Methods: I identified a cross-sectional sample of public health policy documents from Overton – the world's largest policy document database – that cited articles published by the OMICS group. OMICS is a well-established predatory publisher. I extracted meta-data (e.g., document source) and document characteristics such as whether they described their method of selection or quality assessment for cited sources. Authors of these documents with contact information listed, as well as a convenience sample of people who have prepared public health documents, were invited for a semi-structured interview. I thematically analyzed these interviews by organizing the codes (both deductive and inductive) into key overarching themes.

Results: Two hundred forty-two public health policy documents were included. The World Health Organization was the most common source accounting for 45 documents (19%). A total of 283 articles were cited from 126 OMICS journals. Only 54 (22%) of the policy documents described their source-selection methodology, and 22 (9%) assessed the quality of cited sources. Five key overarching themes were generated from the thematic analysis of the interview data, highlighting that information cited in policy documents is sourced and evaluated in several ways, many of which are related to a series of factors which could be contributing to the predatory journal citations.

Conclusion: Public health policy documents are prepared using a variety of methods for information selection and evaluation, but the exact approach for doing so is rarely reported within the document itself. This may contribute to the reliance on untrustworthy research to inform policy; and thus, may help amplify misinformation entering policy globally. Certain steps can be taken to help minimize any potential negative impact of relying on such sources, but a better understanding of policymakers' perspectives may be required to ensure successful implementation.

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Abbreviation List

CSA	Cabell's Scholarly Analytics
DOAJ	Directory of Open Access Journals
ERIC	Education Resources Information Center
IGO	Intergovernmental Organization
RCT	Randomized Controlled Trial
TA	Thematic Analysis
WHO	World Health Organization

Chapter 1: Introduction

The practice of incorporating scientific research into policymaking first appeared in the medical field after World War II [1]. Similarly, this approach has been increasingly used in other disciplines ever since evidence-based policymaking gained traction in the policy-development community during the 1970's, 80's and 90's [1–5]. This channel between researchers and policymakers (e.g., government officials) is critical to ensure that policymakers can support their policy decisions with scientific evidence. Policymakers often rely on policy documents to inform their decisions since they are not experts on every topic for which they are charged with making policy decisions [2,5–7]. These documents include evidence syntheses (e.g., policy briefs, guidance documents, working papers) [8,9] that are produced by various individuals and organizations (e.g., academic researchers, private think tanks, civil servants, government agencies) [2,10].

Because policy documents inform and support policy decisions [11], the sources of evidence cited in these documents should be reputable and trustworthy [11,12] – meaning they should be transparent about their methods and reliably provide high-quality research (e.g., methodologically rigorous). This is especially important in the health domain where the policies can have serious, widespread implications, and may even lead to patient harm if decisions are based on unreliable information. Which begs the question, what determines whether the literature used to inform policy documents can be trusted?

Sources of evidence can be untrustworthy for a variety of reasons, including, but not limited to, employing poor methodological rigour or failing to declare conflicts-of-interest. Some sources are more likely than others to be unreliable. One such example of potentially untrustworthy sources of research are predatory journals or publishers [13,14], which have been

defined as "entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices" [15].

These predatory entities use various strategies to make themselves appealing to researchers looking to quickly publish their work (e.g., having very short reviewing periods and low article processing charges)[16]. However, this sacrifices proper quality control – predatory journals may have poor, if any, peer-review processes – which reduces the trustworthiness of the studies they publish [17–19]. Other tactics, such as listing well-respected members of the academic community on their editorial board despite them having little to no connection to the journal, are often used in attempts to "legitimize" themselves, and can make predatory journals very difficult to identify or distinguish from reputable counterparts [20,21].

Since predatory journals and publishers can be so difficult to identify, both the individuals responsible for developing the policy documents and the policymakers for whom the documents are intended may not even be aware that they are relying on potentially less trustworthy evidence [22]. Another element of complexity stems from the fact that studies assessing the quality of articles in predatory journals have found that while many are of poor quality [23], this is not always the case [24], which raises questions regarding when, or even if, it is appropriate to include these studies in evidence syntheses such as health policy documents. In an in-progress study of the Overton database – the world's largest searchable index of policy documents [9] – we found over 1200 policy documents with citations to the OMICS publishing group [25], a well-established predatory publisher [26]. This not only demonstrates the potential for predatory journals to influence policy, but since these preliminary findings only represent

citations to articles from one predatory publisher, they likely also represent an issue that is much more widespread.

Thus, in this thesis, I investigated how information included in health policy documents – specifically those pertaining to public health – is sourced and evaluated. This included gaining a better understanding of potential factors that could be contributing to the inclusion of predatory journal citations in public health policy documents, thereby extending the existing literature on the impact of predatory journals, into the policy context. In the following section, I present a review of the literature regarding the notion of evidence-based policymaking (i.e., the incorporation of scientific evidence into policy decisions) and common strategies used for evaluating the quality of sources included in policy documents; how predatory entities are typically identified; the impact that these entities have had on scientific publishing; and how predatory entities may influence public health policy. These topics are discussed in the context of my research questions and objectives:

Research Questions and Objectives

The purpose of this thesis is to better understand how the authors of public health policy documents find published research to cite, as well as what consideration they give to the reputability and quality of their sources, including predatory journals. The research questions for this thesis are as follows:

1) How is the trustworthiness of research/evidence considered by individuals and organizations preparing public health policy documents?
    a. How is the research/evidence cited in public health policy documents sourced and evaluated?

b. What factors contribute to the citation of articles from predatory journals in public health policy documents?

To address these research questions, I conducted a cross-sectional synthesis of public health policy documents to characterize those with citations to articles published in predatory journals. I followed this analysis with semi-structured interviews of individuals involved in producing public health policy documents.

Chapter 2: Background and Literature Review

Evidence-Based Policymaking

The adoption of evidence-based recommendations has proven highly beneficial across many disciplines when making decisions for policy and practice [1,2]. For example, in medicine, the post-World War II transition to evidence-based policy has drastically increased the efficacy and efficiency of clinical practice by ensuring that decisions are informed by strong scientific evidence rather than anecdotal rhetoric [1]. The same can be said for social policy, which was a bit slower to implement the evidence-based approach but has been steadily increasing its use since the 1980's, and especially since the year 2000 [1,27]. In fact, the practice of using scientific evidence has taken a strong foothold in modern public health policy development [1]. There are many benefits of translating evidence to policy, as is demonstrated by the fact that some of the most notable public health achievements from the 20th and early 21st centuries (e.g., seat belt laws, tobacco restrictions, vaccination programs) can be at least partially attributed to advances in policy development [5,28,29].

Since policymakers are not experts on every topic for which they are responsible for making policy decisions, nor do they have the time to personally conduct extensive reviews of the literature, they often rely on policy documents to help inform their decisions [1,2,5–7]. The term 'policy document' refers to a wide array of evidence syntheses (e.g., policy briefs, guidance documents, working papers) [8,9] that are produced by a variety of individuals/organizations (e.g., civil servants, government agencies) [2,10], and serve the purpose of bridging the gap between research and policy [8,30]. Although highly beneficial if properly implemented, this system works best if the scientific evidence is rigorously and systematically selected, and presented in a way

that policymakers can understand. Thus, having a rigorous and clearly defined policy document development process is imperative.

Policy Document Development

There is extensive literature on the complexity of the overall policy development process. For example, in their 2002 paper, Dobbins et al. describe how research dissemination and utilization – a key component of evidence-based policy development – is a multivariate process dictated by the available research evidence, as well as organizational, environmental, and individual factors [31]. Additionally, a series of papers by Lavis and colleagues describe the SUPPORT tools for evidence-informed policymaking (STP) – a set of tools developed through the *SUPporting POlicy relevant Reviews and Trials* (SUPPORT), which were designed to help policymakers do their jobs more effectively [6,32]. This tool guides policymakers through the policy development process and addresses the following four topics: 1. Supporting evidence-informed policy making; 2. Identifying the need for research evidence when clarifying the problem, proposing potential solutions, and planning their implementation; 3. Finding and assessing systematic reviews and evidence syntheses; 4. Going from scientific evidence to policy decisions [6]. Another paper by Brownson et al. (2009) [33] discusses how policymakers rely on a wide variety of evidence – on a spectrum from objective systematic reviews to subjective personal experiences, and that the "best" evidence depends on the particular situation. This said, some of the more commonly relied upon sources by policymakers are evidence syntheses (e.g., policy documents) and these are often developed using systematic reviews of the scientific literature [5,6,30,33,34]. This is largely because systematic reviews allow for "the identification,

evaluation, and synthesis of the best-available evidence to provide an answer to a specific question" [13,35].

One of the main disadvantages to conducting systematic reviews is that they are very resource intensive and time consuming. Indeed, reviews do not already exist for many policy-related topics. Therefore, in many cases, policy documents rely on evidence from individual primary studies [5]. The specific types of studies to include vary between disciplines, though in general, policymakers seem to prefer action-based research (e.g., case studies, comparative studies) over more theoretical work [36]. For example, in the medical and social policy context, the randomized controlled trial is considered the highest quality study design [1].

Policy document development involves much more than simply collecting studies and describing their findings. For example, since policy documents are intended to promote knowledge translation and the uptake of evidence [7,8], the documents should be tailored to their specific end-users (i.e., policymakers) and structured in such a way as to facilitate understanding of information [5]. To further this point, a 2008 study by Jewell and Bero, which involved interviewing policymakers, revealed that since many policymakers are not experts in the fields for which they preside over decision making, they are often hesitant to consult scientific evidence when making their decisions. However, they are much more likely to do so if the information presented is easily digestible [37]. Given that the development of policy documents is subject to time constraints, financial barriers, and access to information [6,37], the evidence they use may not always be properly vetted. Thus, various strategies are sometimes used to assess the quality of the cited sources and assure stakeholders of the documents' robustness.

Methods for Evaluating the Quality of Sources

There are a variety of ways in which the quality of academic research is evaluated, especially for clinical research where guidance regarding how to do so is extensive. For example, the most common strategy to evaluate the quality of sources identified through systematic literature searches is the 'Risk of Bias Assessment' [38,39]. Sometimes also referred to as the "Critical Appraisal" or "Quality Assessment", this strategy usually involves individually assessing each study being considered for inclusion in the systematic review for sources of bias – factors that can systematically affect observations and result in conclusions that stray from the truth. Several potential sources of bias exist, one example being a flawed research design [40].

In addition to quality assessments for systematic reviews, there are also many existing grading systems for guideline documents. A 2004 study by Atkins et al. [41] describes the strengths and weakness of six such systems commonly used in the clinical context, and mentions that this information was incorporated into the now widely used 'GRADE methodology' system [42]. GRADE methodology is used by many organizations (e.g., World Health Organization, American College of Physicians) because it increases the transparency and trustworthiness of clinical guideline documents by rating the quality of evidence on a four-point scale (from very low to high), and grading the strength of recommendations as "weak" or "strong" [42].

Despite being so widely used, none of these assessment tools explicitly mention how to deal with predatory journals. Thus, it is not clear if their potential influence is considered in the evaluation process. Additionally, while there have been many checklists developed to detect predatory journals, there does not appear to be any existing research pertaining to how often these checklists are actually used [43]. Therefore, the question remains of whether those producing policy documents give any consideration to whether their cited information came from predatory

journals, or how this could potentially impact the trustworthiness of the evidence being included in these documents.

There is another element of complexity to this issue. Although predatory journals are associated with many poor publishing practices, this does not necessarily mean that all research articles published by predatory entities are of low-quality. A few key studies have tried to assess the quality of research published in predatory journals and yielded mixed results. McCutcheon et al. (2016) conducted a post publication peer review of 50 research articles in psychology – half from presumed predatory journals and half from non-predatory journals – and found significant differences between the two groups that suggested the predatory articles were of lower quality [23]. Similarly, a study from 2017 by Moher et al. also demonstrated that studies published in predatory journals tend to have significantly poorer reporting quality than those from legitimate sources [44]. Oermann et al. (2018) however, analyzed 358 nursing related research papers from predatory journals and found that more than half of their sample was of "average" quality or better, with 13 papers even being deemed "excellent" [24].

With the findings of these studies suggesting that the quality of articles from predatory journals varies, it is still unclear whether these articles should be included in evidence syntheses. Three other papers have discussed this question by looking specifically at the potential implications of including articles from predatory journals in systematic reviews, all of which concluded that predatory journals pose various challenges which are likely to persist as these journals become more prevalent. They also recommended that systematic reviewers pay special attention to their quality control measures when conducting reviews [13,14,45]. For example, Rice et al. (2021) suggest increasing the transparency of the process by reporting the types of journals from which articles are sourced, and "Assuring that appropriate methods are in place to account

for eligible research published in predatory journals" [45]. However, they also mention that additional research is required to determine the best approach. Other proposed solutions for dealing with predatory journals include: excluding all articles from suspected predatory journals, or applying additional evaluation criteria to studies from such sources [13]; and remaining vigilant when using databases such as Google Scholar or PubMed, whose quality control processes are not as robust as other bibliographic databases [14].

These recommendations are somewhat ambiguous and do not provide clear guidelines for how to handle studies from predatory journals in systematic reviews. In addition, the suggested solutions are dependent on the researchers' abilities to identify predatory sources effectively and consistently, which is often very difficult to do. Furthermore, based on a preliminary review of several public health policy documents, many do not include descriptions of the literature search, selection, or quality assessment methods used. This observation corresponds to a gap in the literature regarding how the trustworthiness of evidence is considered by those who produce public health policy documents.

Identifying Predatory Journals and Publishers

The increased prevalence of predatory journals is thought by many – including Jeffrey Beall, the Scholarly Initiatives Librarian at University of Colorado Denver who coined the term 'predatory publishers' in 2010 [46–48] – to be a byproduct of the rise of the Open Access publishing model. In this model, the journal or publisher charges an 'Article Processing Charge' to authors of an article accepted for publication [17,49]. In exchange for paying this fee, the work is then made freely accessible to the public [50,51]. This contrasts with the traditional subscription-based

publishing model that instead involves charging a fee to individuals who seek access to published material.

There are many variations of the Open Access model, but two of the most common are the 'Green' and 'Gold' models. Green Open Access is like the subscription-based model in that it gives the article's copyright to the publisher but differs from the subscription model by placing a version of the manuscript in a repository, which will become freely accessible after an embargo period. In Gold Open Access the article's author(s) retain the copyright, but also makes the article openly accessible immediately following publication [49]. In either case, Open Access journals are part of the broader Open Science movement which aims to increase access to, and the transparency of science, by promoting various practices such as publishing study protocols prior to completing the research, posting preprints, and making peer-review publicly available [52].

After Beall coined the term 'predatory publishers', many academics became increasingly concerned with the existence of these entities and their journals, and what they mean for the quality of research being published. As a result, Beall developed a new set of criteria for evaluating publisher quality that allowed him to compile a list of "potential, possible or probable" predatory journals and publishers [51,53]. The inception of his list – which later became known as *Beall's List* and served the purpose of helping others identify predatory entities – came in 2012 when Beall made the initial version available through his blog at scholarlyoa.com [48,51,53]. Beall later removed the list from his blog in 2017 [54]; however, its various versions have been archived and the list continues to be anonymously updated and made available at https://beallslist.weebly.com/ [50,55].

As the prevalence of predatory journals and publishers has increased, other organizations have also developed criteria for distinguishing between predatory and legitimate journals and

publishers. Some examples are the Directory of Open Access Journals (DOAJ) – a freely accessible, indexed online directory for open access, peer-reviewed journals [56]; or Cabell's Scholarly Analytics (CSA) – a pay-to-access, searchable online database containing information regarding journals across 18 disciplines [57]. In contrast to *Beall's List* of predatory entities, the DOAJ contains a list of journals and publishers that are considered legitimate. Whereas the CSA database consists of two separate lists, one for predatory entities and one for legitimate ones [58]. These two lists are respectively referred to on their website as "Predatory Reports" and "Journalytics" [57].

These lists can be helpful for distinguishing some predatory journals or publishers from their legitimate counterparts, but they are not without limitations. For example, they use discrepant criteria for evaluating the predatory or legitimate nature of the journals and publishers [58]. In their 2019 study, Strinzel et al. identified seven themes within the inclusion criteria across the four lists: (1) peer review; (2) editorial services; (3) policy; (4) business practices; (5) publishing, archiving, and access; (6) website; and (7) indexing and metrics; which they then grouped into four key concepts: (1) transparency, (2) ethics, (3) professional standards, and (4) peer review and other services [58]. While the lists all share these same general concepts, the weight given to each differs between the predatory and legitimate lists, with the predatory ones emphasizing professional standards and ethics, whereas their legitimate counterparts focus on transparency [58]. These differences in relied upon criteria have resulted in not only some inconsistencies among different predatory lists or legitimate lists, but also overlap between the two categories. For example, there are 34 entities that overlap between the DOAJ and *Beall's List*, and 31 overlapping entities between the DOAJ and *Cabell's Blacklist.* Another significant

limitation to the efficacy of these lists is that some are not readily accessible [15]. For example, the Cabell's lists are behind a paywall that can only be accessed by institutional subscription [59].

In addition to compiled lists of journals and publishers, there are other resources designed to guide authors in identifying predatory sources, including approximately 90 checklists and various campaigns such as the 'Think. Check. Submit' initiative [15,59,60]. However, it can be difficult for authors to decide which of the 90 checklists to follow, especially given that only three were developed using empirical evidence [15].

One of the reasons for such diversity in criteria for distinguishing between predatory and legitimate entities has been the lack of a clear, agreed upon definition for 'predatory journals and publishers' until quite recently. Grudniewicz et al. (2019) [15] used a modified Delphi survey study to develop a consensus definition:

> *Predatory journals and publishers are entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices.* [15,17].

Establishing this consensus definition was difficult because not all predatory journals or publishers "look" the same [15], and thus cannot easily be characterized. This said, a few trends have emerged among presumed predatory entities. Firstly, many of these journals and publishers take insidious measures to "legitimize" themselves [20] . This often makes them very difficult to identify or distinguish from their legitimate counterparts, even for experienced researchers. For example, some of these entities list highly regarded academics on their editorial board, regardless of whether the individuals are connected to the journal [21]. Others have even included the names of fake or deceased scientists as editorial board members [61]. Predatory entities also use various strategies to make themselves appealing options for researchers looking to publish, one of which

is having very short reviewing periods [16]. This feature can be intriguing for individuals looking to quickly gain multiple publications; however, the downside is that it sacrifices proper quality control, thereby reducing the trustworthiness of the studies they publish [17–19]. One of the most glaring examples of the lack of quality control exhibited by many predatory entities is that of a paper by David Mazières and Eddie Kohler titled 'Get me off your fucking mailing list,' [62]. This paper consists entirely of these same seven words repeated over and over for ten pages, and was somehow successfully published in the *International Journal of Advanced Computer Technology* [62]. While this is an extreme example, it highlights the need for caution when referring to studies from predatory sources, given that, at least in some cases, almost anything can get published.

There have also been several studies aimed at trying to understand why authors choose to publish in predatory journals. There appear to be two broad categories of authors who submit their manuscripts to predatory journals: those who do so accidentally or out of ignorance, and those who are motivated to do so intentionally. The accidental publications typically occur when individuals are unaware of the existence of predatory journals [63]; when they submit to journals that they believe are legitimate but turn out not to be [21]; or when researchers are enticed by, and made to feel sought-after by emails from journals asking for manuscripts [64]. On the other hand, the intentional publications are often indicative of authors who are under a great degree of pressure to publish (e.g., social, professional) and are therefore motivated to submit their manuscripts to predatory journals; authors for whom language and resource barriers are of particular concern; or authors who are frustrated by the cumbersome requirements of 'legitimate' journals [50]. In either case, journals with high reviewing speeds, little to no peer review, and high acceptance rates can be very appealing [50,63,65–67].

The many challenges associated with identifying predatory entities mean that there is potential for untrustworthy evidence to be mistakenly included in legitimate scholarly databases or cited by articles published in reputable journals. If this is the case, it will contribute to continued propagation and dissemination of unreliable knowledge. Thus, to properly understand the scope of the issue and the potential consequences, the following section will discuss the current state of knowledge regarding the inclusion of research published by predatory entities in legitimate academic literature.

Research Published by Predatory Entities Has Penetrated the Academic Literature

When Beall first raised his concerns in the early 2010's, he sparked a field of research on the topic of predatory journals and publishers. Many publications on the topic, as outlined by Björk et al. (2020) [68], have been commentaries and opinion pieces. However, there has also been a number of empirical and analytical studies completed. Some researchers have dedicated time and resources to defining and identifying characteristics of predatory entities, while others have focused on assessing the impact of their inclusion in the academic literature. Within the latter category of studies, some of the more commonly explored topics include the indexing of predatory journals in reputable scholarly databases, and the prevalence of citations to predatory journals in publications from reputable journals [68].

Even after knowledge of predatory journals became commonplace in academia, many still believed their potential influence on the overall quality of the literature to be minimal. This belief was predicated on the assumption that predatory journals were not indexed in scholarly databases or indices and were therefore unlikely to be cited or referred to by the academic

community [22,69]. However, recent studies have shown this assumption to be false. In 2016, a study by Machàček and Srholec identified over 300 journals indexed in the Scopus database that were presumably predatory and accounted for nearly 3% of all articles indexed by Scopus from 2015-2017 [70,71]. Other studies have shown that articles from predatory journals have also made their way into other databases such as PubMed (i.e., PubMed Central & MEDLINE), Web of Science, and the Education Resources Information Center (ERIC) [20,58,69,72], which may be problematic since their indexing in popular scholarly databases can increase the likelihood of accruing citations [22]. While we do not know the extent to which this has an impact, it demonstrates that predatory journals are indeed in academic databases.

Predatory journals have also been included in the DOAJ – whose inclusion standards are considered by many as the "unofficial gold standard for open access journals" [73]. In 2014, the DOAJ attempted to rectify this issue by completely reassessing all journals included in its database and purging those which did not meet their updated inclusion criteria [73]. Despite these new rigorous criteria, there remains some overlap between the DOAJ's list of legitimate journals and some lists of predatory journals [58], emphasizing just how difficult it can be to identify predatory journals .

A few studies have tried to determine the prevalence of citations to articles from predatory journals. Nwagwu and Ojemeni (2015) found that the 5601 articles from presumed predatory journals in their sample had an average of just over two citations per publication [74]. Similar findings were reported by Bagues et al. (2019) who identified roughly 6000 articles published by journals on *Beall's List* and found that median number of citations was three [75]. In addition, Andersson (2019) found that five of the seven predatory journals they investigated had either never or very rarely been cited. This said, the other two journals had at least 25% of their

articles cited by publications indexed in Web of Science [76]. Another study by Björk et al. (2020) also found that citations to each individual article published in predatory journals are relatively rare; however, they subsequently noted that approximately 40% of articles published in predatory journals have been cited at least once [68]. The latter of these findings is especially concerning given that the prevalence of predatory journals is continually increasing [77], and therefore even a citation to only one in every three articles could potentially generate a large volume of citations across the current scholarly literature and even more so in the future.

Since predatory journals have penetrated the 'legitimate' academic literature, without careful consideration and assessment of cited sources, there is increased potential for untrustworthy evidence to be cited in evidence syntheses such as policy documents. While this may also be the case for studies published by reputable sources since it is possible for untrustworthy studies to be found in all journals, it may be of greater concern with predatory publishers given their lack of quality control. This in turn means that policymakers may not be able to rely on the information and/or recommendations provided to them in said documents to inform their decisions, or if they do, the resulting policy decisions could be based on false or low-quality evidence. Thus, to mitigate this potential problem it is imperative to thoroughly understand the policy document development process, including how evidence used to support recommendations in these documents is sourced and evaluated.

How do Predatory Entities Impact Public Health Policy?

The work done to assess the impact of predatory journals specifically on public health policy documents has been much more limited. As part of their 2015 study, Shen and Björk attempted to estimate the total volume of articles published by predatory journals in the previous

year (2014) and determine the approximate distribution of these articles by scientific discipline. They reported that, of roughly 420,000 scientific articles published by predatory journals in 2014, approximately 70,000 were biomedical in nature and 30,000 were related to the social sciences, making these the third and fourth most common disciplines respectively [77]. Studies from these disciplines are most likely to influence health-related policy decisions. The rapidly increasing prevalence of predatory journals – which grew nearly eight-fold between 2010 and 2014 [77] – could increase the potential for serious negative consequences if policy recommendations are influenced by untrustworthy research. Thus, improving our understanding of how evidence included in public health policy documents is sourced and evaluated is a gap in the literature well worth investigating.

To further emphasize this point, working with a research team, we have identified over 1200 policy documents in the Overton database which cite predatory journals [25]. This was done through a preliminary search of citations to articles published by a single predatory publisher, OMICS. The exact proportion of predatory journal citations in policy documents attributable to any given publisher is very difficult to estimate [77], thus the true number of policy documents citing predatory journals is unknown, but likely much higher. These findings suggest that public health policy recommendations and/or decisions may be influenced by untrustworthy literature.

Relying on low quality evidence when making health related policy decisions has the potential for severe consequences. There are numerous examples of the reliance on poor-quality studies resulting in negative consequences for public health policy decisions, including two examples from highly-regarded journals such as the *Lancet* [78–82], and the *New England Journal of Medicine (NEJM)* [83,84]. To my knowledge, there are no such examples specific to predatory journals, which is unsurprising given that these journals are less likely to be cited than more high

profile publishers [68]. It could, therefore, be argued that there are few citations to predatory journal articles in public health policy documents. However, while it is unlikely for any given predatory journal article to have a significant direct impact on policy decisions, even a single citation to a low-quality article from a predatory journal in a policy document would raise concerns. Thus, there is an urgent need to understand how those charged with producing public health policy documents evaluate the trustworthiness of their sources and whether predatory journals are considered during this process.

Chapter 3: Methods

To answer my research questions, I used an objective, descriptive approach to characterize the key features of public health policy documents with predatory journal citations, as well as a more nuanced, qualitative analysis of the defining features of the process through which these documents are developed.

My research questions aligned well with a pragmatist epistemology, which is premised on the avoidance of meta-physical debates about the nature of truth and reality, and posits that knowledge acquisition requires both objectivity and subjectivity [85]. Taking a pragmatist approach to this research also allowed me to focus on developing a practical understanding of a real-world issue – the reliance on potentially untrustworthy research evidence to inform public health policy and practice – while also extending the knowledge base regarding how predatory journals influence academic literature into the policy space.

Pragmatism lends itself well to a qualitative descriptive research design – an approach commonly employed for health-related research [86,87] – whereby "decisions are made about how the research should be conducted based on the aims or objectives and context of the study" [86]. Therefore, both the pragmatist paradigm and the qualitative descriptive research design were aptly suited for my thesis, given that their flexibility allowed me to select the most appropriate methods to answer my research questions rather than being restricted to one particular method [86,88]. In this case, these methods were a cross-sectional descriptive synthesis of public health policy documents in Part 1, followed by a qualitative interview study in Part 2 – both of which are research methods commonly associated with qualitative descriptive studies [87]. The methodological approaches used for both parts of my thesis are described in detail below.

Part 1 – Cross-sectional Synthesis and Characterization of Public Health Policy Document Characteristics

In Part 1 of my thesis, I descriptively synthesized various characteristics of public health policy documents that have cited predatory journals, as well as characteristics of the cited predatory journal articles. The methods of this review are reported in two sections because the sample I used for my thesis-specific cross-sectional study was taken from a broader project, described by Brandts-Longtin et al. (2022). [25]

In this broader project, we conducted a comprehensive search of the Overton database – the world's largest searchable index of policy documents which houses more than five million documents from over 180 countries and 1200 sources [9]. The objective of this search was to identify policy documents in the Overton database with at least one citation to an article published by a predatory journal. Given the current lack of an accepted strategy for identifying predatory journals, this sample of policy documents was identified by those that cited articles published by the OMICS Group – a well-established predatory publisher with over 700 Open Access journals across many disciplines [89]. This group is known for using questionable business practices to make themselves appear legitimate, such as making false claims about review processes, listing well-respected researchers as editors without their knowledge, and providing misleading information to appear as though their journals are indexed in reputable databases [25]. In fact, in 2019 these deceptive practices led to them being successfully sued by the United States' Federal Trade Commission for over $50 million [90–92]. The search was conducted simply by selecting the option in the Overton database to identify policy documents that have cited work by the OMICS group [25].

Broader Overton Study Sample

The broader search (conducted in June of 2021) identified 1226 policy documents – many of which were health-related – with at least one citation to an article published by the OMICS group. These policy documents were screened (in duplicate) using the following eligibility criteria (see ***Table 1***): **1.** Documents had to fit our definition of 'policy document'. When determining what constituted 'policy documents', we based our definition off the definitions from Overton and the US Department of Commerce [9,93], and included "statements from any agency or organisation that put forward a policy on a statutory, regulatory, or technical issue, or interpretation thereof, or documents otherwise primarily intended for policymakers" [25]. This definition included "working papers, reports, case studies, policy briefs, testimony, clinical guidelines, and government documents that are not behind a paywall or clearly in the scholarly record (e.g., journal articles)." [25] – an important distinction because Overton contains some scientific articles not directly intended for policymakers, which were therefore excluded; **2.** Documents had to have been produced in 2012 or later. This decision to only include documents produced in 2012 or later was made because the concept of predatory journals became widely recognized in 2012; **3.** Documents were included only if the PDF for both the policy document and cited OMICS article(s) were readily available, because otherwise data extraction would not have been possible; **4.** Duplicate records were also removed – in cases where two versions of the same document were found, the most recent was kept.

Table 1. Eligibility criteria for policy documents to be included in broader Overton project and Part 1 of thesis. *Any documents in the initial sample identified from Overton (n=1226) not meeting all criteria described below were excluded.*

Inclusion Criteria	Exclusion Criteria
Eligibility criteria for broader Overton project[25]	

- Record **meets the definition of 'policy document'** established using Overton's and the U.S. Department of Commerce's definitions (i.e., document is directly intended for use by policymakers) - Policy document produced **during or after** 2012 - Policy document contains includes **at least one** citation to an article published by the OMICS group - PDFs for **both** the policy document **and** cited OMICS articles are accessible	- Record meets the definition of 'policy document' established using Overton's and the U.S. Department of Commerce's definitions (e.g., scientific paper not directly intended for use by policymakers) - Policy document produced **prior to** 2012 - Policy document **does not contain** any citations to articles published by the OMICS group - PDF for either the policy document or cited OMICS articles **cannot be retrieved**
Eligibility criteria specific to Part 1 of my thesis research	
- Policy document is written in **English or French** - Policy document pertains to a **public health** policy topic	- Policy document is written in another language (other than English or French) - Policy document pertains to other health topics (e.g., clinical medicine, health economics) or non-health topics

Thesis Sample

To ensure a feasible thesis project, I narrowed the criteria from the broader project to examine only public health policy documents. Two additional inclusion/exclusion criteria were added: 1. Documents not written in English or French were excluded, and 2. Documents had to pertain to 'public health' policy to be included.

The Canadian Public Health Association defines 'public health' as "the organized effort of society to keep people healthy and prevent injury, illness and premature death" [94]. Given the broad nature of this definition, I included documents pertaining to various public and global health topics (e.g., vaccine programs, food safety, workplace safety, obesity, addiction management, mental health) [33], providing that they were not specific to clinical practice guidelines. For example, I included documents relating to 'primary health care' (e.g., health promotion, managing obesity at the population level) but excluded documents regarding 'primary care clinical practice guidelines' (e.g., guidelines for diagnosing or treating individual

patients with specific ailments) [95–97]. To further narrow the scope, I also excluded documents pertaining to other areas of health (i.e., health economics, and pre-clinical or translational medicine). Eligibility criteria for inclusion in this cross-sectional study are summarized in ***Table 1***.

As was the case for the broader Overton study, all documents were screened in duplicate by independent reviewers, and any conflicts regarding whether a given document related to 'public health', were resolved by consultation between reviewers.

Data Collection

Full PDF records of the included public health policy documents and their cited OMICS articles were exported into *Distiller SR* (Evidence Partners, Ottawa Canada), a cloud-based software used for the data extraction in reviews [98]. Data extraction involved collecting meta-data, as well as certain document characteristics for both the policy documents and their cited OMICS articles. This process began with a pilot extraction to test two sets of extraction forms – one for the policy documents and one for the OMICS articles. The purpose of piloting these forms was to ensure consistency between extractors and that the most pertinent information was collected. Full extractions were then performed in duplicate to increase the robustness of the results and ensure that findings were accurate and representative of the document sample. Any conflicts were resolved via consensus-reaching discussions between extractors. A total of five experienced extractors were involved – all documents were reviewed by myself, as well as one of the other four extractors (EA, DD, MP, FA).

Extracted meta-data for the policy documents included the document source (i.e., country of origin and producing organization); Digital Object Identifier (DOI); and contact information

(i.e., email addresses) for the corresponding author(s). If no individual's email was provided, organizational email addresses were collected instead. Additionally, extracted policy document characteristics included whether the documents described their source selection methodology and quality assessment strategies for cited sources, and the number of OMICS citations. The latter of these was automatically collected from Overton rather than being extracted manually – Overton parses through each document in their database to provide detailed data on any included references (e.g., on which page a given citation is located) [9].

For the cited OMICS articles, extracted meta-data included the document source (i.e., country of origin); Digital Object Identifier (DOI); publication year; and the name of the journal in which it was published. Additional characteristics collected included the type of article (e.g., observational study, clinical trial, commentary/editorial); the subject area (i.e., public and global health, clinical medicine, health economics, etc.); whether ethics approval was reported (if applicable); and the citation context – how the OMICS citation was used in the document (e.g., as background information, in a quantitative manner).

Data Analysis

The extracted data were exported from *Distiller SR* and organized in data matrices using MS Excel. The characteristics of both the policy documents and cited OMICS articles are reported using descriptive statistics (e.g., proportions, absolute counts). As this was a purely descriptive study meant to characterize public health policy documents that cite OMICS articles, no hypothesis testing was performed.

Part 2 – Qualitative Interview Study

The second part of my thesis focused on the interconnection between knowledge, perceptions, and actions regarding the trustworthiness of relied-upon sources in public health policy documents and thereby sought to acquire actionable knowledge which could be used to minimize the reliance on untrustworthy sources and maximize our ability to translate reliable science in policy and practice. This involved asking open-ended questions regarding individuals' experiences, behaviours, and perceptions; the answers to which cannot be easily quantified [85,88,99,100]. To this end, I conducted a qualitative interview study using semi-structured interviews, through which I sought to provide an understanding of how specific sources come to be cited in public health policy documents. The thesis was approved by the University of Ottawa's Social Sciences and Humanities Research Ethics Board (REB). Ethics file number: S-07-22-8094.

Sample

To be eligible, individuals either had to be currently involved in the preparation of public health policy documents or have had previous experience doing so in the last ten years (since predatory publishing became widely recognized in 2012). Interviews were conducted in English.

I conducted interviews until no new themes appeared in the data provided by subsequent participants, and after which further data collection would have reaped diminishing returns [101–103]. Hennink et al. (2017) found that as few as nine in-depth interviews were sufficient to reach this point [103]. Thus, I aimed to recruit approximately 10-15 interview participants to provide rich and insightful information that helped to improve my understanding of the topic [101,103], while remaining feasible within the scope of a thesis.

Access to the interview participants came from a mixture of purposive, snowball, and convenience sampling. The purposive sampling involved using the author/organizational email

addresses collected in Part 1 to initiate recruitment of individuals who produced the policy documents with citations to OMICS articles. After removing duplicates, 119 unique email addresses were collected from the documents in Part 1. I sent the REB-approved recruitment email to all 119 of these email addresses. The recruitment email outlined the study's purpose, inclusion criteria, and details pertaining to what would be required from participants (e.g., virtual interviews via Zoom).

I subsequently provided interested participants with an informed consent form outlining the study's purpose, methodology, strategies to ensure anonymity, and benefits to participation. Additionally, I recruited some interview participants via snowball sampling through a recommendation from one of the purposively sampled participants. I also recruited some participants via convenience sampling, which was facilitated by my thesis supervisors' connections to individuals in the evidence-based policy development space.

Data Collection

Interviews were conducted virtually via Zoom video conferencing software and were audio-recorded with participant consent for the purpose of transcription. Although the interview guide was followed throughout, the inherent flexibility of the semi-structured design allowed for the freedom to explore any unforeseen or especially interesting topics pertinent to my research questions through probing questions [104] – see interview guide in ***Appendix A***. Additionally, I engaged with participants by providing occasional encouragement and using active listening techniques (e.g., briefly repeating some of their answers, taking notes) to ensure participants' comfort and to demonstrate genuine interest in the information they were providing. These

strategies helped establish rapport with the participants, which facilitated the collection of rich, insightful data [104].

The interview guide was informed by a narrative review of the literature, discussions over the course of developing my thesis proposal, and suggestions provided to me when conducting pilot interviews of individuals with experience in developing general health policy documents. Three pilot interviews were conducted as part of a qualitative research methods course which I completed during my program. The interview guide was geared towards understanding the process of developing public health policy documents, more specifically, how the cited information is sourced and evaluated. It included questions such as "What sources of information/evidence do you normally use to inform your policy documents and how do you search for them?" or "How do you decide which sources you will be use/reference?". Additionally, since I sought to understand how articles from predatory journals come to be cited in these documents, I also gauged the individual's knowledge of these entities with questions such as "Are you aware of the notion of predatory journals or publishers? If so, what can you tell me about them?". Finally, I asked participants for their input on how the policy document development process can be improved.

Data Analysis

Given the flexible and iterative nature of this in-depth interview study, data analysis began concurrently with data collection [105]. The first step in the analysis involved using a strategy outlined by Miles et al. (2020) [106], which was to complete a Contact Summary Form after each interview. These brief write-ups included a summary of the main points discussed in

the interview and a reflection on key points or issues from the interview (e.g., my initial thoughts on how it went, areas to improve, missing information, suggestions from the participant) [106]. These forms were completed as soon as possible after each interview (within three days) and were key tools to inform the conduct of subsequent interviews.

Upon reflection, the notes recorded in these forms made it evident that the interview guide was effective for obtaining the sought-after information from participants, thus no modifications were made to the questions during the study. However, my reflections on these contact summary forms did lead to minor adjustments regarding how I conducted the interviews. For example, one of the earlier interviews lasted longer than expected (84 minutes) and thus, for subsequent interviews I slightly modified the pace of delivery to ensure all key topics were discussed within the allotted one-hour timeslot.

Once conducted, the interview recordings were transcribed using an online automated transcription service, *Otter* (Otter.ai, Mountain View United States). I then checked the transcripts and reviewed the audio recordings to verify transcription accuracy, and corrected any errors. I also anonymized the data by removing personal information from the transcripts that could potentially be used to identify participants (e.g., names of professional affiliations). Shortly thereafter, I began carefully reviewing the interview transcripts to familiarize myself with the data [107]. This involved reading each interview in its entirety (two to three times) while jotting initial thoughts and impressions. For example, from the outset of the interview study it was evident that most participants were relatively familiar with the notion of predatory journals but did not actively employ any specific criteria to exclude them from their policy documents. No formal coding was performed at this stage.

For the main component of my interview analysis, I conducted a Template Analysis as described by Brooks et al. (2015) [108]. This analytic method is a type of Thematic Analysis (TA), but differs from the commonly cited 'Reflexive Thematic Analysis' described by Braun and Clarke (2006) [107], whereby rather than 'themes' being "patterned meanings" across the dataset as is the case when conducting Reflexive TA, they are simply recurrent features of the data which are relevant to the research question(s) [109].

This is an important distinction because Reflexive TA is an organic, primarily inductive analytic process that seeks to actively generate themes through "deep questioning [and] data engagement", whereas Template Analysis on the other hand, combines deduction with induction, to create themes that "reflect data topics… rather than storied, conceptual patterns" [109]. The freedom provided by Template Analysis to incorporate some initial tentative themes developed *a priori* based on existing literature, data from my cross-sectional analysis in part 1, and questions in my interview guide (subject to modification throughout analysis [108,109]) rather than being restricted to mainly inductive theme generation [109], was best aligned with my pragmatist approach, which itself was not aligned with a particular conceptual framework.

Data analysis was a recursive process that involved iterative coding and evolved over time. I actively engaged with the data to organize it using both descriptive and interpretive codes and themes [108,109]. Initially, two transcripts were coded separately by myself and my two thesis supervisors using MS Word – we used 'comments' to highlight chunks of text and tag them with specific codes. This process involved using theoretical codes deduced from the literature, my interview guide, and my research questions (e.g., "Knowledge and perceptions of predatory journals"); however, several codes were also developed inductively (e.g., "Utility of evidence").

This resulted in an initial code list consisting of 40 unique, first-level codes. I then met with my supervisors to discuss our codes and reach consensus.

Through this discussion, we refined the code list into a more concise 29-code list by combining certain overlapping codes. For example, 'Trustworthiness of evidence', 'Quality of evidence', and 'Utility of evidence' were consolidated into 'Evidence Assessment'. I then organized the resulting 29 first-level codes under seven second-level codes: 1. Participant background; 2. Methodological and content expertise or training; 3. Approach to policy document development and evidence synthesis; 4. Approach to literature search and review; 5. Approach to knowledge translation; 6. Challenges with policy document development; and 7. Knowledge and perceptions of academic literature. ***Table 2*** depicts the breakdown of first- and second-level codes at this point in the analysis. These groupings, along with code descriptions and example quotes from the interviews were then used to generate a coding template. The complete coding template is available in ***Appendix C***.

Table 2. Qualitative interview study codes. *Depicts the breakdown of first- and second-level codes used to code the interview transcripts (n=15). The node tree consists of 29 first-level codes, each categorized under one of seven second-level codes. The complete coding template is available in Appendix C.*

Second-level Code	First-level Codes
1. Participant Background	1.1 Academic/Professional Background 1.2 Experience with previous policy documents 1.3 Research experience
2. Methodological and content experience or training	2.1 No formal training 2.2 Importance of policy knowledge 2.3 Importance of content knowledge
3. Approach to policy document development and evidence synthesis	3.1 Importance of clearly defined policy document objective 3.2 Teamwork on policy documents 3.3 Informal peer review for policy documents 3.4 Incorporating own empirical data with existing literature 3.5 Incorporating alternative (e.g., non-academic) sources into policy documents 3.6 Approach to dealing with potentially problematic studies or sources 3.7 External vs Internal document development 3.8 Transparency of development process

4. Approach to literature search and review	4.1 Literature search strategies and objectives 4.2 Recognize limitations of non-systematic search strategy 4.3 Expert input to inform review 4.4 Evidence assessment
5. Approach to knowledge translation	5.1 Timeliness of document development 5.2 Gathering stakeholder perspectives during the development process 5.3 Approach to knowledge dissemination
6. Challenges with policy document development	6.1 Availability of evidence 6.2 Limitations/challenges with Systematic Reviews 6.3 Making policy recommendations is difficult 6.4 Time required to develop policy document 6.5 Limited resources
7. Knowledge and perceptions of academic literature	7.1 Published literature is unreliable 7.2 Knowledge and perceptions of predatory journals 7.3 Knowledge and perceptions of academic publication models

Using this coding template, as well as *NVivo* qualitative data analysis software (QSR International, Burlington United States) [110], I coded the remaining 13 interview transcripts. The 29 first-level codes in the coding template were sufficient to effectively code the remaining data, thus I did not make additional changes to the template. Once I had coded all 15 interviews, I generated 'node reports' for each of the seven second-level codes and exported these reports from *NVivo* for subsequent analysis in MS Word. This step in the analytic process involved reviewing all coded excerpts – from all 15 interviews – for each of the second-level codes and their corresponding first-level codes. To do so, I developed seven data matrices (one for each of the second-level codes) with the goal of highlighting key notes and takeaways, as well as sample quotes pertaining to each of the first-level codes [106,111]. A sample from one of the data matrices I developed is in ***Table 3***.

Table 3. Second-level Code 3 – Approach to policy document development and evidence synthesis. *This table depicts a portion of the data matrix prepared to organize the key notes, takeaways, and example quotes pertaining to one of the second-level codes in my coding template. This table also depicts an example of a sub-theme being created (i.e., 3.1.1 How and why to establish clearly defined terms of reference).*

First-level code	Key notes and takeaways	Key quotes
3.1 Importance of clearly defined terms of reference (policy document objective)	**3.1.1 How and why to establish clearly defined terms of reference** - Meet with policymakers beforehand to establish terms of reference. What are they trying to accomplish? What is the scope? What is the policy context? Etc. (**P10**) - Establishes key definitions or pertinent terminology to be used (**P4**)	"We often receive problems and questions that aren't well formulated. So, we do a lot of public consultation with different levels of policymakers and civil society members and other researchers to best understand what they are facing as a policy problem. And what are the kinds of policy documents that will be more useful for each stage?" **– P10** "the key thing that's either, that requires that iterative process is really some understanding of key definitions, or, I guess, understanding what 'universal' means. So 'universal' might mean one thing compared to someone else's interpretation on 'universal'." **– P4**

Organizing the coded interview excerpts into these matrices facilitated subsequent cross-interview comparisons, whereby I searched for commonalities (and differences) between participants' responses with the goal of capturing different perspectives [111]. After multiple iterations of reviewing the matrices, and seeking feedback from my supervisors, I organized the data into five overarching themes, each with several levels of subthemes. This hierarchical theme structure is commonly used in template analyses [108]. Subsequently, I developed a thematic map to visually represent the interrelationships between these five overarching themes [107,111].

Throughout the analytic process, I took various steps to ensure the quality of my work. First, it was important to remain as objective as possible when analysing the data so that my findings were representative of the participants' experiences and perspectives rather than my own potential biases. For example, I actively sought-out negative or diverse cases – where a minority of participants expressed a thought, belief, or perception which differed from the majority – to increase the robustness of my findings and strengthen my overall analysis by minimizing influence of confirmation bias on any inferences I made from the data [112]. One such

example of a diverse case was that while most participants were aware of the notion of predatory journals and could describe them (in varying degrees of detail), one participant had never even heard of the term 'predatory journal'. This discrepancy was important to note because it highlighted the breadth of knowledge and expertise amongst those who produce policy documents and provided one potential explanation for why predatory journals are often cited that may have otherwise been overlooked (i.e., a lack of awareness of their existence).

Second, to ensure that my interpretation of the data was representative of the participants' experiences and perspectives, and not of my own biases, I regularly sought feedback from, and discussed my findings with other individuals within my research team (i.e., my supervisors). Additionally, I worked closely with my supervisors when developing my coding template, which allowed me to benefit from the expertise of experienced qualitative researchers and increase the robustness of my findings by considering external perspectives.

Third, I have supported my findings and claims with strong evidence directly from the data (i.e., meaningful direct quotes from participants) [107] – these are provided in the results chapter. Fourth, I have ensured the quality of my thematic analysis by going beyond simple description of the data to provide meaningful inferences regarding how the created themes help to understand and explain how individuals and organizations involved in producing public health policy documents source and evaluate the information they cite [107]. Finally, I maintained transparency throughout the entire study by clearly documenting my process (e.g., using memos, noting any changes made) [105], as well as reporting my findings using the COREQ reporting guideline [113]. A completed COREQ reporting checklist is available in ***Appendix B***.

Chapter 4: Results

Part 1 – Cross-sectional Synthesis and Characterization of Public Health Policy Document Characteristics

Policy Documents

This comprehensive search of the Overton database identified 1226 policy documents with at least one citation to an article published by the OMICS group. Of these, all duplicate records (n=144) and all records not meeting our definition of 'policy document' (n=127) were removed. All documents produced prior to 2012 (n=20) were also excluded. Of the remaining 935 records, several additional records were also excluded because either the policy document PDF (n=31) or the PDF for the cited OMICS articles (n=50) were not found.

The remaining records all met the criteria for the broader Overton study (n=854). As planned, I then further narrowed the sample of documents for my thesis-specific cross-sectional study by excluding all policy documents not written in English or French (n=54), as well as those that did not pertain to 'public health' policy (n=564). Abiding by these criteria, 242 public health policy documents were included in the final sample. The algorithmic process used to identify this final sample of documents is depicted in ***Figure 1***.

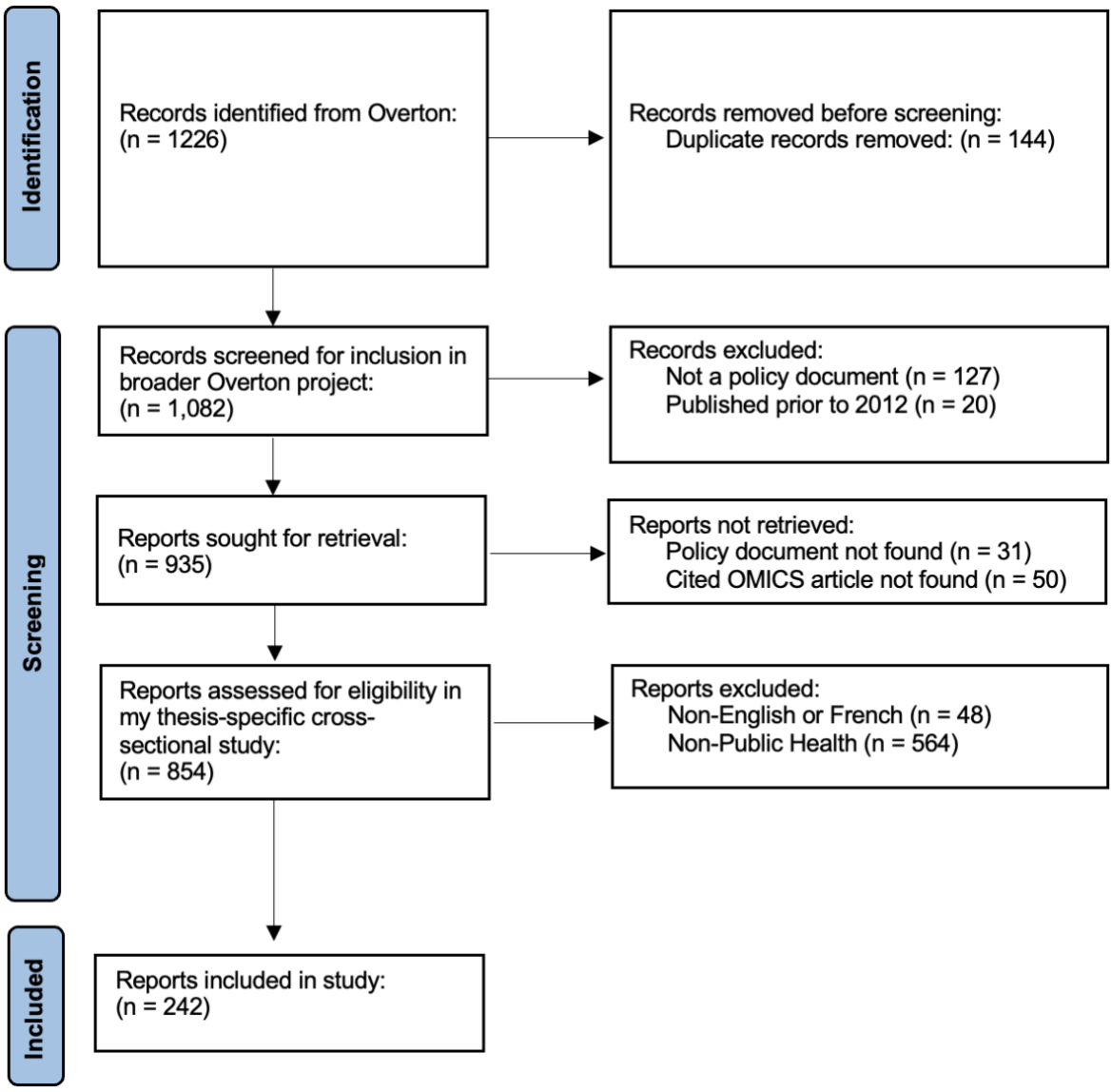

Figure 1. Flow diagram depicting inclusion/exclusion criteria for screening of policy documents. *Policy documents with at least one citation to an article published by the OMICS group were retrieved from the Overton database. The two-step screening process involved first identifying documents that were eligible for inclusion in the broader Overton study (n=854), followed by identifying the documents eligible for the final thesis-specific subsample (n=242). The flow diagram is adapted from the PRISMA Statement, 2009* [114].

Among these 242 public health policy documents with citations to articles published by the OMICS group, the United States of America was the most frequent country of origin, accounting for 55 (22.7%) of the documents. ***Figure 2A*** depicts the geographic distribution of policy documents by country of origin.

These documents were produced by a variety of organizations, which fall into one of four categories: government, intergovernmental organization (IGO), think tank, and other. Of these, 107 documents were produced by government bodies; the Publication Office of the European Union being the most common government source (n=16). Seventy policy documents were produced by IGOs, with the World Health Organization (WHO) being the most common individual source. In fact, the WHO was the most common source across all categories, accounting for 45 (18.6%) of the policy documents. Forty-six policy documents were produced by a variety of think tanks from several countries. Additionally, 19 policy documents came from other sources (i.e., Analysis and Policy Observatory, PubMed Central). A breakdown of the policy documents frequency by source is depicted in ***Figure 3.***

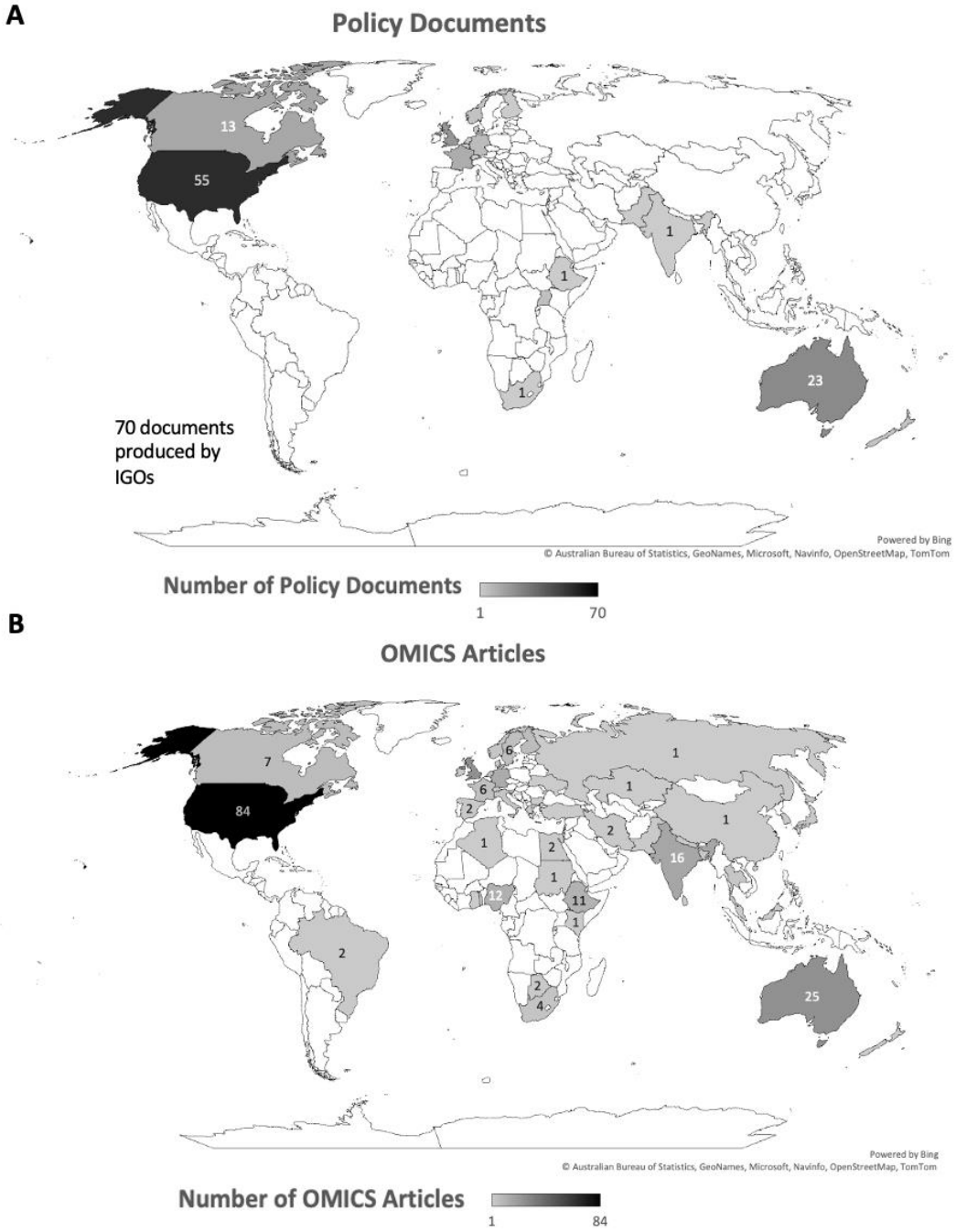

Figure 2. Countries of origin for Overton policy documents and cited OMICS articles. (A) *Heatmap depicting the distribution of public health policy documents by country of origin (n=242). Documents produced by Intergovernmental Organizations (n=70) do not appear on map A.* ***(B)*** *Heatmap depicting the geographic distribution of OMICS articles cited by public health policy documents by country in which the article's corresponding authors' primary affiliation is located (n=283).*

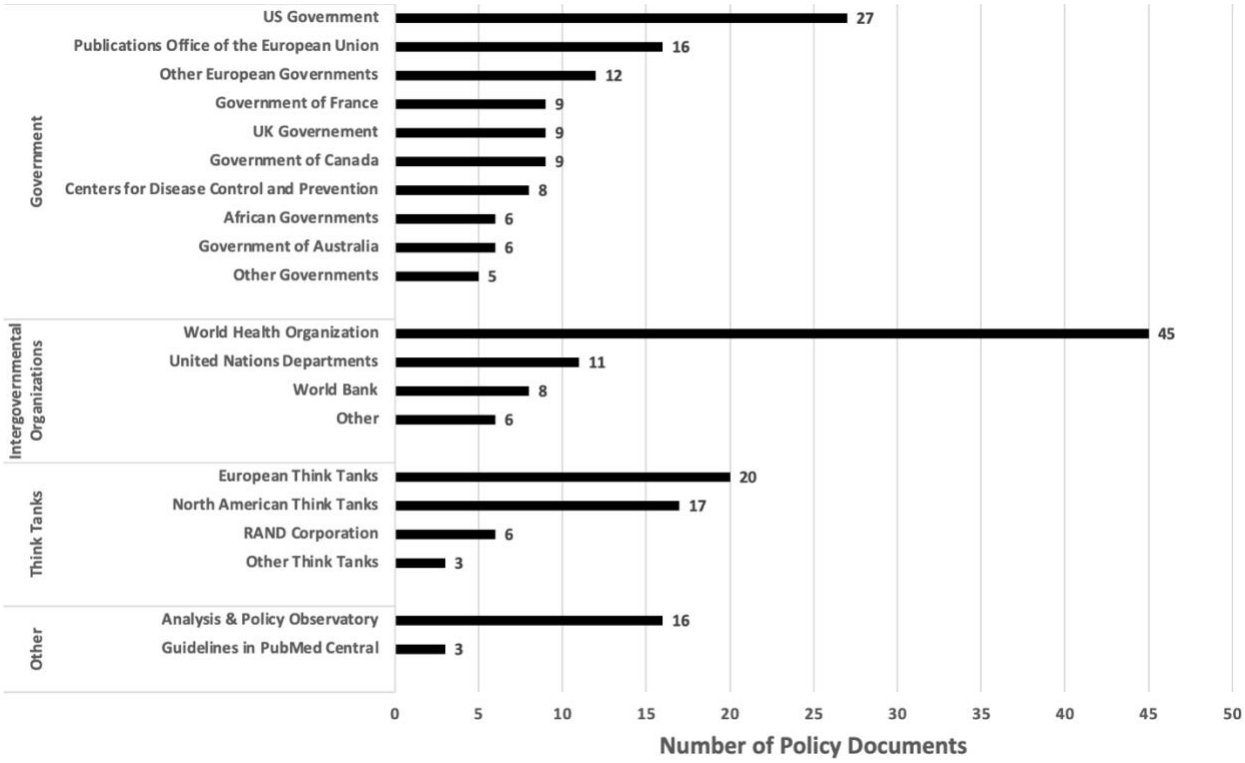

Figure 3. Sources of Overton policy documents with citations to OMICS articles. *Depicts the distribution of public health policy documents by source type (i.e., government, intergovernmental organization, think tank, other) and source name (n= 242).*

Most policy documents (n=221, 91.3%) included only a single OMICS citation; however, 15 documents included two OMICS citations and six documents included three citations. Most policy documents (n=188, 77.6%) also did not describe their method of selection methodology for their cited sources in detail, while only 22 (9.1%) of the documents assessed the quality of their cited sources. Additionally, the corresponding author's contact information (i.e., email address) was collected from 138 (57.0%) of the policy documents; 119 unique email addresses remained after duplicate removal.

Cited OMICS Articles

A total of 283 unique OMICS articles were cited across the 242 policy documents. The publication year of these articles ranged from 2007-2019, with 280 (98.9%) being published between 2009-2019. The cited articles were produced in six different continents. As was the case for the policy documents, the United States of America was the most common country of origin, accounting for 84 (29.7%) of the cited articles. The number of contributing authors listed on these articles ranged from 1-25, though most articles were authored by two individuals.

Most of the cited OMICS articles pertained to health-related topics, with public health (n=160, 56.5%) and clinical medicine (n=60, 21.2%) being the two most common subject categories. Additionally, 22 (7.8%) of the OMICS articles were not health related. Refer to ***Figure 4*** for a full breakdown of the cited articles by subject category. The 283 cited articles were published by 124 different OMICS journals, 25 of which received three or more citations. The three most cited journals were the *Australasian Medical Journal* (n= 22), the *Journal of Addiction and Research Therapy* (n=17), and *Neuropsychiatry* (n=12). Refer to ***Appendix D*** for a complete list of these top 25 most-cited OMICS journals.

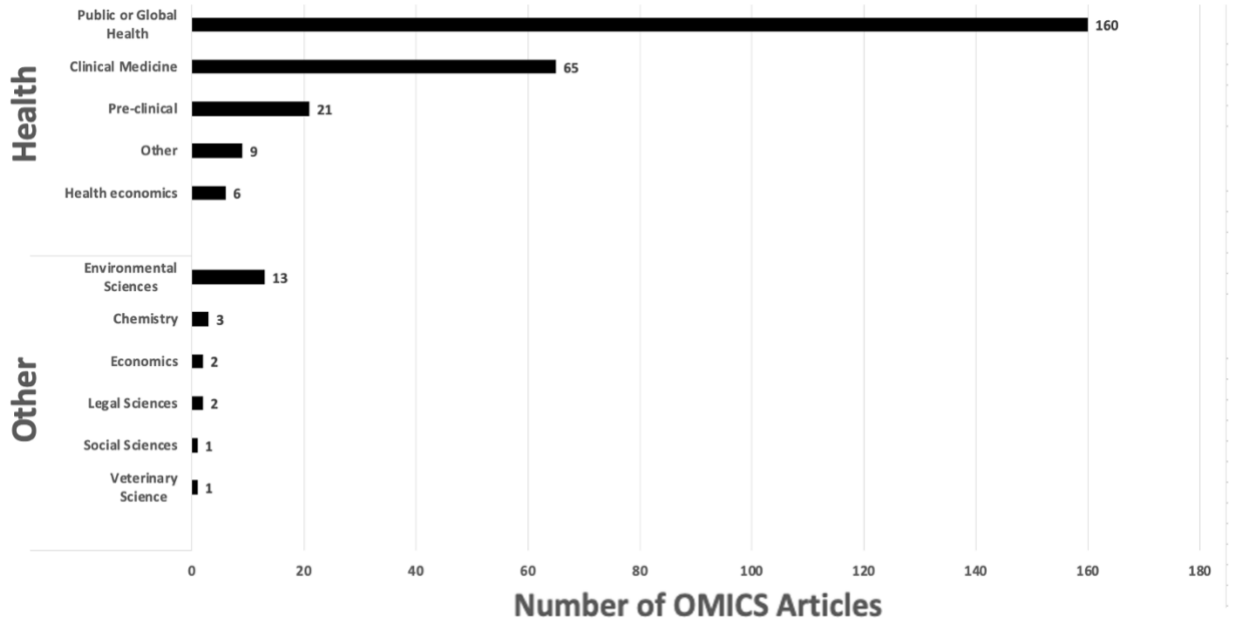

Figure 4. Subject category of cited OMICS articles. *Depicts the breakdown of cited OMICS articles by subject category (n=283).*

Observational studies were most frequently cited (n=86, 30.4%), followed by narrative reviews (n=48, 17.0%) and opinion pieces (i.e., commentaries, editorials), (n=45, 15.9%). Among those for which it would be expected, the cited studies rarely reported receiving, or even mentioned ethics approval. For example, 54% of the cited clinical trials and 67% of the cited case reports did not report receiving ethics approval or patient consent to report, respectively. Additionally, only 48% of the observational studies reported receiving ethics approval – this excludes the studies for which ethics approval would not be applicable (i.e., secondary data analyses) (n=14). A full breakdown of the OMICS articles by study type is depicted in ***Figure 5.***

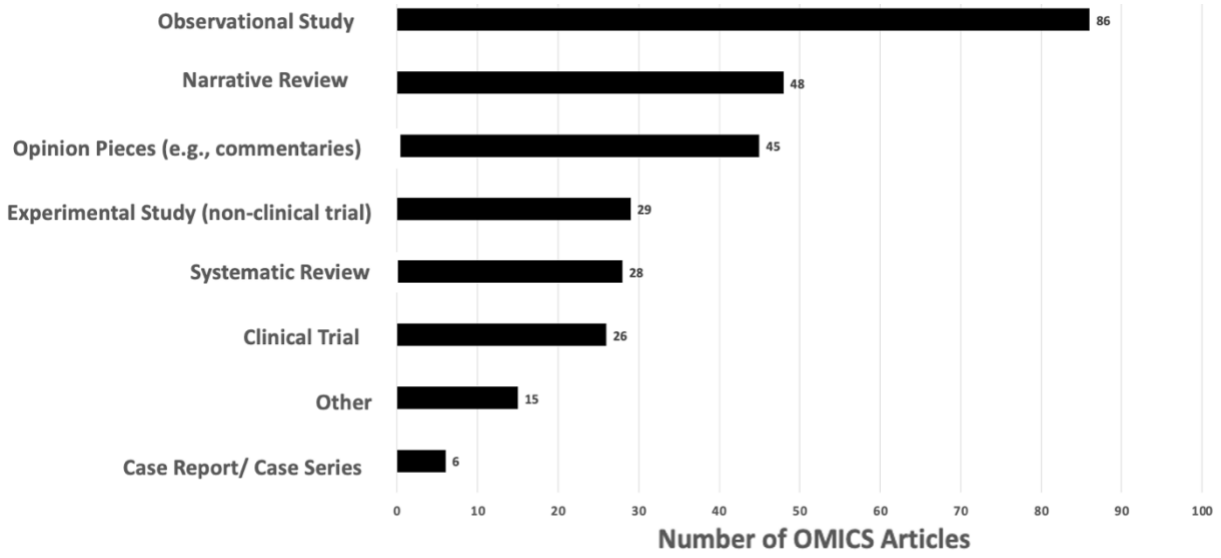

Figure 5. Study publication type for cited OMICS articles. *Depicts the breakdown of OMICS articles cited by public health policy documents (n= 283).*

The OMICS articles were cited in the policy documents in various ways. Most were cited in background information or in the description of the context of the relevant public health topic (n=202, 71.4%). This said, 23 OMICS articles were used in a quantitative manner (e.g., included in a meta-analysis). Nine OMICS articles were excluded from the policy documents despite having been identified during the literature search used to prepare said documents. In other words, these OMICS articles were relevant (in terms of subject matter) and thus cited as articles which were identified during the literature search, but later excluded from the sample used for a meta-analysis presented in the policy document. I then looked for the reason for exclusion of each of these articles and found that common reasons included not meeting all eligibility criteria or having low critical appraisal scores. Though interestingly, none were excluded because they came from a predatory journal. In fact, none of the policy documents in the sample mentioned the terms 'predatory journal' or 'predatory publisher'. Additionally, 49 of the OMICS articles

were in the reference list of policy documents but not cited in text, thus making it unclear how they were used.

The findings of this cross-sectional synthesis demonstrated that public health policy documents with citations to predatory journal articles (i.e., articles published by the OMICS group) are produced by a variety of individuals and organizations across several countries. Many of these organizations are highly regarded and heavily relied-upon in the policy space (e.g., the WHO). These policy documents included citations to a variety of different study types published by OMICS, many of which were of questionable quality (e.g.., clinical trials that did not report ethics approval), which raised concerns about how these studies came to be cited. The policy documents lacked relative transparency regarding how their cited information was sourced and evaluated. Thus, fully grasping this issue required understanding the experiences, behaviours, and perceptions of individuals directly involved in producing these documents. To this end, I expanded on the findings of Part 1 with an in-depth qualitative interview study.

Part 2 – Qualitative Interview Study

In this section, I present the results of my thematic analysis of semi-structured interviews with individuals who prepare public health policy documents.

Participant Recruitment

Of the 119 recruitment emails I sent out, twelve individuals/organizations declined to participate, 15 email addresses were unreachable, and 84 did not respond. Eight individuals indicated an interest in participating, of which, six ended up participating in the study – the other

two did not provide their availability and failed to respond to my follow-up email to schedule an interview. I obtained one interview participant via snowball sampling through a recommendation from one of the first six. The eight remaining interview participants were recruited via convenience sampling, which was facilitated by my thesis supervisors' connections to individuals in the evidence-based policy development space. A flow diagram depicting participant recruitment is in ***Appendix E***.

Participant Demographics

The 15 individuals who participated in this interview study (interview duration ranged from 25-84 minutes) were from six countries: Australia (n=5), Canada (n=5), Brazil (n=2), Columbia (n=1), Denmark (n=1), and the Philippines (n=1), and were all affiliated with either government organizations (n=4), academic institutions (n=8), or private think tanks (n=3). They had various professional roles, including academics (i.e., researchers; information specialists; medical librarians) (n=8); government/policy experts (i.e., public servants; population health advisors) (n=5); and communications experts (n=2), and all participants possessed either master's (n=6) or doctoral (n=9) degrees. Participants worked in a variety of disciplines and fields of study: social sciences and humanities (e.g., psychology, other social sciences; philosophy) (n=3); health (e.g., public or community health, medicine, health technologies and assessments, clinical epidemiology) (n=9); and publication science or library/information studies (n=3). Participants also had various amounts of experience with policy documents, ranging from five years to 30+ years.

Table 4. Demographic characteristics of interview study participants (n=15).

Demographic Characteristics		
	Number of participants (n)	**Frequency (%)**
Country		
Canada	5	33
Australia	5	33
Brazil	2	13
Denmark	1	7
Columbia	1	7
Philippines	1	7
Type of affiliation		
Academic institution	8	53
Government organization	4	27
Private think tank	3	20
Professional background		
Health (public or community health, medicine, health technologies and assessments, clinical epidemiology)	9	60
Social Sciences and Humanities (psychology, other social sciences; philosophy)	3	20
Publication Science or Library/Information Studies	3	20
Education level		
Doctoral degree	9	60
Master's degree	6	40

Using thematic analysis, participants' responses to semi-structured interview questions were organized into a hierarchical theme structure – including five overarching themes, each with several levels of subthemes. An overview of this theme hierarchy is provided in ***Appendix F.*** Below, I provide a narrative synthesis of the themes generated from this interview data, 1. An overview of the policy document development process as described by participants; 2. A description of those involved in producing policy documents; 3. An outline of the strategies used to source and assess cited research evidence; 4. An account of the reported obstacles to evidence-based policy document development; and 5. The importance of maintaining transparency throughout all stages of development. ***Figure 6*** shows a thematic map depicting the names of, and interconnections between these five themes, as well as how they relate to my research questions. A summary table highlighting the key takeaways and example quotes pertaining to each of the themes is available in ***Appendix G***.

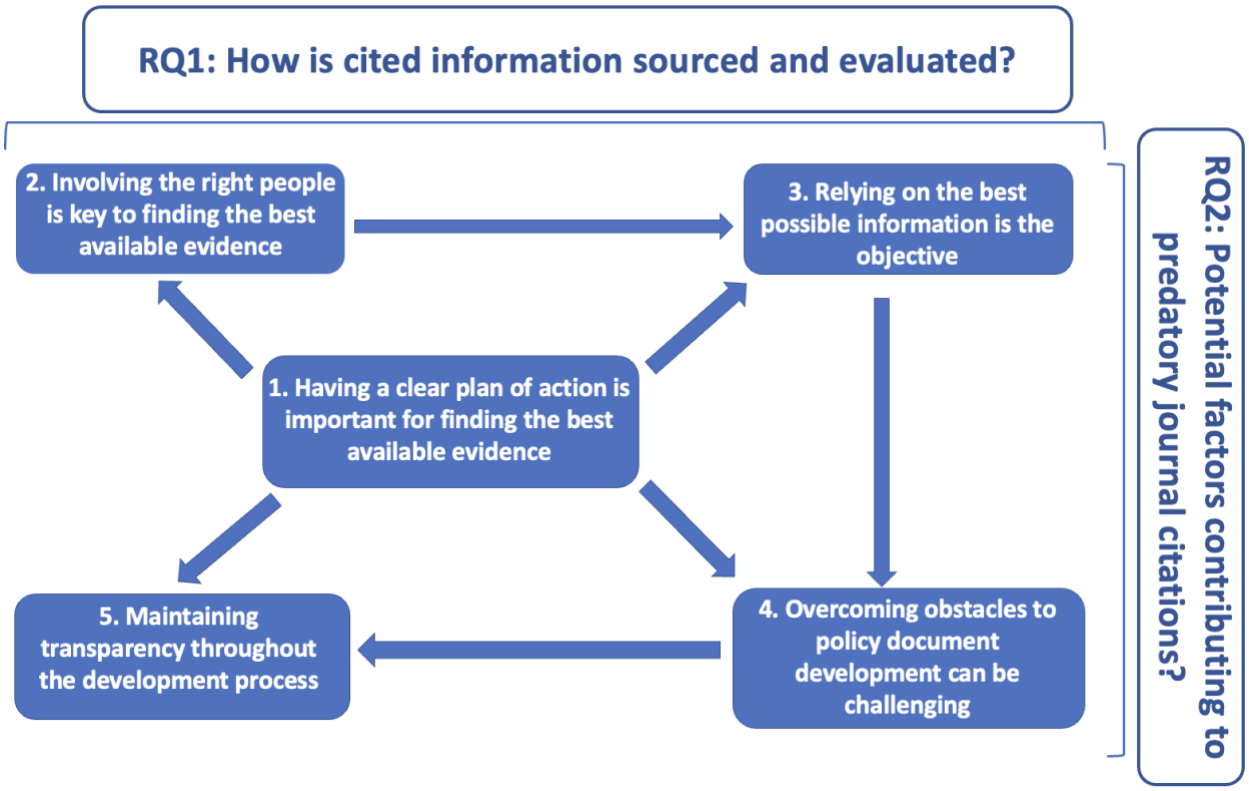

Figure 6. Thematic map. *Depicts the interconnections between the five overarching themes of public health policy document development generated by thematic analysis of 15 semi-structured interviews with individuals involved in the development process. Theme 1 outlines key contextual information for the policy document development process; Themes 2&3 directly answer my first research question (RQ1) by describing how evidence cited in policy documents is typically sourced and evaluated; Themes 3&4 answer my second research question (RQ2) by outlining potential factors that could contribute to predatory journal citations; and Theme 5 highlights the notion that maintaining transparency can help mitigate some of the potential negative consequences of citing untrustworthy sources.*

Theme 1: Having a clear plan of action is important for finding the best available evidence

The first theme generated throughout this interview study emphasized the importance of establishing a plan of action and having clearly defined objectives prior to policy document development because these can directly impact how evidence is found, evaluated, and ultimately selected for inclusion in the policy document.

1.1 Policy document objectives and role in evidence-selection

When asked to briefly describe the policy document development process, participants unanimously emphasized the importance of establishing a clear plan of action prior to beginning subsequent document development steps (i.e., literature search and review, evidence synthesis, etc.). Often referred to by participants as the 'terms of reference', this plan of action is developed to clarify the scope and objectives of the policy document and ensure that all parties involved (e.g., researchers, funders, end-users) are on the same page. Additionally, these terms of reference are important for establishing clear definitions of pertinent terminology, especially in cases where specific terms may have different meanings depending on the context.

According to participants, the terms of reference have a significant impact on the policy document as they influence all subsequent steps of its development, including which synthesis method to use (e.g.,., rapid review vs systematic review), where to look for relevant research evidence (e.g., academic literature vs grey literature, specific jurisdictions), which type of research to seek out (e.g., specific study types), and which personnel will be required to develop the document efficiently. One participant noted how methods can vary by document:

> *Okay, so, we try to develop different types of documents, regarding who are we trying to inform or regarding… who the document is for… so our methods change on the type of documents that we include in the report that we are doing.* ***– P11***

Participants also reported that defining these objectives *a priori* helps to establish clear, reasonable expectations for the resulting policy documents. These include expectations about timelines and feasibility of the project. Rapid reviews, for example, while useful for quickly developing evidence syntheses, often do not employ the same level of rigour as full systematic reviews. A participant described the importance of setting expectations about the methods used:

> *…to establish a very reliable relationship, we need to have conversations … to explain … what is*

> *a rapid review. How [can] you use this product? Because at the beginning, sometimes people have very high expectations about [rapid reviews]. 'What do you provide for me, is it the answer [to] all my problems?', and we need to explain it's just an input, it's just one thing to support [a] more informed discussion.* ***– P12***

One participant described the difference between 'evidence-based policy and policy-based evidence', noting that while terms of reference should guide evidence synthesis, it is critical for resulting recommendations to be based on an objective review of all pertinent evidence (as much as possible), rather than cherry-picking research which supports a particular narrative (i.e., 'policy-based evidence'). Another participant noted that the recommendations they formulate within a policy document may be influenced by the lens through which they evaluated the data. Thus, the same set of data may yield different key findings and/or recommendations depending on the initial objective of the policy document.

> *Like, let's say, if I'm sitting inside [organization] and developing a policy, [organization] has a mandate and then maybe my branch, if it's infectious disease vs chronic, has a sub-mandate… when I'm assessing evidence within [organization], I'm assessing it within the lens of that mandate, so… I can look at that same data if I'm in a different agency who has a mandate and I might weigh things differently and even come to a different recommendation. And I think again, when you're developing guideline documents, that's one of the key things to remember, whatever part of the process you're in for, like what are you developing? Because it shapes the entire process.* ***– P14***

1.2 How to ensure the objectives are effectively met

Participants shared several strategies they employ to meet the policy document's objectives. Some organizations have 'foundational documents' which act as guidelines for those who produce policy documents to follow and help ensure uniformity across all policy documents, while others use a 'research agenda' to meticulously track each step in the process. Several participants reported that the timeliness (i.e., current popularity of the policy topic) of policy document development is a key factor influencing whether objectives can be met. For example, one participant noted that if other policy groups (especially large, influential ones) are

concurrently working on the same policy issue, document development can often be facilitated by incorporating their research:

> *You know, there isn't maybe the time you'd like to do full systematic reviews, but we lean heavily on, I mean everybody in the world is working on COVID right, so we lean heavily on systematic reviews done by other groups.* ***– P13***

In addition, participants often mentioned the importance of ensuring that the intended end-users are also interested in the potential policy issue(s) being covered. This was especially important when working on non-commissioned projects (as opposed to projects where individuals/groups have been specifically hired) because a common interest from stakeholders greatly facilitates securing sufficient funding, resources, and personnel for the project.

The most frequently reported strategy for ensuring that the policy document's objectives are met was the use of an informal peer review process. Participants reported several different ways of implementing peer review; however, the approaches described can be organized into three categories: expert review, internal team review, and stakeholder review.

The 'expert reviews' are done by policy or content experts who ensure the document contains high quality information (approaches to evidence assessment are further described under *Theme 3.2*); the 'internal team reviews' are performed by other members of the research or policy development team, with the goal of verifying that the policy document is consistent with its *a priori* terms of reference; and the 'stakeholder reviews' are carried out by end-users (i.e., policymakers) to get their input regarding the clarity of the presented findings and recommendations. Most participants reported the use of at least one of the informal peer review approaches:

> *The documents that we produce… are reviewed by an expert in the field, not an expert on the methods or something like that, so an expert on the policy issues that were dealing with, we sometimes send it to a policymaker to review it before we have the end product.* ***– P11***

> *Even the public policy reports nowadays, at least they are peer reviewed by experts, so they can really assess the evidence well. …. So, I think that in that sense, I'm very happy to hear that even policy documents are also peer reviewed.* ***– P7***

Theme 2: Involving the right people is key to finding the best available evidence

All interview participants shared the belief that policy document development, in its ideal form, should be a highly collaborative endeavour whereby different parts of the process are delegated to various individuals (or groups) with different expertise (e.g., methodological competencies vs policy expertise) to ensure the selection of the best available evidence. The importance of both methodological competency and topic expertise are highlighted in the following quote:

> *I think this work requires you understand about evidence. In other words, you need to have a methodological competency to develop these products, to disseminate these products, to make these products as very friendly products to be used. In other hand, you need to understand about policy. Okay. And if you just deal with the policy, or just deal with evidence, you have uncomplete work –* ***P12***

2.1 Policy documents are developed by various individuals/interprofessional teams with a wide range of methods training

A common theme across all 15 interviews was that public health policy documents are produced by a variety of individuals with varying educational backgrounds (i.e., undergraduate to doctoral degrees), areas of expertise (e.g., academics, policy experts, communications experts), and levels of experience. Participants emphasized the importance of diversity in expertise because policy documents take on various forms and undergo several distinct stages of development, including literature searches, review and assessment, evidence synthesis, and more, each of which demands different skills and knowledge. Interestingly, while many

participants reported receiving formal training in research methods (e.g., literature search and review), albeit in different forms, others reported feeling that their training was incomplete. For example, one participant noted that adequate training may not be readily available for individuals in some disciplines, while another shared that while they had received training on overall literature search approaches, they learned the nuances of policy document development "on the job" (e.g., which databases to search).

> *So, I mean, I kind of learned, had to learn how to do it. I think outside of very specific disciplines, it's very hard to get good pedagogical instruction about how to write a useful recommendation.* ***– P1***

> *So yeah, a lot of it is on the job. We get more training during the degree on um, overall approaches for searching and how to be systematic and how to be comprehensive and where to look. …. But then maybe specifics on like what databases to use? What's a good source? What are they less interested in? That's on the job.* ***– P6***

However, other participants were not only trained in various research methods (e.g., systematic reviews, scoping reviews) but also reported having formal training in the quality appraisal approaches associated with some of these methods. For example:

> *I am trained in, and I have trained a lot of people in conducting proper research for either rapid reviews or evidence syntheses… I also am the person that still does most of the quality appraisal of included studies, because … I have been properly trained for that… I have done many systematic reviews, and also scoping reviews … I've been trained in conducting rapid reviews, and evidence syntheses. And we've done, maybe over 50 or 60 now, … so, I have experience with these different methods.* ***– P10***

Given the importance of methodological competency for ensuring effective policy document development, multiple participants reported actively recruiting experienced researchers to collaborate with when developing these documents. Several participants also mentioned situations where less experienced individuals were involved, in which case, they facilitated the necessary training for them. For example:

> *You know, over the last few years with COVID, we've really struggled to staff projects with graduate students …who've got capacity and space to do this work. So, we have to sometimes even work with undergraduates and train them up.* ***– P3***

2.2 Important to be as well-versed on the topic as possible

Participants unanimously agreed that being as well-versed as possible on the topic greatly facilitates effective policy document development – this applied to both policy knowledge and field of study knowledge.

Possessing in depth knowledge of the key policy issues and context was described by several participants as important for developing and honing policy document objectives, as well as for informing literature search strategies. Participants reported using certain strategies to help maximize their familiarity with the relevant policy issues, including conducting scoping reviews of the academic literature and consulting stakeholders with policy expertise (discussed further under *Theme 2.3*). The following quote is one example demonstrating this sentiment:

> *I think definitely, we need to understand the current context. So, context analysis is very important, we usually do literature review, looking at you know, what are the studies out there? What are the issues that we are confronted with, that we thought would need some solutions?* ***– P8***

Most participants also expressed that familiarity with the research landscape is critical because it helps inform search strategies by knowing which are the 'best' places to look – a sentiment well-highlighted in the following quote:

> *For instance, I would have conversations with information specialists in [toxicology] where I have a lot less content expertise and I would be able to be less critical… I would say 'we should be doing a minimum of X databases, and the database search is this' but they would say 'oh, well we aren't searching that database you brought up because we can tell you it has like 98% the same coverage as this database and it almost never identifies a study'* ***– P14***

Additionally, having a strong understanding of discipline-specific conventions was also described as important for evidence assessments. Being able to decipher 'good' from 'bad' evidence can be challenging without sufficient expertise regarding the research discipline at hand. Many participants noted that much of this 'expertise' simply comes from experience working in the field and gradually developing an understanding of what should or should not be relied upon. Approaches to evidence assessment are described in further detail under *Theme 3.2.*

2.3 Importance of gathering stakeholder perspectives during the development process

Several participants described the practice of gathering stakeholder perspectives and input to facilitate policy document development. The specific stakeholders with whom these consultations occur varies, but they usually include researchers, industry members, fundings bodies, policymakers, and members of the public who may be directly impacted by the resulting policy recommendations. For example, one participant mentioned an instance where they decided to conduct an impromptu series of interviews with local adolescents to get their perspective on the issue at hand because they felt that despite the impending policy recommendation having potential direct implications for them, they had been excluded from the conversation up to that point.

Gathering stakeholders' perspectives was described as a continuous and iterative endeavour that occurs at multiple stages throughout the policy document development process. Some participants reported doing so prior to development (e.g., to help establish terms of reference; understand the policy context; and determine the best suited development methods). Other participants noted that obtaining feedback from stakeholders during development can also be beneficial. Various approaches were described for this; however, one noteworthy example

included using 'citizens panels' or 'stakeholder dialogues' as a form of data triangulation to increase the robustness of recommendations. Additionally, some participants emphasized the benefit of post-development informal peer review (as described under *Theme 1*) to help ensure their document meets its original objectives and that it is devoid of any major flaws. This was captured by a participant in the following quote:

> *We do the citizens panel and stakeholder dialogues, which I think in terms of the work that we do, that adds a little layer of trustworthiness to the work, right. This type of, this kind of I don't know triangulation of we do the review of evidence, we produce a document, we do citizens panel, which is like a focus group. And then we do a stakeholder dialogue.* ***– P11***

Theme 3: Relying on the best possible information is the objective

The third main theme reflected the emphasis participants placed on the importance of relying on the best possible information – for which they described several approaches to identify and evaluate evidence.

3.1 Literature search strategies and objectives

Interview participants described three main approaches to literature search and review: systematic reviews, narrative reviews, and scoping reviews; and they all specified that the approach adopted depends on the policy document's objective. Systematic reviews for example, were described by most participants as the ideal approach to follow because of their comprehensiveness and rigorous evidence assessments. One participant even explained how systematic reviews can be used in more contexts than many people believe, as is demonstrated by the following quote:

> *And that general advice was to use rigorous evidence synthesis methods, like systematic reviews… the evidence synthesis methods that we use in general, they mirror, they've largely been based off Cochrane methods… but for public health, a lot people think that these methods don't apply cause they were developed in clinical and that's often one of the myths that we have to get by…* ***– P14***

Yet, participants also reported several limitations to systematic reviews (e.g., very time and resource intensive) which are further described under *Theme 4*.

Another common approach is the narrative review, which participants reported often using in cases when there are time or resource constraints. According to participants, these reviews allow for more freedom than systematic reviews but lack some of the rigour, as is demonstrated by the following quote:

> *We're not, they're not, you know, described as being a comprehensive, exhaustive search, like there's none of those claims that a systematic review can make, right. There's no critical performance, critical appraisal, or evaluation of the included sources. You just got to trust our best judgment you know, and we've tried to caveat it as much as, as appropriate. I won't to say as much as possible, but as appropriate.* ***– P5***

The other main approach discussed by participants was the scoping review, which was described as ideal for situations where little is known about the policy landscape or when trying to identify gaps in the literature.

Participants reported relying on academic literature more often than any other type of literature. When asked which databases they usually search, most participants stated the "regular ones" – the most common being PubMed (MEDLINE), EMBASE, and Epistemonikos. Notably, all participants agreed that one of the main reasons for searching these large, popular databases was because they contained reliable evidence. Several participants reported conducting ad hoc Google searches as well. The following quote demonstrates the commonly reported strategies regarding where to search for academic literature:

> *We can go to a specific database like these databases that already have pre-appraised evidence, like health systems evidence, social systems evidence access, which we already have pre-apprised the evidence that they included, that's, we start there and we always, we always go to Epistemonikos. That one doesn't have pre-appraised evidence, but it's very comprehensive. And then we go to the regular ones like PubMed or Embase to complement the search.* ***– P11***

In addition to relying on specific databases, some participants also reported prioritizing certain study types. Approximately one third of the participants shared that the 'hierarchy of evidence' often informs their search strategy. For example, some participants described existing systematic reviews as the gold standard for evidence. They also explained that in cases where existing systematic reviews are not available, they turn to primary studies, of which randomized controlled trials are ideal. One participant captured this in the following:

> *So, yes, so we've got what we call Level One study, which is this the systematic reviews. And then level two studies is randomized control trials, level three, comparative studies or case control. Level four, we've got a cross sectional study, so often that would be used as well. Those are generally the ones that are generally accepted. And again, it's often it's, it's, you know, if, for example, there's a really good randomized control trial, that might be sufficient.* ***– P4***

In contrast, two participants stated that while they are aware of the 'hierarchy of evidence', they do not typically prioritize randomized control trials or existing systematic reviews because they are not commonly available in their field of study.

> *Um, I mean, I know the pyramid of evidence and the RCTs and all that stuff, but I really don't care about RCTs so much.* ***– P7***

> *For some stuff you'll never find systematic reviews, somethings you'll never find a clinical trial on. So, you've got to take the evidence that's there.* ***– P9***

Additionally, another participant shared their belief that published narrative reviews should not be relied-upon for anything other than finding primary studies.

Aside from academic literature, all participants reported relying on certain 'alternative sources', albeit to varying degrees. The most frequently mentioned type was 'grey literature' – common sources being news articles, existing policy documents, and government documents.

> *So, you do the normal PubMed and Google Scholar, all of the scientific literature that we use. But I also think it's important to consider grey literature. So, a lot of policy, a lot of documents*

> *that can inform policy aren't published through peer review. They're held in government websites, or reviews or royal commissions. So, using that kind of evidence is important.* ***– P9***

There was also one participant who mentioned often relying on pre-prints of academic studies. Participants reported many different reasons for turning to grey literature, including a lack of relevant academic literature or because their funding body specifically requested for them to do so. Other participants noted that there were even certain instances where grey literature may be preferable to academic literature. This appears to be especially true when other groups or jurisdictions have previously worked on the same policy issue and may therefore provide useful guidance regarding the best approach to take.

As for additional 'alternative sources', two participants reported incorporating their own empirical research (e.g., interview studies) into their policy documents; however, they both noted that this was not intended to challenge the existing literature, but rather simply used to complement the findings of their academic literature reviews and/or fill gaps in the knowledge base.

Despite often relying on grey literature to partially inform their recommendations, several participants expressed concerns regarding such alternatives to academic literature. The main concerns stemmed from the fact that these sources can be difficult to systematically assess because the tools designed to assess academic studies are not sufficient. One participant mentioned that their organization has "grey lit checklists," which can help to some degree.

> *Like the whole use of grey literature, …once you really have to dive into government websites and government reports, and maybe some blogs with experiences, I don't think we have the proper tools to present that* ***– P10***

3.2 Evidence assessment

As was briefly mentioned in the previous section, once research evidence has been identified through a literature search, the next key step is to assess said evidence for inclusion in the policy document. Most participants noted a distinction between 'quality' and trustworthiness'. They typically thought of 'quality' of evidence as pertaining to the methodological rigour and reporting completeness of a given article. However, one participant expressed disdain for the term 'quality', noting that they prefer to think of it in terms of 'certainty of evidence'. On the other hand, 'trustworthiness' was seen as referring to the reputability of the source from which an article came (e.g., "honest to goodness" research, transparency about potential conflicts-of-interest). These perceived definitions of 'quality' and 'trustworthiness' are captured in the following quotes:

> *I actually hate the word 'quality'. Like, risk of bias is about systematic variation, it's very specific. I know when we develop new risk of bias tools for people, especially in new areas, they take anything that they think is important for 'quality' and just jam it into risk of bias, and they call it a risk of bias item. And it's like, that's not how any of this stuff works. that's just 'certainty of evidence'… And that's not the same as 'trustworthiness'… you want that trustworthiness, so things like conflict-of-interest statements for it… So, in terms of trustworthiness, that's the best thing that I can think of in terms of a process, it's the conflict-of-interest, but it also comes down to the brand.* ***– P14***

> *The quality, there might be some legitimate research, but the quality in terms of, you know, how the analysis has been done, or how the research was documented, can be an issue. And I think for me, trustworthiness is whether it's an honest to goodness research that has been conducted… So, so I thought those two are not the same. But of course, we expect that trustworthy research should produce quality outputs.* ***– P8***

In contrast, one participant did not distinguish between these two terms, believing them to be "one and the same" **– P4**, and stating that low-quality work is also untrustworthy. In either case, participants agreed that recommendations provided in policy documents can only be effective if all cited research is reliable, with one participant stating that "a few dodgy RCTs in there, can it change your bottom line? That's a real worry." **– P2**.

Among those who distinguished between quality and trustworthiness, most participants reported prioritizing quality of content over the source when evaluating research – a sentiment which was expressed in several ways. These included not caring about where research is published as long as they can access it; stating that they have never excluded any studies based on publishing journal; and that they prefer to determine if a given article should be included or excluded based on "what's inside the paper". Two participants captured these sentiments:

> *Do I care the fact that it's published or not? No, I don't care. Is the research real? Is it high quality? Did it meet the criteria? And I need access to it… That gets to the more, like who cares that it's published in a predatory journal? Do I care that it's published in a low impact factor journal vs a high impact factor? No, I don't. I just care about the research.* ***– P14***

> *I don't think we've ever specified the quality of the journal as an exclusion or inclusion criteria, we would accept all comers at that first pass. And then once we get inside the paper, we would decide, you know, based on what's inside the paper, whether it should be included or excluded –* ***P3***

There were some participants, however, who reported giving some consideration to the sources of information, stating that they typically check whether the study is coming from an established publisher. One participant also noted that current quality appraisal tools do not account for where something is published, but that they believed it should start being considered moving forward.

> *I would be tending usually to look also at the publisher of the journal, and whether it's an established publisher… So, it doesn't have to be Sage or Elsevier, if it's, you know, the University of Amsterdam has an open access publisher associated with it.* ***– P1***

Building on this notion of 'where cited information comes from', participants were then asked if they had ever heard of 'predatory journals', and if so, to describe what they knew about them. All but one participant had heard of predatory journals, and they collectively described them as using, but not limited to, aggressive or 'dopey' solicitation emails; limited or non-

existent peer review; and prioritizing financial gain over scholarship by taking advantage of the Open Access publication model – a model which all but two participants were able to distinguish from the traditional subscription-based journals. Several participants reported that predatory journals try to 'trap' junior authors and that usually "authors who are reputable wouldn't be publishing in predatory journals" **– P4**. Most participants also shared the belief that predatory journals are not indexed in the reputable databases (e.g., EMBASE, MEDLINE); however, a few others noted this was not the case.

> *And that's what I think people think of in terms of predatory, is that it's really a scam, and is a scam which is motivated by finances… the financial barrier to publish for a lot of people, and that extremely perverse and strong incentive to publish from people, and it's being taken advantage of… lots of people don't have the money to publish in Open Access journals, and so here's an avenue to do that potentially.* ***– P14***

When asked how they typically identify predatory journals, some participants mentioned that they were not exactly sure how to do so. One participant mentioned that while they were quite familiar with predatory journals, they were unaware of any effective checklists regarding how to identify them, and that even if such a list did exist, they did not have the "capacity or methods to search a list of predatory journals". Other participants, however, did describe various strategies for identifying these entities. Some reported using existing lists of predatory journals (e.g., *Beall's List)* or guidance tools such as the *Think.Check.Submit* resources, while others simply noted that they look for 'red flags' such as "grainy-looking pictures and spelling mistakes, and stuff like that" **– P13**.

> *That list I'm talking about, Jeff Beall's list, really had a lot of discussion around that. It was removed. I know there's another one now. I follow Scholarly, the Scholarly Kitchen… But one of the things I also use, if I'm in any doubt is the Think.Check.Submit resources, which are similar, like they overlap with the Scholarly Kitchen resources… or the Directory of Open Access Journals.* ***– P6***

Participants were then asked if they were aware of any instances where predatory journals had been cited in policy documents and what they thought the impact might be. The main concern raised by some participants was the potential for reliance on fabricated or falsified data. However, most participants agreed that while it would be ideal to avoid articles from predatory journals, occasionally citing them is inevitable and their impact would likely be minimal, with one participant stating:

> *I wouldn't be surprised if you went back and checked all the citations that there would be something… I would be more surprised, I think, if there was not a predatory journal cited in there to be honest with you… I think it takes like a lot of digging and a really keen eye to actually pick those things out. So, I don't think that it actually has that much of an implication to be honest. Like I think if you have a health policy document with eighty citations and one of them is from a predatory journal, I don't think it's the end of the world. It's obviously unfortunate, and you would like to try to avoid it, but I don't think it really matters that much to be quite honest.* ***– P13***

When asked how they approach evidence assessment, participants described several strategies. Most of the reported approaches can be placed into one of two categories: 1. Approaches to assessing the 'quality' of evidence, and 2. Approaches to assessing the 'trustworthiness' of sources.

3.2.1 Assessing 'quality' of evidence

Participants shared several strategies for assessing the 'quality' of their cited sources. Referring to it as a 'critical appraisal of evidence' or a 'risk of bias assessment', they described objective processes involving the use of established assessment tools. The specific tools varied between participants, but the most frequently reported were *A MeaSurement Tool to Assess systematic Reviews* (AMSTAR), the *Cochrane Risk of Bias* tools (RoB, RoB 2, ROBINS-I), and the *Critical Appraisal Skills Programme* (CASP). Several participants noted that many of these assessment tools require training and a certain level of expertise to use effectively.

> *… [I] am the person that still does most of the quality appraisal of included studies, because these tools are not super known in [country], and I have been properly trained for that… we teach in [country], but the quality appraisal is not something very easy to translate, because you have to understand so many steps until you get to the tools* ***– P10***

In addition, several participants mentioned their use of reporting checklists to verify that their included studies were compliant with the expected reporting practices. These checklists depended on study type, but those frequently reported were STROBE (observational studies), PRISMA (systematic reviews), CONSORT (randomized controlled trials), CHEERS (economic evaluations), and COREQ (qualitative studies). In addition, one participant mentioned the use of tools developed by the Joanna Briggs Institute to guide their assessment of qualitative studies but noted that qualitative studies are notoriously difficult to assess.

> *There's just a huge amount of information out there, as I say, much of it, almost all of it, is qualitative. Quite hard to do quality assessments on. ... So that's, that truly is a work in progress. … We were still learning about trying to find new and better ways of doing things. I certainly don't think that we've got there with the qualitative material.* ***– P2***

Of note, despite also relying on these checklists and viewing them as beneficial, one participant mentioned that reporting checklists may actually provide a template for some researchers to falsify their findings:

> *In some ways, I think we made it easier for some folks to fabricate it. Because we did a beautiful job, I think with CONSORT, laid it all out there. So, what do we do when we do our quality assessment, we say yes, we've got the right words. We did a double-blind randomized control trial. So, you know, you just pick it up from CONSORT and put it in your paper. Whether it's valid or not. Sometimes we don't know.* ***– P2***

Multiple other participants described applying a varying level of rigour to their quality assessments (i.e., it may be less rigorous/more relaxed when evidence is scarce).

> *One of the things that is difficult when working with multinational organizations that are interested in not only high-income countries, but also low- and middle-income countries, is that*

> *of course, there is a strong bias towards, you know, the US, for example. I mean studies in Africa, or, and that's a challenge… So, I often, I think that we are more lax when it comes to including articles from low- and middle-income countries.* ***– P7***

3.2.2 Assessing 'trustworthiness' of sources

In contrast to 'quality' assessments, assessing the 'trustworthiness' of sources appears to be a much more subjective endeavour. Among those participants who did assess the 'trustworthiness' of their sources, the most frequently reported metric was whether the publishing journal is 'high impact'. Several participants noted that a journal's 'brand' (i.e., its reputation as a 'high impact' journal) could often act as a proxy for the trustworthiness of the articles it publishes. Thus, participants tended to prioritize research published in large, reputable journals (*Nature, New England Journal of Medicine,* etc.). In keeping with this notion of 'brand' influence, several participants also reported relying mainly on well-known, reputable databases (PubMed, EMBASE, etc.) which are perceived as having "already filtered" the information and are thus unlikely to contain unreliable sources (e.g., predatory journals).

> *The word "trustworthiness" is important, like where are your trusted sources? Where do you go?... You're relying on you know PubMed, EMBASE, you're relying on these other filters that have already filtered and harvested information to get it… When you find trusted resources, it ties into the management and process side as well, because there's a reason why you would search only trusted databases outside of the fact that you know you're going to capture much of the literature in it, but also because you're going to be arguably, like PubMed should in theory not be a reservoir of predatory, low-quality work. Or should we do what some people suggested, like should we all source the New England Journal of Medicine for trials because obviously it's the best journal in the world, and it has a big impact factor?* ***– P14***

A few participants also mentioned that they often rely on research from authors/groups they recognize and whom they know "do good work". Peer review was another reported metric of trustworthiness "because it had gone through, you know, refinements, given the requirements of the journal" **– P8**.

3.2.3 Other measures used to assess evidence

Rather than assessing 'quality' and 'trustworthiness', some participants reported using entirely different measures to assess their cited evidence. For example, one participant described their measure of 'quality' as 'utility'. In other words, their priority when evaluating evidence was what purpose the information would serve and whether it would meaningfully contribute to their objectives. Another participant emphasized the importance of consensus within the literature, asserting that when multiple studies have reached the same conclusions, they collectively have higher perceived 'quality':

> *I guess it depends on not only the strength of evidence, but the number of studies that have been published in that particular intervention. Yeah, that also provides some weight as well.* ***– P4***

Additionally, some participants reported going beyond evaluating the individual studies which they are citing and assessing their evidence synthesis as a whole. The objective of this step is to evaluate the cumulative strength of the recommendations provided in the policy document (e.g., Does the document instill confidence? Is it sufficiently transparent?). To this end, participants reported following GRADE methodology (or GRADE CERQual for recommendations based on qualitative studies). Finally, although in the minority, a few participants reported that they do not typically perform any formal assessment of their evidence, but rather they simply read critically and rely on intuition and gut instinct to determine what they "believe is good research". One participant described:

> *I haven't done a formal evaluation of it. But I think you sort of learn what you can and can't trust, and just by reading critically, you can understand, you look at something and go, 'well, this doesn't make sense, I don't understand how they come to this conclusion. I have concerns about this'… So, I think it's about, yeah, it just is about according to what you believe is good research.* ***– P9***

3.3 Expert input to inform review

Given the complexity of conducting a comprehensive literature search and the skills required to appropriately assess research evidence, participants unanimously emphasized the importance of relying on expert input. For the literature search, participants commonly reported consulting information specialists for guidance (e.g., where to look for research; how to structure the PICO – a strategy commonly employed to format the research question for a systematic review by explicitly outlining the population, intervention, control, and outcomes of interest). In some cases, participants even reported outsourcing the literature search to an external group better equipped to conduct the search.

> *If you are not aware of the academic process of reviewing literature, I would say, consult people who are doing this kind of work in an in daily basis. And that's what I think, evidence-based public health policies, that's what they do.* ***– P7***

Expert input was also highly sought-after for the evidence assessment portion of the literature review. Some participants reported having regular discussions with content or methods experts to ensure that selected evidence was high quality and representative of the literature, while others stated that they rely entirely on experts to assess the evidence for them.

> *… one thing that we do, that we think is really important is following up with experts. And I think that is huge for the validity of it. And can also add to your trustworthiness and credibility and all of that… Or if you're hearing conflicting things in your search, then talking to a bunch of experts might help resolve either confusion or sort of triangulate what actually is going on, or verify that what you're finding is indeed, correct.* ***– P15***

Theme 4: Overcoming obstacles to policy document development

It was clear, across all interviews, that the policy document development process is littered with obstacles to overcome. Most participants described various barriers with respect to

accessing information, and several participants also noted challenges related to the overall complexity of developing an effective evidence synthesis. Subsequently, participants emphasized the importance of trying to overcome these obstacles as best as possible in order to limit the potential for downstream consequences.

4.1 Accessing information can be challenging

The importance of recognizing the limitations of search strategies, regardless of which approaches are taken, was commonly emphasized. To reiterate a point from earlier, there was consensus among participants that systematic reviews are the 'gold standard' literature review approach because of their ability to rigorously assess evidence. This said, several participants noted two key limitations to systematic reviews.

The first being that conducting a systematic review is an arduous, time consuming, and resource intensive endeavour which also requires a certain level of methodological expertise to conduct properly – luxuries not often afforded to those producing policy documents. One participant elaborated specifically about how time constraints often hinder one's ability to properly conduct a systematic review:

> *… working with government… sometimes it's, we need this in three months. So, to do a systematic review can be really challenging to get everything together and understand the whole picture. So, you might do more of a comprehensive review, or a narrative review, or rapid review…. one of the issues of policy development is how often it's done on the fly.* ***– P9***

The second key limitation to systematic reviews, as reported by participants, was that they can limit the researcher's ability to capture key contextual information from alternative sources. For example, one participant stated their reluctance to use systematic reviews for policy documents, despite them being the gold standard, was because "although they're expansive,

they're also limiting", and they do not "look at things that haven't been indexed in commercial databases" **– P1**.

Multiple participants also asserted that even when relevant studies are available, they may not be accessible. Academic journal paywalls and difficult-to-navigate databases or repositories were commonly mentioned as prohibitive, especially for individuals in the global south. Language and geographic context were also notable factors that could restrict the usability of available evidence.

> *In my current place we have no process to conduct literature searches, we 100% rely on the subcommittee of experts to provide research for us… We don't as an organization have any access to journals, so we're 100% dependent either on the subcommittee of experts providing it once they find something, we need them to send it to us.* ***– P14***

4.2 Policy document development is very complex

Several participants described the complexity of the policy document development process – it involves several steps, many of which require various expertise – as a significant barrier to overcome. This was especially true for the few participants who reported not having received any formal training regarding how to develop policy documents. In fact, one participant even admitted to having "made a lot of mistakes" early on while they were still learning the ropes:

> *I learned as I went along, actually. And that was a big one, because I made a lot of mistakes. I must say, I got, for the first five years, I was doing it unsystematically and until I realized how important it is and how much information you can get to if you do it right. So, then I started to read about the Cochrane Library, systematic reviews, systematic searches, and then I asked our librarians to help me out on how to do it the best way. And now I am, I am myself teaching about it to the students. So yeah, I must say, learning by doing until I realize how important it is to really do it right.* ***– P7***

The common reasons for not having received training were a lack of available discipline-specific training and geographic constraints preventing access to training. In contrast, however, another participant expressed their belief that not having been formally trained was actually beneficial because it allowed for more flexibility rather than being constrained by the 'right' approach to take.

> *I think it's useful sometimes to not be trained in sociology or public health, because the ways that undergraduates are trained is very much like 'this is the correct way to do it'* ***– P1***

Inherent to the complex development process is the interplay between multiple parties (e.g., funding bodies, external groups), each of which can influence aspects of the policy document development, including which evidence is relied upon. For example, some participants mentioned that when contracting out the literature search and review, the level of rigour used to assess evidence can vary significantly. Additionally, other participants noted that they rarely do commissioned projects because they find that in some cases, the commissioning body may try to 'control' which sources are included. For example:

> *The advantage, I think, in my work, is that I have not, or very rarely done work that was directly commissioned. So, I am always an external or almost always an external party, who is able to say, 'this is what I think this is what I think you should do. Take it or leave it'. And it means I don't have to adapt a recommendation because the minister at the time is concerned about an upcoming election. And I think that can be the problem for internal people, internal to either not for profit organization or a government organization, that there can be some self-censorship. It may not be overt, but there can be an understanding that, you know, we don't say certain things, or we can't recommend certain things.* ***– P1***

Furthermore, the complexity of the development process means that it often requires significant time and resource commitments. All participants agreed that both time constraints and limited resource access can negatively impact policy document development by restricting the

level of rigour which can be applied to evidence collection and assessment. When asked to describe how long it typically takes to develop a policy document, participants reported timelines ranging from one week to over a year. This was important because having tight time constraints often changes the type of document which will be produced (e.g., narrative review instead of systematic review), in turn resulting in a streamlined, and therefore less rigorous, evidence assessment. Likewise, several participants explained how limited personnel or financial resources often have a similar impact. This sentiment is exemplified in the following quote:

> *Also, our methods change on the, how rigorous are we with the systematic review methods, right, because sometimes you have to have two people in parallel doing inclusion, exclusion, that extraction and those type of things. But we don't do that if we have to do a review for seven days. So, it's just one person doing that. So, we have shortcuts on the methods, depending on how fast we have to deliver the review* ***– P11***

4.3 How to best manage the information available to you

Participants emphasized the importance of making the best of the evidence you have available, especially when it is suboptimal, and subsequently shared a few strategies for doing so.

In terms of dealing with potentially problematic sources, the most frequently shared suggestion was to simply avoid them. This relates to the earlier themes pertaining to search strategies and evidence assessment, whereby several participants described their tendency to focus on 'reputable' journals and databases and prioritize peer reviewed studies from authors with whom they were familiar.

In contrast, a minority of participants expressed the belief that it is important to include all published studies regardless of quality. One participant noted that while they understand, and generally agree with, the notion of relying on best available evidence, there are certain instances where "you also have to have creativity" regarding which studies you rely on. They went on to

explain how this is especially pertinent when dealing with small, context-specific studies that could provide useful insight for policymakers.

> *I think whatever is published is worthy of the public eye. Like the debate in science for me is okay, how much can I trust this?... Because in policymaking, of course, you have to have the best of available evidence, but you also have to have creativity. So sometimes a study that is very small and like super context based gives you insight for policymaking that is useful. And I myself think even crappy studies should be published. Like if the person went there and did the whole job of preparing a manuscript, which is a pain in the ass, I think it should be out there.* ***– P10***

Additionally, when asked about how they manage the influence of predatory journals specifically, none of the participants reported using any criteria to filter out predatory journals from their searches. In fact, several participants stated that they never limit by journal at all. Many participants also re-emphasized that using systematic approaches whenever possible helps to maximize the chances of relying on strong sources. One participant noted that the more ad hoc a search becomes, the more likely it is to capture potentially problematic sources:

> *You're in more risk land when you start using google and stuff like that, and you're just pulling things on a more and more ad hoc basis.* ***– P14***

Another recurring point across several of the interviews was that 'potentially problematic studies' are by no means exclusive to predatory journals. In fact, all participants agreed that published literature in general can be unreliable, albeit for different reasons. Some noted that certain predatory journals are in fact indexed in the large databases, and thus relying on the filters in those databases does not guarantee quality. Other participants described how issues with the peer review process in general affect studies from most journals, even 'legitimate' ones, and thus "it's not necessarily a seal of quality if it's published in BMJ" **– P13**. To further this point, one participant specifically described the issue of 'ghost writing', whereby some published articles, regardless of the journal, are not actually written by the listed authors – raising serious

concerns about the study's trustworthiness and emphasizing that potentially problematic research extends beyond predatory journals.

> *So, we don't have to rely only on peer-reviewed public literature in [toxicology], most of which is garbage anyways because it's just a bunch of academics monkeying around and they're not doing a good job of it. It's not the rigorous stuff done by industry.* ***– P14***

Finally, multiple participants expressed their concerns regarding how published literature is not always representative. Some participants described 'tunnel vision' in certain disciplines that results in critical gaps in the literature, while others described biases regarding what is published in academic journals. For example, several participants pointed to the dominance of the English language and research from the global north in academic literature. They proceeded by explaining that it can be very difficult to find context-specific studies relevant to the global south, frequently referencing prohibitive OA publishing costs as a causal factor leading to a relative lack of publications from these regions.

> *Often, even if I'm looking at global evidence from systematic reviews, I very much like to have some systematic reviews that are published by global south authors because the way they frame the question is different. But if I start to see like, if I'm looking at an Open Access journal in the last maybe three to four years, it will be harder sometimes to find global south authors publishing in those, because of the costs related to open access.* ***– P10***

Considering the wide array of ways in which the academic literature can be unreliable, participants all agreed that regardless of the level of rigour used, occasionally including potentially problematic studies is inevitable. Several participants recommended trying to mitigate this issue by being as transparent as possible regarding the limitations of studies cited in the policy document. One such mitigation strategy (i.e., noting any red flags) is highlighted in the following quote:

> *So, [what] I do, if I see anything that concerns me, is I do try and flag it. Like I had one. It wasn't for a policy question, but where it was from a journal that wasn't in, it wasn't one of are typical journals. And then it was open access. So, it, they had their peer review process page, but their*

> *peer review process page was like missing. I thought, that's a little sketchy, so I put a little note in [that] their peer review process unclear.* ***– P6***

Theme 5: Maintaining transparency throughout the development process

The final overarching theme identified throughout this interview study pertains to a recurring notion mentioned by participants related to striving for maximum transparency when producing policy documents. Participants noted that it may not be possible to completely overcome some of the obstacles to policy document development that restrict the amount of rigour which can be applied; however, they also repeatedly mentioned that maintaining transparency throughout the entire process can help to mitigate the potential ensuing consequences as best as possible.

5.1 Transparency of development process

A common theme across many interviews was that in an ideal world, those producing policy documents should strive for transparency, reproducibility, and repeatability of their findings. As is explained in the quote below, participants emphasized the importance of maintaining transparency, not only regarding the limitations of both the literature search and evidence assessment strategies, but also the limitations of the final policy document as whole.

> *[The]argument for doing all of this is transparency, reproducibility, repeatability of the process, and the documentation of it. As opposed to just worrying about the methods, the real driving factor is that you can go from beginning to end documenting how you got it, and people at the minimum would agree that they understand your process of how you got there, even if they disagree with it.* ***– P14***

As was discussed under previous themes, all approaches to find and assess evidence have their limitations. Several participants asserted that while these may not be avoidable, it is important to recognize said limitations and communicate them clearly to the intended end-users.

For example, one participant explained that when they conduct reviews on short timelines, they make sure to clearly communicate the limitations to policymakers and be explicit about how the recommendations should (and should not) be implemented.

> *But that's a challenge that we have addressed by being very clear with policymakers, like if you want something in for that day, this is what we can do, and trying to be very explicit about the risk of doing a very limited search… So, we are transparent about the choices that we make and the implications …, that's how we address it.* ***– P11***

Other reported strategies to maintain transparency included diligently documenting any challenges faced throughout the development process or including detailed data extraction tables (often in an appendix) to describe the 'quality' of each included study. Some such strategies are outlined in the following quote:

> *I think it's important to have the scope of all the evidence that is available, even if it has huge limitations… We usually present the policymakers with some narrative report that states what was the appraisal. So, I say, 'from our systematic review with very low quality' and then I explain in a footnote or a box, whatever quality means in that case… But we also usually put as an appendix, all of our extraction and tabulation tables, that includes the quality appraisal. So, I tend to make it as public as possible and never forego this. Whenever we need to forego this, it's because the time is a constraint.* ***– P10***

In addition, one participant mentioned that a key element of transparency is to declare any conflicts of interest, as these can impact both the literature search and evidence assessment strategies.

5.2 Approach to knowledge dissemination

Participants reported disseminating their policy documents using a variety of approaches. Some published them on either their organization's website or a government website, while others made their documents available on ResearchGate, policy clearinghouses, or others forms of social media. Additionally, certain participants reported publishing some of their policy

documents in academic journals, especially the larger systematic reviews because they are more attractive to publishers. One participant explained how their ability to publish their policy documents is often dependent on resource availability (e.g., ability to pay OA fees). Finally, some participants reported disseminating their policy documents directly to stakeholders (via email or even hard copy), especially in cases where the document was commissioned by a specific party.

Regardless of dissemination method, there was clear consensus that the priority was to maximize accessibility. One participant explained that making documents user-friendly and digestible for policymakers requires a different skillset than producing effective evidence syntheses and can be especially challenging to accomplish while also maintaining transparency. Thus, they often involve specific individuals (i.e., graphic design experts) to facilitate this process. A few participants noted that it can sometimes be challenging to ensure the policy document is seen by the intended end-users – an issue typically mitigated via consistent stakeholder engagement throughout the document development process. Two participants described their approaches to dissemination:

> *Obviously, you know, researchers can use social media, websites, journal[s]…. And but that doesn't really get to that audience specifically. So that's where there is some need for that relationship already to be established or relationship building. So that's where it's really helpful to have a good team and collaborators who can have that insight and have those connections and how to get it really into the hands that it needs to go. And also doing that development work with those organizations.* ***– P15***

> *Because we are engaging with them from scratch, it's quite easy to disseminate. And we always keep these conversations and relationships going with other policymakers that we have done previous reviews or interactions with so this is not such a big deal for us. We do have a public website where we put these, we have a journalist that is very good in creating social media content, as well. But I would say most of our, like the effectiveness of our dissemination, is just having engagement with policymakers from the problem definition and from scratch.* ***– P10***

This qualitative interview study provided several key insights regarding how information cited in public health policy documents is both sourced and assessed from the perspective of the individuals who produce such documents. This first-hand perspective shed light on the importance of having a clearly defined plan of action prior to document development and ensuring that the right individuals are involved in the development process, both of which can impact which information is included in the resulting document. Participants also described a variety of approaches for identifying and assessing research evidence for inclusion in their policy documents, as well as several notable obstacles that can impact how this is done. Finally, the interview participants noted the importance of recognizing and addressing the limitations of whichever development approach was employed.

Chapter 5: Discussion

5.1 Introduction

In this discussion chapter, I begin with an overview of my thesis' main purpose and research questions, and provide a summary of the main findings of my research. I then discuss how these findings relate and contribute to the existing literature on predatory journals and policy document development. Next, I discuss the limitations to my research. I follow this with implications of my work for policy document development and provide recommendations for how to minimize reliance on potentially untrustworthy evidence. Finally, I conclude by highlighting the key takeaways of my thesis research.

5.2 Summary of Overall Purpose and Key Findings of Included Studies

The purpose of the thesis research was to better understand how individuals who produce public health policy documents source and evaluate the information they cite and use to inform their recommendations. Additionally, I sought to identify potential factors that may be contributing to the citation of articles published in predatory journals. To address these research questions and objectives, I conducted two studies: a cross-sectional synthesis of policy document characteristics and a qualitative interview study.

5.2.1 Summary of Part 1 – Cross-sectional synthesis and characterization of public health policy documents with predatory journal citations

The objective of the descriptive cross-sectional synthesis of public health policy documents was to characterize these documents and understand how their cited information is sourced and evaluated. The synthesis included 242 documents with citations to articles (n=283) published by the OMICS group. Many of these articles were of questionable quality (e.g., 54% of the cited clinical trials; 67% of the cited case reports; and 48% of the cited observational studies did not report receiving ethics approval). Additionally, it was not always clear how the cited information was sourced or evaluated – only 22% reported source selection methodology and only 9% described a quality assessment of their cited sources.

The relative lack of transparency in the policy documents themselves about how cited information was sourced and evaluated, suggested room for improvement in terms of how policy documents are prepared. Fully grasping the issue required a better understanding of the process from the perspective of those who produce the documents.

5.2.2 Summary of Part 2 – Qualitative interview study

In the semi-structured qualitative interview study, I built on the findings of Part 1 by capturing the thoughts, beliefs, and perceptions of those who produce public health policy documents. Using thematic analysis, I generated five overarching themes relevant to my research questions and objectives. While participants reported sourcing information in several ways, they primarily rely on academic literature from large, reputable databases. They described a variety of approaches to assess the research identified through their literature searches, ranging from objective systematic critical appraisals of evidence to subjective 'best judgements'. It also became clear that when assessing research articles for inclusion in their policy documents, participants tended to prioritize the 'quality' of content over 'trustworthiness' of the source.

Additionally, the insights provided by interview participants revealed several potential factors that could be contributing to the citation of articles from predatory journals, and untrustworthy literature in general (e.g., prioritizing content over source, not conducting systematic evidence assessments).

5.3 Interpretation of Results

My thesis results broadly corroborate assertions within the existing literature that the policy document development process is a complex one with several obstacles to overcome [6], and identified room for improvement in order to ensure the provision of the best possible evidence to policymakers. Below I provide an overview of the key findings of my thesis.

5.3.1 Information cited in policy documents is sourced and evaluated in several ways

Policy documents lack transparency regarding approaches to source selection and evidence assessment

The comprehensive search of the Overton database revealed hundreds of public health policy documents produced by a wide variety of public health organizations including one of the world's most influential (i.e., the World Health Organization), with citations to research published by arguably one of the most egregious predatory publishers – the OMICS group. These findings were concerning for several reasons.

First, while all documents in the sample were public health-related, the cited predatory journal articles pertained to a variety of disciplines, including several biomedical topics. Estimations of predatory journal prevalence have found that approximately one fifth (~17%) of all articles published by predatory journals pertain to biomedical topics [77]. It is therefore

reasonable to assume that many other predatory journal articles – beyond those published by OMICS – are also cited in policy documents, thereby suggesting the true scope of predatory journal impact on policy could be much more widespread.

Second, although compliance with reporting guidelines is less than ideal across most of the corpus of academic literature, previous research has demonstrated it to be particularly poor in studies published by predatory entities [44]. This trend held true for the predatory journal articles cited in my sample of policy documents. It was concerning that most of the cited OMICS articles, among those for which ethics approval would be expected, did not report having received such approval. This also raises serious questions regarding the rest of the information in these papers – what else was improperly reported?

Third, most cited predatory journal articles in this sample were used as background information rather than to directly inform policy recommendations, which appears to support the assertion from multiple participants that any given predatory journal article is unlikely to have a significant impact on policy. However, the mere inclusion of predatory journal citations in policy documents may be a cause for concern. When a policy document cites a clinical trial without mention of ethics approval, it casts doubt on all other information presented in that document. This is especially true when combined with the apparent lack of transparency within these documents regarding how the cited information was sourced and evaluated.

Methodological rigour varies when identifying and evaluating information to be cited in policy documents

Despite the relative lack of transparency regarding how cited information was sourced and evaluated within policy documents, interview participants provided detailed accounts of how

the literature search and evidence assessment are carried out. Unsurprisingly, the general approaches described by interview participants were chiefly aligned with existing guidance regarding how to properly implement evidence-based policymaking (e.g., SUPPORT tools for evidence-informed health policymaking) [6,32]. Systematic literature searches were reported as ideal because of their ability to find the best available evidence to answer a specific research question, which corresponds with existing recommendations [5,6,30,33,34].

However, interview participants also described several limitations to these literature search approaches which often force them to resort to non-systematic literature searches – many of these limitations have been widely reported in the existing literature. For example, Dahabreh et al. (2012) describe how systematic reviews often rely on only a limited number of databases to identify potentially eligible studies [115], a notion frequently described by interview participants who believed systematic reviews did not sufficiently capture the full context. Interview participants shared a similar sentiment regarding approaches to evidence assessment, noting that while objective 'quality' appraisals are ideal, they are very time and resource consuming and are thus often replaced by more subjective 'best judgements' of quality.

This notion of limitations to the strategies used for evidence identification and assessment highlighted that, if not careful, those producing policy documents may inadvertently increase their risk of relying on untrustworthy sources by employing less rigorous approaches. In fact, these findings have revealed several potential factors that could, at least partially, explain how articles published in predatory journals come to be cited in public health policy documents.

5.3.2 Several potential factors could be contributing to predatory journal citations in policy documents

Factors related to the literature search strategy

One potential factor contributing to predatory journal citations was that several participants believed predatory journals are not indexed in large academic databases (e.g., PubMed, EMBASE) – a claim that we know from the literature to be false [20,58,69–72]. Regardless, because of this belief, participants reported often relying on the 'brand' of these databases, which may provide a false sense of security and could partially explain how some predatory journal articles come to be cited.

Another potential factor related to search strategy was that all participants reported never excluding studies based on the journal. Although there is nothing necessarily wrong with this approach at face value, since good studies can be published in any journal, it does increase the chance of citing predatory journals, especially considering that all participants explicitly mentioned not actively trying to weed-out predatory sources. Even if participants wanted to 'filter out' articles from predatory journals, these entities can be notoriously difficult to identify and distinguish from 'legitimate' journals [15,17,43,58], thus this would likely be an unreasonable expectation for many individuals producing policy documents.

In contrast to some existing literature demonstrating that many individuals are unaware of predatory journals [116–118], most participants had not only heard of the notion of predatory journals, but were able to describe some of the characteristics with which they are commonly associated. Thus, a lack of awareness of predatory entities does not appear to be one of the main contributing factors to their citation in policy documents, at least not in my sample.

Finally, the fact that some participants also reported turning to smaller databases, or even using ad hoc Google searches, could also increase the risk of citing articles from predatory journals. Although some of these predatory entities are indexed in the large databases, they are

still more likely to be found using ad hoc searches of smaller databases or Google with little to no requirement criteria for indexing.

Factors related to evidence assessment approaches

The most obvious potential contributing factor to predatory journal citation is the use of non-systematic approaches to assess evidence. Understandably, conducting a systematic review is not always feasible (e.g., because of time or resource constraints, or limited evidence availability); however, reverting to less rigorous evidence assessment methods (e.g., 'best judgements' of quality) nonetheless increases the risk of including lower quality studies.

Another factor that could partially explain why predatory journals are cited in policy documents is that, when assessing evidence for inclusion in policy documents, participants reported that they tend to prioritize 'quality' of evidence over 'trustworthiness' of the source. If a given study is assessed and deemed to be of 'high quality', then the source from whence it came may no longer be considered pertinent.

Another potential contributing factor is that the people producing policy documents have varying levels of expertise. In particular, the limited methodological training that some of these individuals reported having received could impact their ability to properly use some of the complex systematic evidence assessment tools. For example, although recent versions of tools such as the Cochrane Collaboration's risk-of-bias tools are more user-friendly than older versions [119], they still require expertise to use effectively. Thus, if those performing these assessments are inadequately trained, they could be more likely to misuse the tools. This may lead to unknowingly relying on untrustworthy studies, which could partially explain why some predatory journal articles are cited given their increased propensity to publish such research.

There is disagreement amongst researchers whether assessment tools such as the risk-of-bias tools should be used to determine if a given study ought to be excluded, but nonetheless, some individuals do choose to exclude studies with a high risk-of-bias [120], and thus, misusing the assessment tools may result in the inclusion of studies that would have otherwise been excluded.

5.4 Limitations

As is the case for any study, there were some limitations to this thesis research. These are presented below for part 1 and part 2 of the thesis and for transferability of the findings overall.

5.4.1 Part 1 limitations

For feasibility reasons, the public health policy documents included in the synthesis in Part 1 only included those that cited articles from a single predatory publisher (i.e., the OMICS Group). Thus, this study is not a fully representative characterization of the entire corpus of public health policy documents with citations to predatory journals. However, the sample still included nearly 250 documents, and the OMICS Group has a large predatory publishing presence [89]; therefore, I am confident that the selected methodology has yielded meaningful results while ensuring that the project remained feasible in scope.

5.4.2 Part 2 limitations

The sample of interview participants was also a potentially limiting factor. Given that one of the research questions sought to understand how articles from predatory journals come to be cited in public health policy documents, the ideal participants to interview would have been individuals who have been involved in producing policy documents that include such citations. However, given the low email response rate – only six interview participants were identified

using purposive sampling – I was forced to rely on snowball and convenience sampling to meet my prespecified sample size to attain data adequacy.

As a result, some interview participants (nine of fifteen) did not come from the document sample in Part 1, and it is unknown whether they have ever cited a predatory journal in their policy documents. However, these individuals were still able to provide insight into how information is sourced and evaluated for inclusion in public health policy documents – directly helping answer my first research question. Additionally, a mixed sample of this sort was beneficial because it allowed for the comparison of interview responses between subgroups of participants [111] (those who have cited predatory journals versus those who may or may not have), which revealed no meaningful differences – all key themes applied to both subgroups. These findings suggest that predatory journals, and by extension untrustworthy literature in general, may be cited by anyone involved in producing policy documents.

Another notable limitation to my thesis research is that no 'member-checking' (seeking feedback on my preliminary analysis from the interview participants themselves [111]) was employed during the interview study. Although the decision to omit this step was once again made for feasibility reasons, it did potentially increase the risk of introducing my own biases in the interpretation of interview findings. This said, to help ensure that my final interpretations were truly representative of the participants thoughts, perceptions, and beliefs, I regularly sought feedback from my supervisors regarding how I interpreted the results and revisions were made to the analysis as needed. I have also increased the robustness of my findings by supporting my claims with several meaningful quotes to directly demonstrate participants thoughts, beliefs, and perceptions [107]. I would also highlight that there is some disagreement in the literature regarding the efficacy of 'member-checking' for increasing the rigour of qualitative interview studies [121–

[123]. For example, some commonly reported concerns include that 'member-checking' may actually lead to confusion rather than clarity because interview participants may have changed their mind about a particular issue since the original interview; or that researchers and participants may disagree on the interpretation of a given statement or what should be considered "a fair account", in which case it is not always clear whose interpretation should stand [121].

5.4.3 Limitations related to the transferability of findings

Finally, the transferability of this research may be limited. For example, I conducted all interviews in English and although the scientific literature is dominated by the English language, there are many policy documents produced in other languages [124,125]. Given that the individuals producing these non-English documents may have a much harder time finding relevant evidence, their policy document development process may differ. This notion was discussed by multiple participants who described how disparities in evidence availability can impact the strategies they use. However, since a few of my participants were from the global south and had experience producing documents in other languages (in addition to the ones they produce in English), some of these relevant perspectives were captured in my interview study.

Additionally, this thesis's findings may not be fully transferable to other policy disciplines given that I only spoke with individuals who develop public health policy documents. However, the broad strategies described by participants who produce public health policy documents (e.g., systematic reviews, narrative reviews) are often similar to those employed in other disciplines. This assertion is corroborated by a recent position statement from Evidence Synthesis International (ESI) – a "partnership of organizations that produce, support and use evidence synthesis around the world" – which discusses how the underlying principles of

evidence synthesis are shared across several policy disciplines (public health, clinical medicine, environmental, etc.) [126]. Thus, the findings of my thesis are likely transferable beyond public health policy to other policy document development contexts. Furthermore, by conducting interviews until new ideas ceased to emerge (no new themes were generated after approximately the ninth or tenth interview), I have maximized the capacity of this thesis' findings to sufficiently encompass the key themes related to sourcing and evaluating evidence for inclusion in policy documents [101,103].

5.5 Implications for Policy Development and Suggestions for Future Research

5.5.1 How can the evidence identification and assessment process for policy document development be improved?

Based on my study results, I provide two broad recommendations for potential strategies to help improve the processes of evidence identification and assessment to ensure the translation of reliable knowledge into policy and practice.

Having clearly defined terms of reference and involving the right people could help improve rigour

First, beginning the policy development process by establishing clear terms of reference was unanimously viewed as critical for achieving success because all subsequent steps of the process are dependent on these initial objectives. For example, the terms of reference are used to establish project timelines, which in turn determine the appropriate search strategy and how the identified information will be assessed, while also accounting for feasibility. Additionally, clearly defining objectives *a priori* appears to help ensure synchronicity between all parties involved, which is important given that participants regularly emphasized the highly

collaborative nature of the process. The complexity of the policy document development means that a variety of individuals are involved with various aspects of the process, thus it is important to ensure the 'right' individuals are included. Whether it is for the literature search or the evidence assessment, involving individuals with appropriate expertise (information specialists, methods experts, etc.) can improve rigour, and thus the ability to ensure reliance on the best available information.

Maintaining transparency throughout the entire process could help minimize potential negative impact of citing untrustworthy studies

The most glaring revelation from Part 1 was the relative lack of transparency regarding approaches to evidence selection and assessment within the policy documents. Given participants' own admission that they cannot always guarantee sole reliance on trustworthy sources, this lack of transparency is concerning. One potential approach to help minimize the negative impact of accidentally citing low-quality, unreliable sources, is to be as transparent as possible about how the document was produced (i.e., source selection and evidence assessment methods should be explicitly documented). Even in cases where systematic approaches were not employed (e.g., ad hoc search strategy was used), the process should be described. Additionally, to ensure maximum transparency, it may be beneficial to describe who was responsible for each part of the process. For example, if the literature search was contracted-out to an external group, this should be explicitly stated in the document.

This notion of maintaining transparency extends beyond the documentation of methods used and also includes being transparent about the limitations of the methods. It is clear that systematic approaches to evidence identification and assessment cannot always be employed, and therefore, questionable sources may be relied-upon in certain situations (e.g., when available

evidence is limited). In these instances, it is important to recognize and clearly outline any limitations so that the intended end-users (i.e., policymakers) are aware of how much faith they should place in the evidence/recommendations provided.

5.5.2 Importance of going beyond predatory journals and considering the trustworthiness of all cited information

Although the focus of my thesis research was on predatory journals, it is important to note that the trustworthiness of all cited information need be considered when developing policy documents. Just as we cannot assume all studies published in predatory journals to be of low-quality, a study simply being published in a 'legitimate' journal does not guarantee quality. In fact, there are countless instances of 'legitimate' journals publishing studies which were later retracted – two prime examples being those from the *Lancet* and *New England Journal of Medicine* previously discussed in the background section [81,82].

This assertion was echoed by several interview participants who noted that although they often use journal 'brand' as a proxy for quality, it would be naïve to regard journal reputation as a guaranteed seal of research quality. It is no coincidence that nearly all literature search and assessment strategies described by interview participants, except for those specifically pertaining to predatory journals, also apply to the rest of the academic literature. Since none of the participants reported using journal-specific inclusion/exclusion criteria, it would appear that, at least in most cases, all academic literature is treated the same, regardless of where it was published. In fact, most of these strategies also seem to go beyond the academic knowledge base and apply to grey literature as well, emphasizing the fact that predatory journals are but one small piece of the puzzle.

5.5.3 Future research could seek to better understand how these documents are used by policymakers

An interesting avenue to explore with future research could be to try to better understand how policymakers actually use policy documents in practice. While the recommendations I have provided based on my thesis research may help to improve policy document development, if they do not affect how policymakers use the documents, then they are unlikely to have much impact on the overall evidence-based policymaking process. For example, it is unclear if policymakers would respond to increased transparency of the policy document development process.

On this note of better understanding how policy documents are used, several studies including a recent scoping review by Arnautu and Dagenais (2021) [127], have explored which policy document 'format' is preferred by policymakers. However, to my knowledge, no existing studies have directly assessed policymakers' thoughts and perceptions regarding how to ensure the trustworthiness of the information they incorporate into their decision-making. Thus, a qualitative interview study with policymakers, similar to the study I conducted with the individuals who produce policy documents, could help to shed light on this by providing first-hand insights.

5.6 Conclusion

This thesis has added to an important field of study regarding the potential impact of untrustworthy research evidence on evidence-based policymaking. I have extended the existing knowledge base regarding predatory journals' influence on academic literature, into the policy space, by demonstrating that citations to articles published by predatory journals have indeed

infiltrated public health policy documents. While those producing the documents use a variety of approaches to source and evaluate the information they cite, there is room for improvement in terms of how they document these approaches and their limitations, especially given that some of these limitations could be contributing to the predatory journal citations.

These findings suggest the potential for policy decisions to be based on untrustworthy research evidence; which is potentially problematic since doing so may have widespread consequences. However, by developing a practical understanding of how these documents are produced, it has become apparent that ensuring the implementation of practices such as clearly establishing terms of reference, involving the appropriate individuals, and maximizing transparency throughout the entire development process, may help to minimize the reliance on untrustworthy science.

While my thesis focused specifically on predatory journals citations, the importance of ensuring the trustworthiness of cited information extends beyond these entities to all relied-upon sources. Additionally, since evidence-based policy is used across many disciplines, the applicability of my findings could go beyond public health and may be transferable to the other policy contexts. Moving forward, ensuring the translation of reliable knowledge into policy and practice will require additional research to better understand the policymakers' perspective regarding how emphasizing the trustworthiness of cited information, as well as promoting transparency throughout policy document development, will impact their decision-making.

Appendices

Appendix A: Interview Guide – Individuals involved in producing public health policy documents

Time (Min)	Topics and Speaking Points
0:00 – 0:05	***Introduction of Interviewer.***
	Study purpose and background • This interview is part of my thesis for the MSc. Health Systems program at the University of Ottawa's Telfer School of Management. • I am interested in understanding how individuals involved in producing public health policy documents find literature to cite, as well as how they consider the trustworthiness of their sources. • Please note that this interview is to understand your own experiences and perceptions and not those of the organization for which you work or have worked. Thus, you are not asked to represent your organization but instead share your own perspectives. Your organization will not be linked to your interview in any way.
	Consent • I emailed you a consent form for participation in this interview, have you reviewed it? • *Review contents of consent form if they did not* • Do you have any questions before we continue? • I would like to audio-record this interview for transcription purposes. All data will be anonymized and if I quote you in my findings, you will not be identified, and your privacy will be protected. • *Confirm consent to participate in this study and to record.* • ***Begin recording***
0:05-0:15	***Background*** 1. Tell me briefly about your academic and professional background? 2. For my study, I am defining "policy or guidance documents" as: evidence syntheses (e.g., policy briefs) that serve the purpose of presenting scientific evidence to policymakers to aid in their decision making. Can you tell me about your role in preparing these types of health policy/guidance documents? *Potential Probes:* - *How long have you been involved in this process?* - *What subject matter do the documents you work on typically deal with?*

	3. What kind of experience do you have with looking for research data or searching through research literature? *Potential Probes:* - *Any specific training/instruction? Was it formal or informal?*
0:15-0:25	***Health policy documents – development and purpose*** *4.* Can you tell me about your process for developing or writing health policy documents? *Potential Probes:* - *Who is involved? Do you work as a team?* - *How long does it take?* - *Are there specific instructions or protocols to follow? Can you describe them?* 5. What purpose do the documents you have prepared serve? *Potential Probes:* - *Why are they produced?* - *How are they used?* - *Who are they used by/produced for?* *6.* How are these documents shared with their intended readers? *7.* What challenges have you experienced when developing or writing policy documents? *8.* What suggestions/recommendations do you have to improve the health policy document development process?
0:25-0:40	***Literature search and review*** *9.* What sources of information/evidence do you normally use to inform your policy documents and how do you search for them? - What search strategies do you use? - What resources do you have available for accessing research information or papers? *Potential Probes:* - *Specific databases or indexes? Specific journals? Other sources?* - *Specific types of research (e.g., primary, systematic reviews)?* - *MeSH terms?* 10. How do you decide which sources you will use/reference? *Potential Probes:* - *Does it depend on the topic at hand?* - *Do you look for pertinent information in specific parts of the documents (e.g., Abstract, Discussion)?*

0:40-0:55	***Trustworthiness and quality of sources*** 11. Do you evaluate the trustworthiness of your sources, and if so, how? By "trustworthiness" I mean the reputability or reliability of where the information is coming from. *Potential Probes:* - *Journal reputation?* - *Journal publishing practices?* - *Individually evaluate each research article?* 12. Do you distinguish between evaluating the trustworthiness of sources and evaluating their quality? If so, can you elaborate specifically on what quality control measures you use when selecting sources to cite? - Do the quality standards differ depending on how the source will be used? (i.e., background info, to inform recommendations, etc.) If so, how do they differ and why is this the case? *Potential Probes:* - *Critical appraisal/Risk of bias assessment?* *13.* If you do use any sort of evaluation methods for the sources you use, how are these methods documented? *Potential Probes:* - *Are they kept track of in-house?* - *Are they reported in the document?* *14.* What are your thoughts regarding the importance of where cited research/information is sourced from? *15.* On a slightly different topic, are you aware of the different publishing models used by academic journals? If so, what can you tell me about them? *Potential Probes:* - *Subscription based vs Open Access (OA)* 16. Are you aware of the notion of predatory journals or publishers? If so, what can you tell me about them? - How did you find out about them? - How have they impacted the work you do? *Potential Probes:* - *What are they? How do they work?* - *How can they be identified? What do they look like?* - *How common are they?* *17.* If you do know about predatory journals, does this knowledge impact how you use research in your policy documents? If not, why not? *Potential Probes:*

	- *Are you aware of any health policy documents that include information from predatory journals? If so, can you describe an example?* - *What potential implications do you foresee in this case?* *18.* What suggestions do you have for how to best ensure the reputability of research/sources to cite?
0:55 – 1:00	***Thank participant for their time and insight.*** Is there anything you would like to add? Are there any questions that I did not ask that I should have? If so, what were they? Do you have any final questions? Would it be okay if I contacted you over the course of the study should I have any other questions? ***End recording.***

Appendix B: COREQ Reporting Checklist

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	33-35
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	i
Occupation	3	What was their occupation at the time of the study?	i
Gender	4	Was the researcher male or female?	n/a
Experience and training	5	What experience or training did the researcher have?	n/a
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	n/a
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	98
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	98
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	27
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	33-34
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	33-34
Sample size	12	How many participants were in the study?	51
Non-participation	13	How many people refused to participate or dropped out? Reasons?	50-51
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	34
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	n/a
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	50-52
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	34-35
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	n/a
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	34-36
Field notes	20	Were field notes made during and/or after the inter view or focus group?	34-36
Duration	21	What was the duration of the inter views or focus group?	51
Data saturation	22	Was data saturation discussed?	33
Transcripts returned	23	Were transcripts returned to participants for comment and/or	n/a

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	37
Description of the coding tree	25	Did authors provide a description of the coding tree?	37-41; 104-110
Derivation of themes	26	Were themes identified in advance or derived from the data?	35-41
Software	27	What software, if applicable, was used to manage the data?	37;39
Participant checking	28	Did participants provide feedback on the findings?	91-92
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	53-82
Data and findings consistent	30	Was there consistency between the data presented and the findings?	53-82
Clarity of major themes	31	Were major themes clearly presented in the findings?	53
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	53-82

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Appendix C: Coding template for qualitative interview analysis

Second Level Code	First Level Code	Description	Example From Data
1. **Participant Background**	1.1 Academic/Professional Background	Use this code for any mention of the participant's professional/academic background (e.g., education, employment, relevant scientific disciplines).	"I'm an associate professor at the Faculty of Health and Medical Science… I do research in socio-economic inequalities in health… and I've been working in that, in academia for the last 13 years… I was working as both as a consultant for the family and community health section… and as a public health professional." **– P7**
	1.2 Experience with previous policy documents	Use this code for any mention of the participant's experience with preparing policy documents (e.g., specific role undertaken, topics dealt with, objective of work).	**"**So, again, it wasn't based on systematic reviewing, but I guess it was kind of like systematic type reviewing… that identify where the gaps were… but I guess, at the moment, I'm focusing on the systematic kind of component because I think that that's, that gives you a clear, transparent, comprehensive, transparent and replicable means by which to arrive at a set of high-level principles that can then be used for policy." **– P3**
	1.3 Research experience	Use this code for any specific mention of the participant's research experience.	"So, I've done a master's in public health and Doctorate in Health Science. And so, in both of those, there was components of critical thinking and literature review. And I also tutored, taught, lectured a course on evidence-based medicine. So, getting people to think critically about what evidence they use to inform, mostly for clinical based decisions, but it's just applied more broadly for literature reviews for public health." **– P9**
2. **Methodological and content experience/training**	2.1 No formal training	Use this code for any explicit mention of a lack of formal training in specific methods required to produce a policy document (e.g., literature search). This may be due to simply not having received training for various reasons or	**"**No, I wasn't formally trained, no. So this was this was a post PhD learning. And it was, it was almost kind of, I think it's useful sometimes to not be trained in sociology or public health…I think outside of very specific disciplines, it's very hard to get good pedagogical instruction about how to write a useful recommendation." **– P1**

		because of a lack of training availability.	
	2.2 Importance of policy knowledge	Use this code for any mention of the importance of having policy knowledge when producing policy documents (i.e., knowledge of existing policies in the field, knowledge of how to structure recommendations, etc.).	"I think definitely, we need to understand the current context. So, context analysis is very important, we usually do literature review, looking at you know, what are the studies out there? What are the issues that we are confronted with, that we thought would need some solutions? And what are the current studies that have already been done on that particular area of study" **– P8**
	2.3 Importance of content knowledge	Use this code for any mention of the importance of being well-versed in the subject matter when developing policy documents.	**"**So psychology, I know is focused primarily on the individual and isn't really making claims about cultures or collective experience. So I wouldn't bother to assess each individual article for that, because I kind of know that psychologies gig, it's like, you know, it's about individual subjective experience. But yeah, it would be it would be looking for tendencies across genres" **– P1**
3. **Approach to policy document development/evidence synthesis**	3.1 Importance of clearly defined policy document objective	Use this code for any mention of having clearly established objectives/goals for the final product when developing policy documents.	"We often receive problems and questions that aren't well formulated. So, we do a lot of public consultation with different levels of policymakers and civil society members and other researchers to best understand what they are facing as a policy problem. And what are the kinds of policy documents that will be more useful for each stage?" **– P10**
	3.2 Teamwork on policy documents	Use this code for any mention of teamwork or team member qualities involved in the policy document development process.	**"**I was very fortunate to work with people who had very formal undergraduate training in public health and in sociology, and it worked in the field, too. So I was when I got too wacky I was pulled into line, basically. Yeah." **– P1**
	3.3 Informal peer review for policy documents	Use this code for any mention of a 'peer review' analog in the policy document development process.	**"**the documents that we produce… are reviewed by an expert in the field, not an expert on the methods or something like that, so an expert on the policy issues that were dealing with, we sometimes send it to a policymaker to review it before we have the end product." **– P11**

	3.4 Combine own empirical data with existing literature	Use this code for any mention of conducting primary research and incorporating this new empirical evidence in the policy document (e.g., to support findings of the literature review).	**"**And we did a literature review as part of that, which I think is the bit you want to actually get to, but a lot of it was, I'm just saying a lot of it was qualitative research to go alongside the desk research because I, primarily, when I'm working, do validation work in a sense, to test the literature" **– P1**
	3.5 How to incorporate alternate sources	Use this code for any mention of how to incorporate information obtained from alternative sources into the policy document (e.g., non-academic publications).	"'we have no evidence around this'. We go to the next step there is maybe grey literature and then some interviews and try to deliver something like, 'this the scenario right now. It's full of limitations, but this is like". Only if I have very, very little time I will deliver something saying yeah, we will have nothing on this." **– P10**
	3.6 Approach to dealing with potentially problematic studies or sources	Use this code for any mention of how to manage the potential impact of articles/research evidence from potentially problematic studies or sources when preparing policy documents.	"But we don't limit by, I've never worked anywhere where you limit by journal, etc., because of the types of questions you're searching, usually you're searching by database, and you aren't limiting by that type of information. You're relying on you know PubMed, EMBASE, you're relying on these other filters that have already filtered and harvested information to get it" **– P14**
	3.7 External vs internal document development	Use this code for any mention of a distinction between producing a policy document internally vs externally (e.g., differences in pressures on those producing policy documents when work is commissioned/funded vs when it is not).	"The advantage, I think, in my work is that I have not, or very rarely done work that was directly commissioned. So I am always an external or almost always an external party, who is able to say, 'this is what I think this is what I think you should do. Take it or leave it'. And it means I don't have to adapt a recommendation because the minister at the time is concerned about an upcoming election. And I think that can be the problem for internal people internal to either not for profit organization or a government organization that there can be some self-censorship, it may not be overt, but there can be an understanding that, you know, we don't say certain things, or we can't recommend certain things." **– P1**

	3.8 Transparency of development process	Use this code for any mention of strategies/practices to uphold transparency and openness of the development process (e.g., documenting methodology, clear presentation of findings).	"But that's a challenge that we have addressed by being very clear with policymakers, like if you want something in that for that day, this is what we can do, and trying to be very explicit about the risk of doing a very limited search… So, if we are transparent about the choices that we make and the implications that they can, those implications, that's how we address it." **– P11**
4. Approach to literature search and review	4.1 Literature search strategies and objectives	Use this code for any mention of the strategies used to search the existing literature on the relevant policy topic, or the intended objectives of said search. This may include discussion of using an iterative/flexible approach; using targeted/clearly defined search criteria; scoping/identifying knowledge gaps in the literature. This may also include discussion regarding strategies used to screening/filtering articles identified through the search.	"So, so our methods change on the type of documents that we include in the report that we are doing. Also our methods change on the, how rigorous are we with the systematic review methods, right, because sometimes you have to have two people in parallel doing inclusion, exclusion, that extraction and those type of things. But we don't do that if we have to do a review for seven days" **– P11**
	4.2 Recognize limitations of search strategy	Use this code for any explicit mention of recognizing limitations to the search strategy being used to accomplish the desired objective of the policy document.	"So I would be looking at, I would be looking at that literature and, you know, respecting the literature and not snarking about it. But being very clear about who's not represented in these studies, and how that might limit the claims that could be made in relation to the findings" **– P1**
	4.3 Expert input to inform review	Use this code for any mention of garnering expert input to help inform the literature review. This can either refer to content or methodological expertise.	"If you are not aware of the academic process of reviewing literature, I would say, consult people who are doing this kind of work in an in daily basis. And that's what I think, evidence-based public health policies, that's what they, that's what they do." **– P7**
	4.4 Evidence assessment	Use this code for any mention of assessing the evidence being considered for inclusion in the policy document. This may refer to	**"**Utility, is more my measure, like is this useful? Like you know, so I think, and again, that this is me coming from a more humanities inflected field… And there's another way to think about it, though,

		the 'content' of the articles themselves (i.e., methodological rigour, reporting, etc.); the evidence's 'utility' (e.g., how likely it is to help achieve the objective of the policy document); or the trustworthiness/reputability of the source from which it came (e.g., journal, website, etc.).	which is more about what he terms ritual. So it's like, "What purpose does this serve?" **– P1**
5. Approach to knowledge translation	5.1 Timeliness of document development	Use this code for any mention of the timely development of policy documents being an important factor to consider (i.e., existing demand or inquiry from policymakers).	"So, if you're doing an evidence synthesis, for public health, clinical or for animal health, and you don't talk to the people who would implementing it before you start it, or the policy you want to help to inform; why would you do that? It might not even be a priority for us." **– P14**
	5.2 Gathering stakeholder perspectives during the development process	Use this code for any mention of engaging stakeholders to gather their perspective on the policy topic and using this to inform policy document development.	"That's also why it's important to consult stakeholders…. 'here's where we've arrived at, what do you think of this? Is it going to work? Is it feasible? Do you understand it? Does it hit the mark? What can be improved? And how? What might we add to this that would assist with the implementation?'. Yeah. So, when a policy document is, when a policy is then framed, it needs to be presented in a very non-academic way." **– P3**
	5.3 Approach to knowledge dissemination	Use this code for any mention of dissemination strategies employed to share the policy document with knowledge users (e.g., seeking external perspectives/feedback regarding policy document development).	"Our standard is disseminating to the partner. Okay, so we send the product to Minister of Health and then they make the dissemination inside, or outside for other partners" **– P12**
6. Challenges with policy document development	6.1 Availability of evidence	Use this code for any mention of the availability of appropriate evidence being an important factor to consider when developing policy documents (e.g., do relevant studies exist?).	**"**Or it might have never been, you know, the evaluation might be stored as grey literature on some institutional website, but is not actually in a database" **– P1**

	6.2 Limitations/challenges with Systematic Reviews	Use this code for any explicit mention of challenges to use of systematic reviews to develop policy documents.	**"**There are obviously issues around Cochrane Reviews or even systematic reviews because often they don't capture sometimes contexts, that may not necessarily capture things that may be important to stakeholders, for example, so things around equity, which often effectiveness studies may or may not really be considered as part of the evaluation, for example. And so, often things around equity is something that we would, that would generally be subjectively explored or discussed whenever we look at developing policy documents." **– P4**
	6.3 Making policy recommendations is difficult	Use this code for any mention of how difficult/complex the process of forming policy recommendations can be.	**"**It's a very different perspective, and I mean this is a classic meme. Policy people struggle sometimes to even articulate their questions in a way which could be even informed by science, but scientific people often don't even know what the relevant policy questions are." **– P14**
	6.4 Time required to develop policy document	Use this code for any mention of the timeline for policy document development.	"It takes less time than it should… So, it doesn't take very long, the timelines are super fluid, super quick. You know, there isn't maybe the time you'd like to do full systematic reviews, but we lean heavily on, I mean everybody in the world is working on COVID right, so we lean heavily on systematic reviews done by other groups." **– P13**
	6.5 Limited resources	Use this code for any explicit mention of limited resource access having an impact on the policy document development process (e.g., inability to conduct a systematic review because of limited personnel).	"For the small ones, for the, for these single reports its typically a single author… they're not, you know, described as being a comprehensive, exhaustive search, like there's none of those claims that a systematic review can make, right. There's no critical performance, critical appraisal, or evaluation of the included sources. You just got to trust our best judgment you know, and we've tried to caveat it as much as, as appropriate." **– P5**
7 Knowledge and perceptions of academic literature	7.1 Published literature is unreliable	Use this code for any mention of concerns regarding the reliability/trustworthiness of published academic literature (e.g.,	"it's not necessarily a seal of quality if it's published in BMJ, for example" **– P12**

		reasons for consulting alternative sources).	
7.2	Knowledge and perceptions of predatory journals	Use this code for any description of, or information pertaining to the notion of predatory journals characteristics or operating practices.	"And that's what I think people think of in terms of predatory, is that it's really a scam, and is a scam which is motivated by finances… the financial barrier to publish for a lot of people, and that extremely perverse and strong incentive to publish from people, and it's being taken advantage of… lots of people don't have the money to publish in Open Access journals, and so here's an avenue to do that potentially." **– P14**
7.3	Knowledge and perceptions of academic publication models	Use this code for any description of, or information pertaining to the publication models used by academic journals (e.g., Open Access, subscription-based). May also refer to a relative lack of awareness regarding the academic publication process.	"You know, honestly, I think when I was a student, I was like, okay, I had the chance to be exposed to all this. But, you know, given the different contexts and environments that we are operating, [I'm] not so familiar with that... And what happens is, sometimes there is opportunity for us to partner with academe, or another research institute that is like hardcore research, like the Nutrition Research Institute, for example. And I think that is where they are the ones bringing in this additional resources and references coming from those academic resources." **– P8**

Appendix D: Most frequently cited OMICS journals

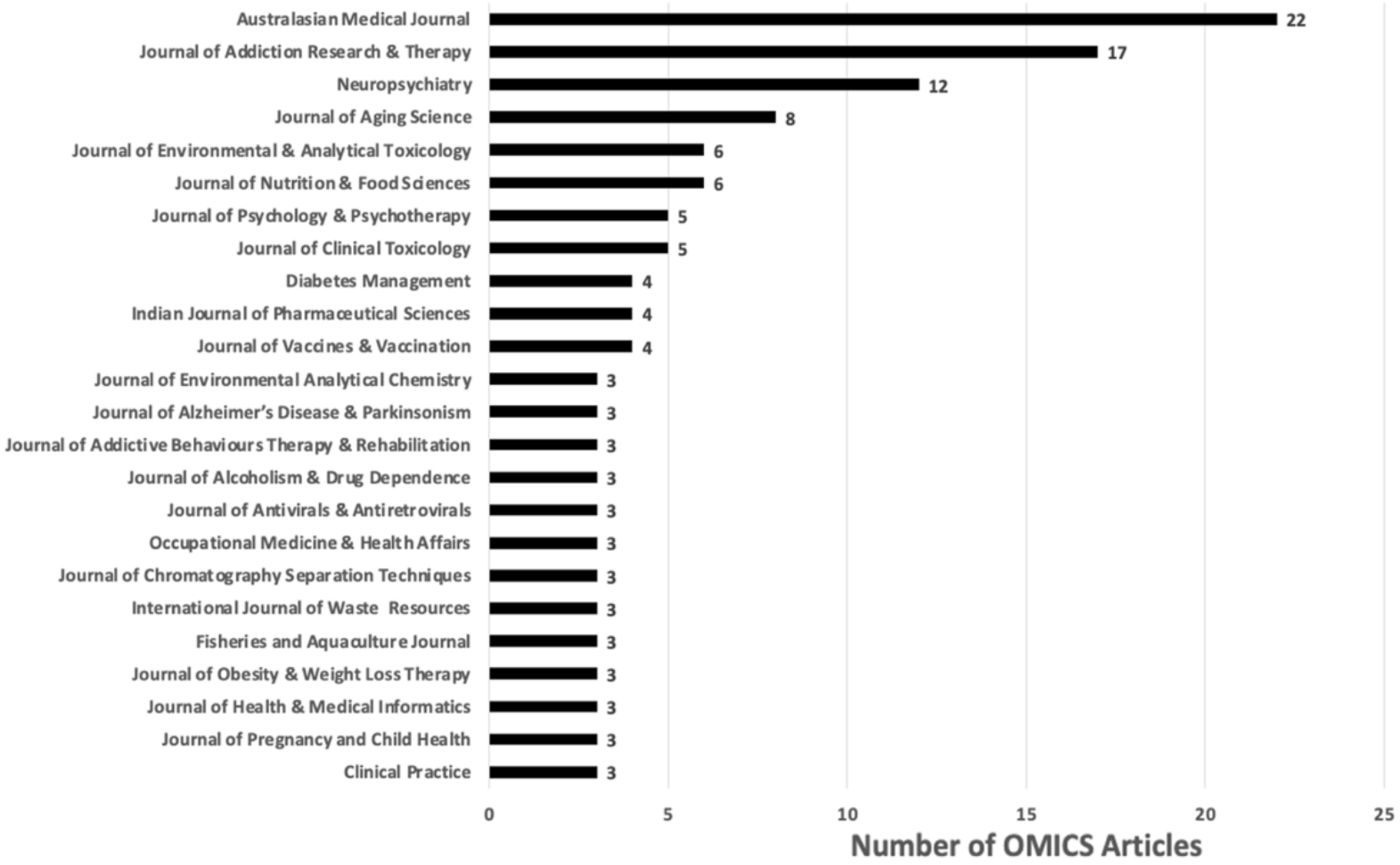

Figure 7. Journal of Publication for cited OMICS articles. *Depicts the breakdown of cited OMICS articles cited by journal of publication (n= 283). Only journals with ≥3 citations are depicted (n=25) – accounting for 157 OMICS citations. The remaining 99 journals accounted for 126 OMICS citations.*

Appendix E: Flow diagram for the recruitment of interview participants

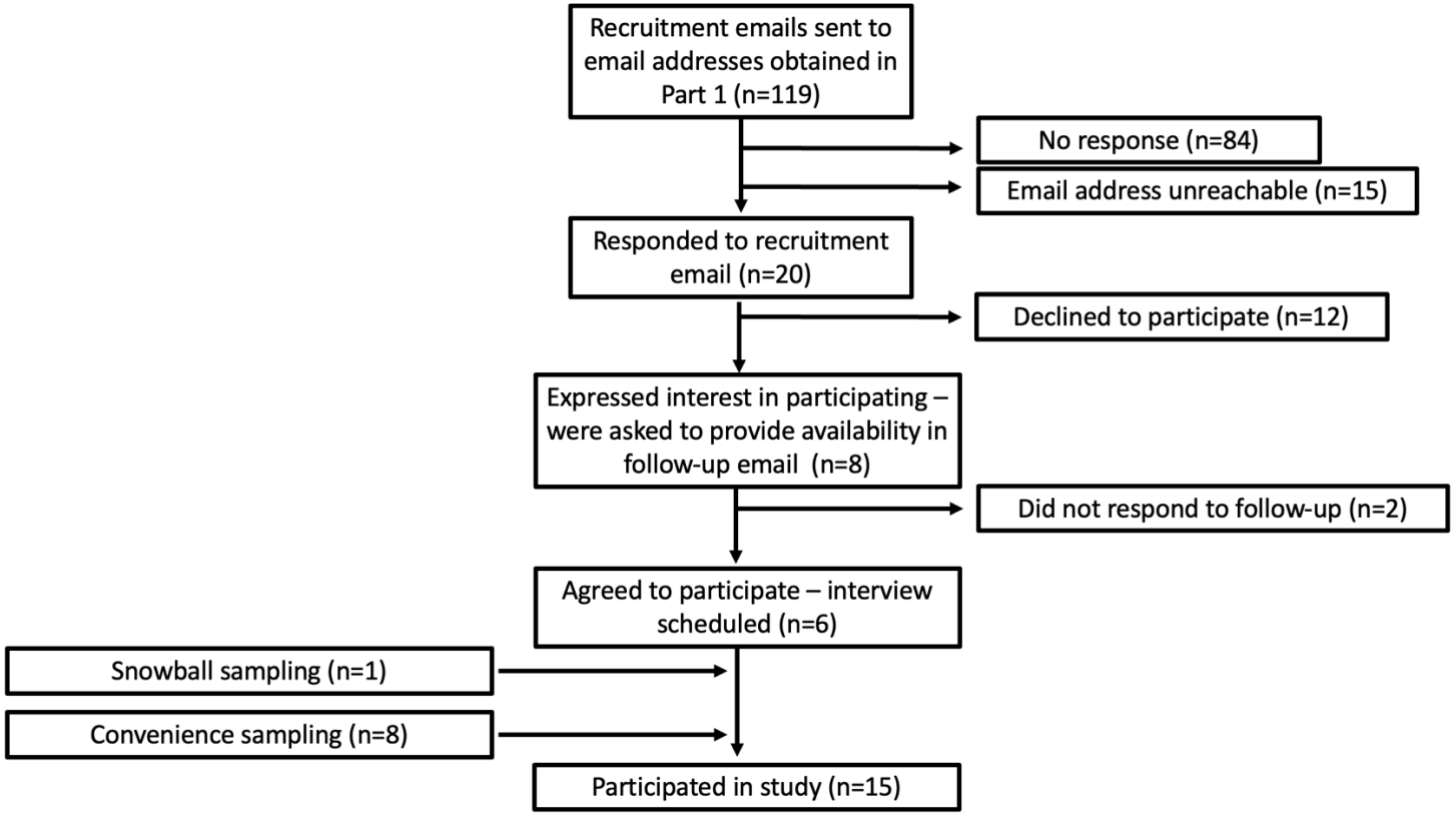

Figure 8. Flow diagram of interview participant recruitment (n=15). The *one interview participant I recruited via snowball sampling was referred to me by one of the six participants initially recruited via purposive sampling using contact information from the policy documents in Part 1. My recruitment of the eight remaining interview participants (via convenience sampling) was facilitated by my thesis supervisors' connections to individuals in the evidence-based policy development space.*

Appendix F: Overview of the hierarchy of themes and subthemes

1. Having a clear plan of action is important for finding the best available evidence
- **1.1 Importance of clearly defined policy document objective**
  - 1.1.1 How and why to establish clearly defined terms of reference
  - 1.1.2 Clearly defined objectives help to set realistic expectations
  - 1.1.3 Strategies used to develop the policy document are dependent on the objective
  - 1.1.4 Objective also influences how to implement the findings
- **1.2 How to ensure the objectives are effectively met**
  - 1.2.1 Informal peer review for policy documents
    - 1.2.1.1 Expert review
    - 1.2.1.2 Research/policy document development team internal review
    - 1.2.1.3 Stakeholder review
  - 1.2.2 Timeliness of document development
    - 1.2.2.1 Helps get sufficient support/resources
    - 1.2.2.2 Can influence the timeline for document development
  - 1.2.3 Teamwork on policy documents
    - 1.2.3.1 Team size and composition is project-dependent
    - 1.2.3.2 Document development is a highly collaborative effort

2. Involving the right people is key to finding the best available evidence
- **2.1 Policy documents are developed by various individuals/interprofessional teams with a wide range of methods training**
  - 2.1.1 Academic/Professional Background
    - 2.1.1.1 Countries of origin
    - 2.1.1.2 Level of education
    - 2.1.1.3 Profession/role
    - 2.1.1.4 Disciplines
    - 2.1.1.5 Years of experience
  - 2.1.2 Experience with previous policy documents
    - 2.1.2.1 Variety of approaches used to develop policy documents
    - 2.1.2.2 Roles played in developing the documents
  - 2.1.3 Research experience
    - 2.1.3.1 Formal training in research methods
    - 2.1.3.2 Experience with which research methods?
    - 2.1.3.3 Research experience of other team members
    - 2.1.3.4 Teaching research methods to others
- **2.2 Important to be as well-versed on the topic as possible**
  - 2.2.1 Importance of policy knowledge
    - 2.2.1.1 Knowledge of policy context is critical for properly developing/defining objectives
    - 2.2.1.2 Helps inform search strategy
    - 2.2.1.3 Strategies employed to better ensure policy knowledge
  - 2.2.2 Importance of content knowledge
    - 2.2.2.1 Know where to look
    - 2.2.2.2 Know what 'good evidence' looks like in given discipline
    - 2.2.2.3 Know discipline-specific conventions or methodological standards
    - 2.2.2.4 Have a good sense of the research landscape for the given topic
    - 2.2.2.5 Know how to use tools required

2.3 Gathering stakeholder perspectives during the development process
- 2.3.1 How are the stakeholder perspectives gathered?
- 2.3.2 Which stakeholders are consulted
- 2.3.3 Gathering perspectives is a continuous and iterative endeavor
  - 2.3.3.1 Prior to development
  - 2.3.3.2 During development
  - 2.3.3.3 Post-development

3. Relying on the best possible information is the objective

3.1 Literature search strategies and objectives
- 3.1.1 Structure the search based on its objectives
  - 3.1.1.1 Scoping reviews
  - 3.1.1.2 Narrative reviews
  - 3.1.1.3 Systematic reviews
- 3.1.2 Types of sources typically consulted
  - 3.1.2.1 Academic literature
  - 3.1.2.2 Alternative (e.g., non-academic) sources
    - 3.1.2.2.1 When/why do we need to rely on alternative sources?
    - 3.1.2.2.2 Types of alternative sources that may be relied-upon
    - 3.1.2.2.3 How to incorporate alternative sources effectively
    - 3.1.2.2.4 Concerns about relying on alternative sources

3.2 Evidence assessment
- 3.2.1 No formal assessment
- 3.2.2 Trustworthiness vs Quality
  - 3.2.2.1 Prioritize quality of content over its source
  - 3.2.2.2 How to assess 'quality' of evidence
  - 3.2.2.3 How to assess 'trustworthiness' of sources
    - 3.2.2.3.1 Knowledge and perceptions of academic publication models
    - 3.2.2.3.2 Unfamiliar with how academic journals typically operate
- 3.2.3 Knowledge and perceptions of predatory journals
  - 3.2.3.1 Understanding of what predatory journals are
  - 3.2.3.2 How to identify predatory journals
  - 3.2.3.3 Thoughts/perceptions regarding how to deal with predatory journals specifically
  - 3.2.3.4 Potential impact of articles they publish being relied upon
- 3.2.4 Other measures used to assess evidence
- 3.2.5 Assessment of the policy document as a whole

3.2 Expert input to inform review
- 3.3.1 Experts to inform search strategy
- 3.3.2 Experts to help with evidence assessment

4. Overcoming obstacles to policy document development can be challenging

4.1 Accessing information can be challenging
- 4.1.1 Recognize limitations of search strategy
  - 4.1.1.1 Limitations of non- systematic reviews
  - 4.1.1.2 Limitations/challenges with Systematic Reviews
    - 4.1.1.2.1 Arduous, time-consuming, and resource intensive
    - 4.1.1.2.2 Expansive but also very limiting
- 4.1.2 Availability of evidence

4.1.2.1 Can impact the document development strategy
4.1.2.2 Language, geographic context and discipline/field are key factors for availability
4.1.2.3 Even if evidence is available, it may not be accessible

4.2 Policy document development involves a very complex process

4.2.1 No formal training
4.2.1.1 Learn the process as you go
4.2.1.2 Lack of available training
4.2.1.3 Benefits of not being formally trained
4.2.2 External vs Internal document development
4.2.2.1 Political pressures can influence policy document development
4.2.2.2 Those who produce policy documents may not have complete control over some parts of development process
4.2.3 Making policy recommendations is difficult
4.2.3.1 Understanding what the stakeholders are asking for is challenging
4.2.3.2 Can be challenging not to stray from original objectives
4.2.3.3 Clearly and concisely presenting findings is a challenge
4.2.4 Time required to develop policy document
4.2.4.1 Typical timelines
4.2.4.2 Timeline influences type of document to be prepared and approach used
4.2.5 Limited resources
4.2.5.1 Affects search strategy
4.2.5.2 Affects ability to assess evidence

4.3 How to best manage the information available to you

4.3.1 Approach to dealing with potentially problematic studies or sources
4.3.1.1 Avoid untrustworthy sources/focus on the reputable ones
4.3.1.2 Use systematic approaches whenever possible
4.3.1.3 Belief/hope that their impact will be minimal
4.3.1.4 When in doubt, include anyway but be transparent
4.3.1.5 Emphasize the importance of training/awareness
4.3.2 Published literature is unreliable
4.3.2.1 Quality of the available information can be questionable
4.3.2.2 Published literature is not always fully representative

5. Maintaining transparency throughout the development process

5.1 Transparency of development process

5.1.1 Transparency, reproducibility and repeatability of the findings is the ideal goal
5.1.2 Importance of clearly documenting search strategies/approaches to evidence assessment
5.1.3 Importance of clearly outlining potential limitations of the final evidence synthesis product
5.1.4 Conflict of interest is also something to consider when producing policy documents

5.2 Approach to knowledge dissemination

5.2.1 Publishing/advertising the policy document
5.2.2 Directly to stakeholders/end-users
5.2.3 Engage with stakeholders throughout process
5.2.4 Important to make as accessible as possible

Appendix G: Summary of key takeaways for each of the five themes generated from participant interviews

Theme 1 – Having a clear plan of action is important for finding the best-available evidence	
Subtheme	**Key takeaways and sample quotes**
1.1 Importance of clearly defined policy document objective	**Helps to ensure all parties are on the same page** *I really don't know what they want sometimes. So, it's not clear to me even though there are some terms of reference. So, it actually helps a lot to define proper terms of reference.* ***– P7*** *The key thing that's either, that requires that iterative process is really some understanding of key definitions, or, I guess, understanding what 'universal' means. So 'universal' might mean one thing compared to someone else's interpretation on 'universal'.* ***– P4***
	Clearly defined objectives help set realistic expectations *When you start the people are more, the people know the process and see how useful could be the use of this document, but to establish a very reliable relationship, we need to have conversations and have many sessions to explain about what is a rapid review? What how you can use this product because at the beginning, sometimes the people have very high expectation about 'what do you provide for me, is it the answer we have all my problems?', and we need to explain it's just an input, it's just one thing to support more informed discussion.* ***– P12***
	Strategies used to develop the policy document are dependent on the objective *Okay, so, we try to develop different types of documents, regarding who are we trying to inform or regarding who, who the document is for? So, we, at the beginning, we have, we had different decision makers, we had, we wanted to focus on patients' decisions, on community decisions, professional decisions, and then policymakers. And so, for each of those types of decision makers we have different type of documents…. So, so our methods change on the type of documents that we include in the report that we are doing* ***– P11***
	Document objective also influences how to implement the findings *Like, let's say, if I'm sitting inside [organization] and developing a policy, [organization] has a mandate and then maybe my branch, if it's infectious disease vs chronic, has a sub-mandate… when I'm assessing evidence within [organization], I'm assessing it within the lens of that mandate, so… I can look at that same data if I'm in a different agency who has a mandate, and I might weigh things differently and even come to a different recommendation. And I think again, when you're developing guideline documents, that's one of the key things to remember, whatever part of the process you're in for, like what are you developing? Because it shapes the entire process.* ***– P14***
1.2 How to ensure the objectives are effectively met	**Informal peer review for policy documents** *The documents that we produce… are reviewed by an expert in the field, not an expert on the methods or something like that, so an expert on the policy issues that were dealing with, we sometimes send it to a policymaker to review it before we have the end product.* ***– P11***

	Timeliness of document development can impact access to information *You know, there isn't maybe the time you'd like to do full systematic reviews, but we lean heavily on, I mean everybody in the world is working on COVID right, so we lean heavily on systematic reviews done by other groups.* ***– P13***
Theme 2 – Involving the right people is key to finding the best available evidence	
Subtheme	**Key takeaways and sample quotes**
2.1 Policy documents are developed by various individuals and interprofessional teams with a wide range of methods training	**Those producing policy document have a range of research experience and training** *So, I think as part of my foundation degree, I did a, I guess I did a summer, I had a period of time when I was doing a literature review. So, I sort of developed some skills in understanding evidence, how to synthesize and understand what that is presents… And so that sort of developed over time because of my skills, and then obviously formal training through the Master's of Public Health program… I think that's probably given me, I guess, probably good founding to understand what is good evidence, what isn't.* ***– P4*** *I have done many systematic reviews, and also scoping reviews as part of both of my undergraduate and research experience in the university… I've been trained in conducting rapid reviews, and evidence syntheses. And we've done, maybe over 50 or 60 now, of those in the past five years. So, I have experience with these different methods* ***– P10*** *You know, over the last few years with COVID, we've really struggled to staff projects with graduate students who are, you know, who've got capacity and space to do this work. So, we have to sometimes even work with undergraduates and train them up.* ***– P3***
2.2 Important to be as well-versed on the topic as possible	**Importance of policy knowledge** *And I guess you also need to understand the catalyst for why the policy is being developed, like, is it just that there was a gap?.... you know, there was, there was a need for this and a gap that's been identified that that we need to feel, and early conversations with the field have suggested this is something that they really need. So again, it's got, it can't ever be designed. Or that synthesis work, this thematic analysis can't ever be done without awareness of what your field is, and what the field is like* ***– P3*** *Yeah. So, we have a good conversation with the policy team to find out what they want and always getting, are there any places they recommend that we look? Because quite often in their background, they will be aware of something that might be from really good organizations I might not be familiar with* ***– P6***
	Importance of content knowledge *For instance, I would have conversations with information specialists in tox where I have a lot less content expertise and I would be able to be less critical… I would say 'we should be doing a minimum of X databases, and the database search is this' but they would say 'oh, well we aren't searching that database you brought up because we can tell you it has like 98% the same coverage as this database and it almost never identifies a study'* ***– P14***

2.3 Importance of gathering stakeholder perspectives during the development process	**Increases the trustworthiness of the evidence synthesis** *We do the citizens panel and stakeholder dialogues, which I think in terms of the work that we do, that adds a little layer of trustworthiness to the work, right. This type of, this kind of, I don't know triangulation of we do the review of evidence, we produce a document, we do citizens panel, which is like a focus group. And then we do a stakeholder dialogue… So, I think that adds, that helps to our product to be telling, like the story of what's going on there. And to, I think that adds to the trustworthiness of our work.* **– *P11***

Theme 3 – Relying on the best possible information is the objective

Subtheme	Key takeaways and sample quotes
3.1 Literature search strategies and objectives	**Important to structure the search based on its objectives** *And that general advice was to use rigorous evidence synthesis methods, like systematic reviews… the evidence synthesis methods that we use in general, they mirror, they've largely been based off Cochrane methods… and I mean I've jumped between different areas, but for public health, a lot people think that these methods don't apply cause they were developed in clinical and that's often one of the myths that we have to get by… But that's, it looks the same. You're working with an information specialist and you're developing a PICO or a PECO* **– *P14*** *We're not, they're not, you know, described as being a comprehensive, exhaustive search, like there's none of those claims that a systematic review can make, right. There's no critical performance, critical appraisal, or evaluation of the included sources. You just got to trust our best judgment you know, and we've tried to caveat it as much as, as appropriate. I won't to say as much as possible, but as appropriate.* **– *P5*** **Cited information comes from a wide variety of sources** *We can go to a specific database like these databases that already have pre-appraised evidence, like Health Systems Evidence, social systems evidence access, which we already have pre-apprised the evidence that they included, that's, we start there and we always, we always go to Epistemonikos. That one doesn't have pre-appraised evidence, but it's very comprehensive. And then we go to the regular ones like PubMed or Embase to complement the search.* **– *P11*** *So, you do the normal PubMed and Google Scholar, all of the scientific literature that we use. But I also think it's important to consider grey literature. So, a lot of policy, a lot of documents that can inform policy aren't published through peer review. They're held in government websites, or reviews or royal commissions. So, using that kind of evidence is important. But it's also some NGOs also can really make… their own policies to inform the bigger government policy… They have more insight than academics.* **– *P9***
3.2 Evidence assessment	**Trustworthiness of source versus quality of evidence** *Well, if I would define it, yes. The quality, there might be some legitimate research, but the quality in terms of, you know, how the analysis has been done, or how the research was documented, can be an issue. And I think for me, trustworthiness is whether it's an honest to goodness research that has been conducted… So, so I thought those two are not the same. But of course, we expect that trustworthy research should produce quality outputs.* **– *P8*** *The word 'trustworthiness' is important, like where are your trusted sources? Where do you go?... You're relying on you know*

	PubMed, EMBASE, you're relying on these other filters that have already filtered and harvested information to get it. ***– P14***
	Knowledge and perceptions of predatory journals *I wouldn't be surprised if you went back and checked all the citations that there would be something, I wouldn't be surprised. I would be more surprised, I think, if there was not a predatory journal cited in there to be honest with you… I think it takes like a lot of digging and a really keen eye to actually pick those things out. So, I don't think that it actually has that much of an implication to be honest. Like I think if you have a health policy document with eighty citations and one of them is from a predatory journal, I don't think it's the end of the world. It's obviously unfortunate, and you would like to try to avoid it, but I don't think it really matters that much to be quite honest. Yeah, that's just my opinion.* ***– P13***
	Other measures used to assess evidence *Utility, is more my measure, like is this useful?... So it's like, 'What purpose does this serve?'* ***– P1***
	Assessment of the policy document as a whole *The other thing is a quality assessment of this product, how our products provide confidence? That's important. The other is how robust and transparent and systematic was our process?* ***– P12***
3.3 Expert input to inform review	**To inform search strategy** *If you are not aware of the academic process of reviewing literature, I would say, consult people who are doing this kind of work in an in daily basis. And that's what I think, evidence-based public health policies, that's what they, that's what they do.* ***– P7***
	To help with evidence assessment *Yeah, so, here we rely on expert judgement. So, we're just assuming that the experts are applying their expert judgement* ***– P14*** *I guess one thing to add, is that even when we do say literature searches, and whether that's academic or grey, one thing that we do that we think is really important is following up with experts. And I think that is huge for the validity of it. And can also add to your trustworthiness and credibility and all of that… Or if you're hearing conflicting things in your search, then talking to a bunch of experts might help resolve either confusion or sort of triangulate what actually is going on, or verify that what you're finding is indeed, correct.* ***– P15***

Theme 4 – Overcoming obstacles to policy document development can be challenging

Subtheme	Key takeaways and sample quotes
4.1 Accessing information can be challenging	**Important to recognize the limitations of the search strategy** *Sometimes it's, we need this in three months. So, to do a systematic review can be really challenging to get everything together and understand the whole picture. So, you might do more of a comprehensive review, or a narrative review, or rapid review, is trying to get an understanding. Like that, one of the issues of policy development is how often it's done on the fly.* ***– P9*** *So that that's one of the reasons I don't do things like systematic reviews, even though they're like gold standard, because I actually find them, although they're expansive, they're also limiting. Because it's like… if there's a chapter in a book*

		that explains that case study really well, that research method, that very clear, narrow, well defined research method will never find you that book chapter. And that might actually be the piece of the puzzle that's missing. So that's why I call what I do narrative review, scoping review, because it allows me to look at grey literature and to look at things that haven't been indexed in commercial databases. ***– P1***
	Availability of evidence can impact which sources are consulted and how they are assessed	*And for other social policies, we do have a lack of evidence produced, or at least, what they seem to agree as the best evidence. So, we don't have many systematic reviews, we don't have many randomized controlled trials for much of the social policies we work with. This is a problem… It's just if the question is tricky, or there isn't much evidence, we try our best to deliver whatever evidence is possible with of course, disclosures on the limitations. We just like, I've never, I think delivered a rapid review that said, 'we have no evidence around this'. We go to the next step there is maybe grey literature and then some interviews and try to deliver something like, "this the scenario right now. It's full of limitations –* ***P10*** *This is the evidence that I have from this context. And it's not, compared to the American studies or Canadian studies. It's not good enough, but this is what it is. So, I often, I think that we are more lax when it comes to including articles from low and middle income countries. So, we were a bit like. okay. –* ***P7***
4.2 Policy document development is very complex	**Not being formally trained can affect policy document quality**	*I learned as I went along, actually. And that was a big, that was a big one, because I made a lot of mistakes. I must say, I got, for the first five years, I was doing it unsystematically and I until I realized how important it is and how much information you can get to if you do it right. So, then I started to read about the Cochrane Library, systematic reviews, systematic searches, and then I asked our librarians to help me out on how to do it the best way. And now I am, I am myself teaching about it to the students. So yeah, I must say, learning by doing until I realize how important it is to really do it right. –* ***P7***
	Level of control over document development can impact the findings	*The advantage, I think, in my work is that I have not, or very rarely done work that was directly commissioned. So, I am always an external or almost always an external party, who is able to say, 'this is what I think this is what I think you should do. Take it or leave it'. And it means I don't have to adapt a recommendation because the minister at the time is concerned about an upcoming election. And I think that can be the problem for internal people internal to either not for profit organization or a government organization that there can be some self-censorship, it may not be overt, but there can be an understanding that, you know, we don't say certain things, or we can't recommend certain things.* ***– P1*** *Groups like [organization], contract out evidence syntheses to two of the best places [that] are going to use very rigorous methods of evidence synthesis that follow using information specialists and use all the best things. They're going to develop the PICO statement with the group, and then they'll document it and do everything rigorously. But that's on a sliding scale… and depending on which group wins it and which process they follow; you'll see various levels. It can look very rigorous like a Cochrane type review, all the way to like No Man's Land, and some of that is just because people don't know, or they don't have the resources as well, pragmatically.* ***– P14***

	Making policy recommendations is difficult	*It's a very different perspective, and I mean this is a classic meme. Policy people struggle sometimes to even articulate their questions in a way which could be even informed by science, but scientific people often don't even know what the relevant policy questions are.* ***– P14*** *I guess, we need, we need more skills, I guess on our part, on political analysis. So, we, I think, we try to have like, 'okay, what is the political context around this policy issue that we are working on?'. And the team of researchers that we have is very technical on systematic reviews. But when you have to figure out 'okay, what are the institutional constraints? Where are they interest, the group pressures behind these? What are the ideas or value of this political analysis?', that is always key in providing context to the work that we're doing, is something that we try to do it. But I think we have a long way to do that in building capacity in our side to try to do better jobs in political analysis.* ***– P11***
	Time constraints are a common limiting factor to policy document development	*Also our methods change on the, how rigorous are we with the systematic review methods, right, because sometimes you have to have two people in parallel doing inclusion, exclusion, that extraction and those type of things. But we don't do that if we have to do a review for seven days. So, it's just one person doing that. So, we have shortcuts on the methods, depending on how fast we have to deliver the review* ***– P11*** *If we have very, very little time, we go to databases that have already some systematic reviews such as health systems or social systems evidence that can provide us very quick access to systematic reviews that will help answer our question. If we have a bit more time, usually we opt for broader search and then we use PubMed, Epistemonikos, or whatever like, depends very much on the question. But we try to run the search on maybe five to seven scientific databases if we have more time in this case, meaning 30 days or longer. If not, we, maybe we'll do two to three databases and really focus just on the scientific databases that are focused on systematic reviews.* ***– P10***
	Resource limitations affect approaches to document development	*For the small ones, for the, for these single reports its typically a single author… they're not, you know, described as being a comprehensive, exhaustive search, like there's none of those claims that a systematic review can make, right. There's no critical performance, critical appraisal, or evaluation of the included sources. You just got to trust our best judgment you know, and we've tried to caveat it as much as, as appropriate.* ***– P5***
4.3 How to best manage the information available to you	**Some try to avoid potentially problematic sources altogether, others prefer to include everything**	*And when I look at our processes now compared to where I want to be, there's a massive gap. Knowing where the information comes from, I mean like, I don't care, 'where' can be a proxy just like Cochrane as a brand is a proxy for quality, right. Like, if there's 40 systematic reviews and that are within the last ten years all on the topic, if I'm pressed for time, I'm only going to read one, and it's probably the Cochrane one because I know that it is done to a certain standard, and I know that generally speaking they tend to be better quality than your average generic one. In a good review process, you would read all of them and suffer through them all, but knowing where, and just generally knowing, I'd say yeah, where the information comes from directly can be a proxy for that.* ***– P14***

	I think whatever is published is worthy of the public eye. Like the debate in science for me is okay, how much can I trust this? Why this idea is so different from whatever else has been put out there? Is there something I can follow there in policy? Because in policymaking, of course, you have to have the best of available evidence, but you also have to have creativity. So sometimes a study that is very small and like super context based gives you insight for policymaking that is useful. And I myself think even crappy studies should be published. Like if the person went there and did the whole job of preparing a manuscript, which is a pain in the ass. I think it should be out there. ***– P10*** *So, I do, if I see anything that concerns me is I do try and flag it. Like I had one. It wasn't for a policy question. But where it was from a journal that wasn't in, it wasn't one of are typical journals. And then it was open access. So, it they had their peer review process page, but their peer review process page was like missing. I thought, that's a little sketchy, so I put a little note in their peer review process unclear.* ***– P6***
	Unreliability of published literature is not exclusive to predatory journals *It's not necessarily a seal of quality if it's published in BMJ, for example* ***– P12*** *So, for me, the term "predatory journals" I guess is problematic because of where it came from, and then I think it's a bit of an oversimplification of the problem, and I don't know that it's the key problem.* ***– P14*** *As you know, I work in [country]… there is always this question from policymaker about 'okay, but what has been done here?', what, like, we relied so much on evidence that is being produced, or is being published in English or is being produced in the Global North, I guess. And there's always the question, 'okay, what is being produced in the Global South? And where is that evidence?' and sometimes that's a challenge to identify that research* ***– P11***

Theme 5 – Maintaining transparency throughout the development process

Subtheme	Key takeaways and sample quotes
5.1 Transparency of the development process	**Transparency, reproducibility and repeatability of the findings is the ideal goal** *[The]argument for doing all of this is transparency, reproducibility, repeatability of the process, and the documentation of it. As opposed to just worrying about the methods, the real driving factor is that you can go from beginning to end documenting how you got it, and people at the minimum would agree that they understand your process of how you got there, even if they disagree with it.* ***– P14***
	Importance of clearly documenting search strategies and approaches to evidence assessment *But we don't like, I know some people have some criteria where like, 'I don't present the evidence if it's not high quality'. I don't like, they conduct AMSTAR, or they even look at the paper and say, "Oh, no, this would be classified as extremely low quality", and then don't include it. I myself don't do this, I think it's important to have the scope of all the evidence that is available, even if it has huge limitations… We usually present the policymakers with some narrative report that states what was the appraisal. So, I say, 'from our systematic review with very low quality' and then I explain in a footnote or a box, whatever quality means in that case… But we also usually put as an appendix, all of our extraction and tabulation tables, that*

		includes the quality appraisal. So, I tend to make it as public as possible and never forego this. Whenever we need to forego this, it's because the time is a constraint. ***– P10***
	Importance of clearly outlining potential limitations of the final evidence synthesis product	*And of course, rapid reviews is not the highest, the most high level of methodological approach, but we identify limitations in a very transparent way and have red flags, when we identify important limitation, we use it for example, time, we define, we will just search from 2010 sample and that could be important for the conclusions and we include a red flag to advise the people be caution when you have this discussion, because we can we can be wrong about that.* ***– P12***
5.2 Approach to knowledge dissemination	**Approach to dissemination depends on document type and intended end-users, but should promote transparency**	*Sometimes we try to publish that on journals, because we have these, these office of trying to inform decision making, but at the same time, we always, we sometimes get grants for research projects around trying to evaluate what we do. And that's what we try to publish. And we always try to go for Open-Source journals… The issue with that is the, yeah, they're expensive sometimes for us, but yeah, sometimes it is good to be in a lower- or middle-income country where you can have some discounts on that… But the other work that we do is, it's always in the public domain for free and we put it on our website, we try to disseminate it with people, with different people that we know so people can access the information that we produce.* ***– P11***
	Engage with stakeholders throughout process can facilitate dissemination	*Because we are engaging with them from scratch, it's quite easy to disseminate. And we always keep these conversations and relationships going with other policymakers that we have done previous reviews or interactions with so this is not such a big deal for us. We do have a public website where we put these, we have a journalist that is very good in creating social media content, as well. But I would say most of our, like the effectiveness of our dissemination, is just having engagement with policymakers from the problem definition and from scratch.* ***– P10***
	Important to make as accessible as possible, and accessibility can depend on dissemination strategy	*Obviously, you know, researchers can use social media, websites, journal article, like journal, sorry. And but that doesn't really get to that audience specifically. So that's where there is some need for that relationship already to be established or relationship building. So that's where it's really helpful to have a good team and collaborators who can have that insight and have those connections and to how to get it really into the hands that it needs to go. And also doing that development work with those organizations.* ***– P15***

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