

“WHOSE VOICES ARE NOT IN THE ROOM?” INDIGENOUS WOMEN’S
PARTICIPATION IN THE ARCTIC CLIMATE CRISIS RESEARCH

by

Elissama De Oliveira Menezes

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Dedication Page

To my Spiritual Guide and the Ocean, my greatest love

To Jaci Paula, my mother, and to my community

To my Ancestors, whose shoulders I stand on

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Abstract

The climate crisis is the new black with thousands of documents published on the topic every year with significant input from the Inuit, knowledge holders of the dynamic of the Arctic environment. This study reports on a systematic literature review that examines the participation of Inuit women from Nunavut in climate crisis research. Here, the recruitment approaches and research methodologies were explored, finding that Indigenous women's participation is different for different fields within the climate crisis research. Women were not represented in the policy field, well represented in medical-science and natural hazards, and less represented in climate and natural sciences. The findings discussed through a relational lens, places the scientists within the research process, and through examples of meaningful and diverse methodologies, methods, and frameworks to engage with communities. The study concludes with management recommendations for researchers and policymakers on how to challenge themselves, the framework and data.

List of Abbreviations and Symbols Used

*: Used in the searching strategy to retrieve all the variations of the word searched,	25
CBPR: Community-based participatory research,	35
CEDAW: Convention on the Elimination of Discrimination against Women,	23
GS: Google Scholar,	17
HTO: Hunters and Trappers Organizations,	33
IRMs: Indigenous research methodologies,	35
LNUK: Local Nunavimmi Umajulivijiit Katuqiatigininga,	35
LTK: Local and traditional knowledge,	30
MARA 5003: Marine Science and Technology course,	18
NIWA: Nunavut Inuit Women’s Association,	38
NWAC: Native Women’s Association of Canada,	38
NWMB: Nunavut Wildlife Management Board,	34
PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses),	13
QUOROM: Quality of Reporting of Meta-analyses,	14
UNDRIP: UN Declaration on the Rights of Indigenous Peoples,	23
URL: Uniform Resource Locator,.....	19
WOS: Web of Science,	17

Glossary

Climate crisis – the choice to use climate crisis instead of climate change throughout this work is based on Carrington (2019) to represent the world's environmental crisis accurately. Climate crisis, along with climate emergency, breakdown, global heating, are being used to effectively communicate the urgency of the changing in climate in the world. The term has been used by leaders worldwide.

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Chapter 1 - Introduction

I was told that indigenous studies are about relationships and connections; that is how I want to start this study – elaborating on my relationships and connections with Indigenous women who are participating (or not) in Arctic climate crisis research.

I was born and raised in Brazil. I grew up hearing the stories told about the people, especially women from the slums, and these stories were different from what I experienced, having lived in a slum area for my childhood and youth. Those women were the pillar of their communities. On top of their exhaustive labour at home taking care of children as well as working the entire day, they were the ones who would get together to help someone sick, or after a divorce, or during maternity leave. These women would mobilize the community after flooding to support the families that lost their homes. Nevertheless, media reports and even the types of research that were being undertaken often portray these women as inferior, weak, and victims.

My awareness of the distortion between what I experienced and what I read about the place that I grew up drove me to my main concern in my academic career: the voices that are not in the room, the ones not sitting on the table or counted. Because of my interest in the social dynamics associated with climate crisis research, my specific question in my field has been: who has not been represented in the social dimension of the climate crisis narrative?

This question led me to my current graduate project as I started to dive deep into learning more about the climate crisis in the Arctic, a region that works as a nature-based solution for climate change, yet, the most affected one by the outcomes of the climate crisis. In the

Arctic Ocean, the high levels of primary production, surface water cooling, and sea-ice dynamics induce locally significant CO₂ uptake underlining the global importance of the Arctic Ocean as a CO₂ sink (MacGilchrist, et al., 2014). The Arctic region has been three times more affected by the climate crisis than other parts of the world (Bush & Lemmen, 2019). Beyond its geo-oceanographic importance, the Arctic is the home of Inuit peoples who have a close relationship with ice (*siku*), land (*nuna*), sky (*qilak*), and wildlife (*uumajut*). The Inuit peoples depend on hunting, fishing and gathering, which have already experienced changes due to increasing urbanization and climate change that disrupts local hunting and fishing practices (Del Bello, 2017).

The climate change narrative in the Arctic is also starred by Inuit activism and knowledge. The first book that I read in Canada was *The Right to Be Cold* by Sheila Watt-Cloutier, an Inuit woman who, through her memories and experience growing up in the Arctic, shows how climate change threatens the cultures connected to the ice and snow. The book not only advocates for the Arctic but the entire world. Sheila's resilience, commitment, and survival are inspiring. I was also fascinated by the story of Higilak, the wife of Ikpakhuak, who was the Inuit leader of the Copper Inuit of the Northwest Territories, one of the last Indigenous groups to be contacted by outsiders. She was an *Angakok* – a shaman - whose insight directed where the family hunted and fished, and she had the power to treat and heal the sick (Harper, 1992). I was mesmerized by the protagonist of Inuit women in the community and global issues.

However, in academia, the sources that I accessed were telling a different story about the social dimension of climate change in the Arctic. I realized that the studies in that area seemed to prioritize a specific type of narrative, especially the ones related to the

environment and its geography, and giving no or little attention to other ways of knowing and stories. My realization soon materialized in a research question as I read about Indigenous women from the Arctic flagging this issue and asking for representation in the climate crisis research in the Arctic (Quinn, 2018).

From this, the research goals were to understand what fields included Indigenous women as research participants or collaborators in the Arctic climate crisis research; and, when included, the quality of their representation in the climate crisis fields of study. Therefore, this project has the objective to understand how Indigenous women are participating in the climate crisis research in the Arctic. Five sections divide this work. The first section is the introduction and an overview of the project background, relevance and research question. The second section provides detail and rationale for the location of the study, which is Nunavut, Canada. The third section presents the methodology and tools used to conduct this research, followed by the fourth section, which presents the results and discussion and elaborates on the limitations and considerations for the data analyzed and the outcomes. Finally, the fifth section concludes by identifying the next steps, as well as management recommendations to address the issue of indigenous women participation in the climate crisis research in the context of the coastal marine environment in Nunavut.

1.1 Background

Every year, thousands of articles and reports on climate crises are published (Ford, Berrang-Ford, & Paterson, 2011). In the Arctic, most research funding goes to climate change-related projects (Desbiens, 2010). In the last two decades, the number of

scientific works published in the Arctic climate change field has increased by more than 700% (statistics based on search Arctic and “climate change” in Scopus database title-abstract-keywords fields, from 1971 to 2018 on February 2019) (Figure 1). Most of the studies published in the Arctic are related to environmental science ecology (Web of Science results for “climate change” AND Arctic, all fields, all documents types, from 1977 to 2019 in April 2019). Because the Inuit, the collective term for the Indigenous peoples inhabiting the Arctic regions of Greenland, Canada, Alaska and Chukotka, hold generations of local knowledge on the dynamic of the Arctic environment, they are often sought to be involved in the Arctic climate change research, to varying degrees, depending on the type and nature of the research.

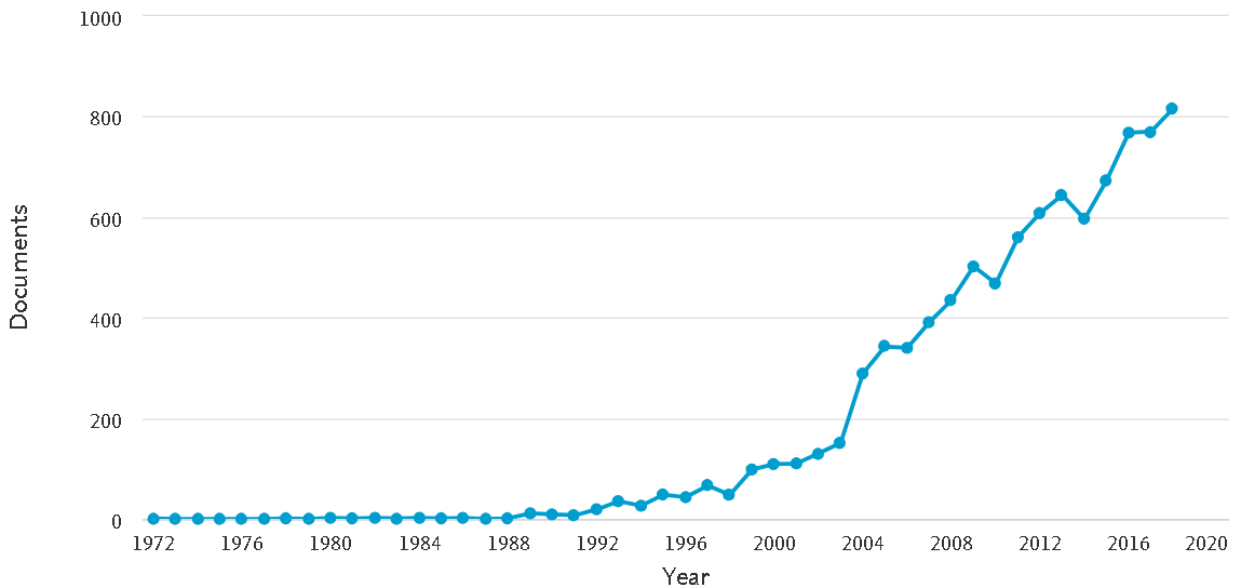


Figure 1-Number of Arctic climate change documents retrieved in the Scopus database from 1971 to 2018. Search: ‘Arctic AND “climate change” on February 4th, 2019. Source: Scopus database.

1.2 Relevance to Marine Management

Even though climate change affects everyone, marginalized groups such as indigenous women are the ones who bear the most significant burden of social and environmental crises due to their socio-economic vulnerability and limited access to resources (Wedeman & Petruney, 2018). Therefore, a misrepresentation of indigenous women in the climate crisis science will generate biased information that could have policy implications which, in turn, could exacerbate gender inequality making it very difficult, and in some cases, impossible, for Indigenous women to navigate climate changes in ways that build on, and support, their identity and resilience.

In order to foster a climate crisis action taking into consideration community-responsive mitigation and adaptation, the critical role that women play in their communities must be acknowledged and incorporated into decision-making processes (Wedeman & Petruney, 2018). In the interface of policies and knowledge is where science plays a fundamental role: indeed, quality and accurate information is the first step to effective decision making.

The reasons why women may not be included in the Arctic climate crises research could be associated with:

1. The funding for scientific work which focuses on broad-scale environmental and climate data favouring male hunters input due to the nature of their land-based knowledge (Shannon, 2006);
2. Research frameworks may not incorporate the different dimensions of how climate change is experienced in the North; as a result, there is no space, especially for women, to situate themselves in the process of knowledge production (Desbiens, 2010).

In this work, the focus is on the second reason – the scientific research framework and the involvement of Indigenous women in the research process.

Even though the lack of women participation in the climate crisis research process is not only a problem in Arctic communities (Canada, 2019) (United Nations, n.d.) (IUCN, 2015), this geographic focus was chosen due to the fact that : (i) the Arctic is already experiencing the effects of the climate crisis; (ii) climate crisis in the Arctic has a global effect due to its connection through several couplings both in atmospheric circulation and the thermocline circulation in the ocean (Dalsøren, Endresen, Isaksen, & Sørgård, 2007) and; (iii) indigenous women carry a double discrimination by being a woman and being Indigenous (Hanson, n.d.).

The stakeholders directly affected by this management problem are: 1) Inuit communities' (women, men, elders, children, youth, whose lives are tied to the role and identity of women); 2) the scientific community, as the misrepresentation of indigenous women may lead to partial or even unrepresentative research about climate change within the Arctic context; and 3) the funding agencies, as the structure and goals of the calls for scientific projects may constrain the research process. In a broader sense, the entire society is affected by the undocumented knowledge of Inuit women as their perspective may offer a different approach to deal with the climate crisis. The incorporation of different perspectives is especially important in the Arctic environments where the effects of the climate crisis have environmental, social, cultural, economic, and political dimensions. For instance, with the reduction in the extent of sea ice in the Arctic, more ships will be able to navigate in Arctic and Northern waters; the increase in shipping traffic leads to higher risk of oil spills which increases food insecurity in the community

as local sources of food are essential for the survival of the population in this area (Martin, 2011). According to the study on country food in the Arctic by (Collings, Marten, Pearce, & Young, 2016), women in Arctic settlements, especially those who are single, are already at risk for food insecurity. In a scenario of climate emergency, women would be at even higher risk in that regard.

1.3 Research Questions

The research questions for this study are:

1. What is the representation in terms of involvement as research participants or subjects of Inuit women in the Arctic climate crisis research?
 - a. When included in the climate crisis research, what are the fields that Inuit women are most engaged with and represented?
2. What changes in approach and methodologies researchers need to apply to make space for women's knowledge in their project?

1.4 Research objectives

The objective of this study is to provide a qualitative picture of the participation of Inuit women as research participants or subjects in the climate crisis research in the Arctic. It also aims to be a tool for practitioners, scientists, and the government in terms of what fields and recruitment methods in the climate crisis research with communities may need

to be revisited in order to guarantee a more accurate representation of the Inuit community as a whole in the Canadian Arctic.

1.5 Outcomes

This work has three defined outcomes: (1) a list of the Arctic climate crisis peer-reviewed documents that engaged with the Inuit community in the research process from 1972 to 2019; (2) comprehensive analyses of the aforementioned studies emphasizing the participation gap of Indigenous women in fields related to climate change research in Nunavut; and finally, (3) an evaluation of the efficacy of a systematic review as a methodology to identify participation gaps in studies that engage with community.

Chapter 2 - Nunavut and the Climate Crisis Research

Nunavut means “our land” in Inuktitut, the language of the Inuit. Geographically, Nunavut is the largest and most northern territory in Canada (Figure 2). For the Inuit, which means ‘human beings’ or ‘the people,’ Nunavut has been their home for millennia. According to the 2016 Census, 35,940 people live in Nunavut, in which about 51% were males, and 49% were females.

The Inuit have a deep relationship and connection with the land (Facing History, n.d.). They have developed a lifestyle that is adapted to the Arctic’s extreme conditions, becoming the knowledge holders of the Arctic ecosystems and dynamic, which is very valuable for environmental and social research in the region (Sjöberg, Gomach, Kwiatkowski, & Mansoz, 2018).

The Inuit are also witnessing the changes in the environment due to the climate crisis. Dowsley et al. (2011), start their article on Inuit women and climate change describing the observation of an elder regarding the changes in the wind direction in the Bake Lake, Nunavut. The elder was accustomed to set up her family’s summer tent on the same location, where the wind would hit the back of the tent for a long time. However, lately, when she places the tent in the same location and direction as before, the wind hits the side of it. In the same study, Attakalik Palluq, an Inuit woman, describes the changes she has experienced regarding the spring conditions, sea ice and snow cover:

The sea ice has really changed. I used to travel both by dog team and skidoo to and from Pond Inlet. In my recent trip, the snow has changed. The snow on top

and snow condition on top has changed. Normally, in the spring, the snow on the top will freeze at night. This process is called *qiqqsuqqaqtuq*. This frozen layer can be seen when the day just starts getting daylight; it is sparkling because of the recent freeze up on top. I noticed it wasn't like that anymore. This process, the freezing, isn't happening anymore.

Palluq 2007 (apud Dowsley et al., (2011), para. 13)

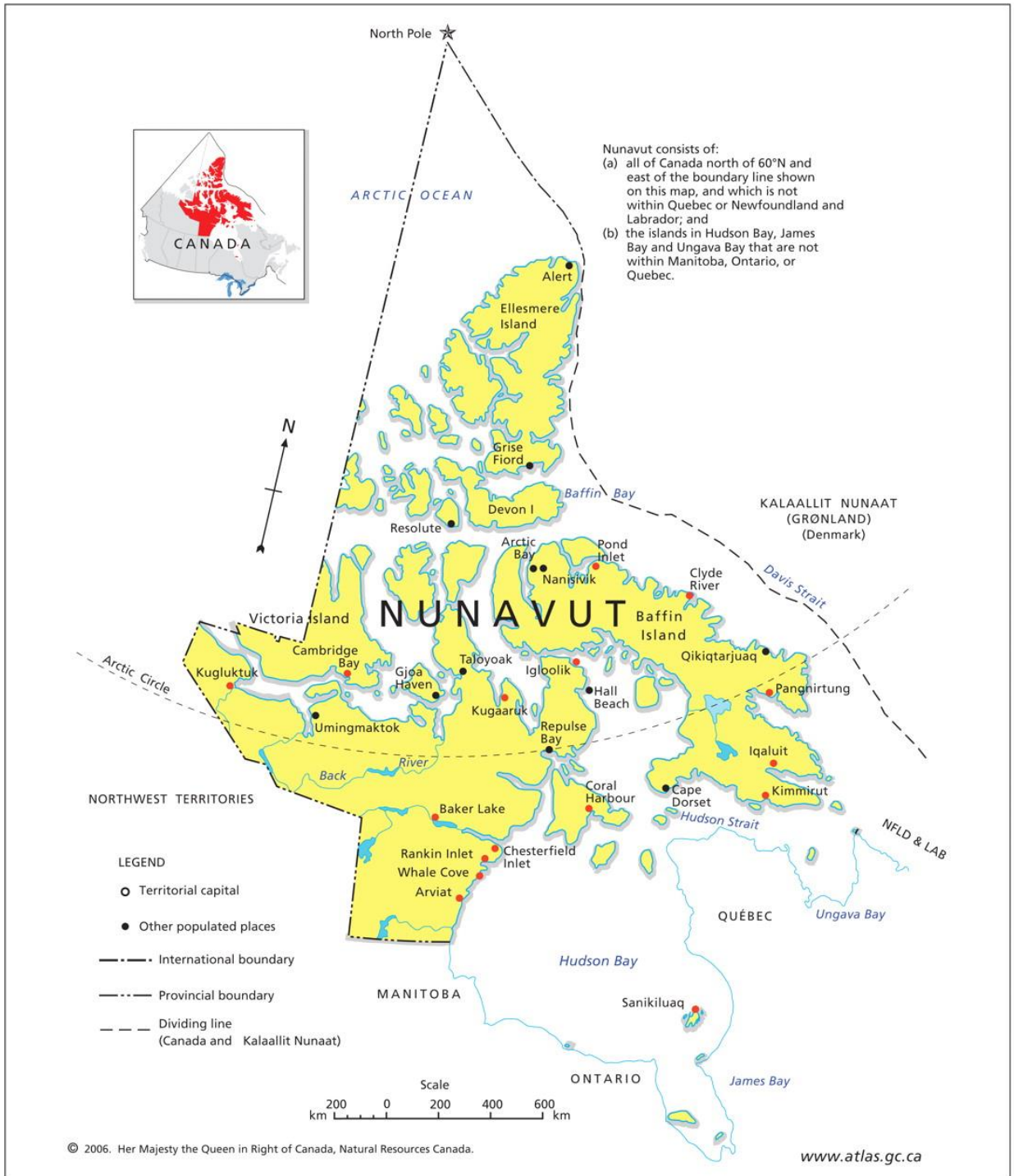


Figure 2– Map of the Nunavut Territory. Source: Natural Resources, Canada, 2006.

Climate crisis research in Nunavut has increased substantially in recent years. Using the same search strategy and database as the one applied in Figure 1 and replacing ‘Arctic’

for 'Nunavut' in the searching strategy, the articles published in the climate change field in Nunavut have increased more than 600% since 2000. Even though the total number of studies per year is below 50 documents, the increase in publications shows that Nunavut has been targeted as an area of climate change study, especially considering that not every research conducted in the area will turn into a peer-reviewed article.

With the increase in research in the area comes the interest in the knowledge and observations by Inuit and the need for scientists to work together with the community in environmental and societal change issues. Challenges and opportunities may arise from the involvement of local indigenous peoples in research. In this work, the focus is on the challenge of equally representing the Nunavut community in climate crisis research, especially vulnerable groups such as indigenous women.

Chapter 3 - Methods and Tools

A systematic review was applied to assess the status and quality of women's participation in climate change research in the Arctic.

3.1 Systematic Review

Often, the vast amount of scientific information on a subject may be unmanageable or even overwhelming (Petticrew & Roberts, 2006). In the field of climate change, for instance, a significant number of articles (peer-reviewed and grey) are published every year (Ford and Pearce, 2011). In order to recognize and combine pertinent studies related to the field, a tool is needed that can systematically assess the status and quality of women's participation in climate change research. A systematic review is an evidence-based method to assess studies aiming to select and summarize relevant research (Petticrew & Roberts, 2006) (Higgins, et al., 2019).

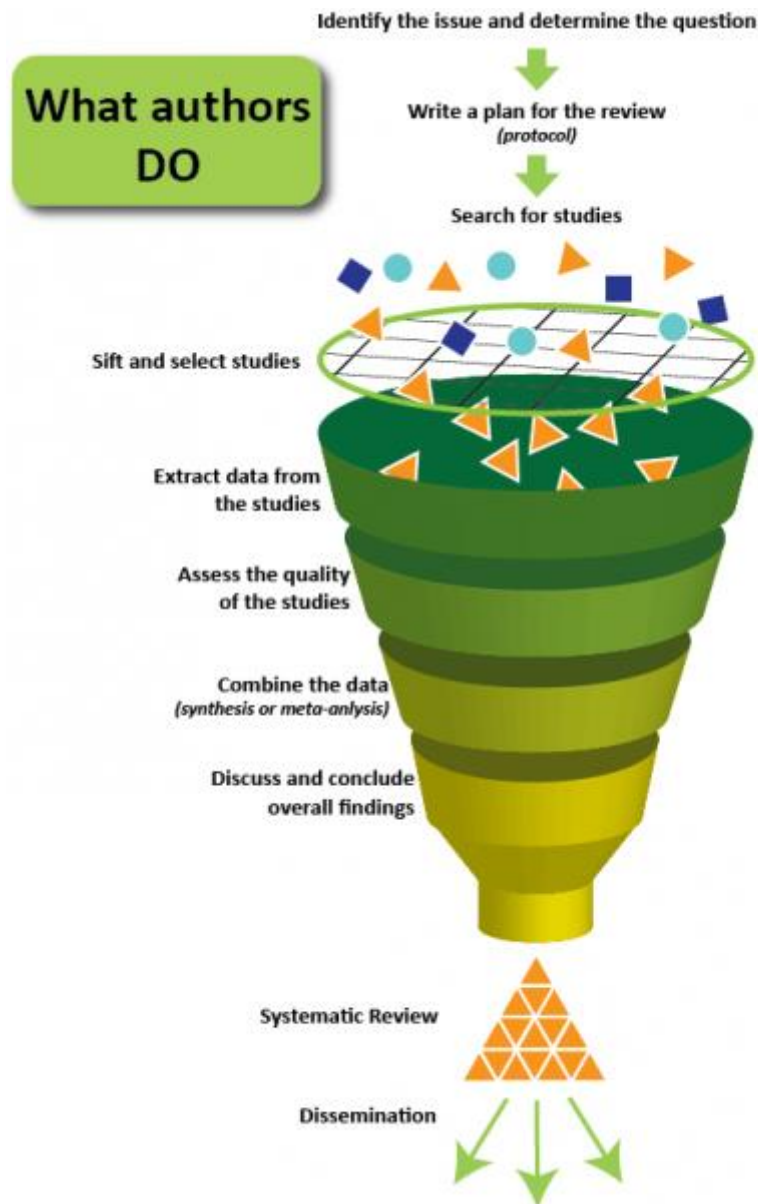


Figure 3 – How to do a systematic review. Source: Designed by Jessica Kaufman, Cochrane Consumers & Communication Review Group, Centre for Health Communication & Participation, La Trobe University, 2011. Retrieved from: <https://cccr.org.au/sites/cccr.org.au/files/public/uploads/What%20authors%20do%204%2012%2015.pdf>

According to (Ford & Pearce, 2010) a systematic review has three characteristics that set it apart from other types of reviews: (i) a strategy is established before the review process stating explicit and systematic criteria that are used to select a study; (ii) inclusion and

exclusion criteria of papers are reported, documented and available to consult; and finally, (iii) the methodology allows a qualitative and quantitative analysis of a vast number of studies available on trending topics. The systematic nature of this methodology allows reproducibility and transparency, thus differing from a traditional literature review (Ford & Pearce, 2010).

Although this methodology is vastly used in medical research using the Cochrane approach (Higgins, et al., 2019), it is gaining popularity in physical and social science (Ford & Pearce, 2010). In recent years, several studies on climate change have been published adopting the systematic review as their primary methodology (see, for example, (Ford, Berrang-Ford, & Paterson, 2011) and (Ford & Pearce, 2010)). Ford, Berrang-Ford, & Paterson (2011) developed a systematic review methodology to analyze the adaptation process to climate change on a large scale. As well, Ford and Pearce (2010) applied a systematic review to evaluate local vulnerability in the Inuvialuit Settlement Region, Canada. These studies are the bedrocks for the introduction of systematic reviews in the climate change field.

3.2 PRISMA Tools

A successfully systematic review establishes pre-specified eligibility criteria and documentation of the methodical approach to collate all relevant evidence and answer the specific research question (Shamseer, et al., 2015). However, to ensure that the process is transparent and that the methodology was fully reported, tools to detail the reporting process such as the PRISMA (Preferred Reporting Items for Systematic reviews and

Meta-Analyses) are crucial to allow access to the strengths and weaknesses of the reviewing process and its duplication.

The need for a comprehensive tool to report systematic review and meta-analyses was first addressed in 1987 when studies were reviewing articles published in medical journals identified flaws with the scientific criteria that were being used to select studies included in the reviews (Mulrow, 1987 apud (PRISMA, n.d.)). About a decade later, an international group developed the QUOROM Statement (Quality of Reporting of Meta-analyses), which focused on the reporting of systematic reviews and meta-analyses, which was updated in 2009 in order to incorporate conceptual and practical advances in the field. It was then renamed as PRISMA.

The PRISMA protocol is the document that serves the objective of planning the systematic review before it takes place. Its importance goes from the ability to plan the systematic review carefully and thereby anticipate potential problems to the capacity to have the review replicated and judged by the validity of the methods planned (Shamseer, et al., 2015). Besides, the protocol prevents arbitrary decisions regarding inclusion and exclusion criteria and data extraction. PRISMA also offers a tool to depict the flow of information through the many phases of the systematic review (PRISMA flow diagram) allowing easy visualization of the decisions made through the review process.

Chapter 4 - Applying Methodology

In order to understand how indigenous women are being included in climate crisis research, a systematic review of the literature was conducted. The keywords to be searched were tested and defined, inclusion and exclusion criteria were established, and three databases used. The documents selected had their methodology analyzed and instances where a study met the inclusion criteria but did not have all the information needed regarding the number of women and men involved in the consultation process, the first author was contacted. The number of indigenous women, as well as the field of study in which they were involved or not, were expressed in graphs and tables, which will be further discussed in the results and discussion section. The details for each one of the steps taken are elaborated in the following sub-sections.

4.1 Systematic Review

A protocol, developed before the review took place (Appendix A), guided the research process and any changes that occurred during the systematic review were recorded and a justification provided.

4.2 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were established early in the process (Table 1). These criteria guided the selection process and reflected the number of documents

selected from the ones retrieved. The criteria established took into consideration the research questions and the objectives of the study. The criteria also incorporated the limitations of the project. Some of the limitations identified include the short time-frame for the study, the lack of human resources, language, and no financial resources to access paid software to analyze the review.

Table 1 - Inclusion and exclusion criteria for document selection divided into two parts: keyword search and title and abstract review and final selection including contacting the first authors of several studies

Inclusion	Exclusion
Step 1: Keyword search and title and abstract review	
English peer-reviewed articles	Other languages such as French and Inuktitut
All years	Documents not accessible through an online database
Indexed in the Web of Science, Scopus, or Google Scholar	Not available in the databases searched
Nunavut Territory	In other parts of the Arctic not including Nunavut
Primary research related to climate change	Grey literature: review, books, conference paper, and others.
Community participation through interview, consultation, and others.	No community participation, ethnographic studies
Article available in the Novanet system	Articles in journals not accessible through Novanet system
Step 2: Final selection including documents that needed complementary data	
Studies with complementary data	First authors had no access to the data or did not answer the email
Participants were asked to self-identify themselves as males or females	Studies without gender breakdown
Unique data	Data used multiple times for different studies-only the oldest study was considered

4.3 Databases

The three databases used – Web of Science (WoS), Scopus, and Google Scholar (GS) – were selected to provide broad coverage of disciplines related to climate crisis research. WoS is well recognized in the literature as a database with a broad range of disciplines in science, social sciences, arts and humanities (Jasco, 2005). Moreover, other climate change studies that used a systematic review approach have performed their search on the WoS database (Ford, Berrang-Ford, & Paterson, 2011) (Ford & Pearce, 2010). Nonetheless, the use of only one database in the systematic review increases the possibility of publication bias. Therefore two more databases – Scopus and GS – were incorporated in the study. A study conducted by Bramer et al. (2017) analyzing the optimal database combinations for literature searches in systematic reviews showed that WoS and GS were one of the four combinations of databases retrieving unique references. Because Bramer et al. (2017) study focused on biomedical reviews, considerations need to be made in terms of the performance of WoS and GS as the searching database, especially in fields not related to biomedicine. Besides, GS errors and limitations have been documented in the literature (Shultz, 2007). GS algorithm is unknown and not controlled. Also, Google adapts the search to each user in order to personalize information making the probability of replicating a systematic search deficient (Piasecki, Waligora, & Dranseika, 2018).

Scopus was included to enhance the range of disciplines incorporated in the systematic review and, most importantly, due to its recognition in the scientific community as the world's largest abstract and citation database of peer-reviewed literature.

4.4 Searching Strategy

A librarian from the Killam Memorial Library at Dalhousie University was consulted to develop the searching strategy, and two pilot projects were performed. The librarian suggested the set of primary keywords (women, Arctic, climate change) as well as the databases (WoS and Science Direct) to start the review. The keywords and databases suggested were tested for the graduate project proposal. In the Science Direct database, the keywords searched did not retrieve any document (January 2019). During the Marine Science and Technology course (MARA 5003) at Dalhousie University in 2019, as part of the class project, the second pilot study was carried using WoS and Scopus and the same keywords suggested by the librarian. The objective of the study was to analyze the limitations of the keywords applied as well as to identify other keywords through the documents retrieved. The pilot study identified that: (1) the search strategy should be broad enough to target the climate crisis studies that engaged with the Inuit and filtered to identify the studies that took place in the focus area of study as Nunavut often was not mentioned - mainly when referring to geographic landscape such as bays - or abbreviated; (2) the strategy should not target women or men, however, they should be included in it, finally (3) a third database should be added to increase the range of disciplines incorporated in the systematic review.

The searching strategy (Table 2 Appendix) was first tested in the WoS database. Among the eleven strategies tested, seven of them were selected based on the number of studies retrieved. The seven searching strategies selected were also applied to the Scopus database.

Because GS does not offer the same searching feature as WoS and Scopus as well as it has a different scope of coverage (Shultz, 2007), a specific searching strategy was developed to attend the limitations and specifications of this database. From twenty-three strategies tested, three were selected based on the best relationship possible with the strategies used in the WoS and Scopus (Table 2 Appendix). The GS strategy did not include citations or patents. Wright et al. (2014) in a study on the incorporation of citation searching in a systematic review, concluded that citation searching, when incorporated in the systematic review, could be time and resource-consuming with a low number of exclusive documents retrieved.

4.5 Database Searching and Data Exportation

The advanced search was used in the WoS and Scopus databases. For the former, the data was exported as a printable file and copied to an Excel spreadsheet. The later database has the option to export the data directly to an Excel spreadsheet.

Logged out of all Google accounts to avoid personalized search, the advanced search feature was used in the GS database, and Outwit Hub, a web scraping software, was used to export the data from GS to an Excel spreadsheet. The searching and extraction of the documents retrieved in GS were made through Outwit Hub. A scraper was written to localize and export specific data from the results such as the title, authors, and URL. Because the Outwit Hub scraper can only export data page by page and GS limits 20 results by page, the software was manually run from page by page until the last one. GS

results were limited to the first 50 pages for strategies that retrieved more than a thousand results, which will be discussed later on in this work.

4.6 Filter Results

The documents retrieved from GS were filtered for duplicated and different locations, using the find tool in the Excel Spreadsheet. Using the find tool and inserting name of locations that are related to the Arctic such as Alaska, the US, Russia, as well as peoples other than the Inuit communities such as the Métis, First Nation, Sámi peoples, the documents with other area of study not including Nunavut were highlighted and subsequently extracted from the list.

The duplicated documents retrieved from the Scopus and WoS were removed using the tool 'remove duplicates' in the Excel Spreadsheet. The application of this tool was possible with these two databases but not applicable to the GS list of documents retrieved since the database does not present the documents retrieved in a standardized way. The find tool was also used to identify the area of study outside the Nunavut, e.g., find Northwest Territory, Quebec, Alaska, Greenland, and other locations in the documents retrieved from Scopus and WoS databases.

The GS, Scopus and WoS lists were combined. The duplicated documents among the three databases were identified using the function conditional formatting, highlight cell rules, and duplicate values in the Excel Spreadsheet. Each one of the titles was searched and the abstract read to verify if the study had Inuit as research participants or subjects. When the participation of Inuit could not be identified in the abstract, the methodology

was scanned. The ‘find’ toll was also used within the article to find the word ‘Nunavut’ and ‘interview.’

4.7 Selected results

The documents that mentioned Inuit involvement and participation as research participants or subjects had their methodology further analyzed to identify the methods carried in the community (interview, focus groups, workshops, and other methods.). Information regarding the sample population profile, the number of women and men involved, and the method used to recruit participants, age, and language used during the interview were also extracted.

Documents that used secondary sources of information such as government reports, unpublished field notes, and data from previously published papers were not considered in the final list of documents. Besides, documents that interviewed or engaged with one individual (man or woman) were not considered in the final list of documents as they were classified as an interview and not Inuit consultation. Documents that separated Inuit participants from long-term residents had only the Inuit participants counted towards the total number of participants and the gender breakdown. Studies that were conducted with the Inuit in Nunavut but did not differentiate Inuit women and men from long-term residents were considered in the study.

4.8 Authors contact

The authors were contacted if the information regarding the number of females and males participants were not available. The correspondent author of each study was contacted by email and seven days were allocated to wait for their answer. The authors who reported data as unknown for female or male participants, the data was not counted towards the total number of participants. Authors who separated the number of participants as Inuit and non-Inuit, only Inuit participants were considered towards the total number of participants and the gender breakdown. The authors were not requested to provide information about their experience or answer any specific questions.

4.9 Documents Classification

All the documents selected were related to climate change research; however, in order to qualify the participation of indigenous women in the broad field, taking into consideration its multi and interdisciplinary approaches, the articles selected were grouped in fields of studies. Selected documents were classified according to the field related to the journal in which the article was published. Fields were combined according to their connection. For instance, Natural Hazard and risk formed one group and social science, health, and medicine another group. Studies that were multidisciplinary and incorporated climate change language such as vulnerability, resilience, ice melting, were classified as Climate Research, Natural Science and Resources.

Chapter 5 - Results and Discussion

5.1 Systematic Review

The application of a systematic review as a tool to identify gaps in community participation in climate crisis research in the Arctic may have a paradoxical scenario: the methodology was applied to assess the most significant peer-reviewed literature in the climate crisis field with involvement and participation of Inuit in a context of a subject of study (climate change) strongly related to natural science which, compared to social science disciplines, the scientists in the field have less training with incorporating community participation in the research (Sjöberg, Gomach, Kwiatkowski, & Mansoz, 2018). Yet, as the funds for research in the Arctic climate crisis are focused on land-based knowledge and in the Arctic environment in general (Shannon, 2006) developed by or with natural scientists, and the continuous development pressure requires scientific and technological information (UNESCO, 2015), identifying how natural scientists can better collaborate with communities from the Arctic may not only be scientifically plausible and politically necessary but also mandatory from an ethical and legal perspective. Women's rights are formally recognized as human rights under the Convention on the Elimination of Discrimination against Women (CEDAW), and Indigenous peoples' human rights are recognized in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), yet, the climate crisis local and international regime has been slow to integrate Indigenous women into its processes, mechanisms, and policies (Prior, 2017). Furthermore, there is an alienation between concerns of social justice and concerns about the environment. The integration of these two spheres requires, first, the identification of relevant forms of

exclusion from the climate crisis narrative, practices, and decision-making. Therefore, the lack of involvement and participation of indigenous women as research participants or subjects in climate crisis studies as one form of exclusion from the climate crisis narrative may ultimately lead to a lack of participatory role and legal status in the climate crisis regime.

5.1.1 Searching Strategy

Searching “climate change” AND Arctic AND “Inuit community” in the title, keywords and abstracts of all documents for all periods in the WoS on July 14, 2019, retrieved 16 documents (Table 2 Appendix). When searching for “climate change” AND Arctic in the title, keywords and abstract and Inuit AND community in all sections of all documents for all periods in the same database on July 17, 2019, 160 documents were retrieved, ten times more results than the previous strategy. The final strategies applied in Scopus and WoS databases retrieved 1479 and 512 documents, respectively (Table 2).

In the GS database, the searching strategy used (Table 2 Appendix) to find articles with the words Arctic AND Inuit, with the exact phrase “climate change” and with at least one of the words ‘interview’ OR ‘consultation’ OR ‘participation’ without the word ‘review’ anywhere in the article retrieved 1610 documents, however, only 986 documents were exported, which represents 61% of the total of documents showed on the first page of the GS results. The limitation of GS to show only the first 1,000 relevant results were reported before in the literature (Tennant, 2005).

Table 2 – Summary of review strategy and documents retrieved

Database	Search Strategy Key Words	Results
Web of Science	“climate change”, Arctic, Inuit, interview, consultation, participat*, community, Man, Wom*	512
Scopus		1479
Google Scholar		1978
Total		3969

5.1.2 Database Searching and Data Retrieved

From the documents analyzed, 63% were peer-reviewed papers and 37% were grey literature, including thesis, reports, conference paper, review, books and book chapter, as well as biography, interview, notes, presentation and other material classified as others in Figure 4.

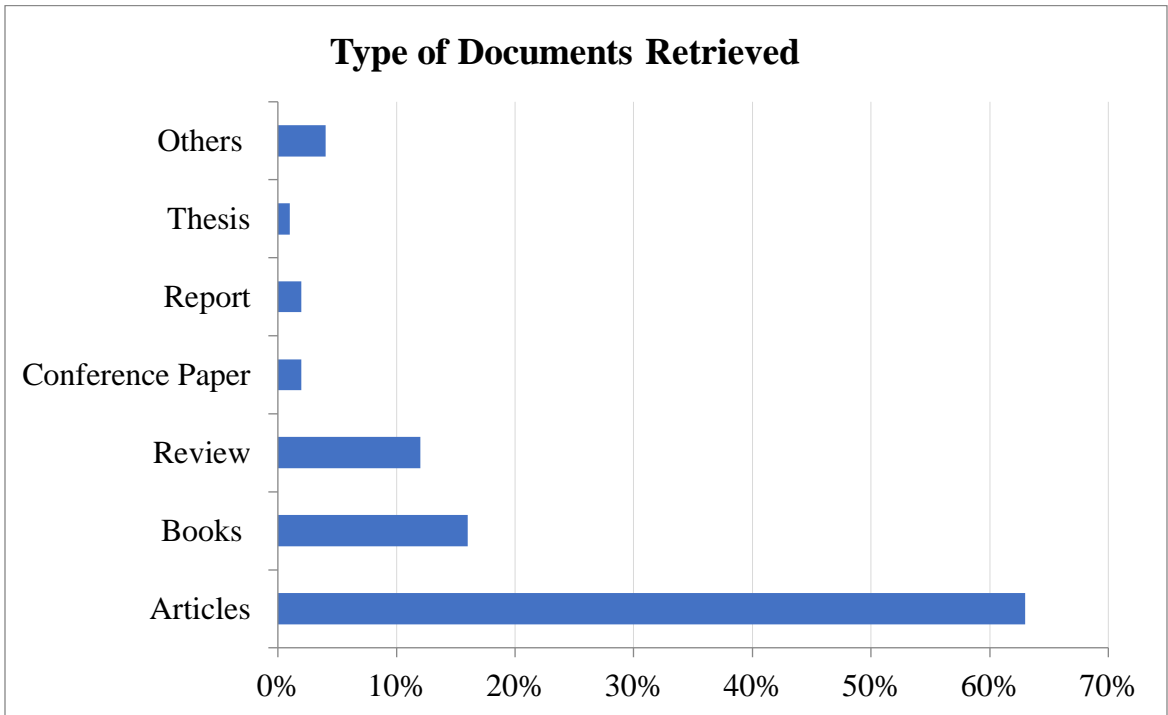


Figure 4 – Type of documents retrieved using the three databases. Others include, but are not limited to: news articles, statements, biography, and notes and any other type of works with ten or fewer documents retrieved.

5.1.3 Selected Results

A total of 3969 documents were retrieved, about 36% were duplicated values. The unique documents were accessed, which 109 records were not found, and 213 were related to other places (not including Nunavut) and other peoples (Figure 5). From the documents not found, only one was from the Scopus database, and 108 from the GS database. The documents from Scopus were exported directly to an Excel spreadsheet and, perhaps, during this process part of the information related to the document was missed. The documents were exported from the GS database using web scraping software. Some of the information was missed when scraped from the GS and then to an Excel spreadsheet. For instance, some of the titles were incomplete, and an ellipsis was used instead. Because GS is known to provide increased access to grey literature, for this particular study focusing on peer-reviewed documents and the limitations of this database, as well documented in the literature (Shultz, 2007), GS proved to be time consuming and not effective as a database searching for peer-reviewed literature mainly due to its limited advanced search and exportation functions.

From the 2430 documents screened, about 2% (69) were eligible, and 1% (25) included in the qualitative synthesis. The high number of documents excluded (1539) can be associated to (i) no limitation was established to retrieve only peer-reviewed documents in the search strategy applied in the three databases; (ii) as discussed earlier, GS database has an extensive number of grey literature documents and the results from this database represented 50% of the total number of records identified (Table 1); finally, (iii) the inclusion criteria for only primary research (Table 1) may have influenced the number of studies selected, as research in the Arctic can be financially and logistically challenging

and when the information is available from secondary sources such as reports, authors may prioritize these sources. Mark et al. (2018) using examples from seabird research and based on the field experience of researchers in the Arctic and south, demonstrated that research conducted in the Arctic is about eight times more expensive than the same study in the south. According to the study, the high cost is associated with the expense of travelling, shipping, and meaningful engagement with northern communities (varying from 4% to 25% of project cost). The authors highlight the importance of policy-makers and funding agencies to recognize the extra financial support needed in the region especially in the context of rapid environmental and social changes.

The 25 documents included in the qualitative synthesis, 44% were exclusively from WoS, 16% from Scopus and 8% from GS; 28% of the final documents selected were found in WoS and Scopus and 4% in WoS and GS. Even though GS indexes a vast number of documents (Haddaway et al., 2015), a study conducted by Martín-Martín et al. (2018) comparing GS, WoS, and Scopus in 252 subject categories indicated that GS cover at least 90% of all citations in 233 out of 252 categories, however, the same study showed that 48%-65% of GS unique citations are not peer-reviewed articles. Thus, GS, when used to target peer-reviewed literature in a systematic review, its data would be unlikely to produce substantial changes in the results. GS may be particularly useful when documents beyond the scope of disciplines in WoS and Scopus are essential to be incorporated in the evaluation.

All of the documents included in the qualitative synthesis were published in the last twelve years. The first study included was published in 2008, and the ratio of participation of women and men in the study was 4.25 men to 1 woman; however, the

most recent study included (2019) the ratio was 0.8 men to 1 woman. Among the 25 studies included only two did not have any input from Inuit women. Female authors led 60% of the 23 documents that had women participation. Studies carried by female authors as the first author were not more likely to recruit female participants.

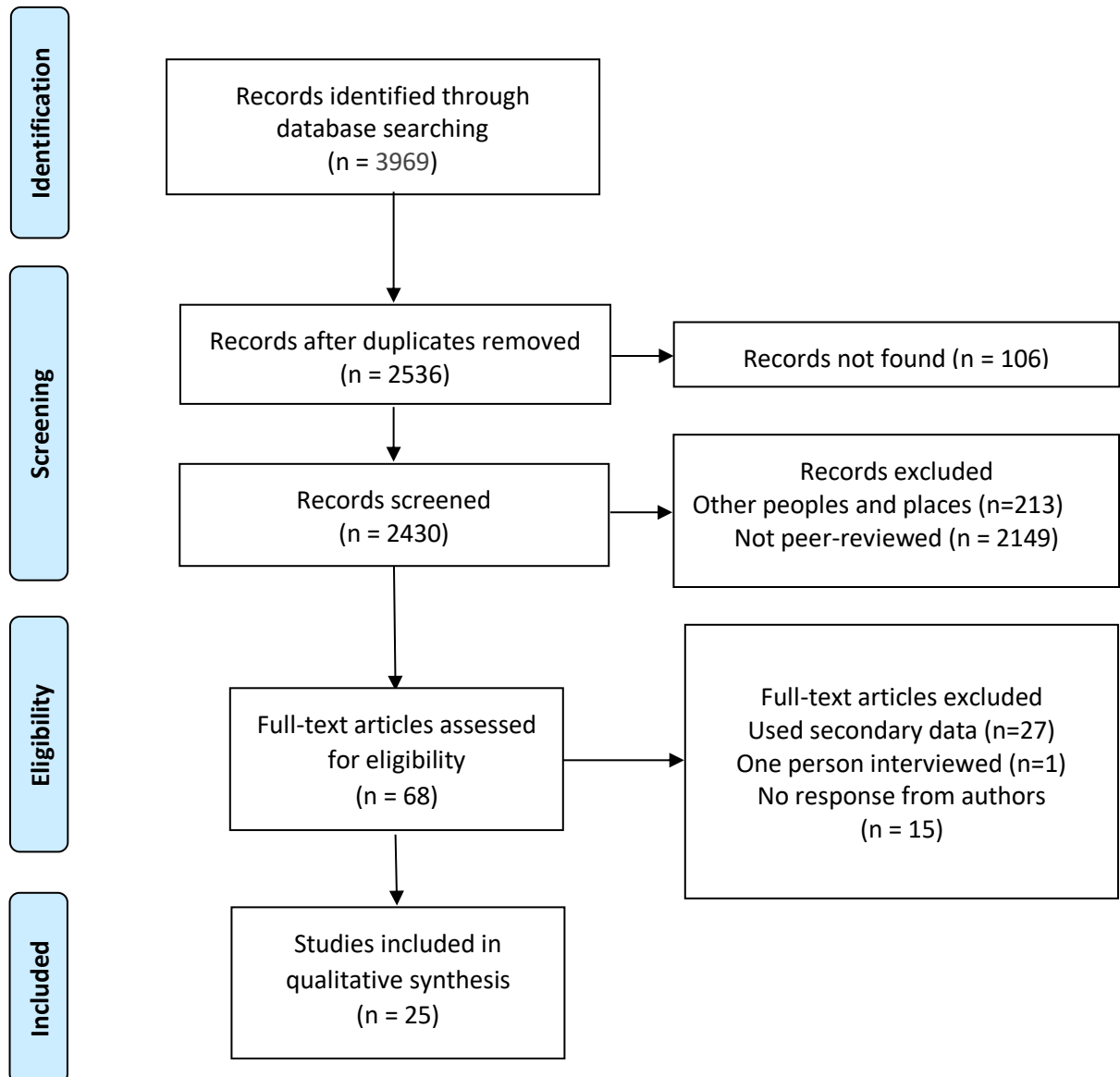


Figure 5 – Adaptation of the Prisma Flow Diagram 2019, showing the number of documents retrieved and analyzed for each step. PRISMA Flow Diagram *Source:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement.* PLoS Med 6(7): e1000097. DOI:10.1371/journal.pmed100009

5.1.4 Contact Authors

The correspondent author of the selected documents, which needed complementary data, was contacted by email and asked to provide the information regarding the number of Inuit women and men who participated in the research process as a research participant or subject. From the authors contacted, 61% answered and 38% sent the data requested (Table 3). The authors who answered but did not send the data were travelling or had no access to the computer where the data was stored, used data from another researcher in the lab and did not have complementary information about it, or were on maternity leave.

Table 3 – Synthesis of the contact with authors for studies that did not have the number of females and males published. *Some articles had the same first author. **Some authors sent an estimation of the numbers of female and male participants; when there were non-Inuit women or men, they were not counted towards the total number of participants or included in the gender breakdown.

Authors' Feedback	
Authors contacted	13*
Authors who answered	8
Authors who answered but did not have the data	3
Authors who answered and sent the data	5**
Authors who did not answer	5

Two studies had different first authors; however, the authors involved had similar numbers of participants and methodology as well as took place around the same time. Both studies were included since there was no information in the papers indicating that the data was used elsewhere before.

Hitomi and Loring (2018) carried a systematic review of gender, age, and other influences on local and traditional knowledge (LTK) research in the North. The authors

used Google Scholar to identify peer-reviewed literature, published between January 1990 to September 2017, in English and documenting LTK in the circumpolar Arctic focused on environmental and climate change. The results from their study present similarities and differences to the ones finding in this one:

- Hitomi and Loring (2018) study found incomplete information regarding the demographic breakdowns of their participants by age or gender. The same problem was identified in this study and authors were contacted to fulfill the lack of information needed;
- The study reported a ratio of 2:1 male authors to female authors whereas this study found roughly 2:1 led female authors to men;
- In both studies more emphasis on the recruitment of men, elders, and people responsible for directly harvesting the fish and game (hunters, fishers, herders.) – see discussion below;
- Both studies found multiple publications stemming from the same study without explicit connection with other publications;
- Studies led by women in this review and Hitomi and Loring (2018) were not more likely to recruit more female participants than when led by men.

In spite of the differences in scope and research question, the similarity between this study and Hitomi and Loring (2018) may demonstrate that there is a structural problem in the way that research has been carried in Indigenous communities that need to be addressed from a regional and local perspective.

5.2 Participation of Women in Research Carried in Nunavut

Based on the results of this study (Figure 5) the participation of indigenous women in climate crisis research in Nunavut is different for different disciplines in the climate change field. Indigenous women are more engaged as research participants or subjects in the natural hazards and risks and social sciences and health fields of study. Women's participation in the Climate Research and Natural Resources and Science field is 40% less than the men. In the policy field, there was no engagement with women and only men were represented.

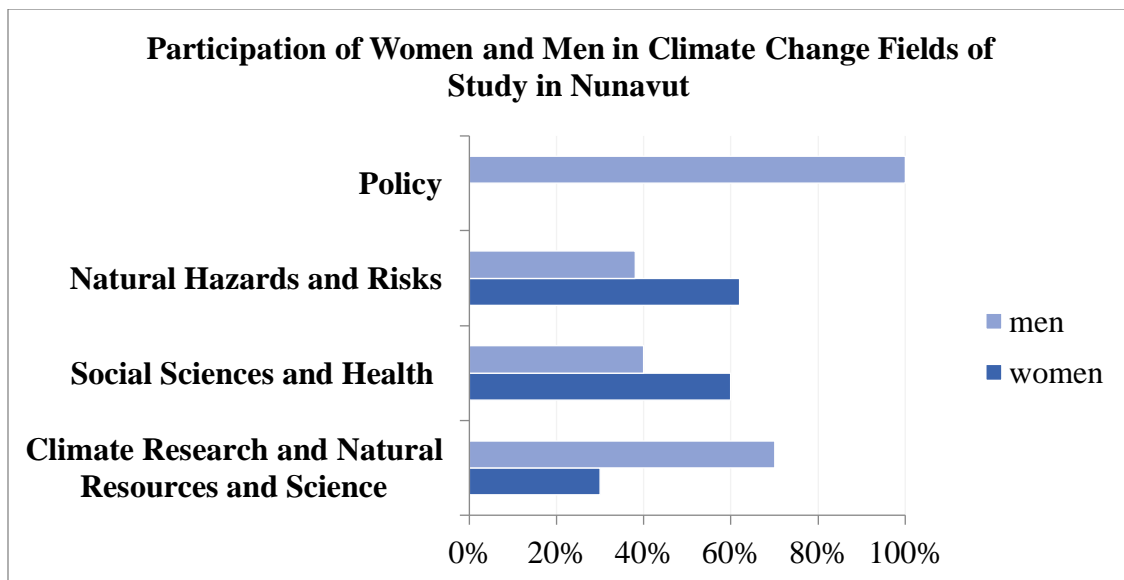


Figure 6 – Participation of women and men in fields of study related to climate change research in the arctic focusing on Nunavut.

Some considerations need to be made. Firstly, one of the two studies classified in the Natural Hazards and Risks field was focused exclusively on women (Table 3 Appendix). Because of the focus solely on women, the study may have influenced the results pushing the rate towards women's participation. Along the same line, in the Policy field, there was only one study, and this study engaged exclusively with Inuit men. Besides, a few

studies, especially the ones with a high number of participants, did not differentiate long-term residents from Inuit participants. The inclusion of these studies may have increased the total number of participants as well as the gender breakdown.

The underrepresentation of women in the Climate Research and Natural Resources and Science and the overrepresentation of the same group in the Social Sciences and Health are supported in the literature. Desbiens (2010) and Bunce et al. (2016) have articulated a preference from studies that require Inuit knowledge input to focus on men, especially those engaged in harvesting activities as the nature of these activities is associated with a broader knowledge of the environment and climate, whereas women's knowledge is commonly associated with the domestic domain. Therefore, climate change scientific research focusing mainly on the geography and land-change may favour male hunters' knowledge, whereas consultation with women is given little or no attention (Desbiens, 2010). Moreover, there seems to be a bias in the research process, perhaps even before it takes place, regarding what ways of knowing should be included or excluded, which may generate hierarchies that benefit one group and form of knowledge over another (Nader, 1996).

In the studies in the Social Sciences and Health, 70% of the total number of participants was associated with food security research in Nunavut. These studies used as recruitment methods: personal communication with community representatives and local interpreters, a household with random selection, convenience sampling or purposive sampling strategy (Table 3 Appendix). However, for most of the Climate Research and Natural Resources and Science field, the recruitment process was facilitated by the Hunters and Trappers Organizations (HTO) (Table 3 Appendix). Kafarowski (2006) in a report on Gender and

Traditional Knowledge in the Circumpolar North, articulated how in Nunavut, studies that engage with Inuit knowledge are guided and determined by board members of local community groups such as the HTO which are in the majority composed by men. It is important to emphasize that such organizations play a critical role in facilitating research in the Arctic and this project has no intention of downplaying or criticizing the structure and role of the HTO. Nevertheless, the results here presented and supported by the literature highlight the importance of scientists conducting studies in the North to address gender and, perhaps, diversify the recruitment methods in order to guarantee a broader engagement of the community.

A diversification of the methods applied in the research planning and recruitment methods to facilitate the engagement of Inuit women in the climate crisis research in the Arctic has been recognized by Arctic researchers, as exemplified in the narrative of Samuel Iverson (included in this work as a collaborator) who voluntarily provided the context of his research on Avian Cholera emergence in Arctic-nesting northern Common Eiders - using community-based, participatory surveillance to delineate disease outbreak patterns and predict transmission risk published in 2016. The following paragraphs represent the view of the author and have not been edited:

I think you are investigating a very important question and something that my thinking has evolved a lot on over the course of my career as I have gained experience. During the first field season for my Ph.D. work in Nunavut (summer 2010), I conducted fieldwork in the vicinity of Cape Dorset. I was following on the heels of another student, Dominique Henri, whom you may wish to contact. Dominique trained as a social scientist and had done formal Indigenous Knowledge interviews related to the emergence of avian cholera in northern birds. My training was in the biology department. My objective was to go out on the

land and conduct biological sampling to support laboratory work and to estimate the abundance of my study species, the common eider, on breeding colonies with potentially different histories of disease presence or absence. The process I followed was to (1) write a research proposal and make a presentation to the Nunavut Wildlife Management Board (NWMB) for funding, (2) travel to the community to meet with the local Hunters and Trappers Organization chapter/mayor to describe the project, obtain approval/consent and seek their help with hiring Inuit field assistants and boats/boat captains to do the work, (3) return a month later to conduct the fieldwork with the help of local Inuit. At the time, the NWMB and HTO leadership were both men. The HTO recommended 2 boat captains and 6 field assistants to work with, all of whom were men. In the course of the fieldwork, I had a lot of discussions with the HTO members and the boat captains/assistants that were hired – this was the basis for the ‘informal interviews’ mentioned in the paper as a supplement to the quantitative results.

I ended up doing 3 field seasons. As time went on I learned a couple of interesting and important things. The first was that the quite formal process we followed the first year could be adapted. After Cape Dorset, I went to several smaller communities in Nunavik. Instead of handpicking my whole crew for me, the HTO/LNUK leaders that I was initially put in touch gave me the names of a few boat captains that I could reach out to directly. When I spoke to them they asked if they could bring family members to crew/act as field assistants. I was open to that. Many of those field assistants were their wives or other female family members/acquaintances. The crews ended up being about 1/3 women in years 2 and 3 of the project. I also learned that while for some species, like polar bears, most of the hunting is done by men, the species that I was studying was a species that women were traditionally highly involved with. It is very common for Inuit to travel as a family out to eider colonies and spend a day or more collecting eggs and feather down. Women are very involved in this activity and as such, they are keepers of a lot of information about the location and status of the bird colonies, perhaps more so than the men.

In my current job with the Canadian Wildlife Service on the polar bear management file, I am aware that a lot of the consultations we conduct are male-dominated unless we take specific steps to seek the input/involvement of women. I'd be very interested in reading your conclusions once you get farther along. We are in need of best practices guidance.

(Samuel Iverson, communication through email)

5.3 Alternative steps in the research process

Among the 23 studies that involved women in the research process, only two applied a collaborative approach (Laidler & Elee, 2008) or community-based participatory research (CBPR) and Indigenous research methodologies (IRMs) (Ljubicic, Okpakok, Robertson, & Mearns, 2018); in the 21 studies left that involved women in the research process, they were involved as research participants. The two studies that reported a collaborative approach and CBPR and IRMs did not specify how these methods were applied.

The collaborative method, based on Gibbs (2001), is grounded on collaborative cross-cultural research approaches that allow an equal share of power between researchers and indigenous participants with mutual benefits. The collaborative approach is applied from the project proposal and the determination of fieldwork timing and duration to the engagement of the community in the establishment of the research priority and project feasibility to gain community support, involvement, and feedback. The CBPR is established on the same ground as the collaborative approach. The IRMs are dynamic alternative approaches to think about research processes that vary according to the uniqueness of Indigenous community knowledge systems and aim to guarantee a sympathetic, respectful, and ethically correct research model from an Indigenous perspective (Louis, 2007). IRMs are based on respect, reciprocity and relationality

through acceptance and advocacy of Indigenous knowledge systems positioning the communities as collaborators and partners in research and following the Indigenous research agenda with reciprocal sharing of knowledge (Louis, 2007). Renee Louis, an academic Hawaiian woman whose work on IRMs is referenced above, in her paper about the need to apply Indigenous methodologies in geographic research, discussed the necessity and obligation of Western scientists to change their research approach when conducting a study with and about Indigenous peoples. Renee Louis also stated that indigenous peoples had enough of the Western scientists' inconspicuous corruption referring to studies that 'proved' genetic and cultural inferiority of Indigenous peoples as well as the political, social, and economic aspects of colonial forces hidden into research proposals (Louis, 2007).

However, what is a research model from an Indigenous perspective? There is no right answer to this question as there is not one single perspective that accommodates all the diversity within Indigenous ways of knowing and knowledge representation. There are, yet, ways through the research process to accommodate Indigenous research methodologies. Among the two studies that applied an alternative research model, Ljubicic et al. (2018) draw the collaborative approach according to the conceptual framework of the Qaggiq Model for Inuktitut knowledge developed by Janet Tamalik McGrath and Aupilaarjuk, an Inuk philosopher Elder from Nunavut. The Qaggiq (large iglu) Model is based on knowledge renewal between Inuit generations and researchers in order to improve accountability and appropriate relationships with the Inuit and knowledge system (Ljubicic, Okpakok, Robertson, & Mearns, 2018). The model is based

on three pillars: the individual, collective, and productive in the context of living histories, land, language and culture (McGrath, 2011 apud Ljubicic et al., (2018)).

The presence of two studies among the 23 with women involvement reporting alternative research approaches may be a reflection of Indigenous peoples' concern for further development of Western scientific knowledge systems to make space for alternative ways of thinking about research processes. The accommodation of alternative ways of knowing in the research process may facilitate the meaningful inclusion of marginalized groups such as Indigenous women by targeting the colonial legacy of research. Nonetheless, the number of studies (21) that did not involve Indigenous women beyond research participation is alarming. The climate crisis research seems to not keep pace with the activism and engagement of Inuit women outside the academic sphere.

Indigenous women are very active not only around issues related to the Arctic climate crisis but in all forms of activism for the well-being of their communities. They are also organized to create spaces where their thoughts, ideas and experiences on leadership can be shared. For instance, the Arnait Nipingit: Women's Leadership Summit in Iqaluit, Nunavut in 2010, was a forum to collect, connecting and creating women's voices in Nunavut to showcase women's skills, talents, and knowledge to Inuit younger generations. The summit aimed to promote leadership and help to create the foundation for strong and healthy communities, rooted in equality and balance (Arnait Nipingit, 2010). Furthermore, the Pauktuutit: Inuit Women of Canada (<https://www.pauktuutit.ca/>) is the national non-profit organization that represents Inuit women in Canada focusing on the needs of Inuit women and encouraging their participation in social, cultural and economic issues in their community and at the regional and national levels. Pauktuutit

promoted the rights of Inuit women and children encouraging their involvement in all levels of Canadian society. In April 2019 was announced the creation of a Nunavut Inuit Women's Association (NIWA), a provincial association member of the Native Women's Association of Canada (NWAC). The NIWA aims to promote Inuit women leadership roles, equity, economic empowerment, and awareness of the intergenerational impact of colonization and ongoing inequities (Ahnationtalk, 2019). These initiatives were led and are running by Inuit women and showcase the presence of Inuit women organizations that could also be engaged in the climate crisis research process in the Arctic.

5.4 Back to Relations

Not only the research framework plays a role in how scientists involve Indigenous women in Nunavut, but also the scientific language and knowledge representation may be a barrier for meaningful engagement. I will draw on my own experience to illustrate my point here.

My grandfather was fascinated by encyclopedias. He would spend hours and hours reading for his grandchildren all the fantastic stories about the creatures in the world, especially the ones in the ocean – I always wonder if my decision to pursue a career in Oceanography and marine-related field has its roots on this memories. My grandfather passed away when I was about five years old, and a few years later, my grandmother gave me his entire encyclopedias collection. I could not wait to read all the stories that I heard from my grandpa when I was a kid. Surprisingly, when I opened the books, none of the stories that he told me was there. Instead, there was only the scientific name of the

animals, the regions where they lived, their behaviour, and other biological information. There was no mention of the pink dolphins in the Amazon River that would impregnate women or the fishes that were so big that they could eat a human body at once.

My grandfather was a storyteller. He was fostering the curiosity and imagination of his grandchildren using in the background scientific information. My grandfather was, perhaps, using a different language from the book to make us, little kids, care about the wonder of the world.

As a natural scientist, I have felt that my way to communicate the science that I am interested in is limited by a language pattern that does not connect who I am and why I care with the work that I am doing, therefore, I do not feel like I am genuinely engaging other communities other than the scientific one (other sciences such as social science has done a better job in that sense). I have always tried to represent the knowledge that I was exposed to in the form of a folktale, as my grandfather used to do. However, in the scientific context that I have been in, there was no or little space for self-expression and folktales have often been placed below scientific documents or as an alternative to it.

Perhaps, it is easier to connect, contextualize and understand a message when we can relate to the human being on the other side of it. Bringing this perspective back to the involvement of Indigenous women in the climate crisis research in the Arctic, it seems like there is space for other ways of knowledge representation and other approaches to connect with the community. For instance, the Pond Inlet resident Tim Anaviapik Soucie, referring to the Baffiland consultation to expand the Mary River mine, suggested that the consultation process needs to be meaningful to grasp the community perception:

“Stay for at least a week or more. Have tea with elders and youth at the Co-op; tell us about your children and ask us about ours” (Elaine, 2019).

What if the research process from its proposal to publication would be more relational? Would this approach facilitate the meaningful engagement of Indigenous women? What if the language used to report a scientific work would reflect the thoughts, ideas, knowledge and concern of the people being engaged? What if natural scientists, especially the ones in the Climate Research & Natural Resources and Science – appointed in this study as the field with the least involvement of Indigenous women, would change the research question from what you know about this subject (focusing on ‘ experts’) to what are your experiences (focus on ways of knowing)?

De Leeuw et al. (2017) called geographers and medical-health scientists to engage in storytelling critically. The authors develop on the reasons why and how stories and storytelling and other creative or art-based practices are growing among disciplines such as human geography, medicine, and public health due to the intensification of human-based methodology in the research process. I am extending this call to climate change and natural scientists developing work in Nunavut; there is a need to work with and learn from the humanities to advance our understanding of the natural world and its connections. Natural and climate change scientists need to reinvent the way that science has been constructed in this field making space for more artistic practice and meaningful representation of different ways of knowing.

It is not an easy task to natural scientists used to follow predictable methodologies and models to accept the unpredictable and to be open to finding more questions than answers; to accept an open agenda and the idea that the outcome of that experience may

change more the scientists involved in the research than the field of study. However, who said that it has to be easy? De Leeuw et al. (2017) highlighted the personal risks and commitment involved in relational research. The authors stated that “(working in-depth and effective manner) avoids comfort, predictability, or neat-and-tidy closure, privileging instead a mode of inquiry and co-creation of knowledge that is emotionally resonant, connected, grounded, flexible, creative, and untethered from the constraints of time or schedule” (de Leeuw, et al., 2017).

Why should we, natural and climate change scientists, choose this path if there is a more controlled one? Because we all have stories, memories, and relations; because we are part of our work and therefore should be changed and challenged by it, and because we must do it right (scientific work is often funded by public agencies, by the peoples and have implications in the real world through, for instance, climate crises policies).

Chapter 6 - Conclusion and Recommendations

The systematic review applied showed to be efficient in identifying gaps in the participation of Indigenous women in climate crisis research in Nunavut. The use of Google Scholar as a database to retrieve peer-reviewed literature was time-consuming and did not provide a significant number of unique studies.

Based on the research questions for this study:

- The representation of Indigenous women from Nunavut, in terms of their involvement in the Arctic climate crises research process, is mostly restricted to their participation as research participants or subjects;
- When included in the climate crisis research, Inuit women from Nunavut are most represented in the Natural Hazard and Risk and less represented in the Climate Research & Natural Resources and Science. Two studies among 27 engaged with Inuit women from Nunavut in the entire research process;
- There are examples of approaches, methods, and methodologies from Indigenous research and humanities that researchers, especially the ones in the climate and natural sciences, can apply to make space for women's knowledge in their project.

The underrepresentation of Indigenous women in the field of policy and natural resources and sciences of the climate crisis research along with the lack of meaningful involvement in all the phases of the research process are particularly concerning in this specific body of literature which has great importance in developing policies that are reflective of the

local context. This study identified the areas of climate crisis research in Nunavut that present gaps in terms of representation of indigenous women as well as the quality of their involvement in the research project. Through the systematic review and based on the documents selected, there are also lessons learnt to guide researchers and policy-makers on ways to meaningfully engage with Indigenous peoples:

- The climate crisis research framework needs to accommodate different ways of knowing making space for Indigenous women to develop their own unique body of knowledge about change environmental and climate;
 - The research project should not target specific expertise based on the Western projection of social roles but engage with the collective expertise allowing different experiences to be counted in the research process especially the one from marginalized groups such as Indigenous women;
- Researchers need to diversify the ways to recruit and engage with Indigenous peoples and groups of peoples in Nunavut. Other organizations besides the HTO should also be seeking, for instance, the initiatives and groups focused on Indigenous women;
- There is a need for policymakers and scientists in the climate change field to engage in and approach the climate crisis research in the Arctic from a multidisciplinary perspective. The accommodation of other ways of knowing should start within the research group engaging scientists from different disciplines on issues related to the climate crisis in Nunavut;

- Policymakers should take with caution studies related to the climate crisis in the Arctic that do not have a multidisciplinary approach and do not include marginalized groups in a meaningful way;
- Scientists should explicitly mention in their articles whom they engaged with and how; scientist could also incorporate as part of the limitations in their research the groups that were not involved in the process, instead of using ‘community’ as a term to incorporate a vision that quite often blends participation of marginalized groups.

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Appendix A – Systematic Review Protocol

Table 1 Appendix - PRISMA-P* (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol. *Source: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ*. 2015 Jan 2;349(jan02 1):g7647.

Section and topic	Item No	Checklist item
ADMINISTRATIVE INFORMATION		
Title:		“Whose voices are not in the room?” ¹ Indigenous Women’s Participation in Arctic Climate Crisis Research.
Identification	1a	Systematic Literature Review
Authors:		De Oliveira Menezes, Elissama
Contact	3a	Dalhousie University, elissama.menezes@dal.ca
Contributions	3b	Desbiens, Caroline Martin, Debbie
Amendments	4	<i>Any amendment to this protocol will be identified in this section with the date of each amendment, description of the change and the rationale for it.</i>
	4a	On August 12 th , 2019 a Data collection process was added. The web-collection engine Outwit Hub was used to export the data from Google Scholar to an Excel spreadsheet. The engine was included in the data process due to (i) the limitation of the Google Scholar database to export all the results simultaneously; (ii) the total of results for the three strategies applied were more than four thousand which would considerably increase the time and effort applied to extract the data from this database; and (iii) Google Scholar only shows a maximum of 20 results per page making it almost impossible to copy and paste the studies retrieved in a reasonable time frame.
	4b	On August 14 th , 2019, the title of the study was changed from “Gendered dimension of Arctic Climate Crisis Research” to “Whose voices are not in the room?” Indigenous Women’s

Continuation Table Appendix A – Systematic Review Protocol

		Participation in Arctic Climate Crisis Research. The change was made to avoid a false dichotomy and simplification of gender studies as a man versus woman approach.
	4c	The review was restricted to peer-reviewed literature due to time and resources limitations.
Support:		This systematic review has no sponsor.
INTRODUCTION		
Objectives	7	This systematic review aims to identify and characterize the participation of Inuit women in the Arctic climate crisis research in Nunavut by reviewing peer-reviewed materials in three databases.
METHODS		
Eligibility criteria	8	English Arctic climate crisis peer-reviewed literature in all years that had involvement of Inuit from Nunavut in any phase of the researching process.
Information sources	9	Literature search strategies will be developed using text words related to Arctic climate change and women in the first stage and Arctic climate change and community* (all terms related to primary research such as consultation, interview.) in the second stage. I will search on Web of Science, Scopus, and Google Scholar for peer-reviewed related to the topic of study in all years placed in Nunavut. The literature selection will be limited to primary research related to climate change in the Arctic.
Search strategy	10	No date limits will be imposed on the search. The study design will be limited to primary studies. Web of Science (WoS), Scopus, and Google Scholar will be searched. The search strategies will be tested in the first phase of the study. The strategy will be developed for WoS, and after it is finalized, it will be adapted to the syntax and subject headings of the other databases. After pilot studies, the search will be updated to ensure that the search strategy retrieves a high proportion of eligible studies found through any means.
Study records:		

Continuation Table Appendix A – Systematic Review Protocol

Data management	11a	Excel will be used to manage records and data throughout the review
Selection process	11b	The author will screen the titles and abstracts yielded by the search against the inclusion criteria. I will obtain full reports for all titles that appear to meet the inclusion criteria or where there is any uncertainty. I will then screen the full-text reports and decide whether these meet the inclusion criteria. I will report where additional information is necessary to resolve questions about eligibility. I will record the reasons for excluding studies.
Data collection process	11c	The author will do the method of extracting data from reports. Data abstracted will include full reference information, authors' filiation, demographic information, the methodology used, and outcomes.
Data items	12	I will extract the recruitment approach, interviewed characteristics (average age, gender, occupation, role in the community), study design and size.
Outcomes and prioritization	13	<p>The primary outcome will be the number of documents retrieved that engaged with women's knowledge in the Arctic climate change research. A diagram showing this quantitative data will be developed in order to graphically represent the gender gap in the Arctic climate change published research.</p> <p>The secondary outcome will be the evaluation of the methodology used to apply gender analysis in the natural science field. This evaluation will be qualitatively, and it aims to analyses the pros and cons related to applying for systematic review in gender analysis as this study is pioneering in applying such methodology for this purpose.</p>
Data synthesis	15d	The PRISMA flow diagram will be used to synthesize the overall result of the systematic review. The data will be summarized in a table and grouped according to the field that had the participation of women in the research process.

Appendix B – Research Strategy Table

Research Strategy Tested in Web of Science and Applied in Scopus Database Between July 14 and 23, 2019			
Strategy #	Strategy [TS = topic = title, key words and abstract; ALL = all sections]	Results	Comments
1	TS=("climate change" AND Arctic AND wom*)	16	Less effective in retrieving studies than strategy #11
2	TS=("climate change" AND Arctic AND "Inuit community")	16	Less effective in retrieving studies than strategy #3
3	TS=("climate change" AND Arctic AND Inuit AND community)	130	Less effective in retrieving studies than strategy #8
4	TS=("climate change" AND Arctic) AND ALL=(Inuit AND interview)	39	Selected strategy.
5	TS=("climate change" AND Arctic) AND ALL=(Inuit AND consultation)	4	Selected strategy.
6	TS=("climate change" AND Arctic) AND ALL=(Inuit AND participation)	15	Less effective in retrieving studies than strategy #7
7	TS=("climate change" AND Arctic) AND ALL=(Inuit AND participat*)	49	Selected strategy.
8	TS=("climate change" AND Arctic) AND ALL=(Inuit AND community)	160	Selected strategy.
9	TS=("climate change" AND Arctic AND Inuit)	186	Selected strategy.
10	TS=("climate change" AND Arctic AND) ALL=(man)	39	Selected strategy.
11	TS=("climate change" AND Arctic AND) ALL=(wom*)	35	Selected strategy.

Appendix B – Research Strategy Table Continuation

Research Strategy Tested in Google Scholar Database in July 30, 2019			
Strategy #	Strategy Google Scholar	Results	Comments
1	Find articles with all the words "climate change" Arctic Inuit interview anywhere in the article	6,620(0.03sec)	(including citations)
2	Find articles with all the words "climate change" Arctic Inuit interview anywhere in the article	6,560 (0.05 sec)	(not including citations)
3	Find articles with all the words "climate change" Arctic Inuit consultation anywhere in the article	7,560 (0.07 sec)	(including citations)
4	Find articles with all the words "climate change" Arctic Inuit consultation anywhere in the article	7,510 (0.05 sec)	(not including citations)
5	Find articles with all the words "climate change" Arctic Inuit participation anywhere in the article	12,700 (0.06 sec)	(including citations)
6	Find articles with all the words "climate change" Arctic Inuit participation anywhere in the article	12,500 (0.05 sec)	(not including citations)
7	Find articles with all the words "climate change" Arctic Inuit participat* anywhere in the article	10,600 (0.03 sec)	(including citations)
8	Find articles with all the words "climate change" Arctic Inuit participate* anywhere in the article	12,600 (0.07 sec)	(including citations)
9	Find articles with all the words "climate change" Arctic Inuit community anywhere in the article	16,600 (0.07 sec)	(including citations)
10	Find articles with all the words "climate change" Arctic Inuit community anywhere in the article	16,400 (0.07 sec)	(not including citations)
11	find articles with all the words "climate change" and arctic and inuit in the title of the article	8 (0.02sec)	(not including citations)
12	Find articles with all the words "climate change" Arctic Inuit in the title of the article	13 (0.04sec)	(not including citations)
13	Find articles with all the words "climate change" Arctic Inuit in the title of the article	44 (0.08sec)	(including citations)
14	Find articles with all the words "climate change" Arctic Inuit man anywhere in the article	14,200 (0.10 sec)	(including citations)
15	Find articles with all the words "climate change" Arctic Inuit man anywhere in the article	12,900 (0.07 sec)	(not including citations)
16	Find articles with all the words "climate change" Arctic Inuit wom* anywhere in the article	9,450 (0.08 sec)	(including citations)
17	Find articles with all the words "climate change" Arctic Inuit wom* anywhere in the article	8,610 (0.08 sec)	(not including citations)
18	Find articles with all the words "climate change" Arctic Inuit women* anywhere in the article	10,600 (0.07 sec)	(not including citations)
19	Find articles with all the words "climate change" Arctic Inuit women* anywhere in the article	9,640 (0.07sec)	(including citations)

Continuation Research Strategy Tested in Google Scholar Database on July 30, 2019

20	Find articles with all of the words Arctic Inuit with the exact phrase "climate change" with at least one of the words interview consultation participation without the words review anywhere in the article [Arctic Inuit interview or consultation or participation "climate change" -review]	1,610 (0.05 sec)	(not including citations); corresponding to: #2, #4, #6 strategies - selected
21	Find articles with all of the words arctic inuit with the exact phrase "climate change" with at least one of the words community man women* without the words review anywhere in the article [arctic inuit community or man or women* "climate change" -review]	3,030 (0.07 sec)	(not including citations); corresponding to: #10, #15, AND #18 strategies - selected
22	Find articles with all of the words ARCTIC INUIT with the exact phrase "CLIMATE CHANGE" with at least one of the words MAN WOMEN* without the words REVIEW anywhere in the article	1,830 (0.16 sec)	(not including citations); corresponding to: #15 AND #18 strategies - selected
23	Find articles with all of the words INUIT COMMUNITY with the exact phrase "CLIMATE CHANGE" without the words REVIEW in the title of the article	12 (0.01 sec)	(include citations)

Appendix C – List of Documents Selected

- Archer, L., Ford, J.D., Pearce, T., Kowal, S., Gough, W.A., Allurut, M. (2017). Longitudinal assessment of climate vulnerability: a case study from the Canadian Arctic. *Sustainability Science*. 12(1), pp.15-29. DOI: 10.1007/s11625-016-0401-5
- Beaumier, M.C., Ford, J.D., Tagalik, S. (2015). The food security of Inuit women in Arviat, Nunavut: the role of socio-economic factors and climate change. *Polar Record*. 51(5), pp. 550-559. DOI: 10.1017/S0032247414000618
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- Flynn, M., Ford, J.D., Labbe, J., Schrott, L., Tagalik, S. (2019). Evaluating the effectiveness of hazard mapping as climate change adaptation for community planning in

Continuation List of Documents Selected Appendix C

- degrading permafrost terrain. *Sustainability Science*. 14(4), pp. 1041-1056. DOI: 10.1007/s11625-018-0614-x
- Ford, J., Lardeau, M.P., Vanderbilt, W. (2012). The characteristics and experience of community food program users in Arctic Canada: a case study from Iqaluit, Nunavut. *BMC Public Health*. 12. DOI: 10.1186/1471-2458-12-464
- Ford, J.D., Berrang-Ford, L. (2009). Food security in Igloolik, Nunavut: an exploratory study. *Polar Record*. 45(234), pp. 225-236. DOI: 10.1017/S0032247408008048
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Continuation List of Documents Selected Appendix C

Panikkar, B., Lemmond, B., Else, B., Murray, M. (2018). Ice over troubled waters: navigating the Northwest Passage using Inuit knowledge and scientific information. *Climate Research*. 75(1), pp. 81-94. DOI: 10.3354/cr01501

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Appendix D – Documents Selected Data Table

Table – Information extracted from the documents selected regarding methodology, recruitment and sampling technique.

Reference	Methodology	Who was interviewed?	Recruitment/ Sampling technique
POLICY			
Roux et al., 2019	Semi-directed interviews and completed the questionnaire	16 Fishermen (all males)	Invitations to participate in semi-directed interviews and the collection of data on Arctic char stocks were extended to all community fishers via the Pangnirtung Hunters and Trappers Association (HTA)
NATURAL HAZARDS AND RISKS			
Bunce et al., 2016	Interview, participant observation and focus groups	Inuit women who had lived in Iqaluit for at least five years and who had a hunter in their family (n=42)	Snowball sampling method, aimed at recruiting Inuit women who had lived in Iqaluit for at least five years and who had a hunter in their family. Research assistants, stakeholders, and other community members recommended women who, in turn, recommended other potential participants.
Flynn et al., 2019	semi-structured interviews	Participants of the ICCiLD project; the Government of Nunavut employees and housing specialists in Arviat. (n=19; 4 females and 15 males).	Purposive sampling
Giles et al., 2013	Three focus groups; held eight semi-structured interviews	Individuals were ranging in age from 26 to 90. (n=40 participants, 17 women and 23 men)	Not specified.
CLIMATE RESEARCH, NATURAL SCIENCE AND RESOURCES			

Continuation Table Appendix D – Documents Selected Data

Panikkar et al., 2018	semi-structured open-ended interviews	The majority were elders and experienced hunters. (25 participants (21 men and four women))	(snowball sampling method)The interviewers were conducted in partnership with the Kuglugtuk Hunters and Trappers Association (HTA) and the Ekaluktutiak Hunters and Trappers Organization HTO.
Archer et al., 2017	Semi-structured interview, participant observation, and informal meetings with key informants.	2015 (n = 40) Male 55%; Female 45%; 2004 (n=50) Male 63% female 37%	Not specified.
Prno et al., 2011	semi-structured interviewing and informal meetings with both key informants and other community members.	n=31 (84% Inuit = 26) (20 men and 11 women)	Respondents were selected using purposive, snowball and convenience sampling methods. Members of the community who were engaged in wildlife harvesting or other commonly practiced activities were targeted, as were members of other demographic groups such as women, elders and youth. Suggestions regarding potential interviewees were often made to the researcher by community members. The interviews were facilitated by summer students working for the HTA who helped manage local publicity and initiated contact with potential interview participants.
Laidler et al., 2008	semi-directed interviews & focus groups	Inuit elders and hunters. (n= 21; 17 male, 4 female)	Inuit elders and hunters deemed to be the most knowledgeable about sea ice by community members and representatives (that is community organizations such as the Hunters and Trappers Association, interpreters, and other elders and hunters), were recommended as key informants in a purposeful sampling strategy.
Ljubic et al., 2018	semi-directed interviews combined with participatory mapping and workshops	N= 39 ; 27 men and 12 women	Community-based participatory research (CBPR), and Indigenous research methodologies (IRMs)
SOCIAL SCIENCE, MEDICINE AND HEALTH			
Clark et al., 2016	semi-structured interviews	Officials (n=45; 9 females and 36 men)	We selected active harvesters and land-users by asking Hunters and Trappers Organizations for names and cross-validating the names with SAR committee members. Hamlet officials and prominent land-users identified elders.

Continuation Table Appendix D – Documents Selected Data

Ritsema et al., 2015	purposive snowball sampling methodology	Interviews first were conducted with residents in Pond Inlet and then with regional decision-makers in Iqaluit.	Preliminary contacts with residents of the hamlet provided valid entry points into relevant social and professional circles so that interviews with key community informants could be arranged
Daley et al., 2014	semi-structured interview	Total of 37 interviews (28 residents, nine key informants. 16 Females, 12 Males (resident participants)	The 28 resident participants were recruited using a combination of purposive and opportunistic sampling. The Community Research Liaison led the resident participant recruitment process using posters, radio messages and word-of-mouth contact.
Nancarrow et al., 2010	Two-day focus groups were held. Focus groups were conducted in a semi-directed unstructured manner	Inuit Elders, hunters, processors of the animals were selected for their knowledge of harvesting and the environment. (Repulse Bay: n= 10; 3 women and seven men; Kugaaruk: n=7, one woman and six men)	Participants were selected using purposeful sampling methods, selecting the most knowledgeable community members for the study. The Hamlet councils organized the selection process, which included radio advertising and word of mouth.
Boulanger-Lapointe et al., 2019	Interviews and mapping exercise.	Those selected were considered local knowledge holders because of the considerable amount of time they spent on the land whether this was ongoing or in the past. N= 138 people, 81 women and 57 men.	Interviewees were identified from reports and personal communication with community representatives and local interpreters.
Iverson et al., 2016	informally interviewed the harvesters	8 HTO members all male	Through Nunavut Wildlife Management Board and HTO

Continuation Table Appendix D – Documents Selected Data

Daley et al., 2015	Interviews	Key informants and general residents. Key informants: Female = 5 Male = 4; General residents: Female = 16 Male = 12	Recruited through a combination of purposeful and opportunistic sampling The purposive sampling criteria included sex and age to gain a diversity of perspectives and variability within the community. Data were not subjected to sex- or age-based analyses. Opportunistic sampling was also used to recruit additional participants based on recommendations that were shared during early rounds of data collection; specifically, word-of-mouth contacts, posters, and local radio messages were used as recruiting tools.
Guo et al., 2015	Data were collected using a repeated randomized cross-sectional household survey	An individual from each household was randomly selected. Sept.n= 268 -89 male and 179 female; May n=254 - 89 male and 165 female	City of Iqaluit's House Number Atlas was used to select households by dividing the city area into four neighbourhoods, based on shared characteristics and geographical location. We surveyed all households in the block sample, both Inuit and non-Inuit. An individual from each household was randomly selected, based on the person with the most recent birthday, to answer questions about country food consumption
Ford et al., 2012	Interviews conducted at the food program places.	Users of food programs and key informants. n = 94 (91 declared themselves as Inuit); 53 female and 41 male.	At the food program location.
Lardeau et al., 2011	Photovoice	Eight participants. (5 women and three men).	Recruitment was conducted over 10 days, using bilingual (Inuktitut, English) pamphlets that were distributed at the Food Bank, the Soup Kitchen and Tukisigiavik. The research assistant, accompanied by a local interpreter, also made short presentations at these centers and invited people to participate in the project. An 'introduction to the Photovoice Project' was held during February 2010 at the Tukisigiavik Centre. Participants were invited to attend the first meeting and become familiar with Photovoice, learn about informed consent and also photography.
Daleu et al., 2018	interview	Household inhabitants and public building managers. n= 46 households. Inuit female: 19; Inuit male: 12. Unknown (intuit or not for males and females) = 15	Through the Hamlets of Coral Harbour, Pangnirtung, Pond Inlet and the City of Iqaluit
Ford and Berrang- Ford, 2009	Food security survey	Participants over 18 years of age, Inuit, and reside permanently in the community. (n=50; Male 30 and female 20)	Individuals were then recruited using convenience sampling.

Continuation Table Appendix D – Documents Selected Data

Clark et al., 2018	Semi-structured interviews	Search and rescue volunteers, harvesters, Elders, and individuals involved in emergency management. N=18; 3 female participants and 15 males	We selected active harvesters and land-users by asking Hunters and Trappers Organizations for names and cross-validating the names with SAR committee members. Hamlet officials and prominent land-users identified elders.
Beaumier et al., 2015	Semi-structured interviews and focus groups	Interview: Inuit women >18 years of age and permanent residents of Arviat. Focus group: selected based on participation in the interviews. N=42 Inuit women.	Women were selected through a purposive sampling strategy designed to include a cross-section of those who were ‘food secure’ and ‘food insecure’ based on food bank usage and employment status, as well as women who were of different ages, marital status and with or without full-time hunter(s) in the household
Healey et al., 2011	Photovoice research method	Community participants. N=6; 5 were women; Of the five women, 3 were Inuit	The participants were recruited through an open invitation sent by fax and e-mail to health centres, community organizations, and government and non-government agencies in Nunavut.
Beaumier and Ford, 2010	One-on-one semi-structured interviews and focus groups	Inuit women (n=36)	purposive sampling method