CASE 12: Eyes on the Supplies: Improving Canada's National Emergency Stockpile System (NESS)

Abbas Rizvi
Western University

Mark Gera
ETIO Public Health Consultants

Amardeep Thind
Western University

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Abbas Rizvi, BScH, MPH (Class of 2020)
Mark Gera, MPH (Partner, ETIO Public Health Consultants)
Amardeep Thind, MD, PhD (Professor, Western University)

INTRODUCTION

It was four weeks into the COVID-19 pandemic and Edgar Reyes, a public health logistics consultant at the consulting firm Axiom Alliance Health, was sitting in a conference room at his office. Waiting for him on a Zoom call was the Deputy Minister of Health, the Director of the Health System Emergency Management Branch of the Public Health Agency of Canada (PHAC), the Director of Operations at the Office of Emergency Response Services (OERS) branch of PHAC, and the Minister of Public Safety and Emergency Preparedness. Because he had been closely following the news that had reported global medical supply rationing measures and supply chain bottlenecks, Edgar was anxious to hear what was being done to address the logistical gaps experienced by Canada's frontline health care workers in securing personal protective equipment (PPE). He had heard from a friend, who was an executive at a for-profit health care facility operator in the United States, that her colleagues were anticipating severe shortages in PPE and were running short on ventilators. Edgar hoped the situation would not escalate to that level of severity in Canada.

The conversation commenced with an overview of the agenda for the hour-and-a-half meeting, which included discussions about the current state of PPE supply chains across the provinces, the future plans for increased funding to support the development of emergency preparedness systems in Canada, and finally Axiom Alliance Health's task to determine what could be done to support the federal emergency response capacity for future pandemics. A federal advisory committee was being formed to tackle these issues, and Axiom had been tasked with providing initial insights, planning, and data to support the committee. Edgar's research into the current political landscape gave him insights as to what was being done already to meet supply chain gaps; however, he knew he would need to conduct investigations into the federal emergency preparedness infrastructure to facilitate the process. An additional requirement of the project was to determine a need for improving emergency response and supply delivery for Indigenous and remote communities from the National Emergency Stockpile System (NESS) and provide direction to the federal advisory committee on this matter.

It was the Deputy Minister of Health who had the last word of the meeting, saying: "It looks like we dodged a bullet for now, but it's high time we start investigating what we can do to improve federal action in the future for pandemic planning. We need to make sure our processes are fair, and that we can mobilize our resources at full capacity if needed."

BACKGROUND

Emergency Management in Canada

"Better to have and not need, than to need and not have."

- *Franz Kafka*

Emergency management in many countries, including Canada, takes an "all-hazards" approach to the understanding that there are commonalities in how countries can prepare for emergencies (Public Safety Canada, 2018). The concept of an all-hazards approach in emergency management is a principle based on systems-level thinking and acknowledges a need for functional integration across all levels of government (Moore et al., 2007). The premise is that community resilience during an adverse event is greater than the sum of its constituent parts. According to Public Safety Canada (2018), emergency management in Canada has four systems-level, interconnected components that may be considered concurrently (Exhibit 1):

1. **Prevention and mitigation.** The reduction of risks from disasters through structural and nonstructural mitigative measures.
2. **Preparedness.** Measures taken to increase response capacity to an adverse event, including public awareness activities, resource inventories, emergency plans, and mutual assistance agreements.
3. **Response.** Ability to act during or immediately before or after a disaster to address the consequences of an adverse event.
4. **Recovery.** After a disaster, the ability to restore conditions to an acceptable level through recovery programs.

These components are informed by community engagement and evidence-based risk assessments to support community resilience and adaptability (Public Safety Canada, 2018).

EDGAR REYES

Edgar Reyes had spent six years as the head of the logistics consulting department at Axiom Alliance Health. He previously worked directly with the firm's partners on various teams, including those pertaining to data and policy analysis. Before that, he was a research analyst at PHAC, specializing in supply chain analysis, which made him an ideal candidate for helping the federal government modify and improve existing solutions for emergency preparedness.

His earliest work involved stratifying economic data based on social determinants of health to support the development of a provincial food security program. This project helped him recognize the importance of nuanced analyses that are based in principles of equity to ensure that the most vulnerable people get adequate support when environmental, economic, and social factors influence basic needs like health and security. Edgar wanted to translate this into the development task he was about to tackle.

THE GOVERNMENT OF CANADA

The Minister of Public Safety and Emergency Preparedness

Under the *Emergency Management Act* (2007), it is the Minister of Public Safety and Emergency Preparedness' responsibility to exercise leadership at the federal level for emergency management activities. This includes implementing policies and other measures related to emergency preparation and management plans, monitoring emergencies, and coordinating a federal emergency response (*Emergency Management Act,* 2007). The Minister assists the Government of Canada in mobilizing resources from federal department headquarters, regional federal departments, provincial and territorial emergency management

organizations, and private sector and/or non-Governmental organization entities (*Emergency Management Act,* 2007).

Public Health Agency of Canada – Office of Emergency Response Services (OERS)
Overseen by the Minister of Health, PHAC is responsible for the development and maintenance of federal emergency health plans related to disease outbreaks, natural disasters, and chemical, biological, or nuclear events. As a branch of PHAC, the OERS is charged with managing the NESS. Edgar has identified the OERS office as a key stakeholder that can help Axiom gather information about NESS operational processes and existing capacities.

Canada's National Emergency Stockpile System (NESS)
Established in 1952, the NESS was created as part of military planning for potential threats from the Cold War (PHAC, 2011). The scope of the stockpile has increased over time to include supplies for use during natural disasters, bioterrorism events, and other emergencies. The NESS includes generators and beds, pharmaceutical agents such as antiviral medications and anesthetics, and medical equipment such as ventilators, stretchers, and PPE (PHAC, 2011). In 2012, the stockpile's assets were spread over 11 warehouses in nine strategic sites across Canada, but they were consolidated in 2019 to eight warehouses in six different locations (PHAC, 2011). Furthermore, as of 2010, approximately 1,300 pre-positioned supply centers exist in diverse locations across Canada, whose purpose is to respond to provincial/territorial requests within 24 hours (PHAC, 2010). These sites are jointly managed by provincial/territorial and federal governments. The latest audit of the NESS in 2010 revealed it had an approximate value of $300 million in assets with $7.7 million in warehouse leases and an operating budget of $4 million (PHAC, 2011).

Edgar recalled briefly reading about NESS in the Globe and Mail. Media reports on the failings of the NESS during the pandemic helped Edgar's team isolate the NESS as a major point of focus for their investigations. His team was curious as to why a federally-maintained stockpile of emergency resources was unable to meet the country's needs during an emergency as predictable as a pandemic.

The NESS has been used in emergencies such as the H1N1 outbreak in 2009 and the Fort McMurray wildfires in 2016. PHAC was established in 2004 after the severe acute respiratory syndrome pandemic, and NESS assets (formerly under the purview of Health Canada) were placed under PHAC control (PHAC, 2011). PHAC works with provinces and territories when municipal emergency resources are overwhelmed by an event, and the release of supplies from the NESS is coordinated by the provincial health or social services directors (PHAC, 2010). In 2011, an evaluation of the NESS by PHAC highlighted the need for modernizing the system to improve its role in emergency preparedness (PHAC, 2011). Previous recommendations have suggested increasing attention from program management to address issues related to allocating resources from the NESS to municipalities, updating resource maintenance processes, improving control and record-keeping systems, and implementing processes to ensure obsolete and/or expired supplies are audited (PHAC, 2011). It is unclear to what degree recommendations have been implemented, and whether improvements to emergency response capacity have been made.

Indigenous Services Canada (ISC)
ISC is a federal organization that was created to improve quality of life of First Nations, Métis and Inuit peoples in Canada through infrastructure development, social support programs, and community initiatives (ISC, 2020). ISC, along with Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), is one of two governmental departments that are responsible for policies relating to Indigenous communities in Canada (ISC, 2020).

ISC also works with First Nations communities to develop emergency prevention, planning, response, and recovery. ISC's Emergency Management Assistance Program provides funding to provinces, territories, and non-government organizations (NGOs) to support emergency management on First Nations reserves, and partners with First Nations stakeholders including Indigenous councils and organizations (Government of Canada, 2021). Federal funding totaling $926.7 million was allocated to ISC to support community-led responses to the COVID-19 pandemic. ISC funding includes coverage of public health expenses related to emergency supplies such as PPE, infection prevention and control supplies, storage costs, and more (Government of Canada, 2021).

Edgar viewed the ISC as a valuable stakeholder organization that could support his investigations on improving emergency supply accessibility for Indigenous communities. Edgar believed it was important that Indigenous public health should be self-determined to account for varied community contexts, needs, and ways of living. Leveraging the existing relationships between the ISC and Indigenous communities could be an effective way to gain access to Indigenous community insights, bring community voices to the forefront of the federal advisory committee, and foster improvements in emergency infrastructure.

BOTTLENECKS IN THE NATIONAL EMERGENCY STOCKPILE SYSTEM (NESS)

Stakeholders are a major asset to investigating gaps in existing systems. A variety of stakeholders from different levels of operation are generally required to develop a big-picture understanding of systems-level problems. For example, Edgar knew the PHAC employees responsible for inventory management at NESS warehouses would likely have valuable insights for understanding challenges at the microlevel, whereas conversations with senior administrators may reveal external challenges such as a lack of funding for improvements or communication gaps. Developing solutions alongside stakeholders and actors associated with program implementation is a key strategy in system improvement.

Edgar decides to host an interview with the Director of Health System Emergency Management at PHAC to learn more about the current state of NESS and its role as seen by an individual in a leadership role. The Director of Health System Emergency Management revealed to Edgar that the NESS baseline budget of $4 million annually was being increased along with additional funding for improvement over the coming five years, for better functionality during pandemics and disasters. Issues with the NESS were becoming clear—large amounts of stored PPE, including N95 masks, had expired. Expired supplies in a stockpile would make it more difficult for the NESS to support health care facilities in the event of future provincial PPE shortages.

Edgar learned that despite a 2006 federal budget allocation of $600 million for pandemic planning, including funding for the NESS, staffing shortages and a lack of health supplies in the NESS asset mix were negatively impacting the OERS ability to support the overwhelming needs of provinces and territories during the COVID-19 pandemic.

Edgar's research brought him to an analysis of factors that contributed to PPE shortages during the COVID-19 pandemic in the US (Cohen & Rodgers, 2020), which provided a good starting point of research for his team. Factors highlighted in this analysis included the federal stockpile not being replenished, PPE expiring, and supply chain issues including exportation of PPE and overdependence on imported PPE (Exhibit 2). During the interview with the Director of the Health System Emergency Management, Edgar learned of the Canadian government's difficulties in timely procurement of new PPE due to long wait times for international order fulfillment.

The Political Landscape

Edgar also knew based on the analysis that a variety of legal directives in response to COVID-19 would likely complicate federal procurement procedures in an emergency scenario (Cohen & Rodgers, 2020). For example, there was hesitation from the office of Prime Minister Justin Trudeau in invoking Canada's Defense Production Act, which grants the Minister of Public Services and Procurement Canada (PSPC) the authority to direct industry and assume control of industrial operations for production of emergency goods including ventilators and masks (Mills et al., 2020). The hesitation was likely due to the perception in government that other options with a lesser magnitude of policy considerations were available and adequate to achieve the level of response necessary to tackle the pandemic.

While policy decisions were likely based on pandemic model projections and expert insights, there is always a level of uncertainty for a system's ability to deal with an unprecedented disease. For example, genetic mutations leading to increased transmissibility, restriction fatigue in the general population leading to illegal gatherings and disregard for pandemic safety measures, and super spreader events such as protests or holiday celebrations could all lead to spikes in infection and hospitalizations that models may not be able to account for. Because of unforeseeable risks and potential miscommunication among government and private-sector stakeholders, Edgar felt that unprecedented policy implementations could lead to issues during a severe national emergency. This further highlighted a need for improvements and increased volume of existing emergency supplies, to serve as a cushion against unforeseeable risks and lengthy policy implementation timelines.

From Research to Actionable Goals

Further investigations brought Edgar's team to the conclusion that while there were many factors related to emergency supply chains that were out of their control including international trade, domestic policy, and consumer behavior, there were two actionable areas of focus that could improve existing capacity for emergency response:

1. **Resource Capacity –** The term *resources* in this context incorporates elements that require infrastructural and monetary support to function and can include intangible assets such as time allocated for ensuring resources are available for an emergency (Khan et al., 2018). Decision-making related to allocation of physical, financial, and structural resources can be an ethically complex challenge, especially given the time-sensitive nature of emergency responses. Therefore, transparency is a core tenet of emergency resource allocation, along with community consultation to ensure trust among community partners and appropriate priority setting (Khan et al., 2018).

2. **Mobilization Capacity –** This concept is primarily based on human workforce assets, such that social infrastructure, specialized expertise, strong communication channels, and adaptability across workforces are available to assist in a public health emergency (Khan et al., 2018).

Edgar decided he would need to develop recommendations and priorities for improvement of the NESS through the lens of these two factors.

ISSUE 1: IMPROVING THE NATIONAL EMERGENCY STRATEGIC STOCKPILE RESOURCE CAPACITY

Edgar hosted an online roundtable meeting involving several OERS employees in the following week. The participants list included two staff members who were responsible for inventory management and four administration staff members responsible for, among other things,

facilitating the transportation of NESS resources to designated federal locations during adverse events.

After facilitating the two-hour meeting by asking a series of detailed questions and allowing free conversation about the NESS among the participants, Edgar and his team conducted a thematic analysis of their meeting notes to identify actionable areas for improvement.

FINDINGS FROM THE ROUNDTABLE MEETING

Misunderstandings about the NESS in Federal Departments

After initial discussions, there was consensus among the group that the PHAC's role in stockpiling supplies was not clear to provincial departments, partly because of the existence of provincial stockpiles for emergencies. Provincial stockpiles are often varied in jurisdictional authority and asset mix, depending on the nature of the disaster, the stockpile is tailored to mitigate. For example, in Ontario, the Ministry of Health and Long-term Care is responsible for maintaining and replenishing provincial emergency PPE supplies periodically (Loriggio, 2021). In British Columbia, Emergency Management BC is the leading provincial agency responsible for maintaining supplies of cots and blankets to support First Nations communities' response to emergencies that result in population displacement (Government of British Columbia, n.d.). The NESS was designed to receive requests from provincial governments, making it the responsibility of provincial stockpile administration to reach out to OERS staff for supplies. Roundtable participants highlighted that many provincial organizations might experience difficulties in acquiring NESS resources, as the OERS had not allocated significant resources into developing clear guidance for provincial agencies on how to request supplies apart from a single government webpage. Edgar established the need for emergency planning guides that would be accessible to provincial and territorial departments, along with layperson fact sheets related to the mobilization of NESS assets in emergency scenarios.

Large Quantities of Expired Supplies

Inventory management staff frequently brought the conversation back to the topic of expired supplies, which participants agreed created difficulties in mobilization of resources. Participants discussed costs associated with restocking the stockpile, as well as potential difficulties associated with a lack of adequate supplies in an emergency setting. "After H1N1, inventory replacement strategies were a major talking point for antivirals. A lot of these drugs are nearing the end of their shelf-life, but they likely aren't going bad right away."

Edgar made a note to explore the possibility of implementing a shelf-life extension program (SLEP) following the meeting, as he had learned from one of the employees that these types of programs have been implemented in other countries to prevent depletion of national emergency stockpiles (Laing & Westervelt, 2020). Another noteworthy talking point during this conversation concerned what potential roles industry could play in supporting NESS, and whether there was a path forward that could enable the government to lean on existing production infrastructure.

Lack of Real-Time Inventory Management

Supply management staff from the OERS identified the lack of an electronic inventory system as a major barrier to effective data processing on NESS assets. Participants with inventory management responsibilities stated the exact quantities of available supplies were unknown, and that many of the NESS warehouses had an undetermined number of expired supplies (Laing & Westervelt, 2020). It became clear to Edgar that a mobilization response would be significantly hampered by a lack of real-time inventory management, making the implementation of an improved supply tracking system an action priority.

Shelf-Life Extension Programs (SLEP) for waste reduction

This process is a cost-conserving method for extending the expiration dates of pharmaceutical supplies in a stockpile. For example, the United States Department of Defense (DoD) administrates the US Strategic National Stockpile (SNS). Batches of medicines from various storage locations of the SNS are sent to the Food and Drug Administration for stability and quality testing (Courtney et al., 2009). Subject to a minimum threshold of chemical availability in tested drugs, the Food and Drug Administration approves the batch for relabeling based on new conservative estimates for the useful life of the drug (Courtney et al., 2009). This process is repeated biannually and annually depending on the drug (Courtney et al., 2009).

It is estimated for every $1 USD spent on SLEP testing (shipping, relabeling, and other associated processes) by the DoD, $22 USD worth of replacement costs are saved (Courtney et al., 2009). Furthermore, SLEP programs are able to increase reported pharmaceutical shelf lives by years. In the case of ciprofloxacin, an antibacterial drug in the United States SNS, the shelf life was extended by an average of 55 months out of 242 tested batches, up to a maximum of 142 months (Lyon et al., 2006). A study by Lyon et al. (2006) testing the stability of 122 expired drugs showed two-thirds of expired medication were stable past expiration date in every batch tested. Edgar felt a strong case could be made for the implementation of SLEP for the NESS from a cost-savings and supply retention perspective, however, further investigations would need to be conducted.

SLEP often focuses on pharmaceuticals, however, quality evaluation and sampling plans have been developed for PPE including respirators and surgical gowns (Moore & Greenawald, 2017). Edgar found no manufacturer-approved or government sanctioned programs were available for stockpiled PPE despite availability of pre-existing standard testing procedures from the National Institute for Occupation Safety and Health (NIOSH) (Yorio et al., 2020).

Edgar's team was keen on exploring the potential of implementing SLEP, based on further review of the successes of the US DoD with the SNS. Based on his team's initial findings, there was evidence that the Canadian government could greatly benefit from a program such as this, potentially freeing up funding for further development of emergency response infrastructure. There was evidence that SLEP implementation had the potential to increase cost-savings in the long term, and the financial benefits of SLEP had been demonstrated from use cases in the international community (Laing & Westervelt, 2020). It was clear that a context specific analysis and economic modelling would need to be conducted to develop a case for SLEP in the NESS. Some of the challenges with SLEP implementation include the need for improved storage and security guidelines (Laing & Westervelt, 2020). SLEP implementation would likely require an overhaul of the existing inventory system, with lengthy system and software design considerations to support management of emergency assets. SLEP implementation would also require updated staff training protocols and documentation systems to ensure proper batch testing (Laing & Westervelt, 2020).

ISSUE 2: ADDRESSING NESS MOBILIZATION CAPACITY

Edgar's team established the need for more insights from individuals from the receiving end of supplies, as well as provincial stockpile management staff. His team emphasized the need to understand perspectives of geographically isolated communities in receiving supplies, as they anticipated a disparity between urban and rural healthcare facilities in receiving equipment.

Edgar's team members were concerned that solely relying on stakeholder insights from provincial government staff, who would then distribute supplies based on their discretion, would mean missing out on the potential issues experienced by other groups including long-term care facilities and First Nations communities. This was a concern Edgar weighed heavily; however, due to time constraints for initial reporting to the Director of the OERS, the team found it would

not be feasible to gather data from these groups at this stage. The team decided further data collection from marginalized groups would be a priority to support an equitable development process at later stages of the development process, once initial solutions were further hashed out.

The Axiom team sent questionnaires with quantitative and qualitative elements to administrative managers from each province, who were responsible for intake of NESS supplies in the event of provincial resource depletion. Topics covered in the questionnaire included a description of the Axiom team's project goals and associated timeline, questions to assess managers' knowledge of NESS and understanding of NESS protocols to receive supplies, and whether there were anticipated/previously experienced gaps in emergency supply delivery. Example answers were provided in the questionnaire to facilitate the process. Edgar's team received responses from almost all provincial staff within a week of sending questionnaires, and subsequently conducted a thematic analysis on the responses.

FINDINGS FROM QUESTIONNAIRES

1. Rural areas within provinces, characterized by a population density of fewer than 150 persons per square kilometer, had greater difficulties in receiving supplies on time from provincial stockpile locations. Geographic isolation was a commonly cited issue, however many of the qualitative questionnaire responses lacked depth and the mechanisms behind this issue were unclear. Urban healthcare facilities near large population centers generally received supplies within 12-24 hours from provincial stockpiles when requested.

2. There was a lack of data on NESS performance from provincial governments during the H1N1 outbreak and other emergencies due to data collection gaps, therefore it was unclear how efficient emergency supply procurement from the NESS was.

3. There was a lack of awareness in newly hired provincial management staff about the protocol for requesting federal supplies from the NESS, as many staff had not been present during the H1N1 outbreak, had not received training on federal emergency supply acquisition, and were not aware of the existence of the OERS.

4. There was a lack of understanding among participants on the NESS asset composition and provincial stockpile asset composition. This finding highlighted a gap in administrative knowledge that could hinder effective distribution of NESS supplies to provincial agencies.

While some of the findings from questionnaires aligned with findings from the roundtable with NESS staff, Edgar felt there was still much to be learned about federal emergency supply mobilization capacity. Despite this limitation, Edgar's team used the information collected from the roundtable meeting and questionnaires to develop a list of action items and a report on future directions for the Director of the OERS to review before dissemination to the federal advisory committee.

IMPROVING NESS FOR INDIGENOUS COMMUNITY SUPPORT

Edgar's team began working on the final stage of the project, which was to provide direction to the federal advisory committee on improving the NESS's capabilities of servicing remote and Indigenous communities. Edgar determined there were multiple ways in which his team could assess the NESS's existing capabilities while isolating new opportunities for federal government-Indigenous community relationship building. However, there were a variety of factors to consider for each alternative including the time constraint and feasibility, benefits, and drawbacks. The time constraint of Edgar's project meant that his team would only be able to

provide comprehensive planning and direction for one alternative, as both would require further stakeholder consultation and coordination.

Alternative 1 – Conduct testing of NESS supply deployment to a sample of Indigenous communities and remote locations

Edgar felt there were too many unknowns associated with NESS mobilization capacity. Due to staff turnover and data collection gaps, many stakeholders that were sent questionnaires to elucidate information about NESS supply delivery did not have a great deal of information to share. Edgar's team suggested the idea of staging a test of the system, working with provincial offices from across the country and sampling operations from some of the pre-positioned warehouses surrounding Indigenous communities and rural locations.

This would be the first active test of the system to Edgar's knowledge. It would serve as an opportunity to gain primary quantitative and qualitative data on the current operational capacity of the NESS as it relates to Indigenous and remote areas. A test of this nature would also allow Edgar's team to get to work on developing a long-term testing program to ensure NESS performance is adequate to deal with emergencies and would provide more insight for development of performance indicators. Relying on anecdotal evidence from previous emergencies alone was a weak foundation for determining mobilization capacity. A system test might also reveal gaps in previously unforeseen areas and may provide evidence for future funding and resource requests.

This plan had potential drawbacks as well. Provincial offices may be hesitant to participate as many may be overburdened by their own priorities. This alternative would require a great deal of coordination that might be difficult to implement due to the broad-reaching nature of the test. Furthermore, small sample size due to cost and time constraints may be a limitation. It would only be possible to capture a snapshot of how the system functions, as there are six warehouses, hundreds of pre-positioned supply centers, and even more communities with diverse contexts and geographic variables that could impact the accuracy of the test. Another drawback of this plan was a lack of room for Indigenous community voices, as this test would be focused primarily on administrative and operational capacity of provincial offices and the NESS to deliver supplies to an area. The test would not include community specific planning or significant stakeholder engagement with Indigenous or remote community leadership, potentially leading to missed opportunities for infrastructure development. Additionally, this alternative would likely be more costly overall than the second alternative.

Alternative 2 – Host stakeholder consultations with members of the ISC and Indigenous community partners

This plan would serve as a "soft" approach to highlighting gaps in NESS mobilization capacity, as it focused more heavily on stakeholder engagement with actors who had lived experience with emergency supply management and community insights. Edgar planned on hosting focus groups and interviews with members from the ISC emergency management hierarchy, including senior and administrative staff, to learn about their experiences working with Indigenous and remote communities. Edgar also planned on investigating opportunities for fostering direct connections between the ISC and NESS, to support infrastructure for getting federal supplies into the hands of Indigenous communities in the event of a disaster. He also planned to leverage existing ISC connections with Indigenous community leadership and Indigenous organizations to host community-level stakeholder consultations.

Edgar felt it was important to work with Indigenous communities directly and develop planning and direction through community participation. This would enable the development of context-specific planning for improving the NESS to support Indigenous and remote communities. Edgar

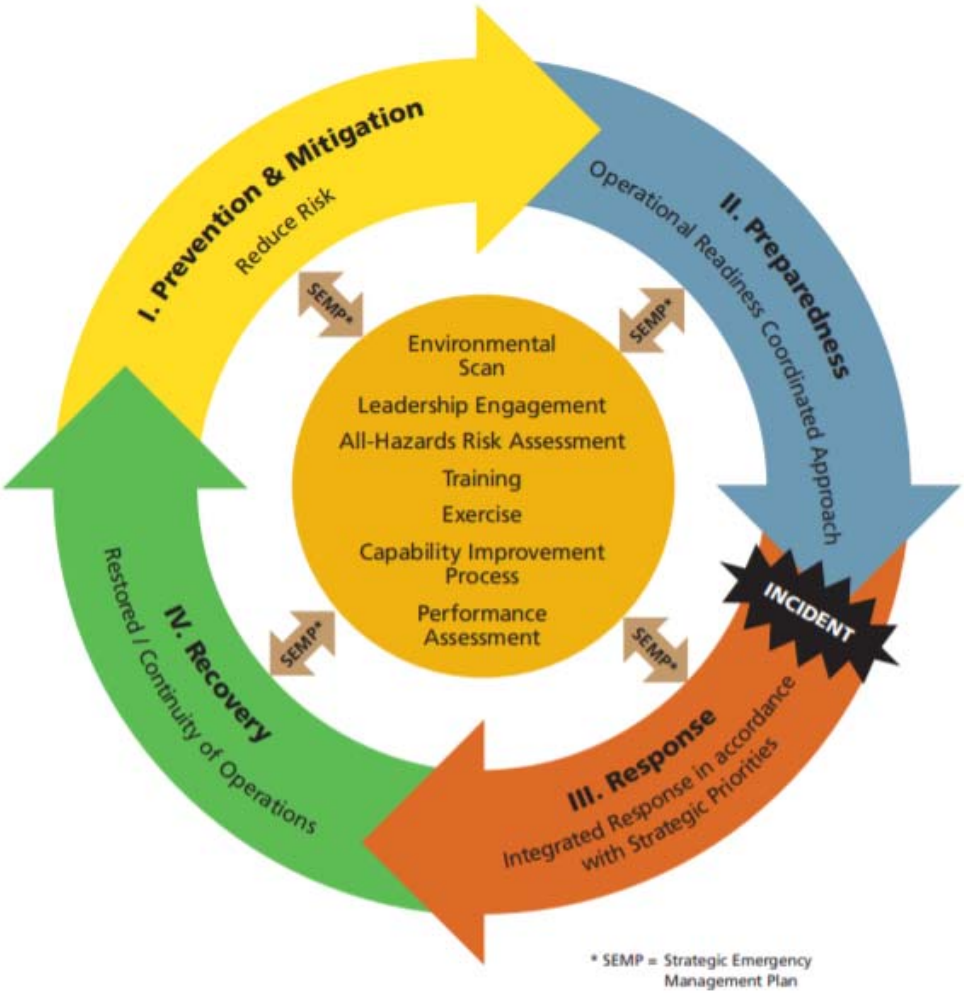
had yet to determine the best method of conducting community-level consultations, but was considering an online qualitative and quantitative survey to capture data from many communities in addition to conducting focus group meetings with selected community leadership members from a smaller list of communities. This alternative would provide greater community visibility for the federal advisory committee and facilitate future community engagement by building connections with community stakeholders. This alternative would also enable Edgar to capture data from across Canada through the online survey, providing novel data on Indigenous and remote community accessibility to emergency supplies. This plan would likely be less expensive than conducting a large-scale test, and therefore may be more feasible.

A drawback of this plan was the risk that stakeholder consultations with the ISC and community partners may be unfruitful in helping Edgar's team determine clearly actionable ways to improve NESS operations as compared to a direct system test. Community leadership may not have significant experiences working with federal departments like the OERS and may only be able to provide context-specific insights that are not directly related to emergency supplies, such as challenges with receiving non-emergency deliveries. A lack of participation could also be a potential drawback of this plan, as community stakeholders may not feel comfortable or may not be available to participate in focus groups. Engaging with marginalized populations is a sensitive matter and requires careful planning and coordination with experts and community members. Rushing and improper planning of stakeholder engagements of this nature could have long-term negative impacts for future collaborative efforts if indigenous community members are made to feel as though they have been exploited or tokenized. Furthermore, isolated Indigenous communities may not have access to online services for completing the survey, and further planning would be required to determine who would facilitate distribution of the survey and collection of results, as well as other potential logistical concerns related to data collection. The timeframe of the project might not be suitable to support the development of a meaningful and respectful relationship with community members prior to engagement, or to accommodate large-scale data collection in the priority population with participatory planning and community knowledge translation.

MOVING FORWARD

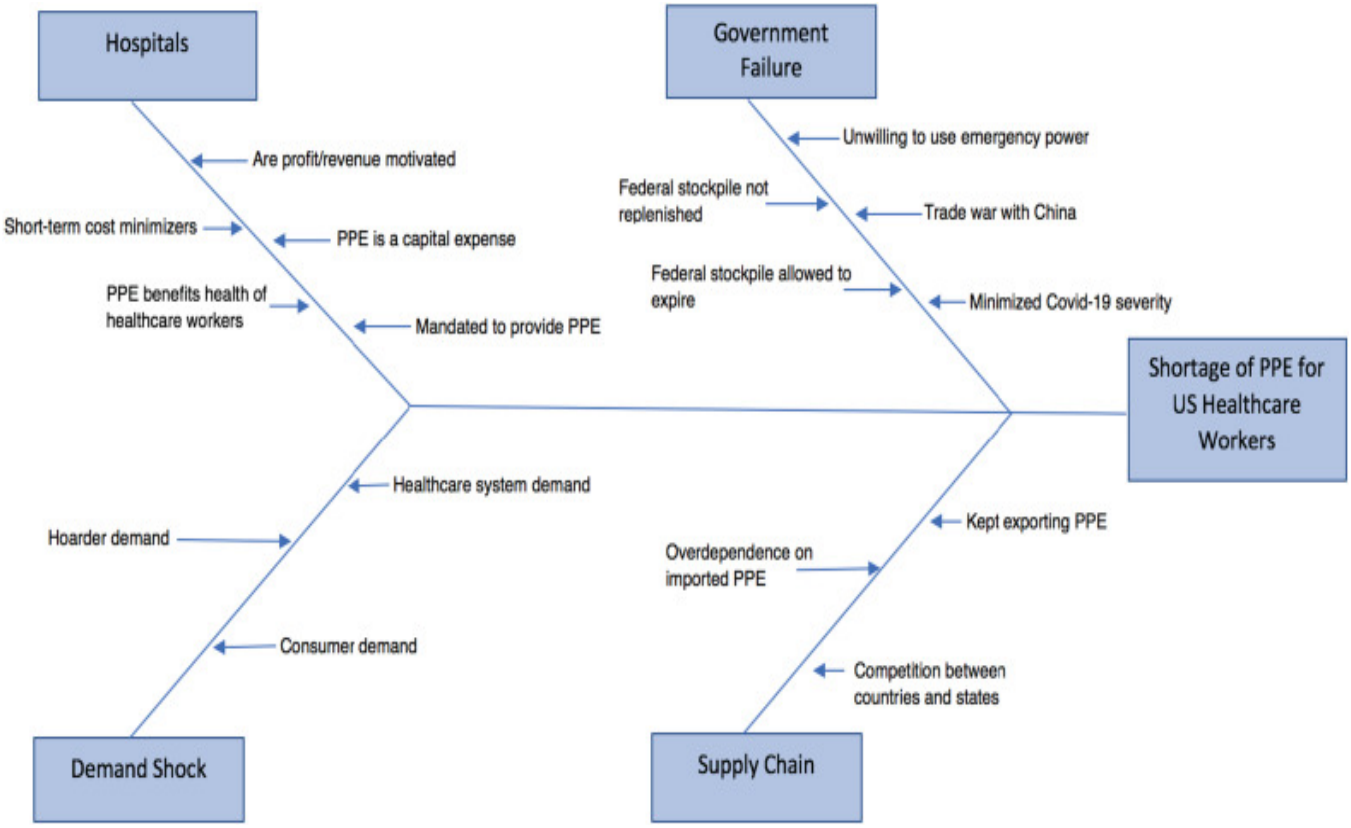
Edgar still had much to consider before choosing between either alternative, and wondered if there were any stakeholders or experts he could consult prior to making a decision on how to move forward. He also wondered if there were any stakeholders he did not include in his initial investigations who could have supported the project.

EXHIBIT 1
Public Safety Canada's Emergency Management Continuum



Source: Public Safety Canada, 2018.

EXHIBIT 2
Factors Contributing to PPE shortage in the US during COVID-19



Source: Cohen & Rodgers, 2020.

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INSTRUCTOR GUIDANCE

Eyes on the Supplies: Improving Canada's National Emergency Stockpile System (NESS)

Abbas Rizvi, BScH, MPH (Class of 2020)
Mark Gera, MPH (Partner, ETIO Public Health Consultants)
Amardeep Thind, MD, PhD (Professor, Western University)

BACKGROUND

The Canadian Federal Government is looking into improving the mobilization capacity of federal emergency supply systems. Edgar Reyes, a consultant at the public health consulting firm Axiom Alliance Health, has been awarded a federal contract to identify solutions to suit this need. The COVID-19 pandemic has revealed gaps in the National Emergency Stockpile System (NESS), which is maintained by the Public Health Agency of Canada. These gaps have affected the government's ability to address pandemic-related supply shortages. Edgar's task is to provide recommendations to increase the system's response capacity. He hopes to isolate actionable areas for review by a future advisory committee and support the development of federal emergency response. Edgar has also been tasked with determining a need and solutions for improving emergency response and supply delivery for Indigenous and remote communities from the NESS. Edgar and his team conduct a roundtable stakeholder meeting with the key stakeholders associated with the NESS to determine common themes and systems-level solutions. Edgar also conducts stakeholder engagements with provincial administrative employees to isolate further gaps in the system. He determines there are significant data gaps, and more investigations will be required to support improvements in NESS mobilization capacity. Edgar manages to identify two specific action items that have their own unique tradeoffs. A key consideration between these alternatives is the potential consequence of excluding Indigenous and isolated community insights from emergency planning and emergency infrastructure development.

LEARNING OBJECTIVES

1. Gain an understanding of emergency preparedness and emergency resource allocation principles.
2. Consider the role of social determinants of health in the context of an adverse population-level event.
3. Understand the importance of stakeholder engagement to generate solutions for resource mobilization and capacity building.
4. Understand the role of systems-level thinking in emergency preparedness.

DISCUSSION QUESTIONS

1. What are the main issues presented in the case? Who are the key people and groups involved, and what are their perspectives?
2. How can the social determinants of health influence community resilience during adverse events? What might the role of social determinants of health be in the context of emergency preparedness and the case?

3. What are potential consequences of failing to involve rural and Indigenous community stakeholders during emergency planning? What are some challenges to stakeholder consultation given the context of the case?
4. What other stakeholder engagement activities could Edgar have used that would help him in his investigations?
5. How might systems thinking be used to understand disaster resilience and emergency preparedness?

KEYWORDS
All-hazards approach; emergency management; emergency preparedness; stakeholder consultation; COVID-19; National Emergency Stockpile System; emergency supply mobilization; emergency resource capacity; systems-level thinking; shelf-life extension programs; Indigenous community consultation.