Advancing Arctic Maritime Awareness: *Frameworks to Assess Arctic Maritime Health Security*

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Abstract

As the Arctic maritime domain continues to increase in accessibility, so too do the health security threats associated with increased maritime commerce. Health security is a critical component of national, regional, and global stability, and as such, it has become increasingly important in enhancing resilience and disaster response capabilities. Robust monitoring and risk assessments are needed to predict and prevent health security crises before they occur. To our knowledge, there are no existing health security frameworks focused on the Arctic maritime domain. This special report sought to explore what health security frameworks do exist, and what their limitations are in the context of the Arctic domain. An evaluation of existing frameworks revealed that conventional metrics are not designed to interface with local intelligence, and are primarily country-level assessments. This is problematic for the Arctic maritime domain, where many health security incidences may occur in small, remote communities where data is limited due to the multifaceted constraints of remoteness and limited infrastructure.

Keywords: health security, health security frameworks, maritime commerce, maritime domain awareness, department of defense

The number of maritime vessels operating in the Polar Code area has increased by 25% in the last decade (Huntington et al., 2023). This has sparked significant attention in the fields of geopolitics, economic security, environmental security, and defense (Ibid.). However, less focus has been directed towards the implications of increasing maritime traffic on the health security of the Arctic region. While there is no universally accepted definition of health security, this special report uses a holistic and broad sense of the term, in which health security is the activities, both proactive and retroactive, which prevent, detect, and respond to acute public health threats to assure the well-being of people and populations (Cullison & Morrison, 2019). Health security is a critical component of national, regional, and global stability, and as such, it has become increasingly important for the U.S. Department of Defense's (DoD's) initiatives to enhance resilience and disaster response capabilities (The White House, 2022a). Enhancing resilience in the Arctic, however, is exceedingly complex.

The health security landscape in the Arctic is characterized by vast distances, extreme weather conditions, low population densities, and limited infrastructure. Roughly four million people reside in the Arctic, with approximately one million people living on the coastlines (Ramage et al., 2021). A substantial portion of coastal communities are small, with a median population size of 622 residents. Ten percent of Arctic residents are Indigenous, many of whom maintain a subsistence way of life that is heavily dependent on the health of marine resources (M. J. Brown et al., 2022). As a result, health security in the region is inextricably linked with the maritime domain. Increased shipping compounds this relationship by introducing a host of multifaceted and dynamic health security risks, particularly those associated with biodefense and the transmission of infectious diseases, food security and safety, and multi-hazard events.

Robust monitoring and risk assessment tools are needed to predict and prevent health security crises before they occur. To our knowledge, there are no existing health security tools specifically focused on the Arctic maritime domain. With that in mind, this special report explores two critical questions: (1) what health security frameworks currently exist with DoD involvement, and (2) what are their limitations if applied to an Arctic maritime context? These questions serve as the foundation for a pilot project to develop an Arctic Maritime Health Security Risk Index.

Existing Health Security Tools

Health Security Assessments

In 2007, the International Health Regulations (IHR) came into force as an international legal agreement intended to prevent and respond to serious public health risks that could require an international response (Cullison & Morrison, 2019). The IHR mandates that the 196 signatory nations must self-report public health emergencies of international concern using the Self-Assessment Annual Reporting (SPAR) tool (Razavi et al., 2020). However, no enforcement mechanism exists for this reporting (Cullison & Morrison, 2019). In 2012, a review of the IHR found that 85% of the world's nations were far below IHR standards. The 2014-2016 West African Ebola epidemic sparked recommendations by the IHR review committee to strengthen assurance in IHR compliance (Razavi et al., 2020). As a result, the U.S. launched the Global Health Security Agenda (GHSA) in 2014 to provide a framework to prevent or mitigate a global health crisis (Razavi et al., 2020). Following the creation of the GHSA, the Joint External Evaluation (JEE) tool was developed to provide a more transparent and objective assessment of a country's abilities to manage health security concerns (Kandel et al., 2020). The current JEE tool

includes 49 indicators housed beneath 19 technical areas, with assessments occurring every 4–5 years (Razavi et al., 2020; World Health Organization, 2018).

In 2019, the Global Health Security Index (GHSI) emerged as an additional global health security assessment (Razavi et al., 2020). Developed by the Nuclear Threat Initiative and Johns Hopkins School of Public Health in conjunction with the Economist Intelligence, the GHSI builds upon the JEE by adding health system resilience, compliance with international norms, and risk environments to the JEE's prevention, detection, and response assessments (Lakoff, 2022). The index uses open-sourced data regarding 85 sub-indicators across six technical areas, with the intent of comparing and quantifying "health security preparedness" across national public health systems (Lakoff, 2022). Together with the JEE, the GHSI is included in a suite of global health security preparedness assessment tools that include the SPAR, after-action reviews, and simulation exercises (G. W. Brown et al., 2022; Kandel et al., 2020; Razavi et al., 2020).

Although most U.S. involvement with the IHR and GHSI is coordinated through the U.S. Department of Health and Human Services, both frameworks support the 2022 U.S. National Security Strategy (NSS) and National Defense Strategy (NDS) priorities to defend the homeland (The White House, 2022a, 2022b). Each framework serves as a tool to enhance force health protection and preparedness, while also strengthening the health security resilience of the U.S.'s allies and partners among the 196 signatory nations (Cullison & Morrison, 2019; Rauch et al., 2023).

Biosurveillance Tools

In 1997, the U.S. DoD established the U.S. military Global Emerging Infections Surveillance System (GEIS) (Cullison & Morrison, 2019). The GEIS works closely with a network of domestic and international DoD infectious disease research laboratories, the Centers

for Disease Control and Prevention (CDC), and the World Health Organization (WHO). GEIS is currently housed under the Armed Forces Health Surveillance Branch (AFHSB), which is the U.S. Armed Forces' central epidemiological resource (Cullison & Morrison, 2019).

Also housed beneath the AFHSB Is the Integrated Biosurveillance (IB) Branch, which provides near real-time situational awareness of infectious diseases and health threats to military populations within the DoD (Defense Health Agency, n.d.). IB epidemiologists use open-source surveillance data, along with collaboration with partners and other Defense Health Agency (DHA) divisions. The IB team additionally publishes their surveillance data using a web-based application called the Health Surveillance Explorer (HSE). The HSE uses geographical imaging software to paint a picture of military-relevant global health security threats, disease outbreaks, and other events of military interest (Ibid.).

Limitations of Existing Health Security Frameworks in the Arctic Context

While the JEE and GHSI are regarded as comprehensive country-level assessment tools, their top-down scope hides major discrepancies at a sub-national level. This is problematic for the Arctic. Take the United States for example, where Alaska serves as the country's claim to an Arctic nation. While the GHSI ranks the United States as the highest in the world in national health security, a deep dive into the GHSI indicators as they relate to Arctic health security reveals stark contrasts. For instance, in examining the GHSI's sub-indicator, "public health infrastructure," the United States received nearly a perfect score with 99% of homes having access to at least basic water infrastructure and sanitation facilities (Global Health Security Index, 2021). Alaska, however, has the highest percentage of homes lacking in-home plumbing in the United States (approximately 6%), with an estimated 12,000 people living without in-home plumbing (M. J. Brown et al., 2022). Furthermore, under the sub-indicator, "adequacy of

road network," the U.S. was ranked with a "low risk" of having an inadequate road system to meet public health needs (Global Health Security Index, 2021). Approximately 86% of Alaska municipalities are not connected to the road network, however, and none of Alaska's coastal Arctic communities are connected to the road system (M. J. Brown et al., 2022). In sum, if a maritime disaster with health security implications occurs off the coast of Arctic Alaska, the probability is high that it will occur in a location that is not connected to the road system, nor contains in-home plumbing.

Lakoff (2022) echoes similar criticisms in his examination of the GHSI in the context of the COVID-19 pandemic. He points out that the key factors in a country's success in responding to the pandemic did not correlate with the indicators of the GHSI. Rather, "[…] characteristics [such] as state capacity, quality of leadership, coordination among different levels of government, and public health infrastructure at the community level proved more critical than the specific technical capacities measured by the GHSI" (Lakoff, 2022, p.38). In other words, it was the subnational level indicators that were critical in reflecting preparedness towards the pandemic, which are not included in the scales of the GHSI or the JEE.

The U.S.'s biosurveillance programs run into similar limitations. While the IB program utilizes substantial resources to scan open-sourced biosurveillance data, it is extraordinarily challenging to obtain this data from rural and remote locations in a timely manner, such as from Arctic communities. As a result, health security events emerging at the local scale may be missed.

Conclusion

Increased international activity in the Arctic maritime domain is inevitable. Both the 2022 National Security Strategy and the National Strategy for the Arctic Region stress the need to

increase Arctic domain awareness to fuel evidence-based decision-making (The White House, 2022b, 2022a). This special report highlights, however, that there are no existing health security frameworks focused on the Arctic maritime domain. This serves as a critical gap in the U.S.'s decision support toolbox, and in global health security writ large.

An Arctic maritime health security framework is needed with the ability to interface with local intelligence and to collect data on locally relevant indicators. Without the capacity to bridge data collection at numerous scales, local incapacities will be overlooked, and localized health events will remain undetected until their magnitude is large enough to be picked up by existing public health infrastructure (Erondu et al., 2021). As evident by the COVID-19 pandemic, one localized event can quickly become a global catastrophe. As such, strengthening mechanisms for early detection of maritime-related health security threats at numerous scales in the Arctic is a matter of regional and global significance. Local input is a critical mechanism of early detection.

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