Is the Silent War Too Silent?

A Qualitative Study on How Risk and Crisis Managers in Sweden Perceive Antibiotic Resistance in Times of War

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ABSTRACT

Introduction: In 2022, the war between Russia and Ukraine began. War has been proven to be a catalyst for antibiotic resistance (AR). AR is among the largest health threats in the world and by 2050 it's expected to cause 10 million annual deaths. Sweden is facing the threat of war, but no evidence suggests that Swedish authorities preparing the nation for war are concerned about this threat.

Aim: The study aims to examine how local Risk and Crisis Managers in Sweden perceive the risk of a war-related increase in AR if war extends to Sweden.

Methods: This qualitative study used purposive sampling to target Risk and Crisis Managers at municipal, regional or county level in various parts of Sweden. The data was collected through six semi-structured interviews and analyzed by manifest content analysis.

Results: Three themes each for municipalities and counties (MAC) and regions were identified that reflects key aspects related to the aim. Insights into how war-related AR is unheard of and unaddressed is gained. The two first themes also present the participants' elaborations prior to the subject of AR being brought up, reflecting about the perception of it in relation to other war-related risks.

Conclusions: The participants perceived AR in war as severe but still saw the need to prioritize other risks instead, which this thesis discusses in the light of the risk prioritization paradox. None of the six authorities have prepared for a specific war-related increase in AR, which suggested by the public health program work theory might be due to a systematic failure.

CONTENT

ABBREVIATIONS

AR	Antibiotic resistance
CDC	Centers for Disease Control and Prevention
EDCD	European Centre for Disease Prevention and Control
ESAC-Net	The European Surveillance of Antimicrobial Consumption Network
EU/EEA	European Union/European Economic Area
FDA	Food and Drug Administration
GAP-AMR	Global action plan on antimicrobial resistance
LMIC	Low- and Middle-Income Countries
MAC	Municipalities and counties
MSB	Myndigheten för samhällsskydd och beredskap
OTC	Over the counter
STI	Sexually transmitted infection
WHO	World Health Organization

1 INTRODUCTION AND AIM

Nearly three years ago, on February 24, 2022, Russian military forces entered Ukraine. Ever since, there has been an ongoing war characterized by tens of thousands civilian casualties, millions of refugees, and people in desperate need of humanitarian assistance (Center for Preventative Action, 2025). Combat wounds, however, are not the only growing concern caused by this war. As injuries intensify and healthcare standards diminish, previously treatable infections are now withstanding medication, and the enemy of a silent war flourishes – antibiotic resistance (AR)[1].

AR is a rapidly growing life-threatening concern that puts the public health of the entire world in a tremendous amount of danger. The World Health Organization (WHO) estimates AR as one of the largest health threats for humanity and according to researchers' predictions, AR will cause up to 10 million deaths each year by 2050 (World Health Organization, 2023; O'Neill, 2016). Because of the conditions of a war, the increase of AR emerges immensely and the warzone in Ukraine for instance, has become a breeding ground for AR bacteria where experts claim to "not have seen anything like it" when referring to the AR bacteria rooting from Ukraine (Stone, 2024).

Currently, Sweden is potentially facing the threat of war. Russia serves as a large threat for the national security of Sweden where destruction of infrastructure below sea level, cyberattacks and political campaigns targeted against Sweden have already unfolded (Försvarsmakten, 2025). Additionally, the Swedish Security Service alleges that the security status is likely to worsen even more (Säkerhetspolisen, n.d.). The ongoing war between Russia and Ukraine is affecting Sweden on various aspects and if the war eventually extends to Sweden, the increased AR is highly likely to occur within its borders as well. The WHO suggests that AR prevention requires efforts and collaboration from stakeholders, policymakers, scientists etc. (Naing et al., 2021). Despite this no evidence has been found to suggest that Swedish authorities are concerned or even aware of this risk. Instead, the risk and crisis information that has been communicated from Swedish authorities suggests tackling other risks of a potential war. This prompts speculations as to whether Swedish authorities and those preparing the nation for war are either unaware of this issue, ignoring it, or perceive it as a low threat.

The aim of this study was therefore to examine how Risk and Crisis Managers at the municipal, regional or county level across the nation perceive the risk of a war-related increase in AR if war extends to Sweden. The aim was answered by the following research questions:

[1] Terminology for this topic differs by source. Antimicrobial resistance (AMR) is a commonly used term and often used synonymously with antibiotic resistance (AR). This study uses AR exclusively, as it is more publicly recognized, hence more appropriate for this study.

- How do local Risk and Crisis Managers in Sweden perceive the risk of an increase in AR due to a potential war?
- How do local Risk and Crisis Managers in Sweden perceive the risk of a war-related increase in AR compared to other war-related risks?
- How have local Swedish authorities prepared for a potential war-related increase of AR?

2 BACKGROUND

2.1 BACKGROUND ANTIBIOTICS

Penicillin, the first ever antibiotic, was discovered in 1928 by Alexander Fleming. However, it wasn't until the 1940s, when the large-scale production began, that the new era of antibiotics was initiated (National Center for Agricultural Utilization Research, n.d). Penicillin was commonly referred to as the "wonder drug" since it effectively treated many infections that were deadly prior to its use (Institute of Biomedical Science, n.d.). Ever since, antibiotic drugs have been universally known as the remedy for infections (World Health Organization, 2014). However, the antibiotic era is quickly changing and faces the threat of only becoming known in the history books. Even in 1945, as a part of his Nobel Prize speech, Alexander Fleming recognized that bacteria could potentially develop resistance towards these drugs. Alexander Fleming was in fact right, and today antibiotic resistance is one of the largest public health threats in the world (World Health Organization, 2023). From an evolutionary perspective, the advancement of resistance genes among bacteria is normal. But the process is quickened since humans are overly misusing antibiotics through methods that benefit the growth of resistance bacteria. As a result, the effectiveness of antibiotic treatments is constantly decreasing and even vanishing.

Studies have estimated that by 2050, if urgent action is not taken, AR will cause up to 10 million deaths each year. Major areas that are already largely affected are for instance infectious diseases like pneumonia, HIV, tuberculosis and malaria. Because of antibiotics, these once life-threatening diseases became treatable. However, a report in 2014 estimated that around 700 000 annual deaths were caused by some of these infections, implying that the pre-antibiotic era is again becoming a reality. AR in just tuberculosis alone results in 200,000 annual deaths while 60,000 newborns die each year of neonatal infections[2] in India (O'Neill, 2016). Less than two years after the 2014 report, a new report was published by the same authors, stating that since then over one million lives were taken due to AR bacterial infections. In addition to that, hospitalized patients such as cancer patients, organ transplants patients, and cesarean sections patients are extremely sensitive to infections. Without effective antibiotic treatments to rely on, infections for these patients could become fatal (O'Neill, 2016).

By 2050, the expected economic impact of AR will be 100 trillion USD globally, but the economic impact is today already significant. Solely in the United States, over 2 million infectious diseases caused by AR bacteria occur annually, which results in excess expenses of 20 billion USD for the US health system each year (O'Neill, 2016). In the EU/EEA countries, almost 11.7 billion Euros in health

[2] Infections that affect infants during its first 28 days of life.

expenditure is caused by AR annually. Of the total expenditure, around 56% is attributable to additional health costs while the remaining part is due to the decreased workforce and production that AR causes (OECD, 2023).

2.2 THE OCCURENCE OF ANTIBIOTIC RESISTANCE

Antibiotic resistance emerges when bacteria obtain resistance genes. This takes place by either mutation or by gene transfer which implies that they receive such genes from other bacteria. Due to their ability to transfer resistance genes, AR bacteria can spread very fast. While undergoing antibiotic treatment, the majority of bacteria are killed. However, due to carrying resistance genes, some bacteria survive. This indicates that the only bacteria left and capable of reproduction are the resistance bacteria. Consequently, this process will over time result in a predominance of AR bacteria (MacGowan & Macnaughton, 2017).

By natural selection, the use of antibiotics contributes to antibiotic resistance according to the process described above, also referred to as “selection pressure”. Due to selection pressure, it is therefore extremely important that antibiotics are not used unjustly (Levy, 1998). For example, during the COVID-19 pandemic 74% of hospital patients in Europe were being treated with antibiotics when only 14% of those patients actually needed the treatment, indicating that the overwhelming use of antibiotics was not fully justified (Miljkovic et al., 2022). Excessive use is one major issue of the spread of antibiotic resistance. Additionally, another large contributor to an increase in AR is when antibiotic treatment is not implemented properly which intensely motivates the spread of resistance bacteria. It is not unusual that people prescribed antibiotics do not fulfill their treatment, perhaps since they think that they’re cured. Because of this, the improper dose of antibiotic will unsuccessfully eliminate all bacteria, especially those who carry resistance genes, which will advocate the reproduction of resistance bacteria. This is why it is important to use antibiotics properly and under supervision. (Levy, 1998).

2.3 ANTIBIOTIC DISCOVERY VOID

In 2014 the WHO reported that the world has been in an antibiotic “discovery void” since 1987. This indicates that the year of 1987 was the last year that presented new antibiotics (World Health Organization, 2014). Ever since, the antibiotics introduced to the market have exclusively been analogue antibiotics which are a mixture of already established substances rather than entirely new antibiotics (Hansson & Brenthel, 2022).

There are multiple reasons why no new antibiotics have been introduced to the market since 1987: many major pharmaceutical companies do not engage in the field of antibiotic discovery anymore due

to poor financial return; because of stricter regulation, antibiotics is an extremely expensive drug to develop (MacGowan & Macnaughton, 2017); the risk and the expenses of developing new antibiotics is significantly greater than producing analogue antibiotics; and new antibiotics face a larger risk of not being clinically accepted due to for example toxic side effects and when producing analogue antibiotics, the potential toxic side effects are most likely already known, which minimizes the risks of sending failing drugs to testing (Coates et al., 2011). But even if their antibiotics pass the tests and are introduced to the market, it may still not be financially beneficial for the companies since the antibiotic can probably only be used for a short period due to the development of resistance bacteria. The much larger revenue from other medical products therefore motivates the companies to withdraw from the antibiotic field (McGowan et al., 2017; Coates et al., 2011).

In combination with the pharmaceutical companies' withdrawal, many universities' academic departments studying antibiotic development have closed. This has resulted in a decrease of proficiency in labor within the antibiotic development industry over the past decades. Most governmental funding has yet to focus on the development of discovering new antibiotics, but even if it were, it would take decades to reform the knowledge and practice of developing new antibiotics similar to the "golden age" of antibiotic development (Coates et al., 2011). Between 1940 and 1962 more than 20 new antibiotics were discovered and introduced to the market. Another reason for why similar activity of new antibiotics is not occurring today is that it may be possible that all broad-spectrum antibiotics (treatable for all bacteria) have already been discovered (Coates et al., 2011).

The rapid development of resistance bacteria along with the lack of development in new antibiotics has for some infectious diseases led to the "last line" of antibiotics now being used. When these antibiotics are no longer effective, there are no more opinions to choose from. Doctors are even prescribing antibiotics that earlier never would have been prescribed due to severe side effects, such as kidney failure, since other options are no longer effective (O'Neill, 2016).

2.4 ANTIBIOTIC RESISTANCE IN WAR

An intense increase in AR can be seen in war-settings all over the world. Studies have for instance shown that Ukrainian war patients contained high rates of resistance bacteria, even to the most recently developed antibiotic compounds (Granata et al., 2024). Likewise, in Gaza, studies demonstrated an increase in AR of 300% for certain antibiotics. Due to multiple factors, a warzone functions as a breeding ground for AR and because of its catastrophic activities, implementations of mitigation strategies dealing with AR, are unapproachable (Moussally et al., 2023).

The ongoing war in Ukraine has resulted in poorer quality of the healthcare system. The destruction of multiple healthcare facilities is part of the reason. By the start of 2023, over 1200 healthcare facilities

had been damaged, more specifically around 600 hospitals were partly destroyed and almost 200 hospitals fully destroyed. The destruction of these healthcare facilities combined with a limited access to healthcare services has resulted in an unregulated use of antibiotics. As an example of this, soldiers frequently engage in self-medication without supervision from healthcare professionals, leading to overuse and improper use of antibiotics (Demyanyuk et al., 2024). Even with medical staff being present, a rapid increase in AR is still emerging. In the event of war, medical staff face challenges with a significant increase in demand for healthcare services and limited availability of resources (Geddes, 2024). In the pursuit of saving patients' lives while at the same time establishing combat and work capacity, the use of antibiotics has substantially increased. Additionally, the antibiotics used are often of poorer quality due to bad storage conditions and the forced use of expired antibiotics, which could be a result of delayed medical transports since crossing the Ukrainian border is challenging (Demyanyuk et al., 2024).

AR bacteria also thrive inside of military medical facilities. In the event of a large-scale casualty for instance, crucial activities such as isolation, cohorting[3] and thorough disinfection and sanitary practices are difficult to apply. The overcrowding in both hospitals and shelters also contributes as an important factor for the spread of AR bacteria (Granata et al., 2024).

The character of a war wound also accounts for the increased spread of AR bacteria for two reasons. First, the nature of a combat related injury often causes dead and infected tissue, which happens to be an optimal environment for AR bacteria to grow (Granata et al., 2024). Second, a war wound may look more dramatic compared to other wounds. A study found for example an association of purulence with reduced compliance of treatment guidelines which is believed to be a result of that purulence is detected as an indicator for severity. This suggests that antibiotics are overused in such events (Stewart et al., 2020).

Finally, the destruction of buildings, medical facilities and other infrastructure has resulted in a large amount of harmful substances which have been found to also account for the increase of AR (Demyanyuk et al., 2024). For instance, the war has resulted in a heavy metal contamination of the environment. Heavy metals are used in manufacturing of weapons and are released from explosives and the destruction of infrastructure. Studies have suggested that heavy metals enhance the growth of AR bacteria (Bazzi et al., 2020).

2.5 RISK PREVENTION

[3] Grouping patients based on their risk of infection.

2.5.1 PUBLIC HEALTH PROGRAM WORK

The theory of "public health program work" (folkhälsovetenskapligt program arbete) (Andersson & Nilsen, 2015) highlights the significance of recognizing the determinants that influence health and security in a particular community. The program aims to transform a community to a certain extent by "designing" the public health work according to the challenges that exists within that community. The theory has similarities to the underlying ideas behind "the proximity principle" which is one of the basic principles of risk and crisis management in Sweden, i.e., that challenges should be dealt and handled as close to the issue as possible to ensure a contextual and cultural understanding of the problems.

A fundamental element of the program is referred to as "community-based program". This describes the expectation of how members in a specific society are most knowledgeable of their own challenges which therefore makes it more appropriate for the community themselves to account for the decisions affecting their health and security. This can be further explained by "the principle of relevance" which, to briefly describe it, indicates that a program is more likely to succeed if it has the starting point "where the people are". Due to this, local societies are engaged in planning, implementing and evaluating health promoting and damage preventing enactments. A vital aspect of this program is that health and security are primarily influenced outside of the healthcare system. This approach therefore emphasizes the importance of a cross-sectional collaboration of diverse disciplines. A representation as such, generates an enhanced conception of conditions and interventions in a community. If an actor from a single discipline would act independently, it can be difficult to accomplish goals and optimize resources effectively (Andersson & Nilsen, 2015).

The program is an appropriate theoretical framework for this study since it emphasizes how local Risk and Crisis Managers, being ingrained in their communities, are more suitable to react to unique challenges. Since this study aims to examine the perceptions of local Risk and Crisis Managers in Sweden regarding war-related AR, the program offers a comprehensive framework, providing key insights explicitly from those involved with such work in the communities.

2.5.2 THE PUBLIC HEALTH APPROACH WORLDWIDE

The public health approach regarding AR is subject to regional differences. Just like the public health program work described above, the differences could be explained by the differences in determinants of each region (Andersson & Nilsen, 2015). Low- and Middle-Income Countries (LMIC) for instance demonstrate a significantly high rate of AR. These countries are known to have a considerable amount of self-purchasing of antibiotics and in Africa approximately all antibiotics are due to over the counter (OTC) purchasing. Even though most prescribers in LMICs comply with the fact that AR is a growing

health threat, very few acknowledge the cause behind it. Studies even suggest that many medical students and medical workers in some LMICs are unaware of AR, which is concerning since a substantial proportion of the global increase of AR has originated from LMICs. However, some LMICs have today implemented some programs to monitor antibiotic consumption (Pierce et al., 2020).

The United States has acknowledged the importance of antibiotic stewardship, a framework developed to mitigate the increased spread of AR, in all health departments. In 2020, Centers for Disease Control and Prevention (CDC) ensured that antibiotic stewardship was available to all healthcare departments through governmental funding. As an example, it aims to improve the prescribing behavior among physicians to stop the increased spread of AR (Centers for Disease Control and Prevention, n.d.). On the other hand, the US is prescribing antibiotics that might be considered nonessential as they are provided through a sexually transmitted infection (STI) treatment referred to as DoxyPEP. Through DoxyPEP, antibiotics are prescribed after unprotected sexual encounters for individuals who are at increased risk of STIs (U.S. Department of Health and Human Services, 2023). A study demonstrated that if everyone in the eligible population for DoxyPEP would use it, monthly antibiotic use would increase by 3.36 million doses, which is remarkably higher than the 62,100 that would otherwise have been used to treat an actual STI (Roster & Grad, 2024). In the US, about 70% of antibiotics that the Food and Drug Administration (FDA) describes as severely fundamental for treatment of humans, are used in agriculture (O'Neill, 2016).

In EU/EEA countries, around 60% of antibiotic sales accounts for animal use. Despite the large proportion, the use of antibiotics in animals has more than halved since the year 2000 due to guidelines and legislation. All EU/EEA countries have a national plan to mitigate AR, and multiple countries are even involved in the formation of global mitigation strategies. However, while all EU/EEA countries have developed a national plan to mitigate AR, a limited number of them have financed the establishment of these strategies (OECD, 2023). The European Surveillance of Antimicrobial Consumption Network (ESAC-Net), coordinated by the European Centre for Disease Prevention and Control (ECDC), presented a rapid decrease in the use of antibiotics in the beginning of 2020. However, because of the COVID-19 pandemic the consumption of antibiotics returned and even exceeded the amount of use prior to the pandemic, something that may indicate less activity regarding antimicrobial stewardship implementation (Vermeulen et al., 2024) The EU is now working towards reducing antibiotic use where they for instance aim to decrease the antibiotic consumption for humans by 20% in 2030. They also target the use of antibiotics in animals where they have forbidden it for the sake of growth promotion in all EU/EEA countries (OECD, 2023). Despite recent efforts, ESAC-Net reported disparities in antibiotic use in Europe where Southern Europe presented a larger amount than Northern Europe. Despite legislation that is governed by the EU which makes over the counter (OTC)

sales of antibiotics illegal, several countries in Southern Europe have reported prescribing antibiotics through OTC (Machowska & Lundborg, 2018)

Sweden is unique in the sense of having one of the lowest rates of antibiotic consumption and resistance across the globe. This achievement is attributed to the cooperation of mitigation strategies across multiple levels of professions. Between 1992 and 2016 the number of antibiotic prescriptions reduced by 43% and for children 0-4 by 73% (Mölstad et al., 2017). The low rate of antibiotic prescription can to a significant degree be associated with Strama, a framework used across the nation to mitigate antibiotic resistance (Strama, n.d.). Strama is governmentally funded where around 2 million euros is funded for national level and approximately 3-5 million euros on local level (Mölstad et al., 2017).

2.5.3 RISK PRIORITAZATION PARADOX

The risk prioritization paradox was established in 2024 with the aim to examine inequalities between different groups in society regarding the likelihood of being impacted by hazards. It was found that groups that were more at-risk than others were also apathetic to engage in risk-reducing events. Nilson and Wester (2024) supported the development of the risk prioritization paradox by referring to previous research which suggests that despite greater probability to acquire fall related injuries, elderly omitted the risk. This could not be explained by unawareness of the risk or that they considered the likelihood of the risk as low. Instead, it was explained by other risks that surpassed their interest in reducing their risk of fall-related injuries (Gustavsson, Jernbro and Nilson, 2018).

The differences in views and the lack of engagement in AR in different countries can be understood through the risk prioritization paradox. Each individual and society face a certain number of risks and threats in which they can focus on at a specific time. The risk prioritization paradox challenges the perception that the absence of action on certain risks is due to either ignorance or low education. Instead, the risk prioritization paradox suggests that a society or an individual is exposed to a vast number of risks, but with limited ability to handle all risks at the same time, only a restricted set of risks can be addressed. This results in the need to prioritize certain risks and overlook other risks. The overlooking of certain risks is therefore not due to an unawareness of these risks, rather the decision (knowingly or unknowingly) to prioritize other risks instead. The paradox of the risk prioritization paradox appears since those with the largest exposure to a certain risk, tend to classify that risk as less severe than the rest of the society on their risk prioritization scale (Nilson & Wester, 2024). For example, whilst AR is greatest in LMICs these countries don’t prioritize the issue due to other risks being perceived as more important.

This theory was recently developed which might entail limitations regarding its ability to reveal actual underlying concepts behind the participants' responses. Nevertheless, it might contribute to a broader understanding and emphasize alternative perspectives in terms of the topic. Therefore, this theory is suitable for this thesis since it can provide insight on why certain risks might be overlooked and other risks might be prioritized and perceived in greater seriousness. It can already offer understanding of the differences in the worldwide public health approach regarding AR and applying it to this study could create a deeper understanding of the topic, both at local and global level. It opposes the idea that action is correlated with knowledge which suits the aim of this study since it targets Risk and Crisis Managers, who most likely are highly educated and aware of the risk of AR. Preparing for a war comes with assessing a large number of risks and this theory examines why some risks might be perceived as more important than others.

2.6 PREVIOUS STUDIES

Previous studies have dealt with the subject of AR in war and the perception of AR in general. However, I have yet to find a study that combines them both and especially not in Sweden.

One study focuses more on perceptions of AR where one of them investigated how physicians in Jordan perceived AR in events of emergencies. Using qualitative content analysis physicians were interviewed which resulted in information of how these physicians were aware of the development of AR and the contributing factors behind it, but did not perceive it as any case of emergency (Älgå et al., 2018). One study suggested that the public perceived AR as a low threat and of low importance, but the study did not seek answers of how authorities viewed this issue, and it lacked the aspect of war (Hawkings et al., 2007).

Another study aimed to compare knowledge vs imagination in the perception of the risk of AR. A study conducted by Hansson and Brenthel (2022) suggested that fantasy and imagination played a large role in the perception of AR and its future consequences. The study explained why the former Prime Minister in the UK described the issue using dramatic, theatrical and to some extent sci-fi expressions. This strategy is common by higher authorities when communicating about possible future crises since it creates fantasies amongst the public. This study suggests that fantasies are crucial for risk perception and opposes other studies which emphasizes knowledge. The study highlights one theory in particular, where the authors refer to Beck (1986). The theory claims that knowledge and science is the most important in the risk assessment that key authorities need in order to formulate and mitigate risks. Despite this, the former Prime Minister of the UK used another strategy to formulate the problem which suggests that while knowledge might be crucial it needs to be combined with fantasies in order to create a perception of the risk. The study carries on by explaining that using fantasies and imagination, people can more easily create perceptions of a risk which would explain why the former

Prime Minister of the UK did not use science or knowledge to communicate about the risk of AR but instead his ability to create fantasies among people (Hansson & Brenthel, 2022).

One study recognized the importance of policy responses from stakeholders and governance for tackling AR. The study therefore aimed to explore how AR is perceived and understood by stakeholders and policy makers. With a digital survey answered by politicians, stakeholders and policy advisors; the results indicated the overall perception of how knowledge is vital for political actions in the aspect of mitigating AR. However, claims about how AR is an issue of healthcare facilities and therefore solved by the health care facilities were presented. This opposes the WHO global action plan on antimicrobial resistance (GAP-AMR) which emphasizes the value of a multidisciplinary approach with inclusion of politicians and stakeholders for tackling AR. The study also suggested how participants working at the local government level believed they were not acquired to contribute to the AR solution. This is also concerning since community-based interventions have previously been proved to be an effective strategy for decreasing AR (Naing et al., 2021). A study with a similar aim was conducted in Sweden with the intent to establish how, for instance, healthcare policymakers in Sweden perceived the implementation and use of national guidelines such as Strama in everyday healthcare. Beyond the actual aim, the study contained valuable insights of how these policymakers actually perceived AR. Suggested by the interviews the policymakers were not only well aware of AR but even presented as experts of the issues. Among them, some were worried that the public might not understand the severity of AR since slow threats like the development of AR tends to awake little reactions. They expressed that AR should be dealt with in the primary care facilities and that the healthcare personnel are responsible for handling the issue by changing their attitudes towards prescribing antibiotics. This view could be due to the fact that a large part of the public health work in Sweden is put on the individual's responsibility to change their behavior. They even established the paradox of AR being recognized as one of the largest problems globally and yet did not receive enough resources or money to invest in solutions for the issue (Röing et al., 2020).

Although these studies can contribute to vital understanding of how some key authorities and important actors perceive the risk of AR, it does not explore the perception of AR in war among these experts. From what I've seen, no studies have primarily focused on the perceived risk of AR in military conflicts which explains the lack of such findings in the previous studies mentioned above. This may be an indicator of a knowledge gap. The issue of AR is a rapidly escalating concern which is why it is urgently important to investigate how it is perceived in relation to such a large contributor like war. Since war has repeatedly been presented as a catalyst for the rise of AR it is particularly concerning that no studies have examined how the experts preparing their nation for war perceive the risk of war-related AR.

3 METHODOLOGY AND METHODS

The methodology of this study will be a qualitative content analysis. Qualitative studies aim to comprehend how individuals or groups recognize and interpret the world around them and their experiences, which is the central aspect of this study (Jacobsen, 2020). Opposing the aim of quantitative studies, it seeks to address answers to questions concerning how and why. A qualitative approach is used when wanting to examine and analyze tendencies and explore differences and similarities in the data (Burnard, 1996). Since the study aims to examine Risk and Crisis Managers perception of war-related AR, a qualitative approach is appropriate, since the perceptions of each participant is the central aspect of the study. The study employs an inductive reasoning which is appropriate when investigating individuals perceptions of a specific topic. It required the data to be collected with an open mind and later integrated into theories to offer a rich understanding of the research subject (Bengtsson, 2016).

The study does not aim to discover one “truth” among the participants, rather to discover various perspectives regarding the topic that each participant has. Therefore, the lens of social constructivism will shape this study (Creswell & Poth, 2018). To support the discovery of each participant's perception in the social constructivist light, a detailed description of the data will be carried out, which also will enhance the readers ability to understand the perceptions of the participants in depth (Hyett et al., 2014). Using qualitative content analysis with a manifest approach, the results will consist of detailed surface descriptions of each participant's perceptions (the choice of content analysis as the method of analysis will be further elaborated on in chapter 3.4). A manifest approach was chosen over a latent approach since the social constructivist approach recognizes that an individual's perspective is subjective, and this study took interest in emphasizing each subjective perception, which is why the participants original expressions was more important than the researchers’ interpretations of any underlying meaning (Bengtsson, 2016).

3.1 SAMPLING STRATEGY

This study was utilized by purposive sampling. Purposive sampling was considered appropriate since it allowed the researcher to target participants possessing specific characteristics related to the studies aim (Creswell & Poth, 2017). Purposive sampling was also used to ensure variation among the participants as it allowed the researcher to purposefully target participants in diverse parts of the country and at diverse levels of authorities. Variation was considered important for this study, not only since a war-related increase in AR will be a national concern and not a local concern, but also for the enhancement of the transferability (Bryman, 2018).

Referring to the aim of study, the inclusion criteria was;

1. participants working with risk and crisis management,
2. participants working at a municipality or region,
3. a university hospital needed to be located within that municipality or region (as a university hospital was used as an indicator for a larger community, which was believed to be more relevant for the study, and located in different parts of the country), and
4. the participants could be identified through the official websites of authorities, LinkedIn or colleagues from the local authority.

However, as the recruitment process commenced, recruitment was unsuccessful. In alignment with directives from Collins et al. (1984) that was mentioned in Chiang et al. (2001) the inclusion criteria 2) and 3) were modified to;

2. participants working at a municipality, region **or county**,
3. a university hospital **or a city with more than 100,000 inhabitants** needed to be located within that municipality, region **or county** (as a university hospital was used as an indicator for a larger community, which was believed to be more relevant for the study, and located in different parts of the country).

During the course of the data collection, regional perspectives were absent which affected the variation of the data. In alignment with Collins et al. (1984), one inclusion criteria were added;

5. participants working at regions in Sweden outside of the inclusion criteria with available contact information on official regional websites.

Each time, the extensions and modifications of inclusion criteria were discussed with the supervisor.

3.1.1 JUSTIFICATION FOR EXCLUSION OF NATIONAL AUTHORITIES

One could argue that it would be more suitable to include national crisis organizations such as Myndigheten för samhällsskydd och beredskap (MSB) or national authorities instead because it is possible that they might have more resources and knowledge about the subject. However, there is a very particular reason for why municipalities, regions and counties were of interest in this study and not national authorities. One of the three basic principles in Swedish crisis management is “the proximity principle” (närhetsprincipen). The proximity principle suggests that a crisis should be handled where it is occurring and by those affected by it. This means that, if local resources are enough, the affected municipalities are responsible for handling a crisis instead of national authorities (Krisinformation, 2024). Although this principle mainly applies to municipalities, this study will apply it to regions and counties as well. For the particular reason stated above, municipalities, regions and counties are of higher relevance than national authorities for a study of this nature.

3.2 RECRUITMENT OF PARTICIPANTS

Because of inclusion criteria 4, it was not solely decided by the researcher which level of authority was to be contacted. If inclusion criteria 4 was achieved by several participants from either the same level of authority or from a different level of authority, the researcher could choose. This approach was beneficial since the researcher could target unrepresented levels of authorities if needed, but it could also introduce biases. For example, initially the counties overrepresented the data, so when inclusion criteria 4 was achieved by participants in several levels of authorities, the researcher could target participants working at municipal or regional level.

In order for the data to attain variation, only one participant from each geographic location was desired. Considering the limited time and resources, multiple interviews from the same geographic location would be overwhelming. The invitation emails (see appendix 1) were therefore sent out in sessions, to one participant in a municipality, region or county per geographic location at a time. The contacted candidates were given one week to respond. This generated three possible outcomes:

1. If a candidate **agreed to participate** within one week, the researcher and participant agreed on a date and time for the interview. The participant was also provided a letter of consent (see appendix 2) and asked to carefully read it through before signing it and sending it back to the researcher.
2. If following one week, **a reply was absent**, those candidates were excluded. This also meant that if a candidate agreed to participate after the one-week period, they were also excluded. This was essential considering the limited time and it enhanced the structure of the recruitment process which made the documentation of it easier. New candidates were then identified and contacted.
3. If a reply **declining participation** was received, new candidates were immediately contacted, instead of waiting one week.

    - **Identification of new candidates for outcome 2 and 3.**

      If a person either declined participation or failed to respond within one week; a new candidate was identified from either the same local authority or from the same geographic location but a different level of local authority.

After conducting six interviews, saturation was achieved, since no new things were mentioned (Saunders et al., 2018). In total, 36 candidates had been contacted. Seven candidates declined the invitation, and 23 candidates failed to respond.

To ensure anonymity for the participants and create a flow easier for the reader to follow, fictional names are replacing both the participants names and authorities and alternative, more formal, ways of referring to the participants (see table 1).

Table 1 – Information about the participants

Name of participant	**Local Authority**	**Type of Authority**	**Working title or tasks**
Antoine (Female)	St: Antoine	County	Acting Deputy Director of Defense
Bernard (Male)	Port-Bernard	County	Emergency Coordinator and responsible for crisis management organization
Claude (Male)	Claudeville	Municipality	Security Strategist
Dominique (Female)	Dominiquedale	Municipality	Emergency Coordinator for the municipality's employment and Social Services Administration and for a project about emergency coordination of municipal healthcare
Elize (Male)	Eliziana	Region	Emergency Strategist within civil preparedness in crisis management which includes catastrophic medicine.
Fidéle (Male)	Fidélefia	Region	Head of security and Emergency Preparedness unit.

3.3 DATA COLLECTION

The data collection consisted of semi-structured interviews. This meant that the interviews were performed by asking a determined list of questions using the interview guide. Staying consistent with the interview guide was essential for the dependability of the study (Graneheim & Lundman, 2004; Bengtsson, 2016). Using semi-structured interviews also meant that the participants could speak freely and that the opportunity for follow up questions was present. This was considered beneficial towards the aim of the study since it enhanced the researchers' understanding of the participants' perception of war-related AR and other war-related risks (Kelly, 2010). The interviews were held on the digital communication platform Teams. Although conducting the interviews on Teams might result in poorer quality compared to face-to-face interviews, it did allow inclusion of participants across the whole country. The interviews were set in an undisturbed environment to improve the quality. The interviews were conducted in Swedish as it is the native language of the researcher and the participants.

Before each interview, the participants had sent a signed copy of the letter of consent (see appendix 2) that had been provided to them after accepting to participate in the interviews. This indicated that they were aware of their rights before the interviews started, which is crucial for the ethical aspect of the study (Etiksprövningsmyndigheten, n.d). The researcher then informed the participants when the recording of the interview started. The interviews were recorded and automatically transcribed in Teams which was considered more effective since writing notes during the interviews would not only be time consuming and interruptive, but the risk of accidentally excluding important details would be enhanced (Britten, 1995). Prior to conducting the interviews, the researcher tested the process of creating and sending meeting links to ensure it would be successful, as well as verified the quality of the recording and transcription feature on Teams. The interviews were also recorded on the iphone app "Voice Memos" as a backup in case the materials would somehow disappear. The interviews were between 19 and 31 minutes long, with an average time of 23 minutes.

3.4 DATA ANALYSIS

In order to analyze the data, content analysis was employed which enabled key parts of the data to be induced and categorized in order to draw strong conclusions, which is central in qualitative research (Bengtsson, 2016). Content analysis was appropriate in this study since it allows data from documented information, such as interview transcriptions, to be recognized in fundamental concepts of the research area in question (Burnard, 1996). Content analysis is also suitable when the data collection consists of interviews, since it can produce depth in the findings (Bengtsson, 2016). Since this is a qualitative content data analysis, the data will be presented in themes and categories. Explained by Bengtsson (2016), content analysis contains different approaches. The depth of the analysis in this study, however, was utilized by manifest analysis. This meant that the researcher did not aim to explore and interpret any underlying meanings but instead provided a careful description of the participants' own expressions in the results. The surface level approach was considered essential in this study. Since it aimed to investigate what perceptions of war-related AR Swedish local Risk and Crisis Managers had, the actual answers from the participants were crucial in order to achieve the aim of the study (Bengtsson, 2016).

The initial stage of the data analysis began with verbatim transcription of the interviews. The transcripts were downloaded as Word-documents. The transcripts were then carefully compared with the recorded interviews to ensure that the transcriptions were in exact alignment with what the participants had said. Mistakes that had been made by the transcription program were corrected. This was followed by the four-stage analysis process described by Bengtsson (2016).

Stage 1: The decontextualization

The transcriptions were reviewed several times so that the researcher could familiarize herself with the data and create an overview. The researcher then identified meaning units by highlighting key sentences and words. A meaning unit is sentences and words that are connected to the context of the study. This process was repeated to ensure that no important information was overlooked. This was followed by the coding process. Instead of labeling each meaning unit with a code, they were assigned a color. Meaning units with similar content, were assigned the same color. This process was performed multiple times to enhance the reliability of the study.

Since it would mainly be employed to enhance effectiveness of the data analysis, a computer-based tool was not considered essential due to the modest size of data (Yin, 2009). The process was instead performed manually by the researcher.

Stage 2: The recontextualization

In this step, the researcher reviewed the meaning units to make sure that all aspects in relation to the aim were covered. Irrelevant parts were removed which meant that the process of distancing was crucial, since researchers tend to think everything is important.

Stage 3: The categorization

In this stage, the meaning units were grouped together by color. Categories and subcategories were identified. The subcategories is related to categories. The categories were then grouped together based on similarities and divided into themes that explained the essence of the categories. The process in this stage was repeated several times to both achieve accuracy and ensure that the researchers' pre-assumption was not a defining factor when developing the categories and themes. The process was also reviewed by and discussed with the supervisor multiple times in order to minimize researchers' biases. Because the interviews were held in Swedish, the analysis process was conducted in Swedish. Once finished with the analysis, the results, themes, categories and quotes were carefully translated into English.

Stage 4: The compilation

After the subcategories, categories and themes were established, the data analysis and writing process began. The data was analyzed from a neutral and objective perspective. Since this is a manifest analysis, the analysis was carried out describing the participants' expressions and it stayed aligned with the original text. The underlying concepts of the participants' answers were grouped together, but the descriptive element still remained so that the reader could acquire a detailed in-depth description of the findings, in accordance with the social constructivist paradigm (Hyett et al., 2014). During this process, the researcher also identified suitable meaning units to be presented as quotes in the results. To ensure validity of the outcome, this process was also discussed with and reviewed by the supervisor. Tables

were also created with the subcategories, categories and themes to present an overview of the results for the reader (see table 2 and table 3).

Positionality and Reflexivity

A vital aspect of the research process was to acknowledge how the researchers' pre-assumptions and pre-knowledge influenced the entire research process. Reflexivity was therefore a crucial and consistent component during the analysis process where the researcher reflected upon how her own positioning might introduce biases and affect the outcome of the data. Regular discussions with the supervisor were a helpful tool to enhance reflexivity and minimize biases during the data analysis process (Jamieson et al., 2023).

3.5 ETHICAL CONSIDERATIONS

Something that could motivate ethical issues, is the fact that the subject of AR is a large health threat which could cause fear among people. However, since the study aimed to interview professionals about a topic that is related to their work, no unnecessary fear was deemed to be created.

By exploring some common ethical issues in qualitative research stated by Creswell and Poth (2017), knowledge on how to avoid them was also present. By providing the participants with informed consent, numerous ones were prevented. Respect of the participants' autonomy and voluntary participation was for instance of high ethical consideration when including the participants in the study. The informed consent therefore included information about how participation was completely voluntary and that the participants could decide to discontinue with the interview at any time. Ethical issues could also arise if the identity of the participants was exposed which is why each participant and their associated authority was completely anonymous and assigned fictional names. This information was also shared with the participants in the informed consent. The informed consent is overall in line with the Swedish Ethical Review Act (Etikprövningsmynigheten, n.d)

However, only parts of the purpose of the study were stated in the informed consent and communicated to the participants in the invitation emails (see appendix 1). According to the Swedish Ethical Review Act, communication of the purpose of the study is crucial. The fact that only parts of the purpose was given, might be problematic according to the Act (Etikprövningsmynigheten, n.d). It can therefore be argued that the way the interviews were designed and how the purpose was presented might raise some ethical considerations. The participants received the information that the interview would contain questions about concerns they have regarding the risks of the Ukrainian war and what types of risks they perceive as high. The first part of the interviews started with broad questions about this topic. Following the first part of the interview, the second part of the interview began which contained questions about how they perceive the risk of a war-related increase in AR that most likely would

occur if the Ukrainian war extends to Sweden. This specific information was not stated in advance. According to Creswell and Poth (2017) and the Swedish Ethical Act (Etikprövningsmynigheten, n.d), there could potentially be a presence of ethical issues with this approach. Misleading the participants by not informing about the entire purpose of the study in detail may result in ethical dilemmas. However, the aim of the study might have been challenged if the participants received this knowledge beforehand. Since the purpose of the study was to understand how they perceive the risk of an increased AR in war and the issue compared to other war-related risks, the participants mentioning or not mentioning of AR in the first part of the interview was crucial for the aim of the study. If participants knew about the inclusion of AR in the study beforehand, their answers could differ from the actual truth. Potential biases, such as social desirability bias, may have occurred where the participants either answered in a way they thought was expected of them or in a manner they believed would present them and their authority more favorably. However as mentioned previously the participants received the information prior to the interview that they were completely anonymous and that they could withdraw from the interview at any time in case they no longer felt comfortable to proceed. The participants were therefore not forced in any way to answer the questions about AR.

4 RESULTS

This chapter discloses the findings from six semi-structured interviews with Risk and Crisis managers working at municipal, regional or county level regarding their perception of war-related AR. It was analyzed using qualitative content analysis. In this chapter, the findings from the municipalities and counties (MAC) will be presented independently from the findings of the regions, however, a joint discussion will be presented in the discussion (see chapter 5). As mentioned previously (see chapter 3.1) the region's perceptive remained absent as the data collection unfolded. Claims from the MACs indicated that the regions were a central aspect of the research topic, mainly due to their large involvement in healthcare questions. Hence, the inclusion criteria were extended (see chapter 3.1). Due to the regions involvement in healthcare, they will be presented in a separate result section since it was decided that an interesting aspect of this study would be to view the perception of war-related AR between the MACs, who claim to not be involved with healthcare questions, and the regions who are involved with healthcare questions, side by side.

4.1 MUNICIPALITIES AND COUNTIES

The participants included in this part are Antoine (St: Antoine), Bernard (Port-Bernard), Claude (Claudeville) and Dominique (Dominiquedale). The themes, categories and subcategories provide crucial insight of the research aim and are stated in table 2.

Table 2 – Themes and categories for the municipalities and counties

Theme	**Category**	**Subcategories**
Risk perception of war	Characteristics of the war as a risk	
	Critical infrastructure risks	
	Health-related risks	
Risk and crisis management	Increased workload	
	Organizational wartime preparedness	
	Top Down approach to risk and crisis management	

Antibiotic resistance perception	Knowledge of AR	High overall knowledge and risk perception of AR
		Lack of knowledge of AR in war
	Perception of AR in war	AR in war as a deprioritized risk
		Perception of potential risk engagement
	Delegation of responsibility	

4.1.1 RISK PERCEPTION OF WAR

This theme captures valuable information about the participants' perception regarding risks of the Ukrainian war and war-related AR. Overall the participants viewed the characteristics of the war, infrastructure- and system disruption and concerns regarding health as the major severe risks. Although this theme is missing visible information regarding the participants perception of war-related AR, it still captures essential understanding of it. The absence of AR in this theme gains crucial insights in the participants perceptions of war-related AR and to what extent the issue is deprioritized, since other risks dominates this theme.

CHARACTERISTICS OF THE WAR AS A RISK

Nearly all participants expressed challenges with the unique characteristics of the Ukrainian war as a major risk for the Swedish society and it is therefore important to learn from the war and how warfare is changing.

"Our defense is based on a structure of how war should be conducted, but this war is not quite what one would expect in terms of how war is supposed to unfold" – Bernard (Port-Bernard)

Antione described the war as being of a different character than previous wars. Claude reasoned about how the warfare itself in Ukraine could indicate a large threat for Sweden. He explained that it is a unique war where old warfare with trenches on a battlefield is combined with more modern dimensions such as drones and robot attacks.

CRITICAL INFRASTRUCTURE RISKS

All participants viewed infrastructure and systems as severe risks. In all cases, concerns about this were expressed either first or rather early in the interviews. Antoine pointed out infrastructures such as

drinking water, electricity supply, hospitals and schools and nuclear energy as major risks regarding a potential war. Bernard talked about infrastructure as well and industries that produce important assets. He also considered crucial harbors to face big risks and proceeds to see structures like payment systems, supply systems, production and deliveries etc. as particularly vulnerable. Claude spoke about electricity supply to be a major vulnerability in a potential war since Sweden is highly dependent on electricity. He also spoke about how Sweden is reliant on a considerable amount of infrastructure due to our oblong country and if key points were eliminated, issues could arise. Claude also mentioned drinking water as a major risk. Dominique mentioned energy supply, transport systems and disruption of delivery chains.

"We are extremely dependent on imports which makes us particularly vulnerable to disruptions in supply chains" - Dominique (Dominiquedale)

"We are dependent on a lot of infrastructure because of our elongated country" – Claude (Claudeville)

HEALTH-RELATED RISKS

Most of the participants addressed concerns about health-related risks if war in Sweden would occur. Antoine briefly mentioned hospitals as vulnerable for war while also expressing psychological consequences of coming back from a war and trying to integrate into society again as a big risk. Dominique thought the healthcare system could face major risks since a substantial portion of healthcare is governed by private actors that do not face any specific requirements regarding crisis preparations. Because of this the healthcare system might face massive backlashes if a crisis were to occur. Dominique proceeded to express concerns about how people with addictions will be a highly vulnerable group if war would break out and that there is not much funding within this field. She understood that there are other risks that need funding but argued that they have a responsibility for all their inhabitants. Claude raised issues with logistics within healthcare; for instance, how to reach the elderly homes in wartimes.

"Care aspects will always be severely affected." - Antoine (St: Antoine)

4.1.2 RISK AND CRISIS MANAGEMENT

The participants elaborated about the risk and crisis management they conduct regarding the Ukrainian war, which reflects in this theme. Since the war broke out the amount of work has expanded immensely, and the participants are clear about how serious the war is perceived. The participants elaborate regarding what preparations and work they do and parts of it revolve around risk identification and strengthening their mitigation capacity. A central aspect of this theme is the absence of mentioning war-related AR which indicates that the local authorities are not prepared to handle the

issue. It also shows that other war-related risks are treated as more important than war-related AR. The participants also shared valuable insights into the structure of the governance regarding the war-preparations and major parts of it are based on directives from higher authorities.

INCREASED WORKLOAD

When answering questions about how and if their work has changed since the war in Ukraine broke out, all participants agreed that the amount of work with war preparations has intensified a lot. Some participants stated that major changes have been made. Bernard clarified that his work tasks remain the same, but a significant change is that they have hired more people since the war preparations require more labor force, ever since the war broke out.

"We have expanded our operations with a considerable increase in people. Civil defense has become a priority area." - Bernard (Port-Bernard)

ORIGANIZATIONAL WARTIME PREPAREDNESS

Bernard works with monitoring and analyzing the surrounding world, but not to a larger extent than he did prior to the war. Claude explained that identifying risks is a part of their daily work and how important it is. They analyze what parts of the society could be vulnerable for disruptions in order to strengthen the capacity to minimize large threats towards that specific area. Dominique talked about a method they use in order to analyze vulnerabilities and indicated that an increased focus in crisis management is developing in Dominiquedale where they have started to establish a continuity plan in order to maintain their community as well as possible in times of war.

"Identifying risks and crises is part of our daily operation." - Claude (Claudeville)

Antoine works similarly with preparations to ensure that St: Antoine has the capacity to mitigate a crisis. St: Antoine and Port-Bernard are both counties and their preparations involve cooperation of different actors in order to quickly begin to mitigate in times of emergencies. Bernard described their cooperation work as “puzzling” and Antione explained further that they are responsible for cooperating with the municipalities within their geographical area to ensure that they are well prepared and have a continuity plan.

"We are preparing the local authority and the county to manage a heightened state of readiness." - Antoine (St: Antoine)

TOP DOWN APPROACH TO RISK AND CRISIS MANAGMENT [4]

During all interviews, it was clear that the participants and belonging authorities worked with assignments and risk management that emerged from higher authorities. All participants addressed a substantial increase in assignments coming from above, and that it was a defining dimension of their risk and crisis management. When Bernard discussed the increased labor force, he admitted that it had been demanded by national authorities that the area of civil defense needed to be prioritized which resulted in the expanded workforce.

"It has been clear what we should work with. Civil defense is the priority." – Bernard (Port-Bernard)

Dominique stated that the National Board of Health and Welfare has developed an education program about handling civil crisis management for social services. She continued to address a significant change of what type of funding they received from the state ever since the war broke out.

"It's quite clear in the state grants we receive that we need to take that into consideration as well" – Dominique (Dominiquedale)

The government and sector agencies have directed demands related to different sectors, which resulted in local authorities focusing on for instance evacuation planning, electricity supply and drinking water. Antoine was reasoning about a noteworthy increase in assignments from the government where one includes planning for evacuation. She continued to elaborate that they are also being demanded to continue to work with the drinking water supply during critical times. St: Antoine has also received assignments from the Swedish Energy Agency which includes strengthening the municipal energy supply and mapping out potential fuel depots. Claude stated that they have received assignments from the government and that the sector agencies provide them with assignments in relation to the different sectors.

4.1.3 ANTIBIOTIC RESISTANCE PERCEPTION

This theme reveals crucial insight regarding the participants' perception of war-related AR. Prior to the subject of AR being brought up by the researcher, none of the participants had mentioned anything about it, which itself answers crucial questions about their perception of it. This section explores participants' knowledge and perceptions of AR, especially in the context of war. Even though participants demonstrated a comprehensive understanding of AR and its seriousness concerning public health, they revealed insufficient knowledge of it in a war context. Hence, the participants felt limited to elaborate about their perception of it, but some claimed that it might not be more important than

[4] Political movements are usually demonstrated in terms of direction. From higher authorities to lower authorities is called "top down".

other risks. The topic of AR was by all participants unaddressed and therefore deprioritized, both by the participants and their local authority, where it was revealed that the topic had never been encountered in discussions. The participants however did not take account for addressing the issue, it was instead attributed to the regions or healthcare professionals. Furthermore, most participants did perceive potential future engagement in AR as positive, pointing to that the issue is after all perceived with severity.

KNOWLEDGE OF AR

High overall knowledge and risk perception of AR

The participants did recognize AR as something that has been on the agenda for a while and perceived it as a severe issue. Bernard demonstrated a high knowledge regarding the topic of AR overall. He speculated about how war could create a breeding ground for the development of resistant bacteria due to for instance living conditions and more generous prescriptions. The participants admitted to seeing a considerable amount of reports regarding the matter and recognized its severity for future consequences.

"We know that it is crucially important that it doesn't get worse" - Antoine (St: Antoine)

AR was recognized as dangerous for the public health of the entire society and Dominique elaborated about how certain groups of people she worked with could be severely vulnerable to an increase of AR.

"Antibiotic-resistant bacteria are one of the biggest problems of the welfare system. The fact that we have antibiotics that no longer treat our infections – of course, that is something to take very seriously" - Bernard (Port-Bernard)

Lack of knowledge of AR in war

Even though presenting knowledge about AR in general, the participant lacked knowledge of it in a war-context. Antoine responded that it might be possible that the same problem could occur here, but she has no knowledge about and will therefore pass on answering questions about her personal perception of AR in war. When asked about the perception of AR in war specifically, Bernard showed a lack of knowledge stating that he cannot estimate the severity of the risk of AR in war since he does not have the knowledge to do so. Bernard also claimed to have no insight into how well prepared they are at Port-Bernard to mitigate the issue.

"It's hard for me to evaluate it, I don't know, I don't have that knowledge" – Bernard (Port-Bernard)

When asked to estimate the preparedness of the issue, the participants struggled to do so. Claude elaborated about the restrictiveness of antibiotic prescription in Sweden, implying that it could indicate some level of preparedness, but due to low knowledge of the issue, none of the participants could estimate the preparedness of it.

"I don't know, It's not my area of expertise" - Claude (Claudeville)

PERCEPTION OF AR IN WAR

AR in war as a deprioritized risk

For all participants, AR was a highly deprioritized question where none of the participants admitted having worked with the question themselves or even heard colleagues work with it.

"I can tell you that it is not something we have discussed around the table" - Claude (Claudeville)

Antibiotic resistance was not being prioritized at all by the local authorities, and they claimed that the deprioritization is largely due to the topic not falling under their responsibility. War-related AR was perceived as something that did not need prioritization, since it wasn't perceived as more important than other risks. The participants instead prioritized other risks, for instance choosing to work with those who were assigned from above.

"There's probably also a very high risk of other forms of suffering, so I think it should get neither more nor less." - Dominique (Dominiquedale)

"It depends on what assignments we receive and right now we do not have any about that as far as I know" - Antoine (St: Antoine)

Perception of potential risk engagement

The majority of participants had a positive attitude toward addressing this issue. The only exception was Bernard, who didn't think it was necessary to engage with this sort of risk at Port-Bernard. Even though Antoine admitted to not having thought about it she reacted positively to the idea of addressing this issue stating that perhaps they should do it. Claude also responded positively about the matter, emphasizing the importance of the issue, especially since there will be a post-war period.

"What will we do then, you know? Is it worth taking the risk of being a bit more generous with the distribution during a war? Well, maybe not." - Claude (Claudeville)

Claude further discussed that even though they have not touched upon the subject at Claudeville, he admits that they have changed their approach regarding other questions, indicating that Claudeville could be open to changing their perception of mitigating an increase in AR in war if the situation arises. Dominique stated that it could be necessary to work with it, just as any type of risk. She said that it might be positive to increase the engagement of mitigating this issue since it is something that could affect us all.

DELEGATION OF RESPONSIBILITY

None of the participants acknowledged any sort of responsibility for this issue due to their lack of involvement in medical services. Instead, it was assumed that those working with healthcare services were addressing the issue. Dominique talked about how they did not work with healthcare-related matters in that regard, and that if healthcare is needed, primary care is used - hence, such matters are not handled at Dominiquedale. She added that she had not heard about anyone working with this sort of preparations at Dominiquedale and thought that perhaps the Health and Social Care Administration (hälsa-, vård- och omsorgsförvaltningen) addresses this question since they have nurses on their team. Dominique also reasoned that even if Dominiquedale would work with this issue it cannot be under their responsibility since they lack knowledge of the medical field.

"I think it's the healthcare system and the regions that need to lead the work." - Dominique (Dominiquedale)

Antoine clarified that there are others working with this issue and that they are not the owners of these types of questions and thought that the regions might discuss this. Beyond anyone, it is those who work with veterinary issues who usually focus on this, she explained. Bernard argued similarly to Antione stating that this is the responsibility of the regions and that they do not work with healthcare issues at all in that way. Claude also assumed that perhaps the regions have discussed these issues and even offered to check with the Health and Social Care Administration if they have talked about it.

4.2 REGIONS

The participants included in this part are Elize (Eliziana) and Fidéle (Fidélefia). The themes, categories and subcategories provide crucial insight of the research aim and are stated in table 3.

Table 3 – Themes and categories for the regions

Theme	**Category**	**Subcategories**
Risk perception of war	Low war preparedness	

	Remote warfare risks	
	Critical infrastructure risks	
Risk and crisis management	Top Down approach to risk and crisis management	
	Organizational wartime preparedness	Preparedness in healthcare services
Antibiotic resistance perception	Knowledge of AR	High overall knowledge and risk perception of AR
		Lack of knowledge of AR in war
	Risk perception of AR in war	
	Preparedness for AR in war	Delegation of responsibility

4.2.1 RISK PERCEPTION OF WAR

This theme captures insights of what risks the participants perceive as most severe regarding the Ukrainian war and war-related AR. The participants had concerns about Sweden's ability to handle war since Sweden is not experienced or equipped enough for it. They also perceived the risk of remote warfare as high as well as the disruptions of infrastructure and systems since for instance Sweden has crucial key points that could be targeted in a war. Although this theme is missing visible information regarding the participants perception of war-related AR, it still captures essential understanding of it. The absence of AR in this theme gains crucial insights in the participants perceptions of war-related AR in comparison to other war-related risks and to what extent the issue is deprioritized.

LOW WAR PREPARDNESS

When asked about the risks perceived as most severe by the participants in the event of a war, Elize expressed concerns about having much lower capability of handling a war, both regarding experience but also due to the fact that Sweden has supplied a large number of weapons among other things to Ukraine. Fidéle presented similar concerns stating that the day Russian troops enter Swedish grounds, a lot of trouble is ahead since they do not plan for that to happen. Because of the geographic location of Eliziana, Elize claimed that they will receive a lot of responsibility if war would occur by the Finnish border for instance. In terms of population, they are not suited for that.

"Sweden is not prepared for war in that way since Sweden have not been in war before" - Elize (Eliziana)

REMOTE WARFARE RISKS

Both participants were concerned about remote warfare. Elize admitted that he saw weapons such as robots and remote warfare as a major risk. Fidéle explained that because of Sweden's entrance into Nato, Fidélefias preparations are more based on the fact that Sweden will be a transit country or a host nation. Both military troops and important military assets will be transported through Fidélefia onto Finland for instance. Because of this, the risk for remote warfare and sabotage units are high, he explained.

"A missile attack would damage both military and civilians" - Elize (Eliziana)

CRITICAL INFRASTRUCTURE RISKS

The participants perceived infrastructure and system disruptions as major risks, which was mentioned early in the interviews. Elize mentioned concerns about major and long-lasting disruptions in electricity, IT and water as well as water poisoning. He also spoke of risks about connections such as buses, trains, road network, telephone services and IT to be cut-off. Fidéle talked about disruptions in deliveries of materials such as for instance medicines and medical supply to be major risks since those are crucial for essential services in the community. Fidéle expressed worries of the geographical location of Fidélefia which made them a crucially important point for transports. He further discussed concerns regarding emergency power and water but the inability to develop due to lack of funding.

4.2.2. RISK AND CRISIS MANAGEMENT

This theme presents findings regarding an extensive increase in work for both participants and their local authorities. Since the war broke out, an increased amount of directives from the government have been issued and corporations with other national authorities are a big part of their war-preparations. The participants revealed that the directives are connected to fundings and if the local authority does not obey the directives, the money has to be returned. The participants shared that preparations in relation to healthcare is a major part of their work since healthcare is the region's core operations. A central aspect of this theme is the absence of mentioning war-related AR which indicates that the local authorities are not prepared to handle the issue. It also implies that other war-related risks are treated as more important than war-related AR.

TOP DOWN APPROACH TO RISK AND CRISIS MANAGEMENT

Major parts of the regions' risk and crisis management in this war is governed by a top-down approach. Both participants stated that since the war broke out, assignments and funding from the government have increased plenty and according to Fidéle it has been clarified that the war is the defining

dimension. Elize also mentioned that since they are in charge of healthcare services, they receive assignments from the National Board of Health and Welfare. Eliziana also cooperates with counties, MSB and The Swedish Armed Forces (Försvarsmakten) in greater extent, in order to match their needs and requirements.

"The government has spitted out government assignments" - Elize (Eliziana)

Both participants claimed that the directives and assignments are tied to funding. Elize explained that they have received funding from the government in order to strengthen resilience capability for infrastructure and healthcare services and Fidéle talked about the increased funding as crucial since they do not have the money otherwise to work with risk and crisis management as much as needed. Fidéle presented that they receive a lot of funding from the government connected to the healthcare services work with civilian defense. He also discussed the fact that a region is self-governing, but due to the fact that much is tied to funding, a sum of money comes with specific requirements for how it should be used.

"If you don't comply, you won't receive the money, or you will be obligated to return the funds" - Fidéle (Fidélefia)

ORGANIZATIONAL WARTIME PREPARDNESS

Since the war broke out, both participants described how their workload has increased immensely. At Fidélefia, the major focus is on establishing good routines in their everyday lives, which in turn will help them mitigate crises. The participants were then asked about how they work with the specific risks that they had mentioned above. At Eliziana they look over stocks and reserves, security protection as well as collaborating with The Swedish Armed Forces, The National Boards of Health and Welfare and other regions and municipalities. Elize claimed that such things are crucial for becoming more resilient. Elize even explained how their employees have increased from two to eight plus one consultant physician. Elize talked about working with continuity planning so that their operations have fundamental capability to handle different crises. At Fidélefia they work intensely with educating, training and practicing with their staff. They are also planning for how to prepare for war where they develop contingency plans and tests them as well as working with inventory management for crucial materials.

"We are preparing the Region to be able to operate differently in the event of war." - Elize (Eliziana)

Preparedness in healthcare services

For both Eliziana and Fidélefia, a major part of their work is connected to healthcare services. In fact, Fidéle stated that 90% of the region's entire operation is connected to healthcare services.

"Healthcare services is our biggest assignment" - Fidéle (Fidélefia)

Elize explained that the healthcare services are not only the core of the region's work but also among those operations that are more crucial in a war. At Eliziana, they work to enhance the healthcare services to a greater extent than other operations as a part of their risk and crisis management. Eliziana works with education and practice regarding catastrophic medicine as well as the capability of hospitals and healthcare facilities. Fidélefia focuses much on alternative solutions if they for instance can't use their hospital and needs somewhere else to perform surgical procedures etc. The preparations related to healthcare was claimed as crucial for society on many levels.

"If the healthcare systems don't work it will have a great effect on the willingness to defend and the functionality in society" - Fidéle (Fidélefia)

4.2.3. ANTIBIOTIC RESISTANCE PERCEPTION

This section explores participants' knowledge and perceptions of AR, especially in the context of war. Prior to the subject of AR being brought up by the researcher, none of the participants had mentioned anything about it, which itself answers crucial questions about their perception of it. Even though participants demonstrated a comprehensive understanding of AR and its seriousness concerning public health, they revealed insufficient knowledge of it in a war context. The participants admitted that war-related AR will be a serious health threat, but not to a greater extent than other threats of a war. They admitted to not having a specific mitigation strategy for AR in a war-setting but claimed to still be prepared due to everyday mitigation strategies. The participants did not fully account for the issue of war-related AR since they lack medical expertise.

KNOWLEDGE OF AR

High overall knowledge and risk perception of AR

Throughout both interviews, it was evident that the participants possessed a high overall knowledge of AR. They discussed its occurrence in detail and emphasized the importance of using different types of antibiotics appropriately. Both participants perceived AR as a serious threat and recognized its significant impact on public health.

"Antibiotic resistance is, overall, quite an imminent risk to society" - Elize (Eliziana)

Lack of knowledge of AR in war

Although both participants demonstrated a high awareness of AR overall, the participants lacked knowledge about the subject in war. Elize admitted to not knowing anything about AR in war and claimed that the subject is entirely new for him.

"I must admit that I have never heard about that until now" - Elize (Eliziana)

When asked about how they perceive the need to start engaging with this issue, Fidéle replied that he has only known about the risk for 10 minutes and at Fidélefia they work to mitigate risks that are known to them and the risk of an increased AR in war is completely unknown to them. Fidéle also asked to be sent material regarding the subject.

"I do not recognize it. I have not heard anything about this" - Fidéle (Fidélefia)

RISK PERCEPTION OF AR IN WAR

The participants did not recognize the issue of AR in war but had high knowledge of the subject overall, which enabled them to create a perception of AR in war by speculating about the matter. They speculated that it could be a serious issue.

"It sounds like it will be very troublesome" - Elize (Eliziana)

The participants elaborated about the issue in a war-setting and recognized that it would be challenging, but they were still undecided about how serious they perceived it. Elize resonated about issues with availability of various sorts of antibiotics. If, on top of this, the development of resistant bacteria escalates even further, the challenge with availability will additionally increase since specified antibiotics will become more limited. This, in turn, will develop even more resistant bacteria, he said. Even though admitting to considering it while planning for the crisis management of the war, he also claimed that he imagined that there will be other things in a war that will have a greater effect on the public health than AR. Fidéle resonated that even though Sweden is quite restrictive with prescribing antibiotics, desperate times require desperate needs. Fidéle elaborated further that he cannot estimate the severity of the risk since they haven't considered it a risk or even discussed it at Fidélefia. But it doesn't mean that it is not a risk, he said. Fidéle further explained that it doesn't matter how large the risk is in a war as the central aspect is how the issue is addressed in day-to-day practice. That is how they will manage it even in the event of a war which is why AR is not considered a war-related risk.

"It might sound cocky, but it is not a risk today" - Fidéle (Fidélefia)

PREPAREDNESS OF AR IN WAR

When asked how AR is being prioritized in a war-related context, both participants conceded that it has not been prioritized by any means. Elize explained that it has not been a focus when addressing related questions in Eliziana and Fidéle admitted that they have not even identified it as a risk. Regarding mitigation activities, Elize stated that, to his knowledge, no such activities are present. However, Elize explained that medical stocks have been looked over to ensure that there are enough medical supplies to cover a certain amount of time, and some antibiotics are included in that stock. Even though he could not elaborate on their preparedness for an increased AR in war, he claimed that they are overall prepared for an increase of AR. Fidéle described that the risk of an increase in AR is being handled as an issue in day-to-day practice where for instance physicians are being educated to be restrictive with antibiotic prescriptions. Because of their knowledge of the subject in everyday life, he claimed that they are well prepared for it. We are handling it fundamentally, but it might be necessary to consider the knowledge you are referring to in order to become aware and not overuse it, he said.

"We are aware of the risk in the everyday life, and we should not handle it differently in a war, other than that we might need to inform the prescribers" - Fidéle (Fidélefia)

Delegation of responsibility

The participants indicated that this subject did not fall under their area of responsibility. When asked to estimate the risk of AR in a war-related context Elize claimed that he is not an infectious disease doctor which is why it is difficult for him to estimate the risk.

"Well, I'm not an infectious disease specialist, so I don't have those glasses on, and that's something to keep in mind" - Elize (Eliziana)

Regarding the attitude of addressing this issue further on, Elize stated that this challenge should mainly be addressed by the infection control and the infection control physician. He however did not know if they have responded to this risk or have any plans to do so. Fidéle mentioned that he collaborates a significant amount with the pharmaceutical unit and claimed that it might be possible that they have this knowledge and reflected on it.

5 DISCUSSION

The aim of this study was to examine how Risk and Crisis Managers at the municipal, regional or county level across the nation perceive the risk of the war-related increase in AR that most likely will occur in the case of a war in Sweden. The study also aimed to determine how Risk and Crisis Managers perceive the risk of a war-related increase in AR compared to other war-related risks and how they engage in the mitigation of this challenge. The aim was answered by the following research questions:

- How do local Risk and Crisis Managers in Sweden perceive the risk of an increase in AR due to a potential war?
- How do local Risk and Crisis Managers in Sweden perceive the risk of a war-related increase in AR compared to other war-related risks?
- How have local Swedish authorities prepared for a potential war-related increase of AR?

When interviewing the MACs, all answers regarding AR in war were nearly identical. As seen in the first two themes, not only was AR in war not mentioned, considered as a risk, or addressed by their authorities as part of war preparations, but none of the participants had ever heard about a war-related increase in AR. The participants did however claim that this was due to the topic being outside their area of responsibility. Instead, the regions were the ones accountable for topics regarding healthcare and therefore it was assumed by all participants that this question was handled at regional level. By interviewing the regions, it was stated clearly that they in fact were in charge of the healthcare and that 90% of their work consisted of healthcare questions. Their war preparations largely concerned healthcare questions. It was therefore particularly concerning when the participants acknowledged that, prior to the subject of AR in war being brought up by the interviewer, they had never heard about it.

By analyzing the data, it is clear that the participants had somewhat high knowledge of AR in general and all perceived AR as a severe threat for society, where AR was even recognized as the largest challenge of the welfare system. Interestingly, prior to the subject of AR being mentioned by the interviewer, none of the participants raised the issue. Commonly addressed by the participants, major threats to our society in the event of a war instead referred to infrastructure- and system-disruptions as well as the war itself. These findings do not align with the study conducted by Hansson and Brenthel (2022) claiming that imagination, instead of knowledge, is the most vital aspect in risk perception. In this case, the absence of knowledge may as well account for the gap in risk assessment regarding the increased risk of AR in war. However, after learning about the risk of increased AR in war, the participants were able to speculate about the issue in a war-setting. In line with Hansson and Brenthel (2022) claims, the participants created a risk perception of the topic using imagination. They concluded

that the issue was in fact heavily severe and believed that it would cause major consequences for the entire society. But even so, the participants struggled to compare the seriousness of this risk with the war-related risks they had brought up earlier in the interview, and some even stated that it was not more important than other war-related risks and that other factors in a war will have bigger consequences for the public health. The study by Hansson and Brenthel (2022) emphasizes the important role that imagination and knowledge combined plays for risk perception and risk assessment, yet according to the findings in this study neither of those seemed to be sufficient enough to enhance the perception of the severity of AR in war in relation to the other war-related risks. Instead, the attitudes of the participants could be explained using the risk prioritization paradox. The theory contradicts any conclusions regarding ignorance or unawareness as an explanation for the participants' lack of engagement in the topic or their unwillingness to reprioritize the issue. Instead, it highlights the struggle of only being able to handle a limited amount of risks at the same time. With this said, the Risk and Crisis Managers are exposed to such a large amount of risks in relation to this war, that they need to prioritize certain risks and deprioritize others. When learning about it, no one claimed that an increase of AR in war was not an important issue, they might just not able to prioritize it at this time (Nilson & Wester, 2024).

None of the local authorities had addressed this issue at any administrative level. Because of this, the participants of a MAC were not able to estimate their level of preparedness. Although the regions had not committed to preparations specifically in relation to AR in war, they claimed to be well prepared for the matter anyway. Medical stocks that include some antibiotics have been inventoried. However, some claimed that preparations for AR in war in particular are not considered important since they are prepared for an increase of AR in everyday life and due to this fact, AR in war is not even counted as a risk. Even when explaining that the context of war is significantly different from the context of everyday life, the risk will continue to not be handled in relation to that context. The reality of a war is severely different than the reality of peace. While having a mitigation strategy to handle an increase of AR as an everyday issue is most likely better than not having a mitigation strategy at all, it does raise questions of the effectiveness of that strategy in the event of war. For instance, a previous study found an increase of AR in Gaza by 300%, partly due to not being able to implement any mitigation strategies because of the chaotic nature of a warzone (Moussally et al., 2023). Some of the participants also claimed that Sweden's cautiousness with antibiotic prescription today could indicate a level of preparedness for an increased AR in war. However, experts have claimed that even when healthcare professionals are present in war-settings, desperation to save patients' lives results in an increased use of antibiotics (Gedders, 2024; Demyanyuk et al., 2024). With this said, even with medical staff present and available mitigation strategies it doesn't mean that the situation is under control during a chaotic war-setting. It is most likely not very effective to handle this as an everyday issue since it may not unfold like an everyday issue, which previous studies can confirm.

As stated earlier in this chapter, the MACs did not account for the risk of an increased AR in war since they are not involved in the work of any healthcare questions. Apart from claiming that it is the region's responsibility they also assumed that the Health and Social Care Administration and the primary health care addressed this challenge since they have medical professionals on their teams. Similarly, the regions claimed that this is mainly the responsibility of the infection control, infection control physician and the pharmaceutical unit and assumed that the issue was perhaps addressed by them. This approach is not unique solely for the participants of this study. Previous studies by for instance Naing et al. (2021) showed that policymakers and stakeholders expressed how AR is an issue of the healthcare facilities and therefore solved by the healthcare facilities. Röing et al. (2020) had similar findings where the policymakers claimed that the medical workers are responsible for tackling AR by changing their attitudes towards prescribing antibiotics. This perception of responsibility could be explained by the fact that a large part of the public health work in Sweden is put on the individual's responsibility to change their behavior (Röing et al., 2020). This is a significant finding since it contravenes a vital principle of the public health program work theory by Andersson and Nilsen (2015) that claims that questions regarding healthcare are to a large extent influenced outside of the healthcare sector. Although efforts from the healthcare sector are crucial in such questions, an independent act from one single discipline cannot generate an outcome as effective as a collaboration of multiple disciplines would. Additionally, the approach shown by the participants explains an important factor of why the threat of AR in war could be unaddressed. By merely assuming that someone else is operating it, it is understandably not necessary to engage in the work themselves. This way of thinking seems to define a large part of the Risk and Crisis Manager’s perception of war-related AR preparations in Sweden. Another but more far-fetched reasoning aligning with the public health program work theory by Andersson and Nilsen (2015), is that perhaps the healthcare sector is mitigating this issue but because they are the only ones working with it, their interventions or mitigation strategies are ineffective since it lacks a multidisciplinary approach. Although this reasoning seems unlikely, it still highlights the importance of a cross-sectional approach to mitigate this issue.

A frequent observation, related to the preparedness, made during the entirety of the interviews was concerns about whether the proximity principle in risk and crisis management is being neglected. Their war-related work is mainly based on the national authorities’ commands which demonstrates an evident top-down governance. The interviews even generated insight into how some local authorities exclusively work with the assignments they receive from national authorities. In a way, it appears that national authorities control local authorities through funding, which was explained as crucial since one participant revealed that they lacked the financial capacity for risk and crisis management. In order to receive funding from national authorities, requirements regarding its intended use must be met; otherwise, the funds must be returned. This discovery is quite remarkable and gives crucial insights into how the system regarding risk and crisis management actually works, which is a lot different than

how it is believed to. It contradicts the proximity principle and the public health program work theory by Andersson and Nilsen (2015). While it doesn't apply to all interviewed local authorities, it seems that, to a large extent, the local authorities are not able to identify risks within their community themselves. Supposedly, the government and other national authorities dominate the local authorities by issuing assignments connected to funding, which some have explained as crucial. This approach contradicts the public health program work theory since the national authorities cannot possibly be as ingrained in each community as its local workers are, which might underscore that some risks will potentially go unidentified. The theory does emphasize that the local authorities may not be able to account for all risk and crisis management within their geographical area themselves, since it claims that an act from one single actor will not be as effective as when multiple actors are involved. According to this, the involvement from the government and national authorities is essential. However, as stated by the theory's "principle of relevance" the measures are more likely to succeed if it originates from the people of the community. This implies that the local authorities should be the ones responsible for identifying the risks, which then could lead to funding or involvement from above. The political movement should be the opposite of top down, but it seems to be not the case here where most of the local authorities do not identify the risks themselves but simply engage in the ones directed from the government and other national authorities (Andersson & Nilsen, 2015). Instead of identifying risks themselves, the expertise of the higher authorities is completely trusted. This strategy enables the possibility that some risks in each community goes unidentified which could cause serious consequences for the community and in this case, the country. The national authorities might argue that even though they delegate assignments, the local authorities are still able to identify additional risks, and perhaps they do. But with too many risks to handle at the same time, both the risks issued from above and the risks identified by themselves, it is not possible to mitigate them all and many important risks would be overlooked, which is explained by the risk prioritization paradox (Nilson & Wester, 2024). Furthermore, because some authorities seem to be in great need of financial support, assignments connected to funding from higher authorities will most likely be prioritized.

Although both municipalities stated that they do work with risk identification themselves, they also explained that national authorities are highly involved in their risk and crisis management through funding and assignments. By analyzing all participants' answers when asked about what risks they perceived as high, it is also evident that higher authorities, even when identifying risks themselves, have dominated their work since the participants' answers were closely resembling. This is a significant finding since it can enhance the understanding of how some risks, such as war-related AR for instance, may go unnoticed. Perhaps, this points to a fault in the system, and it definitely challenges the way risk and crisis management is believed to work.

There is another interesting point connected to how national authorities defined the work of the local authorities. In all interviews, the participants consistently talked about, not only assignments from the government and national authorities, but collaborations with sector agencies and other disciplines, both inside and outside their local community. A cross-sectional engagement as such is crucial according to the public health program work theory by Andersson and Nilsen (2015) and the concept is possibly based on wanting to cover all different vulnerabilities in society that this war might cause. It therefore comes as a significant surprise that, despite all these collaborations, multidisciplinary involvements, and cross-sectional exchanges of expertise, none of the participants had ever heard about war-related AR before. It can therefore be assumed that this risk has not been addressed at all as part of the war preparations in Sweden. If this was the case, and someone did work with it, the topic would most likely have been brought up during at least one of the interviews. Since the absence of engagement from higher authorities lack evidence, it leaves room for speculation. Is the reason due to a knowledge gap, does it align with the risk prioritization paradox or do they, just like the participants of this study, simply assumes that someone else deals with it? Either way, regardless of the reason behind it, the insanely dangerous threat of war-related AR has fallen through the cracks and goes unnoticed. While the lack of knowledge and confusion of responsibility remains a defining dimension of the issue, AR continues to rapidly grow undisturbed, implying that the silent war might be too silent.

5.1 STRENGTHS AND LIMITATIONS

The approach and challenges of this study have resulted in both strengths and limitations that may have influenced its quality. By nature of qualitative research, this study enabled a deep analysis, which often is obtained from a smaller sample (Bengtsson, 2016). While a smaller sample size constrained the opportunity to apply the study's findings beyond the study, it enabled the researcher to find strong connection to the theories. This is according to Bryman (2018) crucial in qualitative studies, rather than aiming to reveal definite "truth", which also aligns with social constructivism (Creswell and Poth, 2018). By addressing this, the confirmability of the study is enhanced (Bengtsson, 2016). In addition, the trustworthiness of this study is dependent on its transferability, dependability and credibility (Bengtsson, 2016).

Because of an often smaller sample size, the transferability of a qualitative study is generally weak. Transferability refers to the extent of which the studies finding can be applicable outside of the study. This requires variation among the participants and richness in the data (Graneheim & Lundman, 2004) Since this study employed purposive sampling, the researcher could target Risk and Crisis Managers at different local authority levels in different parts of the country. According to Yin (2009) it's highly valuable to interview participants with different perspectives. Since the characteristics among the participants varied (see table 1), the variation was enhanced (Bryman, 2018). The similarity of the participants' answers could indicate saturation in the data (Saunders et al., 2018). The richness in data

that was achieved by the variation and saturation could motivate that the transferability of the study is heightened (Graneheim & Lundman, 2004). On the other hand, it might be problematic to claim that variation and saturation was achieved in this study. The small sample size of six, restricts the researcher to make any claims regarding data saturation (Saunders et al., 2018). Likewise, the sample size also presents challenges with claiming that the sampling achieved maximum variation (Bryman, 2018). It is therefore not possible for the researcher to conclude that the perceived saturation in the data is due to richness, since it might as well be a result of limited variation. Furthermore, transferability is not for the researcher to decide, but the reader. This study provided the reader with transparent discussions of strengths and limitations, characteristics of the participants (see table 1), data collection (see chapter 3.3), data analysis process (see chapter 3.4) and a substantial and detailed presentation of the study's findings along with quotations (see chapter 4) (Graneheim & Lundman, 2004; Elo et al., 2014). This enables the reader to decide upon themselves to what extent the study is transferable.

The dependability of this study was enhanced by carefully documenting the entire process, which was particularly important due to alteration made in the data collection. It was also important to stay consistent with the research guide since the interviews were conducted at different times (Graneheim & Lundman, 2004; Bengtsson, 2016). The transparent documentation of the research process also heightens the reliability of the study (Yin, 2009). By being transparent with the data analysis process and discussing it frequently with the supervisor, the credibility of this study was enhanced (Bengtsson, 2016).

Applying semi-structured interviews to the data collection could indicate certain strengths. The interview guide ensured that the data collection was structured and consistent while having a flexible dimension to it, allowing for follow-up questions and re-clarifications. This is according to Burnard (1996) a strength, since it decreased the risk of any misunderstandings. However, conducting interviews on participants linked to authorities may introduce social desirability biases. The participants may answer untruthfully in order to present themselves or their linked authority more favorably. A way of minimizing this kind of bias was to reassure the participants of confidentiality and anonymity and that they can discontinue the interview at any time, which was stated in the letter of consent (see appendix 2).

An issue with qualitative study is that the researcher's pre-understanding of the subject involves the risk of biases throughout the whole process, which the researcher needs to take into consideration (Bengtsson, 2016). The data analysis was mostly done from the exact expressions of the participants which indicates that key findings are mainly based on distinct statements. Due to some cryptic elaborations from the participants, some findings may have been determined by interpreting potential underlying meanings. The issue with all textual data according to Burnard (1996) is that regardless of whether the analysis is conducted at surface level or at a deeper level, interpretation to some extent is

always present, which needs to be addressed. Because of this, a reflective dimension was applied throughout the whole process and the researcher was aware of her own pre-assumptions of the subject when conducting the data analysis and distanced herself in order to make objective decisions (Jamieson et al., 2023). Despite having this in mind, human mistakes are of course always possible which is why the data was reviewed by the supervisor and the data analysis process was discussed with the supervisor multiple times. Any pre-assumptions that the researcher had that could have affected the data analysis process, were therefore avoided to a large extent.

6 CONCLUSION

The key findings in this study suggests that although the Risk and Crisis Managers demonstrated high knowledge about the immense danger AR could pose to society, they had yet considered or even acknowledged it in a war-setting. After gaining knowledge about it and speculating about its consequences, the Risk and Crisis Managers concluded that it was a severe threat and that it will in fact cause significant harm to society. Despite this, other more visible risks such as infrastructure disruptions and the war itself were still perceived as more harmful and therefore the war-preparations required those to be prioritized. This key finding can be understood by the Risk Prioritization Paradox.

The risk of war-related AR was unknown, not recognized as a risk or even discussed about. In contrast to the MACs, the regions who account for a large proportion of healthcare related war-preparations have certain mitigation strategies where some antibiotics along with other medicines are being stocked. However, specific war-related AR mitigation strategies have not been developed. Existing interventions to mitigate an increase of AR in peacetime is believed to be sufficient enough, even in the context of a war. Because of this, AR in war is not even considered as a risk. Such strategies are however unlikely to be effective since previous studies have demonstrated that they won't be applicable in a war-setting.

The overall approach towards war-preparations contradicts the way risk and crisis management are believed to occur. In contrast to what is stated in the proximity principle, the majority of preparations are to a significant degree influenced by the national authorities through funding. The evident top-down approach limits the ability of risk identification at local level, which could generate serious consequences since important, but less visible, risks may go undetected. Another significant finding in this study is the apparent uncertainty regarding the responsibility of the issue, as they all shifted the responsibility to another direction, primarily medical staff, assuming that the issue was addressed by someone else. These findings are in opposition to the public health program work theory.

Regardless of the extensive multidisciplinary approach towards war-preparations, AR in war is completely unrecognized, indicating that it's unaddressed. Sweden is currently facing the threat of war and due to unawareness, systematic failures, competing priorities and vagueness in accountability, war-related AR continues to go unnoticed. The risk of a war-related increase in AR is a silent threat and has yet to raise its voice. Louder, already outspoken threats are defining the entirety of current war-preparations. While AR remains silent over the surface, it loudly thrives below it, implying that, after all, the silent war is too silent.

7 PUBLIC HEALTH PERSPECTIVES/IMPLICATIONS

The findings in this study can contribute to important knowledge, crucial to public health in society. Since Sweden is facing the threat of a potential war it is concerning that the topic itself is unexplored in previous research. The knowledge that this study contains can contribute to the large existing research gap. The risk prioritization paradox and the public health program work theories used in this study could also help to explain the approach of AR in certain countries, for instance the LMICs. It might be argued that they are ignorant or lack knowledge of the subject based on their approach, but the result of this study demonstrates similar patterns, which in relation to the theories suggests that underlying factors such as prioritization needs or systematic failures may as well account for the attitudes about the topic in those countries.

Some key findings in this study could also contribute to important practical implications since first of all, it enlightened the Risk and Crisis Managers included in the study about the issue, which they may or may not carry with them further on in their war-preparations. Second of all, this study may have found certain issues pointing to systematic failure where the risk and crisis management seems to not be handled as it is expected to. This means that the risk identification and mitigation might be less effective than it intends to. The confusion of responsibility that defined the study also points to a systemic failure since an effective mitigation strategy requires a multidisciplinary approach which appears to not be acknowledged at any administrative level.

The study leaves multiple questions behind and opens the door for further research where the findings can be investigated from new theoretical perspectives. “Creeping crisis” could be one of them. The theory can further explain how war-related AR remains unrecognized since it is a slow-acting threat and is therefore not acted upon (Boin et al., 2021). Future research could also explore the perception of war-related AR among national authorities and the healthcare system since according to the participants of this study, they seem to be accountable for the risk identification, at least in this war. Lastly, it would be interesting to analyze why the risk and crisis management of this war contradicts the basic principles of it. Do the national authorities lack trust in the local authorities, and could there be any elements of powers braided into this?

7.1 DECLARATION OF AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this work, I used CHATGPT to review grammar. After using the tool, I reviewed and edited the content as needed and take full responsibility for the content of the work.

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APPENDIX

Appendix 1. Email to participants

Subject: Invitation to participate in study about risk and crisis management

Hi,
My name is Filippa Nordberg, and I am currently working on my master thesis in public health at the University of Gothenburg. I am contacting you in the hope that you will consider participating in my study.

In my study, I want to investigate how municipalities, regions and counties across the country perceive different types of risks in relation to the Ukrainian war. The aim is to get an overview of what risks are considered the most serious in Sweden and if there are any preparations for these risks. To gain insight in this I would like to interview people that work with risk and crisis management in municipalities, regions and counties, which is why you are receiving this invitation.

The interview will be over Teams and is not expected to exceed 45 minutes. Your participation is anonymous. I would be very grateful if you would like to participate in my study since it will be of large value for my thesis. If you are interested, reply to this email with potential dates and times that are appropriate for you. I'll then send you more information about the study and a "letter of consent" with further details about your participation. You can also reply to to this email if you have further questions about the study and your participation, or email my supervisor finn.nilson@risk.lth.se

I would like to thank you for taking your time to read through this email and I hope to hear back from you.

I wish you a great day!
Best Regards
Filippa Nordberg

Appendix 2. Letter of consent for participation in interviews for master's thesis

Hi!
I invite you to participate in the data collection for my master thesis. I have chosen to investigate how municipalities, regions and counties across the country perceive and work with different types of risks connected to the Ukrainian war.

This is with the hope of gaining a comprehensive understanding of which risks are considered severe for Sweden, how Sweden has chosen to prepare for them, and which risks Sweden is more or less prepared for. Therefore, I want to interview people that work with risk and crisis management for different municipalities, regions and counties, which is why you are receiving this invitation. The interview will be held over Teams and is not expected to exceed 45 minutes. Your participation will be of great importance for my thesis, and I would like to express my gratitude to you, who have chosen to participate in my study.

In order to participate, it is important that you read and agree to the following information:

- I am aware that the participation is voluntary, and I can discontinue the interview at any time without any consequences.
- I am aware that my participation is completely anonymous and my name and belonging municipality/region/county will be assigned anonymous names.
- I am aware that the interview will be recorded, and the information will be kept confidential. The interview will be transcribed word for word and deleted after completed transcription in order to protect the participants integrity.
- I am aware that my participation in the interview will generate data that will be presented in the thesis.
- I am aware that the participation will not generate any risks for me.

I have read and understood the information above. I voluntarily agree to participate in the study under the circumstances that are mentioned in the letter.

Participants name: Signature: Date:

Thesis authors name: Signature: Date:

For questions regarding the study or participation in the study, you are welcome to reach out to gusnordbfi@student.gu.se or my supervisor Finn Nilson finn.nilson@risk.lth.se

A big thank you for your engagement! Your participation will be highly valuable for my studie.

Best Regards
Filippa Nordberg

Appendix 3. Interview questions

General questions:

1. Can you describe your role in the municipality/region/county?
2. How much do you work with risk and crisis management related to a potential war in Sweden?
3. What do you consider to be the biggest risks for Sweden in relation to the Ukrainian war?
4. How do you work with the risks mentioned above?
5. Are there any risks related to the war that you wish you were working on more than you currently are?
6. How has your municipality/region/county adjusted its work with risk and crisis management since the war in Ukraine broke out?
7. Have you received any information or guidance from national authorities regarding this question?

Questions about antibiotic resistance:

1. Due to the war in Ukraine, there has been a significant increase in the spread of antibiotic-resistant bacteria emerging from the conditions of war. It has been proven that war is a large contributor to the spread of antibiotic resistant bacteria. How do you perceive this risk if a war were to occur in Sweden?
2. How would you estimate the severity of this risk in comparison to other risks that the war entails?
3. How would you say that this risk is being prioritised in your work compared to other risks related to the war in Ukraine?
4. What actions have you taken to reduce the risk with a large spread of antibiotic resistant bacteria related to war?
5. How well prepared do you think you are to handle this in the future if a war were to occur in Sweden?
6. What are your thoughts on the need to initiate preventative measures for this type of risk?

Appendix 4. Example of the analytical process

Sentence →	**Category →**	**Theme →**	**Quote**
But I would say that because a lot follows the money, the situation becomes so that this bag of money comes with requirements on what you should use them for. If you don't comply, you won't receive the money,	Top down approach to risk and crisis management	Risk and Crisis management	*"If you don't comply, you won't receive the money, or you will be obligated to return the funds"*

or you will be obligated to return the funds.			
The project I am a part of concerns civil defence, like the civil preparedness which means that heightened alert and war is the dimensioning scenario as they say. So it's quite clear in the state grants we receive that we need to take that into consideration as well.	Top down approach to risk and crisis management	Risk and crisis management	*"It's quite clear in the state grants we receive that we need to take that into consideration as well"*
I think it needs to be worked with, just like other types of risks. But in that case, I think it's the healthcare system and the regions that need to lead the work. Of course a lot requires our participation, but it should be under their governance in that case.	Delegation of responsibility	Antibiotic resistance perception	*"I think it's the healthcare system and the regions that need to lead the work"*