



DEPARTMENT OF POLITICAL SCIENCE
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NORTH TO SOUTH DIVISION IN NATIONAL STRATEGIES TO COMBAT ANTIBIOTIC RESISTANCE IN EUROPE

A comparative study between Sweden and Spain

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Abstract

As the emerging trend of antimicrobial resistance, such as from an overuse of antibiotics, increases around the world, more research is needed to combat the issue. International and European actions are present, such as a global action plan by the World Health Organization with directions of collaboration between different sectors and levels i.e., ‘one health’. However, more attention is demanded on national strategies and measures to combat the matter, as they can influence levels of resistance. The aim of the study is examining the national contributions by looking at national action plans against antibiotic resistance. As there is a division of antibiotic resistance in Europe, Sweden and Spain will represent the varied cases seen in the north and the south. Institutional and governance aspects are in focus, by looking at administrative and political traditions. The methodological approach is a two-case comparative text analysis of two national action plans, and how these relate to the global action plan. The results show that both countries have implemented the international governance framework by the World Health Organization, and have multilevel and multisectoral measures. Nonetheless, the Swedish action plan shows a deeper one health approach.

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List of Contents

1. Introduction	1
1.1 Aim and research questions	6
2. Theory and previous research	7
2.1 Previous research	7
2.1.1 Antibiotics in Europe	7
2.1.2 Governing antibiotic resistance.....	8
2.2 Theory.....	11
2.2.1 Political factors	11
2.2.2 Administrative factors.....	13
2.2.3 Theoretical analysis	14
3. Method and material.....	15
3.1 Material.....	15
3.1.1 Material discussion	15
3.2 Method.....	16
3.2.1 Variables	17
3.2.2 Comparative schedule.....	18
3.2.3 Methodological discussion.....	18
4. Results	19
4.1 The GAP and the NAPs.....	19
4.1.1 The GAP	19
4.1.2 The Spanish national strategy	20
4.1.3 The Swedish national strategy	21
4.2 Comparative tables	24
4.3 Comparative analysis of the NAPs.....	27
4.3.1 Implementation of the GAP	27
4.3.2 The NAPs.....	29
5. Discussion	32
6. Conclusion.....	37
Reference list.....	39

List of figures

Figure 1.1 EU antibiotic resistance landscape, presented by the staphylococcus aureus type methicillin (MRSA): percentage (%), by country, in 2020.....	3
Table 2.1 NAP implementation.....	10
Table 4.1 GAP objectives.....	20
Table 4.2 Spanish NAP objectives.....	21
Table 4.3 Swedish NAP objectives.....	23
Table 4.4 Antibiotic resistance management.....	24
Table 4.5 Political systems.....	24
Table 4.6 Administrative traditions.....	25
Table 4.7 Implementation of GAP objectives.....	25
Table 4.8 NAPs against antibiotic resistance.....	26

List of Abbreviations

AMR – Antimicrobial resistance

ECDC – European Centre for Disease Prevention and Control

EU – European Union

GAP – Global Action Plan

NAP – National Action Plan

STRAMA – Strategy group for rational antibiotic use and reduced antibiotic resistance

WHO – World Health Organization

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1. Introduction

"The thoughtless person playing with penicillin treatment is morally responsible for the death of the man who succumbs to infection with the penicillin-resistant organism."

– Alexander Fleming (1945), Noble Prize Winner for discovering penicillin

The introduction of antibiotics and other types of antimicrobial medicines in the 1940's have had a crucial part of treating and preventing microbial infections in animals and humans. Because of their essential place in modern day health care these medications are often overused which has led to the development of antimicrobial resistance (AMR), and globally marks a health, economic, and societal burden.¹

As AMR is a large-scale, collective-action dilemma, with individual rationality clashing with collective interests, those who are overconsuming antibiotics aren't always touched by the consequences of overuse.² Likewise, for most people the threat of AMR seems distant and abstract and therefore only becomes real for those experiencing the consequences, such as healthcare staff and infected patients. To put the problem into perspective, in Europe alone, the annual cost to health care systems due to AMR is at least 1.5 billion euro and causes around 25,000 deaths each year.³ Furthermore, by 2050, the global number is up to 10 million people dying yearly as a consequence of AMR.⁴

¹ European Commission (2016) *COMMISSION STAFF WORKING DOCUMENT Evaluation of the Action Plan against the rising threats from antimicrobial resistance*, p. 3–4.

² Harring, Niklas & Krokow, Eva M. (2021) "The social dilemmas of climate change and antibiotic resistance: an analytic comparison and discussion of policy implications". *Humanities and Social Sciences Communications*. 8(125).

³ Littman, Jasper, Viens, Adrian M. & Silva, Diego S. (2020) "The Super-Wicked Problem of Antimicrobial Resistance" in Jamrozik, Euzebiusz & Selgelid, Michael (eds.) *Ethics and Drug Resistance: Collective Responsibility for Global Public Health*. Cham: Springer Nature Switzerland AG, 421–443, p. 421.

⁴ O'Neill, Jim (2014) *Review on Antimicrobial Resistance: Tackling a crisis for the health and wealth of nations*, p. 6.

Action of a ‘one health’ approach is called for, and it is a process used, for instance, for designing and implementing policies, including close collaboration and integration of multiple sectors, disciplines, and between different levels. For AMR it includes all aspects of health disciplines in human, animal, and environmental sectors.⁵ Furthermore, AMR is a ‘super wicked’ problem, needing a strong emphasis on policy and a shift in path dependencies. However, the multisectoral and multilevel coordination required makes implementation of effective policies difficult.⁶

In Europe there is a distinct north to south division in AMR, with lower frequencies in Scandinavia and Iceland, and higher frequencies in Mediterranean countries.⁷ The study attempts to examine the interesting case that is the European AMR division. Efforts alludes on a larger aspect of the division, on the norms of governance and on European integration, that need further elaboration in AMR research. The complexity of the emerging health crisis is investigated through examining the differences and dimensions in the European region, that have diverse governance systems and traditions. The contemporary variance in AMR is a European problem and for European Union (EU) member states, and with the examination using governance and institutional tools, a strive to contribute to a bigger picture of collaboration between actors and countries in Europe, is presented in the study.

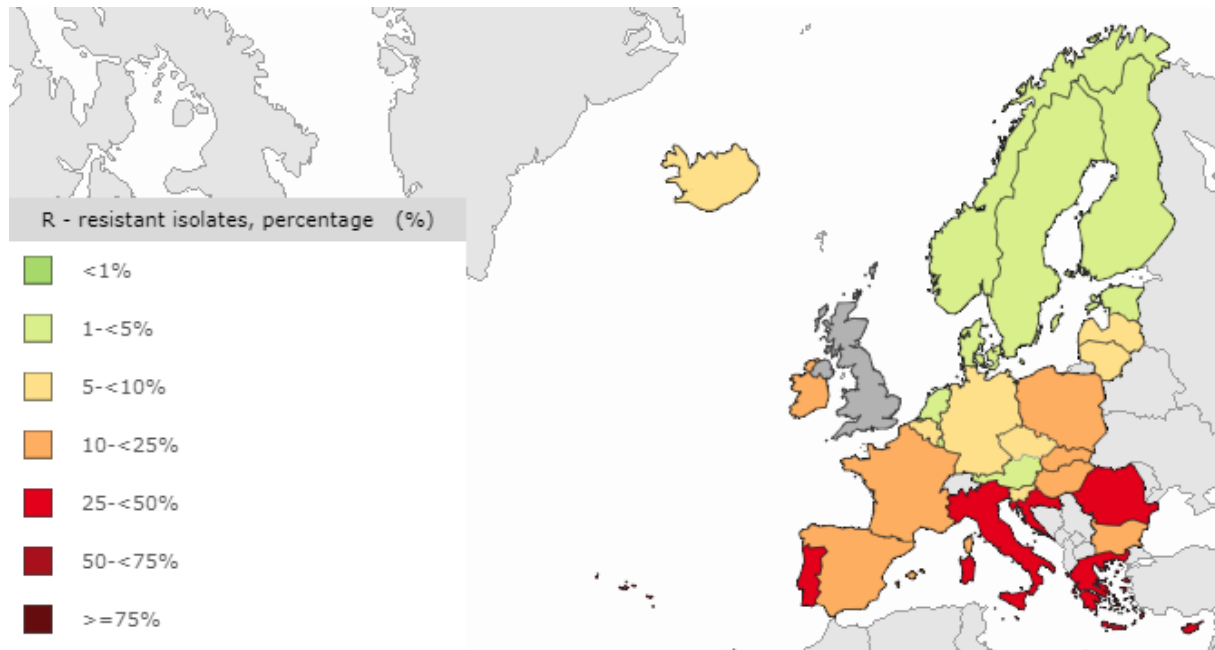
What is meant by the antibiotic resistance division in Northern and Southern Europe in the thesis is presented in the figure below. Northern European countries are in this case the Nordic countries, and Southern European countries are in the Mediterranean region. Included in the figure is the difference in methicillin (MRSA), one bacterium resistant to antibiotics, in the EU member states in 2020.

⁵ World Health Organization (2019) *Has the European Region embraced the One Health approach in the fight against antimicrobial resistance?*. Accessed 2021-11-18.

⁶ Littman, Viens & Silva (2020), 421–443.

⁷ Höjgård, Sören (2012) “Antibiotic resistance – why is the problem so difficult to solve?”. *Infection Ecology & Epidemiology*, 2(1), 1–8.

Figure 1.1: EU antibiotic resistance landscape, presented by the staphylococcus aureus type methicillin (MRSA): percentage (%), by country, in 2020



8

The EU collaboration plays an important role in Europe and for the European forces against AMR, with scientific agencies such as the European Centre for Disease Prevention and Control (ECDC), and with investments of over 1.3 billion euro to AMR research since 1999. Furthermore, a drive from EU forces of being a global frontrunner for addressing the issue is present. However, AMR cannot be tackled solely by European steering. Nonetheless, EU integration of policies among member states in prominent AMR areas, such as agriculture and health, and furthermore EU having a strong position for action giving high degree of economic development and human health protection, is valuable.⁹ The EU member states are part of an increasingly interconnected world characterised by an intensive exchange of people where policies implemented in one region can have significant impact elsewhere.¹⁰ As AMR does not

⁸ ECDC (2022) *Surveillance Atlas of Infectious Diseases: Antimicrobial resistance, 2020*. Stockholm: European Centre for Disease Prevention and Control.

⁹ Anderson, Michael & Mossialos, Elias (2020) “STRENGTHENING IMPLEMENTATION OF ANTIMICROBIAL RESISTANCE NATIONAL ACTION PLANS”. *Eurohealth Observer* 26(1): 3–7; European Commission (2017) *A European One Health Action Plan against Antimicrobial Resistance (AMR)*, p. 3–7, 18; European Commission (n.d.) *The common agricultural policy at a glance: The common agricultural policy supports farmers and ensures Europe’s food security*. Accessed 2021-11-23; European Council & Council of the European Union (2021) *EU Health Policy*. Accessed 2021-11-23.

¹⁰ European Commission (2017), p. 4, 18.

respect borders, the movement of people in the EU with the single market and international travel calls for coordinated action, contrary to national initiatives.¹¹

Strengthening multisectoral and multilevel governance is essential when combating AMR, and the study will investigate this aspect of the issue. The World Health Organization (WHO) has provided international framework with a Global Action Plan (GAP) on AMR in 2015 with global development of National Action Plans (NAPs) by countries within two years later.¹² NAPs can coordinate and align activities of different stakeholders in relevant sectors, and the reason why national strategies against antibiotic resistance will be explored. It will be my contribution to examining the north to south division in antibiotic resistance, using NAPs from Northern and Southern Europe as tools, together with the implementation of the GAP.¹³ It is known that national action evokes levels of AMR, furthermore a need of deeper examination of national AMR policies relation to AMR levels in countries, and additionally there is a governance gap of AMR. Describing the diverse AMR landscape, together with making comparisons between strategies adopted by different countries, can contribute to coordinated prevention measures and control of AMR at a global scale.¹⁴

There are many reasons why antibiotic consumption and levels of resistance differ. Previous research has for instance looked at the European perspectives of a socio-economic division, a knowledge gap both among health professionals and the public that contributes, and aspects of uncertainty that are related to overuse of antibiotics causing antibiotic resistance.¹⁵

¹¹ European Union (n.d.) *Single Market: A single internal market without borders*. Accessed 2021-11-23; O'Neill, Jim (2014), p. 6; Anderson & Mossialos (2020), p. 3–7.

¹² Anderson, Michael, Schulze, Kai, Plachouras, Diamantis & Mossialos, Elias (2019) “A governance framework for development and assessment of national action plans on antimicrobial resistance”. *THE LANCET: Infectious Diseases*, 19(11), 371–384; Anderson & Mossialos (2020), p. 3–7.

¹³ Höjgård (2012), p. 1–8; ReAct Group (n.d.) *National Action Plans*. Accessed 2021-11-19.

¹⁴ Höjgård (2012), p. 1–8; Ogyu, Anju, Chan, Olivia, Littmann, Jasper, Pang, Herbert H., Lining, Xia, Liu, Ping, Matsunaga, Nobuaki, Ohmagari, Norio, Fukuda, Keiji & Wernli, Didier (2020) “National action to combat AMR: a OneHealth approach to assess policy priorities in action plans”. *BMJ Global Health*, p. 1–2; Birgand, Gabriel, Castro-Sánchez, Enrique, Hansen, Sonja, Gastmeier, Petra, Lucet, Jean-Christophe, Ferlie, Ewan, Holmes, Alison & Ahmad, Raheelah (2018) “Comparison of governance approaches for the control of antimicrobial resistance: Analysis of three European countries”. *Antimicrobial Resistance & Infection Control*, 7(28).

¹⁵ Nogueira, Paulo Jorge, Paiva, José-Artur & Silva, Ana C. (2021) “Determinants of Antimicrobial Resistance among the Different European Countries: More than Human and Animal Antimicrobial Consumption”.

Additionally, knowledge about AMR mostly comes from nature science and medicine, and there is less research about AMR in the social sciences than other health related crises.¹⁶ To this day only assumptions can be made to fully comprehend the issue to its full. As there is a gap of approaches to governance regarding antibiotic resistance, this calls for a deeper examination to expand knowledge regarding the governance aspect of the matter, and a contribution to this will be explored in the study. Nevertheless, there are multiple ways to do this.¹⁷ As for the time limitation, I have decided to investigate administrative and political traditions of two countries in Europe. Administrative and political traditions are chosen for their influence of path dependencies in countries and since they impact fundamental structures in societies, as they are part of administrative and political legacies of countries.¹⁸

Sweden and Spain are the cases examined and are good examples of countries in Northern and Southern Europe that differ in antibiotic resistance, despite previous national action targeting the issue.¹⁹ The countries further have dissimilar administrative and political landscapes, with different decentralization in the political system, and diverse administrative traditions.²⁰

Antibiotics, 10(7), 834; Ashiru-Oredope, Diane, Hopkins, Susan, Vasandani, Sagar, Umoh, Eno, Oloyede, Olaolu, Nilsson, Andrea, Kinsman, John, Elsert, Linda, Monnet, Dominique L. & the #ECDCAntibioticSurvey Project Advisory Group (2021) "Healthcare workers' knowledge, attitudes and behaviours with respect to antibiotics, antibiotic use and antibiotic resistance across 30 EU/EEA countries in 2019". *Europe's journal on infectious disease surveillance, epidemiology, prevention and control*, 26(12).

¹⁶ Baekkeskov, Erik, Frid-Nielsen, Snorre Sylvester & Rubin, Olivier (2019) "The state of social science research on antimicrobial resistance". *Social Science & Medicine*, 242, 1–5.

¹⁷ Birgand, Castro-Sánchez, Hansen, Gastmeier, Lucet, Ferlie, Holmes & Ahmad (2018).

¹⁸ Meyer-Sahling, Jan-Hinrik & Yesilkagit, Kutsal (2011) "Differential Legacy Effects: Three Propositions on the Impact of Administrative Traditions on Public Administration Reform in Europe East and West". *Journal of European Public Policy*, 18(2), 311–322, p. 313, 315.

¹⁹ Höjgård, Sören (2012), p. 1–8, Mölstad, Sigvard, Cars, Otto & Struwe, Johan (2008) "Strama - a Swedish working model for containment of antibiotic resistance". *Eurosurveillance*, 13(46); ECDC(2018) *ECDC country visit to Spain to discuss antimicrobial resistance issues*. Stockholm: European Centre for Disease Prevention and Control.

²⁰ Colino, César (2020) "Decentralization in Spain: federal evolution and performance of the estado autonómico" in Muro, Diego & Lago, Ignacio (eds.) *The Oxford Handbook of Spanish Politics*. Oxford: Oxford University Press, p. 1–20; Kickert, Walter (2011) "Distinctiveness of Administrative Reform in Greece, Italy, Portugal and Spain. Common Characteristics of Context, Administrations and Reforms". *Public Administration*, 89(3), 801–818; Montin, Stig (2016) "Municipalities, Regions, and County Councils: Actors and Institutions" in Pierre, Jon (ed.) *The Oxford Handbook of Swedish politics*. Oxford: Oxford University Press, p. 1–17; Lijphart, Arend (2012) *Patterns of democracy*. New Haven: Yale University Press, p. 158–159, 164–166; Nordiskt samarbete (n.d.) *Socialpolitik och välfärd*. Accessed 2021-12-18.

The structure of the study is that after the introduction including the aim of the study and research questions, first provide an overview of previous research in the field, following the theoretical approaches of administrative and political traditions, thereafter the section containing material and method choices and discussions, following the results including comparative tables and analysis of the NAPs, thereafter a discussion, and lastly conclusion.

1.1 Aim and research questions

The aim of the study is examining one out of many causes to the contemporary European north to south division in antibiotic resistance. Focus is on comparing two national strategies against antibiotic resistance in Europe, targeting the governance and institutional aspects of administrative and political traditions. To explore this, Sweden will represent the north and Spain will represent the south, as comparing these two have not been done before targeting the included governance angles of antibiotic resistance. The main characteristics of the national strategies are identified, thereafter a comparison of the strategies to examine the differences between the two. To compare Sweden and Spain the study will utilize two NAPs that have similar time frames, one from each country. Additionally, the implementation of the GAP is used as a tool to examine the division.

Research questions:

- What are the main characteristics in the strategies to combat antibiotic resistance in Sweden and Spain?
- What can be associated with the varying characteristics in the strategies?
- How are the strategies different between Sweden and Spain, and in relation to the GAP?

2. Theory and previous research

2.1 Previous research

The reason for a deeper dive into AMR investigation in the social sciences, despite it having an increased interest globally as for the growing number of AMR, is that knowledge about AMR heavily relies on research from nature sciences and medicine. Furthermore, within the social sciences, there are also less research about AMR than other health crises.²¹ The chapter first investigates the European antibiotic landscape, thereafter the governing aspect of antibiotic resistance.

2.1.1 Antibiotics in Europe

Antibiotics influences antibiotic resistance, and there are numerous reasons for overuse. For instance, in Europe there is a significant knowledge gap between healthcare professionals regarding information known about antibiotics and proper use. This is an essential insight, as all kinds of healthcare professionals impact the use of antibiotics, can educate patients, and minimize the spread of infections in healthcare. Therefore, continued knowledge, commitment, training, resources, and guidelines linked to prescription and administration of antibiotics, are vital contributions to control of antibiotic use.²² On the contrary, EU citizens being exposed to information about antibiotics to a greater extent avoid taking the drug when unnecessary. Therefore, appropriate messaging, and targeted antibiotics campaigns are ways of reducing national cultural dimensions.²³

However, there is a deeper level of the relationship between consumption of antibiotics and antibiotic resistance. Research shows that countries in the EU with a higher use of antibiotics also have a climate of patients and prescribers wanting to avoid uncertainty of a bacterial

²¹ Baekkeskov, Erik, Frid-Nielsen, Snorre Sylvester & Rubin, Olivier (2019) “The state of social science research on antimicrobial resistance”. *Social Science & Medicine*, 242, 1–5.

²² Ashiru-Oredope, Hopkins, Vasandani, Umoh, Oloyede, Nilsson, Kinsman, Elsert, Monnet & the #ECDCAntibioticSurvey Project Advisory Group (2021).

²³ Borg, Michael A. (2012) “National cultural dimensions as drivers of inappropriate ambulatory care consumption of antibiotics in Europe and their relevance to awareness campaigns”. *Journal of Antimicrobial Chemotherapy*, 67(3), p. 763–767.

infection. There are furthermore socio-economic aspects targeting the issue, with high consumption of antibiotics in European countries with lower per capita health costs that can be related to worse healthcare conditions, furthermore, in European countries with a higher proportion of private health expenditure linked to reduced regulation of the drug.²⁴ Another reason is that societies having a high amount of male dominance present, also have increased inappropriate use.²⁵

2.1.2 Governing antibiotic resistance

Regarding the governance side of AMR, in many countries where antibiotic resistance is increasing, there is also lack of political commitment to addressing the problem, therefore is political engagement vital.²⁶ A power gap in governance against AMR is present, and at times the quality of governance is low, most likely the control of antibiotics alike.²⁷ Furthermore, implementation of recommended policies on AMR remains inconsistent. Countries must therefore engage with a cyclical process of continuously design, implement, monitor, and evaluate the NAPs.²⁸ As more research is needed on national AMR policies, it can be done by understanding past and present NAPs, examining the wide range of NAPs, and put this in relation to AMR levels in countries.²⁹

AMR concerns all national stakeholders and global decision makers. Focus has previously been on local issues, and only recently have some politicians become engaged. The impact of

²⁴ Nogueira, Paiva, & Silvia (2021), p. 834.

²⁵ Borg, Michael A. (2012), p. 763–767.

²⁶ Carlet, Jean, Pulcini, Céline & Piddock, Laura J.V. (2014) “Antibiotic resistance: a geopolitical issue”. *Clinical Microbiology and Infection*, 20(10), 949–953; Adhikari, Bipin, Pokharel, Sunil & Raut, Shristi (2019) “Tackling antimicrobial resistance in low-income and middle-income countries”. *BMJ Global Health*, 4, 1–3; World Health Organization (2019) *TURNING PLANS INTO ACTION FOR ANTIMICROBIAL RESISTANCE (AMR) Working Paper 2.0: Implementation and coordination*. Geneva: World Health Organization, p. 23.

²⁷ Collignon, Peter, Athukorala, Prema-chandra, Senanyake, Sanjaya & Khan, Fahad (2015) “Antimicrobial Resistance: The Major Contribution of Poor Governance and Corruption to This Growing Problem”. *PLOS ONE*.

²⁸ Anderson & Mossialos (2020), p. 3–7; Ballesté-Delpierre, Clara, Naing, SoeYu, van Wijk, Max & Vila, Jordi (2021) “Understanding Antimicrobial Resistance from the Perspective of Public Policy: A Multinational Knowledge, Attitude, and Perception Survey to Determine Global Awareness”. *Antibiotics*, 10(12); Baekkeskov, Erik, Rubin, Olivier, Munkholm, Louise, Zaman, Wesal (2020) “Antimicrobial Resistance as a Global Health Crisis”. *POLITICS*.

²⁹ Ogyu, Chan, Littmann, Pang, Lining, Liu, Matsunaga, Ohmagari, Fukuda & Wernli (2020), p. 1–2; Höjgård (2012), p. 1–8; ReAct Group (n.d.).

international and national campaigns are often modest, and further strong initiatives are necessary, with improvement both in scope and of coordination between actors.³⁰ Global action has proven to be a complicated manner, as national governments may be reluctant in giving up legislative power and control of antibiotic use. In the WHO's GAP the individual countries have the primary focus of action, with formulation and implementation of effective national strategies.³¹ In Europe, the north to south division in antibiotic resistance can provide knowledge in how national action influence the number of resistant bacteria in countries.³² Despite the number of countries that have adopted the GAP and produced their own NAP, antimicrobial use is increasing, and AMR rates are high in many countries.³³

The alignment between the GAP for creation and implementation of NAPs, can be investigated both vertically and horizontally. Research using a global database of countries self-assessment surveys is provided in this case. Vertical alignment is by which extent that a NAPs overlaps with the GAP. The poorer the country, the more it shares similarities with the international policy driving the national alignment process. Furthermore, the findings that NAPs from countries in Scandinavia have less of their NAPs overlapping the GAP. Horizontal alignment is explored by measuring to which extent the NAPs overlap with other NAPs across regions, and income is determined by the alignment. There is weaker horizontal alignment in general, and decreasing with country income. Taken from this, it is important to strengthen global policy, rather than the primary focus being on improving national implementation of GAP guidelines. In conclusion, global governance focusing on individualized, legally binding, responsibilities.³⁴

³⁰ Carlet, Pulcini, & Piddock (2014), p. 949–953.

³¹ Ogyu, Chan, Littmann, Pang, Lining, Liu, Matsunaga, Ohmagari, Fukuda & Wernli (2020), p. 1–2; Höjgård (2012), p. 1–8; Anderson, Michael, Clift, Charles, Schulze, Kai, Sagan, Anna, Nahrgang, Saskia, Ouakrim, Ait, Driss & Mossialos, Elias (2019) *Averting the AMR crisis POLICY BRIEF 32 What are the avenues for policy action for countries in Europe?*. World Health Organization, p. 7.

³² Höjgård (2012), p. 1–8.

³³ Ogyu, Chan, Littmann, Pang, Lining, Liu, Matsunaga, Ohmagari, Fukuda & Wernli (2020), p. 1–2.

³⁴ Munkholm, Louise & Rubin, Olivier (2020) “The global governance of antimicrobial resistance: a cross-country study of alignment between the global action plan and national action plans”. *Globalization and Health*, 16(109), 1–11.

NAPs with one health approaches are more common in Northern and Central Europe, where AMR prevalence is generally better than in Eastern and Southern European countries, that have added challenges in healthcare systems and sustained financing. The Spanish NAP though has a one health approach, seen in the number of actors and sectors involved. To provide clarification of the main characteristics and differences of the national strategies, and furthermore what could be associated with such variation, the following section present the different stages of NAP development, seen in the table below. All member states in the EU have developed a NAP, whereas in Europe 4% still do not have a NAP. This still indicates a high number of countries in the European region that have developed and implemented NAPs. Moreover, EU member states are at different stages in the process.

Table 2.1: NAP implementation

Level 1	No AMR NAP
Level 2	AMR NAP under development
Level 3	AMR NAP developed
Level 4	AMR NAP is approved by government, reflects GAP objectives, and have an operational plan and monitoring arrangements
Level 5	AMR NAP identifies funding sources, is implemented, have relevant sectors participating, and a defined monitoring and evaluation process

The two NAPs that are compared in the study, are the ones being investigated in the following research, in 2018. The Spanish NAP is at Level 4 in the development process and the Swedish NAP at Level 5. The Spanish NAP is approved by government, and the Swedish NAP is implemented. The Spanish NAP reflects GAP objectives, and has an operational plan and monitoring arrangements, whereas the Swedish NAP identifies funding sources, participating relevant sectors, and a defined monitoring and evaluation process.³⁵ The table therefore indicates the characteristics and differences in the national strategies between Sweden and Spain, that will be investigated further with the theory included next.

³⁵ European Public Health Alliance (2018) *TRANSLATING POLITICAL COMMITMENTS INTO ACTION: The development and implementation of National Action Plans on antimicrobial resistance in Europe*. European Union, p. 3, 19–23, 70.

2.2 Theory

To analyse the national strategies against antibiotic resistance, the following section conceptualise the distinct institutional and governmental aspects of Swedish and Spanish political and administrative traditions. Beyond these two, there are numerous of factors that can contribute to differences in institutional and governmental climates of countries. For instance, by looking at political party systems of the countries. Seeing as administrative traditions and political systems are domestic factors that provide knowledge of fundamental structures and contribute to path dependencies in societies, and furthermore there being a time limitation present, these two institutional and governmental factors are chosen.

Moreover, as antibiotic resistance is a European problem, with a case of north and south, the knowledge of this, together with administrative and political traditions, can further indicate the different ways in which the separate countries operate health and agricultural governance, beyond the EU regulations, as both countries are in the EU. This can provide variability in how actors, objectives, and control documents operate relating to the two countries' individual implementation of GAP and further national action against antibiotic resistance with the NAPs, as quality of governance affects control of antibiotics.³⁶ Important for antibiotic resistance management, it is explored through making justified assumptions and by systematic investigation. Different routes of political and administrative documents and objectives can therefore contribute to implementation diversity in the two countries in action against antibiotic resistance, that will be studied by making socio-analytical guesses through the two different path dependencies of administrative and political traditions.

2.2.1 Political factors

Differences are seen when comparing the national political systems of Sweden and Spain. Both countries have aspects of decentralization present; Spain with the federal Spanish model of decentralization, which is one of the basic institutional elements of Spanish democracy and political system. Spain has 17 autonomous regions with separate public spending, policy, and

³⁶ Collignon, Athukorala, Senanyake & Khan (2015).

implementation of central law, creating political and administrative diversity. Issues within areas like agriculture and social services that rely on the institutional coordination of the Spanish political system, makes weaknesses of the system clear. A lack of correct implementation in many regional administrations can lead to poor execution of national framework laws. Furthermore, absence of regional expertise and national inspectors to supervise, and regional inspectors to correct issues.³⁷

There is a shared responsibility of healthcare between the central administration agency and the regions, but since the decentralisation is present in the national system, the regional healthcare authorities in Spain have autonomy to plan, change, and upgrade the infrastructure. Additionally, the regions have considerable legislative power regarding this policy area, for instance important legislative and implementation power in the fields of public health, community care, and most social services. Despite the central administration overseeing the process, the coordination between the Autonomous Communities remains limited and there are increasing disparities in services and quality of care in the regions. Furthermore, as the central agency focus on policies with long-term effects and cooperation, the individual regions have most responsibility for healthcare delivery to their population, and diversity remains.³⁸

Much like the Spanish political system, the Swedish national political system has aspects of decentralization and self-governance of its 20 regions, and is recognized as a distinctive feature in the political system. The regions are working with domestic administration of health and medical care.³⁹ Contrary to the Spanish political system, Sweden is still a unitary state, and therefore the local self-government is a negotiated order restricted by the central government and the legislative assembly in Sweden. The local self-governance is a principal, but it has never been clearly defined. On the contrary, the role of the county councils has expanded dramatically

³⁷ Colino (2020), p. 1–20.

³⁸ Colino (2020), p. 1–20; García-Armesto, Sandra, Abadía-Taira, María Begoña, Durán, Antonio, Hernández-Quevedo, Cristina & Bernal-Delgado, Enrique (2010) “Spain: Health system review”. *Health Systems in Transition*, 12(4), 1–295, p.12, 37; HealthManagement (2010) “Overview of the Spanish Healthcare System”. *HealthManagement*, 12(5), 1–3.

³⁹ Regeringskansliet (2021) *Den svenska förvaltningsmodellen*. Accessed 2021-10-22.

since the 1950s, although the central government has increased control and supervision in areas concerning public purchasing, education, and health care.⁴⁰

2.2.2 Administrative factors

Sweden and Spain have different administrative traditions. Sweden has been ranked exceptionally high regarding corporatism in the interest group system, meaning that the country has a strong tradition of involving various interest groups and stakeholders into the central policy-process.⁴¹ For instance, the “Saltsjöbadsagreement” laid down the foundation for the Swedish model, where the cooperation between the state and interest organizations in the labour market presupposed a trusting relationship between the parties, leading to a high level of organizational social capital and agreement.⁴² Opposing this, Spain has been ranked exceptionally high with pluralism, meaning that there is a diverse number of small groups in the society, and absence or weakness of peak organizations, influencing the interest group system.⁴³

Western and Southern Europe have different welfare systems. Southern European countries, including Spain, have tried to set up similar arrangements to the West, but are behind. The development of welfare states after the end of dictatorship in these countries have influenced the administration. The prospects for welfare reforms in Southern Europe can be considered by the theoretical aspects of historical institutionalism. Similar characteristics is present of a multitude of vested interests, political clientelism defined as politicians giving material goods in return for electoral support, patronage meaning vote buying, political polarization creating political division in the population and influencing governance in many ways, administrative inefficiency, legalism defined as strict adherence to administrative provisions, and a public distrust of the state. Consequently, creating relatively low administrative capacities, despite this being a policy priority since mid-1990s.⁴⁴ Contrary to this, the Nordic countries in Northern

⁴⁰ Montin (2016), p. 1–17; Regeringskansliet (2021).

⁴¹ Lijphart, Arend (2012), p. 158–159, 164–166.

⁴² Esaiasson, Peter (2018) *Tilliten mellan svenska politiken* in Barrling, Katarina & Holmberg, Sören (eds.) *Demokratins framtid*. Stockholm: Sveriges Riksdag, p. 240.

⁴³ Lijphart, Arend (2012), p. 158–159, 164–166.

⁴⁴ Kickert, Walter (2011), p. 801–818.

Europe follows the Nordic welfare model with a social safety net for the public created by the state. It is beneficial to the public sector, but also incorporates a norm in Nordic societies that citizens should contribute to the government.⁴⁵

2.2.3 Theoretical analysis

From the theoretical aspects of the Swedish and Spanish political and administrative traditions, a schedule of the following variables, included in the table below, will be analysed to make the comparison, define the characteristics, and differences between the two NAPs.

Political factors	Administrative factors
Decentralization present in the political systems influencing: - Regional power - Health care management	- The role of the state - Differences in welfare systems - Administrative structures

⁴⁵ Nordiskt samarbete (n.d.).

3. Method and material

3.1 Material

As the aim of the study is a try to examine the European north to south division of AMR by using two national antibiotic resistance strategies, furthermore as national strategies are important for examining and comparing the governance aspect of AMR, the material used was the Swedish NAP between 2016–2019⁴⁶ and Spanish NAP between 2014–2018⁴⁷. Both NAPs contain information about how the countries act against antibiotic resistance with extensive measures, such as how to limit the use of antibiotics, furthermore, the actors and levels, included.

3.1.1 Material discussion

The national strategies were chosen since having similar time frame and because of the directions by the WHO of implementing the GAP⁴⁸ during this period alike, that also was used to make the comparison, and can indicate similarities of the NAPs. In the study, the focus is on comparing two NAPs from two countries in Europe, one from Northern Europe and one from Southern Europe, to examine the governance and institutional aspects of differences in resistance levels. Therefore, limitations were present as Europe as a region is large and there are a wide range of national strategies from multiple countries. As of the time limitation, two countries representing the north to south division was the manageable option to be able to compare thoroughly. Nevertheless, differences in resistant bacteria in the north and in the south, as well as knowledge about national action could make a difference regarding AMR, can assist drawing the conclusion that two countries can provide knowledge about the strength and weaknesses of strategies.⁴⁹ Furthermore, being aware that Sweden has worked actively against antibiotic resistance for many years, as will be presented in the results, published its first national strategy year 2006, and it been revised many times, can influence the content of the

⁴⁶ Regeringskansliet (2016) *Svensk strategi för arbetet mot antibiotikaresistens*. Stockholm: Socialdepartementet.

⁴⁷ Spanish Agency of Medicines and Medical Devices (AEMPS) (2014) *Strategic Action Plan to reduce the risk of selection and dissemination of antibiotic resistance*. Madrid: AEMPS.

⁴⁸ World Health Organization (2015) *GLOBAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE*. Geneva: WHO.

⁴⁹ Höjgård (2012), p. 1–8.

NAP, and the comparison.⁵⁰ On the contrary, Spain finalised its first national strategy to combat AMR later, in 2014, and it was the one being used in the study, which also help shape the limitation present with the comparison and the content in the NAPs.⁵¹ As research shows that more focus is needed on understanding past and present AMR NAPs, examining different types of NAPs, and relate this to AMR in individual countries, the comparison can provide an insight to this.⁵² The similar time frame of the NAPs contributes to minimizing and modify the present limitations. Nonetheless, comparing two NAPs still indicate that there are crucial limitations influencing the results and the conclusion, as of the narrow data that is included, and shaping the comparison.

3.2 Method

The study follows a qualitative working method. Document analysis was used to do the content analysis of the two NAPs, to investigate the research question of their main characteristics. Document analysis is one of the most used methods in health policy research, and implicate systematic procedure of reviewing documents and can provide context, generate questions, and confirm other resources. Additionally, be used to analyse content of specific types of policy, which was the case here.⁵³

The study used text analysis to answer the research questions of investigating the differences between the NAPs, and what can be associated with such variation, furthermore in relation to the GAP, as all countries agreeing on implementing its objectives. Text analysis was suitable in this case and is used for collecting, analysing, and categorising information, seen in the study, and used for the comparison.⁵⁴ Tables were used to perform the comparison of the two national strategies.

⁵⁰ Folkhälsomyndigheten (2014) *Svenskt arbete mot antibiotikaresistens: Verktyg, arbetsätt och erfarenheter*. Stockholm: Folkhälsomyndigheten, p. 11; European Commission (2016), p. 71.

⁵¹ European Commission (2016), p. 70.

⁵² Ogyu, Chan, Littmann, Pang, Lining, Liu, Matsunaga, Ohmagari, Fukuda & Wernli (2020), p. 1–2.

⁵³ Dalglish, Sarah L, Khalid, Hina & McMahon, Shannon A (2020) “Document analysis in health policy research: the READ approach”. *Health Policy and Planning*, 35, 1424–1431, p. 1424–1425.

⁵⁴ Boréus Kristina & Bergström, Göran (2018) *Textens mening och makt: metodbok i samhällsvetenskaplig text- och diskursanalys*. Lund: Studentlitteratur, p. 36–38.

The comparative analysis of the national strategies was done by using John Stuart Mill's joint method of agreement and difference as a design. The joint method states that:

If two or more instances in which the phenomenon occurs have only one circumstance in common; while two or more instances in which it does not occur have nothing in common save the absence of that circumstance; the circumstance in which alone the two sets of instances differ, is the effect, or cause, or a necessary part of the cause, of the phenomenon.⁵⁵

The method therefore looks for a single commonality among two or more instances of an event and further a common absence of that possible cause. The cause is the common element present only in positive instances.⁵⁶ The design eased the comparison as the two countries have many similarities, such as implementing the GAP and different aspects of decentralization in the political systems, but it is the differences that is part of the cause of the wide antibiotic resistance landscape in Europe.

3.2.1 Variables

There are numerous reasons for the variation of antibiotic resistance in countries. Seen in the theory section, the institutional and governmental aspects of administrative and political traditions, are used in the study for an attempt to analyse the European north to south division in antibiotic resistance. Beyond categorising the Swedish and Spanish antibiotic resistance managements of previous action against the issue, the two political systems, the administrative traditions, and implementation of the GAP by both countries, are presented using tables. With the NAPs and the GAP as tools; variables were formed for the comparison of the NAPs. The variables were based on the theoretical aspects, such of the role of the state and coordination between actors and between levels. As antibiotic resistance is a problem needing a 'one health'

⁵⁵ Mill, John Stuart (1843) *A system of logic, ratiocinative and inductive, being a connected view of the principles of evidence, and the methods of scientific investigation*. London: John W. Parker, West Strand, p. 463.

⁵⁶ Killick, Rev. A. H. (1870) *The student's handbook, synoptical and explanatory of Mr. J.S. Mill's System of logic* by Mill, John Stuart. London: Longmans, Green, Reader and Dyer, p.121–122, 134.

approach with action from different sectors and on different levels important for governance, additional investigation regarding this was applied, and used to comprehend the divergence of the NAPs. The variables are presented in the comparative schedule below.

3.2.2 Comparative schedule

Categories	Variables from Spain & Sweden
Antibiotic resistance management	Similarities and differences recognized at a local, regional, and national level
Political systems	Similarities and differences in political systems, such as decentralization influencing regional power, and health care management
Administrative traditions	Similarities and differences regarding the role of the state (corporatism/pluralism), the welfare systems (such as trust in the state), and administrative structures (administrative capacities)
GAP implementation	Similarities and differences of implementation of GAP objectives
NAPs against antibiotic resistance	Similarities and differences present regarding political commitment, responsible actors, coordination between actors and levels, collaboration between the state and interest groups, and one health approaches

3.2.3 Methodological discussion

Limitations are present regarding the methodological choices. As a qualitative approach was chosen to analyse the content of the NAPs, and to make the comparison, using institutional and governance aspects; angles and content important for the results and conclusion, can be left out. My role as the author can influence the investigation and the findings in the documents, affecting the results and conclusion. As a qualitative analysis provides a deep dive into the content of the material, it can highlight important aspects that could be left out or limited using a quantitative method, for example the detailed information of implementation of the GAP and the one health approach. Quantitative measures have moreover been used before, seen in previous research of alignments of the GAP and NAPs, using a global database. The qualitative approach was best suited for what I wanted to accomplish of investigating the national strategies and a try of obtaining new insight of their differences and main characteristics. The importance of such analysis was furthermore provided in previous research, putting emphasis on expanded examination, and deeper understanding of AMR NAPs.

4. Results

To investigate the AMR north to south division in Europe and what can be associated with such variation, a content analysis and furthermore comparison of the two NAPs from Sweden and Spain, were formed through the conceptual framework of antibiotic management, the political systems, administrative traditions, and furthermore using the GAP. The results are depicted in the chapter, followed by a comparative analysis of each category variable from the NAPs, furthermore, including analysis of the implementation of the GAP.

4.1 The GAP and the NAPs

4.1.1 The GAP

The GAP was created by the WHO to alert people about the AMR crisis in 2015. All countries agreed and were expected to develop NAPs in line with the GAP, within two year later. The international framework of the GAP contains a ‘one health’ approach, involving establishing coordination among numerous international sectors and actors. Beyond the inclusion of human and veterinary medicine, the sectors of agriculture, finance, environment, and well-informed costumers, are examples of the broad collaboration that is necessary. Prevention measures are recognized as vital to slow down and restrict spread of antibiotic resistance, as no treatment is needed, is cost effective, and can be implemented in all settings and sectors, even where resources are limited.

To examine the main characteristics in the national strategies to combat antibiotic resistance, furthermore what can be associated with such variation. Additionally, how the strategies are different, and investigate this in relation to the GAP that all countries agreed on implementing, the five objectives in the GAP are presented, and can be viewed in the table below.

Table 4.1: GAP objectives

1	Improve awareness and understanding of antimicrobial resistance through effective communication, education, and training
2	Strengthen the knowledge and evidence base through surveillance and research
3	Reduce the incidence of infection through effective sanitation, hygiene, and infection prevention measures
4	Optimize the use of antimicrobial medicines in animal and human health
5	Develop the economic case for sustainable investment that takes account of the needs of all countries and increase investment in new medicines, diagnostic tools, vaccines, and other interventions

Described in the table, objectives of awareness, knowledge and research, prevention, optimization of usage, and sustainable economic investment globally, are presented in the GAP. Furthermore, numerous sectors and actors should be involved when implementing the framework.⁵⁷

4.1.2 The Spanish national strategy

There are numerous examples of practices of managing antibiotic resistance in Spain, on a local, regional, and national level, as well as within professional societies. The Ministry of Health, Social Services and Equality has promoted and coordinated prevention and control programmes since 2008, such as the development of a national hygiene programme. Surveillance and alert systems at all levels provide information about antibiotic prescription and generate data on AMR threats. National campaigns for prudent use of antibiotics have occurred, and some of the regions in Spain have followed establishing such campaigns.⁵⁸

To be able to comprehend the main characteristics in the national strategies, and what can be associated with such variation. Furthermore, how the strategies are different, and in relation to the GAP, the following section provides information of the objectives in Spanish NAP used for comparison in the study of investigating the north to south division of antibiotic resistance. The NAP was used in Spain for the period of 2014–2018, and it is the first national strategy against

⁵⁷ World Health Organization (2015), p. 7–12.

⁵⁸ ECDC (2018), p. 1–2, 10.

antibiotic resistance, and was established following a one health approach, containing six objectives.

Table 4.2: Spanish NAP objectives

1	Surveillance of antibiotic consumption and AMR
2	Resistance control of bacterial resistance
3	Identification and promotion of alternative, complementary measures for prevention and treatment
4	Definition of research priorities
5	Training and information for healthcare professionals
6	Communication and awareness-raising for the public and subgroups

The one health approach is reflected by the diverse sectors and the wide range of stakeholders involved. The priority areas of action were human and animal health, and preserving effectiveness of existing antibiotics. As seen in the table, surveillance, control of resistance bacteria, identifications and definitions of treatment and research, and spreading of knowledge, were in focus. All contributing to Spanish characteristics for action to combat antibiotic resistance.⁵⁹

4.1.3 The Swedish national strategy

In Sweden there is political agreement about prioritizing antibiotic resistance, and Swedish action has been broad and preventative for many years.⁶⁰ For instance, Sweden was the first country in the world to ban antibiotics in animal growth promotion in 1986.⁶¹ The reason that the country has a high degree of action is in favour to the fact that the country is relatively small, and a lot of political support have facilitated national collaboration in managing antibiotic resistance. Even further includes effective exchanges of information between local level and national level. Each region in Sweden oversees their healthcare administration, and there is consensus amongst regions of antibiotic resistance being important, contrary the action and the prescription of antibiotics in the regions differ.⁶² Structural aspects of Swedish healthcare are

⁵⁹European Public Health Alliance (2018), p. 70; Spanish Agency of Medicines and Medical Devices (AEMPS) (2014)

⁶⁰ Regeringskansliet (2016), p. 4.

⁶¹ European Public Health Alliance (2018), p. 71

⁶² Regeringskansliet (2021); Strama (2017) *Framgångsfaktorer och utmaningar i lokalt arbete mot antibiotikaresistens: Intervjuer med Stramarepresentanter och andra nyckelpersoner i regioner och landsting.*

important with specialisation in infectious disease being strong all over the counties, and Swedish medical doctors being resilient to prescribe antibiotics when unnecessary.⁶³

The Strategy group for rational antibiotic use and reduced antibiotic resistance (STRAMA) was developed in the middle of 1990s, to provide collective strategy work in the field. Formed by a voluntary network of national authorities and organisations, furthermore, linked to established local STRAMA groups, consisting of multiple professionals in healthcare in the Swedish counties, providing cross-sectorial coordination.⁶⁴

The Swedish Government's lead on the issue rest with the agencies to a great extent which creates an expert rule on the matter. The creation of STRAMA and infection control of diseases spread between animals and humans, the cooperation between the agencies in health, food, veterinary, and environmental sectors, have created an intersectoral coordination structure for action.⁶⁵

The Swedish Government assigned the National Board of Health and Welfare to prepare a proposal for a national action plan to combat antibiotic resistance, considering all aspects that are important for public health and proposing measures aimed at combating antibiotic resistance both the short term and long term. A proposition regarding this came into force in 2006. The same year the first national strategy was also adopted for coordinated work against antibiotic resistance, and this has been amended several times.⁶⁶

To comprehend the main characteristics in the national strategies, and what can be associated with such variation. Furthermore, how the strategies are different, and in relation to the GAP,

Stockholm: Strama, p. 7–9; Stangborli Time, Martin & Veggeland, Frode (2020) “Adapting to a Global Health Challenge: Managing Antimicrobial Resistance in the Nordics”. *Politics and Governance*, 8(4), 53–64.

⁶³ Folkhälsomyndigheten (2014), p. 25–26.

⁶⁴ Strama (n.d.) *Stramanätverket*. Accessed 2021-10-25; Folkhälsomyndigheten (2014), p. 25–26.

⁶⁵ Stangborli Time & Veggeland (2020), p. 53–64.

⁶⁶ Prop. 2005/06:50 (2005). *Strategi för ett samordnat arbete mot antibiotikaresistens och vårdrelaterade sjukdomar*, p. 1, 7, 10.

the following section provides information about the Swedish NAP between 2016–2019, that is the focus of the essay of examining the European north to south division of antibiotic resistance. The NAP contains seven different strategy lines.

Table 4.3: Swedish NAP objectives

1	Increased knowledge through strengthened monitoring
2	Continuous strong preventative measures
3	Responsible use of antibiotics
4	Increased knowledge to be able to prevent and fight bacterial infections and antibiotic resistance with new methods
5	Increased knowledge in the society about antibiotic resistance and countermeasures
6	Supporting structures and systems
7	Leadership within the EU and international cooperation

The strategy has a one health approach, with the overall goal of preserving efficient treatment of bacterial infections in humans and animals. Seen in the table are numerous measures to combat antibiotic resistance, including increased knowledge through strengthened monitoring, prevention, and in the Swedish society. Furthermore, responsible use of antibiotics, supporting structures and systems, and lastly leadership in the EU and internationally. All contributing to the characteristics in the Swedish strategy to combat the issue.⁶⁷

⁶⁷ European Public Health Alliance (2018), p. 71; Regeringskansliet (2016).

4.2 Comparative tables

The following section contains the comparative tables. The first table show management present in Sweden and Spain to combat antibiotic resistance, followed by the political systems, administrative traditions, the two NAP implementation of the GAP objectives, and lastly a comparison of the two NAPs, using variables of institutional and governmental aspects, and the one health approach.

Table 4.4: Antibiotic resistance management

Category	Variables	Spain	Notes	Sweden	Notes
Antibiotic resistance management	Local level	Surveillance and alert systems	Information about antibiotic prescription and generate data om AMR threats	STRAMA	A national network of national authorities and local strategy groups, with action against antibiotic resistance
	Regional level	Surveillance and alert systems	- Information about antibiotic prescription and generate data om AMR threats	STRAMA	- A national network of national authorities and local strategy groups, with action against antibiotic resistance
		Campaigns	- In some autonomous communities for prudent use of antibiotics	Actions via the regions	- Consensus of importance of action - Action against antibiotic resistance and prescription of antibiotics differ in the regions
National level	Surveillance and alert systems	- Provide information of antibiotic prescription, and generate data om AMR threats	STRAMA	- A national network of national authorities and local strategy groups, with action against antibiotic resistance	
	Programmes	- Such as a national hygiene programme	Strategies	- Long history of NAPs and national action against AMR	
	Campaigns	- Prudent use of antibiotics			

Table 4.5: Political systems

Category	Variables	Spain	Notes	Sweden	Notes
Political systems	Democracies	Decentralized state	- Political diversity: 17 autonomous communities with different public spending, policy, and implementation of central law - 17 regional healthcare systems - Coordination limited between the autonomous communities	Unitary state (with aspects of decentralization)	- Decentralization and self-governance of 20 regions - 20 regional health and medical care administrations - The self-governance is a principal and negotiated order restricted by the central government - Increased control of the central government in health care and other areas

Table 4.6: Administrative traditions

Category	Variables	Spain	Notes	Sweden	Notes
Administrative traditions	Role of the state	Pluralism	Pluralist interest group system	Corporatism	- Corporatist interest group system - “Saltsjöbadsagreement”: agreement of stakeholders without use of legislative measures
	Administrative structures	Southern Europe	Low administrative capacities	Northern Europe	High administrative capacities
	Welfare systems	Southern Europe	Vested interests, political clientelism, patronage and polarization, administrative inefficiency, legalism, and public distrust of the state	Northern Europe	Elaborative welfare system with a social safety net and citizen contribution

Table 4.7: Implementation of GAP objectives

Category	Variables	Spain	Notes	Sweden	Notes
Implementation of GAP objectives	1. Improve awareness and understanding of AMR	In NAP strategic lines 1, 5, and 6	1: Crossing information of AMR and antibiotic use 5: Measures for healthcare professionals 6: Campaigns for the public, and specific population subgroups	In NAP objectives 4, 5, and 6	4: A multilevel- and sectoral collaboration 5: Knowledge in all relevant areas of AMR and for antibiotic use 6: Coherent, efficient, and strategic work on antibiotic resistance
	2. Strengthen the knowledge and evidence base through surveillance and research	In NAP strategic lines 1 and 4	1: Improve surveillance of antibiotic resistance 4: Defining and developing research	In NAP objectives 1 and 4	1: Strengthening multilevel- and sectorial data collection, systems, compilation, analysis, and report of information 4: Research measures already conducted
	3. Reduce the incidence of infection through prevention measures	In NAP strategic lines 2 and 3	2: Reinforce surveillance in the regional governments 3: Improve measures in animal health, and promotion and use of tests in animal and human health	In NAP objective 2	2: Prevention measures in relevant sectors
	4. Optimize the use of antimicrobial medicines in human and animal health	In NAP strategic lines 1, 2, and 5	1: Multilevel monitoring of antibiotics and of critical antibiotics in animal and human health 2: Tools and guidelines for good antibiotic use 5: Develop the self-evaluation of prescribers	In NAP objective 3	3: Antibiotics and other antibacterial agents are used and handled well
	5. Develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in interventions	In NAP strategic line 1	1: Participation in European and international projects	In NAP objectives 4 and 7	4: Identify, remedy knowledge gaps and participation in research in EU and internationally 7: Continuous leadership, European and global commitments

Table 4.8: NAPs against antibiotic resistance

Category	Variables		Spain	Notes	Sweden	Notes
NAPs against antibiotic resistance	Political commitment		Moderate	An overall consensus of the improving antibiotic use	Strong	Strong political agreement
	Responsible actors		Included	Public administrations, multilevel action, and collaboration	Included	- The society as a whole - Swedish Public Health Agency and the Swedish Board of Agriculture responsible for coordination
	Sectors		Two sectors	Human and animal health	Multisectorial	Animal and human health, food sector, agricultural sector, and environmental sector, etc.
	Coordination	Actors	Included	- Two coordination groups (one representing the national institutions and one the Autonomous Communities) - Collaboration when necessary and appropriate between them	Included	- Joint responsibility of the Swedish Public Health Agency and the Swedish Board of Agriculture - Collaboration between sectors and actors as well as within
		Levels	Included	- Between national, regional level, i.e., the two coordination groups. - European, and international level - Multilevel coordinated feedback mechanism of prescribers	Included	High emphasis between local, regional, national, EU, and international level
	Collaboration between state and interest groups		Not included	-	Included	Close collaboration between authorities and animal industry created a ban on antibiotics as a growth promoter
	Antibiotics in consumer products		Not included	-	Included	Used wisely, responsibly, and evidence based
	Risk assessment to the environment of antibiotics		Not included	-	Included	- Environmental data being available - Old antibiotics being discarded in an environmental way - Reduce emission of antibiotics in the environment
	Spread of resistant bacteria		Included	- Identify, develop, and strengthen recommendations - Health settings, homes, among animals, and the environment in focus	Included	- Research, efforts, and prevention to combat spread of resistant bacteria - Health settings, among animals, and the environment in focus - More research needed

4.3 Comparative analysis of the NAPs

The following section provides the comparative analysis of the NAPs from Sweden and Spain, to answer the research questions of studying the main characteristics in the strategies, what could be associated with the variation, and how the strategies are different between on another, and in relation to the GAP. First examined is the implementation of the GAP, as all countries have agreed and expected to implement its five objectives. Thereafter, is the analysis of my findings in the NAPs, focusing on variables of political commitment, responsible actors, sectors included in the NAPs, coordination between actors and levels, collaboration between state and interest groups, antibiotics in consumer products, risk assessment to the environment, and lastly the spread of resistant bacteria.

4.3.1 Implementation of the GAP

Both countries have implemented all GAP objectives of awareness, knowledge and research, prevention, optimization of usage, and sustainable economic investment globally, but done so differently.

The first GAP objective of improving awareness and understanding of antimicrobial resistance through effective communication, education, and training, the Spanish NAP includes crossing information of AMR in human and animal health. Furthermore, training and information for healthcare professionals, and implementing campaigns for both the public and population subgroups in human and animal health, such as livestock farmers, pet owners, children, caregivers, and elderly. The Swedish NAP includes collaboration on all levels, and from different sectors such as universities, the government, healthcare, and businesses. Furthermore, good knowledge about AMR and antibiotic use in all relevant one health areas.

The second GAP objective of strengthening the knowledge and evidence base through surveillance and research, Spain focuses on improving surveillance and developing common research measures more specifically in epidemiological, socioeconomic, and in animal health. Sweden focuses on strengthening data collections, systems, compilation, analysis, and

information, on all levels. Sweden furthermore will systematically follow long-term trends of resistance, sales, use, causes of antibiotics, and infections in human and animals. A wide range of research measures are conducted, such as the consequences of antibiotic resistance for the economy and society.

About sanitation, hygiene and infection prevention measures seen in GAP objective three, Spain works with improving action in animal health of animal hygiene, handling, and wellbeing. Furthermore, promotion and use of microbiological- and rapid testing in animal and human health. Sweden through prevention measures being implemented in relevant sectors, such as within animal husbandry, animal health, medical care, and food chains. Furthermore, these sectors to have access to expertise and competence regarding hygiene and infection control. Furthermore, education, knowledge, alertness, rapid diagnostics, vaccinations, health programs, purification of wastewater, and control of antibiotic release, are available.

To optimize the use of antimicrobial medicines in human and animal health, seen in GAP objective four, the Spanish NAP focuses on monitoring antibiotic consumption and control of usage of critical antibiotics in both areas. Furthermore, through guidelines for antibiotic prescription, such as within veterinary health programmes, and with the development of self-evaluation to those prescribing antibiotics. Sweden acts through only allowing antibiotics to be obtained through licensed prescribers, through multilevel diagnostic recommendations, and avoidance of unnecessary use being implemented in animal and human care, and in consumer products. Furthermore, knowledge of proper use, how to discard old and new antibiotics, and environmental assessment of antibiotics, are included.

The fifth GAP objective of developing economic sustainable action that takes account of the needs of all countries, is implemented by the Spanish NAP by a participating role and includes European and international projects to exchange information to continuously revise the situation of AMR, and rational use of antimicrobial medicines. Furthermore, continuously contributing to the European projects regarding antibiotic consumption and use in animal and

human health. Sweden, on the other hand, takes a leading role on the global arena of antibiotic resistance and rational antibiotic use, and acts through sharing knowledge and experience with other countries and using experiences from other countries. Furthermore, global commitments within Agenda 2030 and its sustainable development goals, and Sweden's policy for global development. An economic emphasis is on developing new business models and financial management systems, to encourage the progress of new antibiotics and other treatments.

4.3.2 The NAPs

Further analysis of the NAPs against antibiotic resistance is compared next. In the Spanish NAP the political commitment is described as "general", but has not led to adoption of measures and necessary coordination needed to combat antibiotic resistance. The Swedish NAP describes a broad political agreement in Sweden to prioritize action against antibiotic resistance.

The two NAPs include that taking multilevel action and collaboration of multiple disciplines. The Swedish NAP includes the whole society, seeing such collaboration that "the list of affected actors can be made long, the whole society must be involved"⁶⁸, but puts two national administrations in public health and agriculture as responsible. The Spanish NAP indicates that the Public Administrations are responsible for action. Regarding the sectors involved in action against antibiotic resistance, the Spanish NAP includes human and animal health. Sweden has a multisectoral approach, in addition to those present in the Spanish NAP, are actors like the food, agricultural and environmental sectors.

Regarding coordination between actors, the Spanish NAP includes two coordination groups, one group from representatives of institutions and bodies, and one from representatives of the Autonomous Communities. Furthermore, each group can request collaboration from people or institutions where necessary and appropriate. In the Swedish NAP, the Swedish Public Health Agency and the Swedish Board of Agriculture are seen as the actors with most responsibility

⁶⁸ Regeringskansliet (2016), p. 3.

to coordinate action, and the NAP furthermore indicates that action is crucial between and within relevant sectors, and includes this throughout the NAP.

The Spanish NAP includes coordination between different levels as of the two coordination groups between regional and national level. Furthermore, by participation in European and international projects. Lastly, multilevel coordination regarding antibiotic consumption and control of critical antibiotics in animal and human health. The Swedish NAP emphasize multilevel coordination in all objectives.

The Swedish NAP includes measures that the Spanish NAP does not. The Spanish NAP does not include collaboration between state and interest groups, contrary to the Swedish NAP that indicates that “thanks to close cooperation between authorities and the animal industry, Sweden, for example, was the first country in the EU to ban antibiotics as a growth promoter in animal feed as early as 1986.”⁶⁹

The Swedish strategy determines the importance of consumers to be given the opportunity to make informed and aware choices. For instance, by labelling the origin of meat meaning that consumers can choose meat from countries with better antibiotics regulation in the production.

The Swedish NAP furthermore includes risk assessments targeting the environment regarding antibiotics. Environmental data is part of the approval process of antibiotics, and is available for relevant stakeholders to assess risk. Old antibiotics are discarded in an environmentally friendly way. Additionally, includes action against emission of antibiotics in the environment, with good manufacturing practices during pharmaceutical production, through engaging the environmental sector, and surveillance on a local, national, and international level.

⁶⁹ Regeringskansliet (2016), p. 20.

However, both NAPs include action against the spread of resistant bacteria in different environments. The Spanish NAP includes those recommendations are to be identified, developed, and strengthened, and targeting health settings, the home, among animals, and the environment. In the Swedish NAP further research, efforts, and prevention measures are seen as necessary among many sectors regarding the spread in different environments. Examples of research areas are health care, animal husbandry, global trade, and tourism. Contrary to the Spanish NAP, the Swedish NAP emphasize international collaboration regarding this, where the EU platform is important.

5. Discussion

Comprehended by investigating the main characteristics in the strategies and what could be associated with the variation, how the strategies differ, and in relation to the GAP, is that there is a broad European landscape of action against antibiotic resistance. Beyond similar measures, including multiple sectors and levels, important for the one health approach, the Swedish NAP is characterized and differ from the Spanish NAP with more focus on the environment and consumer products, also key components for one health. Moreover, Sweden has a long history of management against antibiotic resistance, on all levels, such as with STRAMA. Despite different actions, so does Spain. Details is provided in previous research and results of Spain having a one health approach in its NAP, nevertheless the Swedish NAP contains deeper collaboration of sectors, meaningful to combat antibiotic resistance, for instance collaboration between the state and the animal industry. On the contrary, previous research provides information that countries, like Sweden, have come further with the one health approach for action and have more prevalence than Southern Europe. Furthermore, indicated by the table of different development processes in previous research, the Spanish NAP is approved by government, and the Swedish NAP is implemented.

The GAP was used as a tool to investigate how the NAPs are similar, as all countries agreeing on implementing the objectives. The implementation of the GAP, in this case, shows that countries can implement international policy differently, and still include all objectives necessary because of the objectives having width. Information present in the NAPs indicating implementation of GAP objectives can have been left out in the analysis, but the broadness of the objectives eases the investigation. It is difficult to comprehend if the Swedish NAP has less vertical alignment, as noticed in the previous research about implementation of the GAP by Scandinavian countries. Quantitative measures can be used to further comprehend this, as was used in the same study.

Regarding the method choices, the focus being on deep examination of national strategies, qualitative analysis is most suitable. Further investigation with quantitative measures can

improve the comparison, seen in previous research examining NAPs alignment with the GAP. The analysis of the NAPs and the GAP, is my qualitative comparative analysis, assisted by tables and the design by John Stuart Mill. Therefore, limitations are present as the full scope of the comparison cannot be entirely ensured. On the contrary, a comparison done with qualitative measure, rather than quantitative, can provide a deeper understanding of the strategies because of the comprehensive studying of the NAPs and the GAP. Furthermore, limiting the qualitatively comparison to the two NAPs alignments of the GAP, and leaving out the further comparison of the NAPs, could have created a deeper investigation of the NAPs alignment with the GAP. As of the aim of investigating the governance aspect of European north to south division of antibiotic resistance, going beyond the alignment of the GAP, was chosen.

Furthermore, Spain and Sweden, to a large extent, come from two separate political and administrative landscapes. Additionally have different histories of action against antibiotic resistance, where Sweden has more multilevel collaboration, such as with STRAMA. What was previously mentioned can influence how the NAPs are formulated and its aims, for instance with Spain describing a more participatory role globally where Sweden has a leading role. Furthermore, already established surveillance measurements seen in the Swedish NAP, as of the long history action against antibiotic resistance and revised NAPs. Alongside with the factors such as political commitment differences present, in Sweden being strong contrary to general in Spain, the national measures can, among many other things, diversify the level of antibiotic resistance, and the variations of the NAPs.

The theoretical approaches of the study, administrative and political traditions, were chosen for influencing path dependencies and are part of the ground structures in societies of governance and of institutions. For the comparison, one aspect of this instead of the two factors included, could provide deeper investigation of the national strategies and European north to south division of antibiotic resistance. More contributes to antibiotic resistance and its governmental and institutional aspects, that goes beyond what is investigated in the study. One example of further investigation of political and administrative factors is including private health care

aspects present in the health care systems, influencing the policy processes and implementation due to private financial interests.

Nonetheless, the theoretical aspects provide insight in differences seen in the national strategies, for instance the role state of collaboration between the state and interest groups present in the Swedish NAP. On the contrary, collaboration of actors and sectors are present in both NAPs, despite the contrasting administrative traditions, such as high administrative capacities of the state in Sweden and low in Spain. Furthermore, citizen contribution in Sweden and a public distrust in Spain, that can influence action, for instance as antibiotic resistance is a collective-active dilemma. The countries have different aspects of decentralization of the political systems, that can influence collaboration between levels and sectors. Furthermore, both Sweden and Spain have regional health care administrations, that could limit national action. This can indicate that there are more factors contributing to the governance and institutional aspects of antibiotic resistance.

Limitations are present with the material in the study, as only two NAPs are compared, and representing the north to south division. As extensive examination of national strategies is necessary, seen in previous research, the study tries to contribute to this. As Sweden, contrary to Spain, has revised the national strategies many times, can influence the NAPs. The time limitation made the comparison of the two NAPs best suited. Furthermore, there can be many aspects contributing to the varying characteristics of the NAPs. Moreover, as seen in figure 1:1, a European Eastern aspect of AMR is present, with high percentage of resistance. As of the time limit, the north to south division was chosen.

There are many aspects influencing diverse levels of antibiotic resistance. For instance, present in the chapter of previous research, political commitment, and a knowledge gap among health care professionals, are examples. Taking from this, the comparison of the two countries national strategies, furthermore, the political and administrative landscapes, can provide clarity of the complexity of the issue and how national strategies can be examined using governmental and

institutional aspects as tools, but it is limited as for the multitude of reasons contributing to the outcome. For instance, in previous research is including that despite the number of countries that have adopted the GAP and produced NAPs, countries still have high rates of AMR and antimicrobial consumption. Which exemplifies the complexity of the problem, and that it goes beyond governance of international and national framework. New knowledge though is provided of the differences and similarities of the national strategies, that can contribute to further investigation of the governance aspect and general control of antibiotic resistance.

EU forces wants to provide global action against the issue, but the division between countries both regarding political and administrative aspects, and management against antibiotic resistance, can complicate action. For instance, when bureaucrats in Europe come together to agree on appropriate commitments against AMR, collaboration of the divided countries can both be difficult and complicated. Though seen with EU health and agricultural politics important for 'one health', the EU agencies, and the action and investment, the EU provides strong platform for implementing important actions globally. Both the already established interconnectedness of the EU and the number of member states in the union, can provide larger measures than if individual countries would act solely on their own. The interconnectedness of the member states furthermore contributes to knowledge and research being easily transferred between the member states, that can guide both the member states and on the international arena. Additionally, seen in previous research, all EU member states have developed a NAP, whereas Europe as a region still have some countries without a NAP, despite the determination of the WHO to do so. Which can further indicate that the EU forces can push action to combat AMR.

The overarching goal of the study is investigating the north to south division of antibiotic resistance in Europe, and how this relates to governance differences, collaboration, and integration. Knowing that national strategies have a say in the level of resistance in countries, European and other international forces could change and strengthening policy patterns by targeting more individual measurements because of the diversity of governance and institutional approaches seen between nations. Also provided as a suggestion in the study of

alignment of NAPs and the GAP in previous research, proposing it to be legally binding. Perhaps leading to further Europe integration in the north to south division of the governance aspect of antibiotic resistance, that is a European problem. At the same time, suggestion of going beyond “one fits all” general set of action, could lead to further European and international integration as all countries would take a bigger role on the global arena towards action against antibiotic resistance, and the political commitments towards AMR could increase globally. Having broad objectives seen in the GAP can provide more effortless implementation of international policy. On the contrary, it can also indicate continuous differences among countries in action to combat antibiotic resistance. As the north to south division stands, targeting more individual international measures could possibly enhance action, and assist countries where additional focus is needed and necessary.

6. Conclusion

With the aim of examining the north to south division of national strategies to combat antibiotic resistance, it can be viewed by the investigation of the Swedish and Spanish NAPs, and by the research questions of examining the main characteristics in the strategies, what could be associated with the varying characteristics, and lastly how the strategies are different between the countries, and in relation to the GAP.

There are many important characteristics in the two NAPs to combat antibiotic resistance, and the main characteristics are multilevel action and collaboration between multiple disciplines, both important for one health and action against antibiotic resistance. However, the Swedish NAP includes more environmental measures and action regarding consumer products, that is not included in the Spanish NAP. Furthermore, a deeper collaboration between the state and interest groups, both that are important for one health. Moreover, both NAPs reflect the objectives in the GAP, such as raising awareness, strengthen knowledge, prevention measures, and usage control, but in different ways. For instance, Sweden taking a leading role internationally, and Spain a participating.

Many variables contribute to the division of antibiotic resistance and the differences seen in the national strategies in Sweden and Spain, one can be the governmental and institutional outlooks, with variabilities in political and administrative traditions. As these societal structures influences aspects such as participation of relevant actors, and collaboration between different levels, they can provide one out of many explanations why antibiotic resistance differs in Northern and Southern Europe.

With the study, the larger issue of governance and institutional aspects regarding antibiotic resistance is examined to investigate the antibiotic resistance differences in Northern and Southern Europe. Further integrating Europe in the contemporary north to south division in antibiotic resistance could be done by improving and better comprehend the way European

politics and administration can influence action to combat antibiotic resistance. International policy, in general, could target more individual national measures, as the political and administrative landscape is diverse in countries. Hence, countries having different initial positions for managing the crisis of antibiotic resistance.

The study presents a beginning of a comparison between countries in Europe that differ in levels of antibiotic resistance. Further research could expand the comparison of the governance and institutional aspects of the issue, for instance by including more countries in Northern and Southern Europe, and their national strategies, to gain a greater understanding, comparison, and overview of the gradient of resistance levels present on the continent.

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