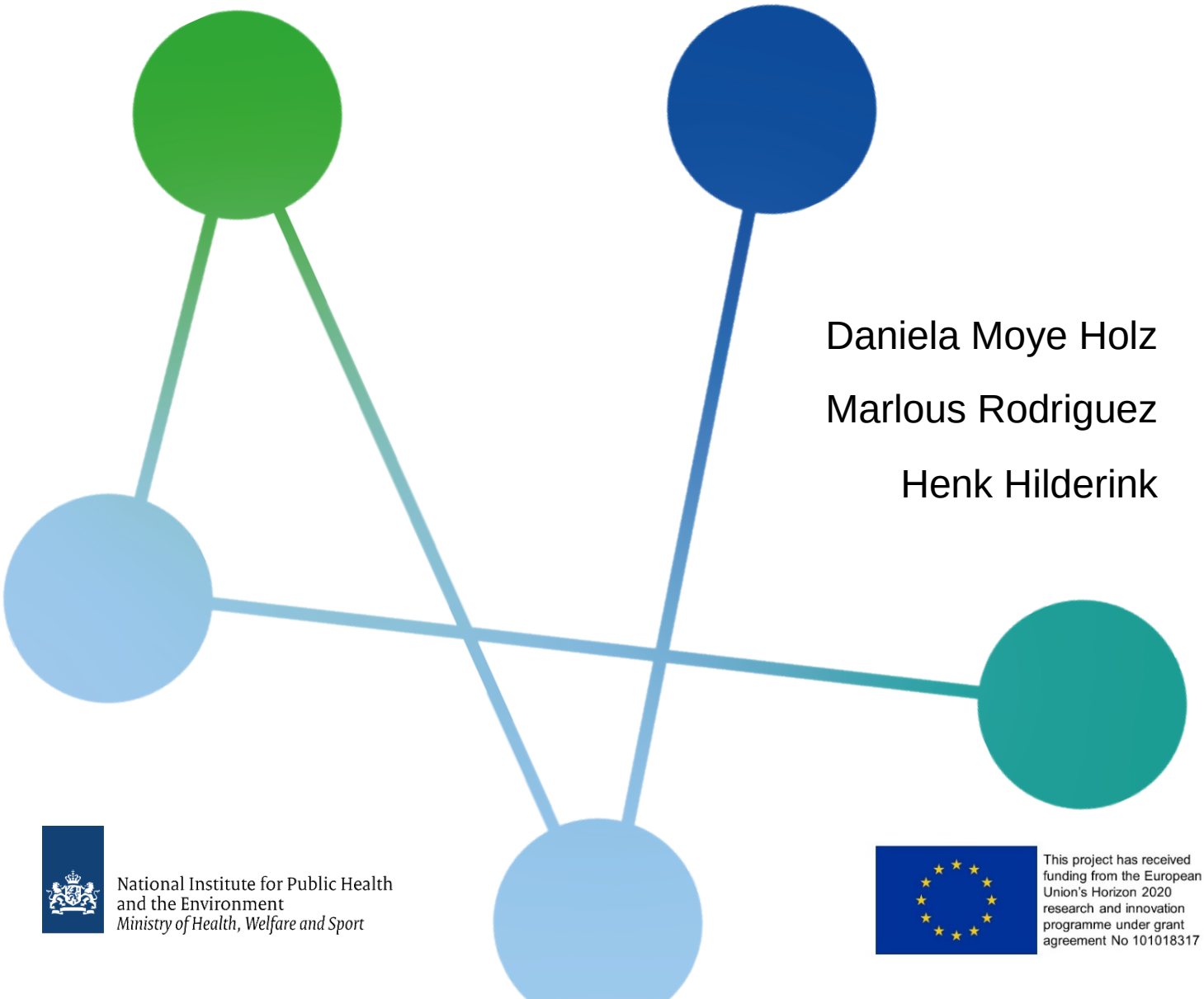
PHIRI
Population Health Information Research Infrastructure

Scenario Development Using Foresight Studies

WP9 Task 9.3, Version 1, 24-03-2023



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Executive summary

PHIRI (Population Health Information Research Infrastructure) project aims to facilitate and generate the best available evidence for research on health and well-being of populations impacted by COVID-19. Work Package 9 (WP9) of the PHIRI project ("Foresight: scenarios and modelling") aims to gain insights into possible future health impacts of the COVID-19 outbreak by developing scenarios. A scenario is not a prediction, rather a consistent, plausible, and coherent description of the future that reflects on past perspectives, the present, and future developments, which can serve as a basis for action.

WP9 follows a stepwise approach that started by learning about the foresight capacity and foresight capacity needs across European Members States (MS) in Task 9.1. Learning about capacity needs led to the development of a capacity building course in Task 9.2. The present task, Task 9.3, builds on Task 9.2 capacity building course to further build capacity by actually developing a foresight study.

The present report provides an overview of the development, content, evaluation, and outcomes of 'Develop your Public Health Foresight Study (PHFS)' as the leading activity of Task 9.3. This activity aimed at giving participating researchers support and guidance in developing their own public health foresight study, including developing scenarios on different public health issues as well as assessing (the direct and indirect) effects of COVID-19 in their respective countries.

'Develop your PHFS' builds on the capacity building training course on foresight provided in Task 9.2 by enhancing and building capacity of the professionals participating in this activity. 'Develop your PHFS' was a hands-on approach on capacity building, by supporting participants in further understanding concepts and steps involved in planning and developing a foresight study. Another aim of 'Develop your PHFS' was to gain better understanding into the challenges and opportunities that professionals can face while conducting a foresight study. Eleven participants from eight Member States participated in our 'Develop your PHFS' activity. Their foresight studies included the following topics: mental health, lifestyle, and non-communicable diseases (NCD), and healthcare.

'Develop your PHFS' consisted of 12 monthly online sessions from January to December 2022 where concepts were revised, and participants received feedback on the progress of their PHFS. After practice country presentations (carried out in September and October 2022), in January 2023, participants were invited to present their PHFS during the last session 'Country Presentations'. In this last session the emphasis was on reflecting on the scenarios developed and their possible outcomes, insights, and policy recommendations that derived from these scenarios.

Participants' progress differed due to time and resource constraints. However, most of the participants, nine out of eleven, were able to develop their foresight studies to near completion. The participants were able to develop scenarios, explore possible outcomes and challenges, and suggest possible policy recommendations to address the challenges. Two of the eleven participants progressed at a slower pace and hence did not develop any scenarios. However, in this report all eleven PHFS studies are presented regardless of the level of progress. Therefore, the resulting case studies presented show different levels of development.

The main outcomes of the 'Develop your PHFS' activity are reflections of this hands-on approach exercise. During this exercise, the progress of each participant was monitored and insights regarding their level of understanding in implementing concepts, planning, and developing their respective PHFS were gained. The following were identified as challenges that the participants faced in developing their individual PHFS:

- Formulation of concrete research questions and objectives

- Building a conceptual model as a framework and roadmap to conduct their study
- Defining driving forces and their influence and impact on the given topic of study
- Ranking trends (driving forces) by relevance and uncertainty
- Formulating and developing scenarios based on the identified relevant and uncertain trends
- Involvement of stakeholders since a foresight exercise is a participatory process by nature
- Translation of outcomes of the foresight study to the users such as policy makers

The exercise 'Develop your PHFS' was a helpful activity in further developing capacity in foresight across Europe (in this case, in eight countries). The participants appreciated the guided sessions, the networking platform, the materials, and the personal support they received. Moreover, the activity gave the organizers a better understanding of the challenges doing a foresight study. It made clear that Developing a PHFS is a resource intensive process with regards to time, capacity, use of tools, and engaging stakeholders. Moreover, the concepts used in the foresight methodology may be new and different from what public health professionals are used to. Learning and implementing new methodologies can come with challenges, including understanding of concepts, and advocating the use of foresight as a strategic tool in policy making.

Moreover, one of the objectives of strengthening foresight capacity is to have better informed policy making. Moving forward to the last task of the PHIRI WP9, in Task 9.4 we will use the outcomes of this task by developing various policy briefs (on mental health, lifestyles and NCDs, and healthcare) that will include some of the findings from the various foresight studies.

Key points

- 'Develop your PHFS' can be the starting point for public health institutions and countries in building capacity in foresight studies and using it as a strategic tool to inform policy making. Planning, developing, and actually carrying out a PHFS is time and resource intensive as it requires constant participation of stakeholders and team members involved.

- 'Develop your PHFS' is based on a six-step approach. 'Develop your PHFS' gave some insights on the challenges faced by participants within each step and how to address such challenges. Participants and professionals can address such challenges through the further understanding of concepts and by discussing such challenges with the involved team members and stakeholders.

- One of the challenges faced by participants was thinking about possible future scenarios and how to address uncertainty in a systematic manner. Exploring the future requires thinking that moves away from a past-to-present evidence-based research and policy making approach, towards a participatory approach based on scenario-building that explores interactions between or among trends in the future, and therefore is not evidence based.

- 'Develop your PHFS' provided support and guidance during the conceptualization, planning, and developing of a foresight study. Realizing the challenges that participants faced during the exercise shed light on the need for further support in developing foresight capacity across Europe.

- We recommend further investing in building capacity in foresight to widen the knowledge base and promoting collaboration and interaction with other parties and experts to facilitate exchange of insights and experience. Additionally, the dissemination of foresight studies and the exchange of experiences can show-case the additional value of public health foresight studies in policy making.

- Foresight studies can be used strategically to inform policy making. Some policy insights and implications from this exercise will be used to develop policy briefs in Task 9.4.

PHIRI: Scenario Development Using Foresight Studies

This report describes PHIRI's Work Package 9 Deliverable 9.3 consisting of the activity 'Develop your PHFS'. This resulted in Country Presentations of participants presenting their foresight studies and the resulting scenarios. This report also includes reflections and lessons learnt from this activity.

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I. Introduction

A. The PHIRI project and the use of foresight in public health

This report describes the work carried out within the PHIRI project (Population Health Information Research Infrastructure, www.phiri.eu). PHIRI aims to develop and implement a research infrastructure to facilitate research and generate the best available evidence on population health impacts based on the principle that well-coordinated European efforts across stakeholders can generate the best available evidence on health and well-being of populations impacted by COVID-19[1]. One means to this end is foresight studies. Foresight studies aim at gaining insight into possible future health impacts where policy makers can act upon in the present.

The current report falls under PHIRI's Work Package 9 (WP9) "Foresight: modelling and scenarios". WP9 supports the overarching PHIRI goals by supporting countries in planning and conducting their own research, such as a Public Health Foresight Study (PHFS). A PHFS provides methodologically consistent insights into the most important societal challenges for public health and health care in a country or region. It explores the most relevant future (uncertain) trends and developments influencing health and health care; the plausible different scenarios in the future of public health; and the possible actions to address challenges arising from these plausible scenarios.

The use of foresight can provide a better understanding of possible future scenarios and their impact on society and population health. Thus, foresight can enable better informed present-day decision-making which can lead to better preparedness for possible future pandemics. The COVID-19 pandemic has made it clear that public health foresight studies (PHFS) are now more necessary than ever, to enable understanding of possible (health) impacts in the near and long-term future. Since foresight studies consider the importance of the uncertainty of the future, they can also support addressing such uncertainty in decision making[2].

[1] https://www.phiri.eu/

[2] Hilderink, H.B.M., The corona crisis and the need for public health foresight studies. Eur J Public Health, 2020. 30(4): p. 616.

The PHIRI work in WP9 on foresight comprises four elements. The first element (Task 9.1) provided an overview, through an inventory, of foresight activities and initiatives in European Union Member States (EU MS) and beyond. This inventory was built through a desktop search, a systematic literature review, and a survey shared among MS. The results of Task 9.1 showed that only a few MS countries have a well-established and developed capacity in public health foresight and that most MS have limited or no capacity in foresight. In addition, through the survey used in Task 9.1[3], MS were able to share in which areas and topics of foresight they lacked capacity.

Learning from the results from Task 9.1 on the actual capacity and the needs to further develop foresight capacity in Europe, the "Public Health Foresight course" was developed and implemented in Task 9.2. The objectives of the course were to build capacity in PHFS across European MS by providing the necessary knowledge, tools, and a solid base for interested participants to conduct a foresight study in their respective country. The course consisted of five modules and covered all the different aspects of a public health foresight study (Figure 1). The first module provided a general introduction on foresight studies and the different aspects of planning a foresight study. The three following advanced modules provided in depth information on different specific aspects of a foresight study. The final module was an evaluation module in which participants provided their feedback and shared their experiences on the course. Materials from the course are available on the PHIRI website[4]. Based on this capacity building course, Task 9.3 aims to bring the knowledge gained during the course forward and translate it into practice. WP9 will conclude with Task 9.4. In this task, we will use insights from Task 9.3 and draw implications for knowledge translation and policy making by organizing a policy workshop and publishing policy briefs.

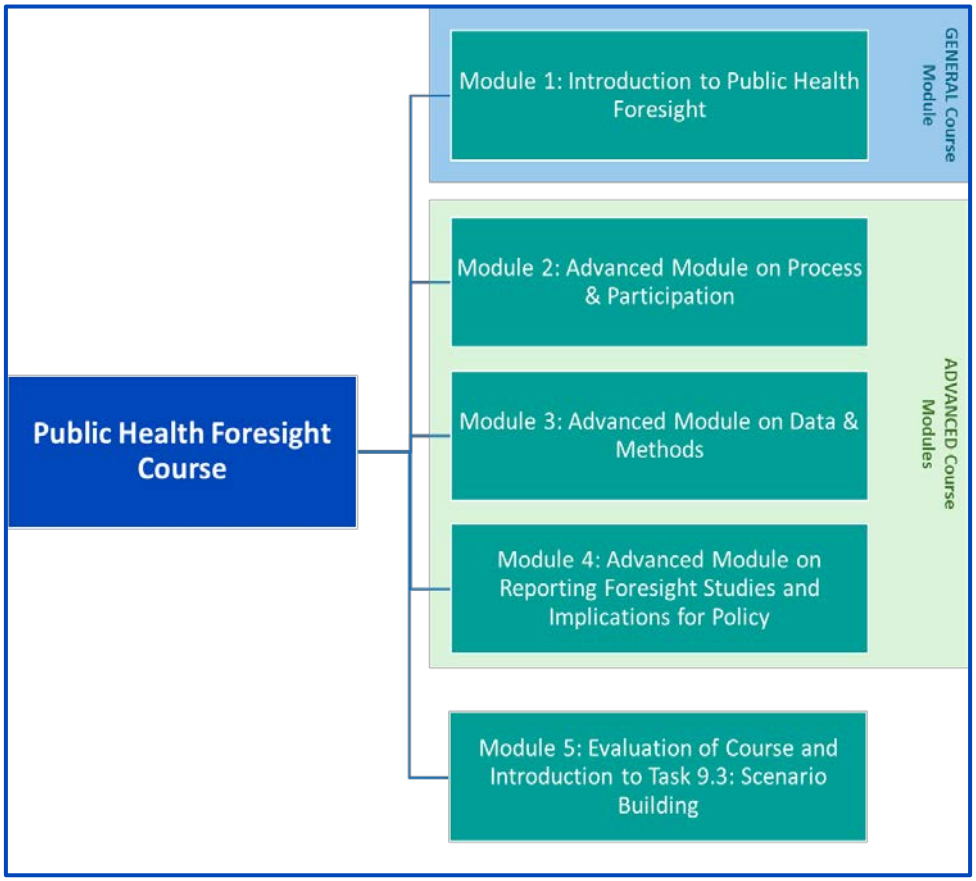

Figure 1. Capacity Building: Public Health Foresight Course

[3] https://www.phiri.eu/sites/phiri.eu/files/2022-02/PHIRI%20-WP9_T9.1_Survey%20Report.pdf
[4] https://www.phiri.eu/node/161

Task 9.3 consisted of two components. The first component consisted of developing a common template and methodology to provide a structured approach to planning and developing a foresight study. This component resulted in 'the compact guide to public health foresight'[5], which constitutes of Milestone M9.2. The second component consisted of supporting MS in identifying main trends and uncertainties and building scenarios that explore the future of public health. The scenarios focussed on direct and/or indirect health impacts of the COVID-19 pandemic. To this purpose, the WP9 developed the activity: 'Develop your PHFS'.

B. Aim of this report and how to read it

The aim of this report is to provide an overview of the foresight activities performed and the recommendations and the lessons learnt during 'Develop your PHFS' in Task 9.3. We discuss how this activity was undertaken, its structure, participation, and the experience of doing a foresight study. We reflect on the different steps and components of doing a foresight study (Section II), an overview of the conducted case studies (Section III), experiences of the organisers (RIVM team) and the participants (Section IV), and we provide recommendations on how to improve the planning and development of a foresight study (Section V).

II. Develop your PHFS – Activity Development & Approach

A. Objectives

'Develop your PHFS' aimed at building capacity on foresight by supporting participants in planning and developing their own foresight study in addition to learning from this building capacity experience. In addition, 'Develop your PHFS' also aimed at providing a learning platform for the participants and to facilitate interaction among participants and between the participants and the WP9 team at RIVM.

B. Approach

'Develop your PHFS' applied a didactive and 'hands-on' approach where participants actively planned and developed their own PHFS. It followed a systematic approach (Figure 2) and made use of the Public Health Foresight Template (see Appendix 1) and the accompanying 'Compact Guide to Public Health Foresight'[2] (Milestone M9.2).

[5] https://www.phiri.eu/sites/phiri.eu/files/2022-02/Compact%20PHF%20guide_2021.pdf

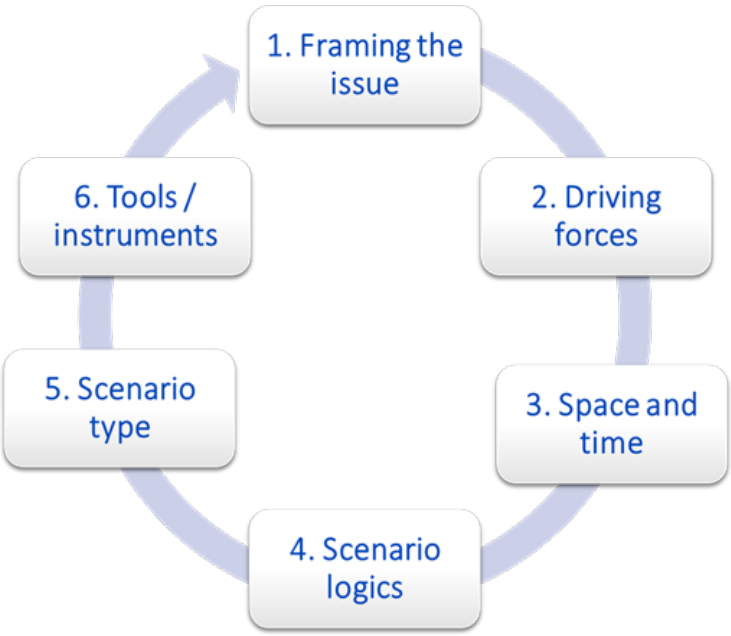

Figure 2. Six-Step Approach to develop a foresight study (Source: Author's)

In 2022, twelve guided monthly sessions took place. These took place online and lasted around 90-120 minutes. The different aspects of planning and developing a PHFS were revised in these sessions (Figure 3). As well, during these sessions, participants provided an update on their progress, received specific feedback on their respective studies, and next steps were discussed.

Figure 3. 'Develop your PHFS' Overview of the guided sessions

Following each guided session, minutes and slides of the session were shared with all the participants. The slides contained specific feedback on the progress of each participant and homework to help them move forward through the template and, thus, their studies. Participants also had the choice to receive feedback specific to their studies in additional Tailor-Made Sessions (TMS). TMS were provided on request and addressed questions and issues specific aspects to individual studies. In total, 19 Tailor Made Sessions were provided.

The final session of 'Develop your PHFS' was a 'Country Presentation'. Two practise sessions were conducted prior to the final session (in September and October 2022) where participants presented their PHFS and received feedback using a common template (Appendix 3). This feedback was incorporated in the final country presentations given by participants. The final country presentation session was also a moment for participants to show the progress of their respective studies. During the presentations, the focus was on the scenarios developed, including the challenges arising from them, policy implications, and the main messages that could be communicated to policy makers.

In order to encourage participation, networking, communication, and exchange of ideas, three platforms were made available: 'participant exchange meetings', Microsoft (MS) Teams collaboration platform, and a LinkedIn group. The 'participant exchange meetings' were scheduled once a month, online, and provided an opportunity for participants to meet and share experiences amongst themselves. Furthermore, the participants had access to MS Teams collaboration platform where the exchange and sharing of documents took place. The RIVM team also used this platform to upload meeting minutes**,** and other useful information materials. Lastly, the RIVM team hosts a LinkedIn group[6] for public health foresight in order to encourage connection and networking amongst the participants of the foresight training course and 'Develop your PHFS' and other professionals interested in public health foresight.

III. Develop your PHFS – Participation

A. Participants

From November 2021 until January 2022, the RIVM team invited participants from the training course (Task 9.2), partners of the PHIRI consortium and external colleagues to join 'Develop your PHFS' to continue building capacity in foresight. An email invite, a one-pager[7] describing the activity with a registration link was sent out (Appendix 2). This One-Pager included information on the support that would be provided by the WP9 team during this activity and the expectations the team had of the participants. It also included different public health topics and the different tracks that the participants could choose from. Since participants had different needs and priorities, an option to choose a track that best suited them was available. Participants could choose to do this activity as a study that could possibly result in a grant proposal or as an exercise in which they improved their knowledge and skills in planning and executing a foresight study.

Initially, we received 19 registrations to 'Develop your PHFS'. Out of the 19, 11 participants actively participated in the activity. Two out of the eleven participants could not continue with the activity after Session 9. The remaining nine participants were able to complete the activity. The eight participants that did not actively participate, declined participation due to, among other reasons, lack of time and financial resources to carry out the activity.

[6] https://www.linkedin.com/groups/13970549/

[7] https://www.phiri.eu/sites/phiri.eu/files/2021-11/PHIRI_WP9-Task%209.3_OnePager.pdf

The 11 active participants were from 8 countries: Austria, Belgium, Bosnia & Herzegovina, Czech Republic, Portugal, the Netherlands, Serbia, and Slovenia (Figure 4). All, but one participant, worked at national institutes of public health within their respective countries. The remaining one participant was affiliated to an academic institution.

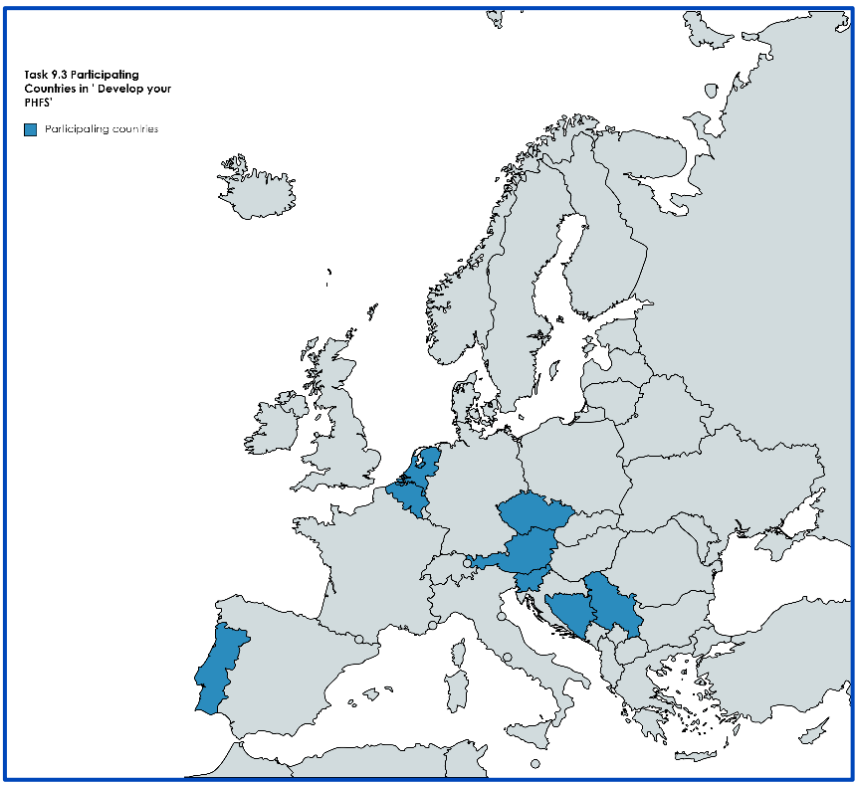

Figure 4. Countries participating in 'Develop your PHFS'

Part of building capacity involves participation in public forums to showcase one's work and receive feedback. During the European Public Health Conference 2022 in Berlin, three of the 'Develop your PHFS' participants (Belgium, Czech Republic, Portugal) presented their studies in the workshop: "Using foresight methodologies to tackle SARS-CoV-2 related health impacts". During this workshop, the participants provided an overview of their respective studies. The participants had an opportunity to address questions and receive feedback from the audience on their studies. This experience further enriched their learning and the capacity building experience in public health foresight.

B. Case Studies

The case studies addressed a variety of topics. Participants were encouraged to consider the direct and/or indirect impact of COVID-19 in their chosen topics. Three overarching topics emerged from these case studies: mental health, healthcare, and lifestyle and non-communicable diseases (NCDs). Table 1 below lists the topics of study selected by the participant and the chosen track.

Table 1. Participating countries with their topics of study and activity goals.

Participant	Study Topic	Track
Austria, GÖG	Long-term care in Austria	Planning as exercise

Belgium*, Sciensano (1)	Indirect health impact of COVID-19	Planning and executing after 2023
Belgium*, Sciensano (2)	Personalized medicine in cancer	Planning as exercise executing after 2022
Belgium*, Sciensano (3)	Long-term and indirect health economic impact of COVID-19 on non-COVID-19 patients' health	Planning as exercise
Bosnia and Herzegovina, Institute of Public Health (FBiH)	Mental Health	Planning as exercise
Czech Republic, IHIS CR	Effective screening and early detection of disease and treatment	Planning as exercise
The Netherlands, RIVM	Update of the 2020 Public Health foresight study	Planning and starting in 2022
Portugal, Universidad Nova Lisboa	Digitalization of healthcare	Planning and executing in/after 2022
Serbia, Institute of Public Health	PTSD/bereavement and cardiovascular disease	Planning and submit as grant proposal
Slovenia, National Institute of Public Health (1)	Control of NCD's	Planning as exercise
Slovenia, National Institute of Public Health (2)	Antimicrobial use	Planning and submit as grant proposal

All the participants completed a 'Summary Sheet' of their study. These summary sheets are available in Appendix 4. Below we summarize the foresight studies per participating country.

Austria

The participant from Austria focused on long-term care in Austria. He was able to complete some of the steps outlined in the template we used and determine the most important driving forces and uncertainties using the DESTEP approach. He suggested an initial trend scenario; however, due to lack of time and other resources, he was not able to move beyond this step and identify the main challenges in his scenario(s) and draw policy recommendations.

Bosnia & Herzegovina

The participants from Bosnia & Herzegovina focused on mental health. They proposed two scenarios following a best- and worst-case approach. The first scenario suggested an increase in mental health disorders and suicide due to COVID-19, where the economic situation led to a decrease in the use of mental health services and a limited amount of healthcare providers. The second scenario suggested no increase in mental health disorders and suicide due to COVID-19. They identified that policies within and outside the health sector have an impact on mental health. In addition, they explored the effects of the COVID-19 pandemic on mental health and mental healthcare services. The challenges that each scenario poses for the mental health of a society were addressed. Within the policy recommendation and interventions, they recommended that regulations and interventions that address mental health must cover a wide array of topics and different population groups.

Belgium

There were three different foresight studies conducted from various Belgian participants.

The first case study from Belgium focused on the economic impacts of health effects of the pandemic regarding COVID-19 and non-COVID-19 patients. The best- and worst-case approach was applied leading to two scenarios that focused on patients that did not seek healthcare during the pandemic. The participant identified that a lack of resources as well as the risk of an increase in health inequalities in accessing healthcare services were challenges in both scenarios. To address these challenges, she proposed to prioritize resource allocation towards vulnerable groups, improving communication efforts, and encouraging care-seeking behaviors among these groups.

The second case study from Belgium focused on the implementation of personalized medicine in the prevention or early detection of cancers. The participants conducted a literature review, a survey among stakeholders, and stakeholder workshops to identify the driving forces (trends) and uncertainties. The three main uncertainties identified were the use of personalized medicine across hospitals and laboratories, digitalization and data exchange, and national and international collaboration and partnerships. Four scenarios were proposed and included worst and a best-case as well as two intermediate scenarios. For each scenario, the main implications were identified. Identified implications included difficulties in moving precision medicine forward, isolated solutions in healthcare organizations, and support and collaboration in standardization and digitalization. The participants will continue to plan, develop, and implement their foresight study during the year of 2023. Hence, further details on the implications, challenges, and policy recommendations are yet to be defined.

The third case study from Belgium focused on long COVID and healthcare utilization. The participant proposed two scenarios using a best- and worst-case approach. The best-case scenario suggested no substantial long-term health complications for people hospitalized with COVID-19, showing a decrease in future hospitalizations. The worse-case scenario presented long-term complications affecting a significant proportion of the population, including vulnerable groups. In this scenario, hospitalizations increased and difficulties in managing the health crisis played a role. To address the challenges related to the increase in the demand of healthcare services, she emphasised the need to have in place policies and interventions to prevent the increase in demand and its (negative) effects.

Czech Republic

The participant from the Czech Republic focused on the benefits of early detection of NCDs. He proposed two scenarios using a best-worst case scenario approach. His scenarios considered the development of technology and the reallocation of funding to it, and its impact on screening and disease prevention (using cancer as an example). His outcomes included no changes, reduction and increase in cancer mortality due to the presence or absence of technologies and resources. He explored the challenges associated with each scenario and how policies and interventions could address these challenges. Based on the identified challenges, he suggested that policies and interventions should address the health workforce needs, the capacity to implement programmes, funding for other services, tackling possible rising inequalities, quality of health programmes, and prevention of low-value care.

The Netherlands

The participant from the Netherlands investigated the direct and indirect impacts of COVID-19 on population health, focusing on mental health, lifestyle, healthcare and living environment. He developed three scenarios, best-case, worst-case and a business-as-usual scenario. For each of the scenarios, the participant identified the main challenges, policies, and interventions to address the challenges. In addition, the participant reported that vulnerable groups will need support in the form of integrated interventions and policies focusing on mental health will be needed. Regarding the best-case scenario, which focused on new technologies delivering on their potential, policies will need to address and guide technological progress to ensure accessibility and target (health) inequalities.

Portugal

The participant from Portugal explored the impact of digitalization in primary healthcare. She proposed three scenarios, each focusing on different trends impacting primary healthcare. The first scenario focused on the investment of technology, i.e., the digitalization of primary healthcare. The second scenario focused on the disruption of health services due to the loss of human resources. The third scenario focused on climate change leading to an increased demand for health services due to epidemiological transition towards emerging communicable diseases. The primary findings have placed focus on how the COVID-19 pandemic has brought about the potential of digitalisation in primary healthcare and the impacts of this digitalisation. This study was still ongoing at the moment of writing this report, therefore, conclusions and policy interventions are yet to be drawn. However, it seems as though the impact of climate change will be substantial and so will be the need to focus on the digitalizing the delivery of health services where possible.

Serbia

The participant from Serbia focused on mental health and the association between anxiety-depressive disorders and changes in cardiovascular risk factors. The foresight study aimed to recommend the importance of having mental health care specialists in primary health care. She used the best- and worst-case scenario approach. The best-case scenario considered COVID-19 as a seasonal disease with minor health impacts. This scenario also considered a raise in the awareness of the existence of mental health disorders and their impact, resulting in an urgency at the policy level to provide funding and support to people suffering from these disorders, thereby addressing the cause of these disorders through prevention. In this scenario, COVID-19 measures such as isolation and working from home can allow people to seek mental health support and reaching better work-life balance. In the worst-case scenario, the participant considered that the new variants of COVID-19 are more severe. In this scenario, the correlation between anxiety-depressive disorders and cardiovascular diseases is directly causal and through coping mechanisms (e.g., tobacco and alcohol use, food). In this scenario, the increase and the severity of mental health disorders cause negative effects on the community and the health system. The resulting recommendations from these scenarios include the continuous monitoring and evaluation of existing mental health programmes and the implementation of new programmes, such as having a mental health specialist at the primary healthcare level.

Slovenia

Two foresight studies from Slovenia were undertaken.

The first case study from Slovenia focused on the use of technology and electronic medical devices (EMD) to manage NCDs. The participants developed a best- and worst-case scenario. In the best-case scenario, they suggested an increase in funding from the elite (billionaires) thriving innovation and implementation. This would comprise, for example, a new smartwatch to monitor one's health, where data can be fed into an online cloud service where data scientists and experts can analyse and discover hidden patterns of disease progression and predict deterioration of the NCD condition for patients and warn patients of effects of their condition via the smartwatch. They also suggested a business-as-usual scenario, where nothing changed. The prevalence of NCDs remained the same, and people living in rural areas and the elderly remained uninterested in EMD. The worst-case scenario considered countries (e.g., Brazil, India, South Africa) decoupling from the Western World, having thus a negative impact on people's health due to a lack of availability of inputs to manufacture medicines and electronics. People would need to resort to alternatives that can be more expensive and the investment in prevention (e.g., the use of EMD) will decrease. They identified the following as main challenges: lack of data sources, data collection with timely measurements, and implementation of interventions. They concluded that medical devices and wearable technologies could improve NCD management, although it is uncertain if these are the most cost-effective interventions to lessen the burden of NCDs.

The second case study from Slovenia focused on antimicrobial resistance (AMR) and antimicrobial consumption (AMC). The first scenario investigated the prescribing practices of antibiotics and considered necessary interventions such as the implementation of clinical guidelines, addressing community pharmacists, monitoring antimicrobial consumption and the use and the training of professionals. The second scenario focused on addressing the local living environment. The third scenario focused on climate change and the need to address it by implementing alert systems and real-time surveillance to identify multi-drug resistant organisms. The study focusses on short- and long-term trends and their possible effects on antibiotic use in the population, with the consideration of having in place interventions or policies addressing prescribing practices, environmental factors, and local living conditions.

IV. Experiences while doing a PHFS

As far as we know, this was the first time that such an exercise on capacity building on public health foresight studies was done. One of the objectives of 'Develop your PHFS' activity was to learn from the experience of how to plan and develop a foresight study to have a better understanding of the obstacles and opportunities that could be experienced while conducting a foresight study. In this section, we depict the experiences from the project team (i.e., organizers of the foresight course and the sessions) and address the difficulties participants experienced with the specific steps of conducting a foresight study. The steps will be addressed in accordance with the six-step approach (Figure 2) and the overall template (Appendix 1).

A. Experiences from the project team

The project team developed the capacity building foresight course and guided the participants in conducting their own foresight study. Bringing the theory of the foresight course into practice by developing country specific foresight studies resulted in various valuable insights regarding the difficulties and challenges faced when conducting foresight studies. In this section, we have selected the most relevant challenges faced by the participants and we draw specific recommendations for them.

Formulating Objective of the foresight study

The first step in the six-step foresight approach (Figure 2) is formulating objectives (i.e., main issue and sub-issues, research question). Most of the participants were able to formulate the objective of their foresight studies and took into consideration both the main and sub-issues related to their topic of interest. For some participants, the underlying research question was not clear and that was reflected on the formulation of the objectives of their studies. Some participants found it quite a challenge to focus their study on specific (sub-)issues. This restricted the formulation of concrete objectives.

Recommendation:

Narrowing down from general issues to more specific sub-issues that encompass a topic of study into manageable objectives can be challenging. Discussions within the team conducting a foresight study need to start with the research questions and sub-issues that they want to focus on and realize that not all issues can be addressed. From the beginning, it is important to clearly formulate the objective of a study and continuously discuss this objective(s). However, it is also important to realise that this is an iterative process whereby the relevance of the research question, main and sub-issues is re-evaluated during the process of doing a foresight study.

Conceptual model

In step three a conceptual model is developed. It functions as a framework that positions the different driving forces (trends), outcomes, and all other aspects that influence the topic, issue, and sub-issues of the foresight study. It should also provide a roadmap for the study where the overarching ideas and concepts are placed and put in relation to each other.

In several sessions, the conceptual models of participants were revised as this step was challenging for most participants. One of the difficulties that the participants faced was to keep the conceptual model simple. For several participants, this was the first time that they had developed a conceptual model, which can be difficult when one has many ideas that one wants to implement in a study. Other challenges were how to include the driving forces (trends), inputs and the outcomes in the conceptual model and to relate them to indicators (and their related data).

Recommendation:

During the sessions, we recommended to participants to look into the literature for existing conceptual models. In most areas of study, conceptual models (or frameworks) exist. Existing models can be used for inspiration and where possible adapted to the needs and objectives of a foresight study. When developing a conceptual model, it is recommended to start simple and build on. During the iteration face, one can change and adapt the conceptual model to suit one's needs and circumstances.

Regarding indicators, these should be linked to the conceptual model as much and as concrete as possible. Sometimes you might need proxy indicators since existing indicators are not available. Participants are recommended to think about indicators in a practical manner and include ones that are commonly used, as these may have already data available.

Defining Driving forces - using the DESTEP

Defining driving forces is the second step of the six-step approach. The driving forces are those trends that can have an important influence on the topic, issues, and sub-issues of study. A trend is an assumed development in the future with a long-term and lasting effect and change on something. The DESTEP exercise is a method that can help identify relevant trends based on distinct categories (demography, economy, socio-cultural, technology, environment, and political-institutional) in a systematic way.

The participants had some difficulty understanding that the driving forces in their studies were trends and not variables. This was evident by the description of these driving forces. For example, when considering demographic driving forces, participants defined gender and age. However, the trend would be aging of the population; regarding gender, a trend could be the increase of women's participation in economy, etc.

Recommendation:

More attention is needed to understand what trends entail (a change in time) and why they are important for the topic of study, since not all trends in society play a predominant role on certain topics. The mindset of researchers when doing foresight should be geared towards changes in time and how these changes may look in the future.

To identify trends influencing a topic of study, researchers can follow a systematic approach. For example, the second participant from Belgium, carried out a literature review, followed by a survey among (identified) stakeholders, and finally refined and defined the driving forces to be used in the study through direct consultations with stakeholder in workshops.

Ranking trends by relevance and uncertainty – using the DESTEP

The DESTEP exercise can also be used to identify the trends that have relevance to the topic of study and those that are uncertain. In foresight, uncertainty refers to those trends that have a low likelihood of occurring or where there is limited knowledge about them. This should be distinguished from statistical uncertainty, which does not play a role in foresight studies. The exercise of ranking relevance and uncertainty is preferably done in consultation with stakeholders.

During the DESTEP exercises, we saw that some participants faced difficulties assessing their identified trends in order of relevance and uncertainty. Sometimes, the concept of uncertainty was not clear or was misunderstood.

Recommendation:

Researchers doing foresight studies need to understand the concept of uncertainty first before consulting with stakeholders. This concept relates to the level of knowledge or likelihood of a trend, but it can also refer to the values and norms related to such trends in term of the knowledge on the (possible) effect of a trend on a certain topic. As well, this concept needs to be understood by the stakeholders participating in the DESTEP exercise to make sure that the ranking and the identification of trends reflects the most important and uncertain driving forces that will shape scenarios.

Formulating scenarios

Formulating scenarios is the fourth step of the six-step approach. To formulate scenarios, the most relevant and uncertain (trends) driving forces have to be identified (see previous step). Based on the number of identified uncertain trends, one can follow different scenario logics (for example, a best-worst case scenario, two axis matrix, multi-panel approach).

We observed that participants found it challenging to identify the scenario logics appropriate for their study. There were some participants whose studies did not combine the trends into the scenarios as required by the scenario approach, but instead formulated scenarios for each uncertain trend.

Recommendation:

Researchers building scenarios can think about how one or more uncertain trends can look in the future and how they influence each other and even in combination with other more certain trends. When choosing more than one trend to build scenarios, the scenarios will be more comprehensive and the message more appealing when considering all the different trends (driving forces) into one single story. A best- and worst-case approach is the most understandable way of constructing scenarios. Starting with such an approach and maybe extending it later is therefore recommended.

Developing scenarios (qualitative and quantitative)

Step five of the six-step approach in foresight is developing scenarios. To build scenarios, different quantitative and/or qualitative tools and instruments can be used, which is step six of the six-step approach in foresight.

Conducting a PHFS is a participative process. Building qualitative scenarios is done through consultations with stakeholders. Stories about the future are built based on the input of these stakeholders when reflecting about trends (driving forces) influencing the topic of study and the future they may have. Quantitative methods are used to support these stories by using projections on trends and/or modelling possible future changes in trends depending on actions in the present.

Building scenarios is challenging as it requires balancing the input and interests of stakeholders and team members, making assumptions about the future, and a certain level of creativity and imagination on how the future could look like when considering one or more trends. We found that participants found this stage quite challenging. Additionally, they found the quantification of the scenarios difficult, as some may not have access to existing data trends and/or capacity to model the scenarios.

Recommendation:

Building the scenarios requires a qualitative approach through the participation of stakeholders that provide their input on how trends relate and influence each other and how each future scenario could look like given such trends. To complement these scenarios, modelling, forecasting, and other quantitative methods could be used to showcase the plausible changes that these trends can have in the future. Using quantitative projections can enrich the story of the scenarios. Regarding the use of quantitative tools, researchers can make use of already existing tools and data that show projections and forecasting of trends. However, it is also desirable to have capacity and expertise in modelling as part of the foresight team.

Involvement of stakeholders

A PHFS exercise is a participatory process by nature and, therefore, requires the participation of relevant stakeholders. Involving stakeholders is important to develop scenarios that also reflect the views of parties involved in policy making, parties with expertise and experience, as well as those affected by these policies. Mapping, inviting, and engaging stakeholders requires time and capacity. Therefore, reaching a balance between the number and type of stakeholders is desirable.

Recommendation:

Doing a stakeholder mapping beforehand is essential in identifying the parties relevant to a topic and very relevant for the foresight exercise. It is also important to identify them by stake (the interest they have in the topic and possibly want influence) and by power (e.g., they can bring forward the conclusions of the foresight study and the actual development and implementation of policies).

Involving the stakeholders in a foresight study can be another challenging due to time constraints and lack of interest in a foresight study. To address this issue, the foresight project team can advocate on the importance of foresight studies as strategic tools in policy making and therefore, the importance of the stakeholder's participation. Applying a systematic approach to get stakeholders involved is recommended.

Translation of outcomes to users (e.g., policy makers)

One of the objectives of a foresight study is to stimulate discussions about the future. The six-step approach in foresight results in exploring outcomes of scenarios, discussing, and providing policy recommendations. These discussions include the possible changes in trends and desirable futures based on different interests and values of stakeholders and other interested groups as well as the population at large. A foresight exercise considers the policy cycle, and therefore, it is a strategic tool in policy making.

By developing scenarios, stakeholders can discuss and realize the different outcomes and challenges that can arise from such scenarios and discuss possible interventions, policies, and solutions to address such challenges in the present and in the near future. Likewise, scenarios can shed light on possible necessary measures in the present, desirable outcomes, and futures.

Foresight experts should consider that any scenario (best-case, worst-case, business as usual, other) will entail a range of plausible outcomes and challenges. It is necessary to think about and consider these in order to develop suitable interventions. We observed that some participants struggled to identify possible challenges that could arise from each of their scenarios. This is an important step in developing scenarios whereby professionals need to consider the policy cycle and how the (uncertain) trends that they are exploring influence this policy cycle and the outcomes arising from such scenarios. Upon identifying these present and future challenges, professionals can discuss and identify plausible policy actions, interventions, and recommendations.

Recommendation:

When developing scenarios, discussions about possible future outcomes and challenges are necessary. These discussions should consider present and futures interventions. When considering interventions, stakeholders can shed light on what is plausible and the priorities of policy makers in the present and in the future.

During the knowledge translation phase, it is recommended to consider the policy cycle to provide feasible and relevant recommendations and interventions. It is also desirable that these recommendations and interventions are relevant to both present and future policy makers, to ensure continuity and sustainability of the policies.

Furthermore, during the whole foresight cycle, a communication strategy should be considered. This strategy should consider the different interest groups that professionals wish to communicate to, as well as the core messages. In addition, appropriate communication tools should be used, and the frequency of communicating during the foresight exercise should be established.

B. Experiences from participants

In the 'Summary Sheets,' we asked the participants to provide their feedback on the exercise ('Develop your PHFS'), regarding planning and developing a foresight study, organization of the exercise, and on the performance of the RIVM team.

The platform provided by 'Develop your PHFS' (e.g., 'Participant Exchange' Meetings) to enable communication and exchange of ideas among the participants was regarded as useful and very helpful. They appreciated the organization of the RIVM team and the MS Teams platform where all documents were made available in a timely manner. The participants also appreciated the exchange of information and experiences and the support they received from their peers. For those having 'Tailor Made Sessions', they appreciated the personalized support given in such sessions, which helped in broadening their understanding of concepts, brainstorming, conceptualization, and in their general progress.

The compact guide[8] and following a structured approach and methodology were regarded as useful in developing the PHFS and in revising concepts. However, some participants found some challenges in the foresight approach. These challenges included: carrying out the DESTEP exercise, linking driving forces with indicators, finding data sources thinking about the scenarios, identifying stakeholders, and recruiting stakeholders for their foresight study.

Participants experienced challenges in planning and implementing a PHFS. This is because they regarded the foresight approach to be complex and resource intensive. Some of these challenges faced included the time required to conduct the study which conflicted with other priorities, economic resources (funding), and the capacity needed to conduct such project that was not always available. Furthermore, access to stakeholders, information, and to the relevant data was challenging. Lastly adequate planning and management was required to ensure that the study remained focused and objective.

One of the participants implementing their PHFS highlighted that some of the difficulties in conducting the study included the agenda of stakeholders or participants and nudging them into participating in the foresight exercise, the creative element in building scenarios, and managing the political agenda of some stakeholders.

Another challenge faced by some participants was anticipating the long-term future and making valid assumptions about the possible future. As described by one participant, since foresight studies use "assumptions and projections, there is the always the risk of unforeseen events and disruptions that can affect the validity of the study's findings." Additionally, balancing short-term and long-term

[8] https://www.phiri.eu/sites/phiri.eu/files/2022-02/Compact%20PHF%20guide_2021.pdf

considerations could be challenging when anticipating future trends. However, following the stepwise approach outlined in the templates helped in the thinking process about the future and to think about what could be done and how to prepare for potential challenges and opportunities. Finally, the participants also regarded a PHFS exercise as a useful and structured tool to support long-term policies and strategies.

V. Lessons-learned, conclusions, and recommendations

'Develop your PHFS' was a helpful exercise to further develop capacity on public health foresight studies. The participants had the opportunity to follow a stepwise approach to plan and develop a foresight study and receive feedback and guidance while doing so. Participants encountered several challenges ranging from the understanding of concepts, the conceptualization of their ideas into a framework of a study, and the development of scenarios based on relevant and uncertain trends for their topic of study.

In this section, we present the overall lessons learnt from this experience and we provide the final conclusions and recommendations.

Overall lessons learned

- Doing a foresight study demands quite some resources. It requires allocating time (from the foresight team and stakeholders) to carry out the different steps and stages of the study. It is also resource and capacity intensive. Besides financial resources to conduct all foresight activities, capacity from different areas of expertise and fields are recommended in order to have a comprehensive team to carry out all activities.

- The understanding of some concepts and how they relate to each other can be a difficult task. Despite the development of a common template and a compact guide, it can take some time to grasp all concepts and understand their relationship with each other. 'Develop your PHFS' facilitated this understanding by revising concepts and providing feedback. Networking and finding support with foresight experts and conducting more foresight exercises can further strengthen this understanding. Furthermore, publishing descriptions of foresight studies and of the methodology will further enhance understanding of the concepts.

- Exploring the future by building assumptions and thinking about how the future could look like is challenging. Developing future scenarios requires the participation and input of a wide range of stakeholders and a systematic methodology. In addition, it also requires a certain level of imagination and creativity in thinking about how trends can develop throughout time, desirable futures, and what policy interventions might provide the desired outcomes. Doing a foresight study is an exercise on how to deal with the uncertainty of the future while considering that there is no evidence of this future yet.

- A foresight exercise is participatory in nature and therefore, invites discussions to take place in the present towards plausible and desirable futures. These discussions can support policies seeking the sustainability and resilience of health systems so that they are prepared for uncertain trends and events, such as future pandemics and/or any other 'black swans'.

- Dealing with the lack of evidence and data is difficult to grasp, since scenarios are based on assumptions, models, and qualitative stories. Therefore, foresight studies invite professionals and stakeholders to move from past-to-present evidence-based policy making to present-to-future scenario policy making in a systematic way.

- Engaging with stakeholders can be a challenging task. Thus, more advocacy on the usefulness of strategic foresight is necessary. Foresight professionals can help policy makers understand that using foresight can be a useful and strategic tool in policy making, one which has already been used in other policy arenas (e.g., environment, technology, etc.). Foresight studies explore the futures by discussing trends and visions of the future with stakeholders. Therefore, discussing policy interventions can be considered to address these futures.

- The process of 'Developing your PHFS' was intensive, both for the participants as for the organising team. We were able to see how the participants were able to achieve substantial progress. In their evaluation feedback, the participants have indicated to value the sessions highly, despite indicating experiencing difficulties with applying the foresight methodology properly.

- All sessions took place online, while previous capacity building experiences (before PHIRI) were mainly through physical workshops. Working online and using MS Teams, both as a video calling tool and as a platform to store and share all documents (e.g., scenario templates), worked rather well, which facilitated interaction and, thus, this experience.

Conclusions and recommendations

Foresight studies applied in the field of public health are still scarce. The foresight course, offered through PHIRI (Task 9.2), strengthened foresight capacity in EU Member States. The application of foresight to various public health topics enabled to bring the knowledge, learned in the foresight course, directly into practice. This will lay the basis for more public health foresight studies.

'Develop your PHFS' gave informative insights into the difficulties and options of doing a public health foresight study. It showed that building capacity through following a course is helpful as an introduction to facets of a foresight study and working in these facets builds experience in foresight. The foresight methodology should be well understood. How to deal with the governance of a foresight study, engage with stakeholders, consider appropriate products to communicate clear messages to the right audience, etc. are relevant elements of foresight methodology that should be thoroughly explored and understood. Applying the foresight theory to real-world research questions, showed that experience is required to make well-considered choices in the process of doing a foresight study.

There is no blueprint that guides you completely through the foresight process. Therefore, we firstly recommend keeping on investing in foresight capacity building to widen its knowledge base. Secondly, promoting collaboration and interaction with other parties and experts (including national public health institutes and organizations such as the WHO) when doing a foresight study facilitates the valuable and necessary exchange of insights and experience. Lastly, these experiences and applications should be disseminated. Using good examples to show-case the additional value of public health foresight studies is essential in maintaining wide support, not only in its use but also for resource provision.

One of the objectives of strengthening foresight capacity is to have better informed policy making. To facilitate foresight-informed policy making, we should address 1) topics that are relevant to policy making, 2) communicate clear messages, that are also sufficiently nuanced, e.g., by not ignoring uncertainties that are inevitably embedded in these future outlooks, and 3) provide options for action that resonate with the process of policy making. In the last task of the PHIRI WP9 "Foresight Scenarios and Modelling" - Task 9.4 - we will use the outcomes of this task addressing the three points mentioned. In Task 9.4, various policy briefs will be developed (on mental health, lifestyles & NCDs, and healthcare), which will include some of the findings from the various foresight studies.

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Appendices

Appendix 1. Public Health Foresight Template

Public Health Foresight Template

Please see the accompanying 'Guide to Public Health Foresight.'

Name: **Country:** **Affiliation:**	**Topic is addressed in*:**
Contextual information	Module 2
Objective of the foresight study **Topic:** **General issue:** **Sub issues:**	Module 2
Main target group(s)	Module 2
Conceptual model	Module 3
Indicators	Module 3
Driving forces (by impact and uncertainty)	Module 3
Time horizon	Module 3
Spatial unit	Module 3
Identifying most important uncertainties (normative, cognitive)	Module 2/3
Scenario logics	Module 3
Scenario type (quantitative, qualitative)	Module 2
Stakeholders	Module 2
Data	Module 3
Tools and instruments	Module 3
Projection method(s)	Module 3
Communication strategy	Module 4
Communication products	Module 4
Uptake of results and evaluation	Module 4

***The videos of the public health foresight training course are available here.

Appendix 2. One pager – Develop your Public Health Foresight Study (PHFS)

PHIRI
Population Health Information Research Infrastructure

Work Package Leader: RIVM, The Netherlands
Last updated: 10.11.2021

DEVELOP YOUR PUBLIC HEALTH FORESIGHT STUDY (PHFS)

The PHIRI (Population Health Information Research Infrastructure) project aims to facilitate research and generate the best available evidence on population health impacts, one tool being foresight studies. Foresight studies aim at gaining insight in possible future health impacts that policy makers can act upon in the present. To support you in the use of foresight methodology, during 2021 we offered the 'Foresight Capacity Building Course'. Starting January 2022, we invite you to **'Develop your PHFS'!**

WE OFFER YOU SUPPORT:

- On planning or conducting a study with a predefined or self-chosen topic depending on your needs and resources
- Based on a stepwise approach explained in a compact guide
- Facilitating interaction with other participants
- Learning together, both method-wise and content-wise

WE ASK FROM YOU:

- Your active participation
- Sharing your experiences: pitfalls and successes
- Keep track of your study using our template and report back on your study

WHEN WILL THIS HAPPEN?

'Develop your PHFS' is taking place from January to December 2022 in monthly sessions. In January 2023, we will present the national results of the PHFS and draw lessons for the EU.

WHERE TO START?

CHOOSE THE TOPIC OF YOUR PHFS

You can choose the topic of your COVID-19 foresight study according to the priorities and context of your country. You may also use our pre-defined topics: the impact of COVID-19 on

- Mental health
- Control of NCDs
- Delayed care in breast cancer patients
- Healthy lifestyle
- Environmental health
- Occupational health
- Maternal & new-born health
- Non-COVID healthcare & mortality utilization in vulnerable groups

CHOOSE A TRACK

We propose the following 'tracks' that you can follow:

- **Planning a foresight study**: to plan a foresight study; to be followed simply as an exercise or to prepare a grant proposal
- **Planning and executing a foresight study:** to fully plan and (actually) carry out a foresight study.

FOLLOW THE GUIDE TO GET YOU STARTED AND GOING!

We offer a guide that follows a stepwise approach to assist you in developing your PHFS.

JOIN US!

If you are interested in foresight studies and want to receive support to plan your own study: **JOIN US** by registering here.

www.phiri.eu/wp9
PHIRI.NL@RIVM.nl
phiri.coordination@sciensano.be
Subscribe to the PHIRI newsletter
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PHIRI
Population Health Information Research Infrastructure

1

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101016317

Appendix 3. Assessment Form used in Practice Country Presentations

Name: **Country:** **Affiliation:** **Title Foresight study:**	**Comments**
Topic: Objective of the foresight study: If the background and context of the study is clear as well as the objective/research questions	
Presentation structure: If the presentation is done in a way that engages the audience (general comment). If the presentation has a good structure, it is clear and understandable, and with an easy-to-follow storyline. If the time for presentation is used effectively.	
Presentation content- it includes the main sections: • **uncertainties identified**. • **developed scenarios (attractive labels)** • **challenges and implications for policy** The scenarios should be understandable and clear, as well as the main implications for addressing challenges of the scenarios/implications for policies and interventions.	
Communication skills Conciseness, body language, confidence…	
How questions were handled during the Q&A session Participants should be able to address Q&A properly and clearly as well.	

Appendix 4. Summary Sheets of the Public Health Foresight Studies of Participants

Note: We have received consent from all participants to add their names in this report.

Austria

Name: Michael Gyimesi
Country: Austria
Affiliation: Austrian Public Health Institute (GÖG)
Title of Foresight Study: Outlook on Long Term Care in Austria (OLTCA)

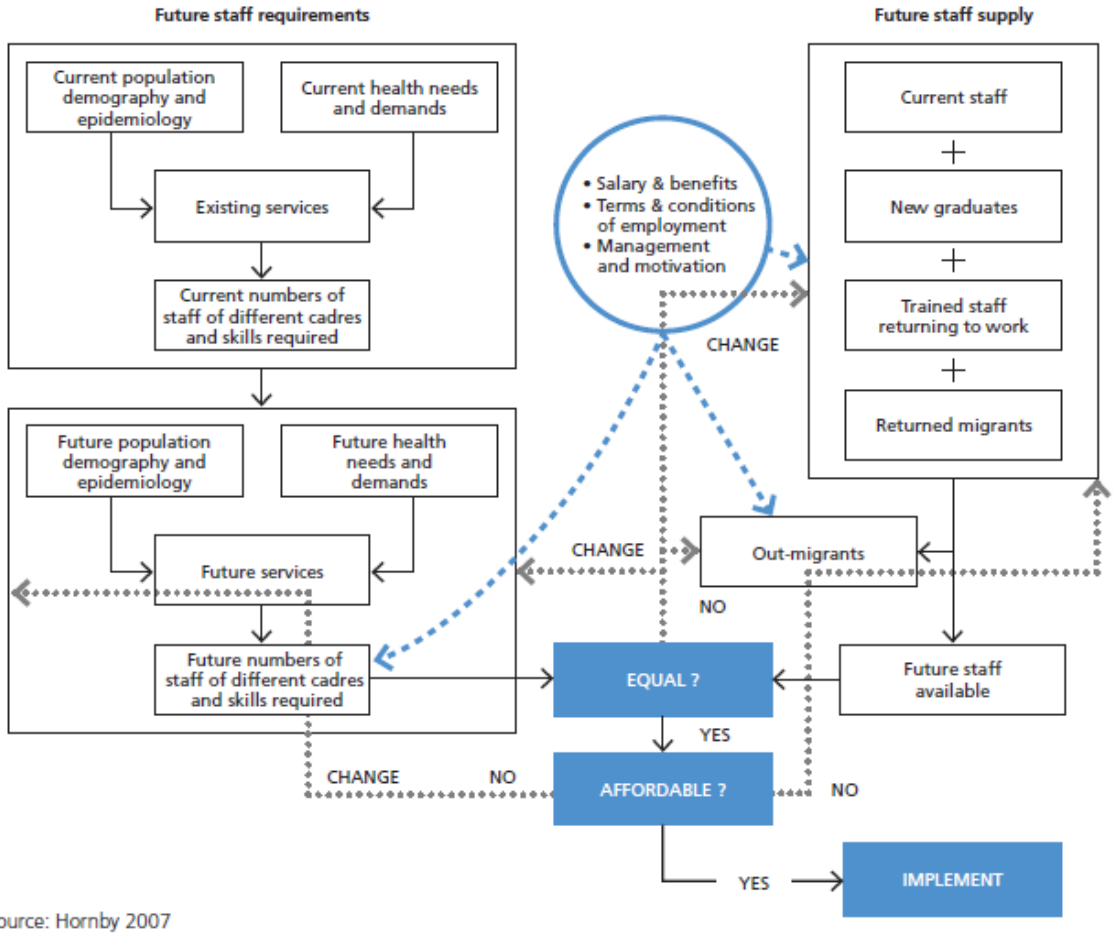
Contextual information & Background
The OLTCA study is funded by the Austrian Federal Ministry of Social Affairs, Health, Care and Consumer Protection. It is assigned to the GÖG for 2023 and will cover an outlook up to 2040. The core project team consists of 5 persons with a variety of education background (economy, mathematics, demography, sociology, public health). They are supported by experts both internally and outside the GÖG (long term care practitioners in different care settings and educational institutions, long term care experts out of the Austrian regions)
No formal advisory boards are installed. The process and results are supervised by the funding ministry and the study will be discussed in the GÖGs scientific board.

Objective of the foresight study
Will there be sufficient personnel available in the future to provide high-quality care and nursing service and how could the availability be stimulated?
Topic: Health workforce planning in long term care
General issue: In the next years**,** many care workers will retire. At the same time and in the hindsight of the COVID-19 pandemic the profession of care and nursing seems to lose attractiveness. Therefore, the Austrian system of long-term care will be challenged to maintain their services.
Sub issues:
Increase availability of professional nursing and care workers.
Improve the image of the nursing and care professions and make work as a nurse and social carer attractive.

Conceptual model
As a conceptual model a WHO staff supply-requirements model is used (Fig. 2, Hornby 2007)[9]

[9] World Health organization., Models and tools for health workforce planning and projections, H.R.f.H. Observer, Editor. 2010, World Health Organization: Geneva

Figure 2. OUTLINE CONCEPT FOR LINKING HEALTH WORKFORCE REQUIREMENTS AND SUPPLY PROJECTIONS



Source: Hornby 2007

Staff requirements are determined by:

- existing services and changes on the service level because of projected changes on needs and demands**.**
- current and future demographic developments

Staff supply is determined by:

- current staff
- projected number of new graduates
- migration
- fluctuation in and out of nursing professions

Both segments are calculated separately for a given year and result in a more or less pronounced gap between requirements and supply. As future (additional) costs are relevant for the public sector, a second economic layer is used in this model so that the affordability of different strategies can be shown as well. Via variation of input parameters, different scenarios can be simulated.

Time horizon & Spatial Unit
2040 – National, Regions

Scenarios
We used a DESTEP approach. The most important driving forces (trends) are**.**

- demographic change (aging of the population) in Austria
- recessionary economic trends that threaten our welfare and availability of (public) resources
- climate change
- IT- and mechatronics development

- Neoliberalism

Most important uncertainties are**.**

- How will the society react to shortage of environmental resources**?**
- How much will the climate change increase migration and how will western societies react
- (Health) care spending

Scenarios: We planned to use a trend scenario with a baseline scenario and policy variants

- Baseline - business as usual
- Best care for the elder people will benefit the whole society
- Centralized management of long-term care is more efficient**.**
- Regions know needs and demands of their elder population the best and manage them the best
- Make long term care great again

Main outcomes and insights

Our work ended in the phase of finding most important driving forces and uncertainties. Scenarios are only outlined and never calculated. Therefore**,** further results are not available.

Policies and Interventions

Our work ended in the phase of finding most important driving forces and uncertainties. Scenarios are only outlined and never calculated. Therefore**,** further results are not available.

Products and Communication

Our work ended in the phase of finding most important driving forces and uncertainties. Scenarios are only outlined and never calculated. Therefore**,** further results are not available.

Conclusions

Our work ended in the phase of finding most important driving forces and uncertainties. Scenarios are only outlined and never calculated. Therefore**,** further results are not available.

Your personal experience

A PHFS is a big task. Even for an educational purpose only study there is a lot of work to do to make it meaningful. On the other hand, you will learn a lot about the task at hand.
The template (together with the compact PHF guide) is a good guideline for conducting a PHFS.
A beforehand estimation about resources needed for conducting a toy (or minimal) PHFS would have helped to secure the resources internally.

Belgium

Name: Yasmine Khan
Country: Belgium
Affiliation: Ghent University
Title of Foresight Study: Future health and health economic implications of the COVID-19 pandemic on non-COVID-19 diseases

Context information & background

During the COVID-19 pandemic, one of the major concerns has been the fear of infection. This fear has resulted in patients avoiding healthcare institutions or postponing their medical appointments, as they believe that they may get infected with the virus or that they may be overburdening healthcare professionals. Unfortunately, healthcare avoidance is often based on unfounded beliefs that can have serious consequences for an individual's health. For instance, patients with chronic conditions may miss important medical interventions and treatments that could prevent their conditions from worsening. Furthermore, delaying medical care can lead to a higher risk of complications and long-term health issues.

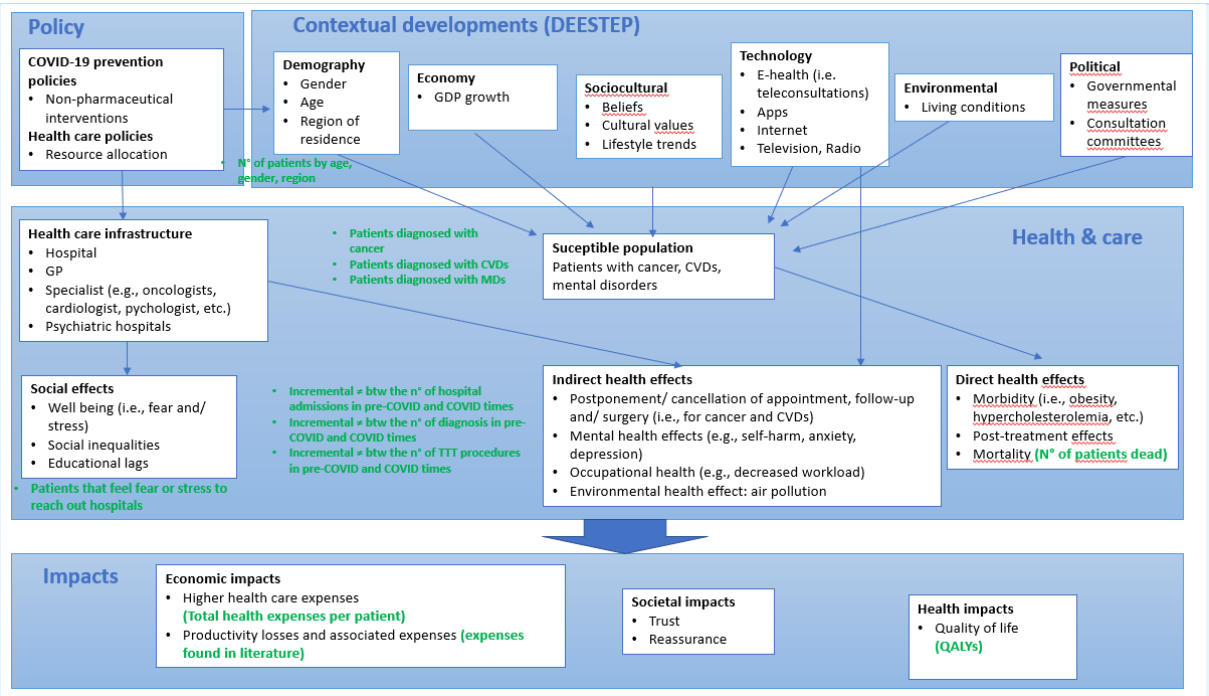
Public health authorities have recognized the importance of addressing this issue and have made efforts to communicate to the public that avoiding care when needed is not the solution. They have used various channels such as radio spots, TV, social media, the internet, and newspapers to inform the public that it is safe to seek medical care during the pandemic. However, despite these efforts, strong personal beliefs may counteract these messages, and patients may still avoid medical care. This highlights the importance of not only communicating the message but also addressing the underlying reasons for healthcare avoidance, such as fear and misinformation.

Overall, healthcare avoidance during the pandemic is a concerning issue that can have severe consequences. While efforts to communicate the importance of seeking medical care are crucial, addressing the underlying reasons for healthcare avoidance is also essential. By working to build trust and address fear and misinformation, we can help ensure that patients receive the medical care they need, even during challenging times.

Objective of the foresight study

Topic: Non-COVID-19 disease patients' health
General issue: Long-term and indirect health economic impact of COVID-19 crisis on non-COVID-19 disease patients' health
Sub issues: the indirect impact of the pandemic (delayed health care) in terms of Quality-Adjusted Life-Year Losses (QALYs), costs (euros), productivity loss and associated expenses on cancer, CVD, and mental disorders.

Conceptual model



Time horizon & Spatial Unit

Our project uses a four-year time horizon from 2021 and our project focuses on a national level**.**

Scenarios

Scenario	Main outcomes	Main challenges
The "missing" patients: • Lack of resources • Lack of healthcare professional availability • Lack of knowledge and understanding of "help-seeking" concept	• ↓ medical appointments • ↓ diagnoses, treatment follow-up, treatment initiation, and surgeries vs pre-COVID-19	• ↓ Patients' medical condition (stage shift) • ↓ Quality of life • ↑ Aggressive & costly treatment • ↓ Productivity • ↓ Survival • ↑ Health inequalities

Scenario	Main outcomes	Main challenges
The "catching-up" patients: • Higher educational level • Health literacy, better understanding of healthcare system • Higher socio-economic status • Access to telemedecine	• ↑ medical appointments • ↑ or = diagnoses, treatment follow-up, treatment initiation, and surgeries vs pre-COVID-19 times	• Lack of resources • ↑ cost to reach the whole population • Reach vulnerable groups & make them catch-up

Main outcomes and insights

Both scenarios face the same challenge: a lack of resources. The worst-case scenario observes an increase in treatment costs and the best-case scenario notices an increase in costs to reach whole population. Health inequalities might increase and therefore need more consideration.

Both scenarios face a common challenge, which is a lack of resources. However, the worst-case scenario would face a more severe issue of increased treatment costs, which might lead to difficulties in providing adequate healthcare services. On the other hand, the best-case scenario faces the challenge of increased costs associated with reaching the entire population, which might limit the reach of healthcare services. In both scenarios, there is a risk of health inequalities increasing, which means that certain groups might face more difficulties accessing healthcare services than others. As such, it is important to give greater consideration to health inequalities and ensure that everyone has access to healthcare services, regardless of their background or socioeconomic status. This might involve the need to prioritize resource allocation, improve communication and outreach efforts, and

encourage care-seeking behaviors among vulnerable groups. Overall, it is essential to address these challenges and ensure that everyone has equitable access to healthcare services to promote better health outcomes for all.

Policies and Interventions

To improve healthcare outcomes, it is crucial to prioritize the needs of vulnerable groups. One way to achieve this is by ensuring better resource allocation towards healthcare initiatives that benefit these populations. Additionally, there needs to be a focus on communication improvement on policy measures related to healthcare to ensure that everyone, including vulnerable groups, fully understands their rights and the available resources. Encouragement of care-seeking behaviors is also necessary to ensure that vulnerable groups receive the necessary healthcare they need. This can be achieved by providing education and outreach programs targeted at these populations to promote awareness and understanding of healthcare resources available to them. By implementing these measures, we can work towards a more equitable and effective healthcare system that prioritizes the needs of those who need it most.

Products and Communication

Effective communication plays a vital role in ensuring that products related to healthcare research and initiatives reach the right audience. The Brain-Helicon project, for instance, has implemented several measures to disseminate its findings and research output. Technical reports on the methodology and use of administrative data are one example of how the project is disseminating its research. These reports are useful in providing in-depth insights and technical details to stakeholders who require this level of information. In addition, the project has a website that serves as a central hub for disseminating information. This website provides a platform for stakeholders to access relevant information, including research findings, news, and events related to the project.

One such event is the webinar, which covers several topics related to the project. For example, the webinar discusses the burden of post-COVID conditions in Belgium, social health inequalities during the COVID-19 crisis, and the impact of the pandemic on cancer care. The webinar is a useful tool in disseminating project findings to a wider audience and allows for interaction and engagement with stakeholders.

The project also has a Follow-up Committee and Steering Committee that oversee the implementation and progress of the project. These committees play a critical role in ensuring that project goals are achieved and that stakeholders are engaged and informed throughout the process. Effective communication and dissemination of project findings and initiatives are essential in promoting engagement and collaboration among stakeholders, which, in turn, can lead to better health outcomes and a more informed healthcare system.

Conclusions

In conclusion, the main outcomes and insights derived from the scenarios discussed above emphasize the need for a more equitable healthcare system that prioritizes the needs of vulnerable groups. A lack of resources is a common challenge faced by both the worst-case and best-case scenarios, which could lead to increased treatment costs or limit the reach of healthcare services. The risk of health inequalities increasing in both scenarios further highlights the need for greater consideration of vulnerable populations. To address these challenges, it is essential to prioritize resource allocation, improve communication and outreach efforts, and encourage care-seeking behaviors among vulnerable groups. By doing so, we can work towards a more equitable and effective healthcare system that ensures everyone has access to the necessary healthcare services to promote better health outcomes for all.

Your personal experience

A foresight study can be an excellent tool for gaining insights into the future and preparing for potential challenges and opportunities. From my experience, there were several aspects of conducting a foresight study that were helpful, and some that were challenging. Having a structured approach and methodology for conducting the study helped to ensure that the study remained focused and objective. However, one of the main challenges was the difficulty in predicting the future with certainty. Foresight studies are based on assumptions and projections, and there is always the risk of unforeseen events and disruptions that can affect the validity of the study's findings.

Additionally, the need to balance short-term and long-term considerations can be challenging, especially when trying to anticipate future trends and changes. Overall, conducting a foresight study can be a valuable exercise for gaining insights into the future and preparing for potential challenges and opportunities. However, it requires careful planning and management to ensure that the study remains focused and objective, and that its findings are accurate and reliable.

Name: Lisa Cavillot
Country: Belgium
Affiliation: Sciensano
Title of Foresight Study: Unravelling the long term and indirect health impact of the COVID-19 crisis in Belgium

Contextual information & Background

This thesis is part of a more global project called "HELICON project". The main hypothesis developed through this project is the following: the COVID-19 crisis will lead to indirect and long-term health impacts that differ according to the sociodemographic (SD) and socioeconomic (SE) factors and through the different waves of the pandemic. HELICON aims to provide answers to three main gaps: What is the social pattern of COVID-19 (i.e., how does the health impact of COVID-19 differ for different population groups)? What are the direct and long-term health impacts of COVID-19? What are the indirect health impacts caused by the policy and behavioural changes implemented to address the COVID-19 crisis?
To meet these three objectives, HELICON will establish links between different Belgian databases: COVID-19 related data (hospitalization, infection, testing) and data on SE/SD characteristics, health care utilization, costs, and mortality.

Objective of the foresight study

Topic: epidemiology/population health
General issue: unravelling the long-term and indirect health impact of the COVID-19 in Belgium
Sub issues:

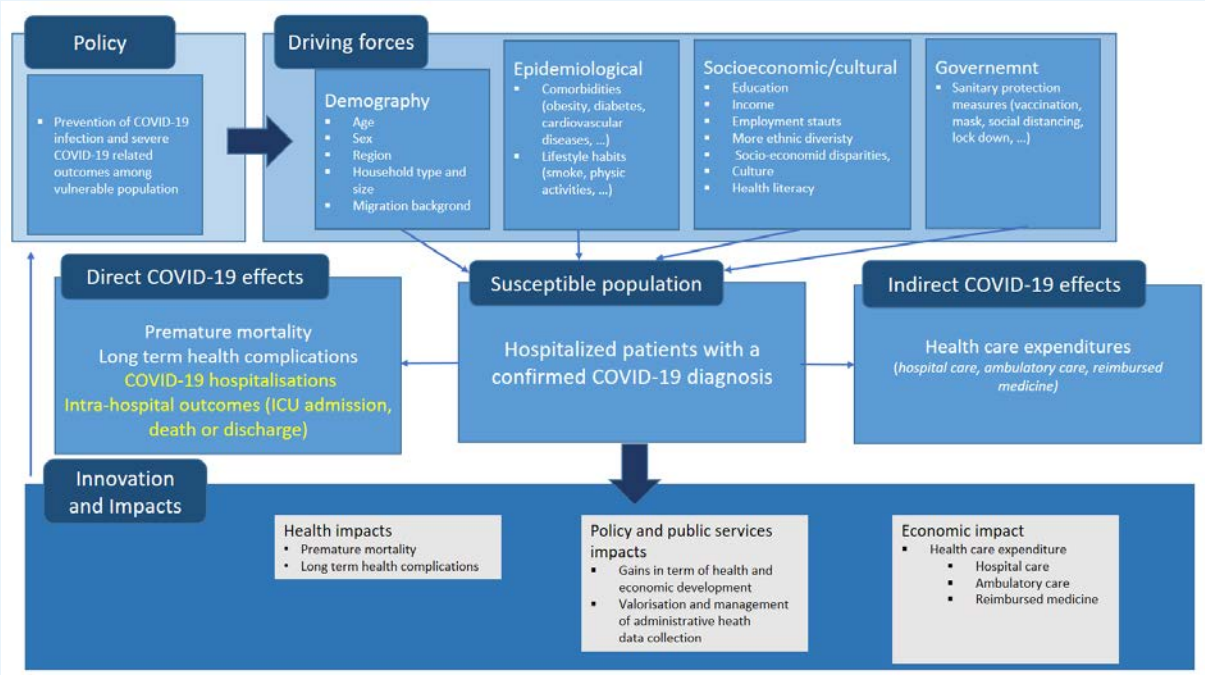
Work package 1 (WP1): COVID-19 and social patterning:

- Social inequalities in COVID-19 hospitalizations

Work package 2 (WP2): Direct long-term health impact of COVID-19:

- Health care expenditure during and after hospitalization
- Long-term health complications after hospitalization
- Premature mortality after hospitalization
- Validity of IMA-AIM nomenclature code

Conceptual model



Explanations:

In this conceptual model, I assumed that some driving forces (i.e., demographic, epidemiological, socioeconomic, and government characteristics) influence the intrinsic and extrinsic characteristics of the population of interest (i.e., hospitalized patients with a confirmed COVID-19 diagnosis in Belgium). This population can develop (due to certain intrinsic or extrinsic characteristics) direct outcomes due to SARS-CoV-2 infection (e.g., premature mortality, long-term health complications, intra-hospital outcomes). But, SARS-CoV-2 infection can also lead to indirect COVID-19 effect, such as an increase in healthcare expenditures. The occurrence of these direct and indirect effects has important health, economic, and policy and public services impacts. These impacts can have an influence on the policy marker's decisions, and these can directly influence the driving forces.

Time horizon & Spatial Unit
Time horizon: 5 years
Spatial unit: national

Scenarios

- *Most important driving forces (trends)*

Ageing of the population, increasingly crowded cities, decrease household size, increase healthcare expenditure, increase in unemployed people, decrease access to the right care, decrease health insurance coverage, increase socioeconomic disparities, increase in the health literacy gap, increase comorbidities, increase distrust in government, decrease number of healthcare professionals.

- *Most important identified uncertainties (trends)*

Increase health expenditures, decrease health insurance coverage, increase long-term health complications related to SARS-CoV-2 infection.

- *Scenarios*

Best-Worse case approach
Best
There are no serious long-term health complications for people hospitalized with COVID-19, the number of hospitalizations decreases, the situation becomes more manageable for future waves, the costs related to long-term complications decrease.

Worse
Presence of long-term complications affecting a large proportion of people who were hospitalized for COVID-19, specifically the most vulnerable (elderly, with comorbidities), difficulties in managing the health crisis in future waves, lack of medical staff, increased direct medical costs related to long-term complications.

Main outcomes and insights
The challenges that should/could be addressed through policy interventions would be to act on the health and cost impacts of long COVID. Measures should be put in place to take care of people suffering from long term COVID, especially vulnerable people (elderly, people from disadvantaged socio-economic backgrounds). It would also be necessary to financially support with state interventions the additional care related to long term COVID.

Policies and Interventions
Scenarios showed us a potential increase, in a large proportion of the population who were hospitalized for COVID-19, in long-term health complications. This implies that this new increase in demand for care must be addressed and prevention must be implemented to avoid a further increase. Here are several possibilities of interventions for policy makers to manage and limit this increase in long-term complications:

- Increase in medical staff to manage the increase in long-term complications after the COVID waves
- Adequate treatment of each long-term complication

- Implementation of prevention strategies (masking, vaccination, drug treatment, etc.) to reduce the occurrence of long-term complications

Products and Communication

To communicate with policy makers and scientific communication, we will use evidence obtained by our studies and for the general public, we will use a summary of evidence obtained by our studies. Our message will therefore be adapted to the public of concern. For policy makers and scientists, arguing on the basis of the results, the size and importance of the effects, the size of the study population, and the significance of the results are important because they make the conclusions robust. Whereas for the general public, the statistical and constructional details of the study design do not matter to the same extent but rather it is the general conclusions we can infer about the population that matter.

In summary, the product use to communicate with policy makers would be reports related to our results, scientific communiqués published in scientific journals, and also round tables in order to exchange our results with the policy makers concerned.

Concerning the communication with the general public, our results will be communicated via press articles in newspapers, radio**,** or television interviews, and via our website HELICON which gathers summaries of all the research carried out within the framework of the project and which is intended for any public.

Conclusions

In conclusion, the impact of the COVID-19 pandemic could have important long-term economic and health consequences. People at risk (elderly, with co-morbidities, from a disadvantaged socio-economic background, etc.), already more affected by the direct and short-term consequences of COVID-19 (infection, hospitalization, etc.) will be more impacted by the long-term consequences with an increase in health and financial consequences. The role of the policymakers will therefore be essential to help these populations, already more fragile, to face long-term health complications (prevention, adequate care, access to health resources) and the costs generated (state intervention in the reimbursement of medical care).

Your personal experience

What has been difficult for me is to grasp and describe everything that could/will happen in the future. This capacity for anticipation and long-term thinking has been difficult to acquire for me especially in the context of my study, which is retrospective in design. What was helpful was the compact guide that was available to us as well as the various meetings and personalized sessions organized to help us progress with our foresight study.

Name: Tugce Schmitt, Marie Delnord
Country: Belgium
Affiliation: Cancer Centre, Sciensano
Title of Foresight Study: Precision medicine in Belgium

Contextual information & Background

The field of genomics changes the way health systems provide care across the world. Personalized medicine has been found to be highly promising in the prevention or early detection of cancers. Despite the advantages, the scope and potential of personalized health care are under-appreciated and underrealized in health systems. Considering the advantages that the personalized medicine can bring to cancer prevention and treatment and acknowledging at the same time the trends happening outside of the field of oncology (or even healthcare), which can act as driver and restraint in the further development of this innovation in Belgium, Sciensano Cancer Centre conducts research on the use of personalized medicine in the Belgian healthcare system.

Foresight is a deliberate attempt to broaden the ‘‘boundaries of perception’’ and to expand the awareness of emerging issues and situations. As such, it integrates the perspectives, procedures, and tools of both trend research and futures studies. Given that policymakers are increasingly forced to assess their environments systematically and to identify the relevant upcoming issues early on, they must think ahead strategically to reduce ‘‘surprises’’, to increase the room for maneuver, and to improve the overall flexibility of governance. Strategic foresight on precision medicine can support decision-makers in these tasks and help them to develop future-oriented policies.

Objective of the foresight study

Topic: Implementation of precision medicine in (routine) cancer care in Belgium in a fair and equitable way
General issue: Precision medicine
Sub issues: Cancer care, use of AI, diagnostics, prevention

Conceptual model

Please see our conceptual model (Figure 5).

1. Desk research: An inventory of the DESTEP trends was created; performing a desk study via a systematic literature review resulted in a long list of possible relevant trends for the precision medicine implementation in Belgium. Next, the results of the systematic literature review were validated in a multi-disciplinary group at the cancer center to ensure that all relevant DESTEP issues were listed.

2. Survey to experts: Based on the outcomes of the first step, a survey was sent to the main precision medicine stakeholders in Belgium i.e.**,** colleagues involved in the Belgian EBCP mirror group (almost 400 experts working in oncology, incl. ComPerMed management board, Ministry of Health**,** and the umbrella organization of the sickness funds). The aim of the survey has been to rank the importance and the likelihood of the DESTEP issues identified in Step 1. The survey results have been evaluated based on the impact-uncertainty matrix as described below:

• Impact: After having obtained the long list of relevant driving forces, the most important ones have been discovered by ranking the driving forces by relevance, i.e.**,** how much impact they may have on the outcomes by asking the question “How important are these factors for the implementation of precision medicine in routine cancer care in Belgium in a fair and equitable way?”

• Uncertainty: Driving forces have been ranked also according to their (perceived) uncertainty or likelihood by asking the question “How high is the chance that these factors will influence the implementation of precision medicine in routine cancer care in Belgium in a fair and equitable way?”. Given that it is advisable that ranking the trends by uncertainty should be done in collaboration with stakeholders, this part is also included in the third step as described below.

When participants filled out the survey, they were asked whether they would like to be involved in stakeholder meetings with other experts. Two stakeholder meetings were planned (online, early 2023).

3. First stakeholder meeting: The aim of the first stakeholder meeting is three-fold:

The first aim is to understand stakeholders’ positioning and their ideal, desired future in relation to access to personalized medicine.

The second aim is to come to a consensus regarding the main driving forces regarding the implementation of precision medicine in Belgium. The participants are asked whether they agree on the most important issues for the implementation alongside their reasons why they think so.
The third aim is to explore the uncertainties about the main driving forces. The respondents are asked to rate the uncertainties about the main driving forces. To collect information from the respondents during the stakeholder meeting, an online tool (Mentimeter) is used.
4. Scenario building: The results of the ranking exercise help the research team identifying the axes along which the scenarios can be constructed, therefore find out the scenario logics. They focus on the 'high important/low uncertainty' and on the 'high important/high uncertainty' quadrants of the matrix. Based on these, the a few critical scenarios are fleshed out, incorporating elements of both desirable and undesirable futures.
5. Second stakeholder meeting: The aim of the second stakeholder meeting is to present the scenarios to the stakeholders and start to turn the scenarios into strategy. The following questions are central to the discussion:
- What are the strategic implications of the scenarios for the implementation of precision medicine in Belgium in a fair and equitable way?
- What options do the scenarios suggest?
- What are the policy options for each of these scenarios?
6. Communicating the outcomes to decision-makers:
The results of the foresight exercise are analyzed by the research team and summarized in a report. Next, a policy dialogue is held between the Cancer Centre and National Institute for Health and Disability Insurance (INAMI-RIZIV). Moreover, the research team submits a paper to a scientific journal.

Time horizon & Spatial Unit
More than 10 years; spatial unit: national.

Scenarios
Based on the outcomes of the survey, the preliminary results suggest the following items as the most important driving forces for the implementation in Belgium:
Economy:
1. Allocated budget for reimbursement of personalized healthcare in the health system
2. Rising healthcare expenditure in health systems
3. Decreasing costs for Next-Generation Sequencing (NGS) in health systems

Social:
4. Increasing incidence and prevalence of cancer

Technology:
5. Digitalization and automation trend that fosters health-data exchange and supports research on new preventive care strategies and treatments
6. Quality of data
7. Standardization (of imaging protocols, tests, and nomenclature) across hospitals and laboratories

Policy and politics:
8. National and international collaborations and partnerships

Based on the outcomes of the survey, the preliminary results suggest the following raking from the highest uncertainty to the lowest:
1. Standardization (of imaging protocols, tests, and nomenclature) across hospitals and laboratories
2. Digitalization and automation trend that fosters health-data exchange and supports research on new preventive care strategies and treatments
3. National and international collaborations and partnerships

4. Quality of data
5. Decreasing costs for Next-Generation Sequencing (NGS) in health systems
6. Increasing incidence and prevalence of cancer
7. Rising healthcare expenditure in health systems
8. Allocated budget for reimbursement of personalized healthcare in the health system, esp. in post-pandemic time

The preliminary results are to be discussed and agreed on in the first stakeholder meeting. If we take the top three uncertainties (see No. 1-3 above), the following three scenarios can be developed:

A. A low level of standardization across hospitals/laboratories and digitalization trend fostering health-data exchange and a low level of national/international collaborations
B. A high level of standardization across hospitals/laboratories and digitalization trend fostering health-data exchange but a low level of national/international collaborations
C. A low level of standardization across hospitals/laboratories and digitalization trend fostering health-data exchange but a high level of national/international collaborations
D. A high level of standardization across hospitals/laboratories and digitalization trend fostering health-data exchange and a high level of national/international collaborations

Main outcomes and insights

Scenario A would be the worst-case scenario whereas Scenario D would be the best-case. Scenario B suggests that the capacity building and resources would happen rather in isolation in and outside of Belgium, having less contact with other countries. Scenario C would imply greater collaborations within Belgium and with other countries that could support the capacity building for the standardization of imaging protocols/tests and health data exchange in healthcare organizations.

Policies and Interventions

Implications of Scenario A: Difficulties to move precision medicine forward
Implications of Scenario B: Isolated solutions in individual healthcare organizations
Implications of Scenario C: Healthcare organizations within and outside of Belgium supporting each other for standardization and digitalization
Implications of Scenario D: Favorable situation to move precision medicine forward

Products and Communication

- Report summarizing the outcomes
- Policy dialogue with National Institute for Health and Disability Insurance (INAMI-RIZIV)
- Policy briefs to be distributed to the Belgian EBCP mirror group
- Communication within Sciensano via newsletter
- Communication within Sciensano via lunch-seminar
- Paper in a scientific journal

Conclusions

With an increasing prevalence and incidence of cancer in Belgium, several factors should be considered to implement the precision medicine for cancer prevention and treatment in a fair and equitable way. The most obvious factors are concerned with the economic issues, such as the allocated budget in the healthcare system. Nonetheless, socio-technical system around precision medicine should not be neglected: especially the conditions external to the healthcare system (e.g., the overall digitalization trend and national/international collaborations) can be decisive to determine the future of precision medicine in Belgium.

Your personal experience

Regular and tailor-made sessions provided by RIVM have been immensely helpful. Finding the right stakeholders and nudging them to participate in the foresight exercise has been challenging.

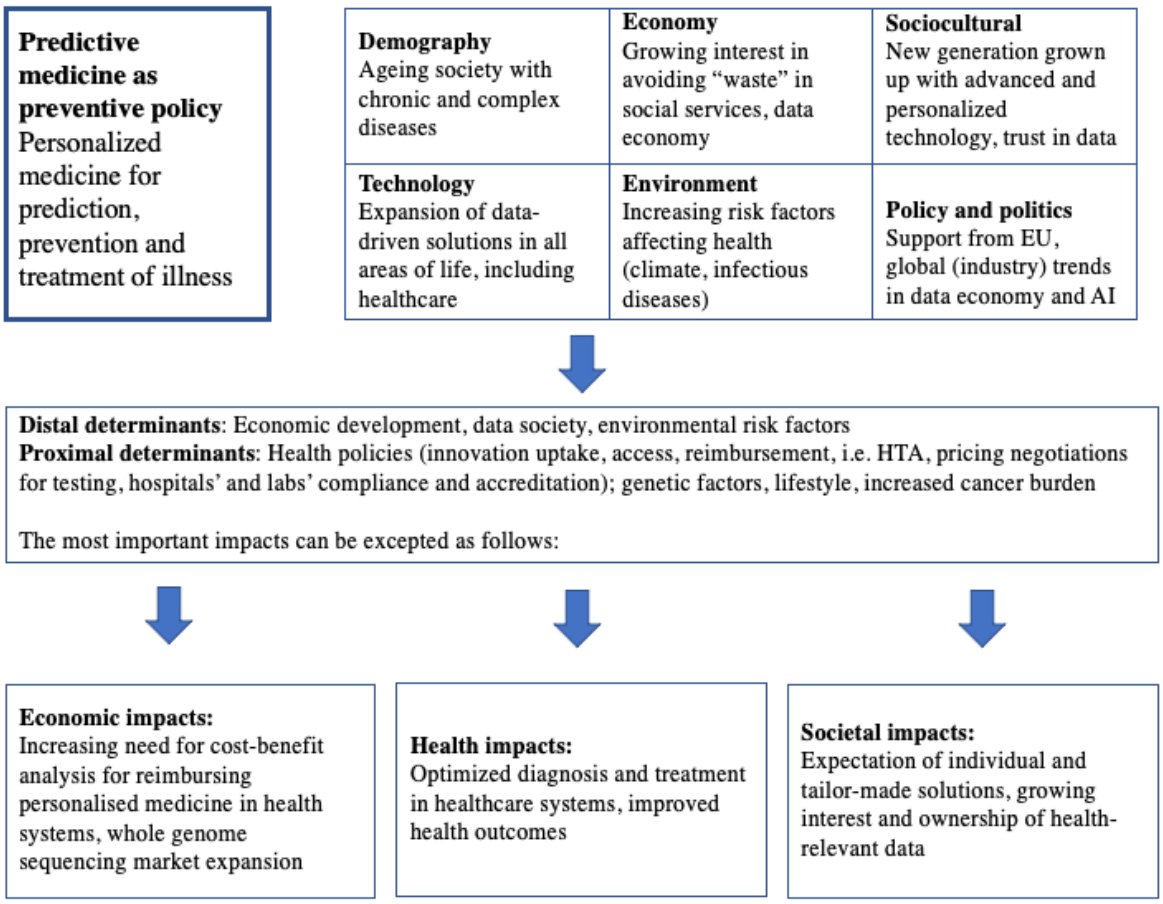


Figure 5: Conceptual model for the implementation of precision medicine in Belgium

Bosnia and Herzegovina

Name: Šeila Cilović Lagarija, Amna Isaković
Country: Federation of Bosnia and Herzegovina
Affiliation: Institute for public health FBiH
Title of Foresight Study: Mental health in pre and post pandemic period in the Federation of Bosnia and Herzegovina

Contextual information & Background

The Institute for Public Health FB&H is authorized by the law to conduct and implement, statistical research in the field of health care in line with relevant laws and by-laws and a specific mandate to periodically report to the Ministry of Health Federation of Bosna and Hercegovina and all Government on the health status and future development of health care in mental health.

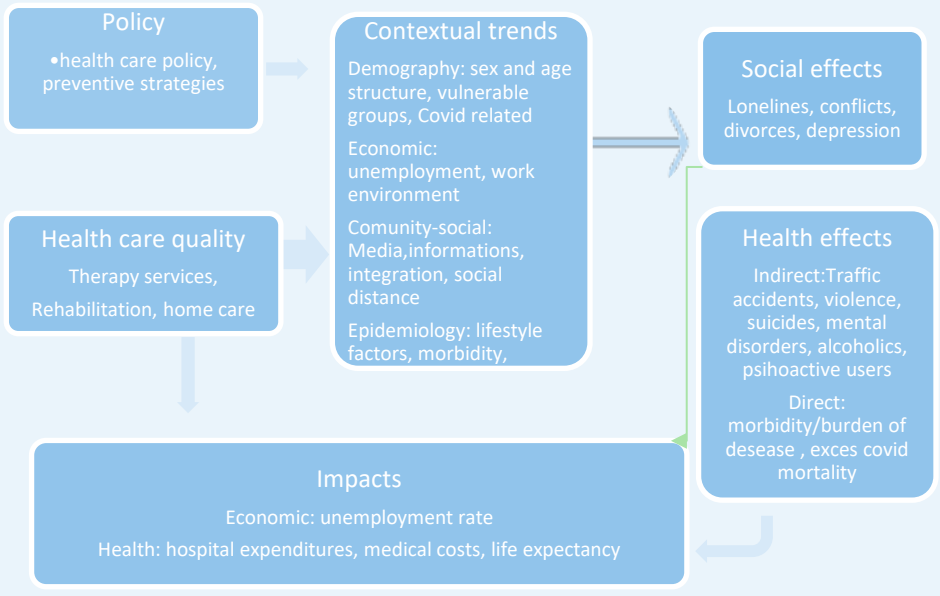
Law:

-Law on Health Records, Official Gazette of FB&H, 37/12.
-Ordinance on the form and content of basic medical documentation, Official Gazette of FB&H, 61/18.
-Ordinance on the form, content**,** and manner of keeping individual reporting forms and other auxiliary forms for keeping records, Official Gazette of FB&H, 61/18.
-Ordinance on the manner and deadlines for submission and form of summary reporting forms, Official Gazette of FB&H, 61/18.
Periodic study according to Official Law[10]

Objective of the foresight study

Topic: Population mental health
General issue: Direct and indirect impact of COVID-19, on mental health
Sub issues: Mental health morbidity, lifestyles, number of suicides, number and purpose of visiting mental health centre

Conceptual model



Based on the collected and adequately presented thematic trends related to demography, economic influences, social events**,** and the state of health in the country, it is necessary to create adequate preventive strategies with the aim of improving mental health on the basis of ensuring the prerequisites that are necessary for the provision of adequate health care. It is important to create prerequisites for providing adequate health care (therapy service, rehabilitation, home care).

[10] https://www.zzjzfbih.ba/wp-content/uploads/2022/05/engleski-ZZJZ_web.pdf

The governing structures must be aware and ready to act constantly with activities aimed at improving the economic situation in the country to eliminate factors that negatively affect the mental health of the community.

Time horizon & Spatial Unit
0-5 years
Study refers to the state level

Scenarios

- ***Increase number of mental health disorders and suicide due the Covid-19***

- Economic situation has led people to reduce the use number of available public services and the number of public health providers are limited. Unpredictable illnesses increase and quick-fix solutions and treatments remain unaffordable for states and citizens. The deterioration of living standards leads to tensions among citizens and mistrust in policies.
  - **No increase in number of mental health, and number of suicide due the Covid-19 just increase in number visiting/telemedicine in mental health centre.**
- Thanks to public and private investments effectively influence on better health care, ensuring quality of existing programmes, Prevent low-value care
  - **Manage the situation in period of COVID-19, related to mental health**
- During crises we will try to find quick solutions to problems using examples of good practice from surrounding countries. we will try to adapt as much as possible to new situations

  - Ensuring quality of existing programmes
  - Prevent low value care**.**

  Reallocating resources from low-value care, systematic assessment of value of health interventions.

Main outcomes and insights
Policy initiatives both within and outside the health sector, including policies on urban planning, health care, nutrition and labour, can also result in significant improvements in community mental health. Both the quantity and quality of work have strong influences on factors related to mental health, including income, social networks**,** and self-esteem. Job insecurity, unemployment and low-quality jobs put mental health at risk and increase both anxiety and depression. Educational and job search training for high-risk groups can bring about increases in re-employment and the quality and pay of jobs obtained, greater achievements in job searching, and reduced depression and mental strain. Government management of the economy need to reduce the highs and lows of the business cycle, reduced hours**,** and job security during times of economic difficulty, reduce the risk of job loss, unemployment**,** and their consequences for mental health. When people are mentally healthy and live in supportive environments, they can learn and work well and contribute to their communities, to the benefit of all. Among its many impacts, the COVID-19 pandemic has created a global crisis for mental health, fuelling short- and long-term stresses and undermining the mental health of millions. At the same time, mental health services have been severely disrupted and the treatments for mental health conditions has widened.
Investing in mental health for all advances public health. It can reduce suffering and improve the health, quality of life, functioning and life expectancy of people with mental health conditions. Enhanced coverage and increased financial protection are fundamental steps towards closing the vast care gap and reducing inequities in mental health. So, integrating mental and physical health care, which improves accessibility, reduces fragmentation and duplication of resources**,** and better meets people's health needs. Around the world, people with mental health conditions are frequently excluded from community life and denied basic rights. For example, they are not only discriminated against in employment, education**,** and housing, but also do not enjoy equal recognition.

Policies and Interventions
Inform Policy makers about increasing number of mental health disorders and number of suicides to define new policies and action strategies because the mental health care system has to be

continuously improved. Regulations has to cover a variety of topics and apply to a number of groups including schools, insurance companies, treatment providers, and employers.
Legislation at this level may take a longer time but can have a massive impact once passed.

Products and Communication

Continuous pointing out of the situation and causes as well as ways of acting in order to involve everyone and contribute to the changes together

Information on future trends in public health. Information about preventive measures that can improve mental health. Better informed audience increases general awareness about future challenges**.**

The importance of monitoring future trends is in the interest of the entire community for better mental health

Continuous research and awareness raising to develop alternatives and new solutions for sustainable health care to meet the needs of the community.

Conclusions

The majority of those who need mental health care worldwide lack access to high-quality mental health services. Stigma, human resource shortages, fragmented service delivery models, and lack of research capacity for implementation and policy change contribute to the current mental health treatment gap.

- There is sound evidence that mental disorders can be successfully treated using evidence-based interventions delivered by trained health workers in community or primary care units. Stigma is a barrier to service uptake. Prevention is necessary to address the problem with mental health. Research-to-practice implementation studies are required to inform policies makers how to scale-up services needed for better mental health care.
- All countries need to expand their specialized workforce for mental health, while simultaneously building mental health care competencies of other care providers and individuals. In particular, primary care staff and a wide range of community providers – including community workers and peers – need to be equipped with new skills to detect mental health conditions, provide basic interventions and support, people where it is necessary specially for crisis situation like was Covid-19.

Your personal experience

Participants from other countries helped us a lot in our work by exchanging information and experiences.

The aggravating circumstance for us was not having enough adequate information related to mental health and care.

Czech Republic

Name: Ondřej Májek, Ondřej Ngo
Country: Czech Republic
Affiliation:
National Screening Centre, Institute of Health Information and Statistics of the Czech Republic
Title of Foresight Study:
Potential gains by effective early detection of diseases (Czech Republic)

Contextual information & Background

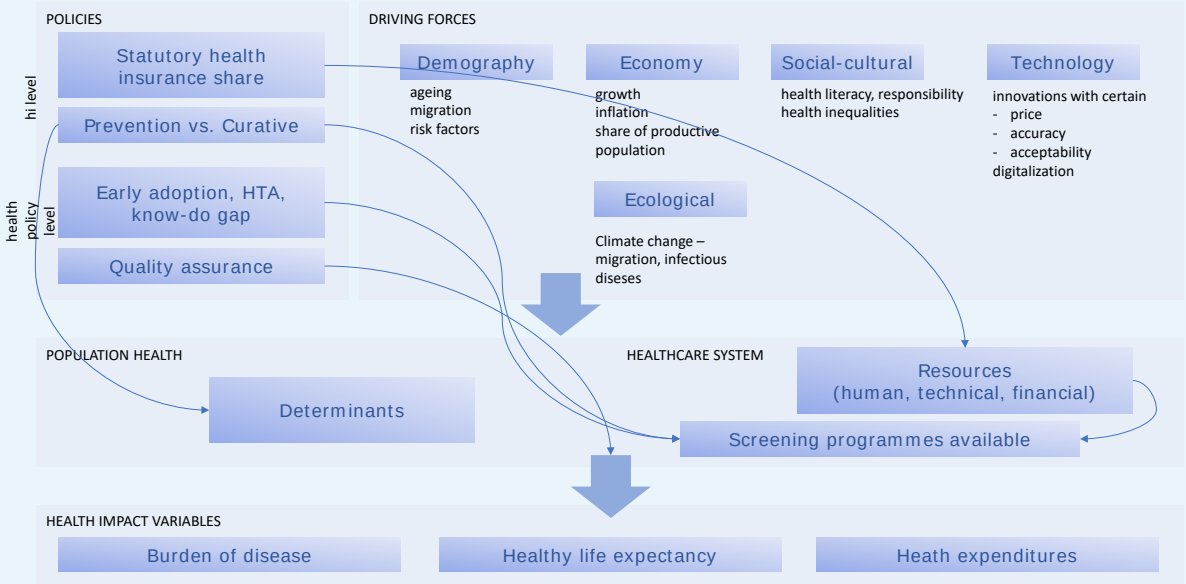
Significant amount of disease burden could be averted by the early detection and treatment of diseases (or their precursors or risk factors). The aim of our unit (National Screening Centre, NSC) is to harness this potential through introduction of effective health policies, notably in the context of public health and healthcare system in the Czech Republic. The foresight study will benefit from the team and tools (data from the National Health Information System, analytical methods) available at NSC.

Objective of the foresight study

Topic: potential gains by effective early detection of diseases
General issue: screening and early disease detection
Sub issues: impact of prevention policies, impact of new technologies

Conceptual model

The conceptual model starts from considering different high-level (government) policies and health policies. The results will be influenced by the classic DESTEP related driving forces. These inputs will influence the population health and the healthcare system: organisation of early detection and screening programmes and resources available (namely human, but also technical and financial resources). Health impact variables include both health and economical outputs.



Time horizon & Spatial Unit

Future development by 2040
National study

Scenarios

Most important driving forces with their relevance and uncertainties are summarized below.

Driving Forces	Trend	Relevance	Uncertainty
Demography	Ageing of the population	very high	medium

	More migration	high	high
	Prevalence of risk factors	high	medium
Economy	Economic growth	high	high
	Inflation	high	high
	Share of productive population	very high	high
Socio-Cultural	Health literacy	very high	medium
	Health inequalities	very high	medium
Technology	Availability of accurate, acceptable, and affordable screening tests	very high	very high
	Digitalization of the society (infrastructure, literacy)	high	high
Ecological	Climate change as a driver of migration, infectious diseases, …	high	high
Political (outside health policy)	Size of public health budget	very high	very high

In addition, we consider the availability of health workforce as a key factor.

Considered scenarios

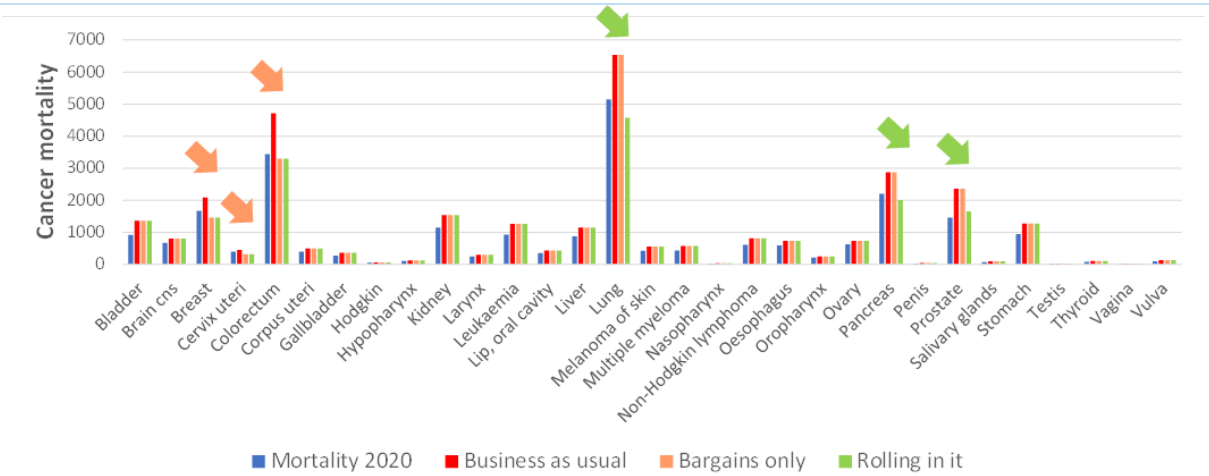
- **Rolling in it**
  Many new technologies, generous budget
  New technologies are emerging in different fields (blood biomarkers including omics, better imaging with AI, utilizing big data for predictive public health). Favourable macroeconomic situation and wide consensus on significant public insurance and investments to prevention provide financial resources.
- **Bargains only**
  Limited new technologies, modest budget
  No significant scientific breakthroughs in basic research. Modest economic growth and limited share of public service budget causes limited health expenditure, which needs to be spent primarily on curative services.

Main outcomes and insights

Cancer mortality in the Czech Republic, modelling estimations 2020 and 2040

Source: ECIS - European Cancer Information System, own modelling added

- **Business as usual:** if we fail to address challenges brought by population ageing**.**
- **Bargains only**
  (successful application of adequate policies)
  - 30% reduction classic: potential impact of 30% further reduction in cancer mortality for optimized “classic” screening programmes (breast, colorectal, cervical)
  - 2200 cancer deaths averted annually**.**
- **Rolling in it**
  (successful implementation of old and new programmes)
  - 30% reduction new: potential impact of 30% reduction in cancer mortality for optimized “classic” screening programmes (breast, colorectal, cervical), new promising screening programmes (lung, prostate) and successfully develop and implement early detection policies for pancreatic cancer
  - 5700 cancer deaths averted annually**.**



Policies and Interventions

Scenario Name	Main Challenges (and findings)	Policies/Interventions
Be rolling in it: Many new technologies, generous budget	Lack of health workforce with adequate mix of skills Insufficient implementation capacity for new programmes Insufficient funding of other public services, growing inequalities	Supporting health workforce education with continuous evaluation of necessary skillsets Institutions and procedures in place to implement and optimize early detection programmes. Strategic planning to assess capacity in other healthcare and public services functions
Bargains only: Limited new technologies, modest budget	Limited public capacity for primary and secondary prevention Ensuring quality of existing programmes Prevent low-value care	Prioritising “best buys” for improving public health in all policies Evaluation and policy-adjustment for existing screening programmes to ensure best cost-effectiveness and affordability Reallocating resources from low-value care, systematic assessment of value of health interventions.

Products and Communication

Potential audience (target groups) include (with pertinent product and channels):

- Ministry of Health, health insurance companies, parliamentary health committees
  - policy brief or fact sheet, explained at individual presentations and meetings
- Medical societies, public health institutions, scientific community
  - full report, accompanying conference or workshop
- General public
  - press release, press conference, infographics, factsheets, video communicated through classic and social media

These products have not yet been prepared, rather, they present potential tools if full-scale PHFS is prepared.

Conclusions

There is a substantial potential of health policies to address disease burden through early detection of diseases. However, resilient health system (with human, technical and financial resources available to be mobilised) and institutional background (for policy advice, planning and implementation, and quality assurance) are necessary to address challenges associated with implementation of organized programmes

Your personal experience

Foresight study is a very useful approach to synthesise evidence and present evidence product. It is a useful analytical framework, but incudes also very structured planning of, e.g., governance and communication/dissemination. It is therefore useful toolkit to prepare outputs to support long-term policies and strategies. On the other hand, the full exercise might be very complex and resource intensive, so the appropriate decision on width/depth considering the resources and time available is necessary.

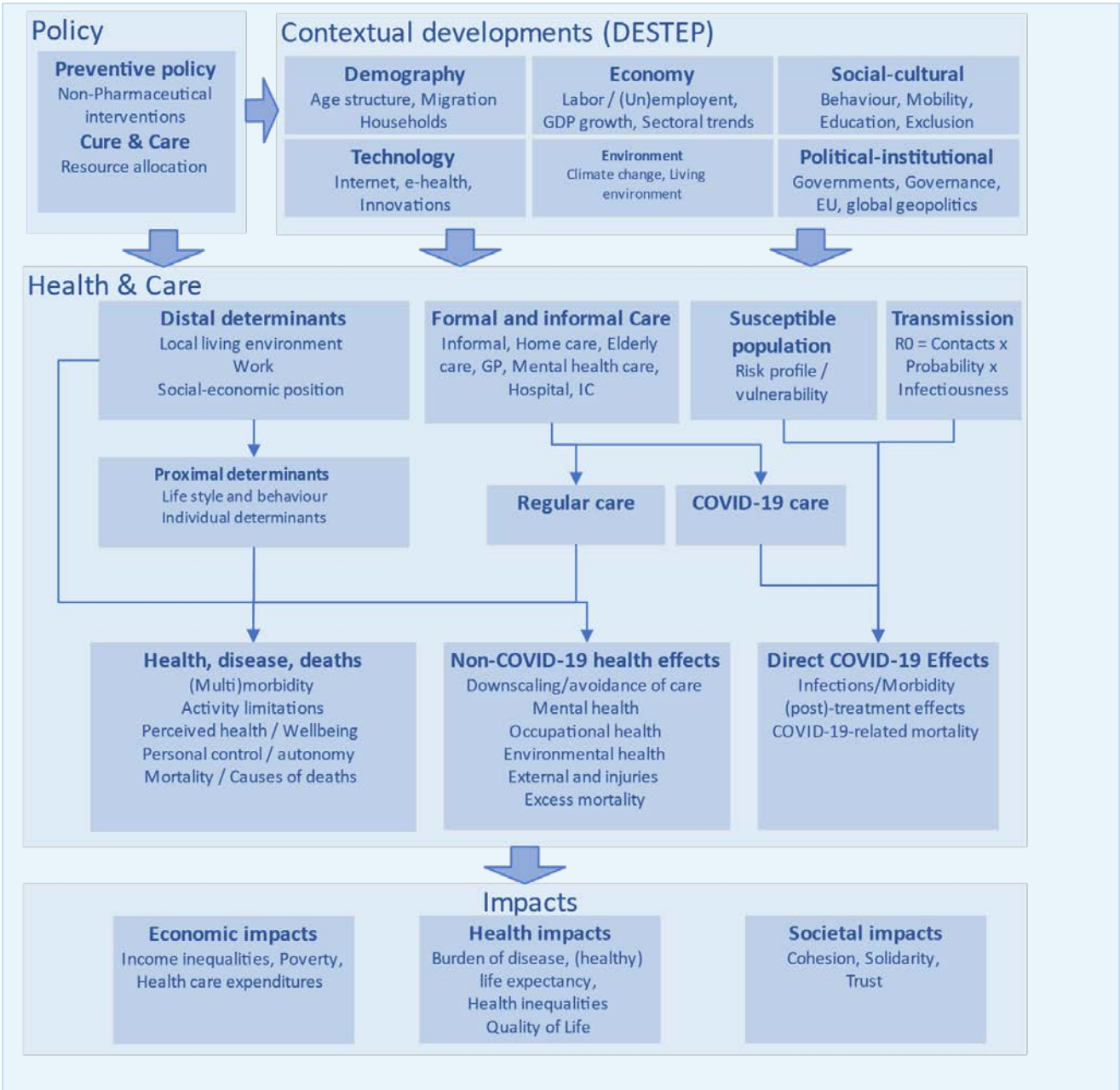
The Netherlands

Name: Henk Hilderink
Country: the Netherlands
Affiliation: RIVM National Institute for Public health and the Environment
Title of Foresight Study: Looking beyond COVID-19, about the future of our health
Dutch Public Health Foresight Study (update)

Contextual information & Background
The National Institute for Public Health and the Environment of the Netherlands has in its law (article 3) a specific mandate to periodically report to the Ministry of Health on the status and future development of public health and the environment.

Objective of the foresight study
Topic: Future Population health, incl. COVID-19
General issue: Direct and indirect impacts of COVID-19 on population health
Sub issues: Mental health, lifestyles, health care, local living environments

Conceptual model
The conceptual model originates from the Lalonde model and has been further developed for the various Dutch PHFS.



Time horizon & Spatial Unit
Time horizon: 2040
Spatial unit: National, where relevant sub-national information

Scenarios
Most important uncertainties that are identified: new outbreaks of a corona virus (or other virus), economic growth (with public expenditures as a derived uncertainties), technological improvement. The scenarios are then constructed using a best-worst case approach, with an additional "in between" scenario:

- Murphy's law: The corona virus will stay with us, causing outbreaks now and then that put parts of society in confinement. Economic growth will remain low due to geopolitical instability, shortage of personnel, climate change impacts and other societal challenges that require public investments.
- Muddling through: We will continue to go from crisis to crisis, without structural solutions. We will adapt as far as possible to the new situations. The corona virus will not be erased completely with seasonal waves, similar to the flu.
- Saved by Technology: Despite of the challenges we are facing, we will find a way to deal with them. Technology (high and low) will (finally) deliver its potential. An increased

acceleration of technological progress will be visible in all sectors, fuelled by the continued pandemic.

Main outcomes and insights

Murphy's law: Health impacts will be felt in the whole population but most severe among vulnerable groups. These groups are not only seen along the lines of education, also migration background, job-poverty, etc. Social and health inequalities increase. Mental health will be a main concern, next to the NCD health challenges arising from the ageing of the population. New outbreaks of infectious diseases will occur.

Muddling through: Every crisis might affect the heath of different groups in society. Governments should be better prepared to implement policies targeting different groups. Especially mental health will be of concern given the insecure feeling that people might have. Health inequalities remain, but along different dimensions.

Saved by technology: How to have new technologies implemented and how to safeguard that everybody will benefit from technology in a similar way. The gap between cans and cannots will increase.

Policies and Interventions

Murphy's law: Supporting vulnerable groups by integrated interventions (financial, education and healthy lifestyles)

Use the pandemic as a further push towards remote health care, lower mobility and pollution, local orientation (less risks from abroad)

Muddling Through: Make use of crisis to implement policies quicker (Never waste a good crisis). This requires a flexible government.

Policies focusing on mental health are important.

Saved by technology: Develop policies to guide technological progress.

Focus on groups with low digital literacy and support them.

Products and Communication

We have not setup a new products and communication approach other than the approach that RVM always applies. The results of this study will be merged with the products of the upcoming Dutch PHFS which will be published in 2024.

Conclusions

- Challenges remain big, no matter the scenario
- In all scenarios the health of different population groups will be affected. Be prepared for this.
- Mental health demands more attention
- Implementation and use of technology is crucial. How to ensure that this will happen
- Use foresight to get a better understanding of the future (and be better prepared)

Your personal experience

Since RIVM has already a longstanding experience in doing foresight studies, this has not been a difficult exercise. However, the information base of how health has been impacted by the pandemic, direct but especially indirect health impacts, is still limited.

Portugal

Name: Mariana Peyroteo

Country: Portugal

Affiliation: NOVA Medical School

Title of Foresight Study: *"The future of health digitalisation: a case study in a Primary - Health Care Group in Portugal"*

Contextual information & Background

The pandemic of COVID-19 has demonstrated the importance, and impact digitalization brings to service delivery in many different areas. In healthcare, and with chronic diseases having had monitoring problems, it is necessary to implement tools that allow the management and monitoring of patients with chronic diseases to be effective and efficient.

As concluded by Lapão[11], the sustainability of Health Services will depend on the efficiency of the implementation of digitalisation of Primary Health Care (PHC) Services. Therefore, it is necessary to study the future of digital tools in this context. As has already been done by Gregório et al.[12], this study will aim to develop possible scenarios for digitalisation's role in a Primary Health Care Group (ACES).

Governance Structure

A multidisciplinary team will organise, plan the study, and moderate the sessions. After the sessions, the results will be analysed and discussed with the participants in the following session.

As this study focuses on this specific case, the number of participants will be small. Their selection will aim to obtain a representative sample. Therefore, members of the different specialities included in the ACES will be invited. To avoid bias, specialists and professionals from other ACES will also be invited.

Objective of the foresight study

Topic: Digitalisation in Healthcare

General issue: Role that the digitalisation of Primary Health Care can play in the ACES Arco Ribeirinho

Sub issues: Measures and actions to be taken so that the Digitalization of PHCs is implemented most effectively, allowing the sustainability and efficiency of health care delivery to its population.

[11] Lapão, L., The Future of Healthcare: The Impact of Digitalization on Healthcare Services Performance, in The Internet and Health in Brazil, A. Pereira Neto and M. Flynn, Editors. 2019, Springer, Cham.
[12] Gregorio, J., A. Cavaco, and L. Velez Lapao, A scenario-planning approach to human resources for health: the case of community pharmacists in Portugal. Hum Resour Health, 2014. 12: p. 58.

Conceptual model

This study will be based on the Conceptual Model (Figure 6) currently adopted in Portugal for managing chronic diseases in Primary Health Care. The Chronic Care Model (CCM) identifies the essential components of a healthcare system that support high-quality care in chronic conditions. Successful system change means that care will be redesigned within each CCM component. As such, this study uses this model as a basis to assess the impact that digitalisation can have and influence each component so that the measures and actions resulting from this study will enable a sustainable implementation of digital services in managing chronic disease in Primary Health Care.

Time horizon & Spatial Unit

This prospective study has a time horizon of 10 years (between 2022 and 2032) and as mentioned before, focuses on a specific region of Portugal (Barreiro-Montijo).

The work is being carried out in ACES Arco Ribeirinho, located in the periphery of Lisbon, Portugal. It is a group that serves the population of Barreiro, Moita, Montijo and Alcochete, with a total of 231,609 registered patients. The ACES Arco Ribeirinho is made up of nine Family Health Units (FHU) that provide services in various specialities and has as its main vision "*to reinvent the organisation model of PHC, through management adjusted to the new challenges and needs of the population and that allows the achievement of health gains*."

Uncertainties and Driving Forces

Together with the study participants we identified which uncertainties and driving forces will have the most impact for the next 10 years in ACES Arco Ribeirinho. Through the analysis of the areas of Demography, Environment, Sociocultural, Technology, Economy, Political-Institutional (DESTEP Approach) it was possible to identify the trends with more impact in the defined time horizon:

1. **Political-Institutional:** Governance and Services Organization
2. **Environment:** Climate Change
3. **Technology:** Investment in technology
4. **Sociocultural**: Behaviour and Community engagement

Scenarios

Three scenarios were developed to highlight each of the driving forces.

- "*Digital PHC and Active Patients*" – The first scenario is where technology is highlighted. In this context, the government has invested in the digitalisation of Primary Health Care, which has resulted in a reorganisation of structures and teams. With better communication, patients have become more involved and active in managing their health.
- "*NHS Disruption*" – In the second scenario governance and the community stand out. During the next ten years, there will be a disruption in the National Health Service due to the loss of response capacity due to the lack of human resources. Private healthcare services grow in the market and non-profit hospitals. Front-line general clinics replace Primary Health Care.
- "*Climate Exigency*" – In the third scenario climate change stands out. Portugal suffers constant climate fluctuations, leading to increased demand for Health Services. With climate exigency and high population migration, there has been an epidemiological

transition, with the emergence of communicable diseases and pathologies due to a lack of sanitation and thermal insulation).

Data and Indicators

Economic and demographic factors have been identified almost as certainties because the trends are already known. The following indicators are common to all 3 scenarios:

- **Demographic:** Resident population; Migratory balance; Birth rate; Ageing indicators; Average life expectancy; Life expectancy (at 65 years); Deaths; Deaths by chronic diseases.
- **Economic:** Gross Domestic Product; Inflation rate; External Debt; Public Debt; Strikes; Active population; Unemployment rate; Minimum wage; Compensation per qualification; Business demography; Import and export rate; At-risk-of-poverty threshold; At-risk-of-poverty rate; Household consumption.

- **Health:** Total expenditure on health; cost of medicines; number of health centres; number of hospitals; occupancy rate in hospitals; number of consultations, hospitalisations, and emergency services; waiting time for treatment; burden of chronic illnesses; burden of disability; Primary Health Care Quality Indicators.

From the study carried out, and in agreement with the participants, it was possible to identify specific indicators to analyse for each scenario.

"*Digital PHC and Active Patients*"

- **Technology:** Rate of population over 65 with schooling; Households with computer and Internet connection; Individuals using computer and Internet; Number of Teleconsultations; Computer and Internet Crime Rate.
- **Human Resources:** Numbers of Graduates in higher education (in health, research, law, computing, and engineering); Human resources in health, research, law, computing, and engineering; Graduates in higher education in ICT.
- **Research and Innovation:** Expenditure on Research and Development.

"*NHS Disruption*"

- **Health Financing:** Health insurance beneficiary rate; Public and private health insurance rate; Expenditure by public and private providers; Numbers of public-private partnerships.
- **Human Resources:** Human resources (health, research, law, IT, and engineering) working in the Public Service and Private Service.

"*Climate Exigency*"

- **Environmental:** Quantity of water treated, distributed and consumed; Water consumption per capita; Quality of bathing water and per consumption; Electricity production; Energy and electricity consumption; Sale of fuels; Gas emissions; Number of days with heat waves and without rain; Total precipitation; Maximum, average and minimum air temperature; Quantity of urban waste; Number of fires; Amount of burnt area; Number of firemen; Expenditure for environmental protection; Amount of agricultural surface; Amount of agricultural trees and crops; Potential greenhouse effect; Forest area; Sales of fish and boats; Income from agriculture and forestry; Number of agricultural producers and fishermen.

- **Epidemiological Profile:** Vaccination Rate; Seasonal Contingency Plan Indicators; Cases of Notifiable Diseases; Number of Travel Medicine Consultations.
  Life conditions: Number of residential buildings; Number of tourist buildings (holiday camps, camping sites, youth hostels); Welfare Index; Number of trips and tourists; Average expenditure per trip; Rate of severe material and social deprivation; Average value of buildings; Transport conditions (metro, rail, road, sea, air, and daily commuting).

Main outcomes and insights

As this study is still ongoing, so far, the primary findings focus on the clear demonstration that the pandemic of COVID-19 has brought the potential of digitalisation to primary healthcare. Not only in reducing waiting times, but also in improving access and travel to emergency services, patient empowerment and health literacy, and the quality of health professionals' work. The main insights came from sustainable implementation in organisations, empowerment of health professionals and patients, and the need for multidisciplinary teams and other specialities.

Policies and Interventions

Study in progress.

Products and Communication

Study in progress.

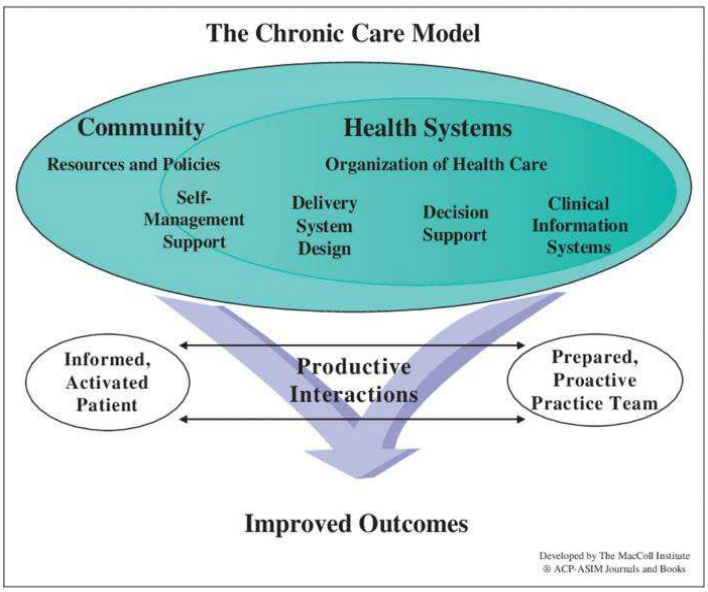
Conclusions

So far, from this study, it has been possible to conclude that climate change in this specific context will have a high impact and that the focus will be on how health services are delivered. And this is where digitalisation is identified as an ideal solution and a priority.

Your personal experience

This activity and the course were very useful for planning and implementing a foresight study. The difficulties encountered were the agenda of the participants, doing creatively and thinking "outside the box", and managing the political views of the speakers.

I. Conceptual Model



Chronic Care Model

Key areas	*Area focus*
Health System/ Organization of Care	Create and foster an environment that values quality and system change to promote high quality of care.
Self-Management Support	Patients participating in the management of their own health care.
Delivery System Design	A team focus with interventions that are evidenced-based and includes regular follow up by the team.
Decision Support	The use of evidence-based guidelines on care delivery, and sharing these guidelines with patients and specialists to encourage collaborative care.
Clinical Information Systems	Timely reminders for care activities and the monitoring of care delivery to assess team and care system performance
Community Resources and Policies	Help patients engage with community-based services as well as develop partnerships on the provider level to support advocacy.

Figure 6. Conceptual Model based on Wagner, 1998[13].

[13] Wagner, E., Chronic disease management: what will it take to improve care for chronic illness?. Effective Clinical Practice, 1998. 1(1): p. 2-4.

Serbia

Name: Jelena van der Wel Milic
Country: Serbia/Netherlands *
Affiliation: *Institute of Public Health of Serbia* "Dr Milan Jovanović Batut"
Title of Foresight Study: Early detection of Anxiety-depressive Disorders** As Risk Factor for Cardiovascular and Metabolic Diseases with Consideration of Pandemic Dynamics
*Netherlands is added due to residency documents, current country of living is Serb
**From initial idea to study PTSD as a risk factor for CVDs throughout the project we came to conclusion that the whole group on Anxiety-depressive disorders should be considered

Contextual information & Background

Anxiety-depressive disorders are previously identified and well-known risk factors for cardiovascular and metabolic diseases, especially having in mind pandemic dynamics scenarios which affect both cluster of diseases both independently of each other and causal (worsened mental state sue to pandemics leads to triggering cardiovascular outcomes). Thus, screening and early detection of mental health is of a high importance in prevention of undesirable outcomes Therefore, the impact of prevention policies led by defining legal and financial background for implementing psychotherapy into healthcare system is also a high priority for healthcare systems worldwide.
Anxiety-depressive disorders (see Appendix 1 for list of disorders) are most often initiated by exposure to stressful and negative life or environmental events. A history of anxiety or other mental disorders in biological relatives also can be a factor for onset of the diseases. Some of the most often traumatic events are experiencing financial problems, going through a major life change (even if it was planned). Also, having a medical problem, such as cancer, stroke, or chronic pain. Taking certain medications. Experiencing a death of a loved one, intimate partner violence, or going through a bio-natural disasters (e.g., pandemic).
Despite large differences in the prevalence of exposure to traumatic events across studies, the lifetime prevalence of anxiety is estimated as 31.1% of adults experiencing any anxiety disorder at some time in their lives. More than 7% of adults are diagnosed with depression, but people aged 12-25 have the highest rates of depression. Clinically relevant depressive symptoms can be present up to 30% in the population. Anxiety may occur as a symptom of clinical (major) depression. It's also common to have depression that's triggered by an anxiety disorder, such as generalized anxiety disorder, panic disorder or separation anxiety disorder. Many people have a diagnosis of both an anxiety disorder and clinical depression.
Although the profound impact of anxiety-depressive disorders on mental health has long been recognized, recently, they have been associated with adverse cardiovascular risk profile. Cross sectional, individuals with has been found to have more hypertension, dyslipidemia, obesity, and endothelial dysfunction. However, remains unclear whether anxiety-depressive disorders relate with longitudinal changes in cardiovascular risk factors. Also, while studies have reported increased risk of type 2 diabetes, cardiovascular disease (CVD) and all-cause mortality associated with anxiety-depressive disorders. it is unknown whether these associations are independent of cardiovascular risk factors, or are they linked with adjustment to some of the existing mental health disorder.
Thus, we aim to study, in foresight study the association between anxiety-depressive disorders and changes in presence and risk factors for cardiovascular disease, type 2 diabetes and all-cause mortality. We aim to propose the ways to implement continues monitoring and evaluation of existing early detection programs. Also, horizon scanning and facilitated stepwise piloting and implementation of new programs possibilities based on health care system priorities. We intend to recommend having a mental healthcare specialist on a primary health care level. New screening and assessment mental health methodology that provides chances for saving part of the budget for curative care and preventing onset or worsening of CVDs.

- All planned timely and gradually implemented within the healthcare system
- Challenges needed to be resolved with time:
- Educated personal, sustainable financing, rising immunization awareness

Steps necessary to examine prior to achieving the main aims:

1. To examine the association of anxiety-depressive disorders with intermediate cardiovascular risk factors (blood pressure, blood lipids, body mass index, glucose,

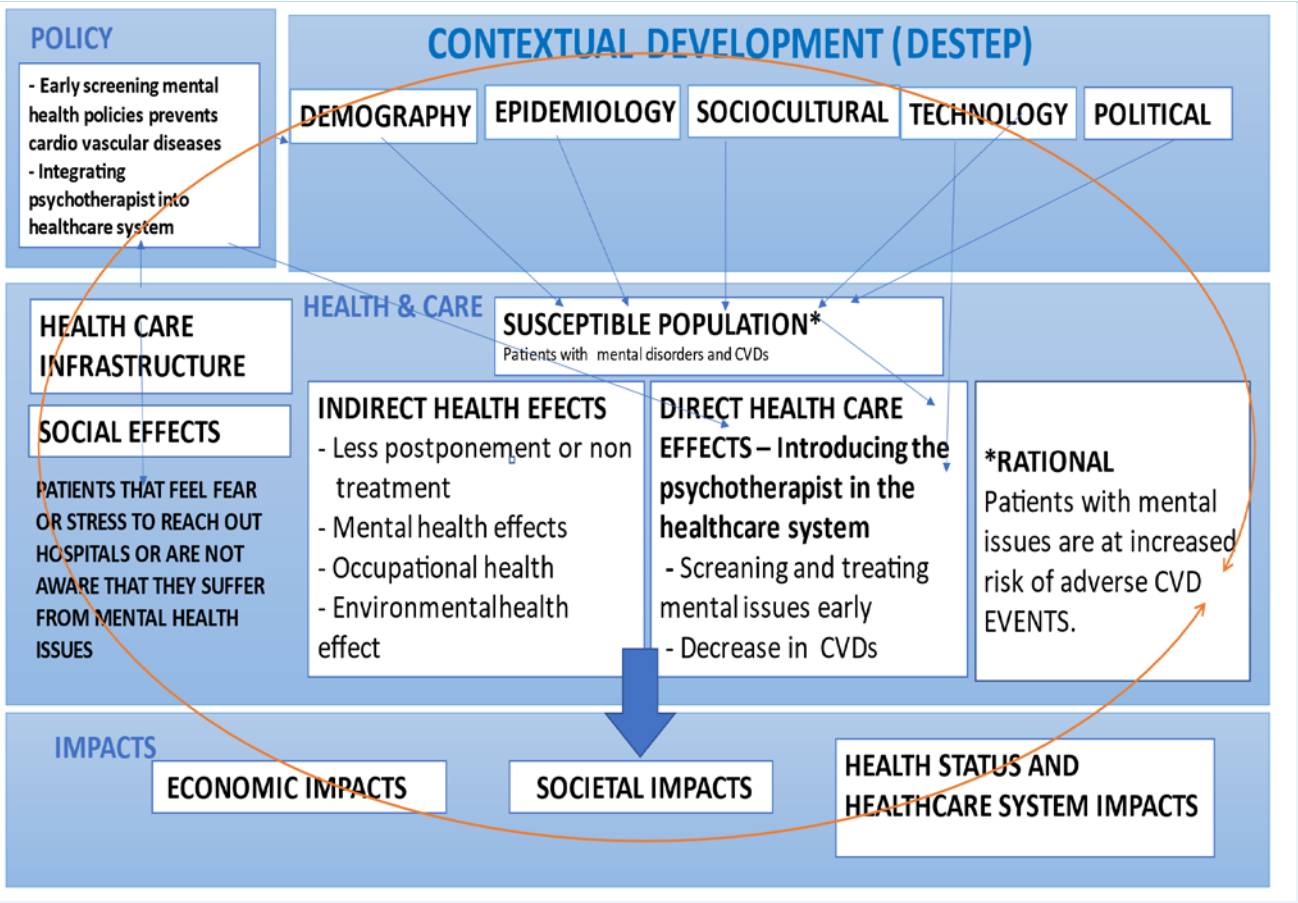
insulin, and type 2 diabetes)
2. To examine the association of anxiety-depressive disorders with inflammation and subclinical measures of atherosclerosis
3. To examine the association of anxiety-depressive disorders with risk of CVD and overall mortality

Objective of the foresight study
Topic: effective early detection of mental health diseases as known risk factor of anxiety depressive disorders
General issue: screening and early disease detection
Sub issues: impact of prevention policies led by defining legal and budget background for implementing psychotherapy into healthcare system

Conceptual model
In the presented DESTEP model Driving forces that are considered to have influence are:

1. Demography that is presented through indicators: Gender, Age and Region of residence – the one that are related to potential onset of Anxiety -depressive disorders as well as the behavioral patterns and genetics influencing CVDs.
2. Epidemiology presented through Lifestyle factors (obesity, smoking and/or sedentary lifestyle). Environmental factors (green areas in the surrounding, air pollution and/or the overall climate).
3. Sociocultural aspects presented via personal beliefs and cultural values as well as lifestyle trends that are characteristic for the observed population.
4. Technology that is presented through usage of telemedicine and presence of e-resources in individual health maintenances, usage of application for health issues, Usage of Internet as source of resolving health dilemmas and relaying on information available through TV or Radio programs.
5. Political influence that is presented via governmental measures introduce regarding healthcare system and services but also healthcare finances.
6. Healthcare system and status are main driving force in the study. The Healthcare status the targeted population that we would like to observe would be the people with mental health issues. Precisely the people with anxiety-depressive disorders who, as we hypothesis, are at the same time in risk or have already developed CVDs This due to the fact that various corelates to mental health issues e.g., high sympathetic activation and hypothalamic-pituitary adrenal axis dysregulation have been linked to arterial damage and coronary heart disorders.

   Also, previous studies have reported increased diabetes type 2 and all-cause mortality association with mental issues, remaining unknown whether these associations are independent of cardiovascular risk factors linked to adjusting to mental health disorders.
   All of the above has direct and indirect effects to health care status and health care system, direct effects that we identify are that the healthcare system needs introduction of psychotherapists on all levels of the system (primary, secondary, and tertiary).



Time horizon & Spatial Unit

5 years* (with 5 of desirable follow up) into the future is necessary to conduct the study, 2 of poor research

This study will be international tending to compare the developments between the Netherland and Serbia.

1st year dedicated to gathering data and more info via systematic reviews (see appendix 7 - *Gantt chart* for pre-project schedule activities regarding research and publishing activities)

Scenarios

Driving force1 - healthcare, *Indicator 1: Mental health disorders – exposure, Trend: Increasing. Indicator 2: CVDs with comorbid mental issue, Trend: Increasing*

Driving force 2: Socioeconomic impacts, Indicator 1. Economic impacts, Trend: Increasing, Indicator 2. Larger socio-economic differences, Trend: Increasing, Indicator 3. More individualism, Trend: Increasing, Indicator 4. More gaming addictions, Trend: Increasing, Indicator 5. More VR / AR applications, Trend: Increasing, Indicator 6. Life expectancy, Trend: Reaching plateau, Indicator 7. Social cohesion index, Trend: Stagnating, Indicator 8 Burden of diseases, Trend: Increasing

Number of Uncertainties	2
Uncertainties Relevance Trends	Availability of accurate, acceptable, and affordable screening tests for anxiety-depressive disorders and screenings on behalf of mental health experts top detect correct anxiety depressive patents (High relevance and trend – moderately uncertain) Size of public health budget (High relevance and trend –highly uncertain)

	New pandemics or excarnation of COVID -19 ((High relevance and trend –highly uncertain)
Other driving forces	Presence of Pandemics
Which Scenario Logics:	Best-Worst case approach

Best scenario - Pandemic failed

New strains of Covid may be milder resulting in seasonal disease.

No further/limited biohazard situations:
Increased awareness of anxiety depressive disorders outside of the military and other instances of physically violent trauma may lead to the discovery of many more people suffering from mental issues and associated comorbidities may prove to be a much bigger drain on the health system and the national economy as well as cause a much larger loss of quality of life than previously thought. This may lead to increased urgency on policy level, meaning that policy makers direct more funding and effort to supporting sufferers of anxiety and/or depressive symptomatology and fighting the main causes of the syndrome that are preventable.
This may very well help make the comorbidities easier to treat, leading to an altogether happier and healthier population, which is more productive.
With further/limited biohazard situations:
New strains of Covid may be milder resulting in Covid becoming nothing more than a seasonal disease that people get used to. Increased awareness of the value of isolating may lead to less infections from other diseases than covid, either because they use the same infection pathway (influenza) or rely on social activity to spread (STDs). Lastly, people may learn to use their isolation time to seek mental health (online) or come to peace with themselves.
As many companies switched to working from home, a better work/life balance may be attained by more people, lessening the incidences of burn-out and overall reducing the number of sick days taken. Reduced traffic from commuting also means less congestion on the roads, reducing stress and time loss for the ones that do need to travel. Less commuting also has a measurable positive effect on air quality, reducing health issues related to the lungs.
Increased mental and physical health is a great way to improve productivity and reduce the cost of the health system. Reduction in time lost on the road also adds to the nation's productivity. Less road use also has a direct and measurable effect on the environment.

Worst Scenario - Vengeance
*The new variants of Covid-19 and more severe one keep**s** appearing*
No further/limited biohazard situations:
It might prove, that the correlation between anxiety-depressive disorders and cardiovascular diseases is mostly causal from the direction of anxiety and depressiveness causing damage both directly and through coping mechanisms like substance abuse (mostly tobacco, drugs**,** and food).
An increase in the amount or severity of mental health cases can have enormous negative effects on a community. Not only can it put a heavy drain on a nation's health system, but PTSD can heavily influence the home situation. The nuclear family as primary caregivers can become overtaxed, making them less effective in day-to-day activities like education or work and severely inflicting the quality of life. In the very worst case, having a family member with mental issue causes so much trauma, that a family member or other caregiver. gains its own mental health burden.
With further/limited biohazard situations:
As new variants of Covid-19 keep appearing and support of invasive social measures gradually erodes, it is quite possible a variation will appear that will be more damaging to the health and again put a greater number of people on respirators. The trauma that is caused by this, coupled with the obvious culpability of a vocal and aggressive minority that refuses to take any measures and even violently opposes them, will have a severe mental impact on those, that survive the ordeal.

Stricter measures concerning social distancing and quarantining also possibly lead to a greater susceptibility to anxiety and depression. People that are bad at handling isolation might suffer anxiety and/or depression from sources that would in more 'normal' circumstances do not ca**use** lasting trauma. Lastly, to the people most vulnerable to it, the isolation itself may cause a form of mental issue.

Main outcomes and insights

Describe possible outcomes from your scenarios and results. Describe insights resulting from your scenarios. Focus on main (possible) challenges and findings from your scenarios (max 20 sentences)

Best scenario - Pandemic failed

New strains of Covid may be milder resulting in seasonal disease.

Outcomes

Increased awareness of the value of isolating. Using isolation time to seek mental health (online) or come to peace with themselves. Remote work gives better work/life balance (less burn-out/sick days) taken. Balanced traffic. Increased mental and physical health is a great way to improve productivity and reduce the cost of the health system

Best scenario - Pandemic failed – Further /limited biohazard situations (new pandemics)	Possible outcomes listed Desirable: Mental healthcare specialist on a primary health care level. New screening and assessment mental health methodology, continuously implemented, already saving part of budget for curative care, and preventing onset or worsening of CVDs Less desirable/Undesirable; Optimized provision of currently available methodologies, potential upscaling based on higher willingness to pay

Worst Scenario - Vengeance

*The new variants of Covid-19 and more severe one keep**s** appearing*

Outcomes:

More people on respirators Increased trauma caused by this. Aggressive antivaxxers /violent activities Severe mental impact on those, that survive the ordeal. Stricter measures concerning social distancing - more anxiety and depression. The people most vulnerable to it, the isolation itself may cause a form of mental issue. More mental issues cause more CVDs triggered by poor mental health that leads to more mortality. Decreased mental and physical health increases the cost of the health system

*Worst Scenario – Vengeance; t*he knew variants of Covid-19 and more severe one keep appearing Many/ Limited new biohazard situations (new pandemics), modest budget	Possible outcomes listed Desirable: Optimized provision of currently available methodologies + implementation of new methodologies based on very high cost-effectiveness and affordability Less desirable/Undesirable: Optimized provision of currently available methodologies improves effectiveness and efficacy

Policies and Interventions, Lessons learned and implications

Continuous monitoring and evaluation of existing early detection programs must exist in health care planning. Horizon scanning and implementation of new programs based on health care system priorities must be a priority for health care policy makers.

Products and Communication

Continuous monitoring and evaluation of existing early detection programs, horizon scanning and facilitated stepwise piloting and implementation of new programs based on health care system priorities. Mental healthcare specialist on a primary health care level. New screening and assessment mental health methodology, continuously implemented, already saving part of budget for curative care**,** and preventing onset or worsening of CVDs.

All planned timely and gradually implemented within the healthcare system**.**

To Ministry of Health, health insurance companies, parliamentary health comities we would like to say that organized prevention programs can change outcomes and efficiency of the health system. consultation, support for implementation of evidence-based health policies consultation, support for implementation of evidence-based health policies we can achieve the best outcomes. Timing that is best to start this communication would when the project proposal is completed and some funning already acquired. Channels of communication would be either brief policy related meetings to discuss new edges or sending the fact sheets with same thematic via emails or letters. Project members would carry out these activities via individual presentations with identified stake holders or covermount members or meetings with same profile of people but in the group meetings.

Conclusions

General conclusion regarding healthcare system and Government

- Foresight study valuable synthesise evidence and presentation
- Background necessary to implement mental health professional**.**
- psychotherapists as a first line of help

Challenges

- Motivating government to act
- The federal government >partnership with the institutions to address mental health.
- Regulating systems and providers by including psychotherapist in the healthcare plan, protecting the rights of consumers, providing funding for services, and supporting research and innovation

General conclusion regarding mental health of population:

We conclude that feeling anxious and/or depressed that can trigger CVDs (and other diseases) in certain situations can help us avoid danger, it's how we've evolved to keep ourselves safe.in the lesson we learned in COVID -19 worst periods. Even if not typically an anxious or depressed person, it's common to feel some anxiety during periods of change or uncertainty. Herewith some actions that my help:

1. Channel anxious energy into action: get informed, plan, and prepare

We often feel anxious when events feel out of our control, and when we think we don't have the capacity, skills**,** or ability to cope. Anxiety tricks us into thinking about the worst-case scenarios in vivid and frightening detail. Instead of worrying, try your best to focus on what's under your control. Equip yourself with the facts about COVID-19 from trusted sources. Follow government advice and plan about what you and your family will do if you need to be in isolation, or quarantine.

2. Limit or avoid unhelpful media and misinformation

Being exposed to constant, alarming, anxiety-inducing stories convinces us that there is something to panic about, and further perpetuates myths, rumors, misinformation, uncertainty, and anxiety. The more we read and hear about it, the more frightening it becomes, and the less chance we have to distract ourselves and do things that can take our minds off it. Although it might be tempting to keep informed, or difficult to escape, limiting your exposure to media, news, and social media about coronavirus will help quell the panic.

3. Cut down or stop the behaviors that are fueling your anxiety

There are certain actions, when performed frequently, that can fuel anxiety about health, and germ-phobia. Focusing too much on bodily symptoms, and relying on "Dr Google", can consume one with anxious thoughts and panic. Being aware of these behaviors, understanding how they're making you feel, and replacing them with more helpful coping strategies can alleviate disproportionate feelings of anxiety.

4. Stay focused on the here and now, taking each day step by step

Try to focus on the here and now- not the past and not the future. Live in the moment and take one day at a time.

5. Be aware of negative thoughts and don't give them too much power
Just because we're thinking something, doesn't always mean it's true. When you notice yourself worrying a lot, take a step back, and try to let worries pass by without focusing on them too much.
6. Look after your body
Get enough sleep, exercise, eat well, avoid smoking, excessive alcohol**,** and drugs. This will help protect your mental health and immune system.
7. Stay connected with others
It can make a huge difference when we share our worries with others and connect with other people who are supportive. Try to stay connected to supportive people in your life so you feel less isolated and lonely. You might need try new ways of connecting that you haven't before.
8. Help other people, be kind, and compassionate
When we help other people, it can also make us feel better. We are all in this together so let's try our best to be kind and compassionate to each other.
9. Take a breath
When you feel overwhelmed take a few slow, deep breaths to help you calm down. If there are other things that help you relax (e.g., a walk or listening to music) you could try these too.
10. If you're feeling like you're not coping, get professional advice
It's ok to ask for help. If you're feeling overwhelmed by anxiety, seek professional support. Psychological therapies can be done online, or remotely via phone or videoconferencing, and are an excellent option if you're in self-isolation, or worried about going to a clinic.
Importantly, be assured that for most people, the anxiety will be temporary, and will reduce over time, especially once the virus has been contained.[14]

Your personal experience

1. ***Helpful aspects***

Phases, processes, and planning
It was very helpful that planned activities, results**,** and their applicability, in the process of the project development, were well defined. Also, the project schedule and implementation were optimally designed.
Implementation — Formative and Process Evaluation
In the project application there is defined model of cooperation between the project partner and project promoter. As well as the project offered the chance for the partners to network and help each other's on additionally planned and organized workshops.
All the lecturers and guest speakers demonstrated excellent expertise in the field, as well as supreme pedagogical skills.
Above all, project promoters were supportive and of a great help to participants at all time points, for both problem solving and personal support.
Completion — Summative, Outcome, and Impact Evaluation
The methods used in project activities are creative, original**,** and innovative and the proposed project activities are relevant for the healthcare and government sector on the global level.
Dissemination and Reporting.
The sample of summary sheet, that is provided by each of the participants will create a solid background for dissemination of the project outcomes and to create a base for possibilities of follow up.
Project promoter tried to guarantee the sustainability of project results after project completion**.**

2. **Difficult aspects**

Firstly, difficult aspects involved the challenge that refers to creation of a valid assumption for the foresight context of the study.
Secondly, the challenges that are related to the methodological aspects of foresight. It was very hard to adapt to making optimal DESTEP model and thinking about driving forces and indicators. Especially data gathering and listing sources in non-developed or Balkan countries is also a great difficulty as there are less of the official data basses that provide sustainable sources**.**

[14] https://www.blackdoginstitute.org.au/news/10-tips-for-managing-anxiety-during-covid-19/

Lastly, the challenges that mainly relate to identifying foresight stakeholders and networking. As well as the challenges arising from different technological aspects of foresight studies performance possibilities in developing countries.
On top of all the difficult aspects, working on this project presented tremendous experience and gave us a chance to learn and grow as professionals in the research field, for which I am very grateful to PHIRI team.

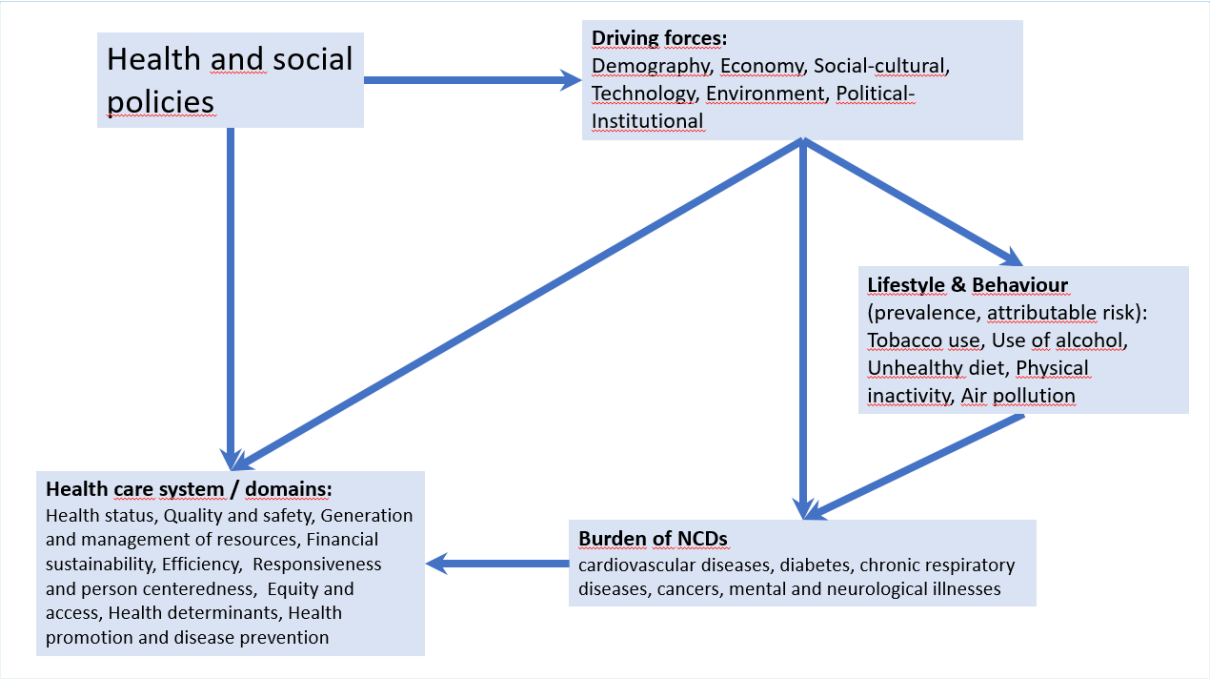
Slovenia

Name: Andreja Belščak, Aleš Korošec
Country: Slovenia
Affiliation: National institute of public health Slovenia
Title of Foresight Study:
Breakthroughs in technology and electronic medical devices (EMD) in the context of a better control of non-communicable diseases (NCD)

Contextual information & Background
Both PHFS exercise authors work at the National institute of public health and are also involved in the research activities of many public health issues, both from a subject perspective and from data perspective. The "hot topics" regarding NCD are diabetes & obesity, dementia & Alzheimer disease, mental health issues (especially among young people) and cardiovascular diseases. The prevalence of these NCD is rather high among older people. Social medicine and epidemiology have tools to explore social aspects and impacts of NCD management, have (historical) data on how a particular NCD has spread among citizens and what are the short-term prospects, with some help from the Ministry of Health and other stakeholders can introduce new public health interventions/programmes to better manage NCD etc. Quite a few people with NCD have issues in managing their conditions, they do not obey doctors, overhear medical advice and this could lead to complications later in their life. It usually takes some time for a NCD to present symptoms in a human body. Furthermore, NCD usually do not kill instantly but slowly. In the context of public health**,** it is important to discover preventable risk factors of NCD (and eliminate them), and if/when a particular NCD occurs it is very important to manage it appropriately (with and without prescription medicines) in order to increase healthy life years (HLY) and decrease disability-adjusted life years (DALY) – on a person and population level. One possible way of controlling NCD before and after they occur is by help of various existing and new technological advances and electronic (wearable) medical devices. 24-hour continuous blood glucose monitors already exist**,** but they are not available for all, which need them. FDA-approved ECG smartwatches have a potential to inform their users about an undiagnosed hearth conditions. Wearable biosensors for real-time stress (cortisol) monitoring ar**e** a rapidly emerging field. Digital health applications (DiGA in Germany) and solutions are increasingly becoming part of our healthcare experience. Many other current and under-development EMD could be used to control NCD, provided there is understanding among clinicians, health authorities, health insurance companies and epidemiologist about their benefits.

Objective of the foresight study
Topic: The assessment of technology and electronic medical devices (EMD) use in the context of a better control of non-communicable diseases (NCD)
General issue:
Sub issues:

Conceptual model
Conceptual model, as of March 2022:



Since then**,** we changed a conceptual model as we had to limit ourselves. There are many driving forces, lifestyle & behaviour risk factors which have an effect on the burden of NCD. Many parts of the healthcar**e** system deal with non-clinical aspects of managing NCD, with public health and epidemiology in the front. Actually, we have newer-ending circle of improvement: first, we have to define which NCD to deal with. Then we need to acquire the data about its prevalence and modifiable risk factors. Then, this i**nformation** is a building bloc**k** for various evidence-based analyses for decision makers, who will in turn provide health & social policies which will (hopefully) alter modifiable driving forces, mentioned above. A lot of professionals and organisations with various motives can be involved in this process.

Time horizon & Spatial Unit

Regarding advances in EMD for control of NCD we have at least two possibilities:

a) technology which already exists today, is not used in Slovenia, but could be imported
b) technologies which are deeply in the research/pilot phase, untested, "would be great to have it," for which tech building blocks might exist, but no final product is anywhere on the market.

For a) we can think about the time horizon of 5 years in which the import of already available EMD could be accomplished and put into clinical practice, in order to better monitor/control patient with existing NCD – provided there are enough funds and willingness of healthcare workers to cooperate. For b) we can foresee at least 15+ years into the future. With current technology and CPU speeds possible future EMS are currently not possible or commercially viable but could be in 10+ years.

Spatial unit: the study will be national. In case of enough time, we might split the country into two NUTS 2 macro regions (Eastern and Western Slovenia). It is already well known that in the Eastern Slovenia the prevalence of many NCD it higher than in the Western Slovenia, therefore it would make sense to start the introduction of new EMS and possible interventions first in the east.

Scenarios

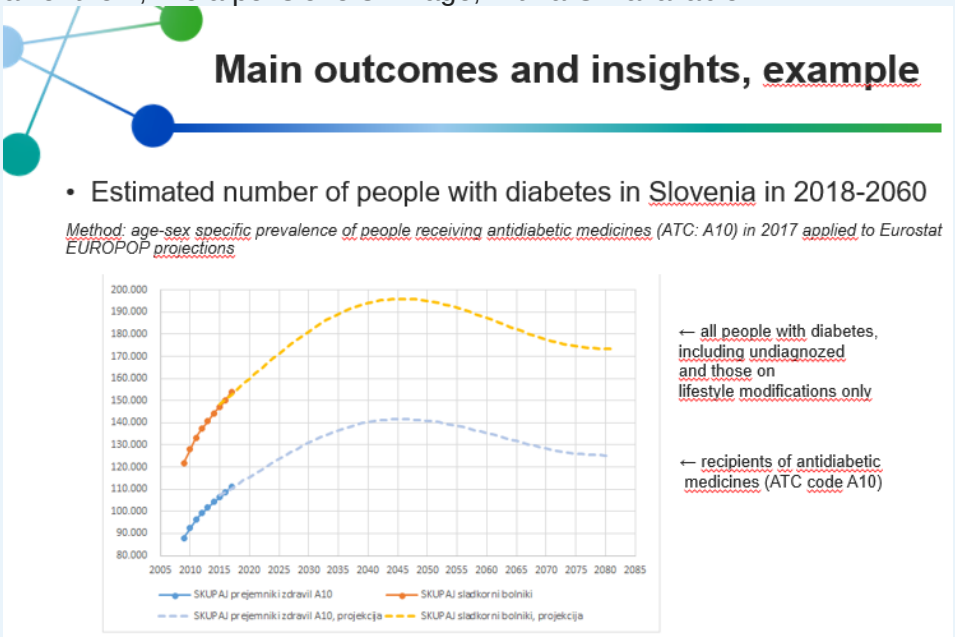
The most important driving force and the least uncertain regarding NCD prevalence is population aging. With increasing age, the probability of at least one NCD occurrence increases. If the percentage of older people in population increases, therefore the number of people affected by NCD will also likely increase. If the age-specific prevalence of NCD also increases, then the number of people with NCD will increase even higher. In other words, unfavourable demographic projections for Slovenia (and in many other developed countries) will lead to higher number of people, who will

be under burden of NCD. The burden (in HLYs, DALYs) and economic costs of NCD is estimated to increase if current trends continue. Other important driving forces include unhealthy lifestyle and food habits, long-term exposure and adverse effects of stress, commercial interests to diagnose otherwise healthy people with potentially life-threatening health conditions in order to sell unnecessary medications, nutritional supplements of dubious value, medical services etc..
Driving forces according to Andreja:

A	B	C	D
		Score the driving forces from very low to very high	
DESTEP	Indicate	Relevance regarding health impacts	Cognitive uncertainty (limited knowledge)
Driving Forces	Trend (example)	Relevance	Uncertainty
Demography	Ageing of the population	very high	low
	Smaller households	medium	high
	More migration	medium	high
Economy	Higher pension age	high	low
	More unemployment and contract employment (platform economy)	medium	high
Socio-Cultural	More ethnic diversity	medium	medium
	Larger socio-economic differences	high	medium
	More indivdualism	low	medium
	Higher educational attainment levels	medium	very low
Technological	More use of internet among elderly	medium	high
	Development of technology and electronical medical devices	high	high
	More gaming addictions	low	medium
	More VR / AR applications	low	high
Environmental	Higher temperatures	medium	low
	More extreme weather events	high	low
Political-Insitutional	More instable geopolicitical situation	medium	high
	More power to multinationals	medium	medium
	More bottom-up initiatives (civil society)	high	low

There are many important identified and unidentified uncertainties. Given a time horizon of 15+ years, many things can happen. We have survived Covid-19 pandemic, many people have long-covid, new pandemics are expected/planned, the military intervention in Ukraine is continuing… Many people with well-managed NCD in 2019 worsened their health situation during 2020-2022. We should not forget about AI in Health: AI is already heavily used in drug R&D, it can be applied to provide personalized health instructions to patients… then, personalized medicine, biotechnology, IT & computing advances. There are many uncertainties regarding what can and could be done do better manage NCD in the forthcoming 10 years. But one is for sure: human hardware (=genes) evolution is much slower than the surrounding environment and society.
Scenarios:
The scenario logic is of a type: (best – business as usual – worst) case approach.
A) “Elon Musk invested in the management of non-communicable diseases” scenario
A group of billionaires, including Gulf sheiks, when confronted with NCD in their families decided to invest some money to create a better world (and to earn something). Innovative ideas, pushing borders, aiming beyond Earth is what drives Elon to do extraordinary stuff. When he saw what can be done with Neuralink, where they develop *brain-machine interfaces to connect humans and computers*, he opened a new company, with the aim of helping people to control their NCD. The plan is to reach to all Twitter users with NCD and invite them to join a long-term experiment in order for them to better deal with their diseases. First of all, a new kind of a smartwatch is being developed which can connect to external wearable sensors, which will monitor not only blood glucose levels but also cortisol, serotonin**,** and melatonin levels. The smartwatch also has GPS, ECG**,** and a blood pressure monitor. With 24-hour continuous monitoring for several days and weeks a person with NCD will feed his data to an online cloud service, like many other people with NCD. AI & ML & data science experts will do some big data analyses to discover hidden patterns of disease progression. After a while, when enough data is feed to a gigantic AI model, this model could predict a forthcoming deterioration of the NCD condition for every enrolled patient and warn him of a possible side effect on NCD via his wristwatch, *before* he do**es** activity XY or other potentially unhealthy activity. This sound dystopian and big-brother-alike, but it could be useful for a better control of NCD. Imagine a wristwatch issues an alarm at 4AM, when it detects an irregular heartbeat. Or when it complains to a diabetic that eating that piece of cake can in long term result in diabetic retinopathy (blindness). When enough people are aware of their NCD and actively take care of them, the management of NCD could get easier.
B) “business as usual” or “I’m not interested” scenario

In this scenario, people routinely do their jobs as usual. % of GDP for healthcare is the same for years from now, nothing**,** particularly changes. Age-specific prevalence rates of the common NCD stay the same. Below is an example of a projection of people with diabetes in Slovenia in the next 60 years if we apply current age-specific prevalence rates to the future projected population. The numbers go up. The same exercise could be made for other NCD. In reality, age-specific prevalence, at least for diabetes, are not the same across the last 10 years, suggesting that the future number of diabetics can be even higher than estimated. This scenario is more "worse" than "neutral." Regarding EMD and technology: older people, especially on the countryside might be more ignorant and non-accustomed with technology and therefore any "smart" device will be of no use for them. What can help them is actually a good social network of supporting people, which will take care for all of them, like a pensioners' village, with a GP available.



C) "Multipolar world and a revenge of China" scenario

In this case, Russia+China+India+Iran+Brasil + some other countries decouple from the Western World. As we know, many raw pharmaceutical molecules come from India and China. *Right now, the U.S. has virtually no capacity to manufacture antibiotics.* That i**s** because China currently controls roughly 90% of the global supply of inputs needed to make the generic antibiotics. If China decides to limit their export of pharmaceutical ingredient, rare earth**,** and electronics, this could have a tectonic effect on people's health. There are already shortages of antibiotics in the EU. People with NCD could not get their medicines and their conditions will deteriorate rather quickly. The most affected will be those patients receiving generics, which will have to switch to alternatives that are more expensive, or abruptly terminate the treatment. Consequently, less money will be spent on prevention and more on curative. People with unmanaged NCD will have higher absenteeism and will be less productive. Technology could not manage such a flow of constantly sick people. In case of a nuclear war in Ukraine and Chinese attack of Taiwan, the World might fall into a nuclear winter, where NCD problems would be irrelevant.

Main outcomes and insights

All three scenarios are possible, with B > C > A. In case of a scenario B, "business as usual", a possible outcome would be a terrible reality check that in order to manage NCD in the next 20 years as successful as today, we would need more funding, more medical staff, more nurses, more long-term care facilities, better prevention programmes, better cooperation among medicine and food industry. "More money" cannot solve problems if there is a lack of doctors and nurses. One possible way out is to lower standards of care (hardly politically acceptable) or privatize healthcare providers and let the market organize by itself (hardly politically acceptable, higher costs for worse service).

Possible challenges & findings: this foresight study will just reveal again, what is already quite well known: some crucial data sources about the health of population are missing or data collection is not digitalized. The prevalence of various health behaviour and lifestyles are survey-based and not collected at least every two years; therefore**,** the possible effect of a lifestyle intervention can be

measured only after several years. If we want to be educa**ted** new medical doctors, it will take 12 years in order they become independent. Medical devices and wearable technologies could improve NCD management but if confronted with HTA (health technology assessment) are they the most cost-effective way of lessening the burden of NCD? Maybe yes for some group of people (young people with diabetes type 1, IT savvy people, higher educated people, immobile people in LTCFs). Further, this study could reveal that rich people can invest more in their health, spend more for OTC medications and other services (regular health checks), monitor their health status etc. therefore widening health inequalities. People from lower education levels usually engage in more risky health behaviour, have worse outcomes, have higher NCD prevalence etc. (Glasgow effect) … and are therefore more appropriate to be the first target group for an intervention.

Policies and Interventions

Policy makers have no obligation to do anything based on our findings. All our scenarios are just "looking into the future" with what we know now. Predictions, projections, estimates are not certain and the accuracy of our exercise/analyses in the long term could be embarrassingly wrong. Our recommendations should be peer-reviewed, should have a sound reasoning and a solid methodology. That is the only way we can be seen enough credible to recommend policy actions, interventions**,** and direct funds.

Policy actions and/or interventions: demography and aging could not be changed. We have to strive for healthy aging but not for every price. We cannot realistically recommend importing several ten thousand young Filipinos in order to create more taxpayers to fund our healthcare system. We cannot recommend the prohibition of meat eating in order to lower CVD and cancer incidence. Likewise, we cannot expect from people to eat only plant-based food, or bugs, to stay healthy and save the planet, or for a breastfeeding mother to switch to BIOMILQ. We are not in a position to recommend implanting people with biosensors and equipping them with wearable gadgets, which will monitor their life functions and report data to some cloud. Health interventions and public campaigns, based on our findings, could take years to show just a small improvement in NCD management.

What could be done are already existing and ongoing PR activities for managing NCD with a possible help of technology. This could include:

- a small group of people of diverse age (including geeks and seniors) which will continuously monitor the Internet and conferences for new EMD which could be used to improve the control NCD. Think of this as a brainstorming exercise.
- when a promising cost-effective device/technology is found, this group could recommend a pilot study to evaluate its effectiveness in our country. MSc and PhD students can jump in. Public hospitals are usually rigid, small private clinics could be more open for experiments.
- a public-private cooperation when, for example, a telecom company invests communication & IT, and a hospital invests medical knowledge (telemedicine, remote sensing…)
- best practices are communicated to diabetics and other patients with NCD, and they are invited to do something new to better manage their condition
- a large-scale intervention could be hard to implement**,** and their uptake/adherence is usually low.

In short, small-scale cost-effective policy actions and interventions could be realistic.

Products and Communication

Many possible target groups could be interested in our PHFS. Some of them have the power and obligation to change health policies (policy makers and health professionals), scientific community could be interested in the research plan and methodology, general public about what can done to improve an average citizen's long-term health.

Products and activities are correlated with how many funds and human resources we could have. Some of our existing research deliverables are sent only to those who fund us (for example, National research agency or Ministry of health) and are generally not publicly available. Some of our existing research is also neither publicly available nor existent, especially those on controversial health topics (waiting times in healthcare, covid-19 vaccination long-term effects, deaths due to medical errors or overprescribing…). Ideally, at least three reports could be produced:

- a full report with a policy/executive brief in the beginning, with only an essential methodology
- a full methodological report (included data sources, statistical part, other charts/tables…)
- a fact sheet with some key messages, for PR
- no separate website or a just a short single site on **www.nijz.si** that we prepare a foresight study
- a Zoom webinar at the end of a project

	Audience	Key messages	Intended outcomes	Timing	Content/product	Channels	Owner	Evidence
1	Policy makers	Future challenges in the field of NCDs and necessary changes to tackle them	New public health policy priorities	3 months before the publication	Policy brief/ fact sheet	Meetings/ presentations	Project team	Results were used in policy documents
2	General public	Information about future trends in NCDs	Better informed audience	End of project	Website	Website, media	PR team	Web-statistics
3	Health professionals	Future trends in NCDs and necessary changes that can be applied by them	Positive adjustments in addressing the NCDs	Half a year before the publication	Reports, website	Meetings/ presentations, website	Project team	
4	Scientific commuity	Study data (results)	More thorough research and data presentation	End of project	Papers/reports	Presentations, website	Project team, PR team	Citation

Conclusions

Conclusions of this PHFS exercise would be:

- Technology and EMD could help to better manage NCD**,** but we should not become too dependent from them. In case of a larger electricity blackout, the society falls apart in a few days.
- AL, ML, cloud computing, data mining … could help in precision medicine and NCD management, but patients also need personalized advice from medical personnel and a human touch**.**
- First-world problems with NCD are not Third-world problems. NCD are not that important in Africa, for example, where TB+HIV is vastly more of a concern.
- A healthcare system is composed of various professionals. Medical doctors are getting increasingly reliant on other professions to correctly diagnose and treat patients.
- Using too much hi-technology in medicine could drive costs through the roof. USA spend too much %GDP on healthcare and health outcomes of their population is not that stellar (opioid crisis…).
- It is usually cost effective to delay the onset of NCD as long as possible. Rather than on technology, more could/should be spent on children and their parents. Young children learn from their parents and if they copy ill health behaviour and lifestyle, these habits are time-consuming to reverse/repair in adulthood.

Your personal experience

The whole team and exercise “Develop your PHFS” was very well organized, including the PHIRI web page. MS Teams meeting were supportive.

This country summary was a great exercise, better than the PowerPoint presentation. Here, I was forced to write tens of sentences, in English, and therefore went through a thought process of designing a study and creating/inventing scenarios. I am not that sure now whether technology is a solution to manage NCD and decrease their burden. There are definitely commercial pressures from various companies to track people and their health status and sell those data to somebody. There is real concern about the safety of patient data and its misuse. Constantly thinking about “my” disease (as a potential patient) and how to manage is appropriately could be exhausting and time-consuming. Overall, this PHFS is a great thought exercise about what could happen in the future and what could be done.

Name: Maja Subelj
Country: Slovenia
Affiliation: National Institute of Public Health
Title of Foresight Study: Prospective foresight study for antimicrobial resistance, Slovenia Antimicrobial use in the community during COVID-19

Contextual information & Background

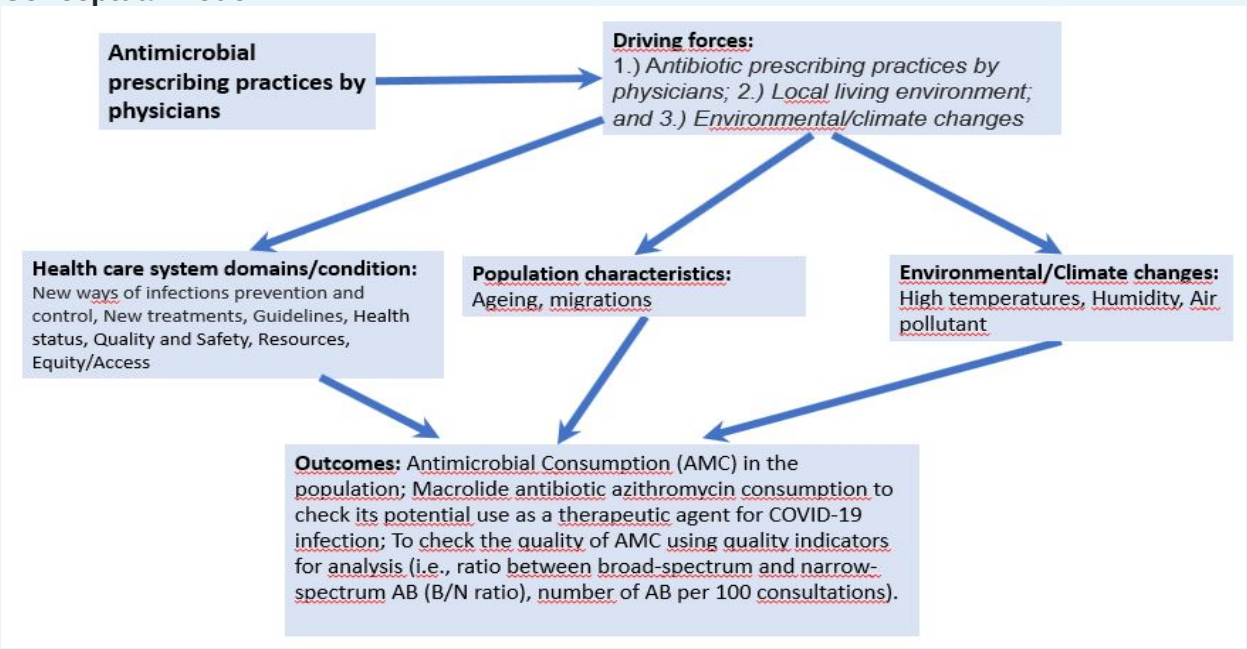
Antimicrobial resistance (AMR) occurs when changes in pathogens cause the drugs used to treat infections to become less effective, increasing the risk of disease spread, severe illness and death, has emerged as one of the leading public health threats.
Misuse and overuse of antimicrobials are the main drivers in the development of drug-resistant pathogens. There was a lot of misuse of antimicrobials during the COVID-19 pandemic.
Improving antimicrobial consumption (AMC) is a key strategy to combat AMR.

Objective of the foresight study

Topic: AMC use in the community during COVID-19.
General issue:
- To assess the impact of the COVID-19 pandemic on AMC in the community/hospitals: i) to describe the impact of the pandemic; ii) to highlight areas for improvement; and iii) to inform context-specific strategies to decrease the rate of AMR in the population.

Sub issues:
- To map a macrolide antibiotic (AB) azithromycin consumption to check its potential use as a therapeutic agent for COVID-19 infection; and
- To check the quality of AMC using quality indicators for analysis (i.e., the ratio between broad-spectrum and narrow-spectrum AB (B/N ratio), number of AB per 100 consultations) in primary care.

Conceptual model



The most important driving forces identified to influence antimicrobial use in the community during COVID-19 were 1.) Antibiotic prescribing practices by physicians; 2.) Local living environment; and 3.) Environmental/climate factors.
The main identified uncertainties identified to influence the antimicrobial use in the community during COVID-19 were 1.) Healthcare-related factors as health care progress i.e., new ways of infection prevention and control, new treatments, and guidelines; 2.) The population characteristics i.e., ageing, migrations; and 3.) Climate/environmental situations are all important factors for patients 'health, but they all bring along various degrees of uncertainty.

Time horizon & Spatial Unit

The study will comprehend 5 years into the future and be national wise.

Scenarios
The most important driving forces identified to influence the antimicrobial consumption (AMC) in the community during COVID-19 were: 1.) Antibiotic prescribing practices by physicians; 2.) unstable local living environment; and 3.) environmental/climate changes.
The main identified uncertainties identified to influence the antimicrobial use in the community during COVID-19 were 1.) Healthcare-related factors as health care progress i.e., new ways of infection prevention and control, new treatments**,** and guidelines; 2.) The population characteristics i.e., ageing, migrations; and 3.) Climate/environmental changes i.e.**,** high temperatures, humidity, and air pollutants, all are important factors for patients‘ health and they all bring along various degrees of uncertainty.
Scenario 1: Physicians’ Antibiotic prescribing practices:
1.) Policies/interventions: i) Guidelines/clinical pathways on antimicrobial prescribing; ii) Clinical pharmacists (i.e., a scenario-planning approach to human resources for health): the case of community pharmacists; Monitoring antimicrobial consumption=annual routine surveillance (estimates of aggregated medicines data (derived from imports, sales, reimbursement, a proxy for actual antimicrobial use, "complete data"; iii) Monitoring antimicrobial use - point prevalence surveys (estimates from patient-level data, info on patients' symptoms, doctor's diagnosis and medicines, sample data-snapshot; iv) Prescribers’ education/training of professionals, information to the patients;
Scenario 2: Local living environment:
1.) Policies/interventions: (Economic) investments in the local environment i.e., housing, hygiene, healthcare, agriculture.
Scenario 3: Environmental/climate changes:
1.) Policies/interventions: Rapid (Mobile?) reporting/IT system alert systems/near real-time surveillance (i.e., multi-drug resistant organisms (MDRO) in sewages/wastewater) reporting.

Main outcomes and insights
Knowing which factors on AMC during an epidemic/complex situation(s) can inform context-specific strategies/measures to decrease the rate of AMR and improve patients’ outcomes.

Policies and Interventions
Special attention is given to environmental/climate and the local living environment trends and their impacts and interaction with AMC practices.

Products and Communication
Prescribing data and evidence will be translated into policies and we will learn from countries’ success stories.

Conclusions
We will apply a scenario approach which explores short- and long-term trends and their possible effect on antibiotic use in the population. Based on these scenarios, societal challenges for the future in areas of prescribing practices, environmental factors and local living conditions will be identified.

Your personal experience
The main challenge was finding the scenarios relevant to the specific context; the PHIRI team was extremely helpful and actively engaged in the progress.

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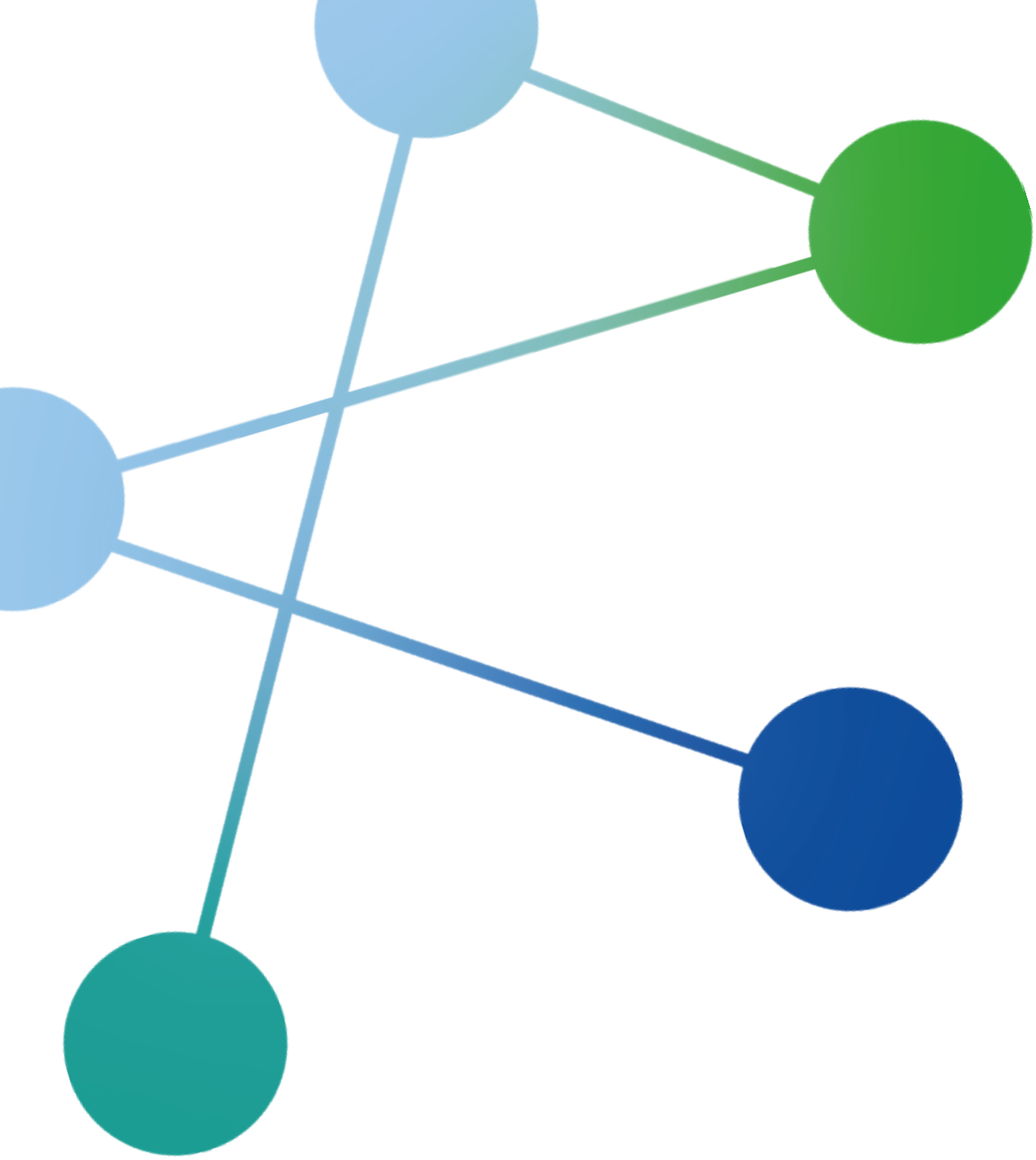

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