



ASSESSING THE RESILIENCE OF HEALTH SYSTEMS IN EUROPE

**An overview of the theory,
current practice and strategies
for improvement**

Report by the EU Expert Group on Health System Performance Assessment

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Cite this publication as: EU Expert Group on Health Systems Performance Assessment (HSPA) (2020), *Assessing the resilience of health systems in Europe: an overview of the theory, current practice and strategies for improvement*, Publications Office of the EU, Luxembourg.
https://ec.europa.eu/health/sites/health/files/systems_performance_assessment/docs/2020_resilience_en.pdf

Print ISBN 978-92-76-27529-9 doi:10.2875/191483 EW-06-20-197-EN-C

PDF ISBN 978-92-76-27528-2 doi:10.2875/473123 EW-06-20-197-EN-N

Acknowledgements

This publication benefited from valuable input and feedback from members of the EU Expert Group on Health Systems Performance Assessment (HSPA), the Organisation for Economic Co-operation and Development (OECD) Health Division, the WHO Regional Office for Europe, and the European Observatory on Health Systems and Policies. The content of the report greatly profited from the ideas, reflections and suggestions provided by members of the Expert Group who joined the sub-group on health systems resilience.

With the exclusion of Chapter 3, this report was prepared by Federico Pratellesi and Simon Drees, with valuable input from Sylvain Giraud and Filip Domański (European Commission).

Chapter 2 is based on an analysis of replies to a survey developed and conducted within the Expert Group on national experiences with defining, measuring and assessing health system resilience. The principal author is Federico Pratellesi, with specific contributions provided by Sophie Gerkens, Mélanie Lefèvre, Pascal Meeus (Belgium), Tomas Troch (Czechia) Eleri Lapp (Estonia), David Bernstein (France) Robert Mooney (Ireland) and Kenneth E. Grech (Malta).

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The full lists of Members of the Expert Group, the health system resilience sub-group and participants to the thematic Policy Focus Group are presented in Annex I.

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Abstract

Over the past decade, a series of technical failings in tackling major health shocks have prompted health policymakers to devise the notion of *health system resilience* - a characteristic that can be nurtured to increase health systems' capacity to absorb, withstand and recover from shocks and stresses. However, a lack of clarity on the exact definition and scope of the concept has curbed attempts by researchers to define prospective measurement and assessment methods for this 'novel' dimension of health system performance. As European countries continue to respond to COVID-19, it is crucial to step up efforts to resolve these methodological hurdles affecting policymakers' ability to assess health system resilience.

The objective of this report is thus to support European health policymakers in their quest to identify more advanced tools and methods to measure and assess health system resilience.

To do so, the report starts by presenting a theoretical overview of the concept of *resilience* applied to health systems, with a view to scrutinizing its potential value and usability as a standalone dimension in health system performance assessment (HSPA) processes. We present a formal definition of *health system resilience*, together with a basic framework for thinking about measurement and assessment approaches. Despite its complexity and limitations, our assessment of the value of the concept of *health system resilience* for policy formation is positive.

The report then presents the results of a survey with the Expert Group on HSPA aimed at finding out if (and if so, how) European health policymakers assess the resilience of their health systems. The survey - which was carried out prior to the onset of the COVID-19 pandemic - confirms that only a few European governments have so far operationalised *resilience* as a standalone dimension of health system performance. However, about half of the countries frame *at least some aspects* of health system resilience as part of their HSPA processes. This illustrates the perceived need by policymakers to capture resilience elements, despite the lack of a systematic assessment framework. To illustrate the multifaceted nature of the concept, we present a series of case studies that provide an analysis of various resilience challenges and how they have been addressed in individual national health systems.

The survey found that more than two-thirds of European countries investigate the resilience capacity of their emergency care services, while less than a third cover the long-term care sector. To explore further the scope of countries' resilience assessments, we developed a typology of *shock types* and *resilience capacities*. The breakdown of countries' resilience assessments by shock type and specific resilience capacity is very uneven. The Most countries concentrate their assessments on the *preventive/forecasting capacity* to withstand *epidemiological shocks*, and on the *adaptive capacity* to withstand *economic shocks*. This distribution suggests the existence of significant assessment gaps.

Finally, the report summarises the conclusions of a workshop by the Expert Group steered by the European Observatory on Health Systems and Policies. Based on a review of the existing literature and countries' experiences, we identify thirteen strategies for strengthening health systems resilience, as well as a number of dimensions for assessment.

Despite the numerous conceptual and methodological limitations that characterise the concept of health system resilience nowadays, our findings show that a number of steps can be taken to improve current assessment methods. Some of the most promising options for improvement in the short term are:

- 1) Developing new measures to assess governance capacity;
- 2) Extending the scope for measurement of health system resilience;
- 3) Extrapolating relevant insights from past failures and experiences;
- 4) Developing more effective communication tools to make resilience matter to policymakers.

Introduction

Following the adoption of conclusions “*Towards modern, responsive and sustainable health systems*” by the Council of the European Union (2011), the Council Working Party on Public Health at Senior Level (WPPHSL) invited Member States and the Commission to set up an Expert Group on Health Systems Performance Assessment (HSPA) to (i) provide participating Member States with a forum for exchange of experiences on the use of HSPA at national level, (ii) support national policymakers by identifying tools and methodologies for developing HSPA, (iii) define criteria and procedures for selecting priority areas for HSPA at national level, as well as for selecting priority areas that could be assessed EU- wide to illustrate and better understand variations in the performance of national health systems; and (iv) intensify EU cooperation with international organizations, in particular the Organization for Economic Co-operation and Development (OECD) and the World Health Organization (WHO).

In the autumn of 2014, the Expert Group on HSPA was established. Its membership is comprised of representatives from the EU Member States, Norway, the European Commission, the OECD, the WHO Regional Office for Europe and the European Observatory on Health Systems and Policies. The Expert Group is co-chaired by a Member State periodically elected by other Member States’ representatives, and the European Commission’s Directorate-General for Health and Food Safety (DG SANTE).

The Expert Group on HSPA organizes its work around a set of priority topics. The activities of the Expert Group are synthesized in an annual thematic report that examines the latest tools and methods policymakers have at their disposal to measure and assess selected dimensions of health systems performance. In 2019/2020, the Expert Group focused its work on identifying tools and methods to assess *health system resilience*.

The work of the Expert Group on this topic comes at a time when the COVID-19 pandemic has put national health systems across Europe under enormous stress, causing major direct and indirect loss of life, morbidity and socio-economic disruption. COVID-19 has revealed the structural fragilities that affected European health systems before the onset of the current health crisis, which either remained undetected in the past years, or which risk potential had been severely underestimated. Although most countries had developed plans to respond to infectious disease outbreaks, in practice, several health systems either revealed themselves ill-prepared to respond to the crisis, or faced severe difficulties in the timely implementation of their (pre-existing) crisis response plans.

From the outset of the COVID-19 pandemic, several countries struggled to cushion the impact of the virus on the health system, implement containment measures, and adapt service delivery in the face of increased demand for acute care. Compounded by a series of coordination failures at the international, European and national levels, the disruption of global supply chains for personal protective equipment, some medicines, reagents for testing kits and other essential products severely decreased health systems’ capacity to control disease outbreaks. Moreover, several countries took a relatively long time to define and implement time-sensitive mitigation measures (e.g. social distancing, contact tracing), and in some cases even neglected important safety aspects to generate extra capacity in response to the surge in demand for inpatient care, with disastrous consequences for patients and health workers. In other words, several national health systems in the EU have demonstrated a low resilience capacity to epidemiological shocks.

As the health crisis unfolds and European countries are implementing additional measures to strengthen their health systems' capacity to endure the second wave of COVID-19, it is a moral imperative for European health policymakers to begin taking steps to build resilience in their health system. In the post-pandemic era, it will thus be key to adequately frame resilience as a key dimension of health system performance, so that it can be systematically factored in health system decision-making and policy design processes.

To achieve this, it is at a minimum necessary to (i) develop a conceptual framework for health system resilience, (ii) identify the core health system features that render health systems *resilient* to an array of shocks, and (iii) invest in the development of an adequate set of prospective measurement and assessment tools to inform decisions on policy interventions, reforms and investments aimed at building resilience. As the following chapters will reveal, the third and last objective is of special concern for the purpose of this report, for two main reasons.

The first reason is that, in non-crisis times, policymakers and health system managers are preoccupied with pursuing other objectives for which a well-established number of performance measures already exists. In this context, a lack of analytical tools to assess health systems' resilience capacity will likely result in an underestimation of the 'relative weight' of resilience-enhancing measures and investments in their decision-making processes. Possibly worse, if the pursuit of other health system objectives is not always complementary to that of building resilience (e.g. as in the case of health system efficiency), failing to provide a comprehensive assessment of the impact of policymakers' decisions on *all* relevant performance dimensions creates a risk the resilience capacity of health systems may be inadvertently eroded.

The second reason is that, should policymakers resort to either using 'low quality'/partial measures of health system resilience, or guide their decisions to build resilience based on methodologically fragile and inconsistent assessment tools, over time claims regarding the need to continue devoting resources to building health system resilience may become (or be perceived as such by taxpayers and other stakeholders) a 'trojan horse' for limited-value health investments at best, and for outright wasteful spending/fraud/corruption at worst. In this sense, investing in the development of a comprehensive, more accurate set of resilience assessment tools not only has an instrumental value for decision-making, but also serves as an accountability-promoting tool to ensure that the pursuit of resilience can become a long-term, stable policy and investment priority.

As the report will explain in greater detail, developing a prospective measurement and assessment tool for health system resilience is a particularly difficult task for several reasons. Being a complex and relatively new concept within the health policy and systems discourse, there is yet no definite consensus on the exact scope of the concept, and few researchers have tried to backtest the efficacy (for the purpose of assessment) of the theoretical models that have been developed so far. On the other hand, it is clear that the time-dependent nature of resilience adds a fundamental, much needed dimension of dynamism to what are largely static current HSPA models – an indication of the potential that the concept holds to strengthen the science of HSPA.

The objective of this report is thus to support European health policymakers in their quest to identify more advanced tools to measure and assess health system resilience prospectively.

To do so, Chapter 1 of the report introduces the concept of health system resilience by providing an account of its origins and main characteristics, based on a review of the relevant research literature. The chapter then presents a formal definition and a basic conceptual framework for health system resilience to provide a starting point to consider possible measurement and assessment approaches. Lastly, the chapter presents a discussion on the added value of health system resilience to the health policy discourse, together with some considerations on the conceptual and methodological obstacles to

the practical development and operationalisation of a fully-fledged measurement and assessment framework.

Chapter 2 presents the results of a survey on health system resilience conducted within the Expert Group. The objective of the survey was to collect data on how European countries define, measure and assess the resilience capacity of their respective national health care systems, and to analyse the extent to which European health policymakers factor in a consideration of resilience (as one of the dimensions of health system performance) when devising their health policy interventions. The chapter provides a cross-country analysis of (i) how European health policymakers define the concept in practice, (ii) the scope and focus of their resilience assessments, (iii) the indicators they have so far developed and used to assess it, and (iv) relevant health system governance characteristics to better understand the use and potential policy impact of the resilience assessments carried out by the countries.

Moreover, throughout the second chapter we present a series of case studies¹ that document countries' experiences with various types of health system shocks. The case studies point out lessons learnt and good practices which can help health policymakers design more effective resilience-building policy interventions.

Chapter 3 aims to bring theory and observed practice together, by identifying a series of strategies for nurturing health systems resilience based on the key takeaways from the existing literature and an analysis of countries' experiences. The chapter draws on (i) information gathered from a Policy Focus Group attended by national health system experts in Brussels in October 2019 and steered by the European Observatory on Health Systems and Policies, and (ii) additional research work by the European Observatory on Health Systems and Policies which was presented in a recent policy brief by Thomas et al. (2020). The chapter identifies a series of assessment areas for resilience linked to the strategies mentioned above, which provide a starting point for policymakers to design more targeted assessment tools within the current conceptual and data availability constraints.

The fourth and last chapter summarizes the key takeaways from the previous three chapters, and presents a list of some of the most promising options that policymakers have at their disposal now to improve their assessment of health system resilience. Although putting forward a set of policies that can foster health systems resilience goes beyond the scope of the report, the chapter offers some discussion on the potential for governments to advance in this endeavour through a more strategic use of currently available health system information to guide their decision-making and policy design processes.

¹ (8) Country case studies are presented in boxes throughout the chapter.

Chapter 1

Health system resilience: a theoretical overview

Introduction

The origin of the concept of resilience can be traced to the field of physics, where it is defined as the ability of a material to elastically absorb energy from dynamic forces (e.g. an impact) without creating a permanent distortion. Over the last decades, this notion was borrowed and further developed independently by various scientific disciplines ranging from ecology to sociology, psychology and finance (Hallegatte, 2014; Meerow et al., 2016; Pelling, 2012; Southwick et al., 2011). Although experts from each of these areas have provided different explanations of what *resilience* means in the realm of policy – sometimes confounding it with other concepts, to the detriment of clarity – definitions across all disciplines remain fairly consistent with the description of the innate capability of a complex system to ‘bounce back’ to a point of equilibrium after having endured some type of disruption.

In the specific domain of health policy and systems research, one of the events that triggered the interest of governments and researchers on this topic was the 2009 European sovereign debt crisis, which knock-on effect on public expenditure simultaneously exposed health systems across Europe to ever-tighter budget constraints and greater health needs. Pressure imposed on health systems budgets by fiscal consolidation measures elicited a wide range of policy responses from European policymakers. Taking into account differences in the severity and duration of the crisis in each country, policy responses to the public debt crisis revealed the existence of significant differences in national health care systems’ structural susceptibility to large economic fluctuations, as well as in their capacity to cope with sudden resource shortages, reconfigure service delivery and, if required, adapt in the face of new circumstances. Another event that made health systems resilience emerge in the mainstream academic and policy discourse was the development of the Ebola virus epidemic in West Africa in 2013-2016 (Kieny et al., 2014). Unanticipated organisational failures and delays in governments’ response to the epidemic led to severe containment difficulties, which caused major loss of life and socioeconomic disruption in the region. This experience revealed the existence of severe structural inadequacies of pre-existing health system structures, which pressed local governments and multilateral organisations to step up investment to develop more robust and resilient health systems (United Nations, 2016).

More recently, the coronavirus disease 2019 (COVID-19) pandemic that began hitting Europe in March 2020 put unprecedented strain on most health care systems, generating a massive direct and indirect impact on morbidity and mortality across Europe and the world at large. The rapid escalation of COVID-19 clusters in several EU countries and the severe difficulties associated with its mitigation encountered by health systems revealed the existence of structural fragilities within health systems that either remained undetected in the past years, or which risk potential had been severely underestimated.

These events sparked significant political and analytic interest from health policymakers and researchers across the world, and highlighted the urgency to further investigate what exactly constitutes a *resilient* health system, and to understand how this specific characteristic can be nurtured in increasingly complex systems that are simultaneously preoccupied with pursuing other objectives (e.g. patient safety, efficiency) vis-à-vis which resilience may not always be complementary. As a result, several policy researchers have tried to conceptualise resilience as part of a framework for health systems strengthening, by outlining the conditions that should enable health systems to become more resilient to ‘acute shocks’ (e.g. infectious disease outbreaks) as well as ‘structural stresses’ (e.g. population ageing). As part of this endeavour, some have also developed proposals for assessing health systems’ resilience to specific types of disruption – for instance, revenue shocks stemming from

economic crises (Thomas et al., 2013). However, most researchers acknowledged the fundamental difficulty in specifying an exhaustive measurement and assessment methodology that manages to capture the complex, time-dependent nature of resilience. This is also at least partly due to a lack of conceptual maturity of the notion of resilience (Turenne et al., 2019) and to the absence of a fundamental consensus on the exact scope of the concept itself, which some researchers even claimed to be impossible to define prescriptively (Haldane et al., 2017).

As set out in the introduction to the report, this first chapter introduces the concept of resilience by providing (i) a summary overview of the recent literature on the subject, (ii) a basic definition and conceptual framework for health system resilience, and (iii) a discussion on the added value of the concept to the health policy discourse, together with some considerations on the obstacles to the practical operationalisation of an assessment framework for health system resilience.

The following two sections summarise respectively how the concept of resilience has been described in various scientific disciplines and research areas other than health policy, as well as specifically within the health policy and systems research literature stream. These elements will help readers understand the potential appeal, added value and usability of the concept of resilience as a dimension of health systems performance assessment (HSPA), along with the main theoretical and measurement-related difficulties for its application in health policy-making.

The chapter then presents readers with a working definition of health system resilience developed by the EU Expert Group on HSPA, and provides an overview of the range of shocks and strains health systems can be subjected to, in reaction to which they are expected to ‘bounce back’ to a new, dynamic point of equilibrium. The following section comments on other relevant characteristics of health system resilience required to clarify the scope of the concept, its potential for implementation in the HSPA context, such as its interaction with other sometimes competing HSPA dimensions (i.e. efficiency), and other challenging aspects related to health system resilience at the ‘macro’ vis-à-vis the ‘micro’ levels.

The last section of the chapter briefly reflects on the advantages and disadvantages of framing resilience as a standalone dimension of HSPA, and on whether the ‘inoculation’ of this concept into health policy does indeed provide some analytic benefit that can be factored in actual policy design, or if the great interest that this concept has generated is mostly reflecting its ‘rhetorical’ strength, in the face of the high levels of complexity and uncertainty that health policymakers and managers are expected to deal with.

Resilience in disciplines other than health policy and systems research

Outside of the field of materials science from which the concept originated, the idea of resilience has been historically employed in disciplines other than health policy and systems research. Our non-systematic literature review suggests that a sizeable part of the early health systems resilience literature bears significant conceptual overlap with the resilience discourse from ecology (Folke et al., 2010; Gunderson, 2000; Holling, 1973) disaster management and risk reduction (Andrew et al., 2016; Bruneau et al., 2003; Norris et al., 2008). Frequent references to resilience are also encountered in the fields of psychology (Bonanno, 2004) and economics/development economics (Béné et al., 2013; Briguglio et al., 2006; Martin, 2012) among other fields. Concerning areas conceptually closer to the field of health systems research, the notion of resilience, generally defined as the ability to “*manage disturbances and produce success despite complex conditions that could easily lead to failure*” (Fairbanks et al., 2014) began to emerge over the past decade as a new paradigm within the quality of care and patient safety research literature (Hounsgaard et al., 2018; Iflaifel et al., 2020).

Looking at research work specifically carried out on this concept at the European Union (EU) level, in 2017 the Joint Research Centre (JRC) published a first conceptual framework on resilience, which provided the theoretical foundation for a substantive assessment published in 2018 titled: “*The resilience of EU Member States to the financial and economic crisis – what are the characteristics of resilient behaviour?*” (2018a, 2018b). In their research, the JRC adopted a broad notion of resilience:

“A resilient system (or society) can face shocks and persistent structural changes in such a way that it does not lose its ability to deliver societal well-being in a sustainable way (i.e., deliver current societal well-being, without compromising that of future generations)”.

This concept of resilience encompasses social and human capital, institutions and infrastructures, as well as “beyond GDP” measures of prosperity and well-being, covering social aspects such as health and poverty. It also acknowledges that “*policy levers to act on for achieving resilience in the short-run and smoothing the impact of a shock may not coincide with the best entry point to achieve resilience in the medium run*”. This explains why resilience is not just about a system’s capacity to absorb shocks, but also about its ability to adjust to them. In light of this, the JRC noted that “*shocks should be considered as windows of opportunity, and utilized to ultimately ‘bounce forward’*”. In this context, resilience is conceptualised with reference to the well-being of future generations, taking into account the strong link to sustainability, both reflecting longer-term effects (JRC, 2018b).

Resilience as a property of health systems: a definition

As stated in the introduction to this chapter, our review of the relevant literature found that over the last decade, research efforts directed at framing the concept of resilience within the health systems research and policy discourse led to the development of several definitions, which were generally characterized by conceptual overlaps and overall indicative of a general lack of consensus regarding the exact boundaries of the concept (Abimbola & Topp, 2018; Turenne et al., 2019). A recent scoping review on this subject by Fridell et al. (2019) confirms that no single definition of resilience has been used consistently within the health systems literature, highlighting significant variation even among the most commonly reported definitions.

Notwithstanding this definitional lack of clarity and related limitations, identifying a basic meaning of *health system resilience* was required to advance our framing of the concept and study of whether (and if so, how) the concept has been operationalised by health policymakers in the EU. For this report, the Expert Group on HSPA developed the following working definition of health system resilience:

“Health system resilience describes the capacity of a health system to (a) proactively foresee, (b) absorb, and (c) adapt to shocks and structural changes in a way that allows it to (i) sustain required operations, (ii) resume optimal performance as quickly as possible, (iii) transform its structure and functions to strengthen the system, and (iv) (possibly) reduce its vulnerability to similar shocks and structural changes in the future”.

The definition presented above aims to encompass the core features of resilience as they are described in the several conceptual frameworks from both the health systems literature and the relevant non-health related disciplines examined during our screening of the literature. Consistently with the emerging consensus in the health systems research community on the need to avoid narrow definitions that risk reducing the concept of resilience to a synonym for preparedness (M. E Kruk et al., 2017), the definition by the Expert Group explicitly refers to health system capacities that not only target short-term (acute) crises, but also structural (cumulative) stresses that develop over the long term. The proposed definition also characterises resilience as an endogenous feature of health systems that goes

beyond their capacity to withstand the effect of external shocks and stresses on health service delivery: the probability of disruption to health system performance following the onset of a shock is explicitly acknowledged, and the capacity of the health system to mitigate the impact of a shock, take remedial action, redesign its own structures and processes to resume optimal performance in the new context and learn from the experience to make itself less vulnerable to shocks of similar nature in the future is conceived as more than the sum of the mix of financial, material and human resource at its disposal.

Concerning specific dimensions of health system resilience, the definition proposed by Expert Group on HSPA partially draws from the conceptual framework presented by Blanchet et al. (2017), which defines three core resilience capacities (*absorptive*², *adaptive*³ and *transformative*⁴) and extends it to include a fourth dimension - *preventive* (i.e. the ability of a health system to anticipate the advent of a shock and create the necessary conditions to minimize its potential future impact.) At the same time, the proposed definition is open to adaptation to the local health systems' needs and context-specific factors, a core component of most definitions in the current literature (Haldane et al., 2017).

Other authors have tried to categorize different aspects of resilience reflecting these specificities. For instance, in the context of developing a framework for assessing the resilience of health systems to economic shocks, Thomas et al. (2013) identified three types of resilience – *financial*, *adaptive* and *transformative*, and backtested this framework to assess the resilience of the Irish health system to Ireland's post-2008 economic downturn. Castleden et al. (2011) carried out a systematic review of the relevant literature, and identified concepts of resilience in the context of disaster planning and public health promotion. This included *disaster*, *community*, *social-ecological* and *infrastructure resilience*, as well as *psychological*, *organizational*, *network* and *urban* interpretations of resilience.

Other general aspects of relevance for assessing health system resilience concern, among other factors, its quality of governance, financial sustainability, the state of the workforce and the health status of their population. Shock (type)-specific aspects include assessments of the state of preparedness and contingency plans, i.e. an assessment of relevant actors' capacity to operationalise them (for instance, whether surge capacity of specific physical resources is deployable). In addition to this, it is also important to acknowledge the role of non-health aspects (such as social protection) on overall health system resilience. Hanefeld et al. (2018) devised a '3+2' model, including three health system functions - *health information systems*, *funding/financing mechanisms* and *health workforce* - in addition to two cross-cutting dimensions – *values* and *governance*.

Based on this working definition of health system resilience, the Expert Group on HSPA developed a basic schematic of the performance of a health system enduring a shock over time (Box 1 below). The main objectives of this schematic were to (i) illustrate the time-dependent nature of resilience and its implications for possible measurement and assessment approaches, and (ii) provide a basic framework that could act as a common starting point for respondents to the Expert Group's country survey on health system resilience, which results are presented in Chapter 2 of this report.

² *Absorptive capacity* is defined as the intrinsic capacity of a health system to cushion the impact of a shock and continue to deliver the same level (quantity, quality and equity) of basic healthcare services and protection to populations using the same level of resources and capacities.

³ *Adaptive capacity* is defined as the intrinsic capacity of a health system to sustain required operations despite extraordinary circumstances caused by the shock and deliver the same level of healthcare services with a different (most likely scarcer) resource mix, which requires making organisational adaptations.

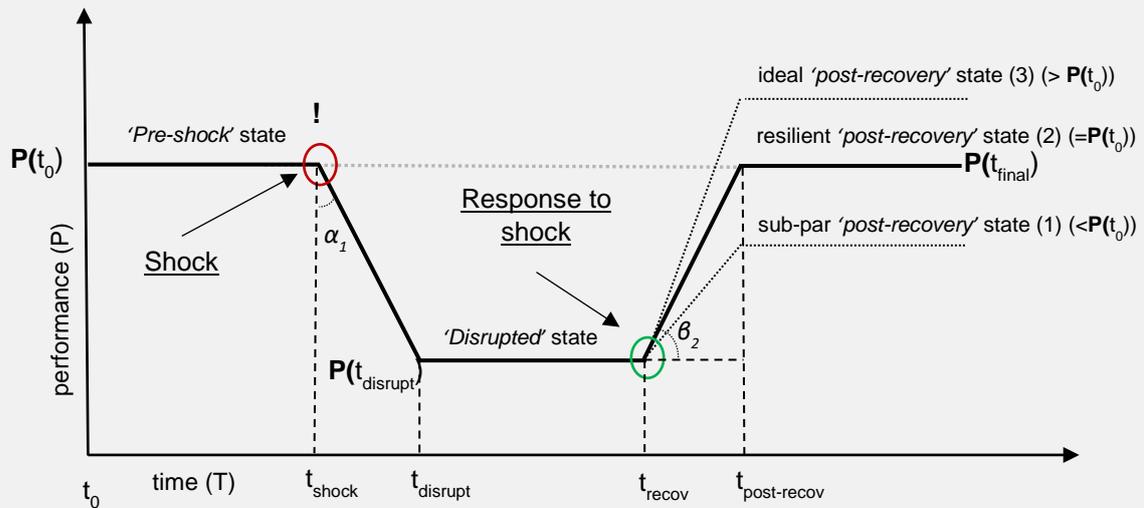
⁴ *Transformative capacity* is defined as the intrinsic capacity of the health system to transform its structure and functioning to respond to structural changes in the operating environment.

Box 1. Devising a definition of resilience

Given a health system (HS), let performance (P) represent some quantifiable, time-dependent measure of health system performance, which value is directly impacted by the disruptive event, so that for each state of HS at any point in time, it is possible to identify a respective value for P_t .

It is therefore possible to analyse the concept of resilience by outlining a basic diagram to describe how a health system (HS) experiencing a shock can demonstrate resilience over time (Figure 1 below).

Figure 1 – Basic illustration of a health system’s performance variation over time following a shock



It is thus fair to assume that the moment HS experiences a shock, over time P_t will find itself in three distinct states (the “pre-shock state, P_{t_0} ”, the “disrupted state, $P_{t-disrupt}$ ” and the “post-recovery state, $P_{t-final}$ ”) as a result of two main events - the “shock” (red circle) and the “response to the shock” (green circle).

As a result of these two events, two corresponding ‘shifts’ occur during which the value of P_t changes: the ‘crash’ from P_{t_0} to $P_{t-disrupt}$ (t_{shock} ; $t_{disrupt}$), and the ‘rebound’ from $P_{t-disrupt}$ to $P_{t-final}$ (t_{recov} ; $t_{post-recov}$).

Angles α_1 and β_2 can be considered as measures of the speed at which the two shifts occur respectively.

In compliance with the notion of “bouncing back” presented in the introduction to the survey, it is possible to think of the resilience of $HS_{(t)}$ in its most basic form as:

$$(1) \text{ Resilience } HS(t) = \frac{P \text{ 'gained' following the rebound}}{P \text{ 'lost' as a result of the shock}}$$

It thus follows from the formula that a system can be defined as:

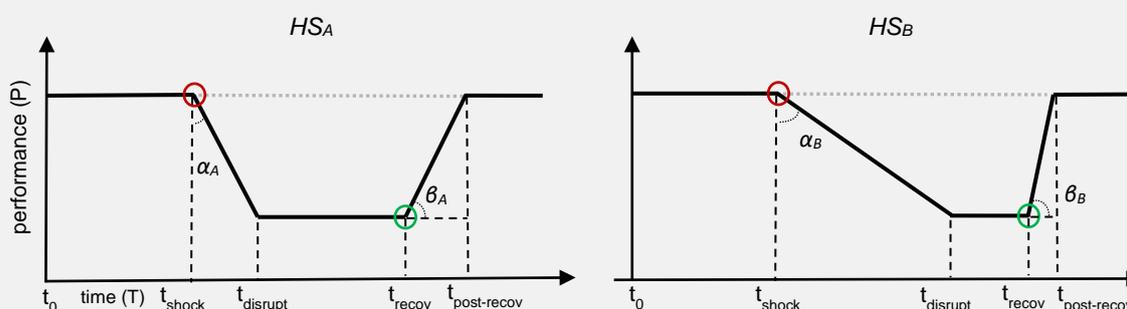
- 1) hyper-resilient ($HS_{(t)} > 1$), if ($P_{t-final} > P_{t_0}$), i.e. if the recovery is greater than the loss caused by the shock;
- 2) resilient ($HS_{(t)} = 1$), if ($P_{t-final} = P_{t_0}$), i.e. if the recovery is equal to the loss caused by the shock;
- 3) partially resilient ($0 < HS_{(t)} < 1$), if ($P_{t-disrupt} < P_{t-final} < P_{t_0}$), i.e. if the rebound is less than commensurate to the loss caused by the shock;
- 4) brittle ($HS_{(t)} = 0$), if ($P_{t-final} = P_{t-disrupt}$), i.e. if there is no recovery following the shock;

Considering a hypothetical situation in which two health systems (HS_A , HS_B) (Figure 2 below) exhibit the same level of ‘basic’ resilience (as expressed in Equation 1 above) in face of a shock of equivalent type and

magnitude, is fair to assume that, all things being equal, the more resilient health system will be the one that:

- 1) manages to exploit its capacity to absorb/cushion the shock to the fullest, so that angle α is as close to 90° as possible;
- 2) effectively adapts to the shock and sustains required operations, so that the depth of the 'crash' from P_{t_0} to $P_{t-disrupt}$ is the smallest possible;
- 3) reconfigures service delivery effectively and in a timely way, so that the duration of the 'disrupted state' ($P_{t-disrupt}$) is as short as possible;
- 4) effectively recovers from the shock and 'bounces back' quickly to a new level of P , so that angle β is as close to 90° as possible;
- 5) Transforms its structure and functioning so that the new level of P is sustainable in the long term (thus making the system less vulnerable to future shocks).

Figure 2 – HS_B is more resilient than HS_A



Box 2. A (non-exhaustive) list of health system resilience-enhancing elements

- Protected and diversified health system revenue generation/financing mechanism;
- Adequate buffers/rapidly deployable reserve capacity (material and financial resources);
- Regularly revised and updated risk management plans;
- Built-in redundancies/alternative ways to deliver care;
- Existence of a high-quality (i.e. sufficiently sensitive and specific) epidemiological surveillance system;
- Easy access to detailed and timely health information by health system managers and policymakers;
- High level of 'social capital' (institutional trust, cooperation capacity, public awareness of health risks);
- Effective communication and coordination across government entities and other relevant stakeholders;
- Explicitly defined public/statutory health insurance health benefit basket;
- Universal health coverage;
- Well-functioning health system performance monitoring and forecasting practices;
- Well-motivated and supported health workforce of appropriate size;
- Strong and transparent health system leadership;
- Existence of an organisational learning culture/'learning from failure' within the health system.

To provide further guidance to survey respondents and allow for a sufficient degree of comparability across responses, the questionnaire was also accompanied by a non-exhaustive list of health system resilience-enhancing factors (Box 2 above) extrapolated from our literature review. While recognising the limitations of its potential for direct operationalisation in empirical assessments of health system resilience, we believe that the basic definition presented above and its accompanying basic conceptual model in Box 1 above provide an overall description of resilience that is sufficiently specific, comprehensive in terms of breadth of definition and largely consistent with most of the relevant research literature on the subject.

Health system resilience to acute shocks and chronic strains

Shocks, as referred to in the definition presented in the section above, are a test to the resilience of a health system. They can be categorized in many ways, including their nature, severity, duration and frequency. Against the backdrop of the complexity of health systems, these dimensions are to be considered as continua, with (i) acute, sudden shocks that happen occasionally and (ii) chronic, structural stresses that systematically affect the functioning of health systems as the two opposite ends of the classification spectrum. As per their nature, a typology should classify, at a minimum, whether shocks and stresses predominantly affect the supply or the demand side of health systems. A more granular typology could classify shocks and stresses based on their main nature – epidemiological, economic, technological, environmental, societal and geo-political. The latter approach was adopted in the resilience survey by the Expert Group, which is outlined in Chapter 2.

At the international level, international epidemiological shocks are included in the International Health Regulations, an international legal framework for country cooperation to prevent and respond to public health risks with cross-border implications (WHO, 2008). In the European Union, implementation follows Decision 1082/2013/EU of the European Parliament and the Council of the European Union on serious cross-border threats to health (2013). Another important framework at the international level is the “Sendai Framework on Disaster Risk Reduction”, of which the UN Office for Disaster Risk Reduction (UNISDR) is the official custodian, promoting and supporting monitoring and implementation (United Nations, 2015). The Sendai framework focusses on disasters, and makes extensive reference to governance in managing risk and promoting resilience (ibid).

In line with the design of these frameworks, definitions of health system resilience in the international health policy and management discourse are predominantly focused on acute shocks and preparedness plans for shocks such as national environmental disasters and infectious disease outbreaks. They thus do not include chronic stresses that have a slow, cumulative impact on health system performance over longer periods, such as negative demographic shifts, health workforce shortages, the introduction of disruptive technologies and others.

It is fair to assume that when a health system is exposed to chronic stresses, traditionally established practices will, by definition, render it incapable of responding effectively to them in the long term. Although the impact of some types of chronic stresses can initially be addressed by health systems' absorptive and adaptive capacities, larger-scale, transformative system change is ultimately required. In the absence of systemic health system transformation, chronic stress factors will eventually render a health system more fragile, overexposed to acute shocks and sensitive to disruptive events which could have otherwise been cushioned by buffers and managed under a 'business-as-usual' scenario. At the same time, acute shocks that either remain partially unresolved, or which temporary solutions implemented in response to the shock inadvertently create a legacy of stressors on the health system can evolve into chronic stress factors, affect them, or exacerbate their gravity.

Other relevant aspects of health system resilience

The comprehensive definition of health system resilience by the Expert Group on HSPA presented above includes elements beyond shock absorption, and sets the concept apart from a system's 'adaptability' or 'robustness' to shocks. Including system transformation as a domain of resilience allows for a discussion of maladaptation or overcompensation in response to shocks. Overcompensation may occur, for example, where the pressure on health system administrators to maximize health system efficiency leads to management decisions that inadvertently erode the absorptive capacity of the health system, leaving little surge capacity to respond or adapt to future crises. Initial savings due to greater efficiency may thus result in lower efficiency in the long-term, as shocks lead to worse outcomes and greater costs compared to systems with greater pre-existing absorptive capacity. Nemeth et al. (2008) described this as a case of cost externalization.

A related, fundamental question which accompanies the one on how to measure the resilience capacity of a health system *a priori* (i.e. before a shock strikes and the health system response to the shock makes its existence apparent) is thus one on how to avoid misjudging contributors to health system resilience as inefficiencies during non-crisis times. At a practical level, this risk can materialize in terms of (i) current (resilience-enhancing) expenditure items that are wrongfully identified as waste and eliminated, and (ii) investments foregone because their potential for increasing health system resilience is underestimated. Although extensive research at the international level on what constitutes wasteful spending in health has been carried out in recent years (OECD, 2017), risks of oversight remain high because of the sheer variation in the nature and magnitude of shocks health systems are potentially exposed to.

The issue of overcompensation is also linked to the need for some variability and fragility to ensure that systemic transformation (and thus improvement) are materially possible. For example, it is fair to hypothesize that the resilience of a health system may benefit on the whole if some of its sub-components are 'semi-fragile'. One example may consist of a persistently low-performing hospital unit, which threatens the long-term resilience of the local health system environment. If the financing formula for hospitals and the governance of health care services allow decision-makers to detect this persistently low performance of the hospital unit and take appropriate remedial action (e.g. change the hospital's management, integrate the hospital unit into a network with a more strategic allocation of care services, or shut down the hospital unit entirely), resources freed up by this shift may be put to more cost-effective use, to the benefit of the resilience of the health system as a whole in the long term. On the contrary, if the health system is forced to keep financing hospital units regardless of their performance and does not offer any instruments for change to managers, whenever a disruption hits the health system, the low-performing hospital unit will continue failing, resulting in an acute shock to local health service provision, as well as additional pressure on *other* hospital units (which, in turn, is going to impinge on their respective performance). In this sense, some degree of sub-system fragility may paradoxically be required to nurture overall system-level resilience.

Lastly, another important aspect of strengthening resilience is trust. It is clear that public trust in the health system and its ability to respond to shocks is crucial for the overall success of said response. The literature on this subject is emerging, and there appears to be limited evidence on how trust can be built in the context of health system resilience (Kittelsen & Keating, 2019). Importantly, distrust can persist and be reinforced beyond recovery and adjustment to a shock, and thus destabilize a health (sub)system in the long-term (Ozawa et al., 2016).

Resilience: A sum of parts or its own concept?

One might argue that the resilience of a health system is just the result of the many parts and characteristics that researchers and policymakers assess: its quality, efficiency, effectiveness, sustainability etc. There is also a debate on whether improving resilience is different from overall health system strengthening (Margaret E. Kruk et al., 2017). Kutzin and Sparkes (2016) have argued that “*resilience is not an action to be implemented but rather a dynamic objective of investments and reforms*” – as such, resilience would simply be an outcome, a by-product of overall system improvement. A different perspective comes from complex systems theory, in which health systems are viewed as entities made up of many subsystems and actors, interacting with and reacting to each other. This leads to unforeseen and unintended consequences and generally complicates policy changes.

Health systems are complex systems that are themselves interacting with, and embedded in other complex structures (Blanchet et al., 2017). How problems are analysed as well as how interventions and policies are designed and tested needs to reflect these complexities (Rutter et al., 2017). The concept of resilience acknowledges this, as it does not simply adopt a causal, linear conception of the response to shocks, but includes the adaptive, transformative part of said response and the influence of other non-health system factors on health system resilience. It thus fits into the growing body of literature on complexity theory and systems (Barasa et al., 2018). As an example, Blanchet et al. (2017) note how building health system resilience in response to Ebola will require “*not treating the crisis solely as a medical emergency, but as a profound and long-term failure of economic and social development*”.

This also explains why improving health system resilience is necessarily a dynamic, continuous process rather than a ‘one-off’ type of reform (Barasa et al., 2017). Furthermore, increasing the resilience of health systems may yield not only improvements with regard to specific shocks in bad times, but a “*resilience dividend*” - better performance in both good and bad times (Kruk et al., 2015). This dividend is increasingly important in a globalized world: improving resilience in one health system affects other health systems. Reverberating shocks can threaten other health systems, just as they can be contained by resilient health systems. This is true for both acute shocks, such as infectious disease outbreaks, and for chronic strains such as workforce shortages. Kruk et al. (2015) have thus coined health system resilience “*a global public good*” – an ever more precious one in the EU context, where achieving adequate levels of resilience across *all* national health systems may be seen as a “natural guarantor” of the integrity of the European single Market against risks of epidemiological shocks.

Concluding remarks

As stated at the beginning of this chapter, the concept of resilience originated in the field of materials science, and policy research has been historically concentrated in fields other than health care. The increasing interest in health systems resilience expressed by policymakers and researchers over the last decade was primarily triggered by the identification of a series of political and technical failures in tackling major health crises, which severely impacted the socio-economic wellbeing of the countries involved. In response to such deficiencies, several governments, international institutions, and other key stakeholders realized the urgency to strengthen health systems so as to make them more *resilient* to an array of potential sources of future shocks. In turn, this prompted considerable effort in the health systems research community to investigate what exactly constitutes a *resilient* health system, and to understand how exactly this characteristic can be nurtured, measured and assessed prospectively.

Our review of the recent literature on the subject indicates that a significant amount of theoretical research has been carried out in recent years, offering several valuable insights into how resilience may be modelled within a conceptual framework for health systems strengthening in the future. At the same

time, several researchers have acknowledged the fundamental absence of a consensus on the exact scope of the concept within the relevant literature, largely because of the sheer dynamic complexity of health systems and their interaction with non-health-system determinants of health system performance (e.g. social protection, trade, industrial and R&D capacity among others). This lack of conceptual maturity has curbed researchers' attempts to backtest these analytical frameworks empirically, and may at least partly explain the relative scarcity of available research aimed at proposing methods to assess health system resilience through a suite of (qualitative and quantitative) metrics.

To advance our study of whether (and if so, how) the concept has been at last partially operationalised in practice by European health policymakers, the Expert Group on HSPA developed a basic definition of health system resilience. The proposed definition draws on the several conceptual frameworks from both the health systems literature and the relevant non-health related disciplines examined during our literature review, as well as on the direct feedback received from the members of the health system resilience sub-group (see Annex 1-b). Based on this definition, the Expert Group also developed a basic schematic of the performance of a health system enduring a shock over time (Box 1) to illustrate the time-dependent nature of resilience and its implications for possible measurement and assessment approaches, which are explored further in the rest of the report.

Our assessment of the merits of framing resilience as a standalone dimension of HSPA (as opposed to, as some have argued, a mere by-product of overall health system strengthening) is overall positive. The wide variety of shocks and stresses to which health systems can be exposed – coupled with policymakers' limited capacity to anticipate in foresight the nature and severity of systemic threats, and to map the complex chain of interactions that shocks can induce across different systems and sectors – make it imperative to establish resilience as a core dimension of HSPA on a par with access, quality and efficiency. From a conceptual perspective, one of the advantages of health system resilience is that it explicitly presupposes the inherent unpredictability of some types of shocks, and that brittle elements within the health system will not only fail to perform their function during a crisis, but act as 'risk magnifiers', with negative knock-on effects for the system as a whole. In this sense, *resilience* compels policymakers to explicitly acknowledge the contextual and time-dependent nature of health system performance.

Promoting the inclusion of a systematic evaluation of health system resilience in HSPA processes is fundamental also because health policymakers are simultaneously expected to pursue other objectives which may inadvertently conflict with that of nurturing resilience. For example, while pursuing health system efficiency, a lack of consideration for the resilience-enhancing potential of certain expenses (or potential future investments) risk having them misjudged as wasteful or deferrable during non-crisis times, leading to a 'silent erosion' of the resilience capacity of the health system. Because changes in performance that are difficult to express quantitatively tend to be overshadowed by those that are more easily quantifiable, intensifying research efforts to develop more advanced methods to assess health system resilience prospectively – necessarily through a mix of qualitative and quantitative measures, always bearing in mind context and shock specificities – is a crucial step to make health system resilience more prominent in health policymaking.

The next chapter of the report presents the results of a survey by the Expert Group on HSPA to find out how European countries define, measure, and assess the resilience capacity of their national health systems.

Chapter 2

Survey on health system resilience: analysis of findings

This chapter presents an analysis of the main findings from a survey conducted within the Expert Group on Health Systems Performance Assessment (HSPA) between July and October 2019. The main objectives of the survey were to (i) collect data on how European countries define, measure and assess the resilience capacity of their respective national health care systems, and (ii) analyse the extent to which European health policymakers factor in a consideration of resilience as a dimension of health system performance when devising health policy interventions.

The analysis of responses to the survey presented in this chapter provides readers with an overview of how the concept of resilience has been operationalised in practice by policymakers across different health systems in Europe. This analysis in turn enables readers to assess cross-country variation and similarities in the use and characterisation of the concept, and to identify divergences between the theoretical descriptions of resilience (presented in Chapter 1) and its actual practical application by health policymakers in Europe.

The first section of this chapter presents a summary of the steps followed by the Expert Group to develop the questionnaire, including the process that led to the development of a working definition of health system resilience to be used as a guide by survey respondents. The second section presents a detailed account of the responses to the survey and an analysis of results for each question. The third and last section of the chapter synthesizes the key findings from the analysis of survey responses, and presents a discussion on policy implications of practical significance for the objective of the survey.

Survey design and development

As outlined in Chapter 1, resilience as a property of health systems is a relatively recent concept, and health system researchers and policymakers are still grappling with the development of a consistent definition of its scope and fundamental characteristics. To gain a better understanding of this emerging concept, in February 2019 the Expert Group on HSPA invited external experts on the subject from academia, international organisations and the Commission's Joint Research Centre to present their research work in the area of resilience.

In April 2019, the Expert Group's Secretariat set up a sub-group of nine volunteer members⁵ from the Expert Group to discuss the aim and scope of the survey and to collect members' input on the design of the questionnaire. Following a brainstorming session within the sub-group and a literature review, the expert group's secretariat developed a first draft of the questionnaire and presented it to all members of the Expert Group. After having received and processed comments on the draft questionnaire, the secretariat produced a second, final version of the questionnaire⁶ and sent invitations to complete the survey to all members in July 2019.

⁵ The health system resilience sub-group was composed of representatives from Belgium, Czechia, Finland, Romania, Sweden, the European Observatory on Health Systems and Policies and the WHO Regional Office for Europe [see Annex I-b].

⁶ The health system resilience questionnaire is presented in Annex II.

As already presented in Chapter 1, during the course of the literature review and the subsequent development of the questionnaire, the sub-group acknowledged significant variation in the definitions of health system resilience within the existing literature, as well as its predominantly conceptual focus, which concentrates on ideas and principles of resilience, and only to a lesser degree on aspects relating its measurement and assessment. This lack of usability of the concept in a more analytic perspective required the sub-group to develop a more 'technical' working definition of health system resilience to guide respondents through the questionnaire, clarify the scope of the concept, and ensure a sufficient degree of comparability of replies.

Based on the one fundamental feature of resilience that appeared consistently across the health systems research literature – that is, the capacity of a system to 'bounce back' to a dynamic point of equilibrium (on some relevant performance dimension) after having endured some type of shock – the sub-group developed (i) a working definition of health system resilience⁷ and (ii) a basic schematic of the performance of a health system following a disruptive event⁸ to illustrate the complex, time-dependent nature of resilience, and to provide a common basic framework for all survey respondents to document their respective countries' approaches to assessing it.

The questionnaire was composed of two parts – Part A and Part B. Questions from Part A formed the core of the survey, presenting 25 questions distributed across four main sections:

- 1) definition of health system resilience;
- 2) scope for the assessment of health system resilience;
- 3) metrics to assess resilience capacity;
- 4) governance and insights for policy formulation.

Part B of the survey invited respondents to document, by means of short case studies, a selection of relevant strategies, policies, health system design features and any other measure implemented in their country which proved effective in nurturing the resilience of their country's health system to specific types of shocks. Survey participants were invited to document either 'success stories' or 'failures/lessons learned' – i.e., how the lack of some specific 'resilience-ish' feature made their country's health system more fragile in face of a disruption that could have been averted in hindsight, had certain resilience-enhancing strategies been put into place.

⁷ See Chapter 1 here.

⁸ see Box 1 in Chapter 1

Survey results

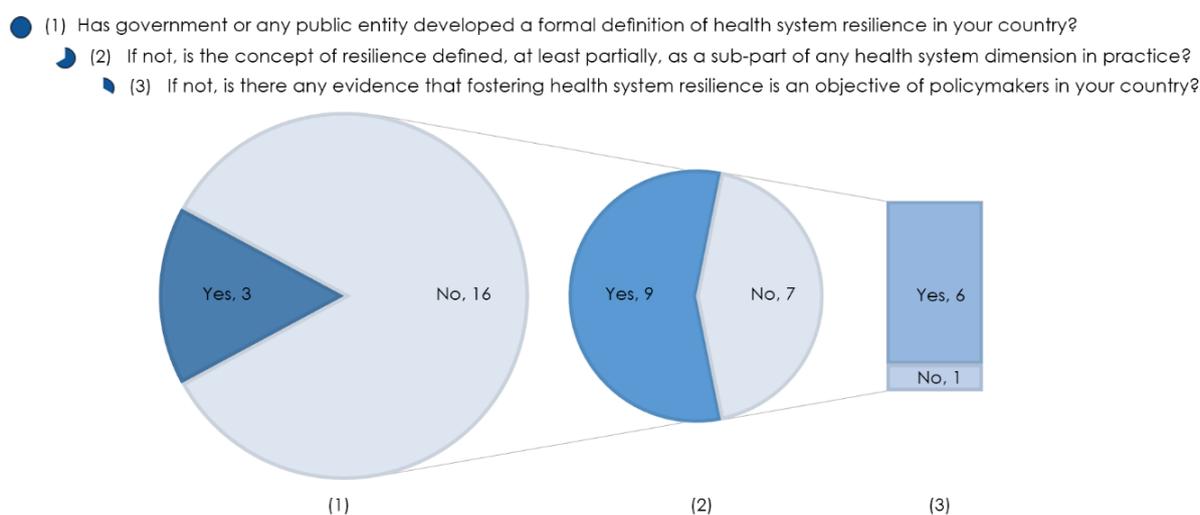
In July 2019, all country members of the Expert Group on HSPA⁹ received an invitation to complete the health system resilience survey via the 'EU Survey' platform. By the end of the survey response collection time, a total of 19 responses (65.5% response rate) were received for Part A of the survey, and eight responses were received for Part B (country case studies).

The results of Part A of the survey are presented below for each section of the questionnaire, while the most illustrative case studies from Part B of the questionnaire are presented throughout the chapter in the form of boxes. All data submitted by survey respondents can be requested directly from SANTE-HSPA@ec.europa.eu.

Definitions of health system resilience (HSR)

Of the 19 countries that participated in the survey, 16 (84%) stated that neither government nor any public entity in their country has so far developed a formal definition of health system resilience (HSR). However, among these countries, more than half (56%) reported having at least partially framed the concept of HSR, as defined for the purpose of the report, as a sub-part of some other health system performance dimension in practice. Among the other half of countries that reported not having defined HSR as a sub-part of some other health system performance dimension, only one country acknowledged the complete absence of evidence that nurturing HSR is a current objective of domestic health policymakers (Figure 3 below).

Figure 3 – Use of the concept of health system resilience (HSR) among surveyed countries



The three countries that reported having developed a formal definition of HSR are Denmark, Malta and the United Kingdom (Table 1 below). All formal definitions presented consistently describe HSR as the capacity of a health system to shield core activities of health service delivery from some type of disruption – ‘*emergency events*’ (Denmark), ‘*external threats and shocks*’ (Malta), ‘*risks and disruptive challenges*’ (United Kingdom).

⁹ The composition of the Expert Group on HSPA is presented in Annex II

Adaptation is consistently referred to as a key feature of this capacity across all three definitions, either by using this term directly (Malta), or by specifying its meaning (*'flexibly expand and reorganize its treatment and care capacity'*, Denmark; and *'divert resources from non-essential services in order for life-saving treatment to continue'*, United Kingdom).

Each of the three formal definitions of HSR contains some particular characteristic that is not present in the other two. For instance, the definition of HSR provided by Denmark explicitly mentions the capacity of a health system to return to normal operations *'as quickly as possible'*, which complements the notion of *'bouncing back'* (common to all three definitions of HSR) with a consideration of the speed at which the recovery from a disruption occurs. The Maltese definition of HSR articulates four distinct phases of exposure to disruption (anticipation, absorption, adaptation, and transformation), emphasises the capacity to forecast the advent of disruption as a feature instrumental to achieving resilience, and suggests the possibility of interactions between the resilience of the health system 'as a whole' and that of its sub-parts¹⁰. Lastly, the definition provided by the United Kingdom describes resilience as a property of both health and social care, suggesting the existence of interactions between these two sectors for the definition of HSR, and identifies the capacity of a system to identify and extrapolate key lessons learnt from past incidents as a main characteristic of resilience.

Table 1 – Formal definitions of health system resilience provided by survey respondents

Country	Resilience definition
Denmark	"Resilience is (...) the ability of the health care system to flexibly expand and reorganize its treatment and care capacity in case of emergency events while continuing to deliver routine services and return to normal operations as quickly as possible."
Malta	"(System-level) resilience is a health system's capacity to absorb, adapt, anticipate and transform when exposed to external threats or forecast shocks that bring about new challenges and opportunities whilst retaining control over its remit and pursuit of its primary objectives and functions."
United Kingdom	"Resilience is (...) the capacity of the health and social care sectors to ensure business continuity in the face of risks and disruptive challenges which may affect their ability to deliver services, divert resources from non-essential services in order for life-saving treatment to continue, and identify key lessons learnt from real incidents."

The (nine) countries that reported not having developed a formal definition of HSR that have nevertheless partly framed it under other dimensions of health system performance have reported a broad array of concepts and definitions related to HSR which can be clustered into three main categories.

The first category, which may be labelled *'financial resilience'*, relates to the capacity of a health system to absorb a *financial shock* – that is, any disruption originating outside the health system that suddenly

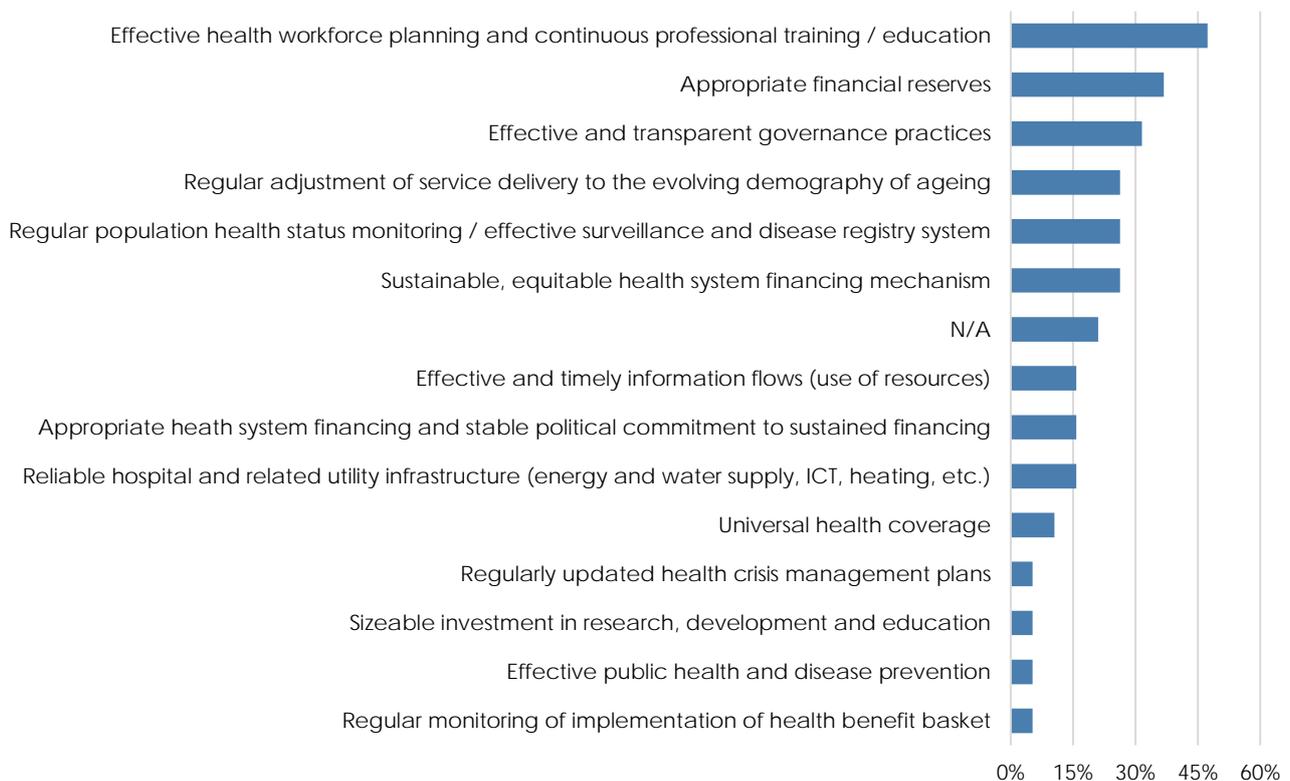
¹⁰ Besides *system-level resilience*, the definition of HSR developed by Malta includes and *community-level resilience* ('the ability of social groups to withstand and recover from unfavourable circumstances') and *individual-level resilience* ('the process of adapting well in the face of adversity, trauma, tragedy and threats and 'bouncing back' from difficult experiences').

and significantly affects the revenue generation capacity of the health system’s financing streams – without negative repercussions on volume, quality and accessibility of needed health care. Countries that reported having conceptualised HSR in this manner tend to be those ones that rely principally on employment-based social insurance contributions to generate revenue for their health systems financing (e.g. Czechia, Estonia and Lithuania).

The second category of definitions related to HSR provided by survey respondents may be labelled as ‘supply chain risk management’, which relates to the capacity of a health system to create buffers along the supply chain of its inputs to ensure their availability in the face of a shock – for example, by means of setting up strategic inventory reserves for certain essential pharmaceuticals and medical devices to avoid stock-outs (e.g. Belgium, France and Czechia), or lists of reserve doctors who can be called to service in case of a sudden surge in demand for health care (e.g. France and Hungary). Measures aimed at increasing the situational awareness of decision-makers within the health system – for instance, maximising the take-up of telehealth services to improve information flows and thus expand the system’s capacity to maintain safety buffers (e.g. Austria) – may also fall under this category.

The third and last category covers health emergency preparedness and response programmes, which relate to the ability of a health system to implement the core capacities required to ensure preparedness and response (at various levels) to specific health emergencies. Health emergency preparedness and response programmes plans reported by countries varied significantly in structure, scope and level of specificity. Some countries reported having developed preparedness and response plans for various ‘classes’ of health emergencies (for example, public health events such as infectious disease outbreaks, environmental disasters), while others reported having developed incident-specific contingency plans – for example, plans to deal with mass casualties from terrorist attacks (e.g. Belgium, France), preparedness and response plans to heatwaves (e.g. France, Luxembourg, Hungary) and the to the flu season (e.g. Italy, United Kingdom).

Figure 4 – Fundamental characteristics and preconditions for health system resilience reported by countries



Based on the aforementioned concepts and definitions related to HSR used in practice by policymakers in their respective countries, the survey then inquired respondents about the fundamental preconditions and characteristics they deemed necessary for a health system to be considered 'resilient'.

As shown in Figure 4 above, almost 50% of countries that responded to the survey have recognised '*effective health workforce planning and continuous professional education*' as a core characteristic for nurturing resilience in their health systems. Effective workforce planning and continuous training allow for the formation and deployment of an adequate supply of health personnel over time, equipped with the requisite skill mix to deliver needed health services to a high standard and adapt in the face of both shocks (e.g. an unexpected, transient surge in demand for care services) and structural challenges (e.g. the shifting burden of disease associated with demographic transitions in Europe).

Box 3. Planning for resilience to weapons of mass destruction incidents: Belgium's Hospital Emergency Plan

On 22 March 2016, three coordinated bombing attacks occurred in Brussels, where two explosions hit the city's airport, followed by a third blast at a metro station close to the EU headquarters. The overall attack costed the lives of 32 people, and more than 340 people were injured, marking the deadliest act of terrorism in Belgium's history.

In this context, the Belgian Federal Public Service Health, Food Chain Safety and Environment (FPS Health) had already begun developing a Hospital Emergency Plan. The design of the plan was tailored to the initiatives set up following the attack, such as the Royal Decree of 17 August 2018 or the creation of the National Crisis Center. The Hospital Emergency Plan offers a canvas that defines uniform structures and procedures for various hospitals in Belgium to provide clear answers in case of an emergency event such as a terror attack. To create a clear framework, the canvas builds on existing relevant legislation and suggested adjustments where necessary. The Hospital Emergency Plan is furthermore better aligned with regional structures and services.

The plan highlights the need for a multidisciplinary approach, while also emphasising simplicity (in particular when analysing specific risks: a new plan is not elaborated each time but the principle and pillars of the general canvas are used). Special attention is given to psychosocial assistance, but also communication with relatives and victim registration, and general information management. In the follow-up phase, attention must be paid to psychosocial assistance for employees of the institutions.

The lessons learned in the context of the Hospital Emergency Plan are manifold: certain risks must be further elaborated. Terrorism, and in particular chemical, biological and radio-nuclear incidents and explosions, have the highest priority, partly because of the important psychological impact of such attacks. Nails and bolts in bomb cases cause enormous damage as seen in Zaventem and Brussels and the wounded in such attacks can be considered as war victims. This requires a specific approach, which is presented in the emergency plan for chemical, biological, radiological, nuclear, or explosive (CBRNe) incidents.

It is furthermore important to mentally prepare care providers for feelings of insecurity and anxiety, a fundamental aspect that became apparent considering previous events such as 9/11 in the United States. The continuity of regular care processes also requires attention. After scaling down, time and energy are required to restart the regular care processes and to eliminate lags.

In terms of resilience, the Belgian Hospital Emergency Plan shows absorptive capacity: the capacity of the system to cushion the impact of a shock such as a terrorist attack.

Information about the hospital emergency plan, including the [CBRNe Guide](#) is available on the website of the hospital emergency plan: www.ziekenhuisnoodplan.be

The second most frequently reported key factor for nurturing HSR – reported by almost 40% of countries – was the availability of *‘appropriate financial reserves’*. Financial reserves of appropriate size are a key enabler of resilience, as they can be immediately deployed to purchase physical resources to cushion the impact of a shock on health systems without forcing health system managers to resort to measures that negatively affect business-as-usual service delivery operations, at a time when health systems typically require more resources to overcome disruption and return to normal performance.

As mentioned above, countries that reported *‘appropriate financial reserves’* as a key condition for HSR tend to rely more on employment-based social insurance contributions than the other countries for financing their health systems. The relatively greater exposure of their health financing system to fluctuations in economic cycles (compared to health systems predominantly funded via general government revenue) can at least partly explain this pattern. However, related characteristics such as *‘a broad, diversified revenue base’* and *‘the existence of a rescue system...to grant a minimum budget for health and social care to tackle the population health status decline that usually accompanies crisis times’* were also reported by countries which health systems are mostly financed through general government revenue (e.g. Italy).

The third most frequent key precondition for HSR reported by more than 30% of countries was the existence of *‘effective and transparent governance practices’*, where *‘governance’* describes the rules and processes that govern the operations of the health system as an organisation. Health system governance practices conducive of resilience reported by countries included, among others:

- the capacity of the health system to quickly mobilise relevant actors at the local level, and allow timely sharing and reconfiguration of financial resources, staff and material resources in response to a crisis event (e.g. Estonia; United Kingdom);
- the capacity of the health system to organise an integrated response to a crisis event, by sharing information promptly and coordinating action efficiently with actors within and outside of the health sector – for example, from the defence, education, transportation and media sectors, as well as with local communities and civil society organisations (e.g. Hungary, Italy);
- a solid legal and management foundation to establish clear accountability patterns for decision-making and rapid implementation of decisions related to crisis management and response (e.g. Romania, Estonia, Latvia and Luxembourg); and
- setting up a target-based health governance system framework, in which strategic and operational goals are explicitly defined through targets, against which the implementation of measures is regularly monitored, assessed and, if necessary, refined in an iterative process (e.g. Austria).

Moreover, about one-fourth of countries reported *‘achieving a sustainable and equitable health system financing mechanism’*, *‘having a regular population health status monitoring system (including granular and timely surveillance and disease registry systems)’*, and *‘regular adjustment of health system service delivery to the evolving demography of ageing’* as key conditions for HSR.

Lastly, about one in six (16%) countries mentioned the importance of setting up accurate and timely information flows on the use of resources by their health systems to nurture resilience, including by *‘fully implementing e-health information systems’* (e.g. Austria), while only 10% explicitly referred to *‘guaranteeing universal health coverage’* as a key resilience-enhancing measure.

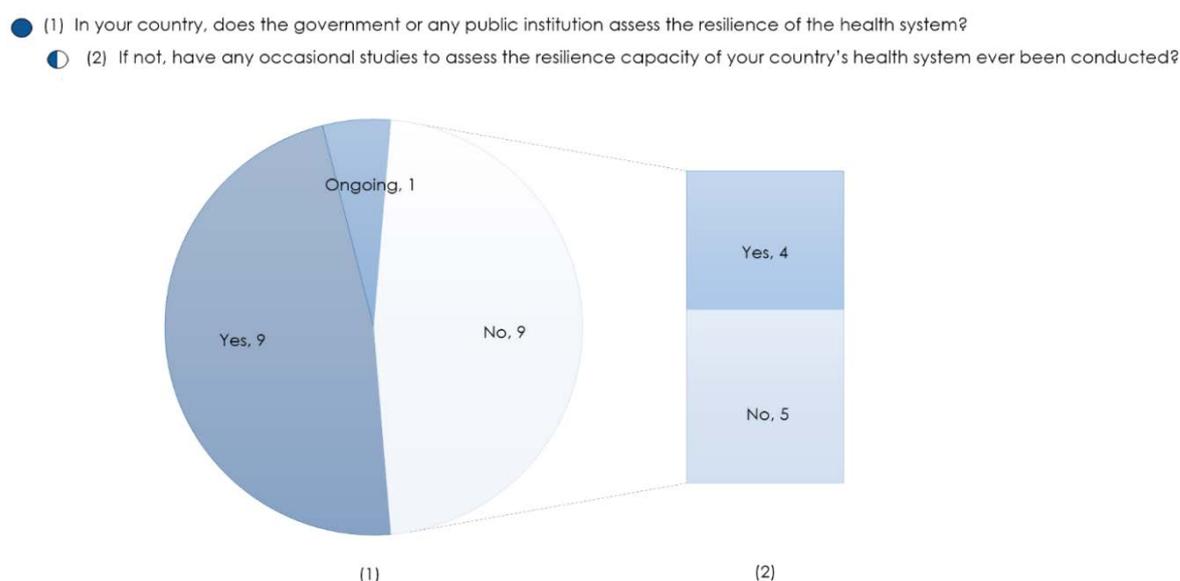
Scope for the assessment of health system resilience

The next section of the survey inquired countries about whether an assessment of the resilience capacity of their health system was ever conducted, either by government or other state entities. Based on the working definition of HSR used for this survey, countries that responded positively to this question were then asked to (i) specify the scope of their assessment of resilience, and (ii) map the focus of their assessment by specific resilience capacity and type of disruption, both for shocks and structural changes¹¹.

When countries were asked if either government or any public entity assesses the resilience capacity of their country's health system, nine countries (47%) responded positively, other nine responded negatively, and one country (Luxembourg) indicated that the development of an assessment framework for HSR was currently being developed.

Among those nine countries that reported not generally assessing HSR, four (Ireland, Italy, Latvia and Sweden) indicated that occasional studies aimed at assessing (at least some aspect of) resilience of their country's health system have been conducted at least once in recent years (Figure 5 below).

Figure 5 – Number of countries that assess the resilience capacity of their health system



The 13 countries that reported having performed at least an occasional assessment of health system resilience were then asked to describe its scope by indicating the key health system elements¹² and health system sub-parts¹³ covered by their assessment. Results are shown respectively in Figures 7 and 8 below.

¹¹ In line with the working definition of *health system resilience* used in the survey, *shocks* are defined as sudden disruptive events that occur suddenly and that are transient in nature, while *structural changes* consist of chronic, recurrent disruptive events that are dragged over long periods of time.

¹² Options provided in the questionnaire were: *human resources; pharmaceuticals and medical devices/equipment; health information management; financing/contingency funds; crisis preparedness plans and other.*

¹³ Options provided in the questionnaire were: *public health; primary care; emergency care; hospital care; outpatient specialist care; long-term care (chronic disease); care coordination (cross-sectoral) and other*

Box 4. The budgetary impact of innovative drugs on the resilience of the Estonian Health System

The growth of pharmaceutical spending for an increasingly large number of high-cost innovative pharmaceuticals entering the market poses a significant challenge to the resilience of our health systems. It is especially relevant for medium- to high-prevalence diseases, for which the high costs of treatment translate into a potentially unsustainable burden on public budgets.

The Estonian Health Insurance Fund (EHIF) is the main public purchaser of health services in Estonia. In 2016, the EHIF faced a significant challenge: despite a decrease in the number of insured citizens and higher than expected contributions, deficit spending had already reached EUR 33 million in the first six months. The main cause of this shortfall stemmed from the availability of new pharmaceuticals for the treatment of hepatitis C. These new drug therapies were curative and provided significant additional benefit to patients. In January 2016, EHIF started reimbursing the costs of these drugs, thereby enabling a very large share of patients to gain access to them. The EHIF estimated such additional demand for this class of drugs for 2016, but actual demand turned out to be significantly higher (EUR 8 million for medicinal products with extra spending of EUR 11,25 million). Other causes contributing to the budgetary shortfall were the over-implementation of the budget of the specialized medical care in health services and greater use of the benefits paid in case of temporary incapacity to work (EUR 7,14 million, with about 180 000 sick days added).

Overall, this situation presented a significant challenge to the financial sustainability of the health system, especially as the initial budget plan had already factored in a transfer of EUR 59 million from the reserves set aside. For cases like this, the EHIF has accumulated reserve capital to reduce the risks arising from macroeconomic changes and obligations. In this case, members of the EHIF Council and the Health Ministry saw the need to finance such extra expense from the reserve fund.

The availability and use of this reserve fund are an example of the absorptive resilience capacity of the Estonian health system. Given the importance of capital buffers to guarantee the solvency and ultimately access, several health systems have set up similar reserve funds like in Estonia. In the longer term, the sustainability of health systems financing remains an important issue, and despite the presence of financial reserves, more structural revenue generation mechanisms for the longer term will be needed to meet future demand.

The Estonian government has already made decisions to improve access to medical assistance and the sustainability of Estonia's healthcare system. Since 2018, the state has been paying the health insurance portion of the social tax for non-working pensioners, which by 2022 will increase to 13%. As a result of these changes, the EHIF will receive an extra EUR 220 million between 2018 – 2021, and nearly EUR 100 million per year after that.

Concerning the range of health system elements covered by countries' assessment of HSR, ten countries (77%) reported including an evaluation of (several) incident-specific preparedness plans in their assessment of HSR, and nine (70%) reported focusing their assessment in the areas of pharmaceuticals/medical supplies and human resources.

Seven countries (53%) reported analysing the resilience of their health system's financing mechanism, including the adequacy of available contingency funding, as part of their resilience assessment, while slightly less than half (46%) reported examining the performance of their health information management system. Lastly, two countries (Estonia and the UK) reported reviewing their health sector-specific contingency plans for the protection of critical infrastructure (e.g. supply of electricity, cybersecurity, social care, etc.).

Box 5. Securing cyber resilience in the English NHS

On Friday 12 May 2017, a global ransomware attack known as *WannaCry* affected more than 200,000 computers in at least 100 countries. In the United Kingdom, the attack particularly affected the country's National Health Service (NHS). According to an investigation by the National Audit Office (2018), the ransomware affected at least 80 (33%) of all hospital trusts across England, either because their IT systems had been directly infected by the ransomware, or because IT systems had been turned off as a precaution. Among these, directly infected hospital trusts were locked out of their digital systems and medical devices (i.e. MRI scanners).

Although affected trusts were not directly impacted by the attack, they nevertheless reported disruption either through preventative action or sharing systems with infected organisations. A further 603 primary care and other NHS organisations were also infected, including 595 GP practices. On the evening of 12 May, a cyber-security researcher fortuitously discovered and activated a kill-switch that stopped the spread of the ransomware. The total cost estimates of the attack by the UK Department of Health and Social Care (DHSC) amounted to ~ £92 million (CSP, 2018).

Three hours after the DHSC was alerted about the cyber-attack, NHS England declared it a major incident through its existing Emergency Preparedness, Resilience and Response (EPRR) processes, and implemented its emergency arrangements to maintain health and patient care. However, as NHS England had not rehearsed its response to a cyber-attack, the implementation of remedial actions faced several challenges. Without clear guidelines on responding to a national cyber-attack, organisations reported the attack to different sources including the local police, NHS England and NHS Digital (the national IT entity managing the health and social care system). For the same reason, communications to patients and local organisations also came from several different sources. Affected NHS trusts were triaged through the EPRR route and, where necessary, received assistance from national bodies, including advice and physical technical support from NHS Digital.

Over the following week, the NHS experienced significant disruption as a consequence of the cyberattack (Figure 6), which included reverting to manual processes (e.g. reporting blood results, paper notes); disruption to radiology services; cancelled outpatient appointments, elective admissions, and day-case procedures; and for five infected acute trusts, emergency ambulances were diverted to other hospitals (Smart, 2018).

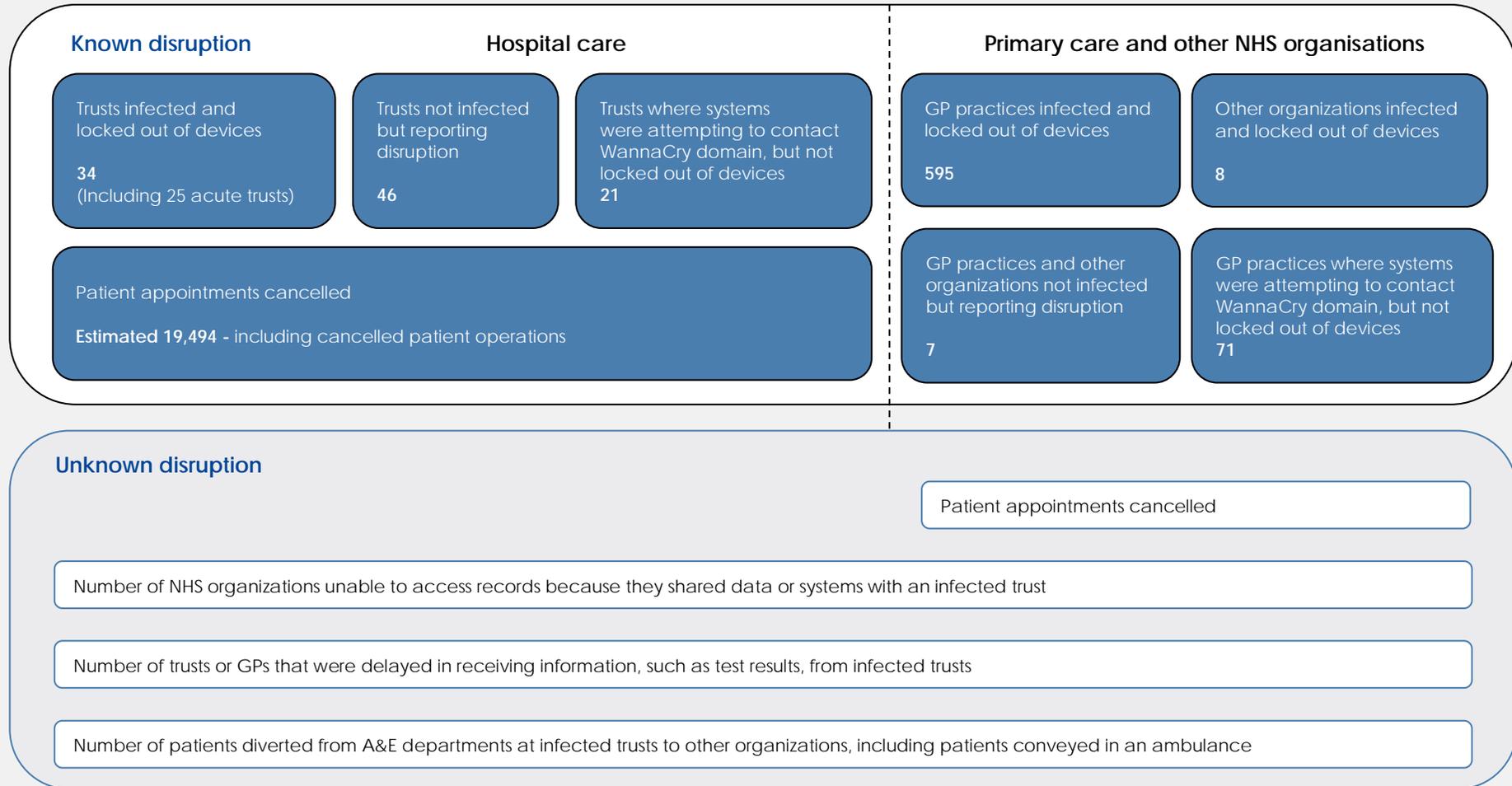
The report by the National Audit Office on the *WannaCry* investigation stated that, among the parts of the NHS affected by the ransomware, none had followed advice by NHS Digital to apply a Microsoft update patch, which resulted in the vulnerability being exposed. This failure to maintain good cyber-security practices highlighted the legacy systems and infrastructure that were in use in the NHS' IT network, and raised the issue of education, awareness, and sharing of information as pivotal conditions to ensure compliance to cybersecurity guidelines (Ghafur et al., 2019).

Since the *WannaCry* incident, the DHSC published a report outlining its plans to improve cyber resilience within the NHS, followed by a progress update in November 2019. In this context, the DHSC also provided 22 recommendations for the NHS to mitigate technological vulnerabilities, and to strengthen the resilience of local organisations to cyber-threats.

Concerning increased investment in healthcare IT, in addition to an agreement with Microsoft to ensure all systems are updated to Windows 10, the DHSC planned to spend £250 million by the end of 2021 to protect key services from the impact of cyber-attacks (DHSC, 2019). These methods of protection include, primarily, improvement of infrastructure, interventions to address weaknesses often found in the NHS, and investment in NHS Digital's Cyber Security Operations Centre.

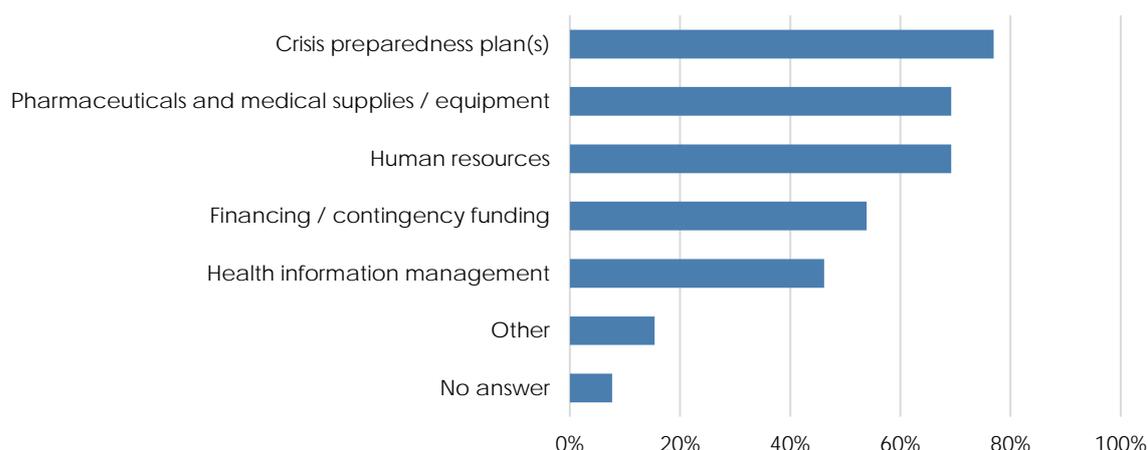
Securing cyber resilience in the English NHS (cont.)

Figure 6 - The impact of the *WannaCry* cyberattack on the English NHS



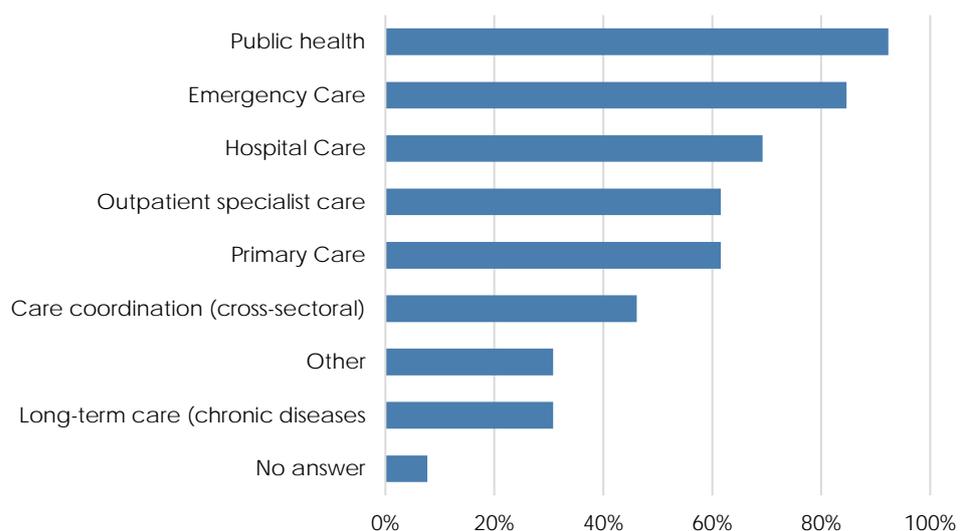
Source: (NAO, 2018)

Figure 7 – Health system elements covered by countries in their resilience assessment



Concerning the range of health system sub-parts covered by countries in their assessment of resilience (Figure 8 below), almost all countries (92%) reported including an evaluation of their public health system as a key component of their assessment of HSR. Emergency services and hospital care were reported respectively by eleven (85%) and nine (69%) countries, while eight countries (61.5%) indicated including outpatient specialist and primary care as part of their assessment. Slightly less than half of the countries (46%) noted including an evaluation of care coordination capacity across different sectors (e.g. among health care and the social care, defence and education sectors), and less than a third (31%) reported including an evaluation of long-term care in their study of HSR. Other two specific health system sub-parts that were listed as part of countries' resilience assessment under the "Other" category (30%) are the transplant and blood transfusion service and the ambulance services, which were both reported by Hungary and the UK.

Figure 8 – Health system sub-parts covered by countries in their resilience assessment



The survey then asked countries whether their assessment of HSR takes account of any non-health system-related factors – for instance, features relating to social protection. If so, countries were asked to specify what these are. Of the 13 countries that reported having carried out an (at least partial) assessment of HSR, six (46%) responded positively.

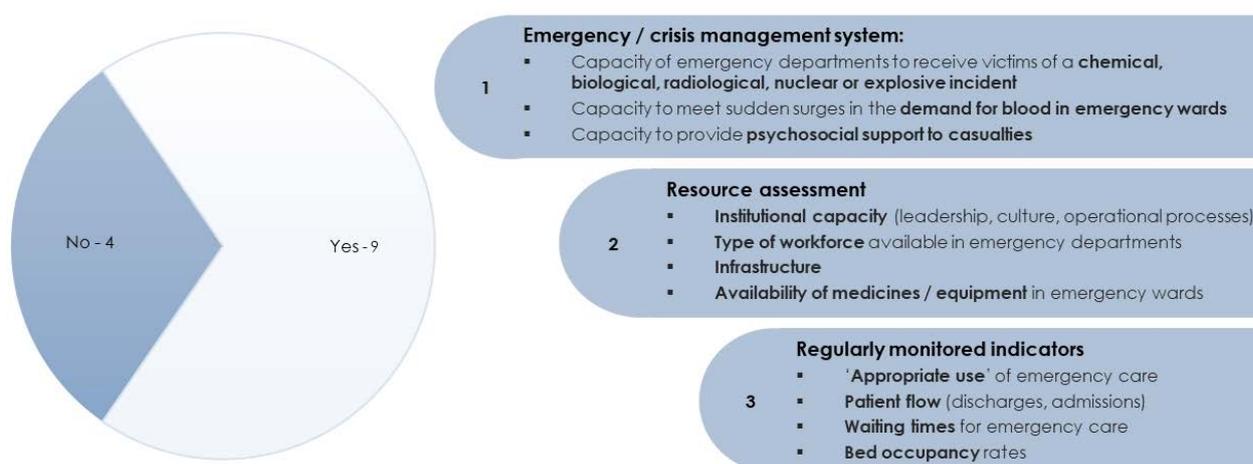
Reported factors outside of the health sector that were taken into account by countries to assess the resilience of their health system can be categorised under three main headings – ‘*socio-economic*’, ‘*infrastructure-related*’ and ‘*redundancy-related*’. Reported factors under the first label include a population’s income distribution and degree of income inequality, population characteristics and demographic shifts, an assessment of the progressivity of health financing and its long-term financial sustainability. ‘*Infrastructure-related*’ factors listed by countries include an assessment of the adequacy and reliability of public utilities (electricity, heating, water supply), of the ICT infrastructure, of the domestic health workforce training capacity (in the education sector), as well as an evaluation of the operability of roads for emergency services (e.g. ambulances).

Lastly, non-health-related factors under the third label (‘*redundancy-related*’) include an assessment of the capacity of a wide range of sectors to coordinate with the health care sector to quickly deploy emergency capacity and provide for an ‘alternative course of action’ in case of major provider failure, or in case of a sudden, large increase of demand for health services. Sectors outside of health care reported by countries included, among others, adult social care, defence (e.g. military hospitals), the civilian protection department and the police.

The next question focused on countries’ assessment of the resilience of emergency care services. Often acting as a buffer between the pre-clinical setting and more complex care delivery, emergency care is typically characterised by high levels of uncertainty, unpredictability and time-sensitivity of demand for services. In light of these considerations, it is fair to assume that resilience should be a particularly important characteristic to assess especially in the area of emergency care.

Nine countries (69.2%) reported specifically investigating the resilience capacity of emergency care services within their assessment of HSR. As shown in Figure 9 below, specific elements reported by countries for their assessment can be grouped into three categories.

Figure 9 – “Is the resilience capacity of emergency care specifically assessed in your country?”



The first category encompasses measures to evaluate the quality of emergency care services’ crisis management system and related protocols, under which countries reported, for example, investigating the capacity of emergency departments to (i) treat special casualties (from chemical, biological, radiological, nuclear or explosive incidents), (ii) meet sudden increases in the demand for blood, and to (iii) provide adequate psychological support to patients and staff in the event of a crisis.

Box 6. Healthcare financing in Czechia during the financial crisis of 2008

The Czech health care system is operated by seven semi-public health insurance funds (HiFs) who receive revenues from health insurance premiums, based mainly on wages. The state pays insurance for people without income (children, students, unemployed and elderly) at a rate determined annually by the government. The collected payment is redistributed among the HiFs based on a demographic risk equalization formula (sex, gender).

By design, revenues are highly pro-cyclical, so to endure crises the HiFs have to build financial reserves to avoid drastic cost-cutting measures during times of economic recession. In 2008, just before the crisis, reserves stood at 18.8% of current expenditure. This seemed sufficient to overcome the crisis, so no cost-cutting measures were adopted and expenditure continued to rise. Even though the health care system was drawing on its reserves and managing to maintain service delivery as usual, the Czech government itself was hit by the European sovereign debt crisis. In reaction to the crisis, the government decided to adopt austerity measures that froze insurance contributions for people insured by the state, thus worsening the depletion of the health system reserves.

The crisis proved to be much longer than expected and the volume of real wages (i.e. the main source of revenue) stagnated between 2009 and 2013. As a result, by 2012, the reserves had been almost depleted, having reached an all-time low of 5.6%) and new measures had to be adopted.

In 2013, efficiency-enhancing measures saw a reallocation of funds and healthcare from costly hospitals to outpatient providers, resulting in a decrease in expenditure. As the economy rebounded in 2014, no additional measures were required.

Another issue appeared during the financial crisis: The financial reserves were distributed unequally between the seven HiFs, with the largest General HiF having the smallest reserves. At the height of the crisis, in 2013, the state even had to lend money to the fund to ensure its solvency.

During the crisis, the pro-cyclical nature of health insurance revenues was fully exposed – as a result, several proposals had been put forward to solve this issue. Most proposals aimed at stabilizing payments of the state for its insurees. In 2017, a law was passed, which ensured a gradual increase in this payment for the next three years (instead of an annual setting) with a more permanent solution being envisaged. The goal was to make the payment more transparent, predictable and counter-cyclical. Unfortunately, so far there is no consensus regarding this permanent solution.

However, greater success was achieved in solving the second problem. After the crisis, it was discovered that the General HiF had many more chronic patients than other HiFs, which are on average more costly than what the risk-equalization model predicted. As a result, the redistribution formula was amended to include chronic conditions as cost predictors, based on the Dutch model of pharmaceutical cost-groups (Lamers & van Vliet, 2004). Due to this change, the reserves are currently much more uniformly distributed among the HiFs.

Overall, the above-mentioned issues are considered to be minor in an otherwise resilient absorptive capacity of financial reserves, which allowed the Czech Republic to endure the financial crisis without major changes to the provision of care, co-payments or doctor salaries. This feature is generally understood by the public and government, which has led to a consensus on building reserves now that the economy is booming. The unresolved question is the target volume of reserves and whether the HiFs should have an explicit rule that would determine it.

The lessons learned from the Czech case are that three features of the health system are deemed resilience-enhancing: sufficient volume of financial reserves, stable and predictable revenues for people insured by the state, and uniform distribution of reserves among health insurance funds.

The second category includes various types of assessment of the appropriateness of resources at the disposal of emergency care services. Countries have reported, for example, assessing (i) the effectiveness of leadership and cooperation practices in emergency wards, (ii) the adequacy of the composition of the clinical workforce (e.g. in terms of number and seniority), as well as that of (iii) the emergency care infrastructure, and of (iv) of medical equipment and medicines' inventory.

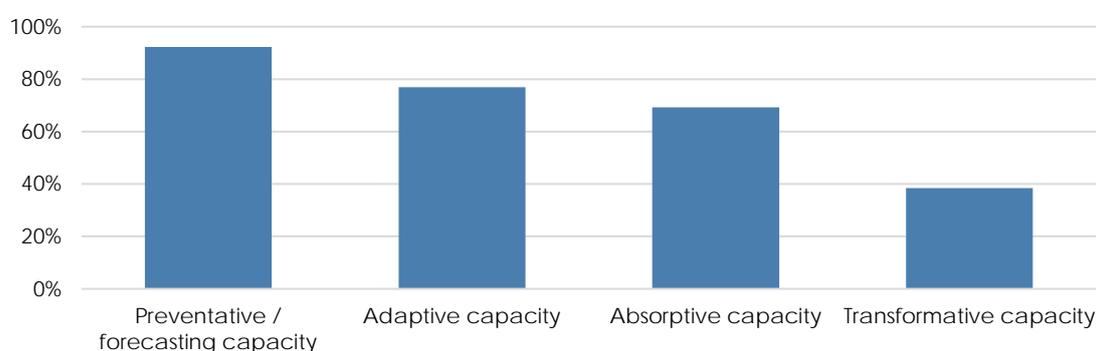
The third and last category lists several regularly monitored health system performance indicators, which some countries reported using to assess of the resilience of their emergency care services – for example, bed occupancy rates¹⁴, waiting times for emergency care/average arrival-to-triage time, and the number of admissions/discharges.

The next question in the survey asked countries to indicate which specific capacities for health system resilience are covered in their assessment. For this purpose, a typology of four specific capacities for resilience was developed based on the working definition of HSR by the Expert Group presented in Chapter 1:

- *'Preventative/forecasting capacity'*, i.e. the ability of a health system to proactively foresee the advent of a shock and minimise its potential future impact;
- *'Absorptive capacity'*, i.e. the intrinsic capacity of a health system to cushion the impact of a shock;
- *'Adaptive capacity'*, i.e. the intrinsic capacity of a health system to sustain required operations despite extraordinary circumstances caused by the shock; and
- *'Transformative capacity'*, i.e. the intrinsic capacity of a health system to transform its structure and functioning to respond to structural changes in the operating environment.

As shown in Figure 10 below, almost all (92%) countries reported assessing the *'preventative/forecasting'* resilience capacity of their health system, and more than three quarters indicated assessing the capacity of their health system to sustain operations in the face of disruption (*'adaptive capacity'*, 77%). About two-thirds of countries reported assessing the intrinsic resilience capacity of their health system to cushion the impact of a shock (*'absorptive capacity'*, 69%), while less than 40% of countries indicated a preoccupation with evaluating their health system's intrinsic capacity to transform its structure and functioning in response to more structural, chronic changes in its operating environment (*'transformative capacity'*).

Figure 10 – Specific capacities for health system resilience covered by countries' assessment



¹⁴ When hospital bed occupancy is high, emergency care departments can spend a lot of time searching for available beds for patients who require admission.

Box 7. Ensuring the supply of critical medical products and equipment during the COVID-19 pandemic: an overview of EU-level action

The coronavirus disease 2019 (COVID-19) pandemic that began hitting Europe in March 2020 put unprecedented strain on most health care systems in the EU. The scale and rapid escalation of COVID-19 clusters revealed the existence of structural fragilities within health systems that either remained undetected in the past years, or which risk potential had been severely underestimated. Among the weaknesses brought to light by the health crisis, the sudden disruption of global supply chains for personal protective equipment (PPE), essential pharmaceuticals (e.g. sedatives, dialysis fluids, neuromuscular blockers) and medical devices (e.g. ventilators, infusion pumps, laboratory technologies), combined with the large surge in demand for these products led to most EU countries facing supply shortages to various degrees, which severely impinged on the resilience of their health systems.

In response to the disruption of global supply chains, in the first phase of the pandemic several countries took extraordinary measures to increase their domestic production (e.g. by supporting PPE factories that could expand or repurpose their production lines), while some put in place unilateral export bans for an array of medical products. Although internal export bans were rapidly lifted through intergovernmental cooperation brokered at the EU level and the imposition of an EU-wide export authorisation scheme for PPE to third countries, they exacerbated the weakness of European countries with no domestic manufacturing capacity or viable stockpiles, slowed down their optimal allocation and generated investment uncertainty for manufacturers at an extremely time-sensitive moment. These issues clearly called for a more coordinated response at the European level. To alleviate shortages of physical resources and rationalise the production, stocking and use of medical products across the EU, the European Commission has put in place a wide range of initiatives:

Joint procurement and stockpiling of medical equipment: Over the course of three weeks in March 2020, the Commission set up four large international tenders that enabled Member States to make joint purchases of PPE, medical ventilators and laboratory equipment (e.g. kits, reagents, hardware). As of May 2020, between 20 to 26 countries participated in the joint purchases, and placed orders for PPE (1,5 billion EUR), ventilators (1,4 billion EUR) and laboratory equipment (350 million EUR). At the same time, the Commission set up RescEU, a strategic reserve of essential medical equipment managed autonomously by the Commission.

Setup of a clearing house for medical products: To complement its joint purchase initiative and speed up the matching between available supplies and Member States' demand for medical products, the Commission set up a temporary clearing house. The clearing house consists of a centralised platform that provides governments and manufacturers with data on the state of trade flows, production capacity in third countries, as well as on logistical, technical and regulatory bottlenecks that can impact the supply chain lead time for medical products.

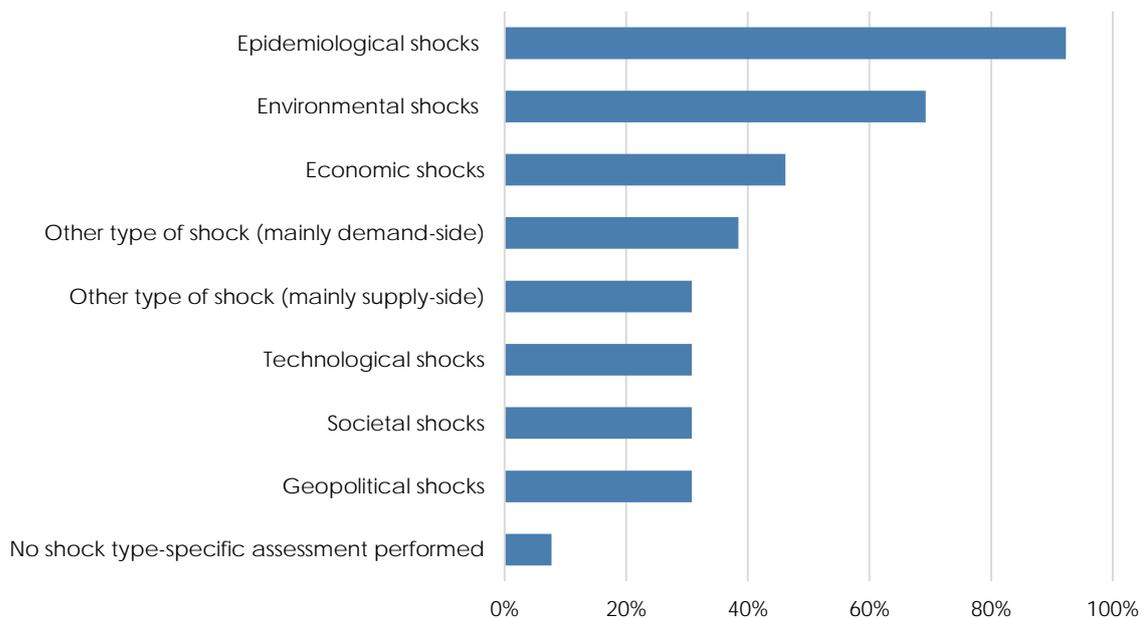
Simplified and more accessible conformity standards for medical equipment: To speed up the market entry of medical products that witnessed a sudden surge in demand, the Commission adopted revised harmonised standards for medical devices. The implementation of these standards allows manufacturers of medical devices to assess their compliance with the health and safety requirements of the three Directives on medical devices in a faster and less expensive manner. The adoption of revised harmonised standards was accompanied by decisions to (i) make freely available all the relevant European standards for selected medical devices and PPE, (ii) provide guidance documents to assist manufacturers of PPE, hand disinfectants, 3D printing and medical devices, (iii) postpone the application of the Medical Devices Regulation by one year until 26 May 2021, and to (iv) temporarily waive customs duties and VAT on the import of medical devices and PPE from third countries.

Guidelines on COVID-19 testing methodologies, medicines availability and cross-border cooperation: To ensure the capacity of governments to collect sufficiently reliable data that can support decision-making at the EU level, in April 2020 the Commission issued a set of guidelines on coronavirus testing methodologies aimed at setting standards for the quality of testing materials. The guidelines also map out the setup of a network of reference laboratories, testing guidelines to be adopted during the lockdown phaseout period and cooperation tools to weed out counterfeit devices. Against the backdrop of increased reports of medicine shortages caused by third country export bans, the Commission also issued guidelines to ensure the rational supply, facilitation of transport, allocation and use of vital medicines. Lastly, guidelines on cross-border healthcare cooperation were adopted to facilitate the transfer of patients and qualified medical personnel across national and regional borders.

After having described in detail the scope of their assessment of HSR by specific resilience capacity, countries were asked to detail the scope of their assessment of resilience to specific types of shocks. The questionnaire presented the following categories of shocks to respondents: *environmental* (e.g. extreme weather events, natural catastrophes); *economic* (e.g. fiscal or unemployment crisis); *societal* (e.g. large-scale involuntary migration); *geopolitical* (e.g. interstate conflict); *epidemiological* (e.g. an infectious disease epidemic); *technological* (e.g. cyberattacks); *other* (mainly demand-side), *other* (mainly supply-side), and *none*.

As shown in Figure 11 below, nearly all countries (93%) reported assessing their system’s resilience to epidemiological shocks as part of their overall assessment of HSR; about 70% reported covering environmental shocks, while slightly less than half (46%) indicated focusing their assessment of HSR to economic shocks. Less than 40% of countries reported assessing the resilience of their health system to other, mainly demand-side types of shocks (e.g. mass-casualty incidents), while about one third reported assessing their system’s resilience to technological, societal, geopolitical and other, mainly supply-side, types of shocks (e.g. large health worker strikes).

Figure 11 – Focus of resilience assessment to specific types of shocks reported by countries



In an effort to detail more precisely the exact scope of countries’ assessment of HSR, countries were then asked to map their responses to the last two questions by matching each specific HSR capacity included in their assessment (Figure 10 above) with each specific type of shock against which HSR is assessed (Figure 11 above).

The results are shown in the heat map in Figure 12 below. The results of this mapping of specific health system resilience capacities broken down by shock type are broadly consistent with the overall findings from the previous two questions: the most frequent ‘resilience capacity/shock type’ combination, reported by 77% of countries, was the capacity of a health system to proactively foresee (i.e. *preventive/forecasting*) the advent of an *epidemiological shock*. More than half (54%) of the countries reported evaluating their health system’s *absorptive* and *adaptive* capacities vis-à-vis *epidemiological shocks*, while slightly less than half (46%) reported assessing the capacity of their health system to sustain needed operations (i.e. *adaptive* capacity) in the face of an *economic shock*.

Box 8. Lessons learned from the 2003 heatwave in France

In August 2003, Europe was hit by a severe heatwave. In France, the period was reported to be the hottest since the 1950s with temperatures rising to 40° and staying abnormally high, also during the night. This heatwave had catastrophic health consequences in France with an imputed 14,800 deaths. In addition to the high temperatures, the pollution peaks registered in urban areas probably contributed to the effects on vulnerable groups.

In 2003, France did not have any heat warning system and was not prepared to manage the heatwave in any organised way. The health crisis, caused by the unprecedented heatwave, was unforeseen and only detected belatedly. It brought to the fore several deficiencies in the French public health system: there was only a limited number of experts working on this topic and the exchange of information between several public organisations was poor. The division of responsibilities among the public organisations was not clearly defined. The health authorities were overwhelmed by the influx of patients and the crematoria/cemeteries were unable to deal with the influx of bodies. Finally, the nursing homes lacked air-conditioning and staff; many elderly people living by themselves without a proper support system and guidelines on how to protect themselves from the heat.

This health crisis, without precedent since the Second World War, had serious repercussions and led the French government to take various steps to limit the effects any future heat waves on public health.

Among the steps taken by the government, several studies looking at the risk factors associated with heatwaves were initiated. Also, checks on the number of admissions to emergency wards and environmental surveillance mechanisms were put in place. In addition, heatwave warnings are now issued when minimum and maximum temperatures for the next three days are likely to be above pre-defined thresholds.

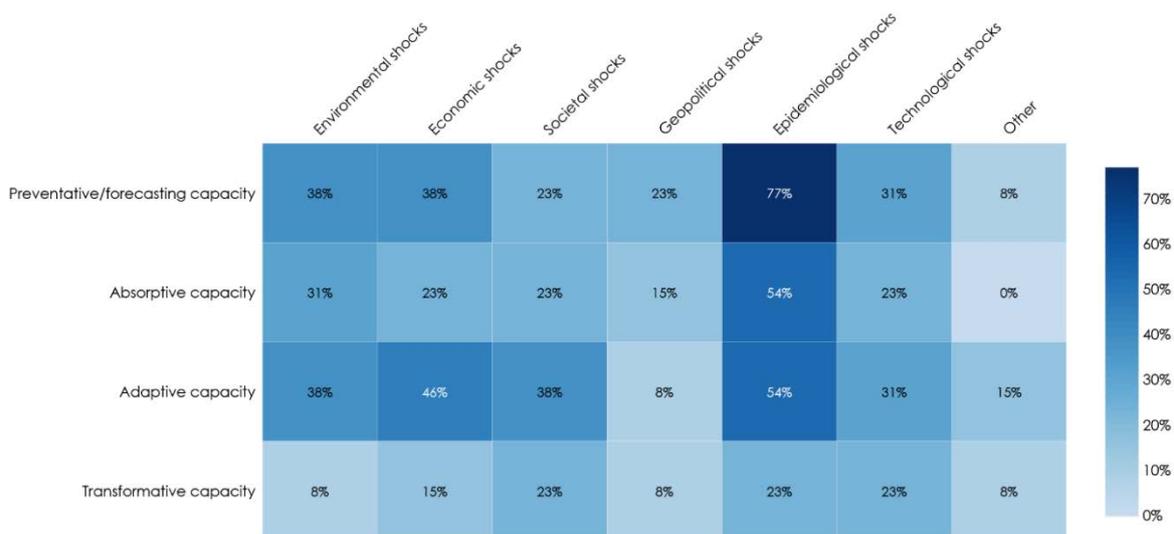
The government furthermore developed a **national heatwave prevention plan** that involved preventive actions targeting vulnerable population groups. Some actions are enforced by law - all institutions housing elderly or disabled people must define the organisation, role and responsibilities of the institution during a heatwave. They must furthermore give people access to a cool room. The plan also obliged each city to develop a database of vulnerable and isolated people who should be contacted during heat waves by the social services. Other initiatives include dissemination of prevention messages through media and city boards during a heatwave. Guidelines on how to establish preventive measures were made available for different stakeholders.

In 2006, France experienced the hottest month of July since July 1950. This heatwave lasted 19 days (11-28 July) and could be seen as a test of the new initiatives put in place in 2003. Using a nation-wide model, researchers have estimated that if the conditions had been those before 2003, 6352 excess deaths would have been registered during the 2006 heatwave. However, “only” about 2100 excess deaths were reported.

This may be interpreted as a successful implementation of the initiatives undertaken since 2003: the population seemed to be less vulnerable to the heat because of increased awareness of risks related to high temperatures, implementation of preventive measures and the warning system.

Sources used to document the case study: Michelon et al. (2005), Pascal et al. (2013).

Figure 12 – Capacities for health system resilience covered by countries' assessment, by shock type



The last question for this section of the survey asked countries to detail the scope of their assessment of HSR to specific *structural changes*¹⁵.

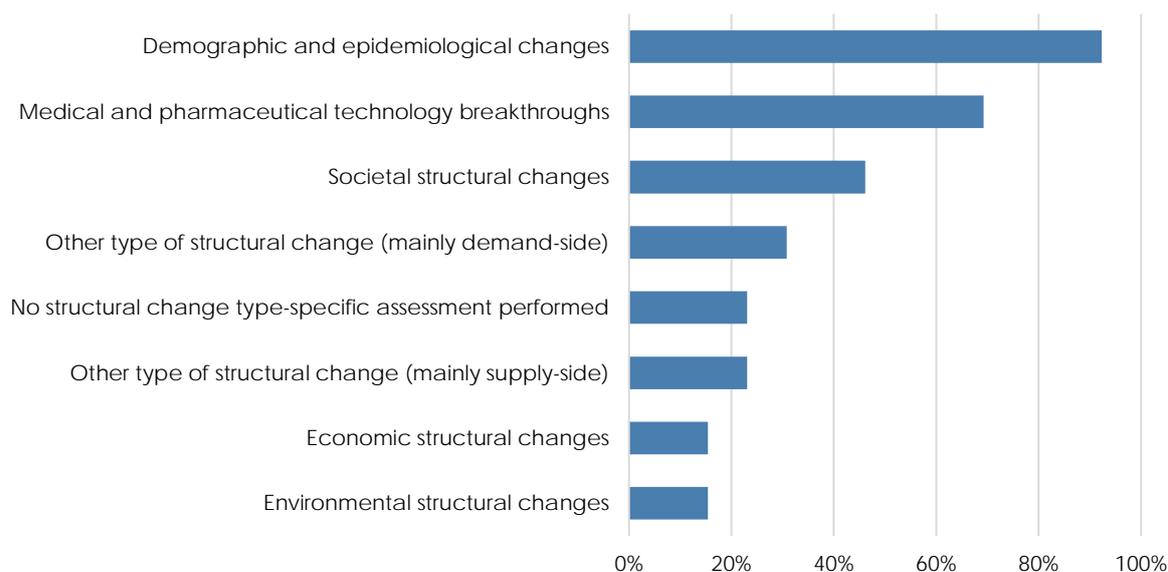
Similarly to the previous question about shocks described above in Figure 11, the questionnaire presented respondents with the following types of structural changes: *demographic* and *epidemiological* (e.g. population ageing and the associated increased susceptibility to disease); *medical* and *pharmaceutical* (e.g. more effective, yet very high-cost innovative therapies); *societal* (e.g. trends in intra- and inter-national migration, increased urbanisation); *environmental* (e.g. global warming and climate change); *economic* (e.g. high technological unemployment due to the rising use of AI and automation); other structural change (mainly demand-side); other structural change (mainly supply-side), and none.

As shown in Figure 13 below, the vast majority of countries (93%) reported assessing the resilience of their health system to structural changes of *demographic* and *epidemiological* nature as part of their overall assessment of HSR; about 70% reported assessing their system's resilience to *medical* and *pharmaceutical breakthroughs*, while slightly less than half (46%) indicated focusing their assessment of HSR to *societal* structural changes.

Around 30% of countries indicated assessing the resilience of their health system to other, mainly *demand-side* types of structural changes, while about one in four countries reported assessing their system's resilience to *supply-side* types of structural changes (e.g. shift to new care delivery models to bridge future health workforce shortages). Another 25% of countries also reported not performing HSR assessments specific to any particular type of structural change. Lastly, only two countries (15%) reported evaluating their health systems' resilience against possible structural changes of *economic* and *environmental* nature.

¹⁵ In line with the working definition of HSR used in the survey, *structural changes* consist of persistent and recurrent disruptive events that are dragged over long periods of time, while *shocks* are defined as sudden disruptive events that occur suddenly and that are transient in nature.

Figure 13 – Focus of resilience assessment to specific types of structural changes by countries



Metrics to assess health system resilience capacity

This section of the survey asked countries to outline their key set of indicators to measure prospectively their respective health systems' resilience. To do so, the survey asked respondents to provide four main pieces of information for each indicator presented: the main type of resilience capacity assessed, its objectives, its specific definition, and the rationale underpinning its classification as a measure of HSR.

Of the thirteen countries that have performed at least an occasional assessment of health system resilience, eleven managed to specify their selection of (at least partial) indicators of HSR. A total of 71 entries were presented, of which 42% could be categorised as measures of the health system's *preventative/forecasting* resilience capacity, 31% as indicators of *absorptive* resilience capacity, 22% as measures of *adaptive* resilience capacity, and 5% could be labelled as indicators for health systems' *transformative* resilience capacity. These results are broadly consistent with the scope for assessment of resilience identified in the previous section (Figure 10 above).

After having merged duplicate and similar entries, a total of 42 indicators of HSR were extrapolated from responses to the survey – the resulting list is presented in Figure 15 and Figure 16 below. The list presents a mix of qualitative (e.g. '*availability of accurate health expenditure and revenue forecasts*') and quantitative indicators, and the level of specificity of their formulation varies significantly across the list.

The consolidated list of indicators can be divided into (10) thematic areas as per Table 2 in the next page:

Box 9. The Climate Change Adaption Plan for the Health Sector in Ireland

Climate change is a globally pervasive phenomenon that represents a significant threat to human health. Climate changes observed in Ireland to date include a change in rainfall patterns, extremes of weather and an increase in average temperatures. Models and simulations project Ireland's future climate as less dependable and less stable, with more frequent and intense weather events. The Irish can expect wetter winters, with more frequent heavy precipitation events, and drier summers. Without effective mitigation and adaptation action, climate change will have profound implications for the health and wellbeing of Ireland's population, for the smooth delivery of our health and social care services, and for critical infrastructure.

Ireland's **Climate Change Adaptation Plan for the Health sector** is one of twelve sectoral adaptation plans developed under the National Climate Change Adaptation Framework (2018) and the Climate Action and Low Carbon Development Act (2015). The Plan sets out the main climate change-related risks and vulnerabilities that Ireland expects to face in the health sector in the next five years and beyond and proposes concrete measures to help reduce Ireland's vulnerabilities. The Plan was developed collaboratively by a sectoral adaptation team from the Department of Health and the Health Service Executive (HSE), using the Sectoral Planning Guidelines. The views and input of stakeholders were gathered, and broader input was received as part of a public consultation exercise. Input from other government sectors was proactively sought, as many health-related risks of climate change originate in other sectors and because health impact is a cross-cutting feature of climate change action.

The Plan identifies three main categories of adaptation actions to address the main climate scenarios and vulnerabilities in the health sector, as follows:

- **population health and wellbeing:** Ireland's healthcare system will need to prevent avoidable illness where possible, paying particular attention to vulnerable population groups, and to be prepared for different volumes and patterns of healthcare demand;
- **health and social care service continuity during acute events:** effective emergency planning and preparedness will be essential to ensure operational continuity and service delivery during severe weather events; and
- **infrastructure resilience to severe weather:** the system infrastructure including buildings, communications, emergency service vehicles and models of care, together with the supply chain including fuel, food and medical supplies, will need to be made more resilient to more frequent severe weather events and other impacts of climate change.

Through developing the Plan, existing health system resilience was assessed qualitatively, drawing on the expertise of the joint Department-HSE team and input from wider stakeholders. The levels of resilience to different climate change impacts were taken on board and informed the vulnerability assessment.

Six main climate scenarios with the most profound health implications were identified (not in order of priority): UV / Sun Exposure, air pollution, windstorms, heat/heatwaves, high precipitation/flooding, and extreme cold snaps. Two of the six scenarios relate to slow-onset climate-mediated effects over time (UV radiation and air pollution) while four scenarios concern acute, severe weather events (windstorms, extreme heat and heatwaves, high precipitation and flooding, and extreme cold snaps). Measures to ensure population health and wellbeing are relevant to all six climate scenarios, while actions to ensure service continuity and infrastructure resilience are more relevant for severe weather events (see Figure 14 below).

Among the lessons learned by the Irish Plan are that adaptation to climate change presents a complex methodological challenge. It calls for decisions to be taken with potentially very long-term consequences based on incomplete knowledge and/or uncertain information about future changes. Climate change adaptation planning and action is therefore an iterative process.

The Climate Change Adaptation Plan for the Health sector will apply to: the Department of Health, agencies of the Department of Health, including the Health Service Executive (HSE), all relevant external organisations which provide services on behalf of the HSE, and non-HSE health sector services, including General Practice, private hospitals and nursing homes. A new Climate Change Oversight Group for the health sector, led by the Department of Health, will be established to oversee actions set out in the Plan.

The Climate Change Adaption Plan for the Health Sector in Ireland (cont.)

Figure 14 - Major Predicted Risks and Health Impacts in Ireland's Climate Change Adaption Plan



Source: Irish Department of Health (2019)

Table 2 – Thematic areas of HSR indicators presented by countries, number of indicators per area

Area	Number of indicators	%
Adequacy of human resources / human capital	7	17%
Adequacy of health system financing and financial protection	6	14%
Material resources (e.g. pharmaceuticals, medical devices)	6	14%
Quality of immunisation and surveillance activities	5	12%
Antibiotic misuse	4	10%
Emergency care performance	4	10%
Reliability of information infrastructure	3	7%
Primary and referral care performance	3	7%
Effectiveness of screening programmes (NCDs)	2	5%
Health crisis preparedness and planning plans	2	5%
	(42)	(100%)

In line with responses presented in Figure 12 which revealed a significant concentration of countries on assessing the *preventative/forecasting* resilience capacity of their health systems vis-à-vis *epidemiological* shocks, Figure 15 below shows that five out of the six of most frequently reported indicators (reported by at least 50% of countries) relate to the *effectiveness of immunisation programmes (children, elderly)* and of *epidemiologic surveillance systems*. Moreover, almost two-thirds of countries reported the *'existence of clear, actionable health risk management and business continuity plans'*, and almost 50% listed the *'existence of strategic inventory reserves for selected pharmaceuticals and/or medical devices.'*

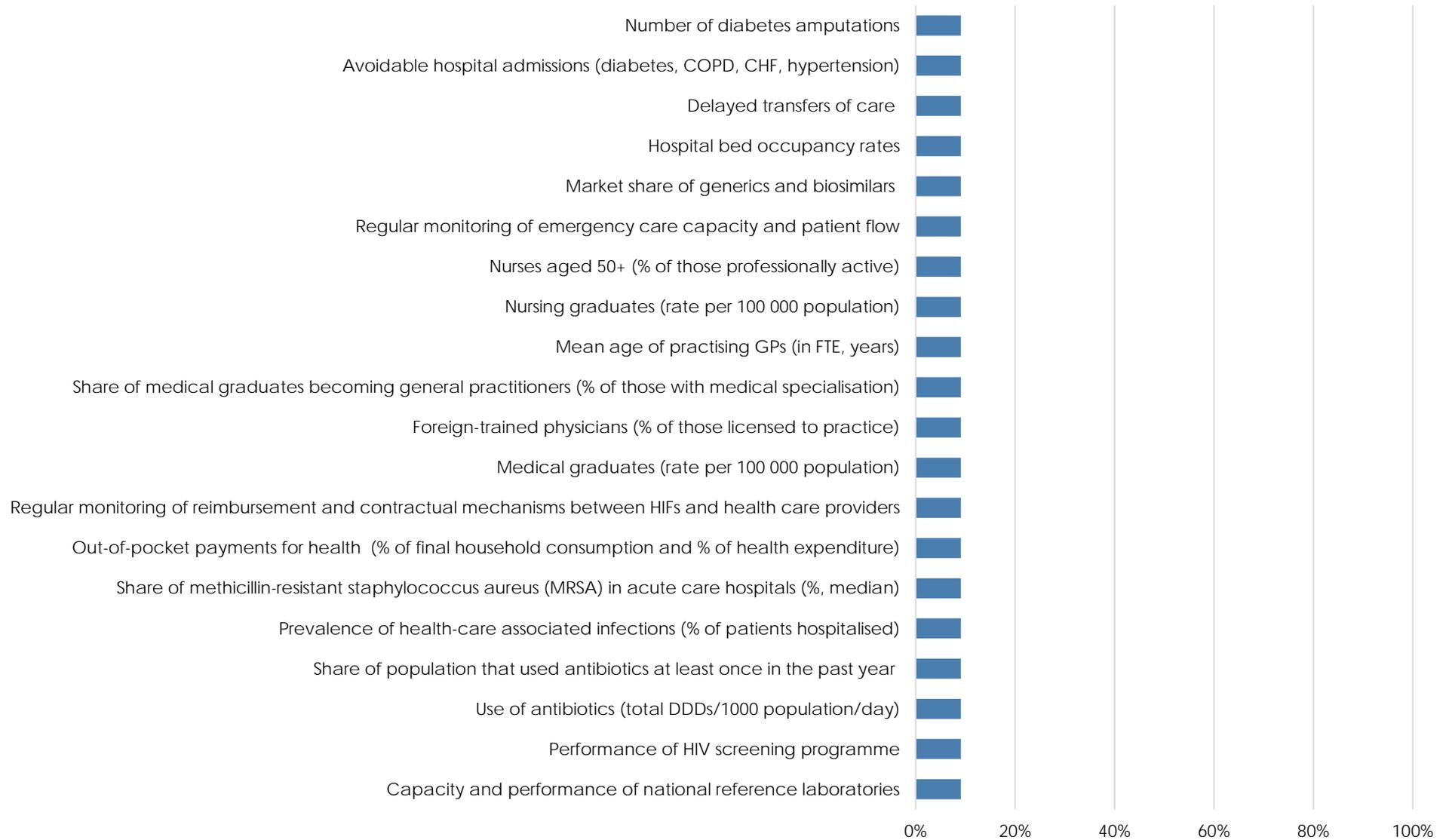
Countries' relatively high concentration on assessing the resilience capacity of their health systems in response to *economic* shocks presented in Figure 12 is also testified by the sizeable number of countries that listed the *'existence of accurate health expenditure and revenue forecasts'* (36.4%), the *'ratio of health insurance funds' reserves to current health expenditure'* and the *'current expenditure on health as a share of GDP'* (27.3%) as indicators for health system resilience.

A somewhat counterintuitive finding from the analysis of the list is the relatively low number of countries that have reported measures related to the *'adequacy of the clinical workforce'*, both in terms of supply and skill composition. Despite the fact that, as described in the first section of this chapter, almost half of all countries recognised *'effective health workforce planning and continuous professional education'* as a fundamental characteristic of HSR (Figure 4 above), only 27% of countries reported considering the *'existence of regularly updated forecasts of health workforce supply shortages'*, and only one country (Belgium) reported indicators such as the *'mean age of practising GPs'*, the *'share of medical graduates choosing to become general practitioners'*, and the *'share of foreign-trained physicians'* as relevant measures of HSR.

Figure 15 – Key indicators of health system resilience reported by countries (1/2)



Figure 16 – Key indicators of health system resilience reported by countries (continued) (2/2)



Box 10. **Better health workforce retention and development in Malta**

Health system resilience is of special concern to small countries such as Malta. Because of their size, both the health system itself and the public administration more generally faces capacity constraints and is thus more vulnerable to the impact of global political changes and shocks. One area where this is especially relevant is the clinical workforce.

In an analysis of the situation in Malta, Briguglio and Azzopardi Muscat point out that small countries face special challenges concerning the retention and development of their health workforce. Specialist training can often not be (fully) undergone in-country, so that health professionals are required to move abroad. Variations in working conditions and pay between countries may motivate staff to permanently relocate and not return to their country of origin.

This phenomenon leads to a depletion of human resources, which is aggravated in the context of the simplified recognition of training qualifications among the EU Member States. Importantly, this challenge to human resources negatively affects a system that is already facing higher training costs and public administration spending relative to larger countries. This is in part due to the need to maintain key services that do not scale with population size, i.e. highly specialised diagnostics or treatment facilities.

In light of these challenges to the resilience of the health system, Malta decided to formally establish a Foundation Course, specialist training programmes and accreditation in-country. It further set up corresponding agreements with institutions in various countries, including the UK, Belgium, Germany and Italy. The goal of these measures was to retain medical professionals and simultaneously offer a wide variety of training options to guarantee adequate care of the population.

Other measures include an increase in the remuneration of GPs, a higher intake of the medical school and an intensified recruitment from abroad. As a result of these measures, the number of practising doctors in Malta is now slightly above the EU average, at 4.0 per 1000 population in 2018.

Sources used to document the case study: Briguglio and Azzopardi Muscat (2016) and WHO (2017)

Governance and insights for policy formulation

This last section of the survey aimed to find out more about the rationale and objectives that underpin EU countries' HSR assessment activities, to understand more precisely how the results of the health system resilience assessments are used by policymakers, and to what extent they have an impact on health policy and management choices.

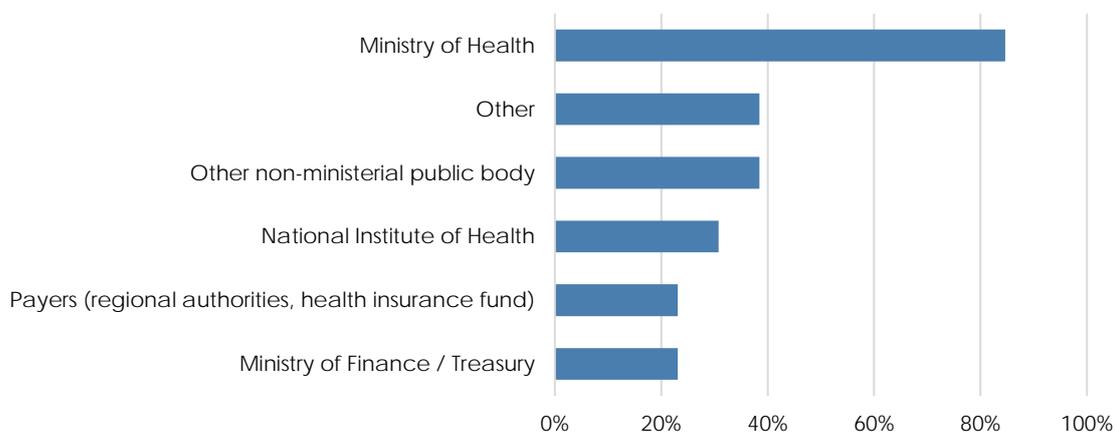
The first question of this section of the questionnaire asked countries to report the main objectives of their assessment of HSR. As shown in Figure 17 below, more than two-thirds of countries reported assessing HSR to ensure that the public health sector is capable and appropriately equipped to endure and respond to possible disruptive events in the future. Moreover, almost 40% reported '*promoting de-centralisation of responsibility*' and '*building an argument to promote reform implementation*' as two reasons underpinning their HSR assessment activity. About 30% of countries indicated '*ensuring institutional accountability*' (i.e. in case of a disruptive event) and '*promoting more inclusive decision-making*' as some of the central objectives of their assessment activity, while about one in five indicated a preoccupation with '*increasing transparency of decision-making*' as one of the main reasons for assessing HSR.

Figure 17 – Main objectives of health system resilience assessments reported by countries



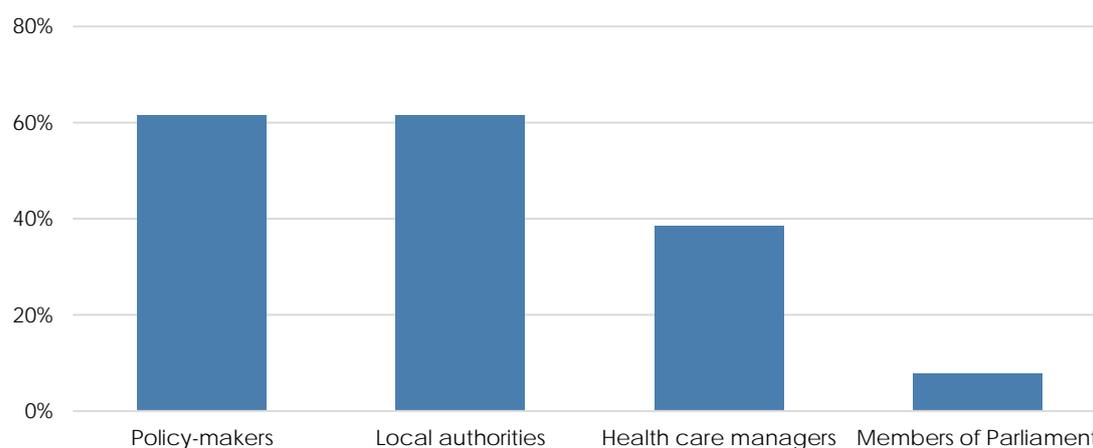
When countries were inquired about the internal allocation of responsibility for assessing the resilience of their respective health systems, responses (Figure 18 below) show that by and large Ministries of Health were the most frequently reported institution, (85%), followed by a wide array of public stakeholders (e.g. the National Audit Office, the Ministries of Defence and the Interior, local health authorities) (38%), National Institutes of Health (30%), payers and, specifically, Ministries of Finance (23%).

Figure 18 – Entities responsible for assessing the resilience of the health system



As per the target audience of the results of the resilience assessment, the majority of countries (60%) reported that national-level policymakers and local authorities are the main recipients of the assessment's results (Figure 19 below). Health care managers were listed by about 40% of countries, while only one country reported presenting the resilience assessment's results to the Members of Parliament. Of the 13 countries that have performed at least an occasional assessment of health system resilience, nine (69%) reported having made its results publicly available, while four (31%) responded that most parts of the HSR assessment are deemed classified information.

Figure 19 – Intended target audience for the results of the assessment of health system resilience



Lastly, countries were asked in an open-answer question to indicate the health system governance characteristics that they assess as having the greatest potential to enhance HSR in practice. The most frequently reported features and enablers of HSR reported by countries were:

- *strong management and leadership capacity* of health care managers; *inclusive decision-making*;
- *effective communication networks*, allowing clear, timely and accurate information flows of relevant information to across the health system;
- *independence of health insurance funds from political pressure*, allowing them to maintain appropriate liquidity buffers in place;
- *decentralisation of crisis management and decision-making*, empowering local actors tasked with the responsibility to quickly develop and implement remedial action in response to disruptive events;
- *an agile legislative framework* that allows for the rapid adoption and implementation of extraordinary operational countermeasures (e.g. accelerated procurement procedures);
- *'breaking organisation silos'*: effective cross-governmental collaboration and integration of strategies across entities responsible for service delivery, human resources and financing;
- General decision-making processes (especially concerning financing) that are not inclined by design to underestimate the importance of high-performing primary care systems;
- *comprehensive risk management and business continuity plans*, developed in collaboration with other (non-health) ministries and stakeholders; and
- the capacity of health system actors to *identify and integrate lessons learned* from real incidents and incorporate them into their future processes and activities.

Concluding remarks

The findings of the survey show that, although the vast majority of national health systems in the EU have not formally embedded resilience in their HSPA frameworks, most countries recognize the necessity and urgency of making its pursuit a core preoccupation of health policymakers. While only a few countries have so far developed a formal definition of health system resilience – possibly reflecting the lack of maturity that characterizes the concept identified in Chapter 1 –, about half of the countries that responded to the survey have in practice framed *at least some* aspects of it as part of other dimensions of their HSPA frameworks.

Notwithstanding considerable variation in the characterisation of health system resilience reported across countries, it was nevertheless possible to trace some commonalities, reflecting countries' most frequently reported preconditions to building a resilient health system: (i) *effective health workforce planning and continuous professional education*, (ii) *appropriate financial reserves* for health, and (iii) *effective and transparent governance practices* (Figure 4 above). Moreover, survey findings suggest that descriptions of health system resilience by countries that have only partially defined the concept tend to be developed around the specific health system fragilities they have identified themselves in their respective national context. This pattern can be understood as a further indication of policymakers' conspicuous need to add another, more dynamic dimension of health system performance to their (mostly static) HSPA frameworks.

Although less than 50% of the countries surveyed reported assessing (at least some aspects of) the resilience of their respective national health systems, about two-thirds reported having performed a resilience assessment of some sort at least occasionally. Consistently with countries' variation in definitions of *health system resilience*, the scope and granularity of these assessments varies greatly across countries. It is nevertheless possible to observe that, at a minimum, (i) the majority of countries reported assessing the adequacy of their *incident-specific preparedness plans* and their *health system inputs* (pharmaceuticals, medical supplies, human resources), and that (ii) about half of the countries assess the resilience of their health system's *financing mechanisms* and *health information systems*.

Regarding the scope of countries' assessment of resilience by health system sub-part, almost all countries that reported having carried out *some* form of assessment of resilience reported looking at the resilience of their *public health* and *emergency care* services. More than half of the countries reported covering *hospital*, *outpatient specialist*, and *primary care* services in their assessment as well. Slightly less than half of the countries include an evaluation of their health system's *coordination capacity*, while only less than a third takes into account the performance of their *long-term care* services. As per the non-health system-related factors that countries take into consideration for their assessment of health system resilience, most countries have reported looking at three main categories of information – (i) the *socio-economic and demographic characteristics* of their population, (ii) the *reliability of utility systems* (electricity, heating, internet) and the *operability of roads*, and (iii) health authorities' capacity to *coordinate with non-health sector entities and services* (e.g. social care, defence, civilian protection, and education).

Concerning the scope of their assessment of resilience by specific resilience capacity¹⁶, almost all countries reported assessing their health systems' *preventive/forecasting* resilience capacity, followed, in order of frequency, by their *adaptive*, *absorptive*, and *transformative* resilience

¹⁶ This classification of shocks/strains and resilience capacities is based on the conceptual framework for health system resilience developed by the Expert Group and presented in Chapter 1 of the report.

capacities. As per their assessment by type of shock, nearly all countries assess their system's resilience to *epidemiological* shocks, and about two-thirds of countries assess their health systems' resilience to *environmental* shocks.

A cross-tabulation of these responses (Figure 12) reveals a very uneven distribution of countries' assessment focus across shock types and resilience capacities, as well as the existence of sizeable assessment gaps. By far, the most frequently reported '*capacity/shock*' combination was the *preventive/forecasting* resilience capacity of health systems to withstand *epidemiological* shocks (77% of countries). Assessments of health systems' *absorptive* and *adaptive* resilience capacities to *epidemiological* shocks were also reported by a lower, yet still significant share of countries (54%). Slightly less than half reported assessing their health systems' *adaptive* capacity vis-à-vis *economic* shocks, while less than 40% reported carrying out assessments of the *preventive/forecasting* resilience capacity of their health systems to *environmental* and *economic* shocks.

As regards *structural changes*, 92% of countries reported assessing the resilience of their health systems to structural changes of *demographic* and *epidemiological* nature, while about 70% assess their health systems' resilience to *breakthroughs in medical technology*. About 25% of countries reported considering other supply-side types of structural changes (e.g. shift to new care delivery models to bridge future health workforce shortages), while another 25% reported not performing any specific assessment of resilience to structural changes.

Concerning the formulation of the indicators presented by countries to prospectively assess health system resilience, the consolidated list (Figure 15) presents a heterogeneous mix of both qualitative and quantitative measures, and their degree of specificity varies significantly across the list. Consistent with countries' indication of the scope of their assessments by specific resilience capacity (Figure 10), the distribution of indicators across resilience capacities is concentrated on the *preventative/forecasting* resilience capacity, which includes almost 50% of all indicators listed by countries. Conversely, only 5% of the reported indicators aim to assess health systems' *transformative* resilience capacity. The distribution of indicators by thematic area (Table 2 above) also broadly reflects countries' assessment of the key preconditions for nurturing resilience, with slightly less than half of all indicators dedicated to assessing the adequacy of (i) *human resources/human capital* (17%), (ii) *health system financing and financial protection* mechanisms (14%), and (iii) *material resources* (14%). Other thematic areas making up at least 10% of all indicators relate to (i) the quality of immunisation programmes, (ii) the (mis)use of antibiotics, and (iii) the performance of emergency care services.

The high concentration of surveyed countries on assessing the *preventive/forecasting* resilience capacity of their health systems to *epidemiological* shocks is consistent with the frequency of reported indicators of health system resilience, as five out of six of the most frequently reported ones¹⁷ relate to the *effectiveness of immunisation programmes* and *epidemiologic surveillance systems*. Countries' relatively high concentration on assessing the resilience capacity of their health systems in response to *economic* shocks is similarly reflected in the number of countries that reported indicators related to *health spending*, the *size of financial buffers* at the disposal of the health system and the existence of reliable *health expenditure and revenue forecasts*.

By contrast, a surprisingly low number of countries presented indicators aimed at measuring the (present and future) *adequacy of the clinical workforce*, both in terms of supply and skill composition. As more than two-thirds of survey respondents reported focusing their assessment of

¹⁷ (reported by at least 50% of countries)

health system resilience on *human resources*, and about half acknowledged the existence of '*effective health workforce planning and continuous education*' as a key enabler of resilience (Figure 7 above), this may indicate the existence of a general measurement/assessment gap in this area.

The last part of the survey on the use of resilience assessments for policy formulation shows that, besides making sure that health systems are capable to endure and respond to shocks, other frequently reported reasons that underpin the resilience assessment activity of countries include (i) *promoting a de-centralisation of responsibility for decision-making*, (ii) *building arguments to promote the implementation of reforms*, (iii) *ensuring institutional accountability* in case of a disruptive event, and (iv) *increasing stakeholder participation* in policy decisions. In most countries, Ministries of Health are by default the entity responsible for carrying out the assessments of health system resilience, and in about 30% of countries results of the assessment are deemed classified information.

Lastly, survey findings confirm that albeit very difficult to measure, health system governance capacity is perceived as playing a fundamental role in enabling all other, more 'material' drivers of health system resilience. The most frequently reported governance-related features necessary for fostering health system resilience-enhancing policies reported by countries were:

- strong management and leadership capacity of health care managers;
- effective communication networks;
- independent health insurance funds;
- decentralised crisis management and decision-making;
- effective cross-governmental collaboration and integration of strategies across entities responsible for service delivery, human resources and financing;
- Health system management inclined to invest in high-performing primary care systems;
- Comprehensive risk management and business continuity plans;
- Key health system actors capable to identify and integrate lessons learnt from real incidents.

Chapter 3

Health system resilience in practice: strategies and measurement

Background

As noted in Chapter 1, the concept of resilience promises to assist, in theory, in preparing for, and coping with health systems shocks. In practice, however, to date the concept of resilience in health systems has not been consistently applied, or even understood, among key stakeholders in the areas of health policy and health systems research.

For this reason, in June 2019 members of the EU Expert Group on Health Systems Performance Assessment (HSPA) expressed an interest in running a Policy Focus Group (PFG) on the topic of measuring and assessing health system resilience. The PFG was steered by Dr Stephen Thomas and Dr Marina Karanikolos from the European Observatory on Health Systems and Policies.

The PFG took place in September 2019 and saw the participation of representatives from 17 European countries. The two core objectives of the PFG were to (i) explore how European health policymakers understand the concept of resilience, and (ii) understand to what extent metrics to measure and assess this specific performance domain overlap with other HSPA dimensions.

The conceptual background for this chapter is based on the policy brief from the European Observatory on Health Systems and Policies titled “*Strengthening health systems resilience: key concepts and strategies*” by Thomas et al. (2020).

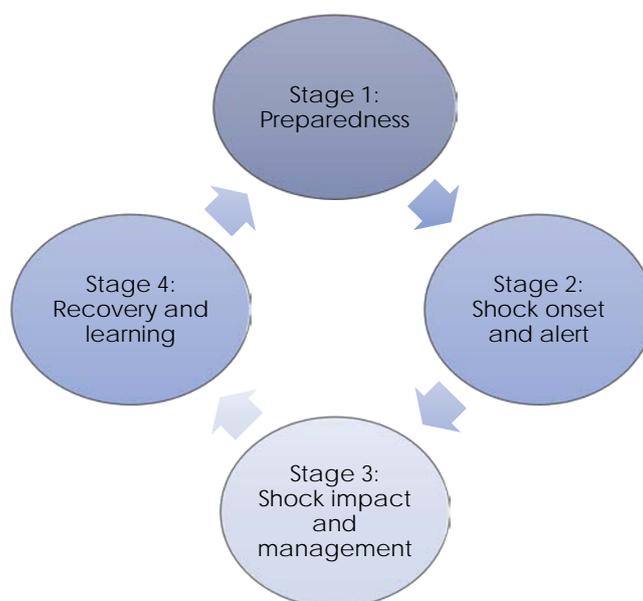
Defining resilience

As outlined in Chapter 1, various definitions of health system resilience have been developed in the context of health systems policy and research. Most of these definitions frame the concept as the capacity of a health system to respond to a shock and how the system can absorb, adapt and transform to cope with sudden changes (Barasa et al., 2017). In particular, the feature of interest is how the system can bounce back from a shock without undermining performance and even, potentially, improving performance. However, from the existing academic literature and expert opinions as well as from the focus of international organisations it became clear that resilience in health systems refers not only to severe shocks and other events the onset of which is less predictable. In policy makers’ views, it often also extends to the management of predictable (and maybe already affecting) and enduring health systems stresses. Hence the focus has widened to include chronic health system strains and not just acute shock episodes.

Despite this broadening of the concept, linking resilience to shocks and the shock cycle may still be helpful to identify various stages of opportunities for resilience strengthening (see Chapter 1 and Figure 20 below). Resilient health systems are those that are able to manage each stage of the shock cycle well, whether predictable or not. They must be: (i) well prepared for different shocks; (ii) able to quickly identify when a shock starts and how it is affecting the system; (iii) able to absorb the shock

and, where necessary, adapt and transform the system to ensure that health system goals are still achieved; and, finally, once the shock has passed they are (iv) able to identify the legacy of the shock in relation to health system performance and remedy any negative consequences. In this final, and often overlooked, phase, health systems seek to mitigate the lasting impact and reflect and draw lessons from their own response.

Figure 20 - Stages of the shock cycle



Source: Thomas et al. (2020)

This multi-faceted view of resilience in health systems does justice to the breadth of the concept and provides a starting point when considering related strategies and areas of evaluation. Nevertheless, the direct management of shocks (Stage 3) remains key for performance assessment, because this is where the links between existing structures and processes and outcomes are the clearest and most measurable. However, while in recent years attention among policy makers has switched more towards preparedness of a health system to deal with both acute stresses and chronic strains, the COVID-19 pandemic shows the critical importance of actions across the entire cycle.

Further debates in the literature around resilience focus on whether resilience is a good thing or not (particularly if the pre-shock system had many weaknesses) and whether bouncing back refers to a return to the original (pre-shock) state or it is the transformation to a new, improved state (Olsson et al., 2015). Given the adaptive nature of health systems, the return to the original state is unlikely.

Taking into account the abovementioned issues in defining and conceptualising health system resilience, we started the PFG by mapping out the concept across European countries.

Resilience mapping across the EU

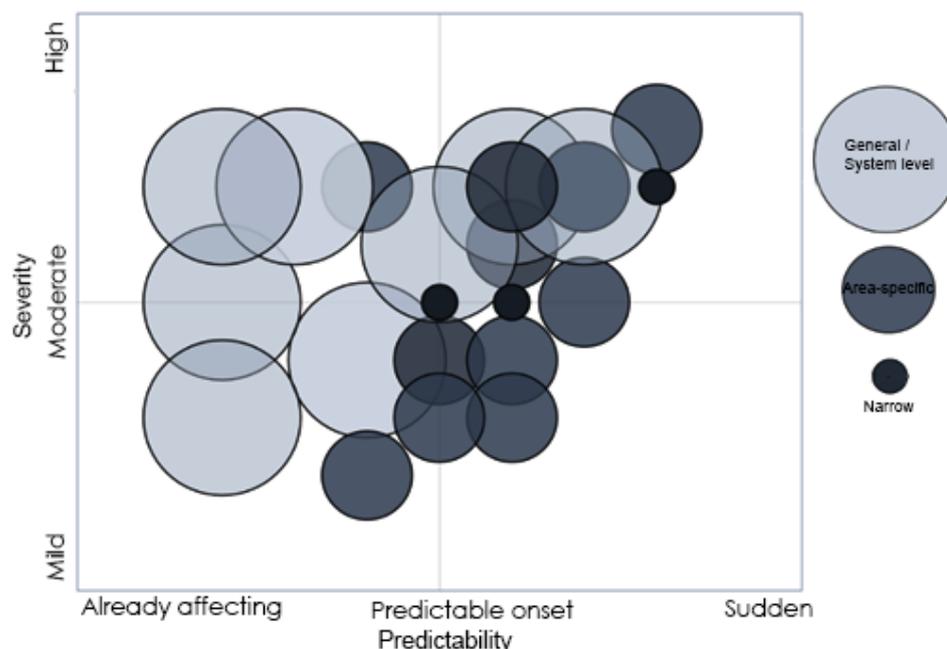
Participants to the PFG were asked how resilience is understood in their respective health system when responding to adverse and unexpected events, in terms of:

- **predictability of onset** (on a scale 1-9, with 1 as something already affecting the system, and 9 as something sudden and unpredictable in terms of timing);
- **severity of impact** (on a scale 1-9, with 1 being mild and 9 high severity);
- **breadth of the concept** (with narrow standing for concrete threats, such as disease outbreak or a catastrophic event; area-specific referring to health system areas, such as financing, human resources, service delivery; and general/ system level resilience – which would imply broad concept encompassing the entire health system).

The results of this survey (Figure 21) were presented during the PFG and reviewed by the attending country experts. Although this exercise does not represent extensive analysis of the resilience concept in each of the countries, it indicatively shows that policy makers do not have a matching understanding of what resilience is, and what type of events a health system needs to be resilient to.

This confirmed the finding from Chapter 2 that some countries understand resilience as a very specific feature, while others look broadly at the need of the entire health system to be prepared for various adversities. While there is a great variation among countries, the general impression is that resilience is understood as an ability to respond to an event that does not yet affect a health system and that has a relatively high degree of severity in terms of impact. At the same time, in countries where the concept of resilience is generally broad, issues that have been affecting the system for a prolonged time (i.e. chronic strains) are more likely to be incorporated.

Figure 21 – How do countries position themselves on the ‘resilience spectrum’?



Note: based on data from 23 countries: 14 responses received during the PFG, further responses were approximated by the chapter's authors based on the results of the questionnaire (Chapter 2).

Preconditions and preparedness

Preparedness is the key stage, where measures can be taken to prepare and strengthen the health system for potential risks or shock. Participants to the PFG were asked about the necessary preconditions for a health system to be resilient. The participants named several factors, which can be categorised as follows:

- **Organization and governance**

Existing health system structures, and the way the system is governed, play a key role in preparedness. The members of the PFG felt that strong leadership and effective governance were among the necessary preconditions for resilience. In addition, preparedness required intersectoral co-operation, as well as a degree of societal trust. Horizon scanning for new technologies and effective services is also useful. The group furthermore felt that a centralised government and control are important contributing factors. Other factors included mechanisms that needed to be in place in case of a crisis, such as clear responsibilities and existence of plans/protocols; regular exercises and stress-tests; pre-established crisis communication lines; as well as a degree of managerial autonomy and space for manoeuvring and entrepreneurship.

- **Information**

The availability of timely and reliable information was considered as crucial at the stage of preparedness, not least for the ability to detect the onset of a shock early on. There is a need for existence of effective surveillance systems and analytical capacity, in order to be able to identify patterns and make forecasts, including those for population needs in the long run. In addition, there needs to be a set of real-time indicators that are sensitive to detect important changes, which can be linked to an alert or an early-warning system enabling the identification of irregularities at an early stage.

- **Financing**

Financing is an area that requires long-term planning, including for adversities. Stability and adequacy of financial resources enables a system to absorb a shock, at least to some degree and in the short-term. Some mechanisms, such as financial reserves or countercyclical measures, can be built into health financing to create a financial buffer when routine sources of funding decrease. In addition, the ability to mobilise additional funding, as well as shift funding where its most needed can be beneficial.

- **Resources**

There was a broad agreement that having a spare capacity within both physical and human resources can help to accommodate and absorb some of an adverse event's impact, particularly in the case of a sharply rising demand. Therefore, routinely running a system on 80-85% capacity was suggested by the PFG members/participants. Effective capacity management, degree of flexibility and mobility, and ability to rapidly increase and deploy additional resources were also seen as a necessary attribute when there is a need to tackle a crisis. Another aspect was having appropriate and ready emergency services infrastructure. In lower income settings, ensuring basic supplies, such as clear water and electricity, may also be an issue. Capacity of human resources, including existence of medical reserve personnel, was seen as an area that needs to be addressed at the preparedness stage, as the training of health workforce requires time.

The above listed categories are by no means an exhaustive list of preconditions and preparedness measures for a health system to be able to respond effectively to a shock. Nevertheless, this shows the awareness of policy makers of the need of ensuring good governance, information flows, stable financing and adequate resource capacity in any health system. However, the PFG has also explored the range of issues that stand in the way of these “ideal” preconditions in practice (see Box 10 below).

Box 11. The realities and challenges of health system preparedness

The policy focus group identified a number of operational challenges that in practice numerous health systems are facing, including:

- Uneven capacity – often resources are not optimally balanced to start with, and this includes health workforce, physical resources (hospitals, beds, equipment), as well as financial resources;
- In a case of a shock, health systems are able to find extra funds to maintain the system during the crisis, but only for the short-term, and these usually fall short of the requirement for funding structural improvement and/or transformation.
- Although risk forecasts are produced and available to policymakers, these are often not translated into investment decisions to pre-empt future strains.
- There are often restrictions on autonomous decision-making – for example due to long command chains, regulation, and financial restrictions. Political interests also may stand in the way of the ability to redistribute resources to cover affected areas.
- Fragmented regional political systems may challenge decision-making on nation-wide issues and priorities.

How to make health systems more resilient?

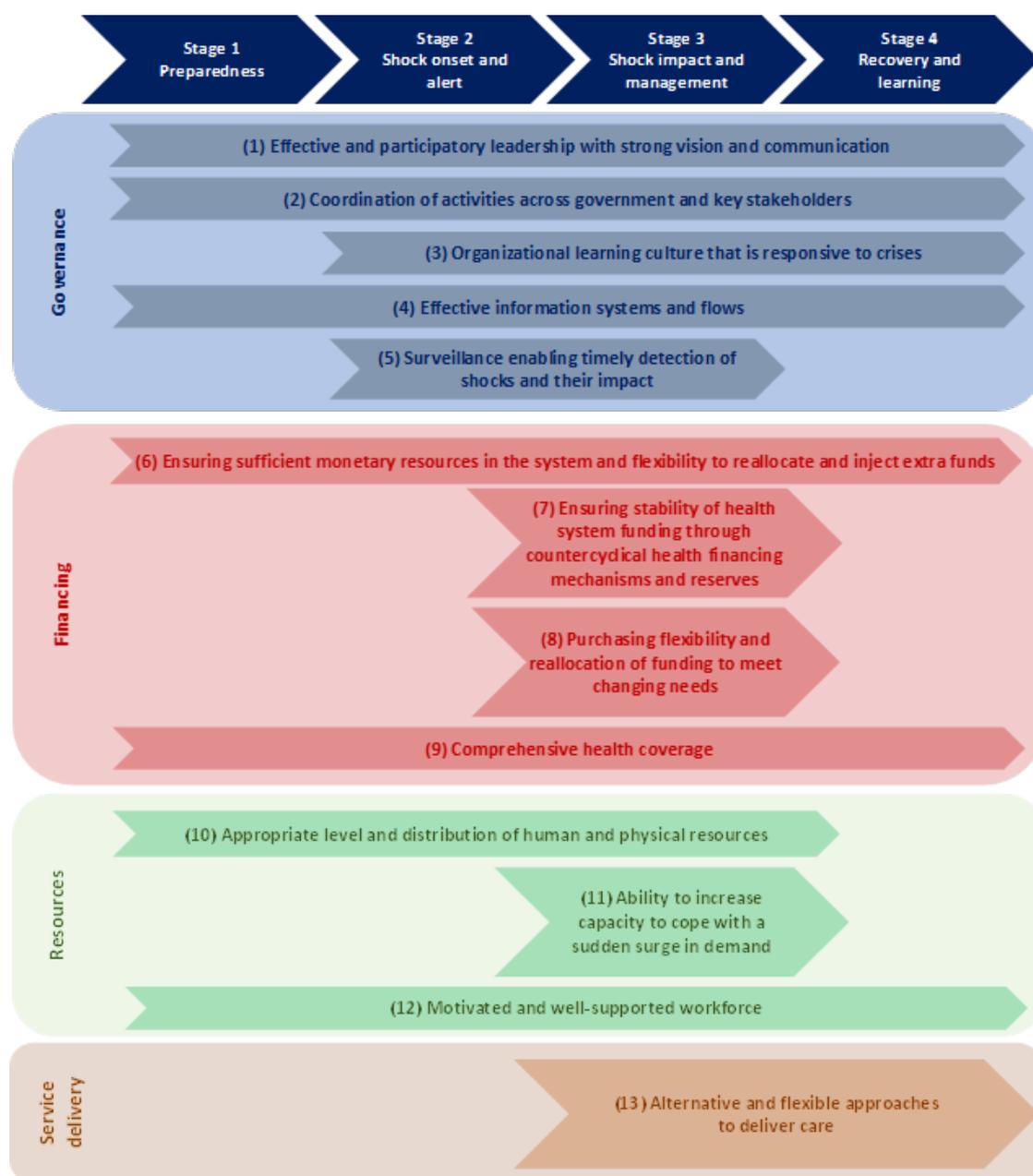
The PFG discussion on preparedness (above) was closely aligned with the 13 strategies recently identified by Thomas et al. (2020) in light of crises, including the COVID-19 pandemic (below).

The strategies have been grouped according to the four stages of the shock cycle and health system function. There is a degree of overlap in functions, as well as stages that these strategies can be assigned to, however such grouping allows us to highlight times and areas where those strategies are particularly important:

(1) Effective and participatory leadership with strong vision and communication - Effective leadership and decision-making plays the key role in resilience strengthening and serves as an enabler for many subsequent strategies. Effective leadership can demonstrate that the health system plays a crucial part in preventing, detecting and effectively addressing a public health threat to the benefit of the entire society.

(2) Coordination of activities across government and key stakeholders - During the crisis, there is a strong need for coordinated action to ensure effective collaboration across sectors, different levels of government, and between government and non-government stakeholders.

Figure 22 – Resilience-enhancing strategies by health system function and shock cycle stage



Source: Thomas et al. (2020)

(3) Organizational learning culture that is responsive to crises - Having a culture that allows stakeholders and systems to learn and adapt both during and after the shock helps to build resilience and facilitate timely use of evidence. This strategy is important not only in the last stage of the shock cycle, which involves dealing with the legacy issues and learning from the shock experience itself and how it was managed, but throughout the entire shock cycle.

(4) Effective information systems and flows - Health information systems are at the core of the decision-making. Timely sharing of critical information with stakeholders is vital and may well be part of the planning needed when policy response is being prepared. This concerns both the ability to share communication between key decision-makers and having functional communication channels.

(5) Surveillance enabling timely detection of shocks and their impact - Surveillance systems need to have the ability to detect, verify and track events in real time or as soon as possible. Moreover, they need to ensure that data reaches all relevant stakeholders and can be rapidly transformed into useful information for decision-making.

(6) Ensuring sufficient monetary resources in the system and flexibility to reallocate and inject extra funds - To be resilient, health system needs to be adequately funded in the first place. However, the key aspect of resilience is to ensure not only that health system financing is sufficient, but that extra funds can be injected to enable the system to respond effectively and continue to provide essential services.

(7) Ensuring stability of health system funding through countercyclical health financing mechanisms and reserves - Health systems are funded predominantly through taxation and social contributions in most countries. Shocks (particularly economic shocks) can impact those sources of revenue, e.g. through unemployment, loss of income or decrease in consumption. Health financing mechanisms that account for cyclicity, have automatic stabilisers or are able to accumulate reserves can cushion the effect of the revenue loss, at least in the short-term.

(8) Purchasing flexibility and reallocation of funding to meet changing needs - During a shock, there may be a need for changes in purchasing to keep the system operational in case of shifts in demand for certain types of care, a need to redirect resources within the system, or to incentivise certain provider behaviour. Developing new purchase mechanisms can be challenging particularly where there are no historic links, or where there are regulatory and legal barriers.

(9) Comprehensive health coverage - A comprehensive and evidence-based package of properly resourced, organized and distributed services gives the best chance for health care activities to be maintained in the presence of many shocks. Countries closer to attaining universal health coverage are therefore more resilient. In countries where there are coverage gaps (e.g. some population groups or services are not covered, or with high reliance on out-of-pocket payments) these tend to exacerbate in a crisis, particularly affecting most vulnerable groups.

(10) Appropriate level and distribution of human and physical resources - General preparation for any shock may include ensuring that health system resources, both human and physical, are sufficient and adequately distributed. In terms of workforce, this means appropriate levels of staffing for doctors, nurses and other health care personnel. For infrastructure, this means that there are enough hospitals and hospital beds, but also that infrastructure allows services (emergency, primary and specialist care) to be delivered in the appropriate setting.

(11) Ability to increase capacity to cope with a sudden surge in demand - Experience of various crises, including the economic crisis and, more recently, the COVID-19 pandemic, shows that a degree of embedded excess or 'surge capacity' in the system allows an effective response to a rapid increase in demands. Nevertheless, there is also a view that building too much preparedness to for a specific even might increase a system's vulnerability to an event less predictable, unless the effort resulted in strengthening of a health system overall.

(12) Motivated and well-supported workforce - During a shock, health system resilience depends on the actions of staff under duress. As health workers may be at the front line of response to certain types of shock, they are also among the groups who are affected disproportionately. Moreover, a long duration of the shock may undermine motivation if management and support mechanisms are weak.

(13) Alternative and flexible approaches to deliver care - As the balance between supply and demand gets disrupted, there is a need for better management of resources to meet the changing needs. This may require an efficiency-enhancing response, e.g. shifting of activity to lower-cost modes or settings, or changing the mix of health professionals to deliver care. Shocks may also reduce the efficiency of service delivery in some activities and it is important to have the flexibility to respond. While care delivery pathways are important for service coordination and continuity, and therefore need to be well-defined, there may be a need to have alternative, accessible pathways in case there are disruptions to standard pathways.

When is the right time?

Some of these strategies need to be used routinely for health system strengthening and therefore for resilience strengthening, but it may be useful to distinguish between what needs to be the key focus in a particular stage of a shock cycle. It is important to recognise that many of the strategies span across different stages, and that the preparedness stage is the one where most protective mechanisms can be put in place. Below we draw on the material from Thomas et al. (2020).

Stage 1: Preparedness

The stage of preparedness (also explored in the PFG, see above) offers the greatest scope for action as much can be done to strengthen the health system, pre-empt shocks and identify optimal responses, as well as to consolidate existing resources. General preparation for any shock may include enhancing leadership and communication, planning for better coordination between stakeholders and putting in place information systems. In addition, having adequate resources (funding and infrastructure) as well as sufficient, motivated and well-supported workforce are important throughout. Finally, appropriate coverage design (in terms of population, services and scale of out-of-pocket payments) ensures that there are essential protection in place for people to be able access services when then need those most. However, all these strategies go beyond preparedness and remain crucially important during all stages.

Stage 2: Shock onset and alert

Clearly, the earlier an occurring shock is realised, the faster and more effective the response can be. Therefore, having surveillance systems in place to provide early warning to any type of adverse event is of a great importance. Given the uncertainty and unpredictability of some shocks, it is important to trace a wide range of indicators (e.g. epidemiological, financial, socio-demographic, and climatic) as close to real time as possible, and have alert systems in place to monitor the situation and detect changes. Systems of sharing critical information with stakeholders are also vital and may well be part of the planning needed in the preparation phase.

Stage 3: Shock impact and management

Absorption relates to incurring the system shock but protecting the health system from profound resource imbalance by making available additional resources, either from reserves or contingency planning. For example, existence of counter-cyclical measures is a mark of good governance and effective handling of a shock.

Adaptation requires absorbing the additional demands or reduced supply capacity by making the system more efficient in doing more with less to meet the additional demands with the same or less supply. This may, for example, be a case of adapting delivery within the system to match the needs.

When adaptation is not working or when all easy efficiencies have been made, the system may well need to more fundamentally change to cope with the impact of the shock. This may require a more radical rethinking of health system policy and the resourcing and delivery of care. This transformation process can sometimes compete with adaptation in relation to scarce governance capacity. The challenge of governance is managing the three aspects of absorption, adaptation and transformation and the tensions between them and knowing when to shift from one to the other.

Stage 4: Recovering and learning

Even when shocks are over, they may leave legacy issues – e.g. demotivated workforce, loss of households' income, etc. These legacy aspects may be different from the pre-shock situation, and they may continue to impact health system performance long after the shock itself. Nevertheless, some legacy aspects may be positive (e.g. increased efficiency), or open up opportunities for effective change. They may also be useful in terms of learning from the shock experience and its management not only for improving the current system but also in relation to better handling any future similar shock scenario. However, a culture of learning is also important at preceding stages, particularly in case of an unprecedented shock characterised by lack of information, such as COVID-19 pandemic. Ability to track, enhance and appropriately interpret existing national and international evidence is crucial for decision making, particularly during a fast-developing large-scale crisis.

How can resilience be measured?

Another question explored by the PFG was about the indicators measuring resilience. Given the lack of a single definition and the breadth of potential scope, the choice of measures becomes almost infinite. With this in mind, the PFG was set a task to identify some of the indicators that can be used to measure resilience during the typically most active stage of the shock cycle – shock impact and management – and relating to the strategies of absorption, adaptation and transformation.

Indicators related to capacity measurement (e.g. bed capacity, bed occupancy, availability of emergency infrastructure), ability to mobilise/redistribute resources (physical, human and financial), and adequacy of supply chains were named among others. A metric was also suggested to measure the difference between change in demand and change in capacity. The general understanding was that existing capacity is the key to determining whether or not a health system is able to absorb the impact of a shock. In terms of the adaptation process, the focus was more on the measures of efficiency and productivity. At the same time, the PFG agreed that measurement of the transformation process would require more qualitative data to document the new state of affairs or described specific mechanisms (e.g. revised plans, strategies, organisational changes) that were put in place as the result of transformation.

The PFG suggested a number of specific metrics that could be used in each of these stages, however the discussion revealed that tracking select relevant indicators over time and their correct interpretation can be more important than a search for an optimal metric. Indicators can be chosen depending on the type of adversity, country context, data availability and completeness. However, it is the tracking of such indicators over time at specific stages of the shock cycle (and their appropriate interpretation) that would provide the insight into the ability of system to cope with the challenges.

Therefore, there was a strong emphasis on effective surveillance systems that can detect and monitor those changes.

Thomas et al. (2020) devise assessment areas that can be used to assess health system resilience in relation to the strategies outlined in the previous section. As strategies are linked to the four health system functions, assessment areas correspond to governance (1-5), financing (6-9), resource generation (10-12) and service delivery (13).

Table 3 – Examples of assessment areas grouped by resilience-enhancing strategy

Strategy	Examples of assessment areas
(1) Effective and participatory leadership with strong vision and communication	<ul style="list-style-type: none"> • Set of contingency plans and protocols, emergency legislation • Functional management capacity for governance • Stakeholder participation and engagement • Leadership/steering and clear chain of command • Accountability of government agencies • Effective governance structures (transparency, accountability, stakeholder involvement) • Clear and feasible plan for response measures • Setting strategic direction • Established public trust in response agencies • Effective communication
(2) Coordination of activities across government and key stakeholders	<ul style="list-style-type: none"> • Collaboration between sectors • Agreements with relevant actors (e.g. international agencies, non-state providers, NGOs)
(3) Organizational learning culture that is responsive to crises	<ul style="list-style-type: none"> • Innovative organizational culture, culture of learning • Use of feedback and analysis in informing decision-making • Mechanisms to assess, audit and learn from response to shock and implement change
(4) Effective information systems and flows	<ul style="list-style-type: none"> • Flow of information between stakeholders, data-sharing mechanisms • Flow of data, information and analysis into decision-making and evaluation • Mechanisms of timely dissemination of guidelines and protocols • Communication infrastructure (hard: phone, Wi-Fi; soft: press, community, NGOs) • Existence of data collection and linkage systems
(5) Surveillance enabling timely detection of shocks and their impact	<ul style="list-style-type: none"> • Epidemiological surveillance and early warning systems • Existence of mechanisms to identify change in need and access to services

<p>(6) Ensuring sufficient monetary resources in the system and flexibility to reallocate and inject extra funds</p>	<ul style="list-style-type: none"> • Levels of spending on health (total, public, and as a share of government spending) • Equitable geographical distribution of health expenditure • Information on public financial management
<p>(7) Ensuring stability of health system funding through countercyclical health financing mechanisms and reserves</p>	<ul style="list-style-type: none"> • Countercyclical financing mechanisms in place to cushion financial impact of shocks • Protected funding for health care, e.g. earmarked funds for health care • Financial reserves available for deployment in health shocks • Change in health spending vs change in government deficit and GDP
<p>(8) Purchasing flexibility and reallocation of funding to meet changing needs</p>	<ul style="list-style-type: none"> • Development of alternative procurement channels • Ability to make rapid changes to purchasing mechanisms • Reallocation of funding to different providers or activities
<p>(9) Comprehensive health coverage</p>	<ul style="list-style-type: none"> • Universal/effective health coverage (including vulnerable groups) • Public knowledge of entitlements • Out-of-pocket payments as share of total health spending • Catastrophic/impoverishing health spending • Existence/broadening of exemptions from user fees
<p>(10) Appropriate level and distribution of human and physical resources</p>	<ul style="list-style-type: none"> • Capacity of diagnostics, primary and specialist care • Availability of pharmaceuticals and medical products, vaccines and equipment • Mapping of health service providers (location, type, opening hours, accessibility) • Numbers of doctors and nurses and their workload • Workforce mapping (location, availability, competencies)
<p>(11) Ability to increase capacity to cope with a sudden surge in demand</p>	<ul style="list-style-type: none"> • Ability to increase capacity of services (e.g. existence of waiting lists, occupancy rates) • Ability to increase number of health professionals and their workload, workforce reserves • Existence of an agency responsible for emergency supplies
<p>(12) Motivated and well-supported workforce</p>	<ul style="list-style-type: none"> • Health workers job satisfaction • Health worker absenteeism • Staff support mechanisms, helplines • Ensuring safety of health workers
<p>(13) Alternative and flexible approaches to deliver care</p>	<ul style="list-style-type: none"> • Crisis preparedness training, cross-training for additional skills • Training of health workers to treat specific or at-risk population groups • Ensuring provision of services for at-risk population groups • Maintenance of quality and safety standards across all services

Source: Thomas et al (2020)

In Thomas et al. (2020), the authors suggest a more comprehensive list of metrics that can potentially be used to measure health system resilience. These were derived from the rapid review of literature and grouped in themes that can also map on to strategies. However, it is important to keep in mind that not all these metrics are always appropriate, as their selection depends on the purpose of the assessment, and their interpretation depends on multiple contextual factors, for example a country's potential exposure to shocks, or the phase in the shock cycle.

Metrics can serve different purposes. For example, more generic resilience indicators can be used for broader routine assessments to identify potential areas of weaknesses within the system, while crisis-specific indicators can be used at all stages to prepare for, detect the onset and measure the impact of a specific event. Below we illustrate some of these considerations:

- **General indicators and crisis-specific indicators**

There is an emerging consensus on certain general indicators for resilience. These relate to: the extent of public entitlements to healthcare, number/location of health care professionals, the presence and capability of an epidemiological surveillance system, government spending and out-of-pocket payments as a percentage of total healthcare spending, health service utilisation, health outcomes, an agreed national plan for healthcare, breadth of service provision and reliable supply of medicines. Along with these general metrics, there are crisis-specific metrics. For example, many of the metrics that apply to infectious disease or conflict situations (e.g. staff safety) will not apply to financial crises.

- **Quantitative and qualitative metrics**

For some measures such as number of health care professionals or government spending, it is clear that quantitative measures are more appropriate. Nevertheless, for other indicators such as entitlements it is less clear; qualitative evaluation is often used, but there can also be quantitative measures, such as OECD entitlements index. Similarly, for eHealth, it is primarily discussed qualitatively, but the OECD has developed an eHealth adoption index. For some metrics, a mix of quantitative measures, documentary analysis and interviews/focus groups may be needed for evaluation. These metrics might include: culture of innovation; staff commitment; decentralisation of duties; and collaboration between services, departments, public and private actors etc. Overall, a mixed methods approach is necessary for a comprehensive evaluation of health system resilience.

- **Formative and summative evaluation**

Another issue of importance is when to assess the resilience of health systems. In low and middle-income countries, evaluations are primarily conducted after a crisis. This is an important summative evaluation of the handling of the shock. Nevertheless, there is also value in regular reviews of health system resilience. Methodologies for these have been suggested, e.g. in the State of Health in the EU's Country Health Profiles (OECD/European Observatory on Health Systems and Policies, 2019) for the overall health system (Box 11 below), or for specific risks, e.g. the refugee crisis (WHO, 2016). The challenge with more regular reviews is to anticipate the nature of the shock and cover the range of metrics and strategies that are most appropriate.

An important aspect in strengthening resilience of a health system is having both a right and measurable set of key metrics and ability to conduct timely analysis of these metrics to identify weaknesses and track performance. From here, the question arises as to where to focus resources to enhance resilience. On one hand, putting effort into preparedness for, and timely identification of, a specific shock can help to identify quickly concrete system weaknesses and address those, mitigating the impact. On the other hand, monitoring a broad range of health system performance indicators

can help to recognise less anticipated shocks, provide important information on system-wide impact and support shock management more broadly. The optimal response may well be a mix of the two. The targeted metrics can help to detect likely weaknesses to be aware of alongside a broader strategy to monitor key metrics allowing more informed decisions and the implementation of knowledge-based policies.

Box 12. Health systems resilience in *the State of Health in the EU*

The *Country Health Profiles* (CHPs) are a key deliverable of the *State of Health in the EU*, a joint project by the OECD and the European Observatory on Health Systems and Policies in cooperation with the European Commission that aims at making health system information, expertise and best practices easily accessible to policymakers and everyone who helps to shape health policies.

The CHPs provide a concise and policy-relevant overview of health and health systems in all EU countries, Iceland and Norway, emphasising the particular characteristics and challenges in each country. Their design aims to create a means of mutual learning and voluntary exchanges that support the efforts of countries in their evidence-based policy making. Each country profile provides a short synthesis of: the health status in the country; health determinants, focussing on behavioural risk factors; the organisation of the health system; and the effectiveness, accessibility and resilience of the health system.

For the resilience dimension, the framework used in the CHPs assesses it along three main parameters:

- **Ensuring long-term stability of resources** refers to the capacity to protect or generate the necessary and adequate financial resources, as well as physical, human and information (knowledge) resources to address any upcoming major challenges, such as economic or fiscal crises, public health crises, demographic changes or new technologies.
- **Responding efficiently** refers to the ability to manage the health system with limited resources, through achieving efficiencies, while not sacrificing key priorities, benefits, access or entitlements. The presence of sufficient resources is necessary, but a health system that is able to withstand shocks to supply or demand must be able to best use the resources it has available. That is, a resilient health system must be able to efficiently use its available resources.
- **Strengthening governance** refers to the capacity to steer the system in order to adapt it quickly to new objectives and priorities, and to respond to major challenges through key governance tools: ability to formulate long-term health strategy; ensure accountability, transparency and stakeholder involvement; as well as use evidence for monitoring and performance evaluation.

Concluding remarks

The outcome of the Policy Focus Group (PFG) documented in this chapter confirms the findings of the theoretical overview from Chapter 1 regarding the existence of a wide variation in definitions of health system resilience, which is reflected in a fundamental lack of consensus on how to operationalize the concept by health policymakers. The most recent literature indicates a growing trend towards conceptualising resilience as broader than absorbing, adapting and transforming through shocks to cover wider health system issues, such as more chronic and predictable strains. Yet the COVID-19 pandemic has highlighted the relevance of more general health system strengthening, as well as the need for preparedness to very specific acute threats, as the costs of failing to tackle public health emergencies can be profound.

Using the examples of major health system shocks, this chapter identified a number of strategies that can strengthen health system resilience. Broadly speaking, the better day-to-day performance of a health system is, the more resilient it can be in the wake of an adversity. However, this is not a universally valid assumption, as generally well-performing health systems can face unprecedented challenges when facing a particular type of a shock, as the COVID-19 pandemic has demonstrated. Among the strategies examined, those aimed at strengthening health system governance played a central role in determining the ability of a health system to react and cope with a crisis, as even in a well-prepared system, poor decision-making can lead to amplification of adverse impacts.

Chapter 4

Conclusions

The wide range of economic, social, demographic and ecological mega-trends that are reshaping our societies' needs and modes of interaction suggest that the frequency, range and intensity of shocks health systems will be confronted with are all likely to increase in the future. Based on this hypothesis, it is important for European governments to scrutinize and nurture the capacity of their health systems not only to provide high-quality, universal and affordable care in 'normal' times, but also to foresee, absorb, and adapt to future shocks and structural stresses. This will allow health systems to sustain required operations, resume optimal performance as quickly as possible, transform their structure and reduce their vulnerability to similar shocks in the future – in other words, to increase their *resilience* capacity.

The destabilising impact of the ongoing COVID-19 pandemic on several health systems in Europe has been a painful testimony of the dire consequences that can result from failing to achieve this objective. The experience of the first wave of COVID-19 (March-May 2020) revealed how most European public health systems were either ill-equipped to respond to this type of shock, or faced severe difficulties in the implementation of their pre-existing response plans. In turn, the major direct and indirect health impacts from the pandemic exposed the structural fragilities that characterized many European health systems prior to its onset, which remained either undetected or underestimated in their risk potential until the health crisis hit.

As European health systems are now striving to mitigate the impact of the second wave of COVID-19 while keeping the economy open, it is imperative for policymakers to extrapolate lessons from the health crisis that can provide a handrail for building more resilient public health systems in the future. One of the logical first steps to accomplish this is to expand countries' HSPA frameworks to include *resilience* as a key dimension of performance assessment, on a par with *access*, *quality* and *efficiency* of care. The cost of inaction would be unacceptable: especially in the long term, health policymakers will be expected to pursue other policy objectives that may inadvertently lead to a silent erosion of the resilience capacity of their health systems over time. Without a solid measurement and assessment framework for resilience, this 'damage' would become apparent only with the advent of the next unpredictable health crisis – when it will be too late to take cost-effective remedial action.

This report has documented how the concept of *resilience* applied to health systems is still new, having attracted a critical mass of research attention only in the last decade. As a result, efforts aimed at defining this concept as well as how it can be built, measured and assessed prospectively within complex entities such as health systems are still in their relative infancy. Moreover, the currently available research literature has not yet reached a consensus on the exact scope of the concept in and of itself, which may explain the scarcity of studies proposing methodologies for its measurement and assessment. In an attempt to bring some clarity and additional input to this discussion, Chapter 1 presented an overview of the descriptions of resilience from the scientific literature, with the goal of verifying its added value and potential applicability in the health policy context. Input from the members of the Expert Group and from the relevant literature allowed us to develop a working definition of *health system resilience* consistent with the vast majority of the research to date, as well as a basic schematic of the concept that illustrates its time-sensitive nature and provides a framework for thinking about possible implications for measurement and assessment.

Despite its current lack of maturity, our assessment of the contribution of the notion of *health system resilience* to the health policy discourse is overall positive. Contrarily to other established HSPA

dimensions, it has the advantage of prompting policymakers to explicitly acknowledge the *contextual* and *time-dependent* nature of health system performance in their policy and investment decisions. Moreover (and contrarily to shock type-specific preparedness plans), the concept of resilience presupposes the *unpredictable* nature of health shocks, as well as the existence of interdependencies between health and non-health system entities¹⁸, whereby the performance of the latter determines to a large extent the resilience potential of the former.

The second chapter presented the results of a survey with the HSPA Expert Group aimed at finding out the extent to which European health policymakers have operationalised the concept of *resilience* in their respective HSPA frameworks. The results of the survey – which was carried out prior to the onset of the COVID-19 pandemic – show that, consistently with the lack of conceptual clarity found in the literature, the vast majority of health systems in Europe are yet to develop a fully-fledged concept of health system resilience their HSPA frameworks. On the other hand, about half of all the surveyed countries report framing as least *some* aspects of resilience as part of other health system performance dimensions. The scope and depth of these definitions of resilience varies greatly across countries, in a pattern that generally sees each country characterise their definition of *health system resilience* based on their respective domestic history of experiences in tackling health crises¹⁹. Several of these country-specific examples were documented throughout the chapter in the form of boxes.

A breakdown of resilience assessments by health system sub-part shows that more than two-thirds of European countries investigate the resilience capacity of their *emergency care* services, while less than a third cover the *long-term care* sector. On top of health system-related elements, the majority of countries factor in a consideration of the *socio-economic* and *demographic* characteristics of their population, the *reliability of utility systems*, and the *coordination capacity of health authorities with other entities* (e.g. defence) in their assessment of health system resilience. The focus of countries' resilience assessments by *shock type* and specific *resilience capacity* is very uneven, suggesting the existence of several assessment gaps. About three-quarters of countries reported assessing the *preventative/forecasting* resilience capacity of health systems to withstand *epidemiological* shocks, while about half reported assessing their health system's *adaptive* resilience capacity vis-à-vis *epidemiological* and *economic* shocks.

The list of health system resilience indicators presented by countries consists of a heterogeneous mix of both qualitative and quantitative measures; almost 50% of all indicators presented aim to assess health systems' *preventative/forecasting* resilience capacity, focusing mostly on the *adequacy of human resources*, and *health system financing/financial protection mechanisms*. By contrast, a surprisingly low number of countries reported using indicators measuring the *adequacy of the clinical workforce*, both in terms of supply and skill composition, suggesting the existence of an assessment gap in this key area. Lastly, survey findings confirm that albeit difficult to measure and assess quantitatively, *good governance capacity* is perceived by countries as playing a fundamental role in enabling all other, more 'material' drivers of health system resilience.

The third and final chapter of the report aimed at combining the theoretical and observed practice elements from the first two chapters. Based on the account of a workshop internal to the Expert

¹⁸ For example, trade relations impacting the robustness of global healthcare and pharmaceutical supply chains.

¹⁹ For instance, several countries which health systems experienced significant budget cuts in the aftermath of the 2009 European sovereign debt crisis reported having developed their notion of health system resilience mostly in terms of '*financial* resilience', i.e. the capacity of a health system to protect its budget in the face of a large and sudden decrease in health care revenues.

Group (a 'Policy Focus Group') and additional research by the European Observatory on Health Systems and Policies, the chapter explores the main preconditions for health systems to be assessed as *resilient*, the operational obstacles impeding health systems from achieving them, as well as a number of important resilience-enhancing strategies to be implemented across the shock cycle. Under the guidance of experts from the European Observatory on Health Systems and Policies, the participants discussed four clusters of conditions for health systems resilience – *governance, information, financing* and (material) *resources*, and identified the main operational challenges that typically stand in the way of their achievement. The obstacles most frequently reported by participants related to the existence of unresolved health system weaknesses persisting even in “normal”, non-crisis times (e.g. uneven capacity, personnel shortages), short-termism driving financing decisions, failure to translate (available) analyses of operational risks into investment decisions in due time, slow decision-making and interference from political interests.

After having explored a set of strategies to improve health systems resilience, the Policy Focus Group engaged in a discussion on how it should be measured prospectively. At least partly due to the high variation in how countries conceptualise resilience (presented in Chapter 2), responses varied widely across participants. However, a general consensus was reached on the fact that;

- at a minimum, metrics related to health systems' *capacity* (e.g. number of beds, bed occupancy, availability of emergency infrastructure), *ability to quickly mobilise/redistribute resources* (physical, human and financial), and *adequacy of supply chains* would constitute the basis of any meaningful indicator set;
- such a set of indicators would necessarily include a mix of both *qualitative* and *quantitative* measures; and that
- tracking selected relevant indicators *over time* and interpreting them correctly may be more advantageous than searching for an 'optimal' metric for health system resilience.

Possible avenues for improvement

This report has documented the numerous conceptual and methodological limitations encountered by health systems analysts and researchers in their quest to develop better methods to prospectively measure and assess the resilience capacity of health systems against various types of shocks. Despite these obstacles, an overarching conclusion from the report is that, against the backdrop of the vast and largely unmet demand for methodological guidance on this topic, a number of steps can be taken to improve current assessment methods for health system resilience, and that the incremental benefit associated with them is likely to be significant. The COVID-19 pandemic has maximised the urgency of developing more policy-relevant, evidence-based analysis on this topic. At the same time, it created momentum for presenting ambitious policy proposals aimed at building resilience at the EU level, including via new data collection and exchange efforts.

To fully capitalize on this time-limited opportunity to make resilience-building a permanent policy priority of health policymakers, we need to build more exhaustive, analytically robust assessment framework for health system resilience complementary to other HSPA dimensions such as efficiency, quality of care, access and fiscal sustainability.

The information and ideas contained in this report can thus provide input for European governments to improve the way they assess the resilience of their health systems. Although more research is required to develop more advanced (quantitative and qualitative) prospective metrics, some of the most promising options for improvement in the short term are:

1) Developing new measures to assess governance capacity

Evidence from both the literature review and responses from country experts have confirmed that *effective governance* constitutes the essential precondition for all other ‘material’ drivers of health system resilience. It may be difficult to assess quantitatively, but developing an evidence-based qualitative assessment framework for health system governance capacity may be feasible. One of the main takeaways from the Policy Focus Group was that the root cause of obstacles inhibiting the pursuit of ideal conditions for health system resilience are often related to governance. Most importantly, these obstacles are oftentimes detectable also during business-as-usual times – a feature that should make them technically easier to assess relative to other more latent health system vulnerabilities. Given the indispensable nature of governance capacity to building resilience, the results of this assessment could be interpreted as a partial proxy of health system resilience in and of itself.

2) Extending the scope for measurement of health system resilience

The results of the survey by the Expert Group revealed how the scope for assessment of health system resilience reported by the majority of countries is characterized by significant gaps. Although a large majority of countries reported assessing the resilience of their *public health* and *emergency care* services, less than half reported carrying out an assessment of their health system’s *coordination capacity*, and of the resilience of *long-term care* services. In terms of focus by resilience capacity and shock type, the majority of countries limit their assessment to their health systems’ capacity to foresee shocks of *epidemiological* and, to a lesser extent, *economic* nature, with only a minority of countries engaging in an assessment of their health system’s capacity to absorb and adapt to shocks of other nature. Moreover, a worryingly low number of countries reported indicators of resilience aimed at assessing the *adequacy of the health workforce*, both in terms of supply and skill composition. Expanding the scope of resilience assessment activities to fill the assessment gaps in these key areas would allow policymakers to obtain a more comprehensive understanding of the complex web of interdependencies that define health system resilience.

3) Extrapolating relevant insights from past failures and experiences

The case studies documented in Chapter 2 of this report have shown how countries are usually able to build greater resilience in their health systems in the aftermath of health shocks they have experienced first-hand. The experiences of countries in tackling several types of health system shocks offer a precious repository of empirical knowledge, which can be reverse-engineered to extrapolate relevant insights for developing more targeted health system resilience indicators and assessment methods.

4) Developing more effective communication tools to make resilience matter to policymakers

As a characteristic of health systems, resilience has been historically overlooked relative to other performance dimensions not only because of its lack of conceptual clarity and the subsequent scarcity of assessment tools related to it, but also because, by its own characteristics, it is not part of the routine health policy discourse until it suddenly is – that is, when it is too late to take remedial action. The experience of COVID-19 is a case in point. Researchers and analysts should develop more effective tools to communicate to policymakers the *value* of building resilience in health systems and explain the enormous risks associated with a lack of resilience. This may significantly increase the relative weight of health systems resilience in decision-making processes.

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Annexes

Annex I. **Members' list**

A. Members of the Expert Group on Health Systems Performance Assessment (HSPA)

Chairpersons:

- Dr Kenneth E Grech (Malta),
- Dr Andrzej Rys (European Commission)

Members:

Austria	Herwig Ostermann, Patrizia Theurer, Florian Bachner, Andrea Schmidt, Eva Kernstock.
Belgium	Pascal Meeus, Lieven De Raedt.
Bulgaria	Petko Salchev, Ivelina Georgieva, Ivian Benishev.
Croatia	Mate Car, Dubravka Teskera.
Cyprus	Vasos Scoutellas, Anna Demetriou.
Czechia	Tomas Troch, Katarina Sebestova.
Denmark	Mossa Al-Naggash.
Estonia	Ulla Raid, Eleri Lapp.
Finland	Liisa-Maria Voipio-Pulkki, Pekka Rissanen, Ilmo Keskimäki.
France	David Bernstein.
Germany	Philip Wahlster.
Greece	Georgios-Filippos Tarantilis.
Hungary	Fanni Borbás.
Ireland	Robert Mooney, Muiris O'Connor.
Italy	Modesta Visca, Maria Chiara Corti.
Latvia	Laura Boltāne.
Lithuania	Raimonda Janonienė.

Luxembourg	Françoise Berthet.
Norway	Birgitte Kalseth, Beate Margrethe Huseby.
Poland	Jacek Siwec, Wojciech Niemczyk, Jan Olmiński.
Portugal	Andreia Jorge Silva.
Romania	Claudia Dima, Alexandra Cucu.
Slovakia	Martin Smatana.
Slovenia	Dusan Josar.
Spain	Elena Andradas Aragonés.
Sweden	Ingrid Schmidt, Maria State, Patrik Hedefjäll.
The Netherlands	Patrick Jeurissen, Luc Hagedaars, José Van Dijk.

The OECD	Gaetan Lafortune.
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The WHO Regional Office for Europe	Gabriele Pastorino, Ihor Perehinets.
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The European Observatory on Health Systems and Policies	Josep Figueras, Jonathan Cylus, Marina Karanikolos, Stephen Thomas.
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European Commission

DG Health and Food Safety (SANTE)	Sylvain Giraud, Philippe Roux, Filip Domański, Federico Pratellesi.
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DG Economic and Financial Affairs (ECFIN)	Santiago Alvaro Calvos Ramos, Boriána Goranova, Benedetta Martinelli.
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DG Research and Innovation (RTD)	Sasa Jenko, Leslie Pibouleau.
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B. Members of the sub-group on health system resilience

Members

Belgium	Sophie Gerkens, Mélanie Lefèvre, Pascal Meeus.
Czechia	Tomáš Troch.
Finland	Ilmo Keskimäki, Pekka Rissanen.
Romania	Alexandra Cucu, Claudia Dima.
Sweden	Patrik Hedefjäll.
The European Observatory on Health Systems and Policies	Jonathan Cylus, Marina Karanikolos Stephen Thomas.
The WHO Regional Office for Europe	Gabriele Pastorino.
DG Health and Food Safety (SANTE)	Filip Domański, Federico Pratellesi.

C. Members of the Policy Focus Group

“Health system resilience: a concept in own right or sum of parts?”

Austria	Florian Bachner.
Belgium	Mélanie Lefèvre, Pascal Meeus.
Croatia	Nina Bončić Mijatović
Czechia	Tomáš Troch.
Estonia	Silja Kimmel.
Finland	Kimmo Parhiala.
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Hungary	Miklos Gresz.
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Committee of the Regions (CoR)	Dorota Tomalak, Marie Grontaniuk

Annex II. **Health system resilience questionnaire**²⁰

Part A

1. Definition of health system resilience

Q1.1 In your country, has the government or any public entity formally defined the concept of resilience applied to the health system?

- Yes
- No

Q1.2 If YES, how is health system resilience defined?

Please provide a link to any relevant documents describing the concept if possible

Q1.3 If NO, is the concept of resilience (as defined for the purpose of this survey) defined, at least partially, as a sub-part of any health system dimension in practice?

- Yes
- No

Q1.4 If you answered YES to Q1.3, please explain how health system resilience is conceptualised in your country.

Q1.5 If you answered NO to Q1.3, is there any evidence that fostering health system resilience is a current preoccupation of health policymakers in your country?

If YES, please explain

- Yes _____
- No

Q1.6 Based on the concept of health system resilience used in practice by health policymakers in your country, what would be the fundamental preconditions for a health system to be considered as resilient?

²⁰ All data submitted by respondents can be requested directly from SANTE-HSPA@ec.europa.eu.

2. Scope for the assessment of health system resilience

Q2.1 In your country, does the government or any public institution assess the resilience capacity of the health system?

If yes, please provide a link

- Yes _____
- No
- Ongoing

Q2.2 If you answered NO to Q2.1, have any occasional studies to assess the resilience capacity of your country's health system ever been conducted?

If yes, please provide a link

- Yes _____
- No

If you replied NO to questions **Q2.1** and **Q2.2**, go to *Part B*

Q2.2 If you answered YES to Q2.1, what health system sub-parts are covered by the assessment?

- Public health
- Primary care
- Emergency care
- Hospital care
- Outpatient specialist care
- Long-term care (chronic diseases)
- Care coordination (cross-sectoral)
- All of the above
- Other _____

Q2.2.1 What are the key elements covered by the assessment?

- Human resources
- Pharmaceuticals and medical supplies / equipment
- Health information management
- Financing / contingency funding
- Crisis preparedness plan(s)
- All of the above
- Other _____

Q2.3 Are there any non-health system related factors that are taken into account to assess health system resilience (e.g. features relating social protection and social security)?

Q2.4 If you answered NO to Q2.1, have any occasional studies to assess the resilience capacity of your country's health system ever been conducted?

If yes, please provide a link and a brief summary

- Yes _____
- No

Q2.5 Acting as a 'buffer' between the pre-clinical setting and more complex care delivery, emergency care is a health system sub-sector that is typically characterised by high levels of uncertainty, unpredictability and time sensitivity of demand for services. These features seem to suggest that resilience should be a landmark feature of high-performing emergency care systems.

Is the resilience capacity of emergency care specifically assessed in your country? Is emergency care considered to be a resilience-enhancing factor for the health system as a whole?

Q2.6 Which specific capacities for health system resilience are covered by the assessment?

Select all that apply

- Preventive/forecasting capacity*, i.e. the ability of the health system to proactively foresee the advent of a shock and minimise its potential future impact
- Absorptive capacity*, i.e. the intrinsic capacity of the health system to cushion the impact of a shock
- Adaptive capacity*, i.e. the intrinsic capacity of the health system to sustain required operations despite extraordinary circumstances caused by the shock
- Transformative capacity*, i.e. the intrinsic capacity of the health system to transform its structure and functioning to respond to structural changes in the operating environment
- Other (please specify) _____

Q2.7 Does the assessment focus on the health system's capacity to be resilient to specific types of shocks?

Select all that apply

- Environmental shocks (e.g. extreme weather events, natural catastrophes)
- Economic shocks (e.g. fiscal crisis, unemployment crisis)
- Societal shocks (e.g. large-scale involuntary migration)
- Geopolitical shocks (e.g. interstate conflict)
- Epidemiological shocks (e.g. infectious disease outbreak)
- Technological shocks (e.g. cyberattacks)
- Other type of shock (mainly demand-side) (please specify) _____
- Other type of shock (mainly supply-side) (please specify) _____
- No shock type-specific assessment is performed

Q2.8 Based on your responses to Q2.2 and Q2.3, please map which health system resilience capacities (*preventive/forecasting, absorptive, adaptive, transformative*) are specifically assessed for each type of shock.

	Environment al shocks	Economi c shocks	Societ al shocks	Geopolitic al shocks	Epidemiologic al shocks	Technologic al shocks	Othe r
Preventive/ forecasting capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Absorptive capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Adaptive capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Transformati ve capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Q2.9 Please describe the method(s) used to assess each capacity for health system resilience to shocks selected in Q2.8 and/or provide a link to any documents describing the methodology.

Q2.10 Besides shocks, does the assessment focus on the health system's capacity to be resilient to specific types of structural changes?

Select all that apply

- Environmental structural changes, e.g. global warming and climate change
- Economic structural changes, e.g. high technological unemployment due to AI / automation
- Societal structural changes, e.g. trends in intra- and inter-national migration, increased urbanisation
- Demographic and epidemiological changes, e.g. population ageing and the associated increase in chronic disease prevalence
- Medical and pharmaceutical technology breakthroughs, e.g. much more effective, yet very high-cost innovative therapies
- Other type of structural change (mainly demand-side) (please specify)

- Other type of structural change (mainly supply-side) (please specify)

- No structural change type-specific assessment is performed.

Q2.11 Please describe the method(s) used to assess each capacity for health system resilience to structural changes selected in Q2.10 and/or provide a link to any documents describing the methodology.

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3. Metrics to assess resilience capacity

Q3.1 Based on your previous replies, please present the measures (qualitative, qualitative) used to assess the resilience capacity of your country's health system. Some (purely illustrative) examples are included in the table:

Main resilience capacity assessed (preventive/ forecasting, absorptive, adaptive, transformative)	Objective	Measure	Rationale for the selection	Other
Preventive	To proactively take measures to avoid foreseeable shocks from occurring	Effectiveness of immunization programmes	Immunization services are an integral part of health system strengthening efforts. The ability to deliver a sustainable vaccination programme that prevents disease is indicative of a health system's capacity to prevent foreseeable shocks.	
Absorptive	To detect early signs of incoming shocks as soon as possible	Presence of an active infectious disease surveillance system.	High-performing disease surveillance and early warning systems integrated at the global level are fundamental to trigger effective early containment and control mechanisms.	
Adaptive	To meet extraordinary spikes in demand for health services	Formal provisions to reallocate resources and provide spare capacity in emergency	Planned flexibility in the allocation of resources across the health system allows for a quicker, more effective response to emergency situations.	
Transformative	To improve health system response to a similar shock in the future	Existence of an institutionalised, independent after-action review mechanism within the governance of the health system	A proactive ex-post evaluation of how the health system absorbed, adapted and responded to a shock allows a system to "learn from failure" and understand what mechanisms within the health system should be reformed.	

4. Governance and insights for policy formulation

Q4.1 What are your country's policy objectives in assessing the resilience of the health care system?

Select all that apply

- Ensuring institutional accountability
- Increasing transparency of health system objectives and decision-making
- Increasing stakeholder participation in policy decisions
- Ensuring that public agencies possess the capacity and organisational structures to address future shocks
- Building an argument to promote reform implementation (to counter-balance the proclivity to maintain the 'policy status quo')
- Ensuring that efficiency-enhancing measures implemented during "normal times" do not inadvertently create brittleness in the system
- Promoting a de-centralisation of responsibility from government to other stakeholders
- Other _____

Q4.2 What are the governance features that are, in practice, more likely to increase the resilience of your country's health system?

Q4.3 Who is the intended target audience for the results of the resilience assessment?

Q4.4 How are the results of the assessment of health system resilience presented to relevant stakeholders?

Q4.5 Are the results of the resilience assessment publicly available?

- Yes (please provide a link) _____
- No

Q4.6 Which public entity carries out the resilience assessment?

Select all that apply

- Ministry of Health
- Ministry of Finance / Treasury
- National Institute of Health
- Payers (regional authorities, health insurance fund)
- Other non-ministerial public body
- Other (please specify) _____

Part B

Case studies

For this part of the questionnaire, respondents are invited to document, by means of short case studies, a selection of (2,3) relevant strategies, policies, design features, processes and any other measure implemented in their country which proved effective in making the health system more resilient to a certain type/range of shocks.

Case studies presented can either document 'success stories' or 'failures / lessons learnt', i.e. how the lack of some specific 'resilience-ish' feature of the health system made it more brittle in face of a shock that could have been allegedly averted, had certain resilience-enhancing strategies been put into place beforehand.

Case studies should present (at least) the following elements:

- I. Context, stakeholders
- II. Problem definition (incl. type of shock)
- III. What strategy / policy / design feature was implemented to fix the problem?
- IV. How was (*preventive/forecasting, absorptive, adaptive or transformative*) resilience capacity expressed in this case? Are there any metrics that may be used to prospectively assess such resilience capacity?
- V. Lessons learned:
 - a. Health system factors that can be considered as enhancing resilience
 - b. Health system factors that can be considered as inhibiting resilience²¹

²¹ In case a 'failure / lesson learnt' type of case study is documented.

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