SEI Stockholm Environment Institute

Bridging the knowledge gap between distance health and social care solutions and environmental impacts

SEI brief
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IMAGE (ABOVE): Storuman, Västerbotten

1. Introduction

The coronavirus pandemic has created a variety of challenges for people seeking health services, due to requirements for physical distancing. Yet physical distances have long been an obstacle for people living and seeking care in rural and sparsely populated areas. The geographic distribution of health facilities and the need for patients to travel long distances has often made getting care more difficult, more expensive and less timely. The pandemic has exacerbated these challenges, but also been a catalyst for testing new tools and methods that can bridge physical distances, whether these have been imposed by a pandemic or by geography.

2. Distance health services online

The use of information communications technology (ICT) to bridge physical distances in health applications dates back to the early 1900s, when it was used to support cardiology and radiology (Bashshur and Shannon 2009). The past decade has seen a major expansion of the tools being tested and deployed, including not just digital tools for communication, recordkeeping and diagnostics, but also online platforms for meetings between patients and caregivers. In 2015, Sweden updated its ambitions for using digital tools for health and social care (Regeringskansliet/SKL 2015). Catalyzed by the pandemic, these efforts have been greatly expanded (Cederberg 2020).

Yet it is important to keep in mind that even when they solve certain problems, changes in the way health services can be accessed can have ripple effects, impacting other aspects of these services, as well as the broader range of economic or social activities in which they are embedded. Ripple effects can have both beneficial and undesirable consequences. In the case of distance-spanning health services that use digital platforms, we could expect technical difficulties and limited human contact to carry specific disadvantages, while reducing travel would be expected to offer climate and other environmental benefits. Each instance poses conundrums for political constituencies, as they might wish to weigh in in favor of the side effects most beneficial to their position.

Distance-spanning health services share these characteristics with many other areas of policy. Actions taken to address one set of policy problems often entail side effects that impact other policies and goals. This reality was a key driver in the development of the UN Agenda 2030 and its 17 Sustainable Development Goals (SDGs). The SDGs are comprehensive, specifying a broad range of social and environmental priorities. Equally importantly, they are considered indivisible, intended to be pursued as a seamless whole.

In practice, this means that the pursuit of specific goals (such as improving access to health services) needs to be done while also taking into account spillover impacts, whether positive or negative, on other goals. Doing this well requires collaboration that encompasses a variety of types of expertise (co-production of knowledge), and cognitive tools for organizing and systematizing that process.

In this project - **Bridging the Knowledge Gap between Distance Health & Social Care Solutions and Environmental Impacts: Via the Lens of SDGs** – two different approaches are taken towards identifying and understanding these ripple effects. The first employs a focused lens, using scenario analysis to estimate the potential climate benefits of reduced tranport resulting from deploying distance health solutions. The second uses a broader systems lens, using the SDG Synergies tool to identify likely synergies and potential conflicts. In each instance, project constraints have limited the analyses to an exploratory effort. Nevertheless, each produced valuable insights that can be further developed in the next phase of research.

3. Scenario analysis – carbon savings in Storuman municipality Västerbotten Region, Sweden

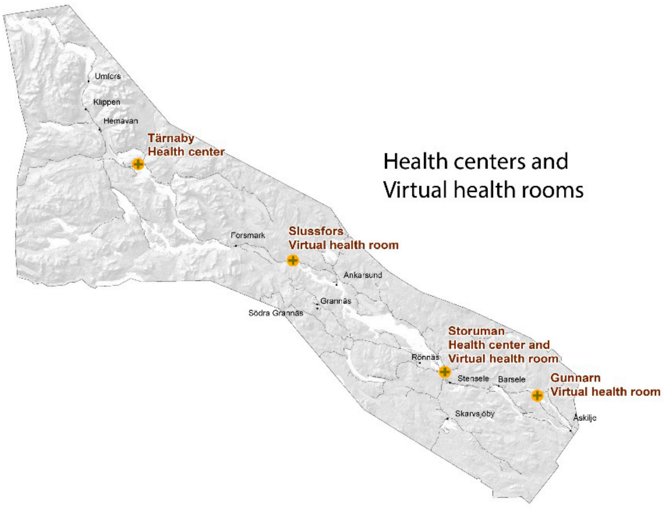
Distance-spanning approaches to providing health and social care are gaining increasing attention, and are being introduced and promoted as a future model for healthcare – particularly in sparsely populated regions (Andersson et al. 2019; Penje et al. 2020). These approaches include a variety of digitalized and remote techniques and tools, such as sensors, cameras, reminders and services including virtual health rooms (VHRs)[1], with the potential to provide a number of benefits (Andersson et al. 2019; Blix and Jeansson 2018). Some of the secondary benefits include reductions in travel time and distance for both patients and health professionals in sparsely populated regions; the reduction of CO_2 emissions as a result of changes in travel patterns; the support of rural development by bringing health services closer to people; and helping people to continue living in rural regions. As an additional benefit, these tools reduce of the risk of contagion at healthcare centres – a benefit especially evident during the pandemic.

Of all the above-mentioned advantages, curbing climate impact is considered a key benefit of distance-spanning healthcare and social solutions. Because the sector is reported to contribute significantly to climate change through the emissions of CO_2 and other greenhouse gases from processes and services involving both patients and healthcare professionals (Holmner et al. 2015 ; Vidal-Alaball et al. 2019), the need for climate-friendly policies and practices is being emphasized. The interconnected challenges of reducing fossil fuel intensity and long travel distances while promoting public transportation or alternative vehicle choices are only accentuated in sparsely populated rural regions (Sovacool et al. 2018). Furthermore, a study using Swedish national travel behaviour data, in line with international research, shows that a minority of the population is responsible for the majority of all passenger mileage by car (Smidfelt Rosqvist and Winslott Hiselius 2019). Rural areas with long distances to access services are a key factor identified, and thus policies and measures proposed to reduce unsustainable levels of car use need to be tailored to those groups in order to be effective.

We examined the potential climate impact using the case of the Storuman municipality in Västerbotten Region, Northern Sweden. Scenario analysis was used to model how the implementation of VHRs has affected travel patterns to primary healthcare, and the estimated CO_2 emissions reduction associated with this implementation.

1 Virtual Health Rooms (VHRs) are unmanned facilities providing services for distance treatment and monitoring

Figure 1.



Storuman is the largest municipality in the Västerbotten region, by area. Nearly 60% of the population lives in one of the four largest urban areas, while the remaining 40% are dispersed across the municipality's 8234 km^2. Roughly 8% of the population is older than 80 years of age. There are two primary healthcare centres (HC) in the Storuman municipality – Storuman HC and Tarnaby HC. The municipality also has three VHRs – one in Storuman municipality, one in Slussfors and one in Gunnarn.

Two scenarios were considered in estimating the distance (kilometers) travelled to primary HCs and VHRs in the Storuman municipality. Scenario 1 is the current situation, which includes VHRs. In Scenario 2, the VHRs do not exist (summarized in Table 1).

Table 1. Scenarios considered

Scenario 1	Scenario 2
Current situation with virtual health rooms (VHRs). Patients visit the closest health centre (HC) once a year and visit the closest facility (HC or VHR) for the other 3/4 visits. This is based on the assumption that at least one visit per year must be made to a doctor for a face-to-face health check.	Patients go to the closest HC for all their visits. No virtual health rooms (VHRs)

The data used to assess the distances travelled was obtained from the following sources: primary care facility location data for both HCs and VHRs; total population in a 100m grid aggregation; proportion of population visiting Storuman HC; frequency of visits to the HC for 2017, 2018, 2019; and road network data.

The following assumptions were made in assessing the distances travelled in both scenarios:

- 92% of population use primary healthcare facilities and the average number of visits per year for this share of the population is four.
- The proportion of the population visiting HCs is similar to the proportion visiting VHRs.
- People are registered at, and use, the nearest facility within the municipality.
- There are no differences in visit or visitor rate based on how close people live to the facility.
- The data (from Storuman) on the number of visits and visitors is applicable to the entire municipality.
- At least once a year, each individual makes a face-to-face visit to the doctor (HC) for a health check.
- Patients visit primary healthcare facilities using a private vehicle.

The calculation of CO_2 emissions is done using the SEI climate calculator, which is based on the CO_2 emission factor of 0.15kg CO_2/km. This represents the emission factor for an average car in Sweden and the European Union (EU).

Results

The results from the scenarios are presented in the tables below.

Table 2. Distance and CO_2 emissions of Scenario 1

Scenario 1 (VHR 3/4 visits) – People visit the closest HC once, then the closest facility (HC or VHR) for the remaining visits	
Total distance covered (round trip) by population visiting the closest HC once a year (km) (1/4 of visits to the closest HC)	109 067.6
Total distance covered by population visiting the closest HC and/or VHR in one year (km) (3/4 of visits to the closest VHR or HC)	505 727
Emission factor in CO_2/kg	0.15
CO_2 emission (tons/year) from visits to the closest HC	75.9

Table 3. Distance and CO_2 emissions of Scenario 2

Scenario 2 (No VHR) – People visit the closest HC for all visits throughout the year	
Total distance covered (round trip) by the population visiting the closest HC/year (km)	711 386
Emission factor in CO_2/kg	0.15
CO_2 emission (tons/year) from visits to closest HC	106.7

Table 4. Differences between the scenarios

Differences between the scenarios	
Annual savings from visits to VHR (km)	205 659
Annual savings from visits to VHR in terms of CO_2 emission (tons)	30.8

The study gives an indication of the potential reduction of CO_2 emissions that could result from distance-spanning health interventions (in line with other studies). As shown in Table 4, the total savings of CO_2 emission as a result of visits to VHRs is about 31 tons/year (i.e about 5kg/person/year). Drawing on SEI's downscaling municipal model for consumption-based emissions[2], this is equivalent to:

1. 0.5% of total car emissions
2. 1.5% of total electricity emissions
3. 1% of district heating and house heating emissions
4. 0.5% of total food emissions
5. 0.1% of total household consumption-based emissions (excl. governmental emissions).

Assuming an average driving speed of 50–90 km/h, the total number of saved hours as a result of visits to VHRs is between 2300 and 4100, or an average of 3200 hours saved. This translates to about half an hour per person.

Based on the two scenarios, we can conclude that the study gives an indication of the potential reduction of CO_2 due to distance-spanning health interventions (in line with other studies).

However, we also note some key limitations of the study, and suggestions for further analysis:

- A broader scope of analysis to include other sustainability criteria would provide further useful insights regarding the impacts of interventions.
- Health personnel travel was not considered in the analysis.
- SEI climate impact factor (CO_2 emission of 0.15 kg CO_2/km) provides an estimate of total CO_2 saved due to interventions and therefore cannot be used to make precise estimates.

In the section below, we broaden the scope of analysis from climate and emissions reductions to consider how such interventions influence our efforts towards the attainment of the SDGs.

4. An SDG lens on Distance Health and Social Care Approaches

With its extensive coverage of policy areas across social, environmental and economic dimensions, the 2030 Agenda has been used in this project for broadening the scope of appraisal of the opportunities and challenges posed by distance-spanning healthcare and social care in remote or sparsely populated regions in Sweden.

2 Available as part of the project Accelerating Agenda 2030: municipal planning for reduced climate footprints https://www.sei.org/projects-and-tools/projects/accelerating-agenda-2030-municipality-planning-for-reduced-climate-footprints/

The 2030 Agenda consists of 17 goals and 169 targets that are highly interconnected. The UN has called for the agenda to be treated as an indivisible whole, and the Swedish government recently further strengthened their ambition for coherent implementation through a government act.[3]

Because attainment of the 2030 Agenda will largely depend on successfully tackling trade-offs and leveraging synergies between the goals, a scientific and policy community has emerged around SDG interactions. A broad range of approaches and tools are also emerging, as means of providing integrated analysis that can guide implementation.[4] In practice, they aim to enhance the understanding of how goals interact, either with each other or with other objectives, and the synergies and trade-offs this entails. While some synergies and trade-offs easily come to mind – for example the way in which climate action is promoted by sustainable energy production (synergy), but often conflicts with economic growth (trade-off) – they are highly contextual. For instance, the focus and conditions for progressing on SDG 3, which covers health, are very different in Sweden compared to most low-income countries, and progress on SDG 3 therefore influences the other goals in different ways. More specifically, this project focused on how distance health solutions could contribute to or hinder the achievement of nine SDGs in Sweden.

Researchers at SEI have developed the SDG Synergies tool (www.sdgsynergies.org), which builds on an approach that was first presented in the journal paper "Towards systemic and contextual priority setting for implementing the 2030 Agenda" (Weitz et al. 2018). SDG Synergies combines qualitative assessment of target interactions with quantitative network analysis; the results can then be used to build different visualizations, including a matrix, of the synergies and trade-offs which result from various interactions. This combination of analysis approaches enables it to look beyond simple interactions between two targets; to analyze more complex, systemic relationships; and to express them in ways that are easier to grasp and communicate. It is designed in a way that reflects the real-world context in which implementation will happen (Weitz et al. 2019). While the intended use of SDG Synergies is to provide analysis of how all the SDGs interact as a system, to help guide prioritization of interventions, leverage synergies and avoid goal conflicts in implementation of the 2030 Agenda, it can also be used as a tool for simply screening how an activity interacts with and influences the SDGs.

5. An exploratory online workshop on SDG synergies

Within the remit of this project, we undertook the design and execution of a co-production workshop, in which the SDG Synergies tool was deployed.

Structure of the workshop

The workshop took place on 12 February 2021, and was attended by 10 selected participants, including representatives from policymaking contexts, health and social care service providers, scientific experts, and regional champions. The objective of the workshop was to introduce and discuss a wider perspective on distance-spanning health solutions in the context of the SDGs (synergies and trade-offs), with an emphasis on the environmental, socio-economic, psychological, and political implications.

Narrowing the scope of inquiry

Given the limited time availability for the workshop (it took place over four hours) and the restrictions imposed by COVID-19 (which required that we meet virtually instead of face to face), we limited the scope of our inquiry to focus on key synergies between the distance healthcare solutions and a selected set of SDGs. Below is an overview of our inquiry:

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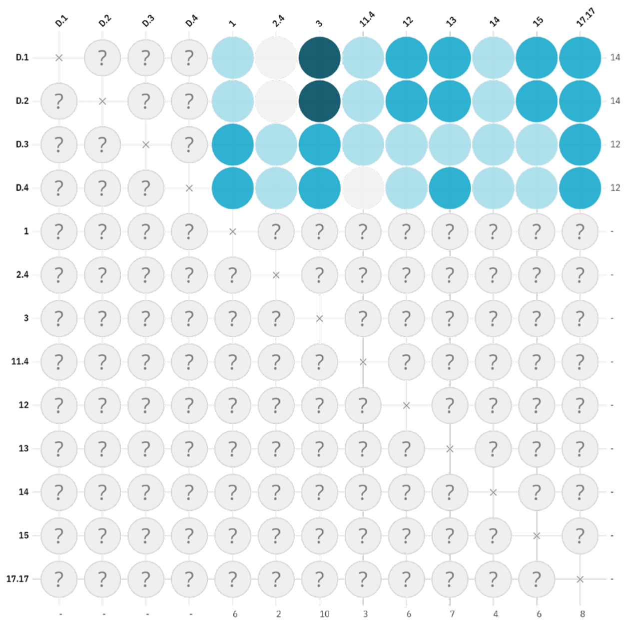
3 Regeringens proposition 2019/2020: 188, kapitel 4.

4 For an overview, see e.g.: https://www.sciencedirect.com/science/article/pii/S0048969720319185

Areas/ecosystem services that could potentially be impacted	SDG that could address issue
Human health and safety	Goal **3**: Ensure healthy lives and promote well-being for all at all ages
Flora, fauna, ecosystems and biological diversity	Goal **14**: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
	Goal **15**: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Soil, water, air, climate and landscape	Goal **13**: Take urgent action to combat climate change and its impacts
Use of land, natural resources and raw materials	Target **2.4**: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
	Goal **12**: Ensure sustainable consumption and production patterns
Protected areas and designated sites of scientific, historical and cultural significance	Target **11.4**: Strengthen efforts to protect and safeguard the world's cultural and natural heritage
Heritage, recreation and amenity assets	Target **11.4**: Strengthen efforts to protect and safeguard the world's cultural and natural heritage
Livelihood, lifestyle and well-being of those affected	Goal **1**: End poverty in all its forms everywhere
Public-private partnerships	Target **17.17**: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Additionally, the distance healthcare solutions were divided into these four categories:

1. **Distance treatment** – treatment at distance. This refers to telemedicine, treatment and advice through online tools and self-treatment. This mainly relates to healthcare.
2. **Distance monitoring** – monitoring at distance. This refers to sensors, cameras, reminders and data collection. This mainly relates to social care.
3. **Distance meetings** – meetings at distance. This refers to all kinds of meetings, both between health and social care professionals and between citizens and those professionals.
4. **New digital services for healthcare and social care.** This category is based on finding innovative new solutions in the form of both private and public collaborations, new national infrastructure for digital services, and new service models where citizens can also assume greater responsibility.



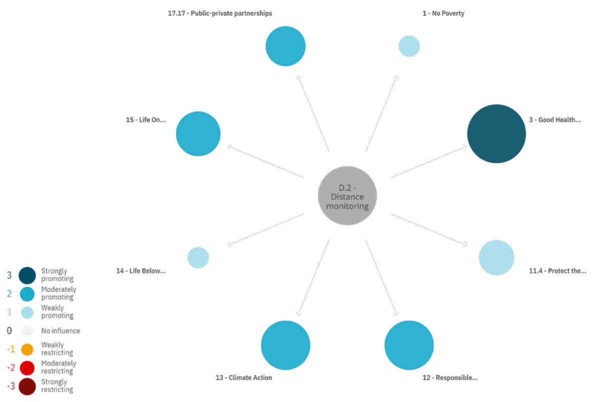
Preliminary findings

Left is a visualization of the matrix developed during the workshop. We asked all participants to critically reflect on questions with regard to the impact and influence of distance-spanning solutions across the selected SDGs. We asked them via a co-production workshop process to tease out the synergies and trade-offs they perceived.

The results below highlight how, when we drill down into specific distance-spanning solutions, be they focused on monitoring or treatment itself, the SDG on good health and wellbeing is the most strongly impacted. This is perhaps to be expected. However, what is of more interest is the array of synergies that emerge with Public-Private Partnerships (SDG 17.17), Responsible Production and Consumption (SDG 12), and Climate Action (SDG 13).

We looked more broadly at the role new digital technologies and platforms play within this context and saw similar synergies in the potential they wield in terms of providing access to remote rural areas and the positive impacts they can have on climate and sustainability.

Based on the discussions these results produced, a general conclusion amongst the participants of the workshop, especially



policymakers and enactors such as mayors from remote rural municipalities, was that the tool and the process provide a robust basis for evidence-based policy. They were particularly interested to learn how negative impacts could be mitigated, as well as how synergies that would broaden the scope of sustainability, from health and social wellbeing to environmental and societal transition contexts, could be fostered.

Experience of the process: collective problematizing

As this project has demonstrated, systematically assessing how various distance-spanning health and social care solutions influence other SDGs makes a first step towards broadening the scope of analysis of such solutions to encompass the wider sustainability agenda. Within the project, the SDG Synergies tool provided a platform for deliberation, as well as space both for learning and for capturing the perspectives of those involved in decision-making, as well as of those likely to be impacted. While the scope of the analysis could be extended to the full 2030 Agenda and application of SDG Synergies, broadening the ways in which decision-makers think about distance-spanning health and social care approaches. Their potential areas of impact may be as important as the analytical results of the exercise.

6. Project insights: evidence-based policy, avoiding unintended consequences, harnessing valuable synergies

In this project, SEI has applied two different kinds of tools to the question of putting health and social care services online to improve access. The first was a scenario analysis, including a calculation of expected CO_2 savings due to reduced travel. The second was an online workshop using the SDG Synergies tool, to review possible synergies and conflicts. Taken together, these analyses provide the opportunity to significantly strengthen the basis for what one of the workshop participants termed “evidence-based policy” – policy initiatives taken with a strong basis for understanding their potential synergies and conflicts with other policy goals, estimates of their levels of impact, and an improved understanding of potential support for or opposition to them.

In each instance, the tools were indicative rather than exhaustive. Results from the analyses provide an example of the kinds of insights each of the types of tools can provide, but there remains much more practically useful knowledge and insight still to be gained.

In a follow up effort, or if the project were to be replayed, we would want to reverse the sequence, leading with the synergies workshop(s) to identify the most important synergies and conflicts. We would then follow with deeper analysis provided via scenario analysis, adding robustness and concreteness to the likely links identified by workshop participants.

The other set of insights only briefly touched on are the policy/advocacy networks, including both supporters and potential opposition, that can be identified through analysis of goal interactions. Knowing likely synergies and conflicts can help identify the societal actors and interests who might be impacted, and what their concerns and goals might be. While it's certainly possible to work up a rough list of which organizations might be in this group, identifying all important players requires a systematic effort.

7. Conclusions

Thinking systematically and comprehensively about a policy initiative's likely synergies and conflicts is best done via broad collaboration between people with different kinds of expertise and with cognitive tools that support systematic examination of possible interactions. The idea of evidence-based policy development suggests that choosing strategies and compromises with a good understanding of their potential synergies and expected conflicts improves effectiveness for three key reasons:

- Identifying likely synergies offers important potential for pursuing win-win options and maximizing the benefits of important policy initiatives.
- Identifying potential goal conflicts helps to avoid or mitigate undesirable side effects, or at least to make conscious decisions regarding trade-offs.
- A better knowledge of likely synergies and conflicts is often helpful for identifying potential allies and opponents based on interest in issues other than the policy's main focus.

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