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Submitted to the National Academies of Sciences, Engineering, and Medicine Cohorts: Finance Workgroup

Issue Brief

Finance Implications of a Climate-Resilient, Zero-Carbon U.S. Healthcare System

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August 2020

Issue

Improving cost containment and investment flow for the digital transformation and decarbonization of the healthcare ecosystem are two cross-cutting finance implications of developing climate resilience and zero-carbon transition programs for the U.S. healthcare industry. The costs associated with building a U.S. healthcare ecosystem that is climate resilient and has a zero-carbon footprint requires a cross-sectoral, multi-stakeholder resource mobilization program, especially in a new COVID-19 era of less. NASEM is poised to harness finance and technology transfer as implementation resources because of how the impact finance and technology transfer communities view healthcare as an essential, commercially dynamic, and opportunity-rich industry. NASEM should, therefore, leverage its convening authority and thought leadership in engaging the impact finance and technology transfer communities. This issue brief offers a three-pronged, data-driven, and step-wise strategy for improving cost containment and investment flow for the digital transformation and decarbonization of the U.S. healthcare ecosystem.

Recommendation

To ensure that developing climate resilience and zero-carbon transition programs for the U.S. healthcare industry reduces the costs of climate-related healthcare costs and promotes investment flow for decarbonization, NASEM should consider this Theory of Change with a three-pronged strategy that is focused on cross-sectoral collaboration.

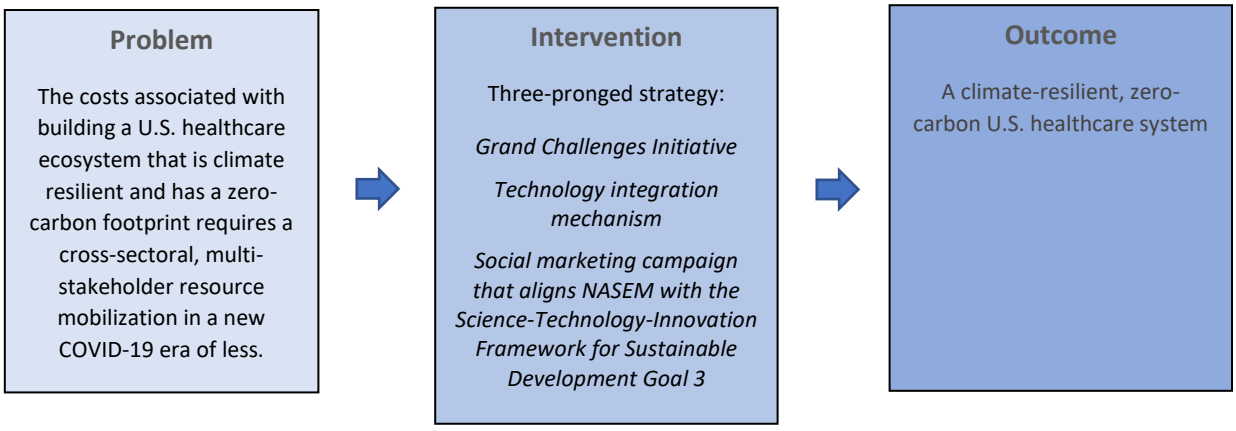

Fig 1. Theory of Change for the development of a climate-resilient, zero-carbon U.S. healthcare system.

Details of the three-pronged strategy ("Intervention") in the Theory of Change are below.

1. **Establish a Grand Challenges Initiative for a Climate-Resilient, Zero-Carbon Healthcare System.** NASEM should launch a grand challenges initiative to have a platform upon which to leverage its already significant convening authority and thought leadership in manifesting both practical (low-tech) and aspirational (high-tech) system transformation toward a climate-resilient and zero-carbon U.S. healthcare system. Grand challenges are paradigm-shifting priorities that propel institutions and professions toward substantive transformation and forward progress.

Low-tech solutions	High-tech innovations
• Incorporating checklists in complex tasks • Nutritional counseling to teach the importance of eating healthy foods • Screening for social needs and addressing social determinants of health • Group appointments • Telephonic care and other types of tele-health approaches • Video-assisted education combined with telephonic group support • Monitoring patients at home with wearables, smartphones, and iPads • Transportation to help people get to their medical appointments	See six digital innovation trends in healthcare in Strategy #2 below

2. **Establish a technology integration mechanism that links the U.S. healthcare industry to impact finance and technology transfer in improving investment flow.** NASEM should leverage its convening authority to accelerate the digital transformation of healthcare to draw further and targeted impact investment in these six emerging focus areas:
   - On-demand healthcare on mobile devices
   - Big data powering value-based and predictive healthcare
   - Virtual reality improving efficiency in treating patients
   - Wearable medical devices
   - Artificial intelligence enabling precision medicine
   - Blockchain enhancing electronic health records
3. **Launch a social marketing campaign that aligns grand challenges efforts in healthcare with global efforts promoting human and planetary health, particularly the Science, Technology, and Innovation Framework (STI Framework) for the United Nations Sustainable Development Goal 3 (Ensuring health and well-being for all).** NASEM could support cost containment and increased investment flow in healthcare by more effectively messaging the overlap between the UN SDGs and the social determinants of health.

   In so doing, NASEM could more actively lead a national effort to harness technology for healthcare transformation via the STI Framework for the UN SDGs. Zero-carbon healthcare—healthcare systems that use 100% renewable energy sources--can advance zero-carbon development and a just transition for marginalized populations that bear a disproportionate burden of disease, thereby promoting health equity. This, in turn, could further engage development institutions and impact investors in NASEM's grand challenges initiative; it would also condition the behavior of large healthcare provider networks to aggressively advance the NASEM grand challenges initiative. Social marketing and system transformation targets under the STI Framework could include:
   - Health system models of care that maximize the integration of appropriate zero-carbon technology,
   - Design and construction of healthcare facilities that are based on zero-carbon approaches
   - Investment programs in renewable energy and energy efficiency
   - Sustainable waste management that promote a circular economy
   - Sustainable transport and water consumption initiatives
   - Zero-carbon procurement policies for pharmaceuticals, medical devices, food, and other products

Relevant Initiatives

1. Stakeholder initiatives relevant to a climate-resilient, zero-carbon U.S. healthcare system:
   - The World Bank http://documents1.worldbank.org/curated/en/322251495434571418/pdf/113572-WP-PUBLIC-FINAL-WBG-Climate-smart-Healthcare-002.pdf
   - Healthcare Climate Council https://noharm-uscanada.org/healthcareclimatecouncil
   - Kaiser Permanente https://about.kaiserpermanente.org/community-health/improving-community-conditions/environmental-stewardship/climate-action
   - Cleveland Clinic https://my.clevelandclinic.org/about/community/healthy-environment/about
   - Boston Medical Center https://www.bmc.org/podcasts/bmc-drastically-reduces-carbon-footprint

2. Global and U.S. legislative bill, policy, or regulatory framework
   - United Nations Sustainable Development Goal 3 https://www.un.org/sustainabledevelopment/health/
   - U.S. Clear Air Act https://www.epa.gov/laws-regulations/summary-clean-air-act
   - H.R.9 - Climate Action Now Act (Introduced 03/27/2019; passed in the House 05/02/2019) https://www.congress.gov/bill/116th-congress/house-bill/9 -- NASEM should revive it in the next Congress and promote its passage in both chambers

Background

1. Why climate resilience?

By 2050, more intense drought conditions and wildfires will likely lead to greater risk of injury, disease, and under-nutrition from diminished food quality and production; extreme rainfall and flash flooding will likely lead to increased risks of food- and water-borne diseases; higher water temperature will likely lead to increased risks of vector borne diseases; finally, extreme heat wave will likely lead to reduced labor productivity and increased exposure to heat-related illnesses in vulnerable populations. Since these health impacts of climate change will aggravate existing health disparities caused by background inequality between and within groups, climate change poses serious structural, practical, and financial consequences for the U.S. healthcare industry. To address these climate-related health risks and consequences effectively requires the U.S. healthcare industry to focus on climate resilience, or the capacity to cope with and respond to hazardous climate-related events, trends, and disruption.

2. Why transition to a zero-carbon footprint?

The U.S. healthcare industry must meet its moral and professional obligations to eliminate – zero out -- its carbon footprint and greenhouse gas emissions. This means a transition away from the use of fossil fuels. It must embrace bold, scalable solutions in healthcare practice applications, energy efficiency, power generation and storage, transportation, and food consumption – an effort with significant social, political, technical, and financial support globally.

3. Why establish a Grand Challenges Initiative for a Climate-Resilient, Zero-Carbon U.S. Healthcare System?

The ecosystem needs to reimagine itself and the best way is to get as many stakeholders involved. The grand challenges model uses innovation challenges and crowdsourcing to focus attention and effort on specific problems. It mobilizes technical, clinical, policy, and social innovation toward a narrow set of goals. It can be traced back to David Hilbert, a mathematician who defined a set of unsolved problems to spark progress in mathematics.

Key characteristics	Finance implications
Grand challenges initiatives foster innovation to solve key global health and development problems.	• Pools financial contributions into a larger expression of mutual support and solidarity scaled for systemwide impact • Builds a funder network that leverages NASEM's prestige and network to draw support from within and outside the healthcare industry • Establishes a mechanism with which to nurture and sustain fundraising for decarbonization and digital transformation over the long-haul
NASEM aligns medical, nursing, public health, social welfare, and other health-related disciplines in inspiring students, faculty members, and practitioners to collaborate with the impact finance and technology transfer communities in deepening the integration of low- and high-tech solutions into the U.S. healthcare ecosystem.	

4. Why establish a technology integration mechanism for the U.S. healthcare industry to improve investment flow?

Areas of digital transformation	Finance implications
On-demand healthcare on mobile devices. Smart devices and the internet are enabling healthcare providers to deliver on-demand healthcare to consumers in specific circumstances and on a patient-centered schedule.	• Technology-driven change in healthcare has corporate giants locked in a trillion-dollar battle to win and retain consumer engagement; both major and minor players are investing billions of R&D dollars to accelerate innovation; • Institutional and impact investors have already pumped $80+ billion into health tech in the last five years in response to regulations requiring interoperability and freeing up data to be aggregated around the patient; • The demand for innovation to drive simultaneous improvement in health outcomes, affordability, quality, and access will continue to be high.
Big data powering value-based and predictive healthcare. Big data aggregates info and enables its practical use to lower medication errors, facilitating preventive care by identifying "frequent flyers," promoting accurate staffing, and reducing emergency room wait times when a facility is understaffed.	
Virtual reality improving efficiency in treating patients. VR technology is being used not only to treat pain, but everything from anxiety to post-traumatic stress disorder, and stroke. VR simulations are used to hone clinical skills or to plan complicated surgeries. VR headsets could motivate exercise and help children with autism learn how to navigate the world.	
Wearable medical devices. Patients are focusing on prevention and maintenance, and demanding information about their health more frequently. These devices provide up-to-date monitoring of high-risk patients to prevent a health event.	
Artificial intelligence enabling precision medicine. AI powering, medical imaging, drug discovery, and genomics. AI is giving patients access to personalized therapies tailored to their genetic makeup and lifestyle.	
Blockchain enhancing electronic health records. Blockchain is poised to play an instrumental role in keeping electronic health records accurate and safe.	

5. Why launch a social marketing campaign that aligns NASEM grand challenges initiative with the STI Framework for UN SDG 3 (Ensuring health and well-being for all)?

Key information	Finance implications
STI are recognized as key drivers for productivity and long-term growth and prosperity.	• SDG-related financial instruments are unlocking new sources of finance, especially for technology-driven projects because of the potential windfalls from the commercialization of associated tech IP. Green bond issuance, for example, surged from US$ 2.6 billion (2012) to US$ 167.6 billion (2018) • Aligning the digital transformation of the U.S. healthcare industry with the STI Framework could draw attention from SDG-oriented investors and financiers.
STI Framework for SDG 3 promotes the availability of innovation driven solutions, to address sustainability challenges in population health. It promotes technological and financial capacity-building among nations. It restructures intellectual property regimes to foster STI-oriented partnerships in the global context.	

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Contact Information

Young Moon Inc. is the first Resilience-as-a-Service (RaaS) firm for food, energy, and water systems in Small Island Developing States (SIDS) and Pacific Island Countries and Territories (PICTs), particularly U.S. territories in the South Pacific. Young Moon is a consortium of 18 technology firms, accelerators, and sustainable development stakeholder groups focused on deploying 'innovations at the nexus of food, energy, water, and sanitation systems' (INFEWS) that promote sustainable development and a just transition to a zero-carbon economy. Young Moon targets HealthTech as an INFEWS priority area. For more information, contact R. Bong Vergara, Director of Strategy, at rbvergara@young-moon.org.