



BU School of Public Health

The report of the 3-D Commission

Data, social determinants, and better decision-making for health

The report of the 3-D Commission. Data, social determinants, and better decision-making for health

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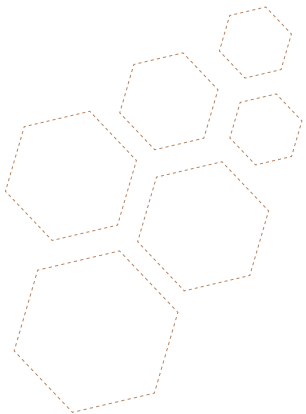
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Preface

Dear Colleagues,

This report is the result of nearly two years of exploration of the question: how can we use data to direct attention toward, advocate on behalf of, and make decisions to address the social determinants of health?

The 3-D Commission was conceived in 2019 and in April 2020 first convened a diverse group of 25 experts spanning the fields of public health, data science, and decision-making. Our goal was to bring together insights from the seemingly disparate disciplines of the social determinants of health and data science to the end of informing decisions that improve the health of populations.

What brought this group of experts together was a recognition that a data-informed understanding of the social determinants of health could contribute to better population health and that a formal study of the intersection of these disparate areas could create opportunities for better scholarship and practice.

What none of us anticipated was the COVID-19 pandemic that would upend the world—and the work of the Commission.

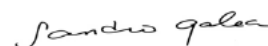
The COVID-19 pandemic reminded the world that health is only partly about the pathogens that threaten it. While SARS-CoV-2 was clearly the cause of COVID-19, the disproportionate burden of COVID-19 illness and death borne by persons who were

marginalized, who had limited access to resources, and who were ill-served by their countries' infrastructure world-wide had very little to do with the virus itself and everything to do with the social and economic forces that shape our lives, and our health. COVID-19 brought to the fore what was already there—deep-seated social inequities that became health inequities. It showed us how a better, data-informed understanding of these social determinants stood to be transformative in the promotion of health even during—and perhaps particularly during—a global pandemic.

The Commission ended up carrying out all of its work virtually as the pandemic swirled around us. We aimed to meet the moment and centered the report—and its core principles and recommendations—in the moral and practical demands brought into sharp relief by the COVID-19 pandemic.

Our goal at the outset was to advance a transdisciplinary approach to the intersection of data, determinants, and decision-making. The COVID-19 pandemic made it clear how much work there is to do on this front. It is our sincere hope that this report is a catalytic starting point that pushes forward a data-driven social determinants agenda that can push us ever closer to a healthy global population.

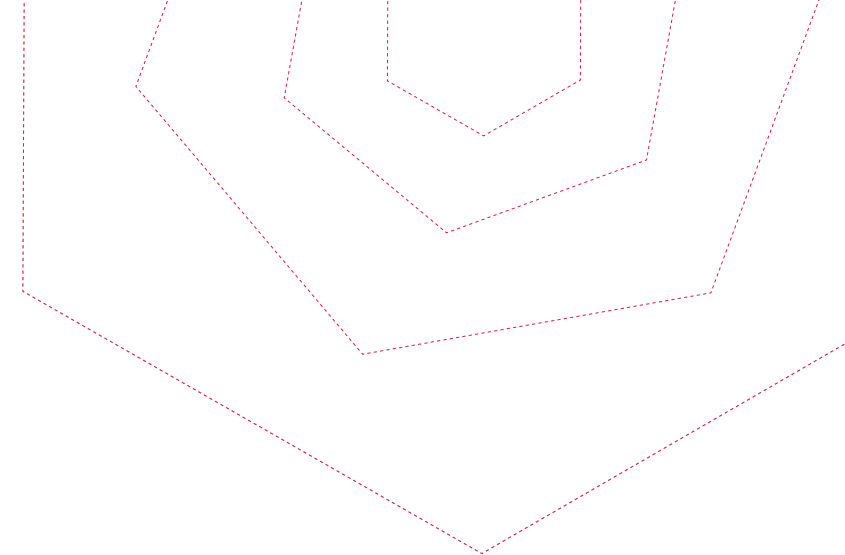
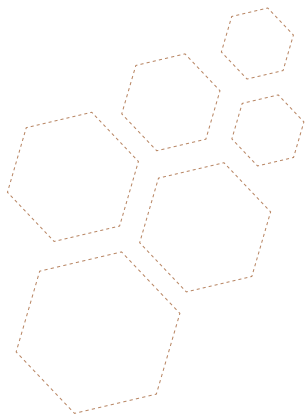
Thank you for being part of that journey.



Sandro Galea
3-D Commission Chair

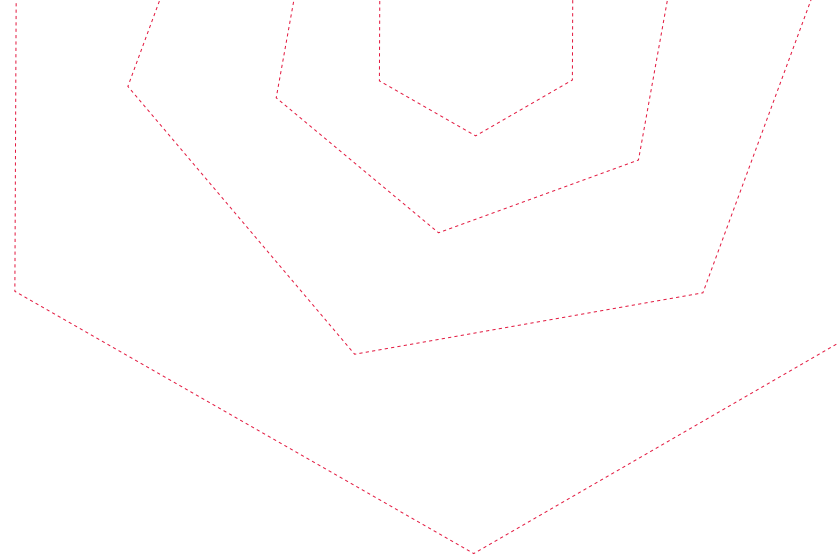
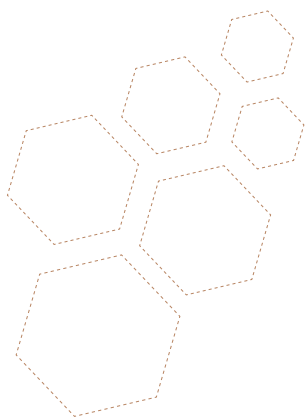
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List of acronyms

DHS	Demographic and Health Surveys	NCDs	Non-communicable diseases
EB	Exabyte	OECD	Organisation for Economic Cooperation and Development
FCTC	Framework Convention on Tobacco Control	SDGs	Sustainable Development Goals
GB	Gigabyte	SDoH	Social determinants of health
GDP	Gross domestic product	TAC	Treatment Action Campaign
GIS	Geographic information systems	UHC	Universal health coverage
HICs	High-income countries	UIHI	Urban Indian Health Institute
LICs	Low-income countries	USAID	United States Agency for International Development
LMICs	Low- and middle-income countries	WEGo	Wellbeing Economy Governments
MDGs	Millennium Development Goals	WHO	World Health Organization



Executive summary

In April 2020, The Rockefeller Foundation and Boston University School of Public Health launched the Commission on Health Determinants, Data, and Decision-Making (3-D Commission) with the aim of creating a common language among health determinants, data science, and decision-making—both health and non-health related—toward the end of improving the health of populations. This report—an output of more than a year of discussion and research among a multisectoral group of distinguished experts representing academia, the private sector, civil society, and government—explores the key social and economic drivers that influence health outcomes and illustrates how data on social determinants of health (SDoH) can be integrated into decision-making processes. The report also offers a set of principles and recommendations designed to support the development of a SDoH-based, data-driven approach to decision-making and foster demand for public and private investment in SDoH.

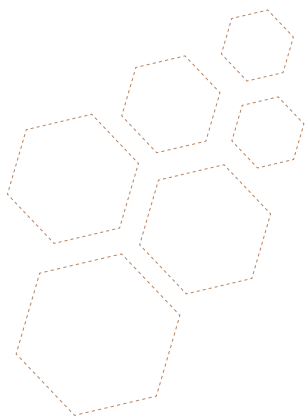
A holistic view of social determinants of health

In this report, the 3-D Commission argues for a holistic definition of SDoH to drive cross-sectoral collaboration, address health inequities, and promote accountability. The 3-D Commission proposes that SDoH include all forces outside of the body that affect health, including local, national, and global political and policy decisions and laws, religion and culture, the environment, commercial influences and forces that structure the availability of goods and services, and individual and collective emotions.

This comprehensive view of SDoH will help decision-makers engage in more expansive and collaborative thinking about strategies that can effectively improve health outcomes. It will also help to assign responsibility—and accountability—for addressing health inequities across the international system, government branches, the private sector, cultural and religious institutions, and communities.

Using data on social determinants to improve health

The recent proliferation of big data presents tremendous potential and opportunity both to better understand SDoH and to guide decision-making to the end of improving the health of individuals and populations. However, a lack of leadership, prioritization, and investment has impeded progress in effective translation of such progress into data-driven action on SDoH. There are multiple challenges to achieving such goals including, data availability, data hierarchy, nonuniform definitions and measurements of SDoH, public mistrust in the use of big data, and lack of engagement of marginalized populations. All these challenges are experienced across high-income, middle-income, and low-income countries to varying degrees. Overcoming these challenges requires leadership at the global, regional, national, and local levels to set a data for SDoH agenda that—with input from the communities and populations that are directly affected—can be translated into action.



Forging a new path to decision-making for health

Despite increasing awareness of the need to incorporate SDoH into decision-making by academia and civil society, the uptake of evidence-informed policies and programs that tackle SDoH or build on the growing availability of data to improve health outcomes has been slow. Progress is impeded because various SDoH often fall outside of the health sector and non-health decision-makers do not always account for health indicators when measuring success within their sectors. Catalyzing action for health across different sectors requires a common language and an understanding that improved health should translate to returns on financial investment and gains in productivity as well as overall population well-being. Moreover, catalyzing action on SDoH necessitates that the values of decision-makers are aligned with improving health and living conditions for their communities.

Political will among decision-makers is a critical challenge to enacting SDoH-focused policy. As the impact of policies addressing SDoH will likely be invisible in the short term, from the perspective of politicians beholden to short and frequent election cycles, there is little incentive to make the requisite investments. The complexity and interactions between potential solutions to address different SDoH also make it difficult to establish priorities among several competing interventions. Promoting population health is a choice that the decision-maker must make consciously, sometimes irrespective of short-term political exigencies.

Additionally, decision-makers often take actions based on their own knowledge, experience, and positions in society. However, their personal realities and understanding of the population may be vastly different from those individuals within the community who will be most affected by their decisions. Priorities, agendas, and decisions are more likely to be trusted if the decision-making process is transparent and incorporates meaningful engagement with community stakeholders. Decisions that include both the people who need to implement the decisions and the people who will be most directly affected by the decisions are more likely to be seen as legitimate and acceptable by all parties.

Looking ahead: connecting determinants, data, and decision-making

There are three interconnected, pragmatic areas needed for the vision of the 3-D Commission to translate into actionable policies and programs: political will, technical capacity, and community engagement. First, creating political will requires developing a common language with decision-makers in different sectors, highlighting the potential return on investment for other sectors, and nuancing and broadening metrics of societal advancement beyond economic indicators. Importantly, the values and principles of decision-makers need to be aligned with the goal of improving the health of populations. Second, technical capacity is needed to translate a new appreciation for data and SDoH into actionable directives that can be used to improve policy

decisions and population health outcomes. Scholarly and technical institutions can help policy makers bridge the gaps in their usual decision-making processes. Third, engaging communities in decision-making processes can then lead to better decisions being made. Inclusion in the decision-making process means that decision-makers listen to a wide range of stakeholders while formulating decisions; this diversity of thought and perspective helps to compensate for the lack of perfect data. The three areas also require a basic level of trust from the population, which, in turn, can lead to greater levels of trust that will inform, support, and reinforce better decision-making.

To improve the health of populations and address health disparities caused by social structural inequities—and exacerbated by COVID-19—a whole-of-society approach is needed. This will require a concerted effort to reframe key issues and adopt common understandings of cross-sector challenges that affect health. All relevant actors must understand the role SDoH play in shaping health outcomes; therefore, critical questions on data collection and use will need to be addressed. Importantly, all decision-makers, regardless of their official mandate, should be held accountable for the health and well-being of the populations they serve. This report—and its principles and associated recommendations—offers a roadmap for making these goals a reality.

3-D Commission principles

PRINCIPLE 1

Evidence-informed decision-making to promote healthy societies needs to go beyond health care and incorporate data on the broader determinants of health.



PRINCIPLE 2

All decisions about investments in any sector need to be made with health as a consideration.



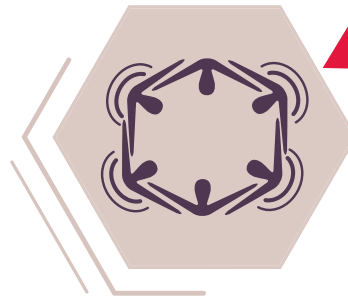
PRINCIPLE 3

Decision-making that affects the health of populations needs to embrace health equity, while also acknowledging potential trade-offs between short- and long-term costs and benefits.



PRINCIPLE 6

Evidence-informed decision-making to promote healthy societies needs to be participatory and inclusive of multiple and diverse perspectives.



PRINCIPLE 4

All available data resources on the determinants of health should be used to inform decision-making about health.



PRINCIPLE 5

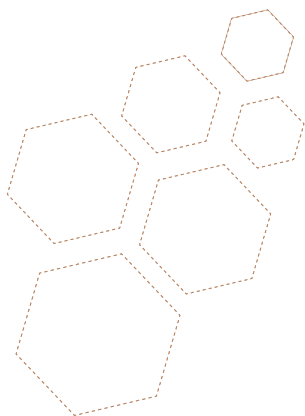
Data on the social determinants of health should contribute to better, more transparent, and more accountable governance.



3-D Commission recommendations

Additionally, the 3-D Commission has identified four core tactics that can be used when implementing data-informed decision-making on SDoH. The following key recommendations support the translation of the principles into action:

- Relevant international, regional, national, and local entities, including funders, should **systematically collect and make available, in real time, quality data characterizing the full range of determinants of health—including, for example, education, housing, economics—to decision-makers and communities locally and nationally.**
- National governments should **develop transparent systems that collect data about the social determinants of health, and explicitly use these data in decision-making processes.**
- Relevant international, regional, national, and local entities, including funders, should **embed follow-through monitoring processes to ensure accountability for data-informed decision-making around health.**
- Relevant international, regional, national, and local entities, including funders, should **center community engagement in acquisition and interpretation of data and make such data widely available to relevant communities.**



1. Introduction

Our understanding of the factors that shape health has progressed substantially over the past decades. Despite centuries old historical recognition of the role social conditions play in shaping health, in the twentieth century, health was seen primarily as the product of individuals' attributes such as genetics, personal choices, and access to and quality of health care. In the last quarter of the twentieth century an influential body of scholarship started to nudge the conversation back to the role of social factors, and governments began to consider factors beyond medical care as drivers of people's health.¹⁻⁵ There is now a growing recognition of the role that social and economic factors play in shaping not only the individual's, but also the population's health.⁶ These factors, collectively termed "the social determinants of health" (SDoH), are sometimes described as the conditions in which people live, grow, learn, work, play, and age. The 2008 report of the World Health Organization (WHO) Commission on Social Determinants of Health was a landmark study in this area.¹

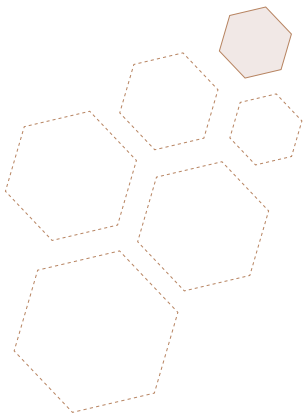
Concurrently, there has been an expansion of digital technologies that allow for the collection of data on all levels with far greater granularity than was previously possible. These data are often known as "big data". This expansion has paved the way for new opportunities to document, measure, and analyze the forces that shape individual and population health. The ever-expanding availability of digital technologies and big data from various sources creates a fertile environment for more data-driven assessments of SDoH, toward the goal of making better decision-making about health.

Better surveillance of SDoH can guide opportunities for interventions designed to improve health.

Despite this potential, most of the use of technology that has been designed to improve health has focused on individual-based interventions and not much has been done by way of investment in use of data to better understand the social, political, and economic factors that shape the health of global populations.

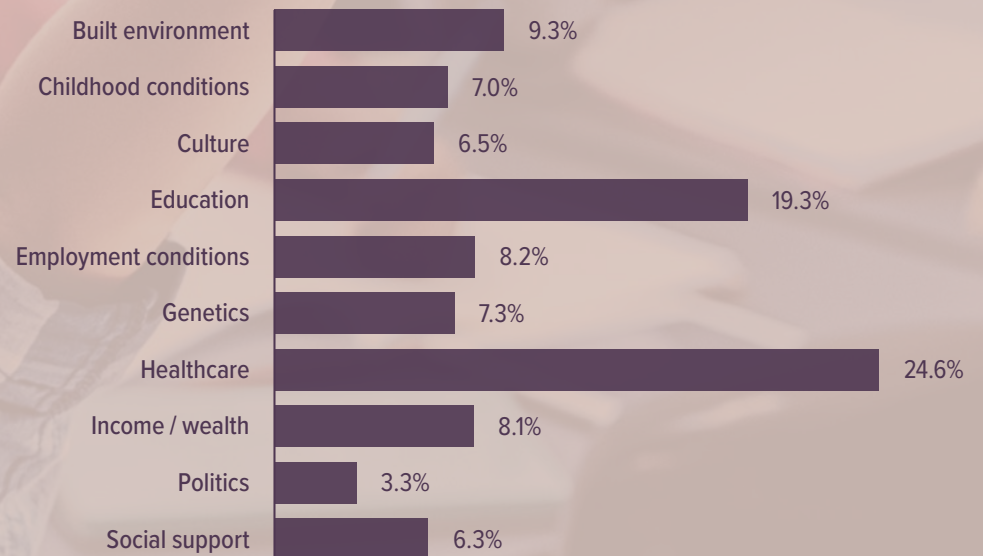
Scholarship around SDoH and the growth of "big data" have developed separately, with relatively little interaction. It is not difficult, however, to envision how they can inform each other and, ultimately, guide decision-making to the end of improving health. Better surveillance of SDoH can guide opportunities for interventions designed to improve health. Similarly, recognizing that health is inescapably linked to exogenous factors can nudge data science to collect behavioral, network, and community data that can both contextualize and more fully inform our understanding of SDoH. This can, in turn, lead to better evidence-informed decisions whether in multilateral organizations, national governments, local communities, corporations, health care purchasers, or provider institutions—to improve individual and population health.

At the core, this report aims to address two fundamental questions. First, how do we create a SDoH-based, data-driven approach to guide decision-making to improve health? Second, how do we create a demand for public and private investment in SDoH? The report provides a roadmap and set of principles to answer these questions. It builds on the observation that social and economic determinants matter, that data can help us understand how they matter, and that used together they can inform decision-making to improve individual and population health.



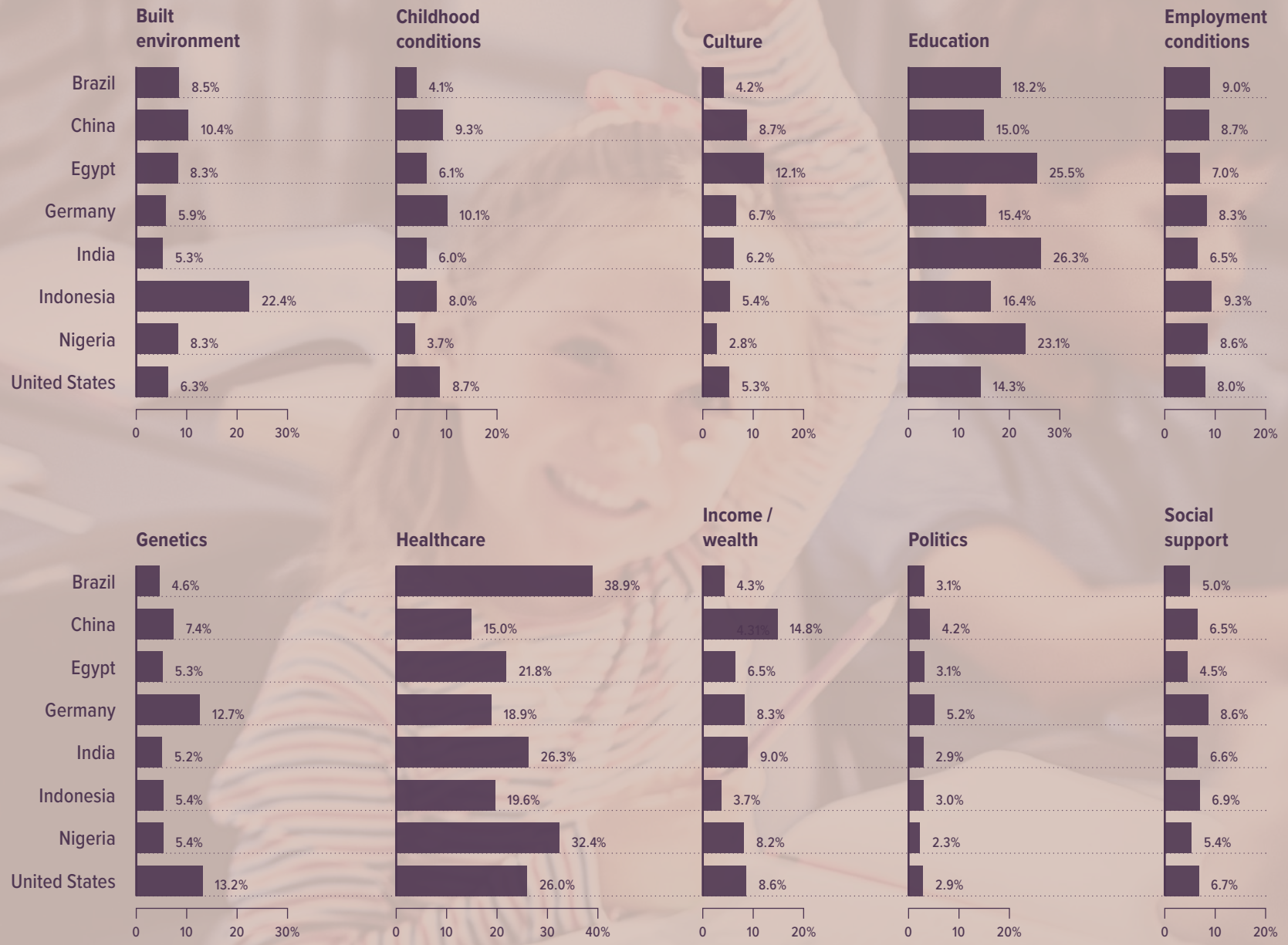
PANEL | FINDINGS FROM THE 3-D COMMISSION MULTICOUNTRY SURVEY

What do people consider as important determinants of health?



The 3-D Commission conducted an online survey in eight countries, Brazil, China, Egypt, Germany, India, Indonesia, Nigeria, and the United States, to understand people's perceptions of the most important determinants of their health and what they believe policymakers think is important for their health.

Findings from the 3-D commission multi-country survey stratified by country





PANEL

Emerging global trends that will affect the role and distribution of social determinants of health

The forces that shape the health of populations, including housing, transportation, and employment, among others, will themselves be shaped by larger population trends in the coming decades. Three global trends, in particular, that will shape the needs and distribution of resources across societies are urbanization, migration, and inequities. Awareness of these trends will inform our understanding of how SDoH influence health, and the implications of these trends for how data can inform decision-making for health.

Urbanization

More than half of the world now lives in cities, with two-thirds of the world's population projected to be living in urban areas by 2050.¹² The relation between urbanization and health is mixed, depending on regional development and varying across health outcomes. For example, in low income countries (LICs) urbanization is often associated with lower levels of undernutrition, lower birth rates, and higher youth obesity, but slightly higher life expectancy.¹³ Urbanization is generally associated with higher rates of depression, with the exception of China, where studies generally show improvements in mental health following movement to cities.^{14,15} Noise pollution, air pollution, and poorer housing conditions contribute to poorer mental health of those living in cities.¹⁶



Urbanization brings with it improvements in economic outcomes, employment, and educational opportunities. Clever use of the built environment can improve health; access to green spaces, bike lanes, and public parks may encourage more active transport and physical activity.¹⁷ Creative interventions in cities can be scaled to improve the lives of populations, making them a high yield place to focus attention. Innovations in energy use, urban design, and human capital development can accelerate improvements in population health. With much of the world concentrated in densely populated cities, understanding which social determinants have the highest return on investment for a community's health and creating innovative ways to distribute those resources to populations will be critical.

Migration

It is estimated that there were 272 million international migrants worldwide in 2019 with 740 million people moving from their usual place of residence within the same country.¹⁸ Projections of future migration are challenging, given that migration is in part dependent on geo-political conditions, conflict and natural disasters, and economic trends that emerge. Migration affects health throughout the journey and settlement process. The process of migration itself can also be a health risk, exposing populations to potential violence, infectious diseases, discrimination, and depending on the laws and customs of the receiving country limited access to resources that promote health.¹⁹ Conditions of the host country can either harm health if they are inhospitable to migrants or be beneficial for populations moving to contexts with improved determinants of health.²⁰ Understanding the barriers populations who migrate face can allow for improved decision-making to allocate resources effectively and fairly to groups most in need. With hundreds

of millions of people moving each year, migration trends will be important social determinants to consider as policy makers assess the needs of populations and create contexts that promote health.

Inequities within and between countries

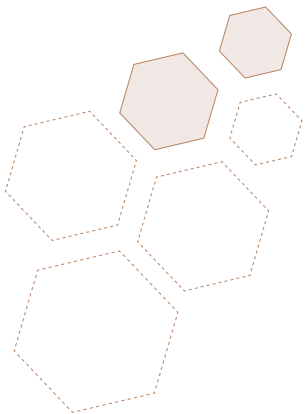
Health gaps characterize population health worldwide. The average life expectancy at birth across LICs was 62.7 years in 2016, while it was 80.8 years across high-income countries (HICs).²¹ Inequities within regions also vary, with marginalized groups seeing worse health outcomes throughout the world. But worldwide, racial and ethnic minorities, LGBTQ persons, and low-income communities experience a range of worse health outcomes compared to majority or high-income communities. Socioeconomic inequities lead to unequal access to social and economic assets, leading to worse health outcomes.²² As technologies evolve to advance quality of care and social determinants, populations with access to resources will continue to live longer, healthier lives, creating larger chasms for populations that lack stable access to basic goods and services. If left unchecked, resources will continue to accumulate within groups with more power and privilege, and that the lived experiences between the highest and lowest wealth portions of the population will continue to diverge. Understanding and addressing growing inequities will be crucial for addressing the role and allocation of social determinants in improving global population health.

Urbanization, migration, and inequities will shape health in global populations in the coming decades. While each provides challenges for population health, they also can provide opportunities for innovation and improve access to and distribution of the determinants that shape health.



2. Social determinants and the health of populations

The role of SDoH in shaping health has been articulated in several landmark reports. One of the first modern state-led reports to identify factors important for health outside of the health care system was the 1974 Canada's Lalonde report⁷, which later led to the World Health Organization (WHO) strategy of Health For All that considered "basic determinants" as a core component.⁸ Later milestone reports included the 1980 Black Report, the 1998 Acheson Report, and the 2008 WHO Commission on the Social Determinants of Health Report.⁹⁻¹¹ These reports gave formal acknowledgement to forces that shape health beyond the health care sector.




An aerial, high-angle photograph of a city street intersection. The street is paved with white lane markings and crosswalks. Several cars, including a yellow taxi and a blue car, are visible. Buildings of various heights and styles surround the intersection. The image is partially obscured by a large, semi-transparent, light-colored geometric shape that serves as a background for the text.

PANEL

A summary of commonly used SDoH frameworks

To understand the factors that have come to be included under the umbrella of SDoH, we conducted a rapid review of commonly used SDoH frameworks. One of the earliest SDoH frameworks proposed by Evans and Stoddart in 1990 maps factors outside of health care that affect health, such as features of the social and physical environment.²⁷ While the idea that factors outside of health care shape health may seem straightforward now, it was groundbreaking for the time.²⁸

The next wave of SDoH frameworks identified specific determinants that affected health and began to organize those factors using a social ecological lens.²⁹ Frameworks developed by Dahlgren and Whitehead in 1991 and Kaplan, Everson, and Lynch in 2000 illustrate how different determinants exist at different levels of interaction, such as individual, interpersonal, community, organizational, societal, and political levels.^{30,31} These frameworks advanced the perspective that individuals and populations are deeply shaped by multiple levels of their environment. In recognition of the fact that structural determinants influenced both the existence and the quality of more intermediate determinants, SDoH frameworks began to sort determinants as either upstream or downstream, distal or proximal. The 2008 WHO Commission on Social Determinants of Health's Conceptual Framework for



Action embraces that perspective.^{32,33} First, it depicts the bidirectional relationship between socioeconomic and political structural determinants (e.g., public policies, cultural and societal values) and socioeconomic positional structural determinants (e.g., gender, race). Second, it demonstrates how those structural determinants affect what intermediary determinants (e.g., living and working conditions, health behaviors) that an individual or population can experience and access.

The WHO's 2008 Conceptual Framework for Action is also notable because it acknowledges both the root causes of inequities and the negative impact that lack of action to address those inequities has on health.^{32,33} Many SDoH frameworks concurrent with or following the WHO's 2008 Conceptual Framework for Action, such as the CDC's 2008 Toolkit or the Bay Area Regional Health Inequities Initiative's (BARHII) 2015 Framework, make a point to incorporate a health equity lens.^{34,35}

More recent frameworks adopt an action-oriented design. While not technically an SDoH framework, Frieden's 2010 Framework for Public Health Action: The Health Impact Pyramid illustrates how intervening to change the socioeconomic factors that form the base of the pyramid not only requires

the least individual effort but also has the greatest impact on population health.³⁶ The 2011 Danaher Framework on Reducing Disparities and Improving Population Health and the 2015 BARHII Framework go further and specify actions, such as community engagement and political advocacy, that can change the conditions in which populations live.^{35,37} Additionally, the 2010 Healthy People 2020 Approach to Social Determinants of Health and the 2014 Cooperative Extension National Framework for Health and Wellness note where collaborative partners and sectors outside of health care and public health must be involved to affect SDoH.^{38,39}

IN SECTION 2.1

- 2.1.1 Political determinants of health
- 2.1.2 Legal determinants of health
- 2.1.3 Commercial determinants of health
- 2.1.4 Environmental determinants of health
- 2.1.5 Religious and cultural determinants of health
- 2.1.6 Emotional determinants of health

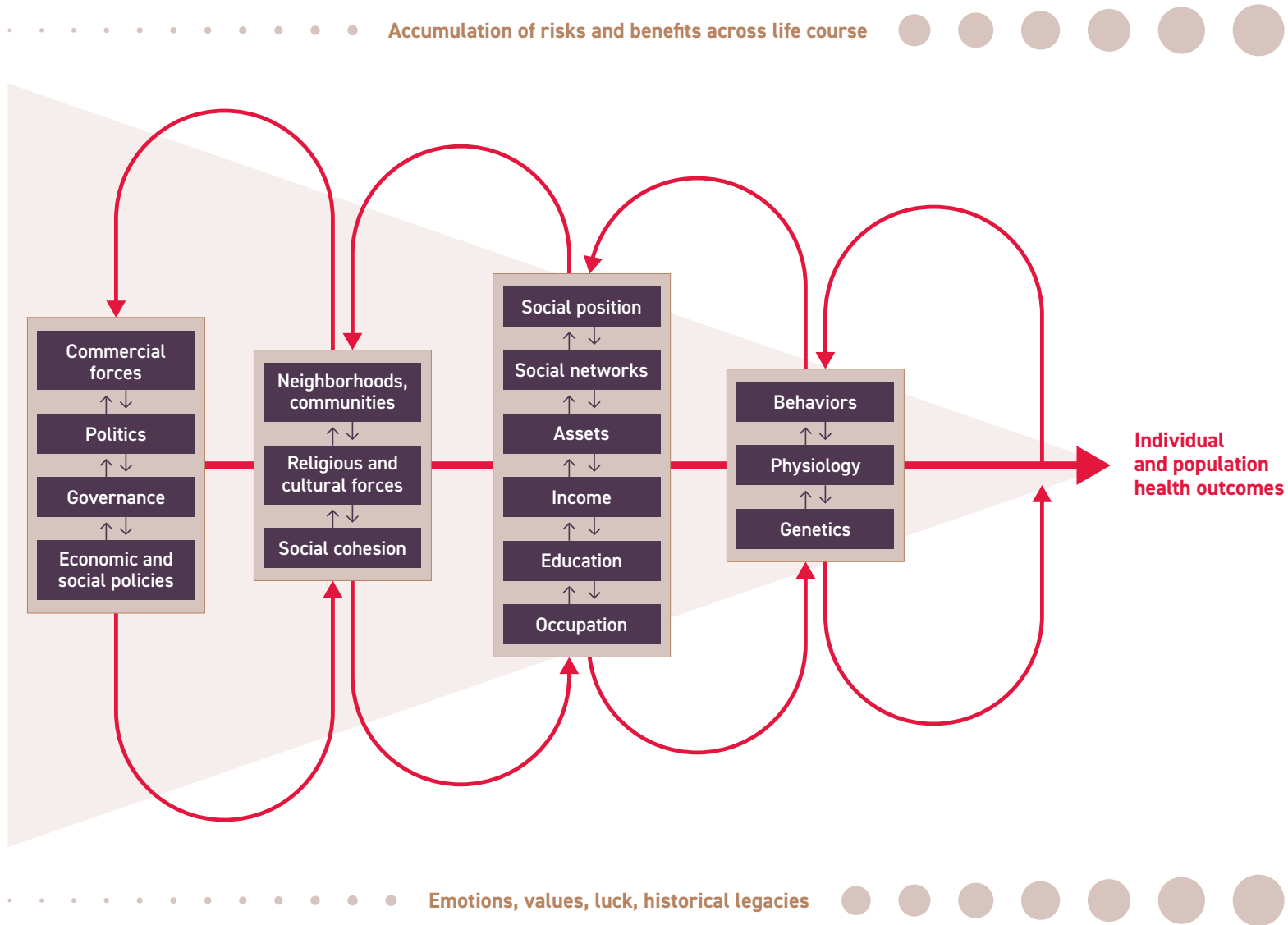
2.1 Our understanding of SDoH has broadened and deepened over the past decades

SDoH are now widely accepted in academic circles as core contributors to the health of populations. Over the past three decades most of the SDoH scholarship and focus has been on four core domains: the neighborhood and built environment, economic stability, education, social and community context.^{9,23,24} Within those domains, some of the most widely agreed upon determinants include economic status and whether a person lives in poverty or not, housing, employment, early childhood education, social cohesion, and access to health care.²⁴ More recent thinking has broadened our concept of SDoH into new areas that offer both challenges and promise for the improvement of population health.

In this report, SDoH refer to all forces exogenous to the body that affect health. This comprehensive view of SDoH allows us to think expansively about the strategies that might effectively change them. The report does not claim to provide an all-encompassing account for all relevant SDoH. It does, however, attempt to remove the boundaries between different groups of determinants and highlights a few examples of determinants of health that are not traditionally included in SDoH frameworks.

There is also a growing understanding that while many SDoH are ubiquitous their role in shaping different health outcomes is often context specific. SDoH are varied and multi-level, complex, and interacting. No single SDoH affects a population's health in a vacuum, and the impact and importance of each SDoH varies depending on context and timing across the life course. The relevance of a specific SDoH for a given population's health, as well as how the SDoH are perceived, will vary based on the population's context. Therefore, our understanding of the role that social determinants play in shaping health is influenced by an appreciation of this complexity of relationships among social determinants and health outcomes, and of the methodological challenges inherent in linking social determinants and health. Given the distance on the causal pathway between exposure to some SDoH and health outcomes, as well as the existence of intervening factors along the way, it can be difficult to quantify a proximal effect that specific SDoH have on an individual's or a population's health.²⁵ However, we build on the growing body of evidence that has applied innovative methods to demonstrate the potential that action on social determinants has for the improvement of population health.^{25,26}

The interlinkages between determinants, life course, and health






PANEL

What determinants of health are guaranteed?

The right to health has been articulated multiple times in several landmark documents. The WHO first stated that “the highest attainable standard of health” was a “fundamental right of every human being” in its 1946 Constitution.^{45,46} The UN’s 1948 Universal Declaration of Human Rights (Article 25) declared the right to health and went further, declaring the right to some determinants of health.⁴⁷ The Universal Declaration of Human Rights is the foundation of human rights law and has inspired several legally binding treaties, many of which also recognize a right to health.^{48,49} For example, the 1966 International Covenant on Economic, Social, and Cultural Rights (Article 12) affirmed the right to “the highest attainable standard of physical and mental health” and placed the onus on nations to ensure this right by addressing the “underlying determinants of health.”^{50–52}

Despite these groundbreaking documents, the right to health is not guaranteed for many across the world. In 2013, out of 191 UN member states, 36% guaranteed the right to health in their constitutions, another 38% the right to medical care, and 14% the right to public health.⁵³ There are important examples that illustrate how a government’s guarantee or support of the right to health improved the health of populations. For example, Chapter II, Article 27 of South Africa’s Constitution states that citizens have the right to accessible health care services and sufficient food and water.⁵¹ Further, it says the



government “must take reasonable legislative and other measures, within its available resources, to achieve the progressive realization of each of these rights.”⁵¹ This constitutional text proved instrumental to saving lives during the HIV/AIDS epidemic. When the South African government announced it would offer only limited access to a medication that prevents mother-to-child HIV transmission, the Treatment Action Campaign (TAC), a citizen advocacy group, launched a constitutional challenge and alleged that the government was violating citizens’ constitutional right to accessible health care services.^{54,55} The courts sided with TAC and required the government make the medication available to all pregnant mothers, first in state institutions and eventually countrywide.⁵⁴ This constitutional challenge was the first of several brought by TAC, who are credited with reducing the price of HIV/AIDS medications and preventing hundreds of thousands of deaths due to HIV/AIDS in South Africa.⁵⁵

The joint approach of Scotland, New Zealand, and Iceland—the Wellbeing Economy Governments (WEGo) group⁵⁶—is an example of a “whole of government” approach to embedding the right to health and health determinants within a country’s larger vision. WEGo endeavors to shift the focus of a country’s success away from the narrow measurement of gross domestic product (GDP) and toward a holistic measurement of how happy and healthy

the populace is.⁵⁷ A critical component of this shift is gathering data on social indicators and in turn assessing a country’s well-being. For example, Scotland has published its National Performance Framework, which includes indicators such as access to housing and to green space.⁵⁷ New Zealand shared its 2019 Wellbeing budget, which directed significant funds toward reducing health inequities among Māori-identified citizens and supporting mental health.⁵⁸ Iceland has been recognized for crafting policies to support working parents, such as state-subsidized child care and equal parental leave.⁵⁹ The involvement of these three countries in WEGo signals their commitment to using policy to provide access to necessary, health-affirming resources.

A country’s enshrining of health as a guaranteed right or a shared priority does not mean that there remains no work to be done to improve population health. However, it does enhance a government’s ability to collect data and act on the social determinants of health while providing the public with a means to hold their government accountable.

2.1.1 Political determinants of health

The conditions that largely shape health and many of its determinants are partially the result of political processes and decisions. Therefore, health is largely a political choice, with its unequal distribution, need for political action on many of its determinants, and critical centrality to human rights and citizenship.⁴⁰⁻⁴² The interventions, norms, policies, and practices arising from political interaction across all sectors, that affect health and its SDoH are considered the political determinants of health.⁴²⁻⁴⁴ Adopting a political determinants of health approach to population health affords an analytic lens on the competing interests, challenges, trade-offs, and priorities that shape health decision-making. In the context of SDoH, the breadth of sectors and stakeholders—their respective interests and incentives, beliefs, values, and limited resources complicate the political prioritization of health even more.

2.1.2 Legal determinants of health

Legal determinants of health play a crucial role in achieving global population health equity; however, they have been chronically under-utilized and poorly understood.⁶⁰ By establishing the rules and frameworks that shape social and economic interactions, laws exert a powerful force on the majority of SDoH.⁶⁰ Law has the capacity to protect health, promote well-being and reduce health inequalities within and across nations or the adversely affect health through three functions: First, the law's prospective function in establishing standards and norms can guide different actors and agencies. Second, its methods of dispute resolution clarify and enforce obligations and can

advance policy agendas through strategic litigation efforts. Last, its functions to strengthen the governance of public and private institutions.⁶¹

2.1.3 Commercial determinants of health

The private sector is complex and heterogenous and has positive, neutral, and negative impacts on health. The commercial determinants of health can be broadly defined as the products, practices, and structures through which commercial activity affects population health.⁶² The multifaceted nature of corporate power can have significant direct and indirect influences on other SDoH beyond the potential health harms of products such as alcohol or tobacco,^{63,64} particularly amid the global consolidation of certain industry sectors.⁶⁵⁻⁶⁷ These can include through shaping the political environment⁶⁸ individual preferences^{69,70}, the knowledge environment^{71,72} the legal environment (through limiting liability)⁷³ or the extra-legal environment.^{74,75} Despite this central role in shaping physical and social environments and norms, the commercial determinants of health are often largely absent from conceptual frameworks of SDoH.⁷⁶

2.1.4 Environmental determinants of health

Human interference with the environment has direct effects on health through floods and heat waves. There can be ecosystem-mediated changes such as reduced food yields that can cause malnutrition and changes in infectious diseases risk factors that can lead to new outbreaks. Indirect effects on health

The background image shows a large, light-colored building with a prominent cylindrical tank on its roof. In the foreground, several flagpoles with various national flags are visible. The scene is set outdoors under a blue sky with scattered clouds. A semi-transparent, light brown overlay covers the right side of the image, containing text.


PANEL

Global governance at the intersection of the political, commercial, and legal determinants of health

There has been widespread recognition of the interconnectedness of SDoH at different levels. However, putting this knowledge to practice is often difficult as many proposed solutions are conceptualized and implemented in silos. Global health is governed through organizations, the private sector, formal and informal rules, and decision-making processes that lie at the intersection of the political, commercial, and legal determinants of health.

The most prominent multilateral organization charged with governing global health is the WHO. The WHO is endowed with normative powers and technical roles that allow it to support its member states with scientific and technical guidance and recommendations, and less frequently, mandates that are binding by international law.

The WHO Framework Convention on Tobacco Control (FCTC) is an example of global health governance. The FCTC is one of only two instances where

A row of international flags on tall poles in front of a building. The flags are partially obscured by a semi-transparent white overlay that contains text. The background shows a building facade and some greenery at the bottom.

the WHO has exercised its normative power to introduce binding international law (the other instance being the International Health Regulations).²²¹ The adoption of the FCTC by the World Health Assembly mandates member states to regulate tobacco product sales, marketing and packaging, and price and tax regulations through legislative processes that largely make up the legal determinants of health.^{5,6} However, the political determinants of health, on the one hand, determine the speed and extent to which these regulations are implemented at the national level, with many countries still lagging on implementing strong policies.⁷⁵ On the other hand, the commercial determinants of health, controlled by the tobacco industry in this case, have significantly hampered the progress of the FCTC mandate in many countries after having failed to block the adoption of the convention altogether through attempting to influence the member states by shifting the conversation from health to economic gains of the tobacco industry.⁷⁵

The intersection of political, commercial, and legal determinants of health becomes even more complicated considering other actors in global health governance such as multilateral agencies under the umbrella of the United Nations, global donors, multilateral regional unions with health as part of their mandate such as the African Union, and regional health institutions such as the African CDC, civil society organizations on all levels, and global organizations with an indirect impact on health such as the Bretton Woods Institutions and the World Trade Organization.

can happen through livelihood loss and displacement. Many of the predisposing factors that lead to environmental degradation are modifiable, and are largely related to unsustainable consumption, population numbers, and technological changes. Between 30–50% of all food produced globally is wasted because of poor practices in harvesting, storage, transportation, marketing, and consumption, while about a third of global energy use is dissipated as waste heat.⁷⁷ A 2006 WHO report found that modifiable environmental factors contributed to one-fourth of the global disease burden including more than one-third of global childhood diseases.⁷⁸

2.1.5 Religious and cultural determinants of health

Both culture and religion are social constructs shaping the everyday life and interactions of people. Culture is historically shaped by, and intertwined with, religion. As such, the lines dividing the two are often blurred, or the remnants of their interconnectedness are too intangible to associate phenomena with one or the other. Culture and religion are social in character and are understood best in the context of groups of people they concern.⁹⁰ Socially connected groups contribute to the health of their members in a number of ways that include regulating behavior. Both also intersect with other SDoH.

2.1.6 Emotional determinants of health

The emotional determinants of health have gained formal recognition recently, with the launch of a new Commission on the Emotional Determinants of Health, co-led by The Lancet and the London School of Hygiene & Tropical Medicine.⁹¹ An understanding of the emotional determinants of health, in their cultural and social contexts, can help explain why individuals and populations make health decisions. Such understanding can also put into perspective why individuals and populations vary in their response to health crises and in assigning meaning to health interventions, providers, or public health policies and strategies.⁹¹ The emotional determinants of health also highlight the observation that decision-making on health is not purely rational but also reliant on many powerful emotions such as fear.⁹¹ Emotions can influence the decision-making process on all levels from a patient deciding whether to accept or reject a practitioner's advice, a policymaker deciding how to implement a policy that will affect their constituents' health, or a community deciding whether to accept a public health intervention.⁹¹



PANEL

Planetary health supports strategies to address climate change-driven health impacts and their social determinants

Human-driven changes, such as climate change, land use change, and loss of biodiversity are a distinguishing feature of the Anthropocene era.⁷⁹ Human activities are simultaneously affecting the biosphere and socioeconomic trends in interconnected ways.⁸⁰ These changes, occurring at the global, regional, national and local levels, have the potential to reverse progress on human health and development because of their impacts on critical ecosystem services such as the provision of food and safe water and, their potential to exacerbate already existing socially mediated risks such as human displacement.⁸¹ The scope of planetary health as a field was launched by The Rockefeller Foundation-Lancet in 2015 as “the health of human civilization and the state of the natural systems on which it depends”.⁸¹ The premise of planetary health is that human systems—political, economic, and social—shape the future of humanity and the earth’s natural systems (e.g., forests, climate, oceans, land, etc.) that define the “planetary boundaries” or safe environmental limits within which people can thrive and flourish.⁸⁰ Planetary health makes explicit the state of natural systems in influencing health and well-being. The traditional global health and public health agendas do not generally consider whether improvements in health were achieved at the expense of compromising the functioning of the natural systems upon which human health depends.

At current rates of warming, the world is likely to reach 1.5°C above pre-industrial levels between 2030 and 2052.⁸² Vulnerability to adverse climate events depends on factors such as health status, socioeconomic status, access to health care services, and geographic location.

There is variation in the most concerning health impacts of climate change within and across countries and regions.⁸³ Climate-driven health impacts will vary by age, gender, income, livelihoods, and ability to deal with the challenge.⁸⁴ Human health risks and widening social and health inequities related to poor living environments could be reduced or perhaps prevented if the drivers and consequences of climate change on socio-ecological systems were addressed through policy and planning.

Planetary health and SDoH must be considered together as intervention targets for improving population health in a rapidly changing climate even though the causal pathways, individually and in combination, are complex. For example, while COVID-19 may not be directly linked to climate change, the risk of its transmission and severity of disease are related to social determinants which directly depend on climate. These include increasing mobility/migration, overcrowding in cities with poor sanitation conditions, and

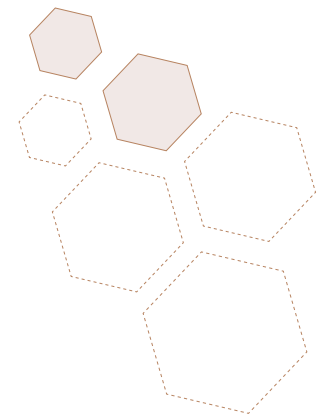
co-morbidities from air pollution exposure.⁸⁵ The same socioeconomic (e.g., poverty, limited access to safe water, limited access to health care services) and health (e.g., existing health status) factors contributing to COVID-19 disease risk also increase a population's vulnerability to the adverse health effects from climate change.

Addressing population health using a planetary health approach is appealing because of the potential of achieving multiple benefits to human health and to the climate.^{86,87} Moreover, understanding the health impacts of human-driven environmental changes can support priority setting by revealing important synergies, trade-offs and unintended consequences of policy actions, including disproportionate adverse impacts on vulnerable or marginalized groups. At a minimum, an understanding of climate change in the planetary health context can help strengthen readiness for addressing adverse health impacts from the outset.⁸⁸ Strong, integrated, planetary health evidence can close the gap between awareness of the climate and health relationship and inform key aspects of the decision-making process.⁸⁹

2. SOCIAL DETERMINANTS AND THE HEALTH OF POPULATIONS

KEY INSIGHTS

- ❖ Our understanding of the determinants of health has broadened and deepened to include all factors outside of the body that affect health. Importantly, there is greater appreciation that SDoH do not operate in silos.
- ❖ The relevance of a specific SDoH for a given population's health, during a specific period of time, will vary based on the population's context.
- ❖ Tackling SDoH will require adopting approaches that consider their ubiquity, complexity, and interconnectedness.






PANEL

Intersectionality as a lens to examine and act on SDoH

There are a number of frameworks that can help provide a unique view on inequities and provide a path forward to acting on SDoH. One approach that provides a more nuanced view of groups in relation to the broader society they are situated in is the concept of intersectionality.

Intersectionality, a concept first coined over three decades ago in legal and racial scholarship, is a framework for examining social inequalities.⁹² The concept promotes an understanding of people as shaped by the interactions of their different positions (e.g., race, ethnicity, Indigeneity, gender, class, sexuality, geography), age, disability/ability, migration status, religion — all of which occur within a context of interconnected systems and structures of power (e.g., laws, policies, state governments and other political and economic unions, religious institutions, media). These systems and structures then create interdependent forms of privilege and oppression.⁹³



Intersectionality has been adopted by population health scholars to examine the complex ways in which SDoH connect, intersect, and mutually reinforce one another. Acknowledgment of the compounding effect of inequities enables researchers and decision-makers to best use the data on various SDoH to identify the communities most at risk of poor health outcomes. Importantly, intersectionality reveals structures of power and inequality. For example, the concentration of racially marginalized communities in redlined neighborhoods, which may qualify as food deserts, reveals an intersection of race, finance, geography, politics, among other forces.

Using an intersectionality lens can enable decision-makers to approach SDoH in a holistic and interconnected manner, considering the upstream causes and downstream impact of investing in SDoH to improve population health outcomes. This approach can help safeguard the most disadvantaged

populations who are at the intersection of different minorities who are often either overlooked or reduced to single category in decision-making processes. However, an essential and overlooked step in this process is investing in research that provides rigorous evidence on how adopting this lens in interventions effects health outcomes.



PANEL

A systems thinking approach to addressing the social determinants of health

Challenges to improving health outcomes are often due to complex problems and SDoH do not operate in silos. This is because populations are complex; and often operate as systems. A system is an interconnected set of elements coherently organized in a way that achieves an outcome. Systems are comprised of elements, interconnections, and a function or purpose. A system is also more than the sum of its parts: it may exhibit adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behavior.⁹⁴ A systems thinking approach can thus enable decision-makers, implementers, and researchers to break these silos. At its core, a systems thinking approach aims at identifying how things are connected to each other within a whole entity.⁹⁴

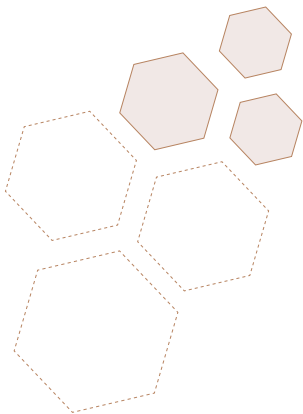
In the context of population health, systems thinking can provide guidance on where data gaps exist or raise new questions and hypotheses about how different SDoH intersect to shape health outcomes.⁹⁵ A systems thinking approach also enables modelling to pinpoint the best entry points for interventions and can be used in policy making to anticipate and avoid long-term negative, unintended consequences or to communicate the benefits of a policy to constituents.⁹⁶ It can also be used to identify high-leverage interventions that can potentially create the most return on investment, be it financial or human resources.

An example of situating a systems thinking perspective in our approach to SDoH is the link between climate change and mental health. A systems thinking approach can allow for risk mitigation through delineating the climate change-mental health system to illustrate the association between disasters, disadvantage, and compromised mental health in populations.⁹⁷

3. Using data on social determinants to improve health

Digital data are expanding rapidly and grew from around 130 exabytes (EB) worldwide in 2005 to about 44,000 EB (44 trillion gigabytes (GB)) in 2020, which is equivalent to more than 5000 GB of data per person.⁹⁸ To put it in perspective, digital data in 2020 was described as seven times the amount of all the grains of sand on all the beaches on earth.⁹⁹ It is estimated that by 2025, 463 EBs of data will be produced each day globally. This led to a dramatic expansion of the field of data science over the past two decades.

While this expansion of data has included the health care sector—which recently saw substantial changes in the way data are generated, stored, analyzed, disseminated, and used—such expansion is yet to fully reach the SDoH, despite the tremendous potential of such data to characterize SDoH and to guide decision-making on health.





PANEL

Defining big data

Many emerging disciplines experience a lack of consensus in defining core concepts. Similarly, big data with its rapid evolution has had a wide range of definitions.¹⁰⁰ The first known use of the term was in 1984.¹⁰¹ Laney and Beyer defined big data in 2012 as "high volume, velocity, and variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision-making".¹⁰² Volume refers to the huge amount of data coming from varying sources. Velocity refers to the growth in the data. Variety refers to different formats of data, including numeric data, text data, and audio and visual data.

In 2012, Schroeck and colleagues expanded the attributes of big data by including "veracity" and defined big data as a "combination of volume, variety, velocity and veracity that creates an opportunity for organizations to gain competitive advantage in digitized marketplace".¹⁰³ Within a year, Dijcks further expanded the definition to big data to include "value".¹⁰⁴ Value refers to the utility of data and depends on the extent to which useful information can be extracted from data.

It was only by 2013 that the Oxford English Dictionary first defined the term as "Computing data of a very large size, typically to the extent that

its manipulation and management present significant logistical challenges; [also] the branch of computing involving such data”.¹⁰⁵ Other definitions focus on the technological requirements necessary to handle big data. Microsoft defines big data as “seriously massive and often highly complex sets of information” that require “serious computing power, the latest in machine learning and artificial intelligence” to process.¹⁰⁰ Similarly, the United States Department of Commerce’s National Institute of Standards and Technology also considers big data as extensive data sets with high volume, velocity and/or variety that require “scalable architecture for efficient storage, manipulation, and analysis”.¹⁰⁶ The UN Global working group on big data uses the following definition: “Big data are data sources with a high volume, velocity, and variety of data, which require new tools and methods to capture, curate, manage, and process them in an efficient way.”¹⁰⁷ With reference to use of big data for sustainable development, the UN considers big data as a “deluge of digital data passively derived from everyday interactions with digital products or services, including mobile phones, credit cards, and social media”.¹⁰⁸

Other related new attributes of big data include cardinality, continuity, and complexity.¹⁰⁹ In this context, cardinality defines the number of records in the dynamically growing data set at a particular instance, continuity refers

to the continuously growing nature of data size with respect to time, while complexity defers to the high dimensions of data sets. Big data definitions also vary by various fields or sectors.

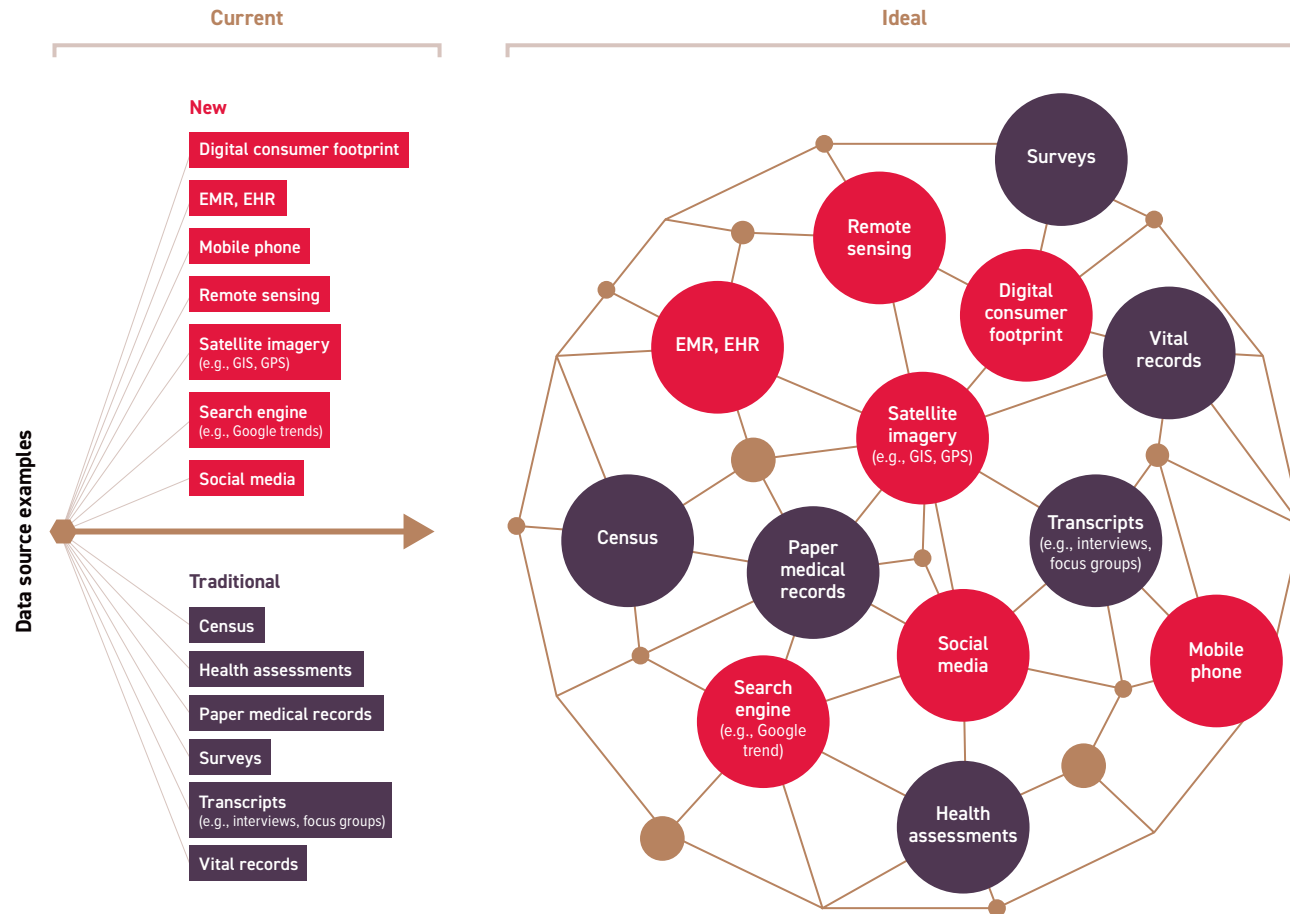
In summary, although there are multiple sector-specific definitions, the overarching themes that define big data are the size and complexity that necessitate advanced and unique data storage, management, analysis, and visualization technologies beyond conventional database and analytical systems.^{110–113}

3.1 Data and the social determinants of health

There are extensive permutations of the use of big data to understand and measure SDoH globally, in part driven by the fact that the definition of, and access to, big data on SDoH differs across the world.^{114,115} Traditionally, vital registration, census,

and population-based surveys have been the main sources of data on SDoH. Governments in many countries collect data on selected SDoH such as income and housing along with the decadal census or annual surveys. Following the publication of

SDoH data sources universe: the current state and potential for an integrated system



*From government, private entities, civil society organizations, health care systems and citizens, either actively or passively generated

the WHO Commission on Social Determinants bringing attention to SDoH, several countries in Europe began a comprehensive approach to integrate SDoH data into existing surveys. In the United States, there are multiple surveys that routinely collect data on SDoH such as housing, education, and employment. For many LMICs, the Living Standards Measurement Survey, supported by the World Bank, has been one of the main sources of data on education, labor, employment, income, food security, housing conditions, and assets since 1980. Other major sources of SDoH data include the demographic and health surveys (DHS)¹¹⁶ and the Multiple Indicator Cluster Surveys supported by UNICEF.¹¹⁷

The data that have been used to define SDoH worldwide are characterized by multiple limitations. Centrally, there is a disproportionate concentration of data availability in HICs, with much more limited data in LICs. In addition, there are substantial inequities with the availability of data by any number of signifiers of privilege worldwide. The table below summarizes key disparities in the availability of the internet by social stratifiers, which in turn shapes the availability of data to characterize SDoH.

Examples of disparities in availability of and accessibility to the internet

Stratifier	Examples
Gender	Women in LMICs are 23% less likely than men to use mobile internet. The gap is widest in South Asia as women are 57% less likely than men to use mobile internet, and 28% less likely to even own a mobile phone. ¹³⁹
Age	In South Africa, while three-fourths of people younger than 30 use the internet, only one-third of people 50 years and older use the internet. ¹⁴⁰
Language	More than a third of mobile phone users each in South Africa, Vietnam, Lebanon, and Tunisia, around 30% each in India, Colombia, and Kenya, and around 20% each in Mexico, Venezuela, and Jordan reported trouble finding content online in their preferred language. ¹⁴¹
Minority status	The 2014–2015 National Aboriginal and Torres Strait Islander Social Survey shows that fewer than half of Aboriginal and Torres Strait Islander people who reside in remote areas had accessed the internet in the previous 12 months, in comparison to 88.8% of Aboriginal and Torres Strait Islander people living in metropolitan areas. ^{142,143} Even within the same constraints of geographical restrictions, disparities differ widely between different socioeconomic groups. In 2015, while 18% of students in remote areas of the United States reported no internet at home, the rate varied from 13% for those who are white compared to 41% for those who are Black. ¹⁴⁴

Examples of traditional sources that include SDoH data

Source	Country/region	Description and examples for potential use
OECD's report, The Heavy Burden of Obesity, 2019 ¹¹⁸	OECD countries	Mobile apps have been developed to assess the cost-effectiveness of efforts to promote healthier lifestyles for those associated with obesity. Examples of relevant analyses include: <ul style="list-style-type: none"> • Austria: App to compare sugar, salt, fat, and energy content of foods across different product categories ¹¹⁹ • Estonia: Help households calculate the amount of salt and sugar in their diet and to check the nutritional value of products by name or brand. ¹²⁰
Centers for Disease Control (CDC) data set directory of SDoH, 2004 ¹²¹	United States	SDoH indicators and the sources of data at local level. The data have been widely studied. Examples of relevant analyses include: <ul style="list-style-type: none"> • Food insecurity to cardiovascular outcomes linkages ¹²² • Cost-effectiveness of food prescriptions within Medicare/Medicaid ¹²³ • Homelessness as a SDoH of substance use disorders among youth ¹²⁴ • ZIP code and doctor visit type to opioid overdose risk. ¹²⁵
WHO's Health Behavior in School-aged Children (HBSC) study, 1982-ongoing ¹²⁶	Europe and North America	This collaborative cross-national study, repeated every four years, collects indicators on SDoH and young people's well-being and health behaviors. Examples of relevant analyses include: <ul style="list-style-type: none"> • Parents' occupational social class in Denmark and intake of sugar sweetened soft drinks among adolescents. ¹²⁷ • Health literacy across regional geographic location and minority status, and health literacy and regional health disparities among adolescents in Finland ¹²⁸ • Immigrant background, family affluence, level of sense of unity, and adolescent health in Sweden. ¹²⁹
Brazilian Observatory on Health Inequities, 2011 ¹³⁰	Brazil	The observatory includes data on general contexts and SDoH. Examples of relevant analyses include: <ul style="list-style-type: none"> • Demographic-proportion of elderly by years of schooling and region of residence • Years of schooling and region of residence, and proportion of population with access to sanitary sewage system • Years of schooling and region of residence and prevalence of tobacco use
World Bank Living Standards Measurement Survey, 1980-ongoing. ¹³¹	37 countries	The survey focuses on improving the quality of microdata to better inform development policies and covers different dimensions of household and individual well-being. Examples of relevant analyses include: <ul style="list-style-type: none"> • Self-produced low-nutrient crops compared to consumption of better nutrition through income from other sources and child height-for-age z-score in Uganda. ¹³²
USAID Demographic and Health Surveys, 1984-ongoing. ¹³³	90 countries	The survey is one of the most widely used data sources on various dimensions of population, health, and nutrition. Examples of relevant analyses include: <ul style="list-style-type: none"> • Social characteristics of men versus of women and prediction of unwanted pregnancies in Nigeria. ¹³⁴ • Household use of clean cooking fuels and birth weight of newborns in India. ¹³⁵
UNICEF Multiple Indicator Cluster Surveys, 1995-ongoing. ¹³⁶	118 countries	This survey is an important source of data for SDG indicators, including for well-being of children and women. Examples of relevant analyses include: <ul style="list-style-type: none"> • Education of household head, wealth and urban/rural locations linked to levels of psychological aggression or physical punishment, child labor and early marriage in Nepal. ¹³⁷ • Water supply system and poorer maternal and child health outcomes in 41 countries. ¹³⁸

IN SECTION 3.2

- 3.2.1 Availability and diversity of data
- 3.2.2 Data hierarchy
- 3.2.3 Definitions and measurements of SDoH are not uniform
- 3.2.4 Public mistrust in data
- 3.2.5 Lack of engagement of marginalized populations
- 3.2.6 Variations in data interpretation and visualization

3.2 Challenges in collecting and using data on SDoH

There are several challenges that need to be addressed to fully realize the promises of big data to measure SDoH including availability and diversity of data sources, data hierarchy, lack of uniformity in defining and measuring data, mistrust in data, lack of engagement of marginalized groups, and variations in data interpretation and visualization. These challenges limit our ability to derive meaningful insights, share data, and move from data to action.

3.2.1 Availability and diversity of data

Availability of data and diversity of data sources vary between and within countries, depending on the agenda of data collectors and donors, political commitment to collect data, the global political economy, technical capacity, and resources. For example, according to the global enabling trade report of the World Economic Forum, data on the Road Connectivity Index—which measures average speed and straightness of road connections in a country—has data for only 129 countries.¹⁴⁵ The International Energy Agency’s 2019 World Energy Outlook report does not report data for 26 countries in sub-Saharan Africa, 16 in Asia Pacific, and 26 in Central and South America.¹⁴⁶ Further, the timeliness with which data are collected varies across countries.

While some countries conduct housing surveys at regular intervals, other countries collect data only in concert with a population census, which is often conducted every ten years.

Other challenges complicating cross-country comparison of data are the result of the political economy of the countries. Data censorship and potential efforts to make certain [sub]populations’ data invisible has often been used to create a more ideal picture of a country. Thus, it is important to explore the extent to which data are being suppressed, what is being intentionally missed and what is being shared, how data are framed, and which components of and what types of data are deemed important.

3.2.2 Data hierarchy

Another challenge inherent in collecting data on SDoH is grappling with the fact that various types and sources of data are differently valued. This “data hierarchy” may not be explicitly codified, and is often determined by the public health or development agenda. However, practitioners and policymakers alike often value and gravitate more readily toward certain forms of data over others.

The clearest example of this data hierarchy in action is the disproportionate dependence on quantitative data compared to qualitative data. Quantitative data related to SDoH are often collected via traditional methods that are routine and comparatively low cost, such as census or survey, or automatic or incidental, such as entries into patient health records. Quantitative data are critical in determining how many people are experiencing, or have a certain level of access to a SDoH. They can also be useful in comparing different populations' health outcomes and the underlying SDoH driving those health outcomes, as well as illuminating disparities and inequities among different groups.

However, quantitative data alone do not tell the full story. While they have limitations, such as a lack of generalizability and representativeness, qualitative data can help explicate, contextualize, challenge assumptions, and offer ideas for action on a quantitative result. When quantitative data reveal that a gap or problem exists, qualitative data can offer insight on why it exists and what can potentially be done to address it. Qualitative data illustrate how individuals, communities, and organizations think and feel as well as their assumptions, motivations, perceptions, and ideas.¹⁴⁷ The emergence of “Big Qual” signals that working with large, qualitative data sets may soon prove more accessible and result in broader and deeper insights to inform public health practice and policy.¹⁴⁸ Moreover, the preparation necessary to build a working understanding of communities by qualitative researchers often necessitates approaching communities in a less extractive, more culturally humble way, which increases the opportunity for trust to be built and more authentic information to be shared.

Using and valuing diverse sources and forms of data, while considering their strengths and weaknesses, allows for more accurate, nuanced, and up-to-date understanding of the SDoH in a particular context. The methodological strategy therefore determines the quality of the data, and a combination of methods (i.e., “mixed methods”) serve to paint a fuller picture of complex realities.

3.2.3 Definitions and measurements of SDoH are not uniform

SDoH have come to mean different things to different stakeholders, in different contexts, with significant implications for policy and decision-making. For example, in the context of the United States health care system, terms such as “addressing social determinants” are often used narrowly to describe removing specific barriers to health care provision faced by the most disadvantaged, such as providing free food, housing, or transportation to or from hospital appointments.¹⁴⁹ In contrast, a Health in All Policies approach seeks to underscore the fact that, policies across all government sectors have the potential to affect the health of all citizens, instead of solely focusing health care.²¹¹ This is reflected, for example, in New Zealand’s Wellbeing Budget, which seeks to take a return on investment approach to population health improvement, acknowledging that prioritizing health across government budgets may take time to deliver results, but will ultimately result in social and economic benefits.¹⁵⁰

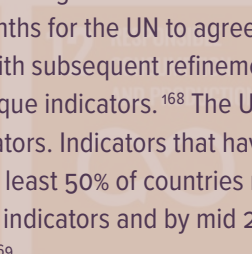
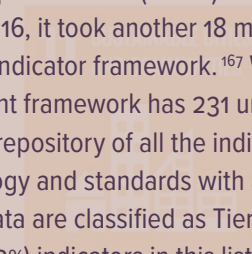
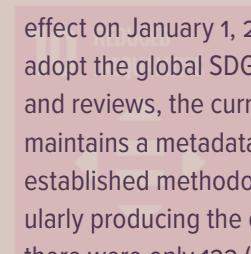
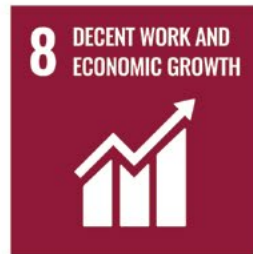
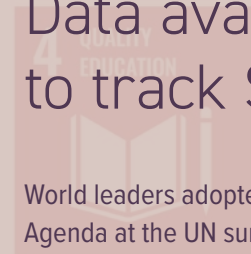
SUSTAINABLE DEVELOPMENT GOALS

PANEL

Data availability is key to track SDG progress

World leaders adopted the 2030 Sustainable Development Goals (SDGs) Agenda at the UN summit in September 2015, building on the success of the Millennium Development Goals (MDGs).¹⁶⁶ Although the SDGs came into effect on January 1, 2016, it took another 18 months for the UN to agree and adopt the global SDG indicator framework.¹⁶⁷ With subsequent refinements and reviews, the current framework has 231 unique indicators.¹⁶⁸ The UN maintains a metadata repository of all the indicators. Indicators that have an established methodology and standards with at least 50% of countries regularly producing the data are classified as Tier 1 indicators and by mid 2020, there were only 123 (53%) indicators in this list.¹⁶⁹

Availability of the data on SDGs has improved over the years. However, an analysis of the UN repository shows challenges in terms of completeness and timeliness of the data. For example, the proportion of population with access



SUSTAINABLE DEVELOPMENT GOALS



to electricity is an important indicator of SGD 7: ensure access to affordable, reliable, sustainable, and modern energy for all, and for this indicator, data are available only until 2017 as of December 2020. At the national level, only estimates were available for 182 countries/territories, while none of the countries reported actual data for rural areas.¹⁷⁰ Another example is SDG 5: achieve gender equality and empower all women and girls, which has an indicator about the degree to which a country's legal framework guarantees women's equal rights to land ownership and/or control. Data for this indicator are available for the year 2019, but only from 16 countries. Land ownership helps to build wealth and provides stability, and lack of land ownership rights for women negatively affects their livelihoods, food security, economic independence and physical security, thereby affecting their health and well-being.^{171,172} The proportion of urban population living in slums is an indicator for SDG 11: make cities and human settlements inclusive, safe, resilient and

sustainable. Although the data sourced from United Nations Human Settlements Program are available for 125 countries for the year 2018, the nature of the data, whether its actual or estimated or modelled, is unclear. The number of people whose livelihoods were disrupted or destroyed due to natural disasters indicates country level action to combat climate change and its impacts, which is relevant to SDG 13: take urgent action to combat climate change and its impacts. Yet, data were available for only 66 countries through 2019.

Data gaps have already been shown to limit the COVID-19 response. Data availability will be a critical factor in tracking the progress of SDGs. To close the data gap, there is a need for substantial investments to build systems, infrastructure, and human resources at the country level to generate and analyze relevant and high-quality data.

Moreover, measurement of SDoH is not uniform: there are differences in the definitions of measures or indicators across disciplines, various agencies, governments, and countries.¹⁵¹ For example, countries differ in distinguishing unoccupied dwellings and vacant dwellings, causing some countries to include second homes as vacant, which results in elevated vacancy rates.¹⁵²

3.2.4 Public mistrust in data

Another challenge to collecting data on SDoH is public mistrust. Mistrust stems from concerns about who collects, stores, and uses data; how and why they are doing so; and concerns over accuracy and robustness of the data. There may be a lack of understanding by the public around the different institutions collecting data and the laws and policies that are in place to regulate the use of that data.¹⁵³ There may also be a lack of faith that, should institutions mishandle data, they would be forthcoming about their mistake and shoulder the responsibility.¹⁵³ For example, 30% of people in the United States responded they were very concerned that a company would use their internet search information to sell them medical products or treatments.¹⁵⁴

Compounding the public mistrust of the entities collecting their data is mistrust around the data themselves. This mistrust is not unfounded, as there are many examples, both intentional and unintentional, of inaccurate or poor-quality data being publicly shared or used as a basis for action or inaction. Further, how data are reported to the public can be selective, oversimplified, and sensationalized.¹⁵⁵ This may lead to public frustration and mistrust, particularly from communities that are both highly

researched and marginalized, which stem from frequently being asked to share data without engagement or explanation of how data were used to better the lives of those within communities. An expected return might merely be community access to cleaned and analyzed data or, even less likely but more beneficial, evidence of data applied in something like a data-driven intervention or a health-affirming policy. When this lack of reciprocity occurs multiple times, people become skeptical about the motivations behind data collection and are less likely to engage.

3.2.5 Lack of engagement of marginalized populations

There is paucity of examples where systematic mechanisms were used that actively involve communities, particularly marginalized communities, in deciding what data to collect, when to collect the data, and how to use the data that are collected. The COVID-19 pandemic has highlighted these issues. For example, many states in the United States do not routinely report race and ethnicity disaggregated data on cases or deaths due to COVID-19¹⁵⁶⁻¹⁵⁸ and in India, there are no data on the caste-level distribution of COVID-19 cases and deaths.¹⁵⁹ Even large scale surveys often have limited participation of marginalized groups, women, and gender minorities.¹⁶⁰ Without these data, it is difficult to identify disparities, determinants of disparities, and track the impact of interventions over time.

Lack of engagement of communities, which leads to missing data, compounds the challenge of data availability, particularly for marginalized groups. For example, massive slums have become major features of cities in many LMICs, with nearly one billion people living in slums.¹⁶¹ This number is projected

to double by 2030.¹⁶¹ Slums now dominate many cities with slum dwellers constituting the majority of city dwellers in LMICs. Yet, data on slums are generally missing in national estimates, due to the limited coverage of slum residents in national sample surveys and censuses. Further, national indicators generally blur inter- and intra-subgroup inequities and often lack aggregation at local levels, where the challenges are experienced, and interventions are needed.¹⁶²

Moreover, existing sex and gender data gaps can lead to non-representative results and interventions—e.g., vehicle safety test dummies have until recently been based on an average male body. Lack of comprehensive, sex- and gender-disaggregated data that are further disaggregated and analyzed by different social categories and SDoH, can obscure vital information about women’s access to SDoH.¹⁶³

3.3 Overcoming challenges to collecting data on SDoH: The 6Ts of data

To overcome the challenges to collecting and using data on SDoH, there is a need for leadership at the global, regional, national, and local levels that also incorporates input from different stakeholders to set the agenda for how data should be collected locally but acted upon universally. The following the ‘6 T’s’ can provide helpful focus: Types, Translation, Technology, Trust, Transformation, Techquity.

First, all data owners should be part of creating a consensus across the various data **(1) ‘Types’** (e.g., electronic medical records, administrative claims, government surveys, digital consumer footprints, etc.) regarding how these data are collected

3.2.6 Variations in data interpretation and visualization

A crucial step between data collection and action on SDoH is how data are disaggregated, analyzed, visualized, and interpreted. Although neutrality and objectivity are ideals that data analysts strive toward, they are often not achieved due to the positionalities and identities of all those involved in these processes. Data interpretation and visualization are situated in specific cultural, historical, geographic settings. Identical sets of data can be (and often are) analyzed, interpreted, and communicated in multiple ways based on the position, background, intention, and goals of the people involved.^{164,165} It is imperative for decision-makers to take these factors into account and seek diverse sources and interpretations of data before acting on them.

and standardized. For example, the World Health Organization has catalyzed this effort with its World Health Data Platform.¹⁷³

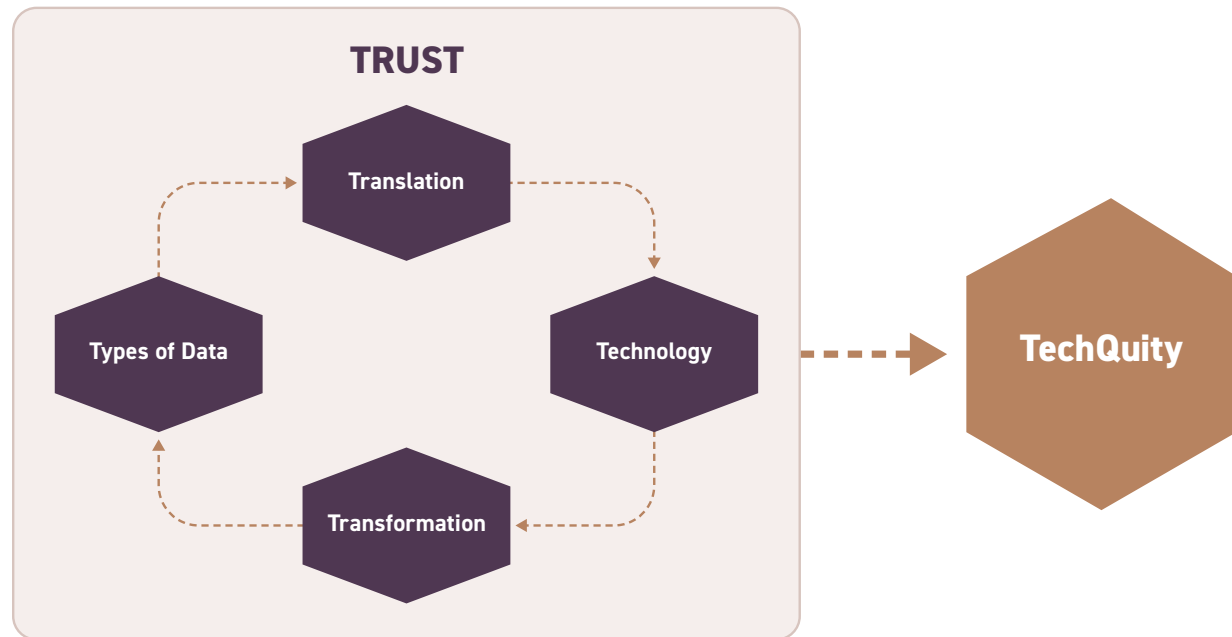
To derive insights or **(2) ‘Translate’**, there is a need to widely adopt standards for data integration and interoperability as well as the **(3) ‘Technology’** to enable scalable and flexible data sharing and analytics, such as open-source and hybrid cloud information technology (IT) infrastructure. Beyond the technical challenges, the current landscape requires building data science competencies and data literacy, especially for people from marginalized groups who have been traditionally underrepresented in health-related data sets.

Foundational to all this, a need exists for **(4) 'Trust'** that is built both over time through relationship building and transparency in sharing how data are collected and used. Innovation and flexibility in technology must be balanced with the need for privacy and security. Examples of principles for achieving this balance include corporate social responsibility, data stewardship, and data philanthropy.

To **(5) 'Transform'**, the entire public health ecosystem must collaborate to change the status quo using insights from SDoH data. This requires structures that support collaboration across disparate stakeholders. Finally, 'Transformation' should take place to ensure **(6) 'TechQuity'** i.e., transformation of our approaches to improving health outcomes should benefit those who need it the most. Thus, leading these efforts that represent the groups being affected or targeted to ensure we are not widening disparities through our collective efforts.

The 6Ts: a path forward for data on social determinants

People generate a wide variety of structured and unstructured data relevant to health decision-making that must be aggregated through standardization. Data need to be made interoperable so relevant stakeholders can translate them into data-driven scholarship, policies, and interventions. Technology should be leveraged for data generation, sharing, and analytics that support translation. Trust must be built among all stakeholders. Any transformation with the support of technology must help those individuals who need it most to ensure equity through technology or 'TechQuity'.






PANEL

Decolonizing data: a case study of the Urban Indian Health Institute

The call to decolonize has become an important part of the current conversation concerning the work of many prominent institutions and fields, including the university,¹⁷⁸ the museum,^{179,180} and the field of science.^{181,182} While definitions of decolonization vary,¹⁸³ most include two dimensions: first, acknowledging and eliminating—or, at the very least, mitigating—the historical and present-day legacy of the violent imposition of colonization and imperialism,¹⁸¹ and second, intentionally making space for, returning space to, and elevating the ways of knowing of communities who have resisted oppression by colonialist and imperialist powers to this day.^{181,183} One organization's mission to decolonize data practices, the Urban Indian Health Institute (UIHI) in the United States, exemplifies how to apply decolonization in epidemiology and demonstrates why that pursuit is both critical and beneficial. A division of the Seattle Board of Indian Health and one of 12 tribal epidemiology centers in the United States, UIHI is the only one that serves Urban Indian Health Programs across the country.^{184,185}

In the United States, seven out of ten American Indian/Alaska Native people live in large, urban centers.¹⁸⁴ However, because the American Indian/Alaska



Native population makes up a comparatively smaller percentage of the entire urban population, this group is often viewed as statistically insignificant in mainstream data on health outcomes.¹⁸⁴ Additionally, mainstream data collection methods often combine American Indian/Alaska Native respondents with respondents from other racial/ethnic groups or place American Indian/Alaska Native respondents into umbrella categories such as “Other”, rendering their unique experiences invisible.¹⁸⁴ Moreover, when researchers do collect data about American Indian/Alaska Native people, they often approach American Indian/Alaska Native communities with a deficits mindset, measuring only problems and gaps, not solutions, assets, or strengths.^{184,186}

These poor data collection practices are normalized and have real world implications.¹⁸⁶ As is amply illustrated in this report, data drives policy decision-making, influencing how problems are identified, solutions are tailored, and resources are allocated.¹⁸⁶ When American Indian/Alaska Native communities are presented as statistically insignificant or erased from the data, political inaction or negligence become acceptable options for decision-makers.¹⁸⁶

UIHI upends these dynamics with a mission to “decoloniz[e] data for Indigenous people, by Indigenous people”.^{185,187}

One of UIHI’s key projects has been to create and maintain a first-of-its-kind, interactive, and publicly available health indicator data dashboard for urban American Indian/Alaska Native people in the United States.^{184,188} This dashboard provides health data for Indigenous communities in 30 urban Indian health areas, as well as national aggregates, putting the issues affecting urban American Indian/Alaska Native communities firmly on the map.^{184,188} UIHI also ensures that American Indian/Alaska Native people have power over how their data are shared and used. While UIHI does share collected data with external partners, it does so in a way that honors the self-determination and data sovereignty of Indigenous people.^{142,184–186}

3.4 Using data to create demand for action on SDoH

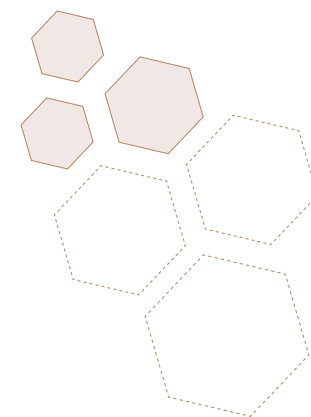
Data can be leveraged to create and advance the demand for policy action to address SDoH.¹⁷⁴ Communities can use the data to demand evidence-informed decision-making. When accurate, representative, and timely data are collected and made accessible, they can present a detailed picture of a population's various health experiences, outcomes, needs, and assets.¹⁷⁵ Inequities in data, particularly those that relate to SDoH, first need to be defined and labeled as problems before decision-makers can come to view them as such.^{176,177} Easily interpretable data can help populations ascertain whether some of their sub-populations have access to healthier outcomes compared to others.

Constituents can mobilize around these data that demonstrate an inequity and use them to build public demand for more equitable resource allocation on the part of decision-makers.¹⁷⁶ Additionally, if constituents can access publicly available linked data sets, which suggest that action in different sectors will result in positive outcomes at the population level, then they can frame their calls for action on determinants in the language of the sector that most resonates with the decision-maker, and thereby meet both parties' objectives. To that end, cost-effectiveness and return on investment data can be particularly compelling.¹⁷⁶

3. USING DATA ON SOCIAL DETERMINANTS TO IMPROVE HEALTH

KEY INSIGHTS

- ❖ With the unprecedented expansion of data, there is tremendous potential for big data to advance our understanding of social determinants of health and facilitate better evidence-informed decision-making.
- ❖ There are several challenges to using data on SDoH and these vary across countries and between the determinants. Governments, global governance institutions, the private sector, civil society, academia should invest time and resources in developing improved data systems for SDoH that can support collaboration among stakeholders to identify challenges and improve the health of populations.
- ❖ Trust leads to better engagement of communities, particularly marginalized communities. Involving communities not only helps in improved data production but also improves demand for action on social determinants.






PANEL

Using data on SDoH for policy decisions: evidence related to food and energy

Food and energy are two important determinants of health. The emergence of big data in different sectors related to food provides an opportunity to enable improved decision-making around food and food systems that can reduce the burden of malnutrition. For example, decisions using data on food can improve access to affordable and safe fruits and vegetables as well as improve awareness and reduce the consumption of fast food. Data around affordable energy, related climate change mitigation policies, and the environmental, economic, and social considerations are important in decision-making around energy and health. These decisions are critical to improving health equity specifically through the provision of clean energy to households, improved transportation, and better management of health care facilities and health programs like vaccination availability.

However, decisions around policies related to food and energy are often flawed or unsound due to data gaps, particularly in LMICs and among vulnerable populations in HICs. The intersection of data, determinants, and decision-making is a less researched area. To understand the extent of available



literature linking the three components, the 3-D commission undertook two scoping reviews, one around food and food systems^{222, 223} and another around energy.^{222, 223}

The food review showcased a paucity of research around the nexus of food, big data, and decision-making. It also highlights the potential in using big data on food systems to inform decisions to improve the health of populations. The review indicated a range of surveillance, supply, agricultural, environmental and consumption data sourced through mobile phones, social media, and the Global Positioning System (GPS), that are used in food-related decision-making.

Key themes from the energy review include the link between energy consumption and economic development; the role of inequality in understanding and predicting harms and benefits associated with energy production and use; and the importance of understanding local contexts and microenvironments in decision-making. The review highlighted the need for more

granular data that could help decisions around feasible and cost-effective courses of action. The review highlighted many examples and possibilities for big data to potentially inform decisions around energy and health.

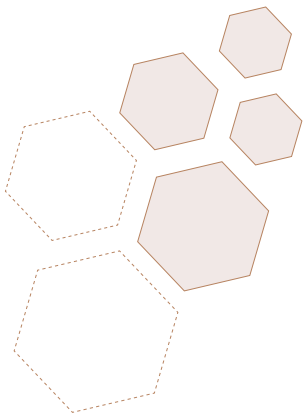
Both reviews highlight that the degree to which big data can be converted into meaningful evidence that informs decision-making depends highly on the context. These reviews also underscore the importance of using data on SDoH in decision-making. Reviews that examine the intersection of data and decision-making with respect to other determinants can both identify the gaps in data availability and possible hindrances to the use of data in decision-making.

4. Bridging the gaps among determinants, data, and decision-making

Understanding that social and economic conditions influence health suggests that better surveillance of SDoH can guide opportunities for interventions designed to improve the health of populations.¹⁸⁹

Despite much progress, there has been slow uptake of evidence-informed policies and programs that tackle SDoH or build on the growing availability of data to advance the health of populations. For example, there is ample evidence around the effects of adequate and affordable public transportation in (mega)cities on creating healthy cities and healthy populations. Yet, countries often do not implement such policies.²²⁴

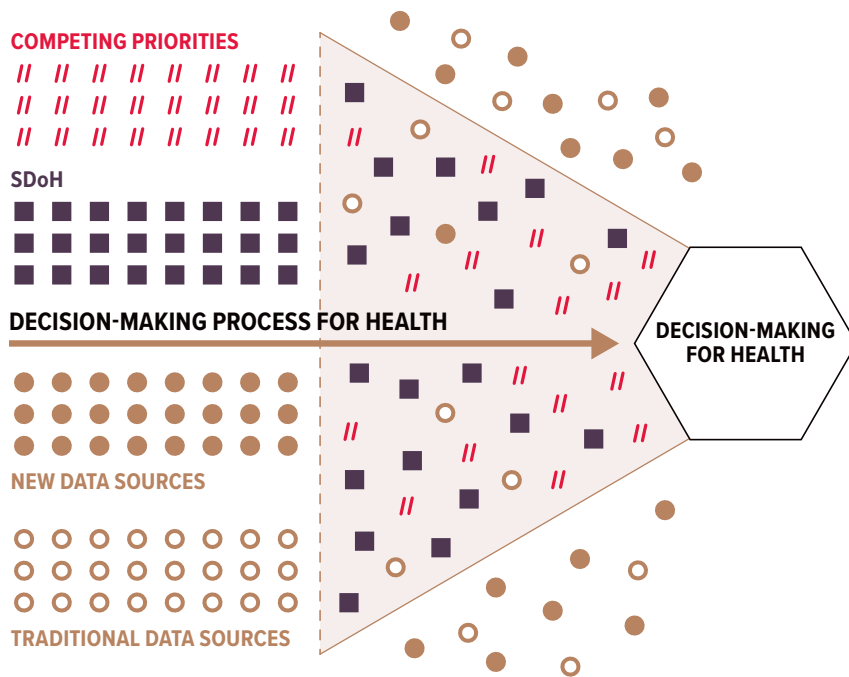
Often, there is a need for evidence that is context-specific to be effectively implemented. But there is also a need for policy windows and opportunities that allow for data to inform decision-making processes. This points to a challenge in both the vision and the practical implementation of policies that incorporate SDoH data in decision-making. This highlights the importance of grappling with the political economy of decision-making in health.¹⁹⁰ How evidence is framed is an important factor of how policy changes are taken up.¹⁹¹ Values and principles also determine access to and use of the right data. Using a political economy approach to health decision-making takes all those factors into account. Bringing data on SDoH to bear on decision-making requires identifying decision-makers who affect health, their priorities, their goals, challenges, and processes.



Determinants, data, and decision-making for health

Current decision-making process

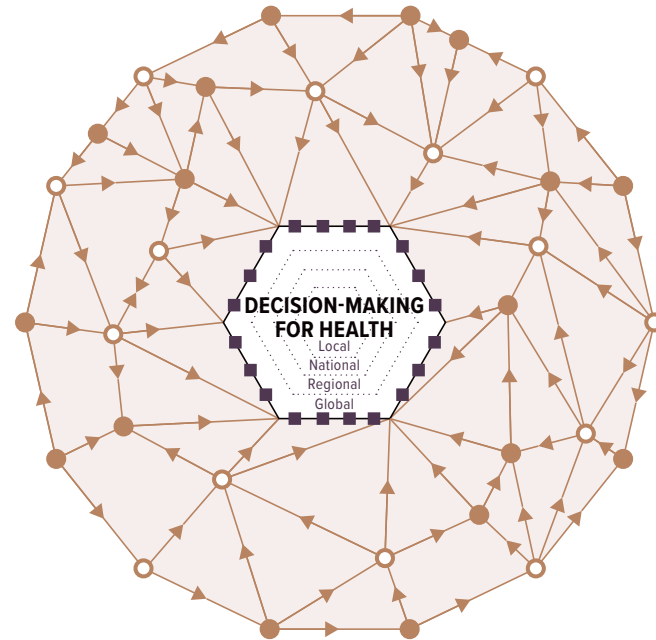
SDoH are overshadowed by **competing priorities** as decision-makers consider solutions for health-related problems. Traditional data sources often take precedence over new data sources, while many data sources, both traditional and new, are not utilized.



Many new and traditional data sources are not utilized throughout the decision-making process for health.

Ideal decision-making process

Decision-making at every level is multi sectoral, with aligned priorities, and **informed by data, both traditional and new, on SDoH to improve population health.**






PANEL

The realities of decision-making on determinants of health that is informed by data

What gets measured gets done, and data are central to ensuring policy makers have the information to measure the impact of these social factors on human health. Measures, such as the incidence of a particular disease, number of years lived with a disease, or premature deaths from a particular disease, illustrate the magnitude of the impact of the disease on both individuals and the population. Policy makers also are concerned about the financial impact of investments in health and follow the cost outlay and in many cases the cost savings or cost avoidance of a health program. In many cases additional costs, savings or avoidance also appear on the financial ledger in a sector other than health. This is known as the wrong pocket phenomenon.²⁰⁰

For example, to get the true cost-benefit of a health intervention that addresses lead exposure in children, one would measure the improvement in the health of lead-poisoned children and the direct costs for health care



of this intervention minus the savings or cost avoidance for health care at a later stage in life.²⁰¹ Sometimes we measure the health impact in quality adjusted life years, which is an economic measure that evaluates the value of medical interventions more broadly. But the cost avoidance and actual savings from this health intervention also accrue to the education system in terms of special education costs from learning disabilities, attention deficit hyperactivity disorder, and impulse control problems.²⁰¹ Lead poisoning can cause brain injury that results in a higher incidence of behavior problems.²⁰² These behaviors may result in significant societal problems that increase the risks of a child entering the juvenile justice system and for some, the adult criminal justice system. A higher incidence of violent crimes among adults has been attributed to lead exposure during childhood.^{203,204} The cost for society to support these more intensive educational or justice systems can be mitigated by the health intervention, but these costs or savings are

generally not accounted for or attributed to the health intervention in measuring the overall impact in these other sectors. Having comprehensive and informed data across sectors allows policy makers to both measure the true impact of a health intervention and its overall societal impact. Such use of a comprehensive data set allows for improved policy making.

Progress in population health cannot depend on a single sector and requires scientific understanding of different sectors including education, social services, economic development, environment (both built and natural), nutrition and food marketing, and health.¹⁸⁹ Effective cross-sectoral interventions are therefore critical for improving health. However, such efforts are challenged by conflicting agendas—which are often reflected in resource mobilization and management—as well as by a failure to capture the return on investment from improvements in health across non-health sectors.

IN SECTION 4.1

- 4.1.1 Lack of a common language
- 4.1.2 Political incentives
- 4.1.3 Complexity
- 4.1.4 Competing priorities

4.1 Challenges to decision-making informed by data on SDoH

There are several challenges to developing a roadmap for improving the health of the population through decision-making that is informed by data on SDoH. Even when there are enough data that warrant action on SDoH, that does not always translate into policy or practice. Decision-making bottlenecks often occur where the evidence and action do not align, where the political will to affect change is lacking. These challenges to action include the following:

4.1.1 Lack of a common language

To act on SDoH data would require developing a common understanding of what data mean and how they can be interpreted. However, scholars and practitioners from different disciplines, and sometimes within the same discipline, can have different approaches and interpretations of data. This creates a challenge as working on SDoH data requires multidisciplinary approaches. In addition, decision-makers rarely have the training to analyze, interpret, and use data. This compounds the challenge of a lack of a common language. Yet, calls to invest in developing scientific outputs that can be used to engage with decision-makers are often not matched by funding for such efforts that aim to bridge the divides between scholarship and action.

4.1.2 Political incentives

The results of decision-making that affects SDoH are often invisible in the short-term, only showing their positive consequences at the population level after years, sometimes decades.¹⁹⁴ At the same time, in many contexts, decision-makers have limited terms and operate under structures that reward short-term successes.¹⁹⁵ It is therefore in decision-makers' political interest to take actions and make policies that will produce rapid, clear, positive results for their constituents in the short-term. Decision-makers are disincentivized to act on SDoH because by the time the positive results become clear, the decision-maker may already be out of office and unable to reap the political benefit and personal credit for a decision. On the other hand, the results of decision-making (or lack thereof) that harm population health are also more difficult to discern in the short-term. This delay between policy action influenced by data on the SDoH and its population health impact reduces the urgency and motivation of decision-makers to advance policies.

4.1.3 Complexity

Decision-makers need actionable data. Decision-makers are often interested in data that provide clear immediate results if acted upon. However, the complexity of how different SDoH affect health and the distance on the causal pathway between exposure to some SDoH and health outcomes create barriers to the specific action that can improve the health of populations. This again compounds decision-makers' incentives, as the difficulty to showcase a casual pathway for many SDoH leads to difficulty for decision-makers to advocate and take credit for action on SDoH.

4.1.4 Competing priorities

There are often a host of competing issues and priorities, both related and unrelated to health, for decision-makers to grapple with. As such, issues that are presented with a sense of urgency take precedence and divert resources from seemingly “slow-burning” areas, such as SDoH. There may be data indicating that not addressing SDoH may be causing harm now or will eventually cause even greater harm in the future (e.g., systemic racism, climate change, housing insecurity).¹⁹⁶⁻¹⁹⁸ There may even also be data showing that addressing SDoH will, in turn, positively affect an emergent health issue.^{198,199} However, acting on such matters can be difficult without a collective sense of urgency.



PANEL

Determinants, data, and decision-making underpin progress toward universal health coverage

The WHO has made achieving universal health coverage (UHC) one of its core goals. However, progress toward achieving UHC varies by country, and this patchy progress is illustrative of the challenges that we face in making data-informed decisions to improve health worldwide. COVID-19 has exacerbated health system weaknesses and health disparities everywhere—resulting in many countries falling further behind in achieving their UHC agendas. As the extent of the health, economic, and societal impacts of the pandemic become increasingly stark, accelerating progress toward UHC will be essential to overcoming the challenges COVID-19 is leaving in its wake.

The foundational elements necessary for UHC are well-defined. According to the WHO, UHC “means that all people and communities can use the promotive, preventive, curative, rehabilitative, and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship.”¹⁹²

“There’s no single path to universal health coverage,” as Dr. Tedros Adhanom Ghebreyesus, Director-General of the WHO, has often observed. “All countries

must find their own way, in the context of their own social, political, and economic circumstances. But the foundation everywhere must be a strong health system, based on primary care, with an emphasis on disease prevention and health promotion. Such health systems do not only provide the best health outcomes; they are also the best defense against outbreaks and other health emergencies. In that sense, UHC and health security are truly two sides of the same coin. There are many steps on the road to UHC. But the key is political commitment.”¹⁹³

Countries that have made the most progress toward UHC have efficient health systems with effective primary care. These systems have adequate staffing levels and can deliver a high-quality essential package of services, medicines, and health technologies. Financing for the system is sufficient and stable, and the costs to patients are also considered to ensure care is affordable. These systems can remain operational during major incidents or emergencies such as pandemics. They have mechanisms in place for adopting innovation across training, new medicines and technologies, service delivery, and patient engagement. The best systems use multisectoral

solutions, drawing on the combined capacities, skills, and resources of government, civil society, and the private sector to ensure there is equity in access to health care.

These systems do not appear overnight, but rather are the product of decisions made by policymakers over extended periods of time. To produce efficient, effective, and equitable systems, these decisions must be informed by health data and social determinants data. The use of these data to drive decision-making is essential because health care does not exist in a vacuum. Services cannot be delivered if patients cannot reach the clinic or if they cannot afford treatment upon arrival. Treatment will not be effective if patients do not have stable, safe housing or if they do not know where their next meal is coming from. Policymakers must continually connect the dots between epidemiological data and social determinants data to fully understand the health challenges they are facing. Ultimately, these three factors—data, determinants, and decision-making—are the common threads that help to weave together the basic elements of UHC in a manner that best ensures successful outcomes.

IN SECTION 4.2

- 4.2.1 SDoH data need to be leveraged to better influence decision-makers
- 4.2.2 Decision-making should balance efficiency and equity
- 4.2.3 Decisions about resource allocation must align with need, informed by data
- 4.2.4 SDoH data need to reflect short-term and long-term outcomes and potential return on investment
- 4.2.5 Investing in data on SDoH can provide a more inclusive approach to decision-making processes
- 4.2.6 Engaging communities should be a central goal of decision-making that is informed by data on SDoH

4.2 Considerations for using data on SDoH to inform decision-making

4.2.1 SDoH data need to be leveraged to better influence decision-makers

There are many opportunities to engage with data on SDoH to improve decision-making. However, this requires that the scientific community invests in improving methods and format of analyzing, presenting, and communicating data to not only decision-makers but also other stakeholders that can influence decision-making processes such as the media, people who work with decision-makers, and communities to advocate for better decision-making.

4.2.2 Decision-making should balance efficiency and equity

In health decision-making, the goal is often to achieve efficiency—maximizing health gains for a given level of limited resources—but it has been long acknowledged that there is

at times a tension between efficiency and equity—distributing resources to minimize disparities in health outcomes. When considering SDoH, such as transport infrastructure, decision-making must similarly consider potential equity pitfalls that could otherwise be missed in pursuit of efficacy. These considerations are often hampered by the nature of data collection and the design of outcome measurements, both of which are often biased in ways that disadvantage marginalized groups.²¹¹

However, operationalizing efficiency as a goal for both the short-term and also in the long-term can lead to metrics and approaches that may advance not only efficiency but also equity.²¹² Decisions that address the root causes of ill health and assure the conditions that make people healthy in the first place not only advance equity but may also, in data that are collected months, years, and even decades in the future, then prove to be more efficient.

Priorities around which populations should be targeted by health interventions are often set based on existing data. As such, lack of timely and accurate data can lead to priorities that are misaligned with need.

4.2.3 Decisions about resource allocation must align with need, informed by data

Priorities around which populations should be targeted by health interventions are often set based on existing data. As such, lack of timely and accurate data can lead to priorities that are misaligned with need. For example, measuring the distribution of ill health within and across populations has been a core function of global health research and surveillance organizations for many years, and the global health sector benefits from having extensive and robust empirical evidence that can contribute to decisions around priority-setting.²¹³ However, shifts in priorities are often not as nimble as might be desired. The 2020 report of Global Health 50/50 showed that health issues that represent a continuation of the MDGs agenda continue to receive the most attention of the global health system. Newer SDG-era targets, particularly non-communicable diseases (NCDs), do not receive proportional attention or funding.²¹⁴ This example shows a discrepancy between available data and decision-making. When it comes to decision-making and priority-setting, the case may be that political priorities, limited resources, the speed with which a desired outcome may be reached, and old, deep-seated priorities take precedence over the clear priorities made visible by current data.

4.2.4 SDoH data need to reflect short-term and long-term outcomes and potential return on investment

Interventions that take a public health approach are often less politically desirable due to longer timeframes, less direct evidence of cause and effect, and greater complexity. A political and pragmatic challenge in disease prevention is achieving the right balance between achieving short- versus long-term outcomes in reducing health inequities and improving the health of a populations. The greatest population-level drivers of health are often more distal and systemic but less immediate, while interventions that focus on individual physiology or behaviors are less effective, but more politically palatable.²¹⁵

Seeking to improve SDoH can also bring other important benefits that are not viewed as “traditional” health benefits but can also potentially influence health. Investments in early education, urban development and housing, or transportation, confer critical non-health benefits such as social cohesion, reductions in crime, unemployment, increasing participation in citizenship and democracy, increased economic productivity, and improved air quality. Taking investments in active transportation as an example, beyond health benefits, such investments

Investments in the SDoH are appropriate even when the return on the investment is minimal from an economic perspective but beneficial to society overall.

are associated with financial benefits at the municipal level through savings in maintenance, increases in tax revenues and property values, higher employment levels and concurrent increases in consumer spending, and potential reductions in carbon emissions.²¹⁶

Investments in the SDoH are appropriate even when the return on the investment is minimal from an economic perspective but beneficial to society overall. In many of these situations the data from several sectors or systems may be helpful to assess the societal benefit and the true cost or financial benefit of the intervention or policy.

4.2.5 Investing in data on SDoH can provide a more inclusive approach to decision-making processes

Decision-makers act based on their own knowledge and experience and their positionality, i.e., class and intersecting domains of privilege and power, or the knowledge and experience that they actively seek, listen to, and/or value.²¹⁷ This may lead to a decision-making process that is not inclusive. Decision-makers, researchers, and policy makers who share the data, are not always representative of their constituents. For example, decision-makers may be much wealthier than their constituents, meaning that their experiences are, by definition, drastically different from their constituents'. Further, decision-makers are not always equally invested in all their constituents.

4.2.6 Engaging communities should be a central goal of decision-making that is informed by data on SDoH

Priorities, agendas, and decisions are more likely to be trusted if the decision-making process is transparent and meaningfully engages community stakeholders.²¹⁷ Decisions that include both the people who need to implement them and the people who will be most affected are more likely to be seen as legitimate and acceptable, including the potential trade-offs of embracing a course of action versus another.²¹⁹

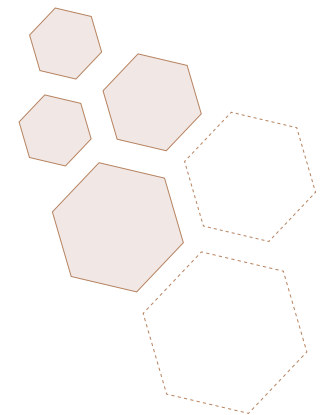
An important component of engaging communities as integral partners in health decision-making is deliberately including communities in the production of data on SDoH through the co-production of knowledge, which allows for communities to identify a problem and have the authority or ability to implement the research recommendations.²¹⁷

This shared approach to decision-making demonstrates respect for people's recommendations and capacity to manage their own challenges, as well as for a collaborative and democratic process.²⁰⁵ This can potentially lead to better outcomes, more acceptance, more adherence and compliance, and more sustainability of interventions.

4. BRIDGING THE GAPS BETWEEN DETERMINANTS, DATA, AND DECISION-MAKING

KEY INSIGHTS

- ❖ Decision-making is complex, iterative, and highly context specific. Incorporating data on SDoH in decision-making, through a shared and participatory approach, can both advance equity but also prove to be more efficient in the long term.
- ❖ Engaging with decision-makers across sectors in their own languages and to present to decision-makers actionable SDoH data that align with their priorities, goals and values, increases the likelihood of policy uptake.
- ❖ It is crucial to engage with communities to ensure that their priorities, goals, and values are aligned with the decisions being made and that there is accountability between the decision-maker and their constituents for action taken or not taken.






PANEL

Who gets a seat at the table? Integration of health across silos and sectors

Siloed approaches to development problems and solutions have been implicated in undermining the potential to address the drivers of systemic change and for scaling impact through a more programmatic approach.²⁰⁵ A key lesson from the limitations in achieving the Millennium Development Goals (MDGs) was that sustained systemic change cannot be achieved through single-sector goals and approaches. Accordingly, a key feature of the 2030 SDGs agenda is the integration of the economic, social, and environmental dimensions of sustainable development and the interlinkages existing within and across the goals. Beyond breaking down traditional silos, the SDGs build on more cross-sectoral decision-making and multistakeholder partnership approaches, identifying various nexuses, clusters, or links among sectors.²⁰⁶

With its population health approach, the Public Health Agency of Canada calls for shared responsibility for health outcomes with multiple sectors and levels whose activities directly or indirectly affect health. The agency defined intersectoral collaboration as the joint action taken by health and other government sectors, as well as representatives from private, voluntary, and non-profit groups, to improve the health of populations. Such action takes different forms such as cooperative initiatives, alliances, coalitions or partnerships, with successful initiatives characterized by early engagement



of potential partners from sectors outside health, as well as from different disciplines and levels within the health sector.²⁰⁷

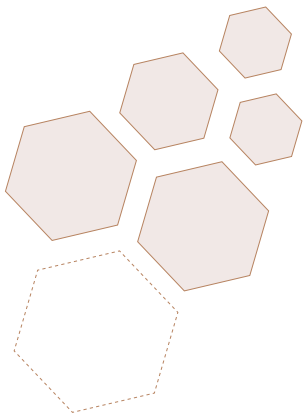
The intersectoral perspective has found expression among researchers through interdisciplinary and transdisciplinary partnerships and collaborations in problem identification and evidence generation. For example, Adeleke et al. envisioned an integrative approach to defining and understanding urban risks that can capture multi-hazard risks from across the spectrum of daily life to the catastrophic risks and their interactions. They also argue that such a multilayered knowledge can help shape policy.²⁰⁷ They called for new efforts to develop political support, technical capacity and methodologies to enable systematic data collection and analysis, including socially and spatially disaggregated data. The group argued for the interdependence of risk and urban development policy, and a focus on institutions as objects and partners for co-produced research, including local government as the focal point for risk reduction and new roles for civil society and the private sector.²⁰⁸

Designating the last decade of the SDGs as a unique opportunity to address the SDoH and improve the health and well-being of people everywhere, the

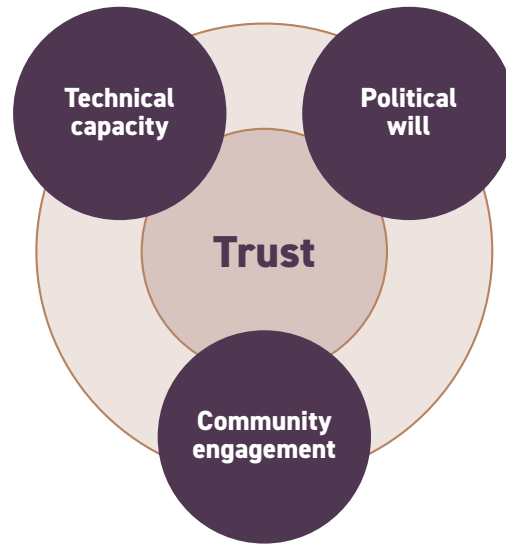
WHO calls for placing health at the center of people-centric economic and social strategies and the integration of access to health care and protection from infectious disease outbreaks into the world's security, economic, and development agendas. In a related contribution, Elsey et al, building on rapid urbanization in LMICs proposed an urban health systems model that focuses on: multisectoral approaches that look beyond the health sector to act on SDoH; accountability to and engagement with urban residents through participatory decision-making; and responses that recognize the plurality of health service providers.^{209,210} Within this model, Elsey et al. explicitly recognize the role of data and evidence to act as glue holding together this complex system and allowing incremental progress in equitable improvement in the health of urban populations.

5. Conclusion

Despite much progress over the past few decades in our collective understanding of SDoH and the proliferation of data science, there has been slow uptake of evidence-informed policies and programs that tackle SDoH or build on the growing availability of data to advance the health of populations. The 3-D Commission set out to address this gap and advance a transdisciplinary agenda at the intersection of social determinants of health and big data to the end of improving decision-making around health. Through a series of principles and recommendations, the 3-D Commission lays out a path forward for scholars, practitioners, and policy makers alike who are concerned with promoting the health of populations. Reflecting on the findings of the Commission, we suggest that these recommendations are actionable if built on a foundation of three interconnected, pragmatic areas of focus—political will, technical capacity, community engagement—each of which will be needed for the vision of the 3-D Commission to translate into actionable policies and programs. We conclude by noting that these pragmatic areas of focus need to be built on a foundation of trust in decision-making.



Key elements for actionable and impactful decision making



Political will

Bringing data on SDoH to bear on decision-making requires identifying decision-makers whose work has an influence on health and to work with them to align their priorities, goals, and processes to the end of improving health. The core challenge is that these decision-makers often work in non-health sectors and often measure success and action using indicators other than health. It will therefore be important to generate a political will for action on SDoH to highlight both the health and the non-health benefits of acting on SDoH. Improving health at the population level involves fundamental political choices. As our report shows, catalyzing action on health will require developing a common language across sectors that values health return on investment, coupled with other non-health measures, such as returns on financial investment and productivity. It may also require the

development of more nuanced metrics to convey economic and societal advancement that transcends the more universally used gross domestic product. Political will for action on the SDoH can also be catalyzed through an appreciation of the greater likelihood of success for all—including policy-makers—that can be achieved through the application of data to inform action on SDoH. Policy makers and politicians are often compelled to make decisions under conditions of uncertainty, where the implications of different courses of action are not entirely clear. Data applied to decision-making stands to improve the chances of better outcomes and higher rewards for policy action and can help nurture the development of a common language and values among decision-makers, aligning broad multisectoral actions with the goal of improving the health and living conditions of communities.

Technical capacity

As the report shows, the world is increasingly swimming in data. Data availability, however, does not readily translate into data utility. Making sense of and finding meaningful and decision-informative signals amid the data noise requires experience and skill, neither of which are typically a part of the decision-makers' tool kit. This means that decision-makers need structures to help them to find and use the data that can inform an understanding of SDoH, and, more importantly, how changes to these social determinants can improve health. Scholarly and technical institutions can help policymakers bridge these gaps, building data analytic and interpretive infrastructures that inform decision-makers and policy making. This challenge extends well beyond health and to the other sectors that we need to align with the goal of improving health. For example, the need to make the economic case for improving the health of populations through addressing SDoH, and communicating that case in ways that are meaningful and economically viable to decision-makers requires not only an understanding of political priorities, but also the right

evidence.²²⁰ This calls for a global investment in the structures that can provide decision-makers at multiple levels of authority—including municipal, regional, and national—with analysis of data and the capacity that can realize the potential of data about SDoH to inform decision-making.

Community engagement

Community engagement should be an essential element of the decision-making process, reflecting and integrating insights from data with the lived experience of those directly affected by the SDoH. As noted above, decision-makers often cannot afford to wait for all relevant data to be gathered and interpreted before taking action. Engaging communities in the decision-making process affords decision-makers the opportunity to listen to and learn from a wide range of stakeholders in formulating decisions. The inclusion of a diversity of thought and perspectives in the decision-making process can help to compensate for the paucity of perfect data. It also serves to reinforce the accountability of decision-makers to community stakeholders whose input can then be reflected in decisions made. Finally, engaging and collaborating with communities can, over time, build and deepen trust that must lie at the foundation of all the areas of focus discussed here.

Trust

The COVID-19 pandemic showed us, yet again, that trust is central for policies and programs to come to fruition. The world experienced this in real time when facing the challenges first of encouraging population compliance with pandemic mitigation efforts, and then in encouraging population uptake of effective vaccines. If trust in systems of governance and decision-making is missing, the contribution that political will, technical capacity, or community engagement can make to the health of populations is limited. Trust is built over generations, and easily lost. Fundamentally, trust in a data-informed decision-making system will require that decision-making be held accountable to the data and the communities from which they come. It requires that decision-making is informed by the values of equity and inclusion, and that decisions are made that aim to improve the health—and lives—of populations. This is all entirely consistent with the agenda for data to inform SDoH decision-making described in this report, and fundamentally speaks to a world where data resources are aligned fairly, made widely available, and operationalized to the end of creating a healthier world for all. The current moment presents exciting opportunities to reimagine possibilities in this regard. It calls for a redoubling of our effort to build the political will, technical capacity, and community engagement that are needed to realize the recommendations, founded on the principles, outlined in this report. We look forward to living in such a world.




PANEL

An example of multisectoral decision-making for health from Kenya

At the levels of national governments, elements of intersectoral collaboration are increasingly being demonstrated. In Kenya, the challenge of sanitation service provision, a key SDoH, was complicated by lack of water and limited coverage of sewerage systems. Beyond the challenge of open defecation, non-sewered sanitation was the option for most urban and rural dwellers. In a novel collaboration, the Ministry of Water and Sanitation and Irrigation, Ministry of Health, development partners, researchers, the National Treasury and county governments hosted the Kenya Sanitation Conference in 2019, which provided a forum to foster discussions on safe, practical, scalable, sustainable and innovative solutions toward the containment, collection, conveyance, treatment, disposal, resource recovery and re-use of wastewater and sludge in both rural and urban contexts, and in both domestic and industrial wastewater, in the context of the right to reasonable standards of sanitation, as enshrined in the Kenya Constitution.²¹⁸

At a local level, which reinforced the perspective of collaboration and multidisciplinary and multisectoral identification of challenges and co-creation of solutions, Daniati et al. demonstrated the effectiveness of indoor-air pollution

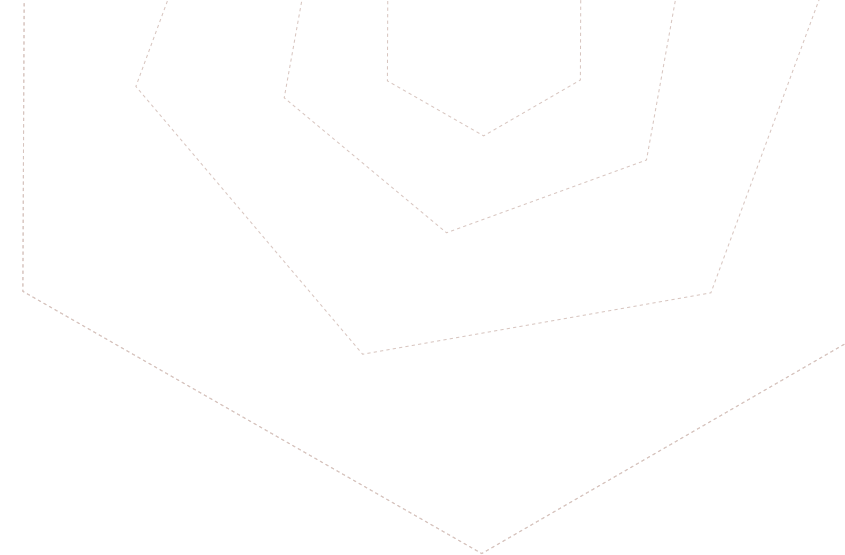


related policies, which had been identified together with various stakeholders (community members, local and national policy makers, representatives from parastatals, NGOs, and academics), and which will potentially lower household air pollution in Nairobi's slums. Applying the participatory system dynamics within a series of stakeholder workshops in Nairobi, they mapped and modeled the complex dynamics surrounding household air pollution and drew up possible policy options, showing the potentially high impact of redirecting investment toward household air quality monitoring and health impact assessment studies, thus raised the public's and the government's awareness and concern about this issue and its health consequences.

In the Kenyan county of Kisumu, the pattern of intersectoral and transdisciplinary approaches are taking root and finding expression. The Directorate of Climate Change has successfully launched the Kisumu County Climate Change Working Group, which discusses issues that cut across all sectors of development and engage in sharing knowledge from every sector on how climate change is to be mainstreamed as well as a monitoring and evaluation mechanism across the board. Further, the Climate Change Directorate

has a working relationship with the city in training the community on public engagement in waste management. The project is aimed at educating the communities, women, children, and youths on best practices in waste management, as well as collaborating with small enterprises who are engaged in collection and recycling of waste materials converting them to wealth/wealth creation opportunities.

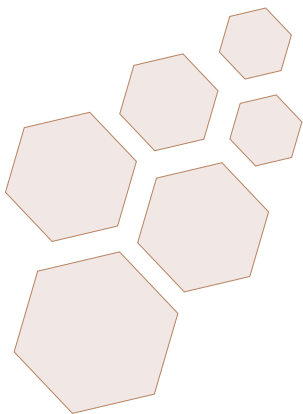
In sum, interdisciplinary and intersectoral collaborations in the generation and use of data for decision-making on policy and action addressing the social determinants of health can be anchored against the backdrop of the foregoing research and practice, more so in the search for pathways to achieving universal access to health care services. In identifying priorities and determining implementation investments, multisectoral action with participatory approaches that involve horizontal and vertical stakeholders at different levels of government and private sectors, NGOs and community groups should be the norm and guidepost to who is invited to the decision-making table.



6. 3-D Commission principles and recommendations

The 3-D Commission has developed a set of six principles applicable to all stakeholders engaged in improving population health. These principles elevate the importance of data-informed decision-making on SDoH and the need to promote increased demand for public and private investment in SDoH.

Additionally, the 3-D Commission has identified four core tactics that can be used when implementing data-informed decision-making on SDoH. These key recommendations support the translation of the principles into action.



6.1 3-D Commission principles



Principle 1:

Evidence-informed decision-making to promote healthy societies needs to go beyond health care and incorporate data on the broader determinants of health.

Decision-making that aims to improve the health of populations needs to look beyond the health care and health systems and actively seek to gather, analyze, and incorporate quality data on a broad range of the social determinants of health. These determinants encompass the systems and structures governing every aspect of people's daily life and much of what determines the general level of inequality in health outcomes across different subgroups of a population. Healthy societies are therefore the outcome of a cross-sectoral approach to health and development and there is a cost for not addressing the social determinants of health.



Principle 2:

All decisions about investments in any sector need to be made with health as a consideration.

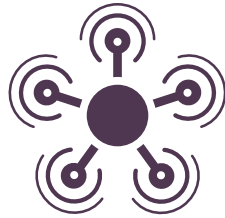
Population-level decisions in any sector that shape SDoH have ripple effects on the health and well-being of the population in implicit and explicit ways. It is therefore necessary to ensure the health outcomes are always considered in investment or divestment decisions, whether it is a matter of finance, human resources, time, public attention, or political power and access, among others. Population health and well-being as central goals of decision-making and governance can streamline and advance the synergies across various sectors and prioritize human capital and development. This requires developing incentives for non-health sectors to engage with health outcomes and ensure that those incentives advance the long-term goal of improving health.



Principle 3:

Decision-making that affects the health of populations needs to embrace health equity, while also acknowledging potential trade-offs between short- and long-term costs and benefits.

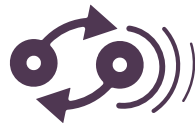
Decision-making can affect health directly, as in the provision of essential medical services, or indirectly, through affecting the social determinants of health. Direct effects may be of smaller magnitude but are immediate and more clearly and obviously linked to health. Indirect effects of decision-making may be far greater, with long-tail time frames that affect health over many decades, and persist across generations, improving or worsening health inequity. It is therefore important that all decision-making is informed by the potential costs and benefits of action to health, both in the short- and long-term, and centers health equity as a primary concern.



Principle 4:

All available data resources on the determinants of health should be used to inform decision-making about health.

Data on social determinants are spread across multiple sources such as population-level surveys and registry-based data; qualitative data such as narratives, case studies, ethnographies, document reviews, and observations; private sector-generated data such as consumer data, and internet data including social media data. This creates a need to invest in and develop efficient systems and technical capacity to harness those data. Use of data encompasses the need for correct interpretation of data, considering the nature of the data, credibility of the data sources, and limitations of the data. The level of data required should be commensurate with the level at which a decision is made. Local decision-making at county or district level requires data at that level while global policy requires global data.



Principle 5:

Data on the social determinants of health should contribute to better, more transparent, and more accountable governance.

Data need to be re-usable and accessible to the communities from where data are generated. This helps in transparency and enhances a sense of ownership. Data needs to be current to help both decision-makers and communities keep track of progress and improve accountability that aligns with decision-makers' responsibility for action. It is important to reflect that the values of decision-makers may not align with those of community-members, and a move toward data-informed transparent governance can at least surface these differences to the end of accountability to the populations whose health is being promoted.



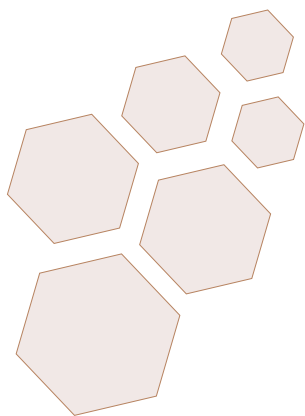
Principle 6:

Evidence-informed decision-making to promote healthy societies needs to be participatory and inclusive of multiple and diverse perspectives.

Community engagement and community leadership are necessary for a decision's ultimate success as communities often have insight that is key to point to interventions that best address their needs and build on the community's existing assets. Further, community engagement with the decision-making process creates a sense of ownership over both the process and the outcome of a decision and thus is more likely to promote its uptake, leading to greater community acceptance of a decision.

6.2 3-D Commission recommendations

- Relevant international, regional, national, and local entities, including funders, should **systematically collect and make available, in real time, quality data characterizing the full range of determinants of health—including, for example, education, housing, economics—to decision-makers and communities locally and nationally.**
- National governments should **develop transparent systems that collect data about the social determinants of health, and explicitly use these data in decision-making processes.**
- Relevant international, regional, national, and local entities, including funders, should **embed follow-through monitoring processes to ensure accountability for data-informed decision-making around health.**
- Relevant international, regional, national, and local entities, including funders, should **center community engagement in acquisition and interpretation of data and make such data widely available to relevant communities.**



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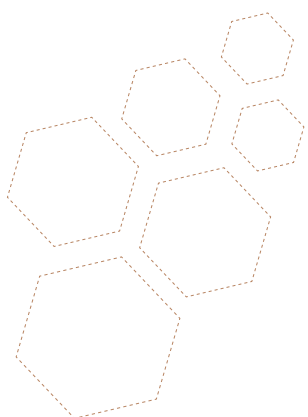
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What do people consider as important determinants of health? Findings from the 3-D Commission Multicountry survey – *Shaffi Fazaludeen Koya and Mark Hernandez*

Emerging global trends that will affect the role and distribution of social determinants – *Catherine Ettman*

A summary of commonly used SDoH frameworks – *Grace Robbins*

What determinants of health are guaranteed? – *Grace Robbins*

Global governance at the intersection of the political, commercial, and legal determinants of health – *Zahra Zeinali*

Planetary health supports strategies to address climate change-driven health impacts and their social determinants – *Montira Pongsiri*

Intersectionality as a lens to examine and act on SDoH – *Zahra Zeinali*

A systems thinking approach to addressing the social determinants of health – *Zahra Zeinali*

Defining big data – *Shaffi Fazaludeen Koya*

Data availability is key to track SDG progress – *Shaffi Fazaludeen Koya*

Decolonizing data: a case study of the Urban Indian Health Institute – *Grace Robbins*

The realities of decision-making on determinants of health that is informed by data – *Georges C. Benjamin*

Determinants, data, and decision-making underpin progress toward universal health coverage – *Jeffrey L. Sturchio*

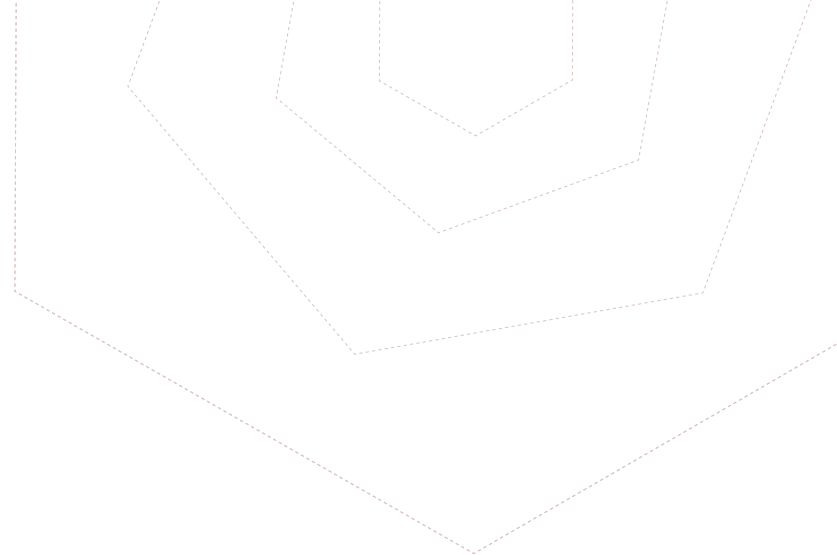
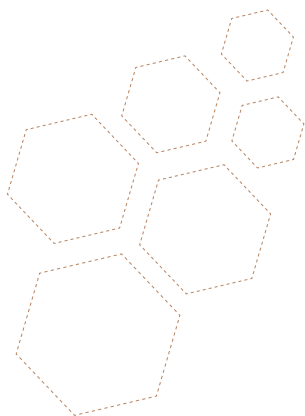
Using data on SDoH for policy decisions: evidence related to food and energy – *Shaffi Fazaludeen Koya*

Who gets a seat at the table? Integration of health across silos and sectors – *Blessing U. Mberu*

An example of multisectoral decision-making for health from Kenya – *Blessing U. Mberu*

Overcoming challenges to collecting data on SDoH: The 6Ts of data (report sub-section) – *Mollie McKillop and Kyu Rhee*

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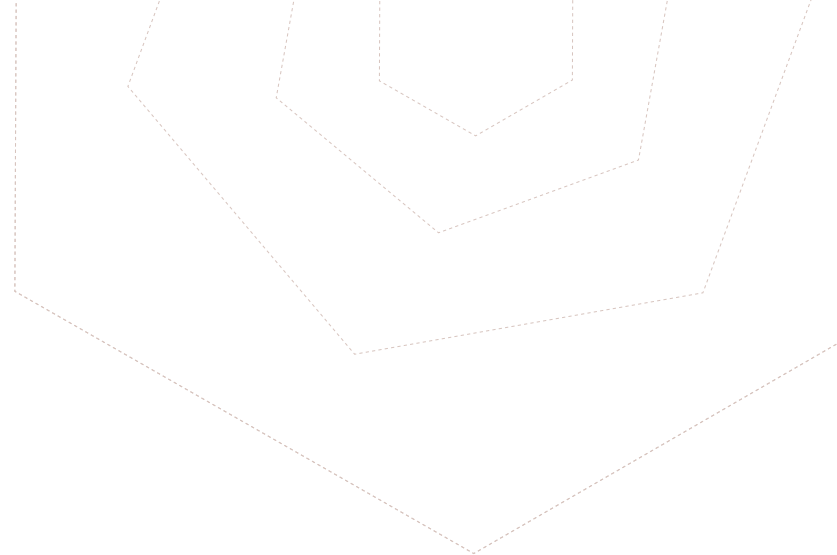
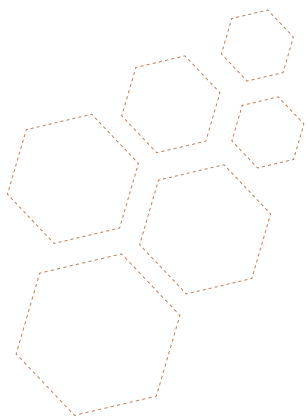
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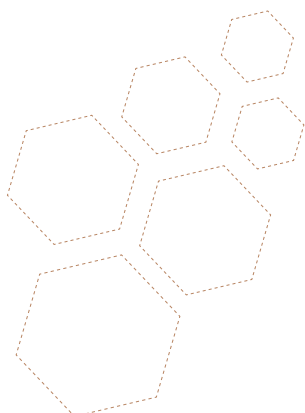
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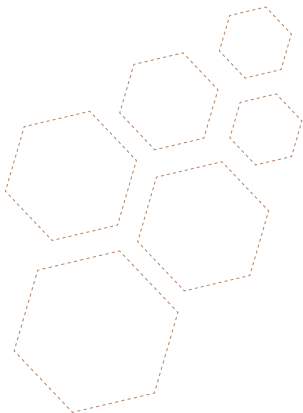
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