

Surveillance Advances
Progrès dans le domaine de la surveillance

Advancing the role of death investigations in surveillance

Faire progresser le rôle des enquêtes sur les décès pour la surveillance

April 30, 2024

12:00 – 1:00pm CT / 1:00 – 2:00pm ET

Speakers

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National Collaborating Centre
for Infectious Diseases
Centre de collaboration nationale
des maladies infectieuses



Public Health
Agency of Canada

Agence de la santé
publique du Canada



Land Acknowledgment: NCCID



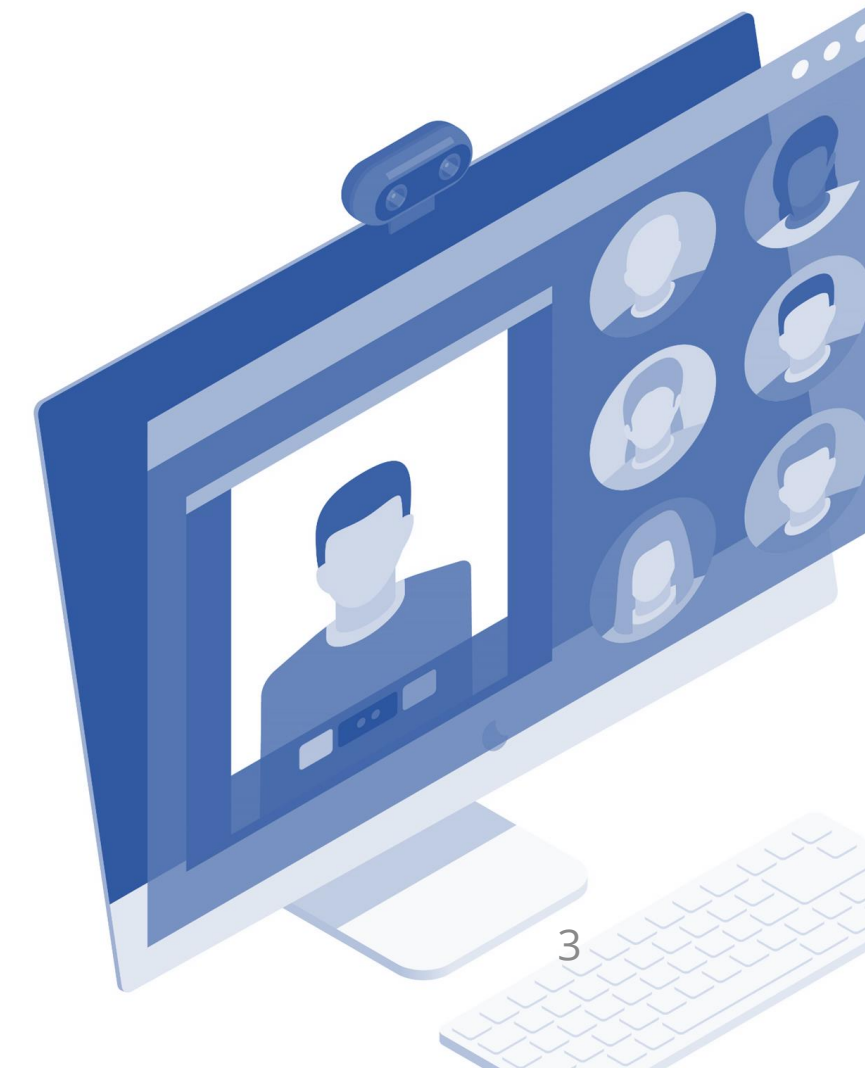
The National Collaborating Centre for Infectious Diseases is hosted by the University of Manitoba, on the original lands of Anishinaabe, Cree, Oji-Cree, Dakota and Dene peoples, and on the homeland of the Métis Nation.

At NCCID, we strive to honor the lands and their original caretakers in our work. We acknowledge that we are on Treaty One land. We recognize that this and other treaties, have been implemented as part of the process of colonization intended to benefit some while harming others. We are committed to working with our partners towards reconciliation.

Housekeeping



- Seminar recording and presentation slides will be available shortly after the seminar at the NCCID website: <https://nccid.ca/>
- If you have technical problems with Zoom, please email us at nccid@umanitoba.ca
- The chat box for participants has been disabled for this session. We will use the chat box to share additional information.
- Please use the Q&A tab to submit your questions for our speakers. You can “like” other people’s questions to push them up in priority



Accreditation



Surveillance Advances is a self-approved group learning activity (Section 1) as defined by the Maintenance of Certification Program of the **Royal College of Physicians and Surgeons of Canada**.

The seminar series is also approved by the Council of Professional Experience for professional development hours for members of the **Canadian Institute of Public Health Inspectors**.

If you would like a letter of participation, please complete the survey which will be shared after the seminar.



Land Acknowledgment: PHAC



I would like to take this time to acknowledge the land that I live and work on is the traditional territory of the Wendat, the Anishnaabeg, Haudenosaunee, Métis, and the Mississaugas of the Credit First Nation.

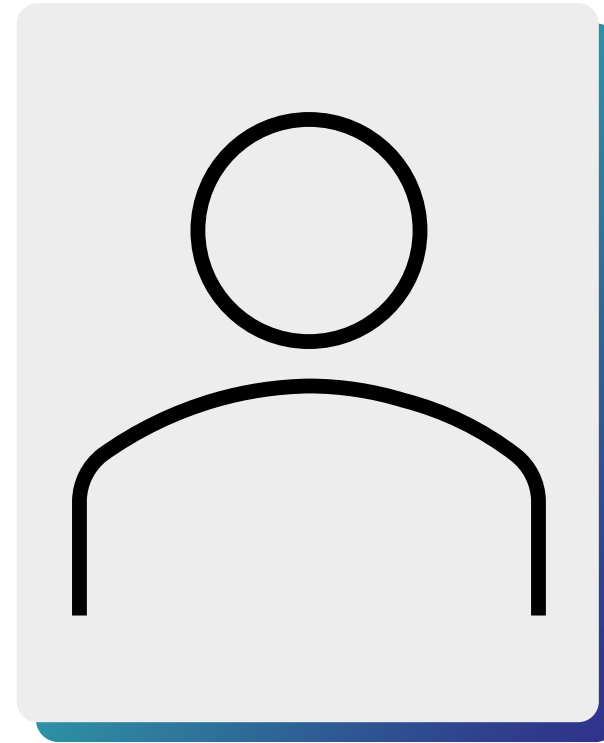
It is home to many First Nations, Métis, and Inuit peoples. I am grateful for the opportunity to share their home.

Today's speakers



Derek Scholten
MSc, Epidemiology and
Statistics

Senior Epidemiologist
Public Health Agency of
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Emily Schleihauf
M. Epidemiology

Public Health Officer and
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Dr. Christopher JL Murray
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Director | Professor, Chair of Health
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Death Investigation Data for Public Health Surveillance and Research

Derek Scholten

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Conflicts of interest

We have no conflicts of interest to declare



Learning Objectives

- Learn about death investigation in Canada and how data from death investigation findings are collected at the national level.
- Understand the origins and focus areas of the Chief Coroners, Chief Medical Examiners, and Public Health Collaborative.
- Learn how death investigation findings can be used for surveillance activities that can inform strategies to reduce preventable deaths.

Background

- Approximately 15% to 20% of all deaths are investigated by coroners and medical examiners
 - In Canada, medicolegal death investigation and its corresponding legislation are the jurisdictional responsibility of the provinces and territories (PT)
 - PTs have either coroner-based (YT, NT, NU, BC, SK, ON, QC, NB, PE) or medical examiner-based (AB, MB, NS, NL) systems
- Coroners and medical examiners investigate deaths that are unexpected, unexplained, or that occur by violence, for example:
 - Domestic homicides, suicides, substance-related toxicity deaths, fatal motor vehicle collisions, and infant, child, and maternal deaths
- Pan-Canadian public health surveillance seeks to use timely and comparable death investigation data to address evidence needs to inform prevention efforts.
- Death investigation data are collated nationally in the Canadian Coroner and Medical Examiner Database (CCMED) held by Statistics Canada (StatCan).

What is the CCMED?

- **CCMED** was established in 2008 at StatCan in collaboration with the 13 PT CC/CMEs and PHAC
- Contains data on over **500,000 records from 12 jurisdictions from 2006 – 2023**
- Data files are submitted to StatCan from the CC/CME offices and include:
 - Demographic variables (PT, age, sex, dates of birth/death)
 - Manner of death
 - Causes of death (text-based)
 - Other health conditions
 - Circumstances of death
 - Place of death/event
 - Safety information
 - Narrative (text-based)
- Represents just a portion of what is collected as part of a death investigation

System Challenges and Limitations

Issue: Challenges in the current system result in a lack of availability and timely access to comparable national mortality data on priority public health issues. This leads to an inability to consistently identify, evaluate, and monitor mortality trends at a national level, reducing the opportunity to inform intervention or prevention.

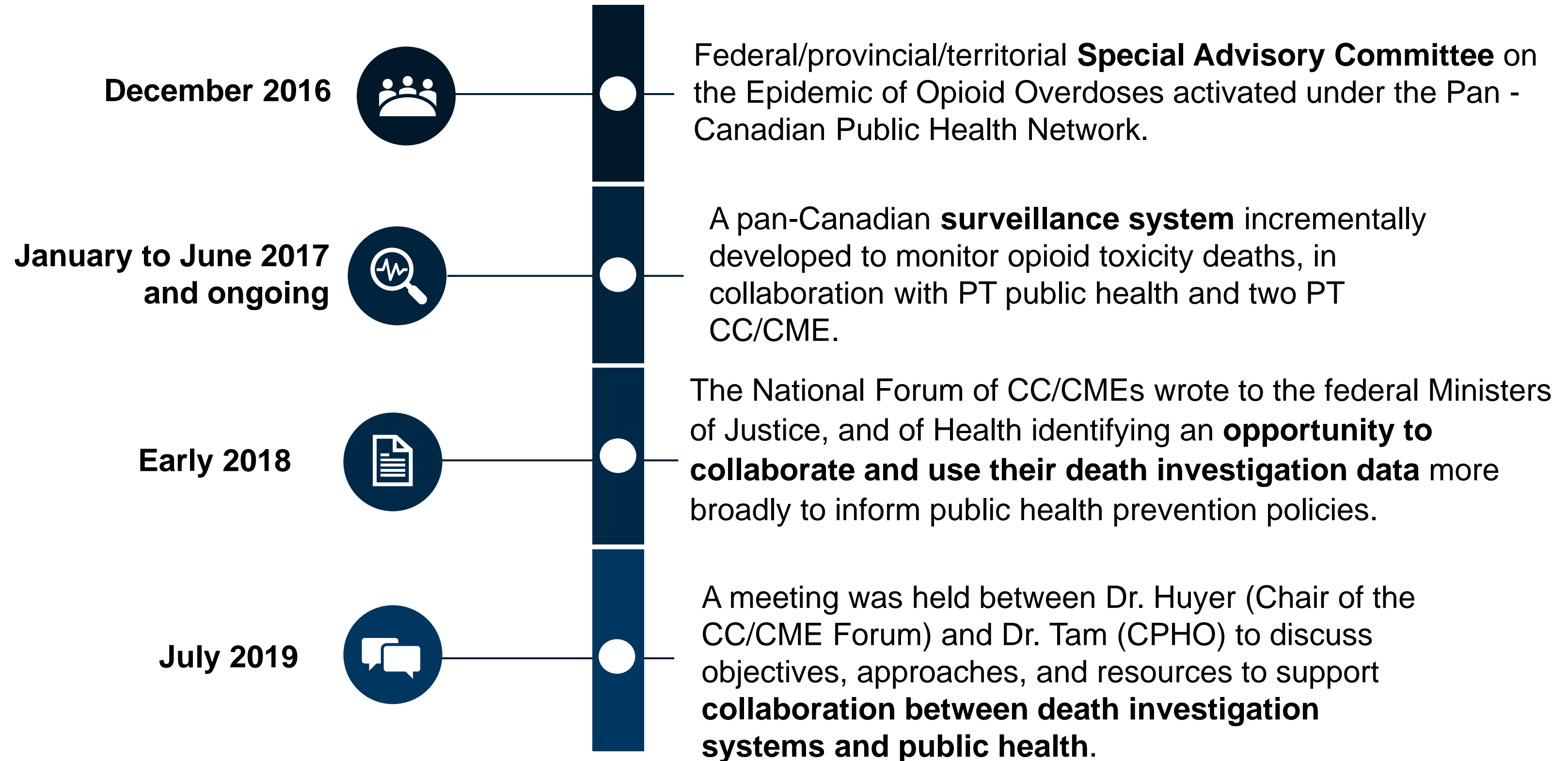
Death Investigation System Challenges

- Varied approaches to death investigation and data collection across PTs
- Limited resources in CC/CME offices for data management and surveillance activities
- CC/CME case management systems
 - Some paper-based processes, variety of systems across PTs, some not amenable to change

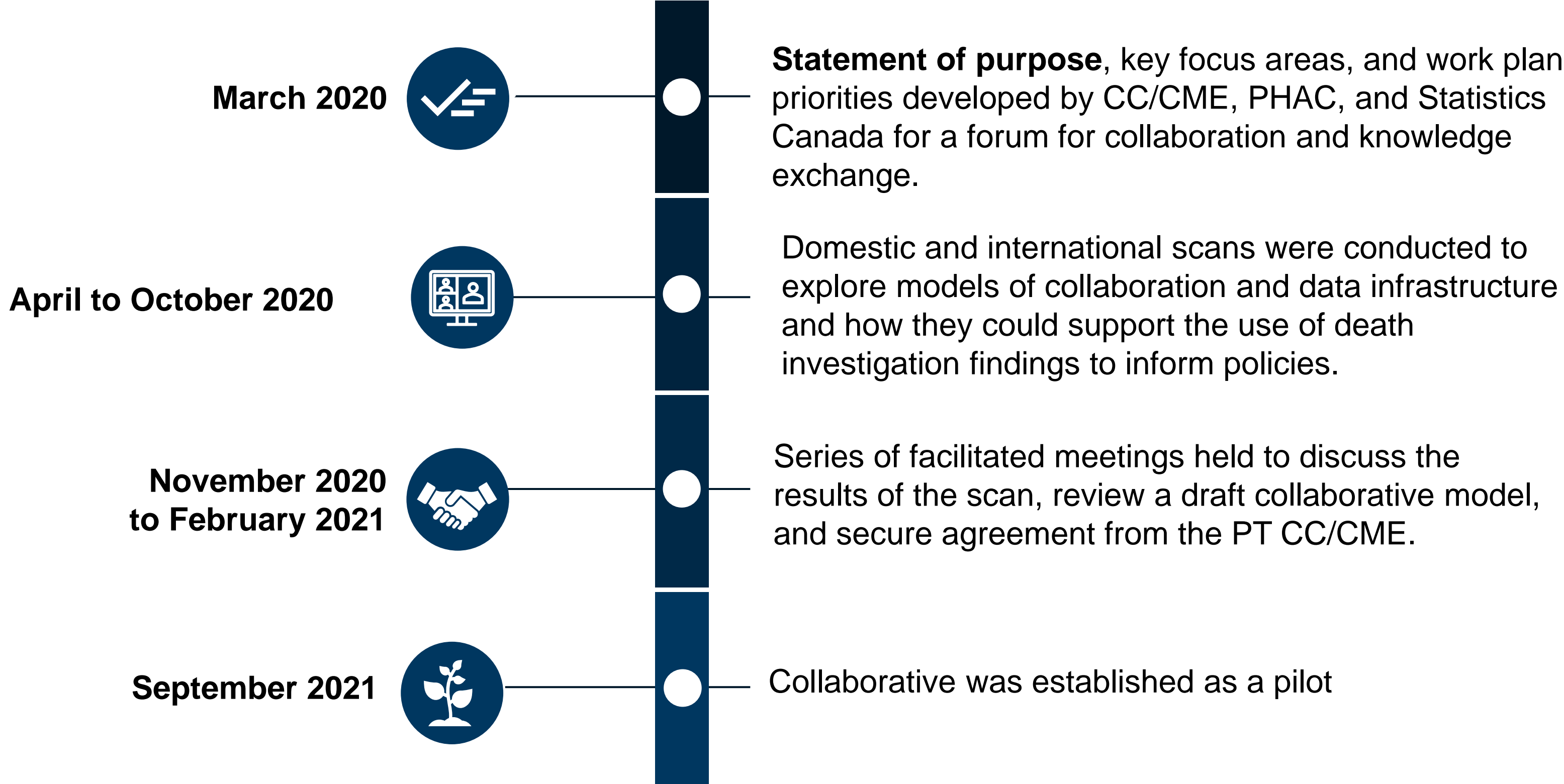
CCMED Limitations

- Lack of data comparability and completeness across PTs
- Lack of pan-Canadian coverage (no data sharing agreement with Manitoba)
- Limited timeliness (some PTs only submit deaths after investigations are closed)
- Delayed access (PHAC can only access released data files at this time)
- Not easily analyzed
 - Cause and circumstance information mostly text-based, lacking discrete data element to capture key circumstance information

Origins of the CC/CME-PH Collaborative – Key Events



Origins of the CC/CME-PH Collaborative – Key Events (Continued)



CC/CME-PH Collaborative

The CC/CME-PH Collaborative is a collaboration among provincial and territorial **CC/CMEs**, **PHAC** (technical secretariat), and **StatCan** (CCMED).

Vision: The CC/CME-PH Collaborative supports a vision where Canada has timely information from death investigations that can be used to identify trends, inform policy and prevention measures, and respond to emerging threats, all in the interests of reducing preventable deaths.

The CC/CME-PH Collaborative is working towards:

- More cohesive death reporting systems across the country and improved collection and reporting of timely and comparable data.
- A centralized national database with common data element sets on priority causes of preventable death to enable timely access by PTs, Government of Canada departments, researchers and media.
- Death prevention policies and measures have a strong evidence base, and create a more meaningful impact, with benefits across sectors, including justice, public safety and health.

Collaborating Office for Medical Examiners and Coroners, US CDC

- Similarly, in 2022 the US Centre for Disease Control and Prevention (CDC) developed the Collaborating Office for Medical Examiners and Coroners (COMEC) to bring together resources from across the CDC to help foster quality, consistency and coordination among public health surveillance efforts and the Medical Death Investigation communities

Collaborating Office for Medical Examiners and Coroners (COMEC)

<https://www.cdc.gov/nchs/comec/index.htm>

Current Status and Key Functions

Through Budget 2022, PHAC received three years of funding to move beyond the pilot stage of the Collaborative to a phased implementation including:

Establishing a technical secretariat within PHAC that provides **technical support** to facilitate development of common approaches and minimum data element sets

Supporting the augmentation of CCMED to receive data elements and improve timely access to data for public health

Improving capacity in CC/CME offices including the placement of PHAC Public Health Officers

Public Health Death Investigation Public Health Officer Stream Background

- Federal Budget 2022 funding also included a capacity building component for CC/CME offices - the placement of six Public Health Officers (PHO).
- PHOs provide epidemiology/analytical/data management capacity to their host CC/CME placement office and support joint federal/provincial/territorial (FPT) priorities established under the Collaborative (e.g. subgroup participation).
- This new stream of PHOs, referred to as the Public Health Death Investigation (PHDI) Stream, was launched in December of 2022 with funding to support placement until March 2025.
- The PHDI PHO stream is coordinated by
 - The Canadian Public Health Service a public health system capacity-building program that recruits, hires and places PHOs (largely epidemiologists and public health nurses) in host organizations across Canada in support of joint FPT public health priorities, and
 - The CC/CME-PH Collaborative secretariat, providing PHO's mentorship, technical support, coordination with Collaborative activities and knowledge exchange opportunities among PHOs.

Current Priorities of the Collaborative

The Collaborative has established several subgroups that are working to develop:

- **Data elements sets** and **common approaches** to death investigation that promote consistency and facilitate more comparable data to inform prevention strategies/policies

Current priorities:

- Substance-related toxicity deaths
- Suicide deaths
- Exploring methods to capture information on:
 - Populations that are disproportionately affected due to existing health and social inequities (those with unstable housing, Indigenous populations, members of 2SLGBTQIA+ communities, and
 - Race and ethnicity



Surveillance Activities Using Death Investigation Data



Pan-Canadian Surveillance on Apparent Opioid and Stimulant Toxicity Deaths

Federal/Provincial/Territorial Governance Context

- **December 2016** : Federal/provincial/territorial (FPT) Special Advisory Committee on the Epidemic of Opioid Overdoses (SAC) established within the Public Health Network Council (PHNC) structure
 - Time-limited mechanism to provide advice to the Conference of FPT Deputy Ministers of Health and act as a forum for public health collaboration
 - Included PT Chief Medical Officers of Health (CMOHs), Chief Public Health Officer (CPHO), and Assistant Deputy Ministers
- **January 2017**: Task group under SAC established: **Substance-related Mortality and Surveillance Task Group (SOMS-TG)**
 - Provides strategic, operational, and technical advice/recommendations regarding public health surveillance to monitor substance-related harms
 - Mandate includes implementing pan-Canadian data collection, collation, synthesis, and information-sharing

Apparent Opioid and Stimulant Toxicity Death Surveillance

- The SOMS-TG collaborated with PT public health and Chief Coroners/Chief Medical Examiners to develop a surveillance system that was initiated in 2017

Surveillance Objective

- To compile data from provincial/territorial Chief Coroners and Chief Medical Examiners on apparent opioid and stimulant toxicity deaths and their distribution by person, place, time, manner of death and the substances involved, and produce and disseminate descriptive summaries on a quarterly basis, in order to address the stated surveillance purposes:
 - Describe the distribution of substance-related acute toxicity deaths across Canada for priority substances
 - Monitor changes in occurrence and distribution of substance-related acute toxicity deaths
 - Facilitate federal, provincial/territorial, and local government and health systems action

Evolution of Data Elements Included in Surveillance

2017

2024

Minimal opioid-related mortality data
(overall numbers, age, sex distribution and fentanyl)

Additional details on substances involved
(more specific categories)

Addition of origin of opioids
(pharm vs. non-pharm)

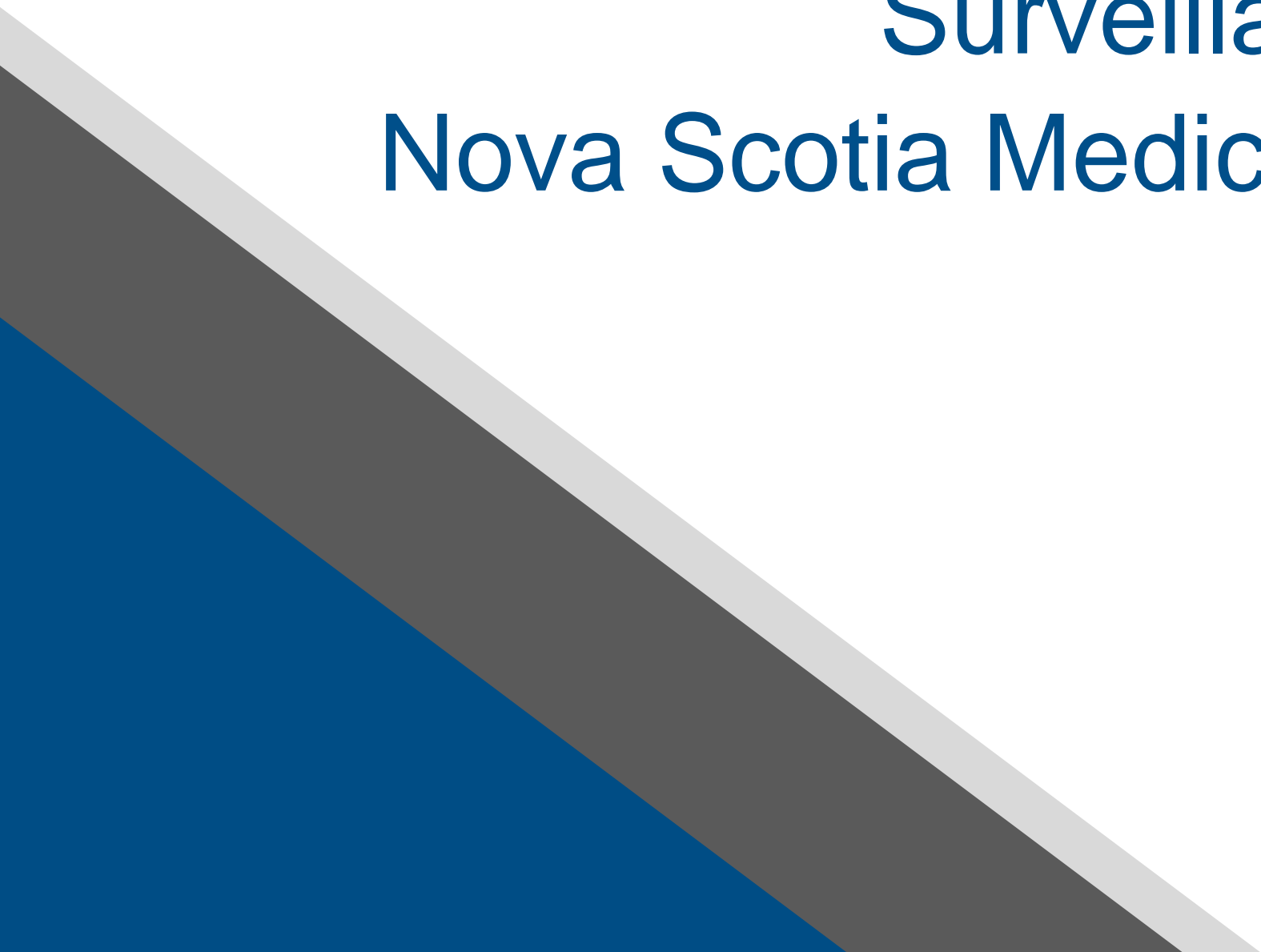
Addition of stimulant toxicity data

Addition of multivariate stratifications
(age by sex, sex by type of opioids, etc.)

Note: National surveillance also includes Emergency Medical Services (EMS), Emergency Department and Hospitalization data sources

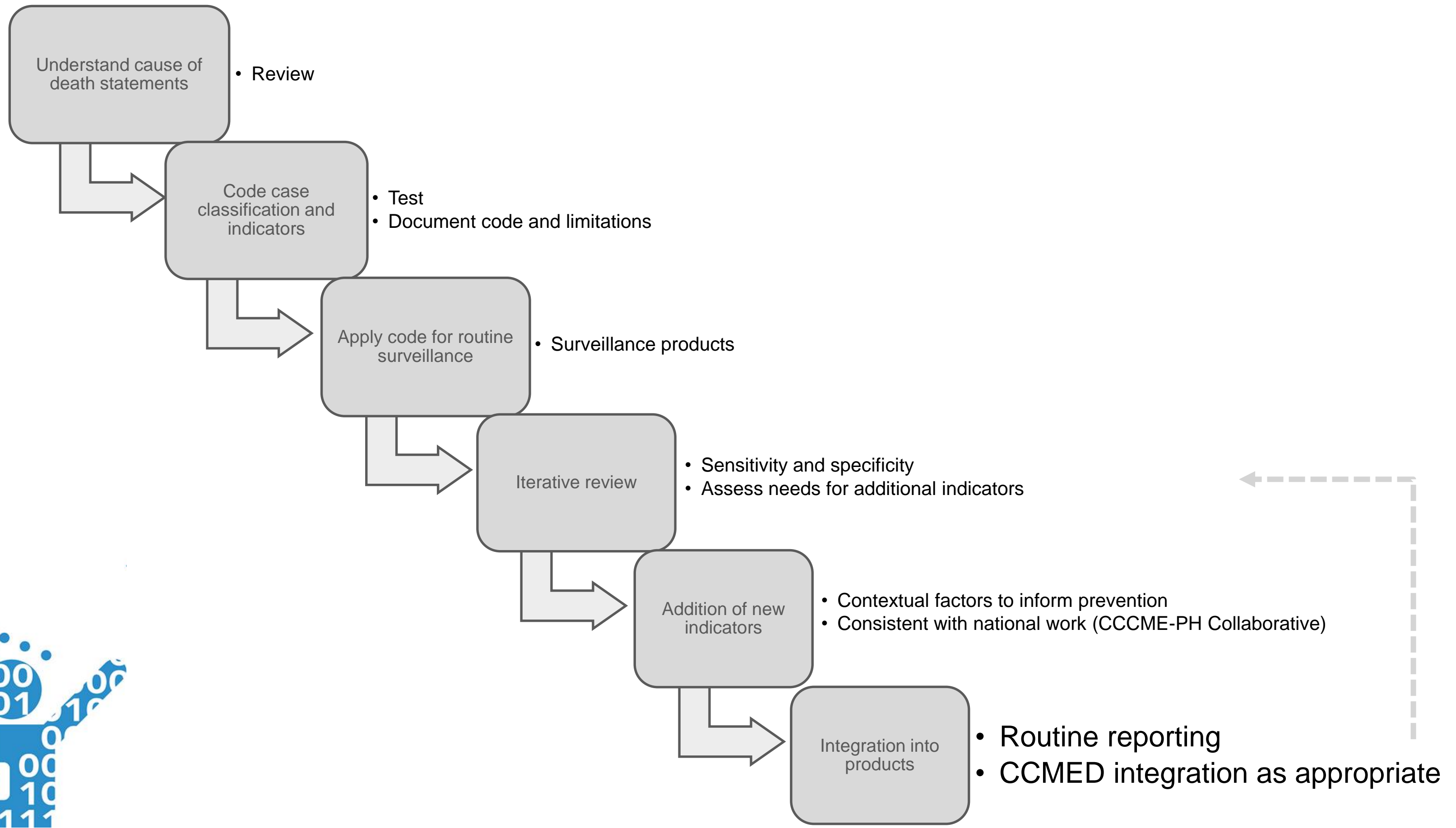
Surveillance and Products – Opioid and Stimulant Toxicity Deaths

- Since June 2017, there have been **29** successful quarterly data releases, which are posted on Health Infobase.
- The resulting quarterly surveillance activities contribute to various deliverables that help inform and support policy and programs:
 - [Health Infobase](#): an online "data exploration tool". Public facing method to share results of surveillance
 - [Ministers' statement](#) and associated social media posts on X (formerly Twitter)
 - [Joint statement](#) by co-chairs of the F/P/T Special Advisory Committee on the Epidemic of Opioid Overdoses
 - Health Canada's webpage ([Federal actions on the overdose crisis](#))
 - [Modelling brief reports](#) prepared by PHAC's Substance Related Harms Division
 - Context for other departmental work, including Health Canada's Drug Analysis Service



Surveillance Activities in the Nova Scotia Medical Examiner Service (NSMES)

Systematic public health surveillance: evidence from the medical examiner to support prevention



NS Examples: Outputs from the Medical Examiner Service

- Current publicly available surveillance information:
 - Data story on suicide mortality
 - » Trends over time and space, age group and sex, suicide methods, and dimensions of deprivation
 - Data tables and visualizations describing drug toxicity mortality
 - » Trends over time and space by drug type, age group and sex, living situation of decedent, whether others were present and/or aware decedent had used substances, place of toxicity event
- Upcoming reporting:
 - Trends in mortality in <25 year age group; all causes for cases investigated at NSMES
 - » Supporting the work of the Child Death Review Committee: annual report and recommendations
 - Trends in motor vehicle driver deaths by drugs detected
 - » Stakeholders in justice and public health

Mortality surveillance supported by the NSMES

1. Timeliness

- » Testing for any association between suicide mortality and pandemic measures
- » Detection of any increase in toxicity deaths through monthly surveillance updates

2. Accuracy/specificity of causes/types of deaths

- » Ability to monitor methamphetamine deaths prior to addition to ICD (International Classification of Diseases)

3. Contextual information

- » Living situation of decedents who died due to drug toxicity
- » Associations between structural and social determinants of health and suicide, homicide
- » Activity at time of death and swimming ability reported in drowning deaths
- » Deaths directly related to climate and/or disaster events
- » Risk and protective factors associated with infant deaths where cause of death was undetermined

Mortality surveillance supported by the NSMES

Original quantitative research

Suicide and drug toxicity mortality in the first year of the COVID-19 pandemic: use of medical examiner data for public health in Nova Scotia

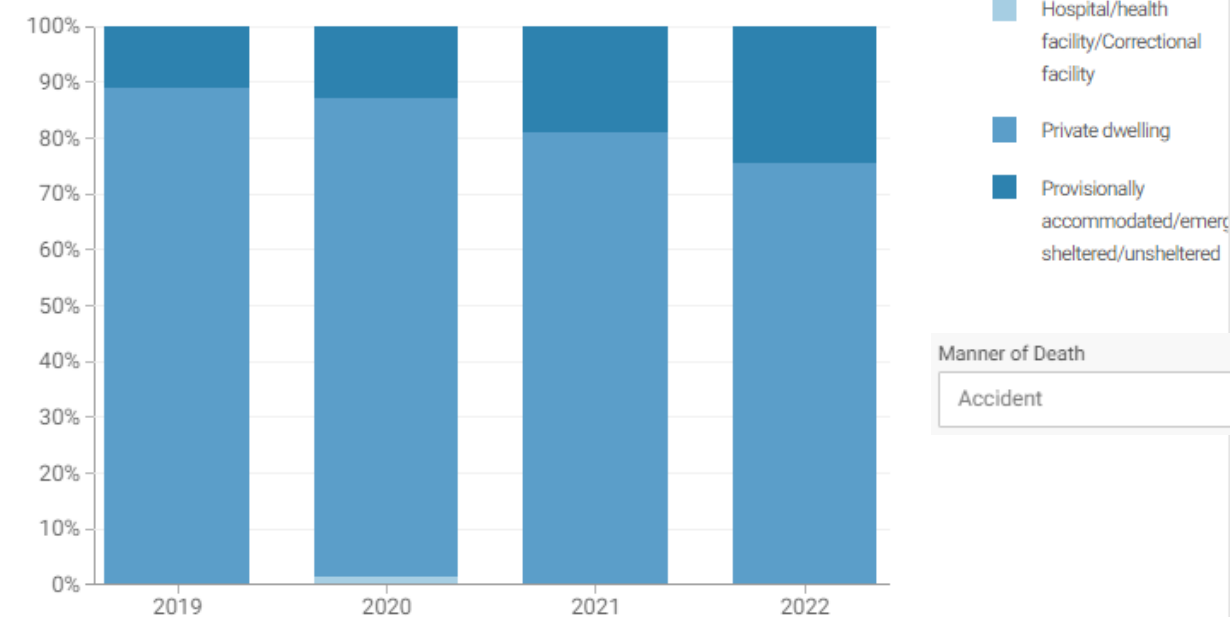
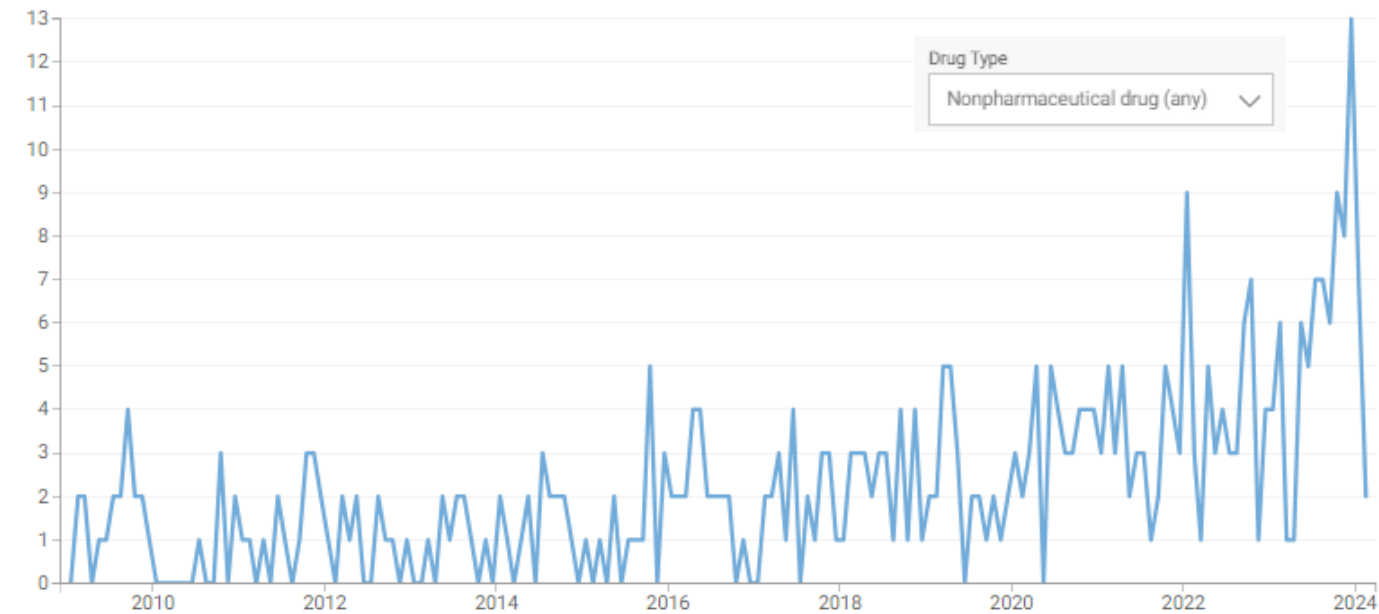
Highlights

- Unintended consequences of the COVID-19 pandemic and the resulting regulations and policies may include increased suicide and/or drug toxicity mortality.
- Suicide mortality decreased during the first year of the pandemic, a finding that was in agreement with international findings and was not related to reporting lags.

[Suicide and drug toxicity mortality in the first year of the COVID-19 pandemic: use of medical examiner data for public health in Nova Scotia - Canada.ca](#)

Drug toxicity mortality: sample indicators

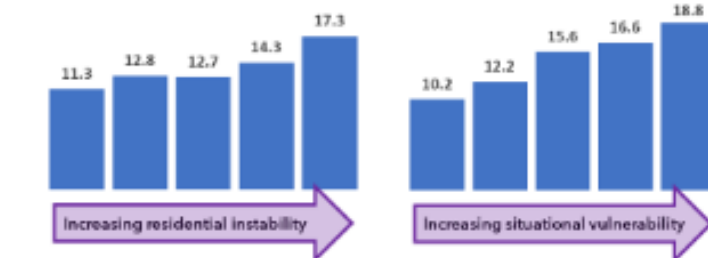
[Numbers and rates of substance-related fatalities in Nova Scotia | Open Data | Nova Scotia](#)



Suicide rates across communities with different characteristics

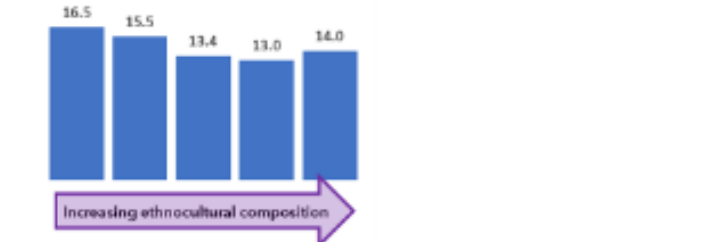
To look at differences in suicide rates across communities which have similar demographic and socioeconomic compositions, the [Canadian Index of Multiple Deprivation \(CIMD\)](#) can be used. The CIMD groups areas together based on similarities in dimensions of deprivation, including residential instability and situational vulnerability. Areas can be grouped into five levels (or quintiles) of residential instability and five levels (or quintiles) of situational vulnerability. More information about these composite measures based on census data is available through [Public Canada](#). For these two measures, based on 10 years of mortality data, there was an increasing trend in suicide rates from the most stable to least stable, for both the residential instability dimension, and from the least vulnerable to most vulnerable, for the situational vulnerability dimension.

Mean Annual Suicide Mortality Rate per 100,000 population, NS, 2012-2021, by CIMD quintiles



Another CIMD dimension looks at a measure named 'ethno-cultural composition'. This dimension did not show the same pattern in suicide rates as the previous two dimensions. For this dimension, increased ethno-cultural composition was not associated with the highest suicide rates. The communities which ranked lowest for ethno-cultural composition had the highest suicide rates.

Mean Annual Suicide Mortality Rate per 100,000 population, 2012-2021, NS, by CIMD quintiles



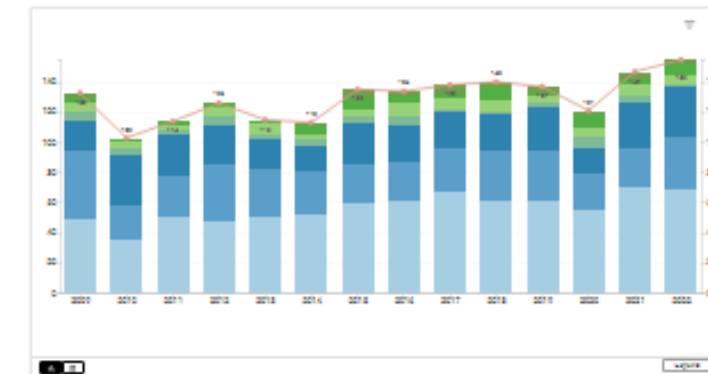
These composite measures can inform discussions on societal and community-level life promotion and suicide prevention activities. While these census-derived dimensions come from a lens of community deprivation, community strengths can be observed.

Methods of suicide in our province and what it means for suicide prevention

One of the ways to prevent suicide is limiting access to lethal means for a person at risk of suicide. Involvement in means restriction. The Harvard School of Public Health found that limiting access to lethal weapons is especially important if the person is experiencing a short-term crisis. [\(https://www.hsph.harvard.edu/means-restriction/\)](#) Reducing access to lethal means such as guns and large volumes of medication is important when someone is feeling suicidal. Some lethal means are difficult to monitor because of their widespread availability.

In Nova Scotia, hanging is the most common method of suicide death, and this lethal means is not something that can be removed or restricted in most settings (an exception may be institutional settings). The graph below shows suicide deaths in Nova Scotia by suicide method by year.

Annual Frequencies of Suicide Deaths by Suicide Method



It is important to recognize that means restriction is a small piece of a larger suicide prevention and risk reduction strategy. Considering more upstream measures that address the social and economic factors that can lead to or contribute to suicide risk together with concrete that support life promotion is an important part of Nova Scotia's Suicide Prevention and Risk Reduction Framework.

Suicide is complex

The Nova Scotia mortality data tells us an important story of how suicide can vary across individual and community factors. Suicide prevention efforts should consider these factors. Suicide prevention efforts need to go beyond individual-level interventions. In addition to clinical treatments, suicide prevention and risk reduction includes prevention that happens at the community and societal levels. Prevention strategies can include increasing financial and housing stability, poverty reduction strategies, reducing stigma and discrimination, and increasing community belonging. Historical injustices, systemic discrimination and racism, and the impacts of intergenerational trauma need to be addressed.

In addition to considering how individuals can more easily access clinical interventions, using a public health approach allows us to focus on societal contexts and prevention strategies that impact communities. This approach will improve not only the health of individuals but also the health of populations. Life promotion is a broad term that includes factors that help people build resilience before a crisis happens. Taking a life promotion approach allows for focus on preventing suicide before people are in crisis and to understand and address a broad range of risk and protective factors.

While mortality data were the focus here, further information from several sources can contribute to understanding suicide prevention and life promotion. Sources may include health care utilization data, or visits to the health care system, and surveys of the population.



Nova Scotia: Public reporting of mortality surveillance

- Multiple stakeholders benefit from the information shared
 - Public Health and health system partners
 - Office of Addictions and Mental Health
 - Justice and social services partners
 - Community-based organizations
 - Media
- Release of data and information through the NS Open Data platform
 - Includes data tables and visualizations
 - Proactive, transparent, accessible, supports research
 - Data release process follows guidelines to mitigate risks of individual, attribute, and community disclosure

Key messages from today



- The CC/CME-PH Collaborative is an innovative, cross-sectoral initiative among federal, provincial and territorial partners working to improve the timeliness and comparability of death investigation data
- Findings from death investigation data are an important source of information for public health surveillance and research to inform public health strategies to reduce preventable deaths
- The timeliness, specificity and contextual information made available for public health surveillance will better inform prevention activities

Thank you

Collaborative email:

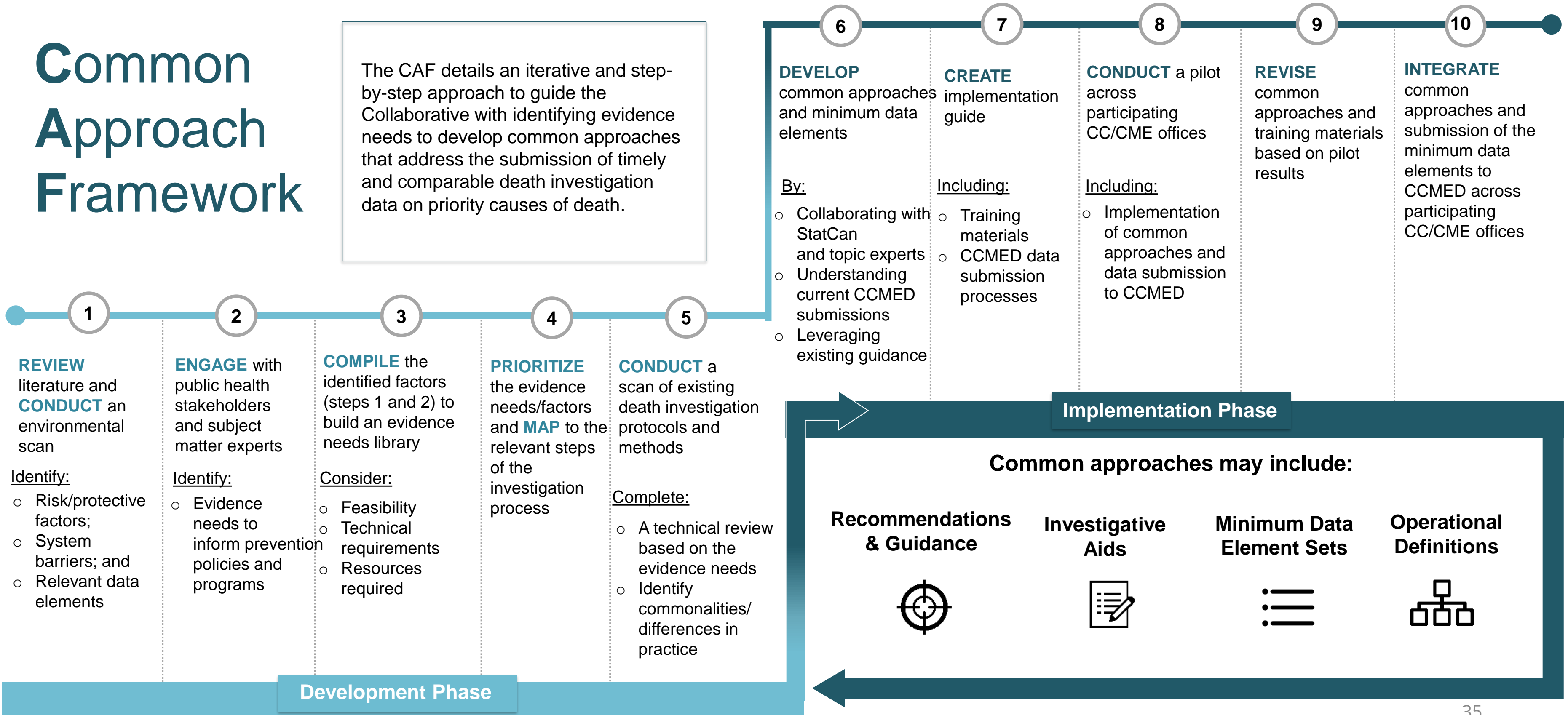
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Appendix

Common Approach Framework

Common Approach Framework

The CAF details an iterative and step-by-step approach to guide the Collaborative with identifying evidence needs to develop common approaches that address the submission of timely and comparable death investigation data on priority causes of death.



1

REVIEW literature and **CONDUCT** an environmental scan

Identify:

- Risk/protective factors;
- System barriers; and
- Relevant data elements

2

ENGAGE with public health stakeholders and subject matter experts

Identify:

- Evidence needs to inform prevention policies and programs

3

COMPILE the identified factors (steps 1 and 2) to build an evidence needs library

Consider:

- Feasibility
- Technical requirements
- Resources required

4

PRIORITIZE the evidence needs/factors and **MAP** to the relevant steps of the investigation process

Complete:

- A technical review based on the evidence needs
- Identify commonalities/differences in practice

5

CONDUCT a scan of existing death investigation protocols and methods

6

DEVELOP common approaches and minimum data elements

By:

- Collaborating with StatCan and topic experts
- Understanding current CCMED submissions
- Leveraging existing guidance

7

CREATE implementation guide

Including:

- Training materials
- CCMED data submission processes

8

CONDUCT a pilot across participating CC/CME offices

Including:

- Implementation of common approaches and data submission to CCMED

9

REVISE common approaches and training materials based on pilot results

10

INTEGRATE common approaches and submission of the minimum data elements to CCMED across participating CC/CME offices

Implementation Phase

Common approaches may include:

Recommendations & Guidance



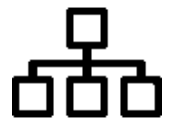
Investigative Aids



Minimum Data Element Sets



Operational Definitions



Development Phase



Institute for Health
Metrics and Evaluation

Global Burden of Disease 1990-2021: Implications for surveillance

April 30, 2024

Christopher Murray


Outline

- **What is the GBD**
- Death registration
- Causes of Death
- Subnational burden experience

What is the GBD?

- GBD study is a systematic, scientific effort to quantify the magnitude of all major diseases, risk factors and intermediate clinical outcomes.
- **“Rules-based evidence synthesis for global health”**
- The first GBD study began in 1991 for eight regions 106 conditions and ten risk factors, 5 age groups for the year 1990.
- The GBD 2021 estimates for each year from 1990 to the present for 371 diseases and injuries, as well as 3,499 clinical outcomes (sequelae) related to those diseases and injuries, for 204 countries and territories and for subnational units in 21 countries.

The Global Burden of Disease Study at 30 years

Christopher J. L. Murray^{1,2} 

The Global Burden of Disease Study (GBD) began 30 years ago with the goal of providing timely, valid and relevant assessments of critical health outcomes. Over this period, the GBD has become progressively more granular. The latest iteration provides assessments of thousands of outcomes for diseases, injuries and risk factors in more than 200 countries and territories and at the subnational level in more than 20 countries. The GBD is now produced by an active collaboration of over 8,000 scientists and analysts from more than 150 countries. With each GBD iteration, the data, data processing and methods used for data synthesis have evolved, with the goal of enhancing transparency and comparability of measurements and communicating various sources of uncertainty. The GBD has many limitations, but it remains a dynamic, iterative and rigorous attempt to provide meaningful health measurement to a wide range of stakeholders.

The Global Burden of Disease Study (GBD) is a systematic, scientific effort to quantify the magnitude of all major diseases, risk factors and intermediate clinical outcomes in a highly standardized way, to allow for comparisons over time, across populations and between health problems. The first GBD began in 1991 and led to the first results being published in 1993, which documented for eight regions the burden of disease for 106 conditions and ten risk factors, broken down into five age groups for the year 1990. The GBD now provides estimates for each year from 1990 to the present for 371 diseases and injuries, as well as 3,499 clinical outcomes (sequelae) related to those diseases and injuries, for 204 countries and territories and for subnational units in more than 20 countries. The full time series produced in each round of the GBD is updated on an annual basis^{1,2}, although the coronavirus disease 2019 (COVID-19) pandemic has delayed the release of the next GBD assessment. Since serialization in 2010, 1,842 publications on the GBD have appeared in the scientific literature.

Although there are many efforts in many countries to measure outcomes relating to single diseases or risks or groups of these, the GBD stands apart because of some core principles consistently applied over the last 30 years. Beginning in 1991, when the first GBD was undertaken as background work for the *World Development Report 1993: Investing in Health*³, the GBD was committed to the principles of best estimates, comprehensive accounting, comparable measurement, summary measures of fatal and non-fatal health outcomes and thoughtful and repeated assessment of face validity of findings. In this Perspective, we reflect on lessons learned from 30 years of the GBD. We begin by reviewing the core principles, and then we examine the universe of data for tracking health, the ongoing evolution of the statistical methods to support the GBD, the history of the broader GBD collaboration and some key future directions for the effort.

Core principles

Best estimates. The GBD estimates each quantity of interest for every location. Even when data are highly inconsistent or there are no data for a disease or risk, a best estimate is produced along with our best estimate of uncertainty. The logic is that decisions have to be made, and a best estimate borrowing insight from where data are available is better than no estimate, provided that there is clarity around the level of uncertainty. All too often, 'no data' has

been historically equated to 'no problem', biasing prioritization and agenda-setting toward diseases, injuries and risk factors for which data have been collected and/or advocacy groups exist. This commitment to best estimates has catalyzed a continuous search for better global data (volume, veracity, variety and timeliness are all prized) as well as continuous efforts for better statistical estimation methods to deal with missing data and conflicting data that inevitably remain. It also sharply distinguishes the GBD from many government or intergovernmental efforts both in health and in other social sectors and remains the most frequently misunderstood part of the GBD.

Comprehensive accounting. This second core principle applies across diseases, injuries and risks. Comparable information on the magnitude of different health problems provides an objective framework to help establish health priorities and, importantly, can also provide important insights into what topics may be neglected. In the 1990s, the GBD finding that the burden of mental health disorders was substantial relative to infectious diseases, heart disease and cancer prompted the World Health Organization (WHO) and many countries to devote more policy attention to these neglected problems⁴. A high-level view of the comparative magnitude of health problems has also highlighted the rapidity of the epidemiological transition in many middle-income (and former low-income) countries where the profile of burden has shifted from communicable, maternal, neonatal and nutritional deficiencies to non-communicable diseases and injuries⁵. In more recent years, this principle has had increasing benefits as this comprehensive estimation has become a somewhat unique resource, in allowing the holistic forecasting of population health effects in an ever more rapidly changing and challenged world.

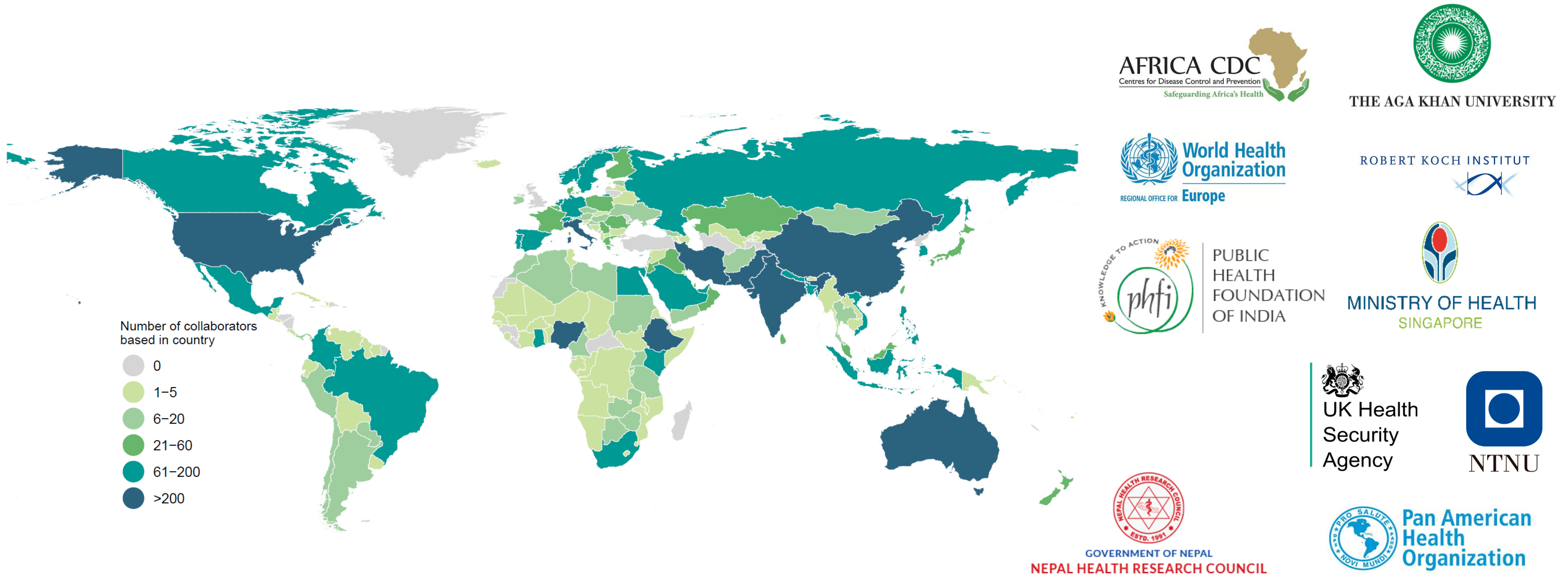
Comparability of measurement. Comprehensive accounting requires a focus on comparability of measurement. Many authors and statistical authorities have argued that the most important comparisons are within a country; but, from the beginning of the GBD, we have seen the value of emphasizing comparability over time and across place. Decision-makers who use the GBD results are drawn to understanding why their community may have a larger or smaller burden from a condition or, even more importantly, faster or slower rates of decline or increase in a disease, injury or risk factor.

¹Institute for Health Metrics and Evaluation, University of Washington, Seattle, WA, USA. ²Department of Health Metrics Sciences, School of Medicine, University of Washington, Seattle, WA, USA. ³e-mail: cjlm@uw.edu

Murray CJL. The global burden of disease study at 30 years. *Nature Medicine*. October 2022.

GBD collaboration

A health metrics ecosystem comprised of over **11,969 Collaborators** in **163 countries and territories**



Global Health Data Exchange (GHDx)

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Search

GHDx data source evolution:

NID is a unique identifier for a source of data e.g. FAO Food Balance Sheets would have a unique NID.

Some NIDs cover more than one country and thus produce many data points

GBD Compare: on-line tools providing access to detailed results, www.healthdata.org

Home > Data tools and practices > Interactive data visuals

GBD Compare

Updated October 15, 2020

Topics

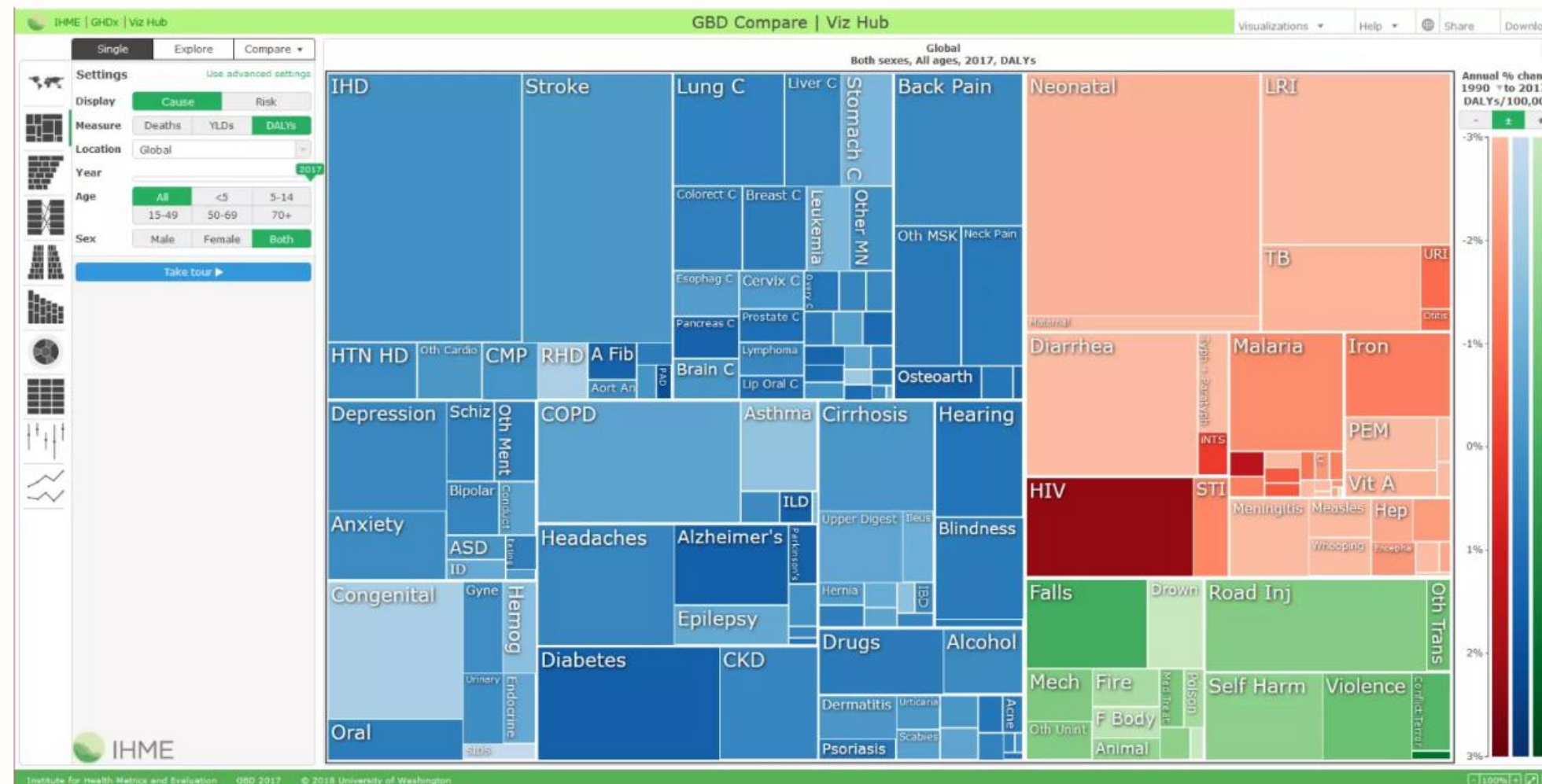
DISABILITY

RISK FACTORS

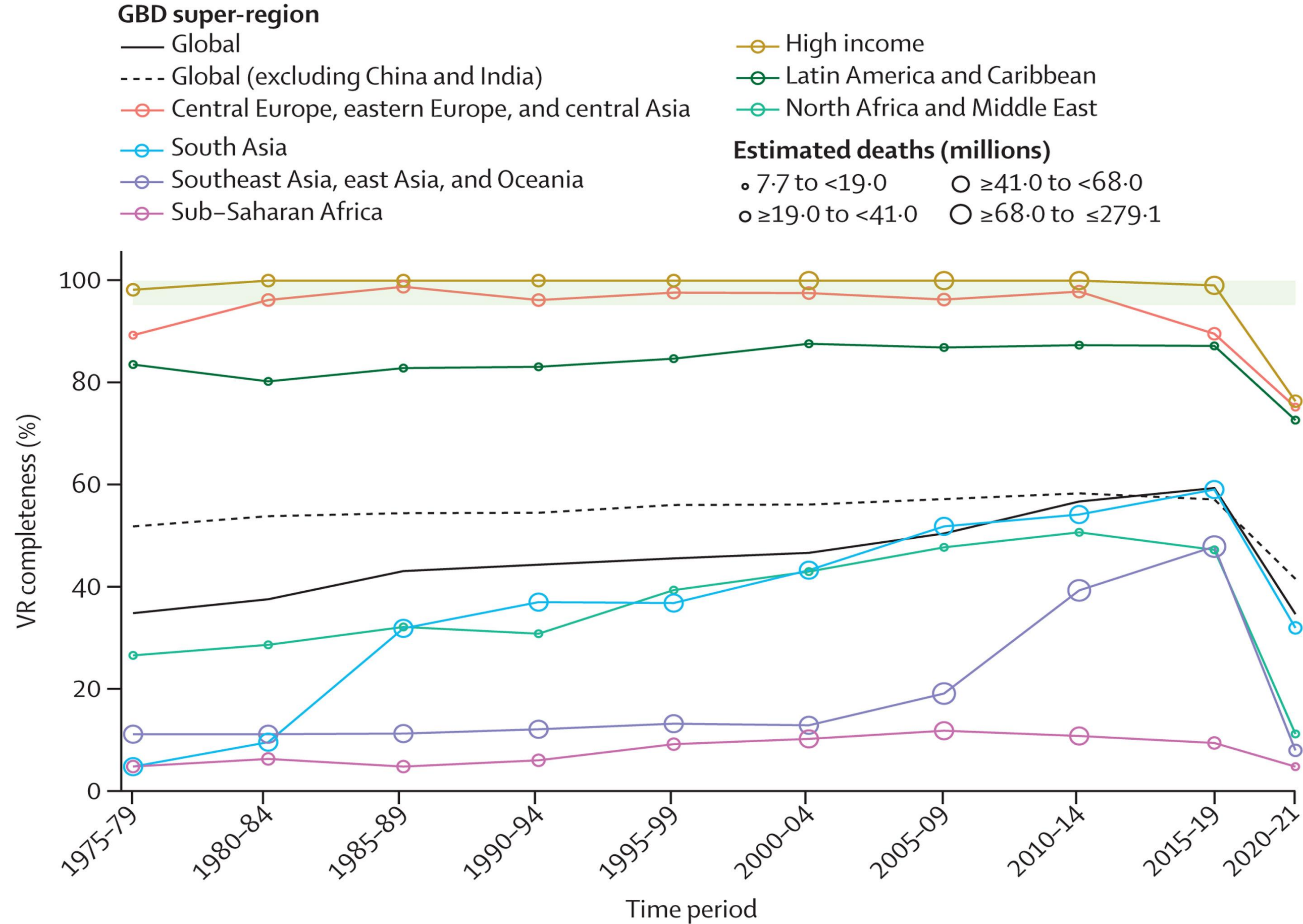
INJURIES

Locations

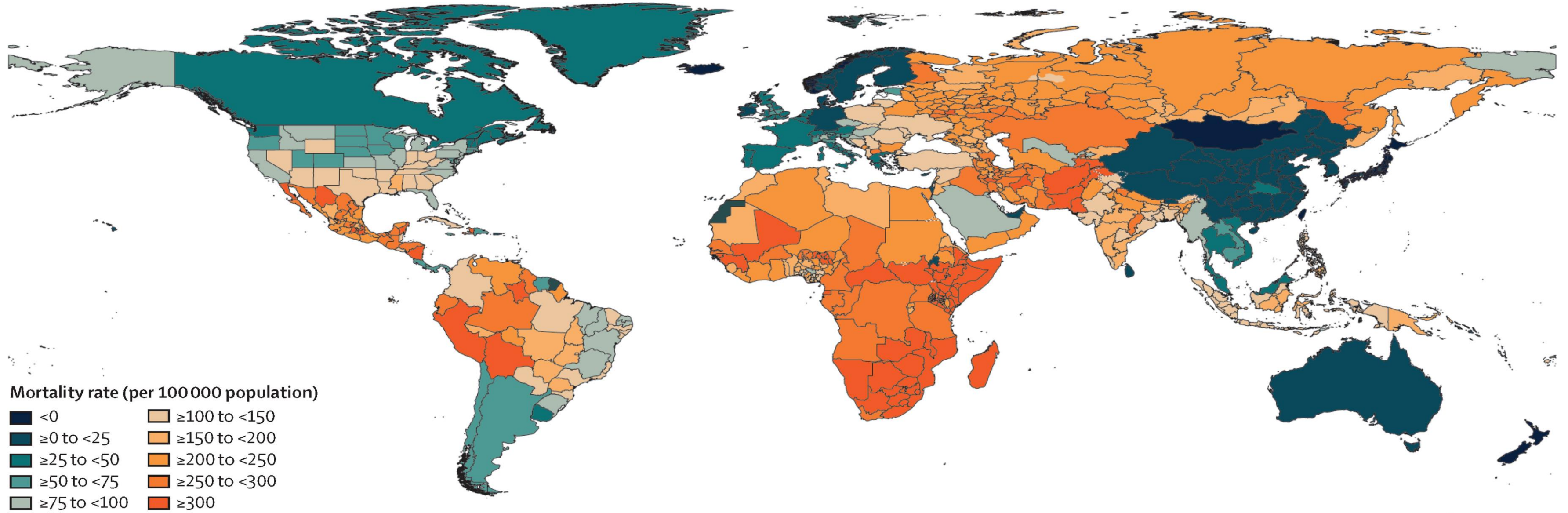
GLOBAL



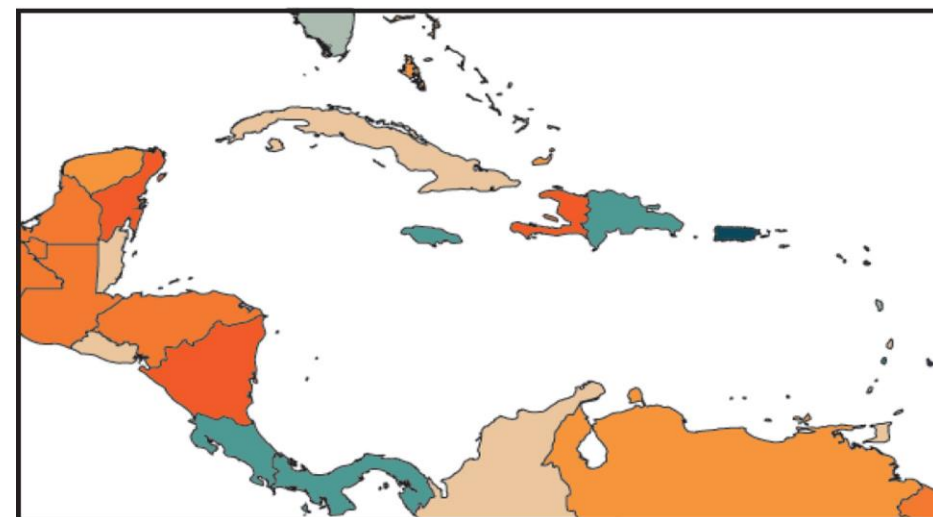
Completeness of VR systems in GBD super-regions, 1975–2021



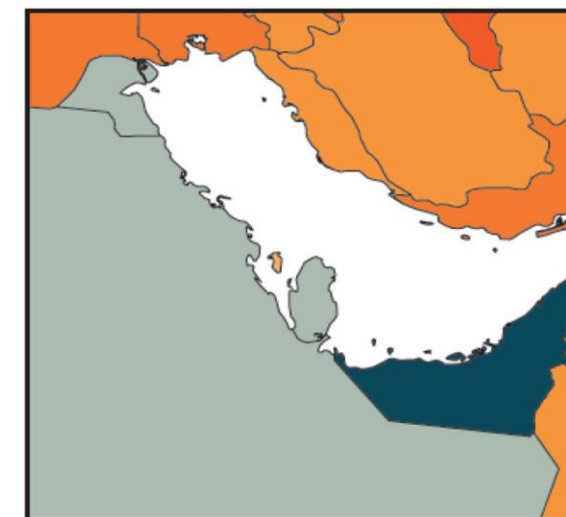
Global distribution of age-standardised excess mortality rates due to the COVID-19 pandemic, 2020 and 2021 combined



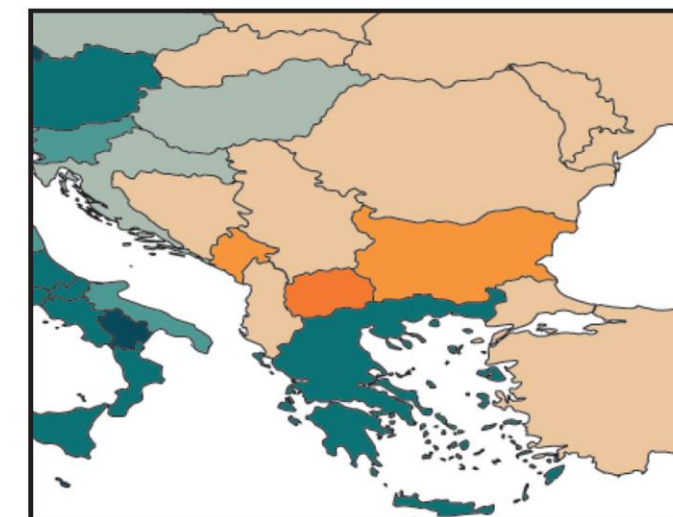
Caribbean and central America



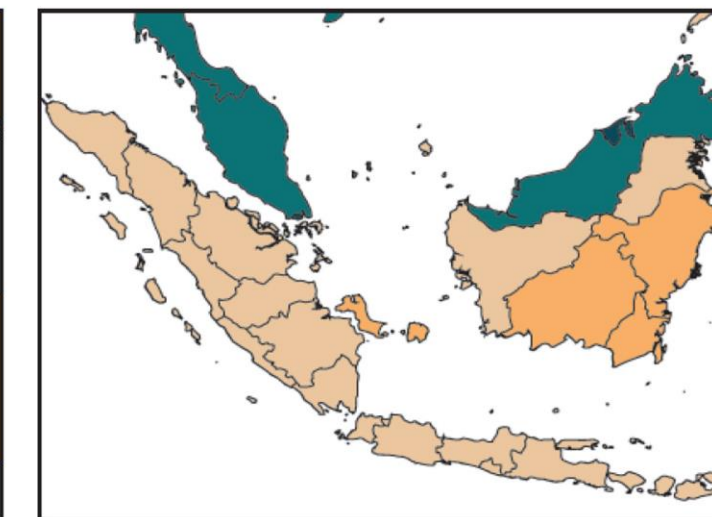
Persian Gulf



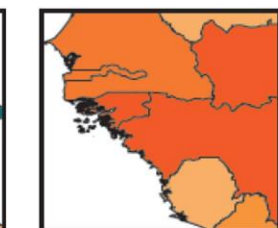
The Balkans



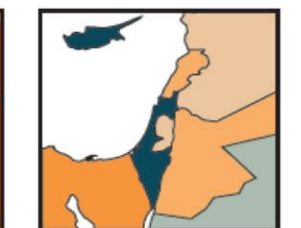
Southeast Asia



West Africa



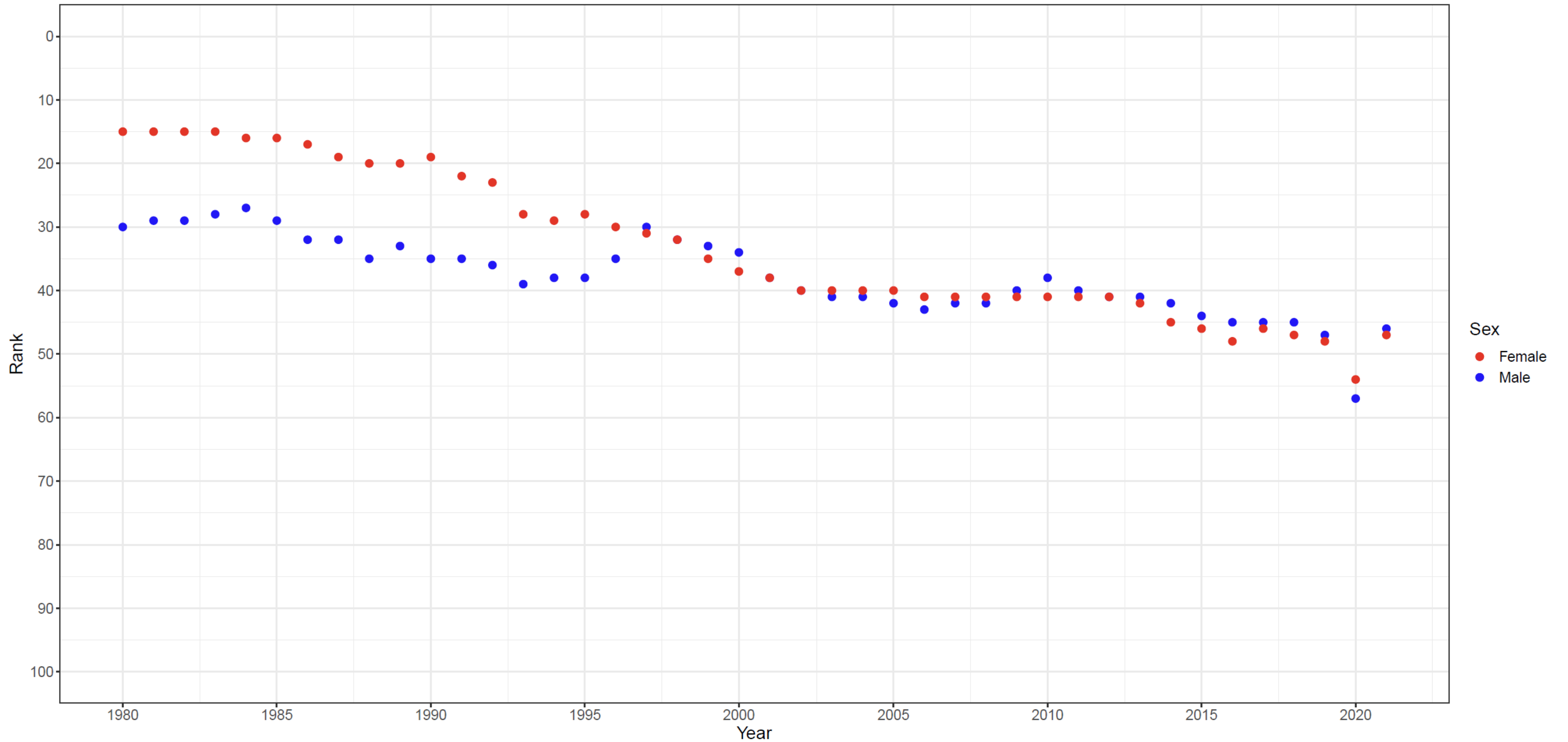
Eastern Mediterranean



Northern Europe



US life expectancy rank across 204 countries



GBD 2021

Six summary capstone papers:

Causes of death and life expectancy decomposition—
published online April 3

Full Lancet issue with all six capstone publications
and a viewpoint will be released May 16

Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021



GBD 2021 Causes of Death Collaborators*



Summary

Background Regular, detailed reporting on population health by underlying cause of death is fundamental for public health decision making. Cause-specific estimates of mortality and the subsequent effects on life expectancy worldwide are valuable metrics to gauge progress in reducing mortality rates. These estimates are particularly important following large-scale mortality spikes, such as the COVID-19 pandemic. When systematically analysed, mortality rates and life expectancy allow comparisons of the consequences of causes of death globally and over time, providing a nuanced understanding of the effect of these causes on global populations.

Methods The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021 cause-of-death analysis estimated mortality and years of life lost (YLLs) from 288 causes of death by age-sex-location-year in 204 countries and territories and 811 subnational locations for each year from 1990 until 2021. The analysis used 56 604 data sources, including data from vital registration and verbal autopsy as well as surveys, censuses, surveillance systems, and cancer registries, among others. As with previous GBD rounds, cause-specific death rates for most causes were estimated using the Cause of Death Ensemble model—a modelling tool developed for GBD to assess the out-of-sample predictive validity of different statistical models and covariate permutations and combine those results to produce cause-specific mortality estimates—with alternative strategies adapted to model causes with insufficient data, substantial changes in reporting over the study period, or unusual epidemiology. YLLs were computed as the product of the number of deaths for each cause-age-sex-location-year and the standard life expectancy at each age. As part of the modelling process, uncertainty intervals (UIs) were generated using the 2.5th and 97.5th percentiles from a 1000-draw distribution for each metric. We decomposed life expectancy by cause of death, location, and year to show cause-specific effects on life expectancy from 1990 to 2021. We also used the coefficient of variation and the fraction of population affected by 90% of deaths to highlight concentrations of mortality. Findings are reported in counts and age-standardised rates. Methodological improvements for cause-of-death estimates in GBD 2021 include the expansion of under-5-years age group to include four new age groups, enhanced methods to account for stochastic variation of sparse data, and the inclusion of COVID-19 and other pandemic-related mortality—which includes excess mortality associated with the pandemic, excluding COVID-19, lower respiratory infections, measles, malaria, and pertussis. For this analysis, 199 new country-years of vital registration cause-of-death data, 5 country-years of surveillance data, 21 country-years of verbal autopsy data, and 94 country-years of other data types were added to those used in previous GBD rounds.

Findings The leading causes of age-standardised deaths globally were the same in 2019 as they were in 1990; in descending order, these were, ischaemic heart disease, stroke, chronic obstructive pulmonary disease, and lower respiratory infections. In 2021, however, COVID-19 replaced stroke as the second-leading age-standardised cause of death, with 94.0 deaths (95% UI 89.2–100.0) per 100 000 population. The COVID-19 pandemic shifted the rankings of the leading five causes, lowering stroke to the third-leading and chronic obstructive pulmonary disease to the fourth-leading position. In 2021, the highest age-standardised death rates from COVID-19 occurred in sub-Saharan Africa (271.0 deaths [250.1–290.7] per 100 000 population) and Latin America and the Caribbean (195.4 deaths [182.1–211.4] per 100 000 population). The lowest age-standardised death rates from COVID-19 were in the high-income super-region (48.1 deaths [47.4–48.8] per 100 000 population) and southeast Asia, east Asia, and Oceania (23.2 deaths [16.3–37.2] per 100 000 population). Globally, life expectancy steadily improved between 1990 and 2019 for 18 of the 22 investigated causes. Decomposition of global and regional life expectancy showed the positive effect that reductions in deaths from enteric infections, lower respiratory infections, stroke, and neonatal deaths, among others have contributed to improved survival over the study period. However, a net reduction of 1.6 years occurred in global life expectancy between 2019 and 2021, primarily due to increased death rates from COVID-19 and other pandemic-related mortality. Life expectancy was highly variable between super-regions over the study period, with southeast Asia, east Asia, and Oceania gaining 8.3 years (6.7–9.9) overall, while having the smallest reduction in life expectancy due to COVID-19 (0.4 years). The largest reduction in life expectancy due to COVID-19 occurred in Latin America and the Caribbean (3.6 years). Additionally, 53 of the 288 causes of death were highly concentrated in locations with less than 50% of the global population as of 2021,

Published Online

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50140-6736(24)00367-2

*Collaborators are listed at the end of the Article

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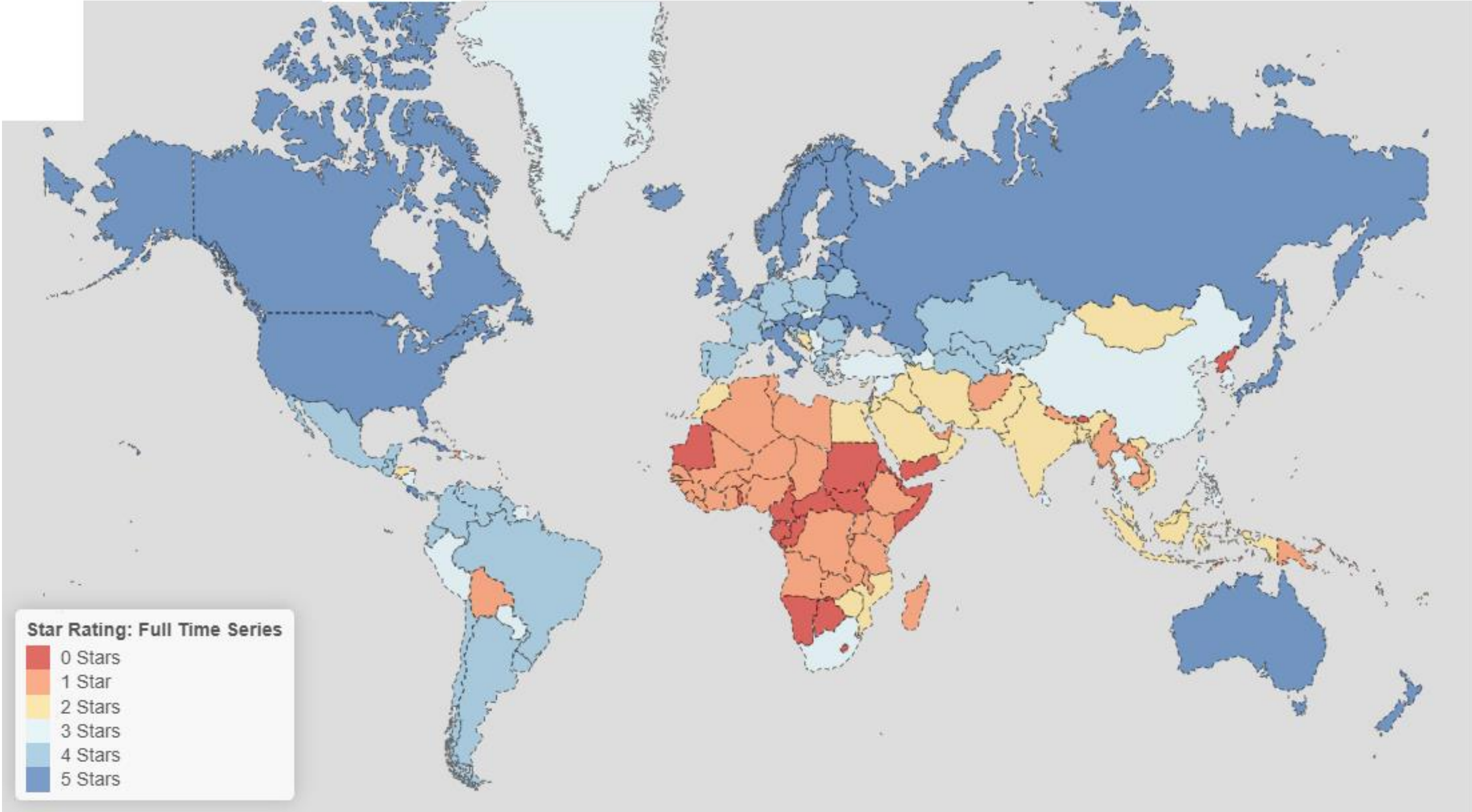
Health Metrics and Evaluation,

University of Washington,

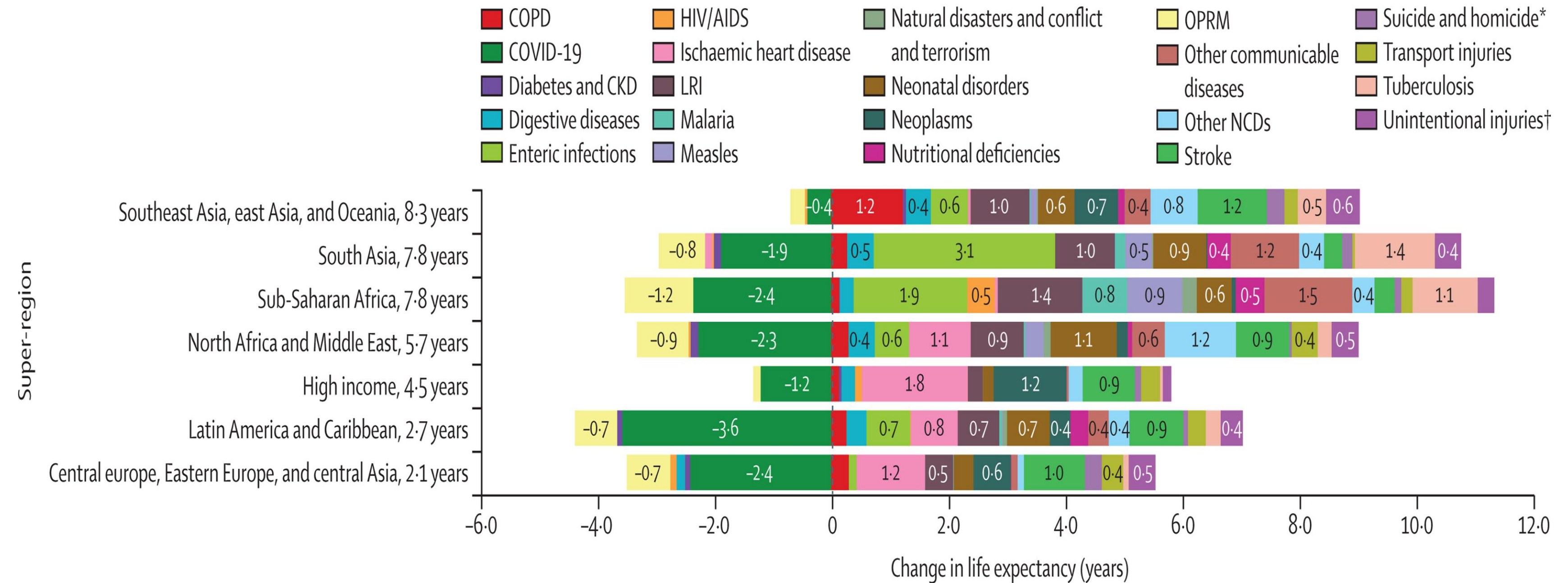
Seattle, WA 98195, USA

shay@uw.edu

Star Rating of causes of death data from 1980-2021 based quality of assignment of death and completeness



Change in life expectancy attributable to leading causes of death among super-regions, 1990–2021



US Burden of Disease and Health Disparities Project

Goal: Estimate burden of disease and health disparities in the US at the county level, stratified by racial and ethnic population.

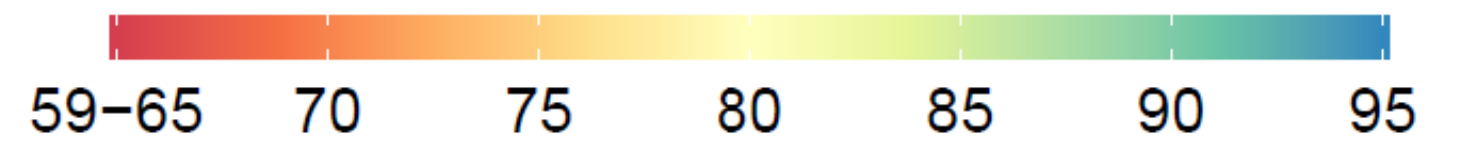
Using the same conceptual approach as the Global Burden of Disease (GBD) Study:

- Focus on all aspects of health loss, and various metrics:
 - *Traditional measures*: mortality, incidence, and prevalence rates
 - *Impact measures*: years of life lost (YLLs), years lived with disability (YLDs)
 - *Summary measures*: disability adjusted life years (DALYs), healthy life expectancy (HALE)
- Consider a wide range of health conditions
- Estimate both exposure to and burden attributable to selected risk factors

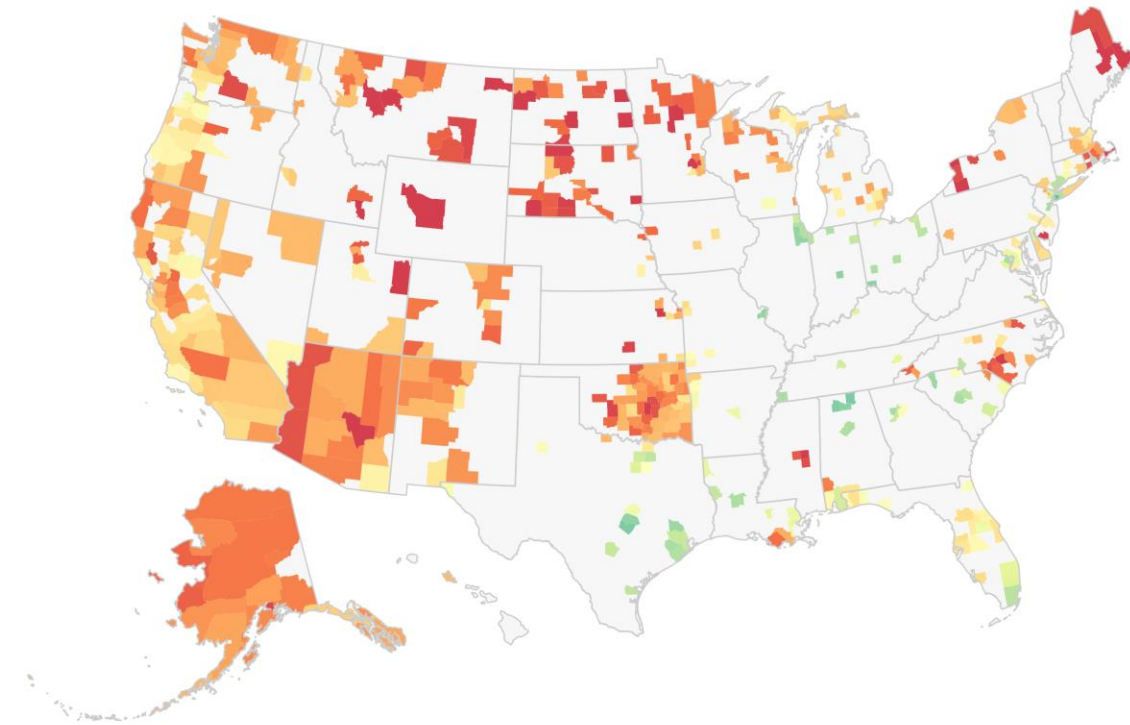
This project is funded by NIH, and undertaken in collaboration with the NIH US Burden of Health Disparities Working Group

County Life Expectancy, 2019

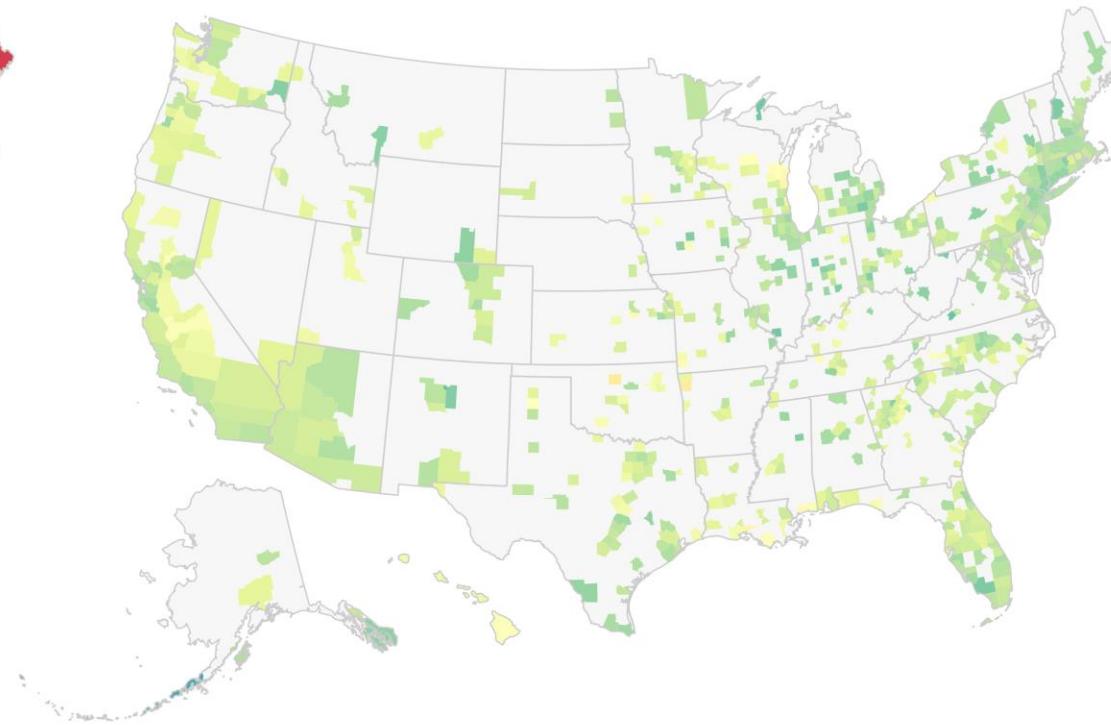
Life expectancy, 2019 (years)



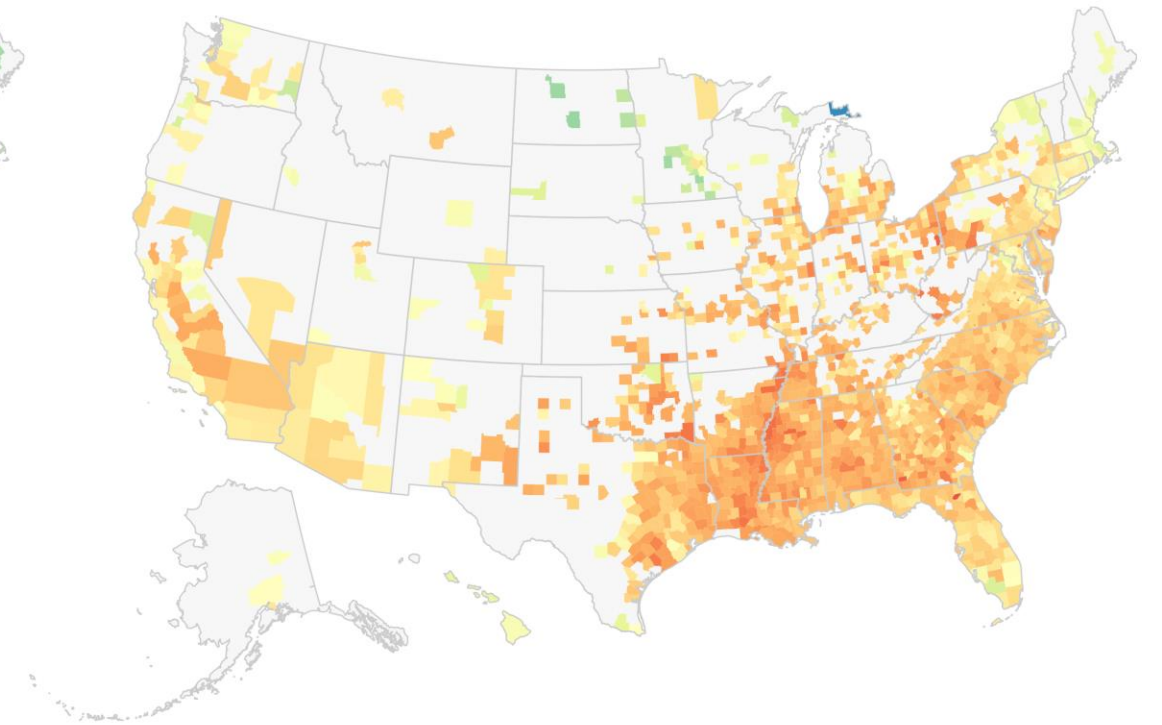
AIAN



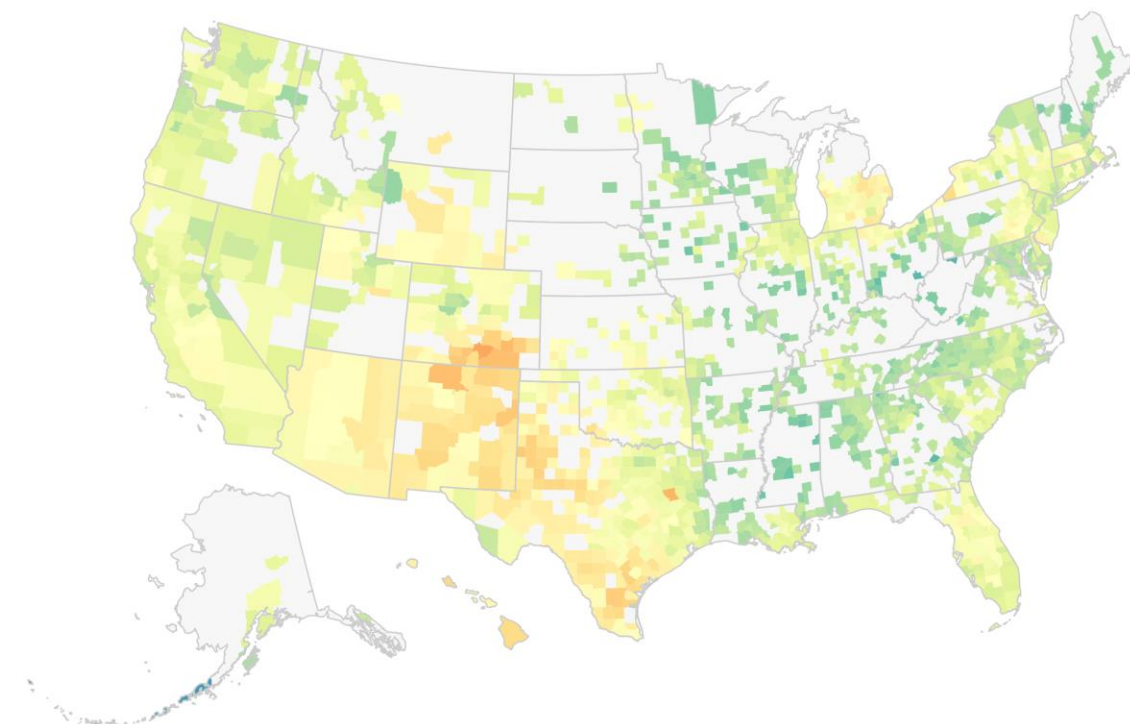
Asian



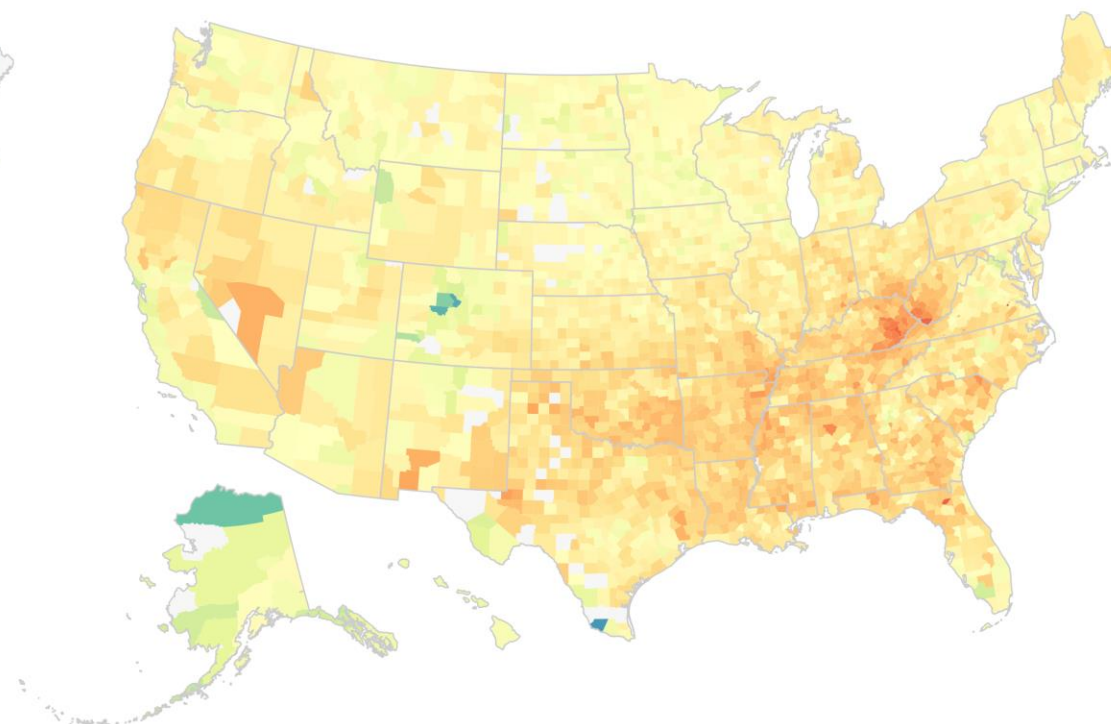
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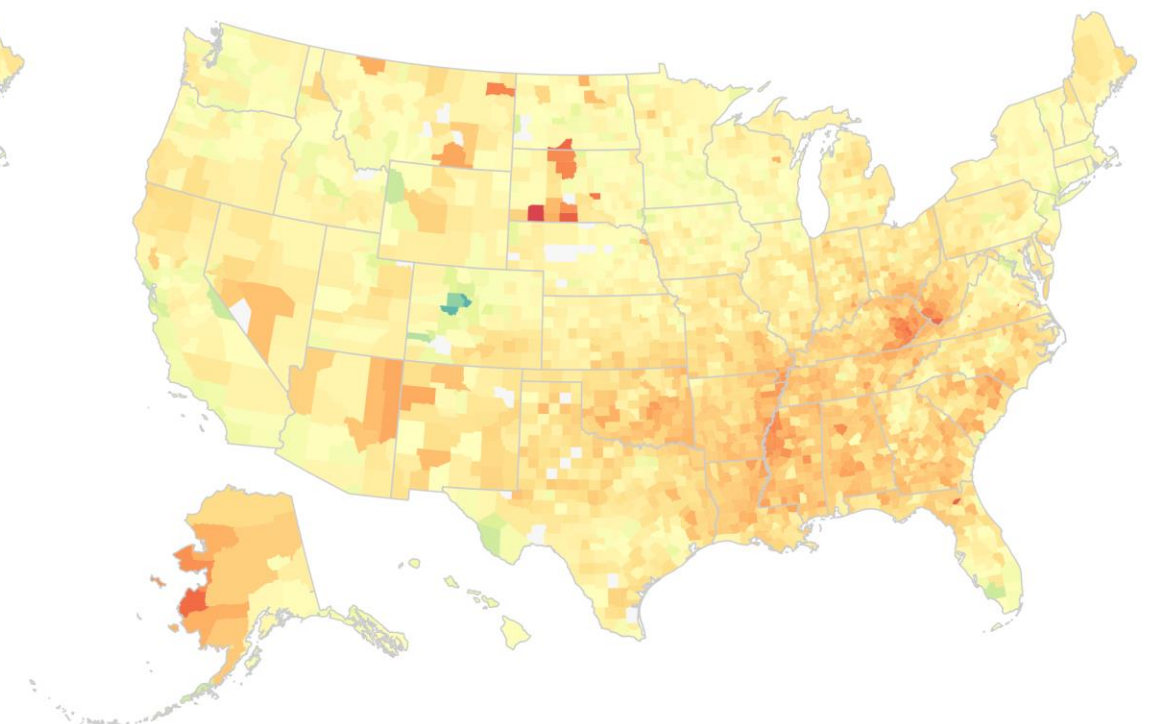
Latino



White

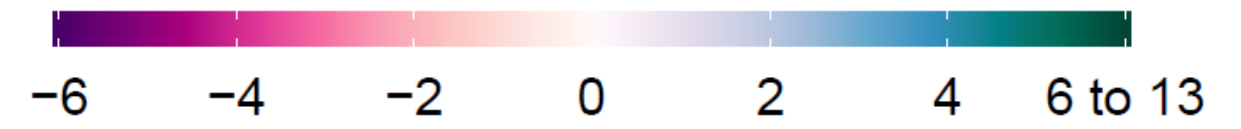


Total

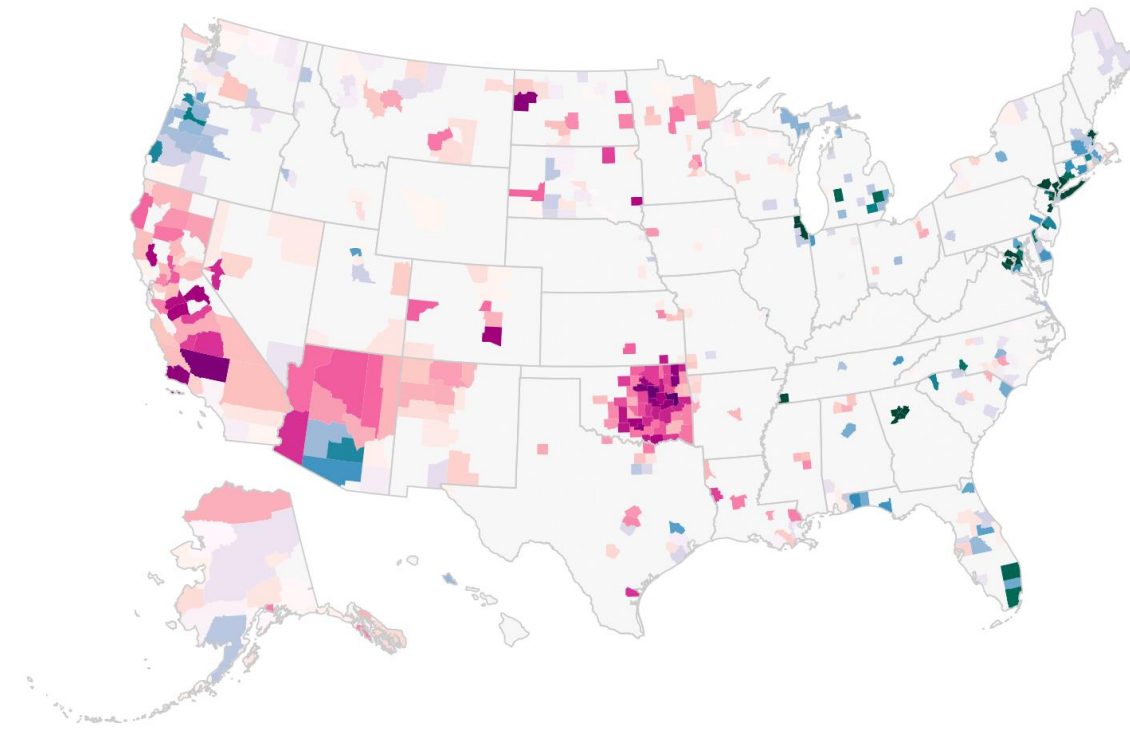


Change, 2000–19

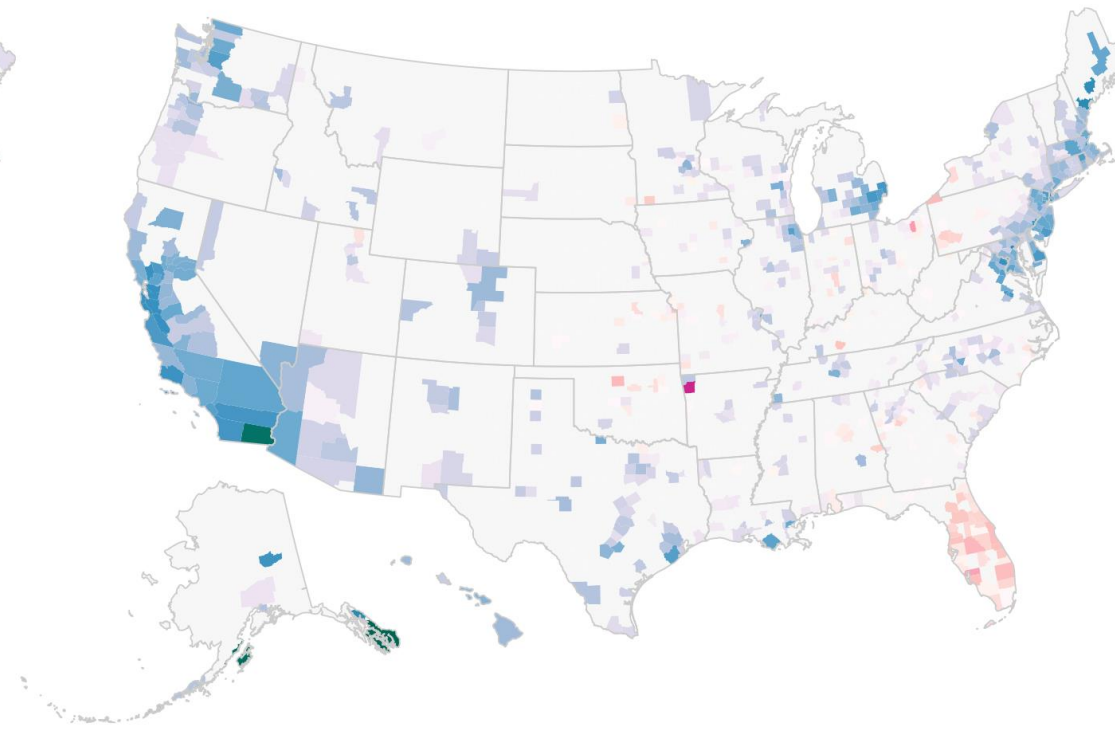
Change in life expectancy, 2000 to 2019 (years)



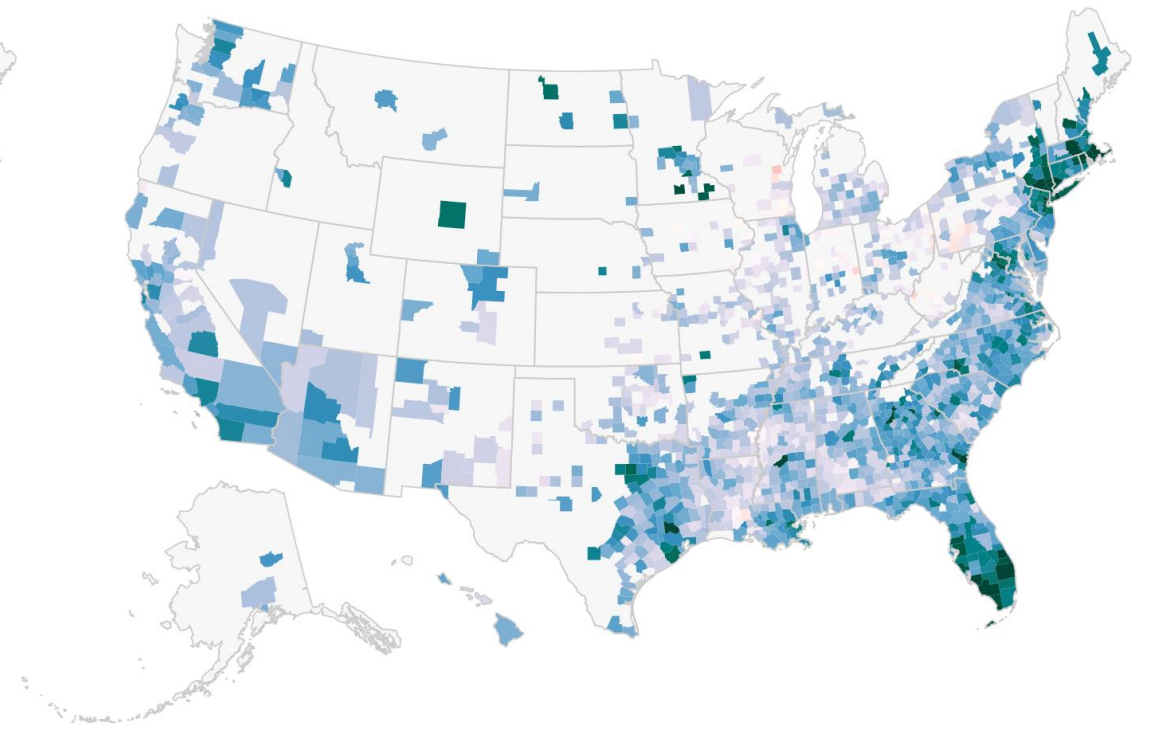
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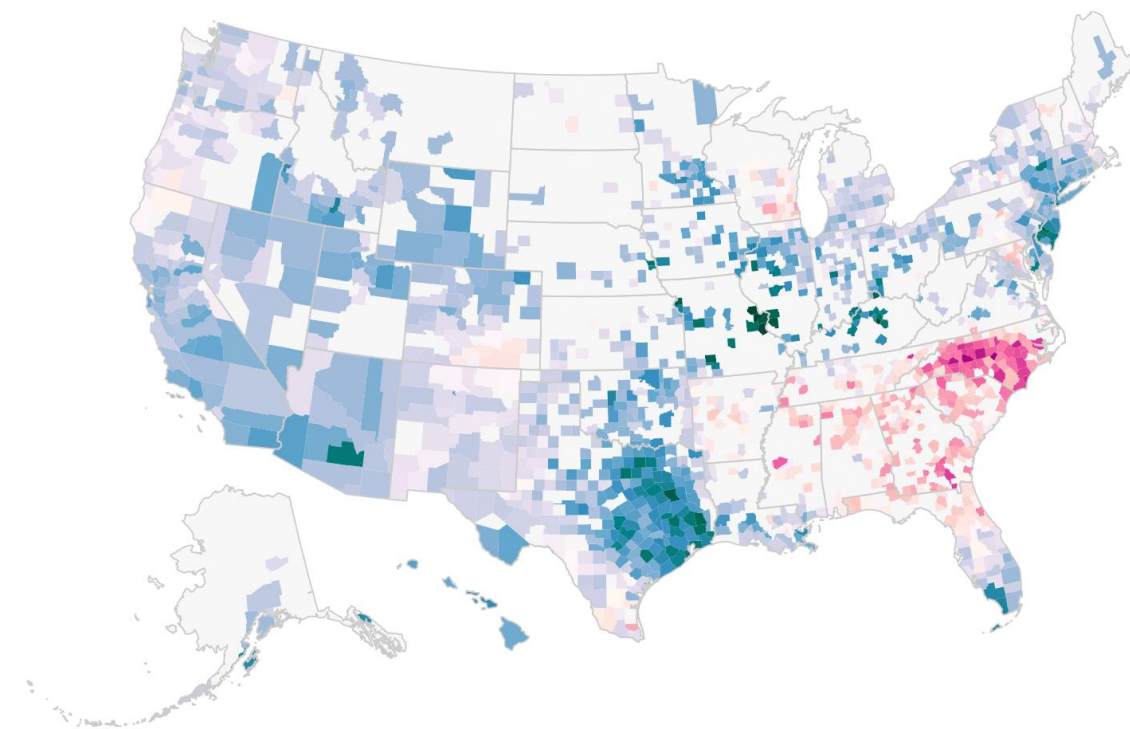
Asian



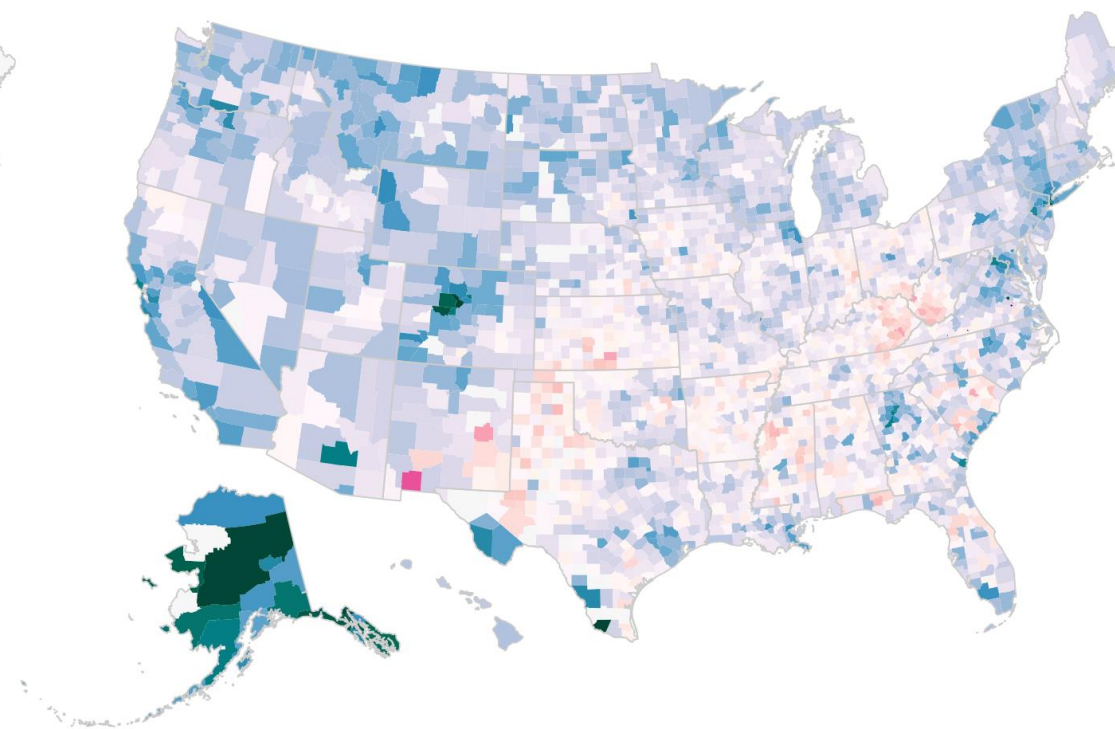
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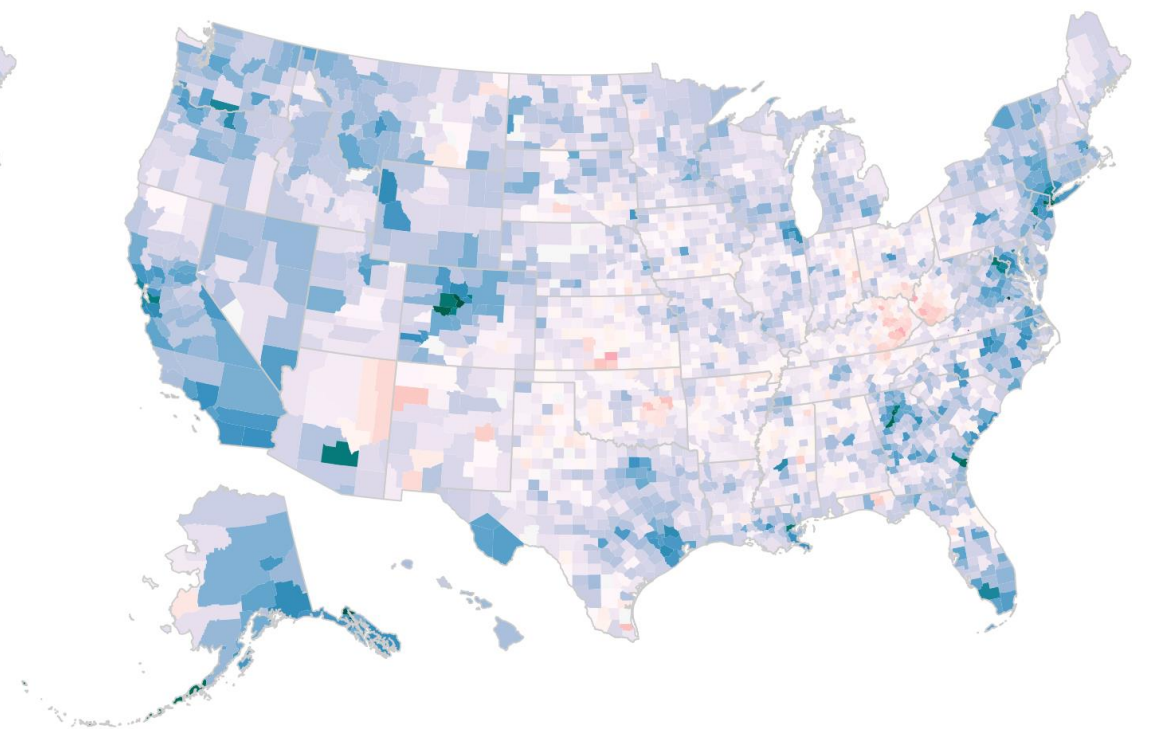
Latino



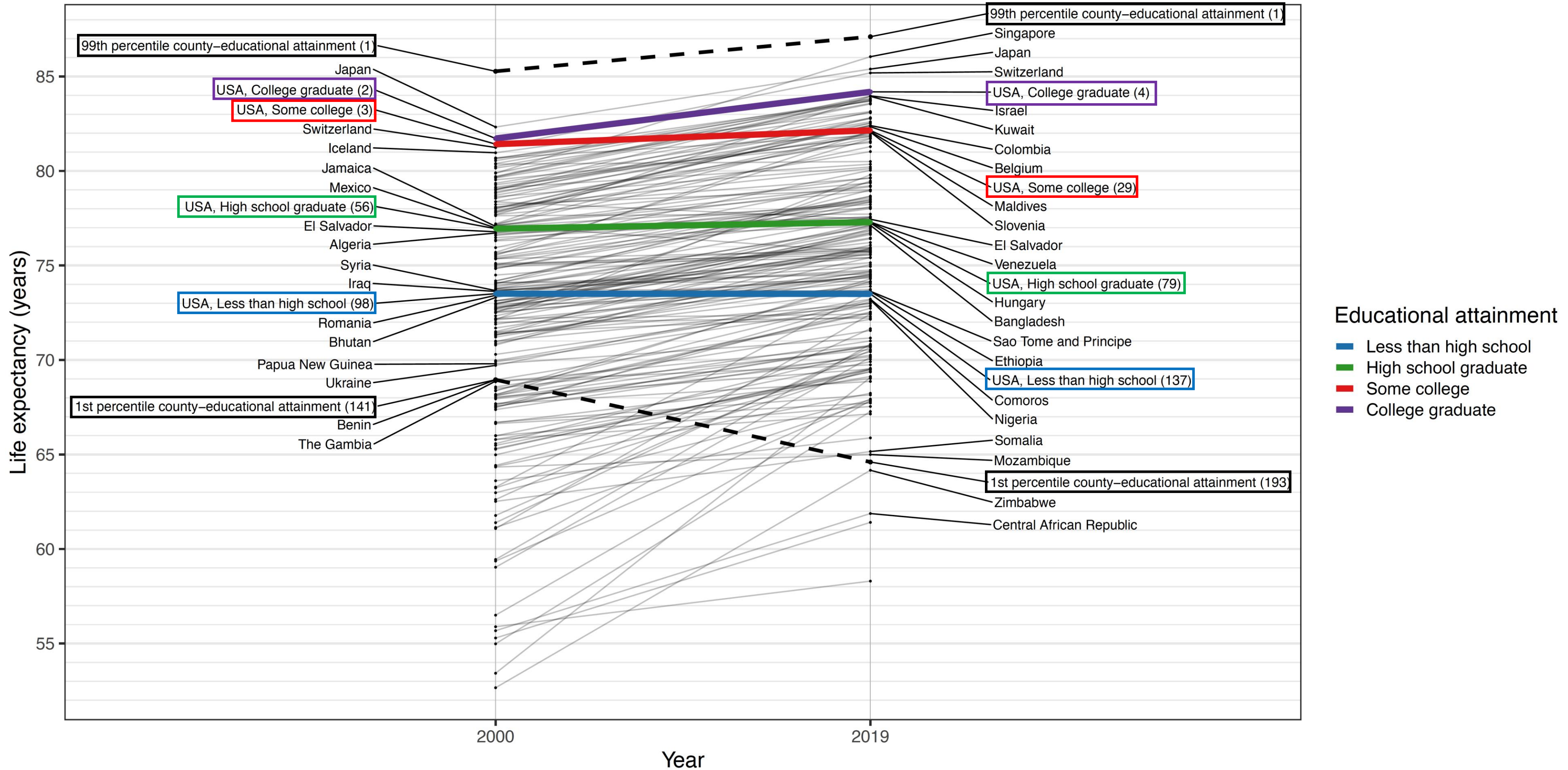
White



Total



Comparison to Other Countries



County Mortality Patterns, 2019

All causes

HIV/AIDS and sexually transmitted infections

Respiratory infections and tuberculosis

Enteric infections

Other infectious diseases

Maternal and neonatal disorders

Nutritional deficiencies

Neoplasms

Cardiovascular diseases

Chronic respiratory diseases

Digestive diseases

Neurological disorders

Substance use disorders

Diabetes and kidney diseases

Skin and subcutaneous diseases

Musculoskeletal disorders

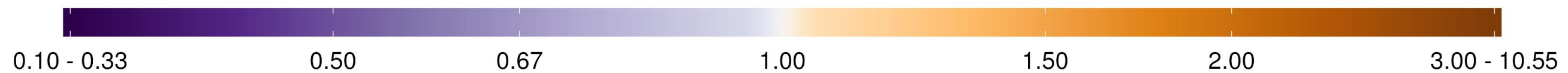
Other non-communicable diseases

Transport injuries

Unintentional injuries

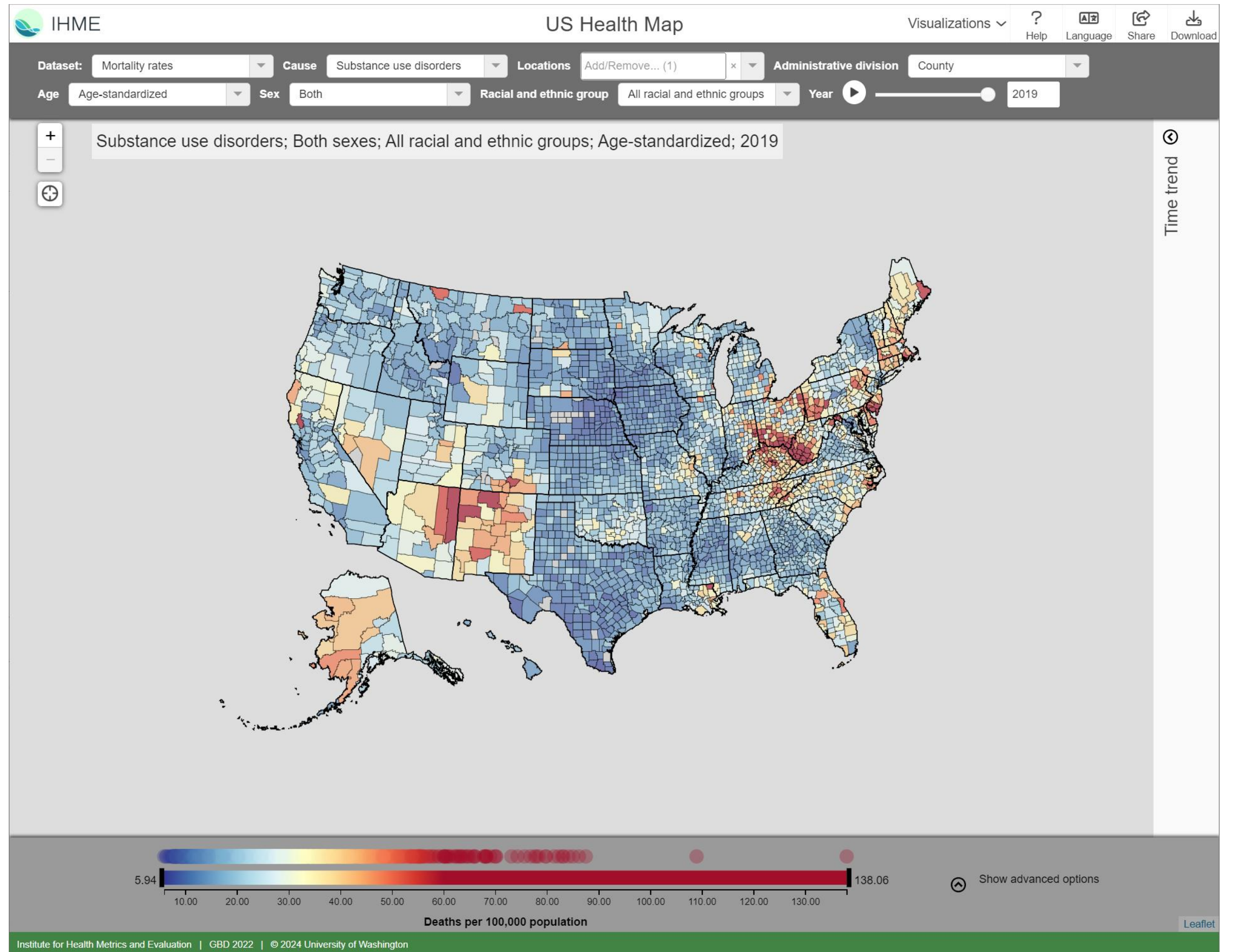
Self-harm and interpersonal violence

Ratio of county mortality to national mortality:



US Health Map

<https://vizhub.healthdata.org/subnational/usa>



County Obesity Prevalence (age 20+), 2019

AIAN

Asian

Black

Latino

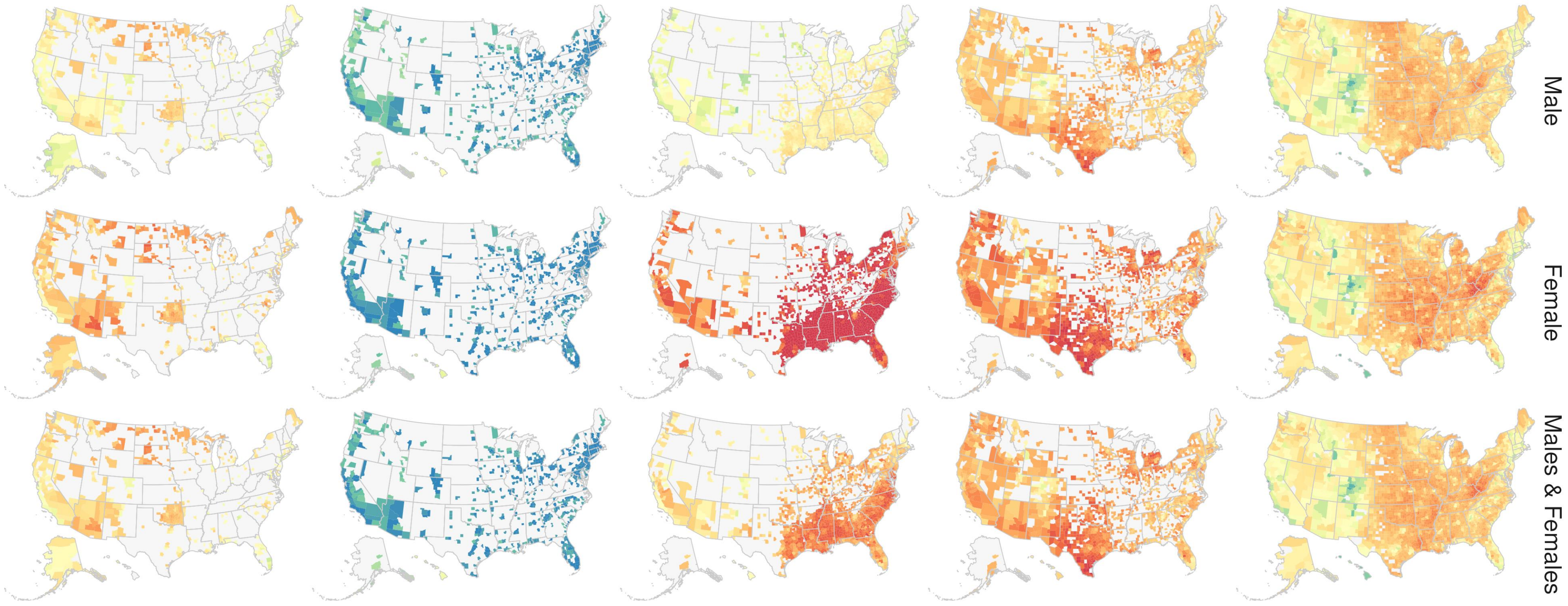
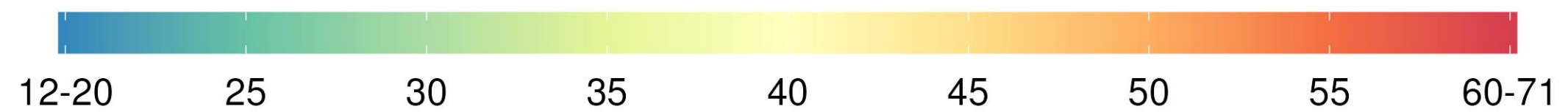
White

Male

Female

Males & Females

Obesity prevalence (%)



Discussion Period

Any questions?

Please use the **Q&A tab** to submit your questions for our speaker. You can “**like**” other people’s questions to push them up in priority.



Closing Remarks



Thank You!

Join us on Tuesday, May 28, 2024 (1:00-2:00pm ET) for the next seminar!

Please complete our **survey** that will be shared shortly after the seminar. Scan the QR code.

Seminar recording and presentation slides will be posted on <https://nccid.ca/> within two weeks.

Visit <https://nccid.ca/surveillance-advances-seminar-series/> for more information about the Surveillance Advances seminar series.

