PROTOCOL FOR THE GLOBAL BURDEN OF DISEASES, INJURIES, AND RISK FACTORS STUDY (GBD)

Institute for Health Metrics and Evaluation

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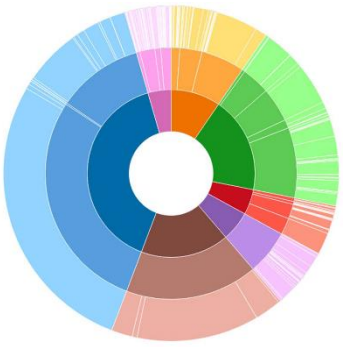

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Executive Summary

This protocol outlines the Global Burden of Disease, Injuries, and Risk Factors (GBD) study. It covers the key principles and assumptions, products, roles and responsibilities, processes, and architecture. The most current version is posted on the IHME website at the following URL: http://www.healthdata.org/gbd/about/protocol.

Overview

The GBD is an approach to global descriptive epidemiology. It is a systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries, and risk factors by age, sex, and geographies for specific points in time. IHME serves as the coordinating center for the GBD and affiliated projects. GBD produces regular estimates of all-cause mortality, deaths by cause, years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs) for a cause list (for a more detailed list of all products of the GBD see "SECTION 3. KEY PRODUCTS"). The critical milestones for ongoing estimation include regular updates to the GBD estimates, referred to as the "GBD round." For each round, the entire time series back to 1990 will be re-estimated using all available data and best available methods to ensure the most complete and highly comparable set of estimates possible.

Roles and Responsibilities

Different groups have significant roles and responsibilities in the GBD estimation process, outlined here:

- Scientific Council: The GBD Scientific Council is a mechanism for key scientific decision-making internal to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD); it is not a substitute for peer-review of publications or for periodic reviews from independent groups not involved in the GBD.
- GBD Management Team: Led by the GBD PI, the GBD Management Team facilitates the GBD production process including managing use of IHME computational capacity dedicated to the GBD, ensuring that the study is meeting critical deadlines, and confirming that the estimation meets the computational requirements as outlined within this protocol.
- GBD Core Analytic Team: Under the direct guidance of the GBD PI and the GBD Management Team, the GBD Core Analytic Team carries out data seeking, management, and estimation for the GBD.
- Collaborators: The GBD and affiliated projects engage a network of individual collaborators with a wide variety of areas of expertise. Collaborators are selected through an open call and referrals, and play a critical role throughout the GBD estimation cycle. Collaborators are also the central vessel for promoting the GBD and affiliated projects, and translating results to be relevant for policymakers.
- Independent Advisory Committee: The Independent Advisory Committee for the Global Burden of Disease advises the Board of the Institute for Health Metrics and Evaluation on the Global Burden of Disease and affiliated projects to ensure the highest scientific rigor of the study, facilitate dialogue with other efforts in global health, identify ways to increase collaboration and ownership, and guide decisions regarding access and use of the GBD and affiliated projects.

Adjudication

Given the complex scope of the GBD, estimates, trends, or approaches may lead to diverging scientific opinion. A detailed process for resolving disagreements is described in SECTION 5. ADJUDICATION. Any member of the GBD may raise issues for debate, and if not resolved through other channels may request that the issue be brought to the Scientific Council.

GBD Estimation Flow

Ongoing GBD estimation follows the methodology outlined in the most recently published GBD study, which builds upon the methodology first presented in the GBD 2010 study, unless otherwise approved by the GBD Scientific Council. The flowchart in SECTION 6. GBD ESTIMATION FLOW illustrates the flow of the key components of the GBD estimation process

Data

The data associated with the GBD are immense. Input data to the GBD and affiliated projects are compiled through continuous extraction of studies from the literature and the addition of key data sources throughout the GBD. The GBD study has and will continue to develop a substantial data repository, including crude data (as released by the original source), model input data points, and final results.

The GBD produces point estimates and 95% uncertainty intervals for every cause of the cause list, every country/location, all ages and a select number of age groupings, each sex separately and aggregated, and every year from 1990 to the current round. Details of the cause list, locations, ages, and years can be found on the IHME website at www.healthdata.org.

To maximize the use of the GBD and affiliated projects as global public goods, crude data, model input data points, and final results will be made freely available where legally permissible for non-commercial use of the data in IHME's public data catalog, the Global Health Data Exchange (GHDx, available at http://ghdx.healthdata.org/)

GBD Collaborators may be granted privileged, confidential access to the crude and model input data upon request where legally permissible, as well as the final point estimate results with 95% uncertainty as applicable pertaining to their enrolled area of expertise.

Publications and Presentations

The GBD is a critical resource for policymakers, researchers, donors, and others to make informed decisions and guide priorities using the most current information possible. In order to maximize the benefit of the GBD as a global public good, IHME strongly encourages the robust production of publications that provide important insight and implications from GBD results and dissemination of these findings.

By participating in the GBD as a GBD Collaborator, GBD Scientific Council member, GBD Management Team member, and/or Core Analytic Team member, individuals are provided multiple opportunities for authorship on GBD publications. The GBD aims to publish each year "capstone papers" presenting overall estimates, and regular updates to disease-, risk-factor-, and country-specific papers. Other papers may be

written by the collaborators or the core analytic team at any time; different types of collaborator-led papers are outlined in "SECTION 9. PUBLICATIONS AND PRESENTATIONS."

The GBD conforms to the principles of authorship, disclosure, and scientific integrity as outlined in the requirements of the individual peer-reviewed journal to which a given publication is submitted, as well as to the overall criteria of the International Committee of Medical Journal Editors.

In select cases – and only with the permission of the GBD Management Team – conference poster abstracts and presentations may be allowed to use preliminary (not-yet published) GBD results. All requests to use preliminary results should be formally submitted to the GBD Management Team. Posters and presentations of already published methodology can be made at any time.

Policy Engagement

In addition to disseminating findings via peer-reviewed academic publications, presentations, and posters, IHME strongly encourages collaborators to share the findings with decision-makers to raise awareness of GBD as a valuable resource.

IHME encourages collaborators to engage decision-makers in their countries and/or focus area(s) to demonstrate how GBD can be an important tool for policymaking and priority setting. To learn more about ways that GBD collaborators are using findings from the study to inform decision-making, see IHME's *Acting on Data* blog. To facilitate joint learning across the collaborator network and beyond, IHME encourages collaborators to share with us other ways that GBD is being used to inform policy. Further, collaborators can use policy-focused materials created by IHME, or can create GBD materials (such as presentations, one-pagers, and reports) that are tailored to decision-makers in their country and/or focus area. To facilitate joint learning across the collaborator network, IHME encourages collaborators to share with us how GBD is being used to inform policy.

In select cases – and only with the permission of the GBD Management Team – conference poster abstracts and presentations may be allowed to use preliminary (not-yet published) GBD results. All requests to use preliminary results should be formally submitted to the GBD Management Team. Posters and presentations of already published methodology can be made at any time.

SECTION 1. INTRODUCTION

This protocol outlines the key roles, responsibilities, decision-making processes, and deliverables included in the Global Burden of Diseases, Injuries, and Risk Factors (GBD) Study and its affiliated projects, and is intended for all individuals directly engaged in the GBD. The most current version is posted on the IHME website at the following URL: http://www.healthdata.org/gbd/about/protocol.

As an institute of the University of Washington (UW), the Institute for Health Metrics and Evaluation (IHME) is subject to the policies and procedures of the UW. Accordingly, the GBD shall be conducted in full compliance with UW policies and procedures, as well as applicable federal, state, and local laws.

Purpose and goals of the GBD

The GBD is an approach to global descriptive epidemiology. It is a systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries, and risk factors by age, sex, and geographies for specific points in time. IHME serves as the coordinating center for the GBD and affiliated projects.

Comparison is at the heart of the GBD approach. For decision-makers, health-sector leaders, researchers, and informed citizens, the GBD and affiliated projects provide an opportunity to see the big picture, to compare diseases, injuries, and risk factors, and to understand in a given place, time, and age-sex group, what are the most important contributors to health loss. To ensure a health system is adequately aligned to a population's true health challenges, policymakers must be able to compare the effects of different conditions that kill people prematurely and cause poor health and disability. A main goal of the GBD enterprise is to ensure that the most current, detailed, comprehensive results are used by policymakers to make decisions to improve population health.

GBD produces regular estimates of all-cause mortality, deaths by cause, years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs) for a cause list (for a more detailed list of all products of the GBD see "SECTION 3. KEY PRODUCTS"). The cause list is agreed upon annually by the Scientific Council. The critical milestones for ongoing estimation include regular updates to the GBD estimates, referred to as the "GBD round." For each round, the entire time series back to 1990 is re-estimated using all available data to ensure the most complete and highly comparable set of estimates possible. Previous results will be archived every time new results are released. The GBD provides cutting-edge and timely results through scientific papers, policy reports, web content, and interactive visualizations. The GBD uses and builds upon the infrastructure of methodology, datasets, and tools that were outlined in the most recently published GBD study[1–6], which builds upon the methodology first presented in the GBD 2010 study[7–14]. Any proposed updates to methodology or cause lists will be approved by a GBD Scientific Council, as detailed in Section 4.

The GBD and affiliated projects engage a network of individual collaborators with expertise on all-cause mortality; specific diseases, injuries, risk factors, and impairments; country-specific epidemiology; and health systems. GBD Collaborators are selected through an open call and referrals. There are many different ways for GBD Collaborators to contribute to the GBD and affiliated studies. GBD Collaborators

indicate their own areas of expertise. Based upon their ascribed area(s) of expertise, GBD Collaborators are then invited to collaborate in the following ways:

- Assess data sources being used and suggest new data sources, including those from surveys, administrative data, hospital data, insurance claims data, disease registries, and other related sources
- Provide data of their own to integrate into the analyses
- Critique results from the estimation
- Suggest new causes, risk factors, and risk-outcome pairs
- Give feedback on covariates and modeling approaches
- Provide critique and feedback on manuscripts
- Contribute to papers and participate as authors
- Carry out related analyses using GBD data
- Develop their own publications based on GBD data
- Disseminate results at conferences, workshops, and other avenues of interest
- Participate in media outreach
- Use the estimates to inform policy discussions
- Refer colleagues as collaborators
- Jointly pursue funding opportunities of mutual interest
- Take part in select training opportunities and be alerted of opportunities to expand the impact of the GBD through conferences, networks, and calls for abstracts

The time commitment for GBD Collaborators is flexible. GBD Collaborators are given the opportunity to participate in all of the above, but may decide their own time commitment. They will receive regular notifications relevant to their areas of ascribed expertise. They may opt out at any time.

SECTION 2. KEY PRINCIPLES AND ASSUMPTIONS

The GBD and its affiliated projects are embedded with eight key principles and assumptions to ensure the highest quality and most useful set of results. The data used and the analytic strategies applied to generate the results are consistent with these principles and assumptions. Any changes to the principles and assumptions will be presented to and discussed by the GBD Scientific Council; accepted changes will be added as a modification to this protocol.

Comprehensive comparisons

- The GBD cause list is a set of mutually exclusive and collectively exhaustive hierarchical categories.
- Results from the GBD are intended to facilitate comparison.

- All quantities of interest are estimated in all time periods. An uncertain estimate, even when data are sparse or not available, is preferable to no estimate because no estimate is often taken to mean no health loss from that condition.

Communicate the strength of the evidence

- Because the GBD produces estimates for a mutually exclusive and collectively exhaustive set of disease and injury causes, it is important to convey to users the strength of the evidence for each quantity through the reporting of uncertainty intervals (UI).
- The GBD estimates uncertainty distributions for each quantity and reports various metrics of uncertainty, such as 95% UI.

Internal consistency

- The sum of cause-specific mortality, defined according to the International Classification of Diseases (ICD) underlying cause rules, must equal all-cause mortality.
- The sum of cause-specific estimates of impairments, such as blindness, must equal estimates of all-cause impairments.
- Where incidence, prevalence, remission, duration, and excess mortality are not changing over time, rates are required to be internally consistent.

Iterative approach to estimation

- New data and methodological innovation lead to revision of estimates.
- Burden of disease estimation is an iterative process. Revisions result in a re-estimation of the entire time series so that results are always available over time using consistent data and methods.

Identify all relevant data sources

- All available relevant sources of data for a given disease, injury, and risk factor and for all-cause mortality should be identified.
- For all data sources identified, the sampling method, case definitions, and potential for bias should be assessed.

Compare like with like

- For cause of death data, variants of the ICD should be mapped to one another.

- For data on incidence, prevalence, remission, and excess mortality, statistical methods should be used to characterize the relationship between different case definitions, diagnostic technologies, recall periods, etc.
- These relationships should be used to transform data into comparable units, definitions, or categories. Wherever possible, uncertainty is propagated in these mappings into the UI for the measurement.
- Some measurements may have to be excluded because they cannot be made comparable to the rest of the measurements or have fundamental problems of validity.

Correct for errors

- All appropriate data should be synthesized using statistical methods that can handle both sampling and non-sampling error.
- For cause of death data, garbage codes are redistributed.

Pick the best model based on performance

- The statistical methods employed should improve predictions where data are sparse by allowing for use of covariates and by borrowing strength across time or geography.
- All estimates should be generated with 1,000 (or more) draws of the quantity of interest from the posterior distribution.
- Where possible, validity of the statistical methods should be demonstrated by using out-of-sample prediction.

SECTION 3. KEY PRODUCTS

The GBD produces comprehensive estimates of burden of diseases, injuries, and risk factors by country, year, age, and sex. For more information on the causes, ages, and other dimensions used by GBD, refer to Section 7 of this document. The GBD releases the point estimates and 95% uncertainty intervals by location, age, year, and sex for at least the following:

- All-cause mortality rates
- Deaths by cause
- Years of life lost due to premature mortality (YLLs) by cause
- Years lived with disability (YLDs) by cause
- Disability-adjusted life years (DALYs) by cause
- Relative risks of mortality for each risk-outcome pair

- Deaths attributable to the independent effects of risk factors and clusters of risk factors
- YLLs attributable to the independent effects of risk factors and clusters of risk factors
- YLDs attributable to the independent effects of risk factors and clusters of risk factors
- DALYs attributable to the independent effects of risk factors and clusters of risk factors
- Healthy life expectancy (HALE)
- Life expectancy
- Prevalence by cause
- Incidence by cause
- Summary exposure value (SEV) by risk factor
- Maternal mortality ratio (MMR) by maternal cause
- Deaths by etiology
- Years of life lost due to premature mortality (YLLs) by etiology
- Years lived with disability (YLDs) by etiology
- Disability-adjusted life years (DALYs) by etiology
- Years lived with disability (YLDs) by impairment
- Probability of death by cause
- Prevalence by sequelae
- Incidence by sequelae

These results are made available at least through the following mechanisms:

- GBD tools and visualizations: http://www.healthdata.org/gbd/data-visualizations
- Publications in peer-reviewed journals: http://www.healthdata.org/gbd/publications
- Publications aimed at policymakers and other audiences: http://www.healthdata.org/gbd/publications
- Presentations detailing the results and methodology: http://www.healthdata.org/gbd/news-events
- Datasets available for download (http://ghdx.healthdata.org/gbd-results-tool) or upon request, as outlined in Section 8 of this document
- GBD code published in repositories, as outlined in Section 8 of this document: http://ghdx.healthdata.org/ (See "IHME data.")

Starting with GBD 2015, the GBD study is fully compliant with the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER). GATHER defines best practices for documenting studies that synthesize evidence from multiple sources to quantitatively describe past and current population health and its determinants. These practices include documenting and sharing data inputs, analyses and methods, and results. Documenting the input data on which estimates are based, and the methods by which estimates are derived, is essential for the accurate interpretation and use of results. For more information, visit the GATHER website at http://gather-statement.org/.

The exact timing and release of results are determined by the GBD Management Team under the leadership of the GBD Study Principal Investigator (PI).

SECTION 4. GBD ROLES AND RESPONSIBILITIES

The GBD includes a Scientific Council, a Management Team, a Core Analytic Team, and a robust network of Collaborators working together to produce the most accurate, up-to-date, and comparable estimates of burden worldwide.

The GBD study is managed by the GBD Management Team under the leadership of the Principal Investigator (PI), Dr. Christopher Murray. The GBD Management Team also leads the analytic development and direction of the GBD study. It is staffed and supported by IHME. In addition, an Independent Advisory Committee chaired by Dr. Peter Piot advises the IHME Board and the GBD study.

GBD Scientific Council

The GBD Scientific Council is a mechanism for key scientific decision-making internal to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD); it is not a substitute for peer-review of publications or for periodic reviews from independent groups not involved in the GBD. The Council Chair for the GBD Scientific Council is Dr. Christopher Murray, and the Council is composed of leading experts in fields relating to the GBD. This GBD Scientific Council provides direct oversight over and has decision-making ability on methodological advancements produced as part of the GBD. As an institute of the University of Washington (UW), IHME is subject to the policies and procedures of the UW. Accordingly, the GBD shall be conducted in full compliance with UW policies and procedures, as well as applicable federal, state, and local laws.

The GBD Scientific Council is primarily responsible for:

- Reviewing and voting on all proposed updates to published methods.
- Deciding whether to incorporate data into the estimates that become available after the data cutoff deadline for that particular round.
- Adjudicating disputes on estimates for mortality, specific diseases, injuries, risk factors, impairments, or geographies; data sources included; methodological approaches.
- Reviewing and voting on proposed modifications to the cause lists and ranking cause lists.
- Reviewing and voting on modifications to the list of covariates available for analyses.
- Reviewing and voting on changes to the existing published set of risk-outcome pairs used for measuring attributable burden of risk factors or risk factor clusters.
- Discussing recommendations from outside groups.
- Reviewing and discussing feedback from the Independent Advisory Committee to the GBD.
- Reviewing and voting on new data sources, lay descriptions, and changes in methods to be used in analyses for recalculating disability weights.

The Council Chair selects and enrolls GBD Scientific Council members for 3-year renewable terms. In selecting Council members, the Council Chair seeks to reflect the diversity of expertise in diseases, injuries, risk factors, countries, or related methodology across the membership of the GBD, including senior members of the Core Analytic Team. The current GBD Scientific Council members and the Council

Secretary are listed on the IHME website at the following URL:
http://www.healthdata.org/gbd/about/scientific-council

The Council Chair convenes regular Council meetings, as needed, with the Council Secretary facilitating its proceedings. The meetings are attended by Council members, a subset of individuals from the GBD Management Team as appropriate, the Council Secretary, as well as other GBD Collaborators, Core Analytic Team members, and related IHME staff, as needed. The council will take decisions based on majority of votes; all Council members are eligible to vote. Further details of the GBD Scientific Council, including current members and recent activities, are posted on the IHME website at the following URL:
http://www.healthdata.org/gbd/about/scientific-council

In addition, Scientific Council members must commit to attending at least one of the GBD estimate review weeks in person at the IHME office in Seattle.

GBD Management Team

Led by the GBD PI, the GBD Management Team facilitates the GBD production process including managing use of IHME computational capacity dedicated to the GBD, ensuring that the study is meeting critical deadlines, and confirming that the estimation meets the computational requirements as outlined within this protocol. The GBD Management Team is responsible for overseeing the GBD Core Analytic Team and for reviewing and approving the final GBD results. Additionally, the GBD Management Team oversees the coordination between teams to ensure processes, data, infrastructure, terms and definitions, and analytical decisions are aligned, consistent, and efficient.

GBD Core Analytic Team

Under the direct guidance of the GBD PI and the GBD Management Team, the GBD Core Analytic Team carries out data seeking, management, and estimation for the GBD. Core Analytic Team members include individuals working on one or more of the following key areas:

1. Cause- or topic-specific estimation

Multiple teams of individuals (including varied combinations of faculty, fellows, researchers, and other IHME staff, collaborators, or others) are responsible for applying the GBD methods to calculate all results for the study, including those for all-cause mortality, cause-specific mortality, cause-specific morbidity, risk factors, healthy life expectancy, and other major extensions of the GBD. These Core Analytic Team members are primarily responsible for identifying data sources used, applying the relevant methodologies, systematically documenting sources and approaches, and producing and vetting results for each GBD round for their cause or estimation area of focus.

2. Data management and incorporation

A team of individuals (including analysts, indexers, and other IHME staff, or others) is responsible for central database management. This includes seeking data, cataloging data, and managing core central datasets and databases, such as the covariates database, cause of death database, epidemiology database, risk factor database, hospital and outpatient datasets, cancer and other disease registries,

household surveys, and many other data source types. It also includes conducting systematic reviews of the published and unpublished literature, as outlined in "Section 8. Data" on page 23, to support the ongoing data needs.

3. Development and implementation of central computation

A team of individuals (including analysts, software architects, engineers, and other IHME staff, or others) is responsible for managing, implementing, and developing the complex central machinery for the GBD and affiliated projects. This work includes creation, maintenance, and documentation of tools for data intake, data analysis and modeling environments, outputs databases, and visualization tools.

4. Central coordination, publication, training, and engagement

Multiple teams of individuals are responsible for ensuring the timely actualization of the GBD production process; for preparing scientific publications, reports, and outreach to the media; for translating the GBD results for policy use and impact; and for managing the GBD Collaborative Network and liaising with other key stakeholders.

GBD Collaborators

IHME engages a large network of individual collaborators with specialties in various topic areas to conduct the GBD and its affiliated projects. Collaborators are critical in both the data analysis as well as the policy uptake and proliferation of the GBD and affiliated projects. GBD Collaborators consist of specialists in particular topic areas related to the GBD. Their expertise generally falls into one or more of the following broad categories:

1) Expertise on demography (all-cause mortality, population, fertility, or migration)
2) Expertise on particular diseases, injuries, risk factors, or impairments
3) Expertise on the epidemiology for a specific country or countries
4) Other expertise as necessary to achieve the aims of the GBD study

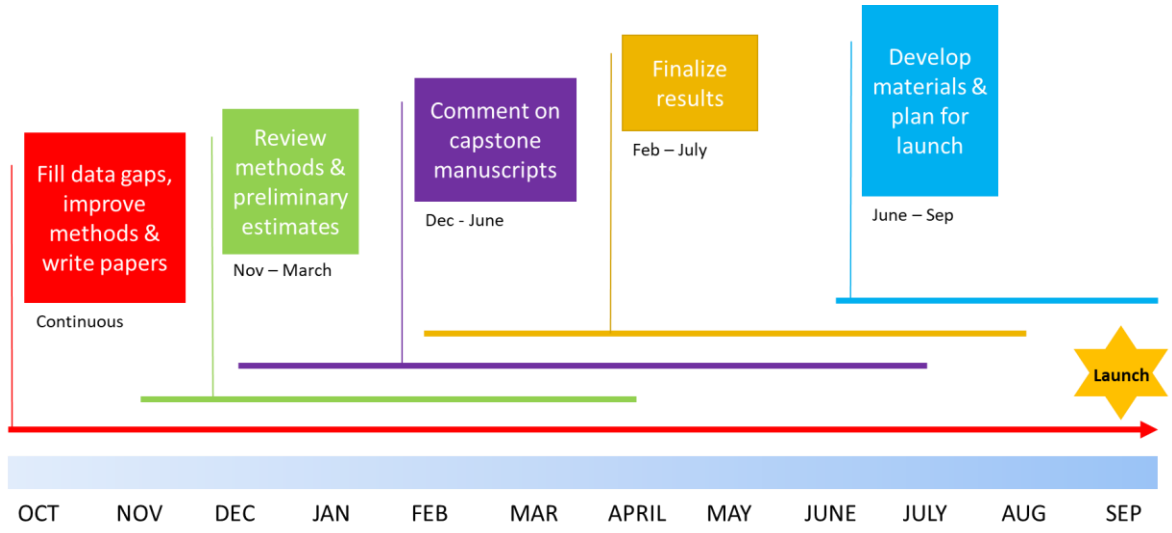
GBD Collaborators may be enrolled in one or more topic areas of expertise. IHME will engage collaborators on topics according to the areas of expertise they specify in the GBD Collaborator application form.

This section outlines the role of the collaborator in the GBD estimation process; but collaborators may also be involved in affiliated projects which may have their own timelines.

Collaborator role in the GBD estimation process

There are multiple stages to each GBD round, and the role of the collaborator in the GBD process is critical at each step, as shown in Figure 1.

Figure 1: Role of collaborators in annual GBD cycle. Dates shown are approximate and may vary from cycle to cycle.



Fundamentally, collaborators participate in six major areas of activity throughout the GBD estimation cycle:

1. Input data:
    a. Providing access to and knowledge of input data sources. This can range from recommending new data sources to be incorporated, to contributing to the interpretation and understanding of the data available.
2. Methods improvement:
    a. Providing technical expertise on methodological approaches, assumptions, and model development. This can be specific to a disease, risk factor, injury, or impairment of expertise, or to a geography or methodological framework as a whole.
3. Preliminary results
    a. Providing feedback on the validity and interpretation of preliminary results before they are finalized for that estimation cycle.
4. Capstone publications:
    a. Commenting on drafts of the GBD capstone publications with a focus on the presentation, discussion, and implications of key results.
5. Outreach and policy uptake:
    a. Promoting the release of GBD capstone publications and visualization tools through professional networks and other channels.
    b. Presenting on the GBD to key public health stakeholders and/or academic audiences.
    c. Disseminating the GBD via events such as seminars and workshops.
    d. Speaking to the media as appropriate, after completing relevant GBD media training.
    e. Translating the results of the GBD, in order to maximize policy uptake and action. For example:
        i. speaking to decision-makers and influencers about how the GBD results can be used to support evidence-based decision-making

ii. supporting policy dialogues and presenting GBD results relevant to specific policy discussions
iii. working with IHME to develop policy-relevant materials based on GBD findings

6. Additional analyses and publications
    a. Conducting additional analyses or further research that builds upon GBD results
    b. Publishing academic papers utilizing GBD results

Legitimate scientific debate may arise across different mortality, disease, injury, risk factor, and country collaborators; disagreements regarding any aspects of the analyses should be addressed following the protocol outlined in "Section 5. Adjudication" on page 18.

Opportunities for Collaborators

Collaborators can also participate in learning opportunities about the GBD approach and specific components of the GBD and affiliated projects. This learning can serve to support collaborator sub-networks to better contribute to the estimation process and translation of results for policy uptake.

Furthermore, as collaborators, individuals gain access to preliminary results for review and comment. Webinars, collaborator-exclusive communications and information, and specialized visualization tools are also available to collaborators to further the GBD and affiliated projects.

Facilitating communications within the GBD Collaborative Network

IHME may contribute to facilitating communications among collaborators in specific countries and formulating in-country networks. In select cases, and only with the permission of the GBD Management Team, a GBD Collaborator may develop an in-country network of GBD Collaborators. Contact gbdsec@uw.edu for procedures and expectations for formulating in-country networks of collaborators.

GBD Collaborator enrollment

GBD Collaborators are identified and enrolled through two avenues:

1. Core Analytic Team members, GBD researchers, and other GBD collaborators may refer colleagues or submit nominations for GBD Collaborator membership to the GBD Management Team via email at gbdsec@uw.edu. All referrals and nominations are reviewed periodically throughout the year as needed by the GBD Management Team.
2. IHME holds a regular open call for applications from interested individuals. Each applicant must complete the GBD collaborator application form. Applicants will also be asked submit a curriculum vitae that demonstrates the specific area(s) of expertise for which he/she is applying. Collaborators are asked to specify areas of expertise that later determine their eligibility for contribution to certain publications and presentations about the GBD results. Open call applications are reviewed and approved by the GBD Management Team.

GBD Collaborators may leave the collaborator network at any time if they so wish. To opt out, a GBD Collaborator must submit a formal request to the GBD Management Team via email at gbdsec@uw.edu.

Independent Advisory Committee for the GBD

In accordance with a resolution of the Board of the Institute for Health Metrics and Evaluation, the Independent Advisory Committee for the Global Burden of Disease (IAC) advises the IHME Board and the Global Burden of Disease enterprise, with a specific mandate:

The Independent Advisory Committee for the Global Burden of Disease will advise the Board of the Institute for Health Metrics and Evaluation on Global Burden of Disease, Forecasting, and Geospatial Analysis research areas with the following terms of reference:

I. review the strengths and weaknesses of different methods and results
II. identify areas in which, on the basis of available evidence, new data collection and analysis would help to improve particular estimates and make recommendations for how to instigate and support such efforts
III. advise the Board about opportunities for strengthening collaboration and shared ownership
IV. engage in dialogue with other efforts on global health estimates
V. advise the Board on guidelines for access to and use of the Global Burden of Disease, forecasting, and geospatial mapping databases globally, regionally, and nationally
VI. report annually to the Board

The members of the IAC can be found at the following URL: http://www.healthdata.org/gbd/about/independent-advisory.

GBD Secretariat

Under the direct guidance of the GBD Principal Investigator, the GBD Secretariat is responsible for official communication with GBD Collaborators. The GBD Secretariat sends official correspondence, receives and responds to inquiries, maintains the GBD Collaborator database, and coordinates all aspects of enrollment and membership. The GBD Secretariat is the central point of contact for all inquiries about the GBD and affiliated projects. The GBD Secretariat can be contacted at gbdsec@uw.edu.

SECTION 5. ADJUDICATION

Estimation disagreements

Given the complex scope of the GBD, estimates, trends, or approaches may lead to diverging scientific opinion. Generally these instances can be classified in the following four ways:

1. Disagreements about data sources included

The GBD and affiliated projects aim to collate all available relevant data for each indicator. Data sources with implausible patterns relative to other related sources may be excluded from the

analysis. Differing opinions may arise regarding which data points should be excluded from the estimation process.

2. Differing opinions about methodological approaches

As the initial approach for estimation, the GBD utilizes the methodological approaches outlined in the most recently published GBD study. Disagreement may arise regarding methodological innovations or directions for subsequent revisions.

3. Disagreement about estimates for a particular disease, injury, risk factor, or impairment

Within a given disease, injury, risk factor, or impairment there may be disputes about the estimates of overall prevalence, by age, or by sex. These disputes normally rest at the model performance level.

4. Disagreement about a particular geography

Differences in opinion may arise regarding estimates, data sources, and/or approaches for a particular country or region. Since the modeling effort is focused on specific diseases, injuries, risk factors, and impairments, the total picture for a given geographic region is dependent upon the sum total model outputs. Data are not equally available for all diseases, injuries, risk factors, and impairments across all geographies. Model performance, therefore, may not be the same for all diseases, injuries, risk factors, and impairments for all countries. As a result, methodological experts and GBD Collaborators with country expertise may have differing opinions about the level of all-cause mortality for a particular country.

Adjudication process

To resolve such disagreements, steps should be pursued in the following order:

1. For any of the types of disagreement, resolution should first be sought through discussion between the individuals with differing opinions. IHME believes the majority of differences in opinion can be managed in this way, resolved through the usual process of scientific testing and iteration. This will be especially true in instances where the dispute is about the inclusion of data or of the effects of different analytic strategies, as each of the different viewpoints can often be tested and the results compared with one another. IHME expects that such discussions will take place in a spirit of respectful academic disagreement. If a proposal to change methodology or analytic approach remains unresolved, then in the interim the approach used in the most recent GBD round, or the most recently approved subsequent proposal, will prevail until final resolution is reached.
2. If the individuals with a disagreement are not able to resolve the issue through discussion, they may ask the GBD Management Team for assistance in facilitating a resolution. Barring consensus between the individuals with differing opinions, the GBD Management Team may decide to render a decision about the particular topic at hand. All decisions made by the GBD Management Team will be based upon the principles outlined in this protocol and will rely to the degree possible on

an objective evaluation of the empirical evidence. In some cases, informed judgment will need to be applied. In such cases, the rationale for the final decision will be made explicit to all individuals formerly in dispute.

3. If steps 1 and 2 have been properly pursued and disagreement still persists, any member of the GBD may request that the issue be brought to the GBD Scientific Council. This formal request should be made via email to the Council Secretary (contact information for the current Council Secretary is listed on the IHME website at the following URL: http://www.healthdata.org/gbd/about/scientific-council). The GBD Scientific Council will review all such requests and make a determination.

Additional disagreements may arise pertaining to areas outside of the scientific scope of the project, such as the overall process, publication or presentation plans, or translation of results for policymakers. In this scenario, the involved individuals should attempt to jointly reach a resolution. If consensus is not reached in this way, the matter should be brought to the GBD Management Team, which will render a decision on the disagreement.

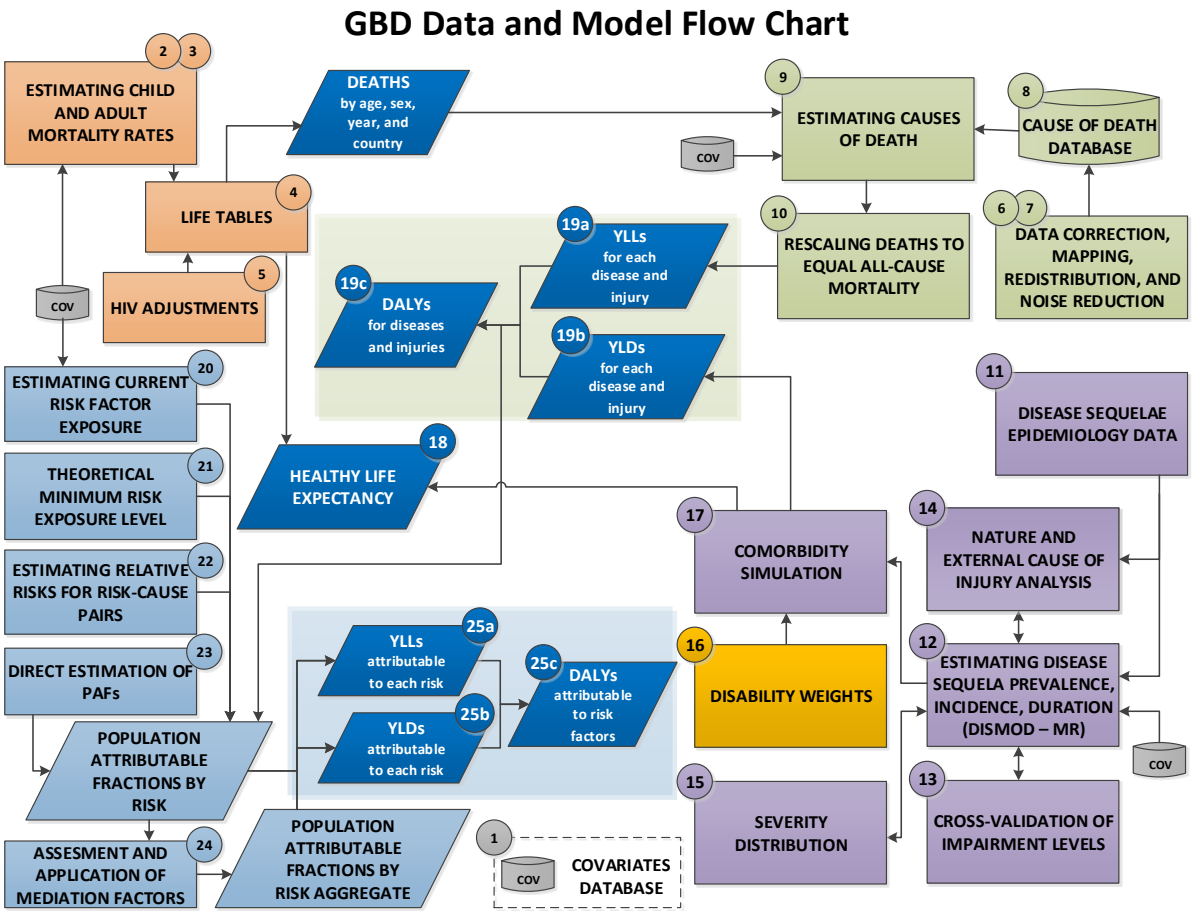
SECTION 6. GBD ESTIMATION FLOW

This section outlines the GBD estimation flow in particular; GBD-affiliated projects may have separate estimation cycles and processes.

Ongoing GBD estimation follows the methodology outlined in the most recently published GBD study, which builds upon the methodology first presented in the GBD 2010 study, unless otherwise approved by the GBD Scientific Council. The flowchart below illustrates the flow of the key components of the GBD estimation process, including:

- incorporation of appropriate covariates (1)
- all-cause mortality estimation (2-4)
- causes of death estimation (5-9)
- estimation of disease sequelae prevalence, incidence, and duration (10-11)
- cross-validation of impairment levels (12)
- analysis of the nature and external cause of injury (13)
- assignment of disability weights for health states (14)
- assignment of severity distributions for the main disabling conditions (15)
- simulation of comorbidity (16)
- estimation of healthy life expectancy (17)
- computation of YLLs, YLDs, and DALYs from diseases and injuries with uncertainty (18a-18c)
- risk factor estimation (19-21)
- computation of YLLs, YLDs, and DALYs attributable to risk factors (22a-22c)

For detailed flowcharts, code, and documentation on the estimation process for a given cause or risk factor, consult the capstone paper appendices, as well as the most recent GBD round's section under "IHME Data" on the Global Health Data Exchange (http://ghdx.healthdata.org/).



SECTION 7. GBD LOCATION, AGE, SEX, CAUSE AND RISK FACTOR LISTS

Locations

Point estimates with 95% UI are released for a set of countries, the list of which can be found on the IHME website in the GBD Results Tool (see: "Codebook"):

http://ghdx.healthdata.org/gbd-results-tool

Over time, estimates at the subnational level may be generated for a number of countries, pending mutual interest, availability of data, and identification of funding mechanisms to support this work. Estimation at the subnational level is conducted using the same methodologies and computational infrastructure as

national estimates, and on the same timeline as the overall GBD effort in order to maintain internal consistency between the national and subnational results.

Requests to add additional geographies or to undertake subnational analysis should be submitted to the GBD Management Team via the GBD Secretariat at gbdsec@uw.edu. Requests will be formally decided upon by the GBD Scientific Council. For more information about subnational analysis, contact gbdsec@uw.edu.

Age groups

The minimum set of age groups for which estimates are generated can be found on the IHME website in the GBD Results Tool (see: "Codebook"):

http://ghdx.healthdata.org/gbd-results-tool

Requests to generate results for more aggregated age groups should be directed to the GBD Secretariat and will be formally decided upon by the GBD Management Team.

Sex

Calculations are made separately by sex; point estimates are reported by sex and for both sexes combined.

Cause and risk factor lists

Extensive cause lists have been developed detailing the diseases and injuries, sequelae, and risk factors used in the GBD. The sections below provide an overview of the cause lists for diseases and injuries and for risk factors. Should a circumstance arise where an individual has substantial scientific justification to propose an addition or modification to the cause or risk lists, this individual should contact the GBD Management Team via the GBD Secretariat at gbdsec@uw.edu. Proposals will be formally decided upon by the GBD Scientific Council.

Diseases and injuries cause list

The GBD cause list has been designed to include the diseases, injuries, and sequelae that are most relevant for public health policymaking. The cause list is organized in a hierarchical structure so that different levels of aggregation are included. The cause list is mutually exclusive and collectively exhaustive at every level of aggregation; causes not individually specified are captured in residual categories.

The most up-to-date cause list can be found in the GBD Results Tool (see: "Codebook"):
http://ghdx.healthdata.org/gbd-results-tool

All proposed changes to the risk factor list are reviewed and **a**pproved by the GBD Scientific Council.

Risk factor list

The GBD risk factor list has been designed to include the risk factors that are most relevant for public health policymaking. The risk factor list is organized in a hierarchical structure so that different levels of

aggregation are included. The risk factor list is mutually exclusive and collectively exhaustive at every level of aggregation; risk factors not individually specified are captured in residual categories.

The most up-to-date risk factor list can be found in the GBD Results Tool (see: "Codebook"): http://ghdx.healthdata.org/gbd-results-tool

All proposed changes to the risk factor list are reviewed and approved by the GBD Scientific Council.

SECTION 8. DATA

High-quality, ongoing estimation requires a constant stream of the most up-to-date data available for a wide range of indicators. This necessitates continuous extraction of studies from the literature and the addition of key data sources throughout the GBD.

Definitions

The GBD study has and will continue to develop a substantial data repository, including the following:

1. Input data

Raw input data are microdata or tabulated data obtained directly from data holders or publications. Raw data has not been corrected by IHME for known bias and processed in any other way. Examples of raw data include demographic and health survey microdata, census tabulations, claims data, or results from a published study or report. For input data, we will continue to catalogue metadata for all sources including source, codebooks, where applicable and available, data type, key descriptions, time period over which data was collected, and region covered. We formulate a citation from the metadata, and make sure the catalogued information for all input datasets that we use is available publically in the GHDx. Wherever we have permission, which we will use all reasonable efforts to obtain, we will share and make publicly available for download via an open data license; where applicable, we will share input data through the GHDx as well. To illustrate the scale of this, we will provide metrics on the proportion of data sources that IHME has been granted permission to share, and we will collect information on the number of downloads in order to audit uptake. Where formal data agreements, required by the original data holders, prohibit us from sharing the input data, we provide instructions as to how users can request the data from the original provider. IHME maintains, and will continue to maintain, an active dialogue with data providers to encourage them to grant permissions for the greatest possible sharing of data. In addition, we are incorporating the capacity to show citation information with each individual data point into each of our data visualizations.

2. Intermediate data

These are data generated from the raw input data as part of the analytic process. They are the result of cleaning, redistribution, and other analytic operations that transform the input data into

intermediate data to be used in the final modeling processes. Intermediate data are specific to our analytic process, but can be useful for external audiences to provide context for interpreting final results and facilitating replication studies. Where legally permitted by data holders and useful to internal and/or external audiences, we make intermediate data available via the data visualizations. We will use all reasonable efforts to obtain legal permission to share from these data holders.

3. Final results data or estimates

The final results data, also referred to as estimates, are fully imputed datasets providing detailed information. We make all of these results visible and available through the data visualizations, through tables and figures, and through papers, policy reports, and other written materials. We also make them available and easily downloadable in csv and other file formats in the GHDx.

To maximize the use of this resource as a global public good, input data, intermediate data, and final results data will be made freely available where legally permissible for non-commercial use of the data.

Citation of crude data sources

The GBD study is committed to citing input data sources used in the study in accordance with the GATHER guidelines (http://gather-statement.org/). Citations and additional metadata for input sources are available in the GBD Data Input Sources Tool (http://ghdx.healthdata.org/gbd-data-input-sources). Input data sources provided by GBD Collaborators and other collaborators should be accompanied by sufficient information so that the data may be unambiguously cited.

Literature reviews

Literature reviews for each disease, injury, and risk factor are performed on a rotating cycle based on the proliferation of literature and impact of the condition. While each condition will not receive a fully updated review every iteration, the rotation strategy ensures that new literature sources for all conditions are included on a routine basis. The literature review processes uses broad search terms to ensure that all relevant data are captured from a large collection of peer-reviewed scientific and medical journals. These journals are known to publish relevant data on prevalence, incidence, mortality, causes of death, risk factors, and other relevant indicators. All articles containing useable data meeting predefined standards will be downloaded, extracted, and entered into centralized databases. Core Analytic Team members will be able to access the data pertinent to the disease, injury, risk factor, or impairment they are modeling, as well as identify and exclude outlier studies.

Other crude data sources

The Core Analytic Team is responsible for systematically collating and cataloging data from sources such as vital registration, hospital data, disease registry data (i.e., from cancer registries and registries for other diseases), surveillance systems, censuses, household surveys, and other relevant data sources. It is expected that GBD Collaborators will actively identify gaps in data sources and help obtain access for the GBD relating to their area of expertise. GBD Collaborators are also likely to be especially helpful in

identifying novel subnational or point-in-time sources; as well as providing interpretation, context, and additional information about relevant data sources that otherwise would not be readily apparent through a centralized review effort. In all cases, IHME bears responsibility for cataloging the data, ensuring that appropriate data use procedures are followed, and ultimately making available the citation source of the data used in estimates.

Data access parameters

General access parameters for crude data

All sources that provided data for the estimation of GBD results are cataloged as legally permissible in IHME's public data catalog, the Global Health Data Exchange ("GHDx," http://ghdx.healthdata.org/). Data cataloging happens on a continuous basis as legally permissible, and all GHDx entries for crude data sources used in GBD are made publicly available by the time GBD results are published. For many crude data sources, agreements with data providers inhibit direct sharing of raw data with third parties, but interested parties can use the GHDx to identify the official data provider.

GHDx entries for crude data sources by GBD component, cause, risk, and location can be accessed through the GBD Data Input Sources Tool (http://ghdx.healthdata.org/gbd-data-input-sources). An updated GBD Data Input Sources Tool is released concurrent with the publication of results for each cycle of GBD. The tool provides metadata about input sources including citations, provider and access information, and other relevant metadata about the input sources as suggested in the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER).

General access parameters for model input data points

Before being used in the GBD, crude data may undergo various preparation processes, such as age and sex splitting or redistribution of garbage codes. The resulting model input data points that are used for each GBD annual analysis are shared, where legally permissible. These data points may have originated in peer-reviewed papers, publications, or reports, or have been calculated from crude data. All data points are linked to a record in the GHDx which contains full metadata where legally permissible. The model input data points for each annual cycle of GBD are released once the results for that cycle have been published, except for cases when copyright or data use agreements may prevent us from sharing selected input data points. The data points are made available through updated visualizations (http://www.healthdata.org/results/data-visualizations) released concurrent with publication of the capstone papers.

General access parameters for final GBD results

The final point estimates with 95% UI (where possible) of the GBD quantities of interest are made available to the public through an updated results query tool (http://ghdx.healthdata.org/gbd-results-tool) and updated visualizations, which are both released concurrent with publication of the capstone papers. Additionally, code used to generate the GBD results is released for public access, as suggested by the GATHER statement.

Data access for GBD Collaborators

GBD Collaborators may be granted privileged, confidential access to the crude and model input data upon request where legally permissible, as well as the final point estimate results with 95% uncertainty as applicable pertaining to their enrolled area of expertise. This exclusive access is explicitly intended to encourage publication and the involvement of GBD Collaborators in furthering jointly held academic interests while achieving widespread dissemination of GBD results in a multitude of settings.

SECTION 9. PUBLICATIONS AND PRESENTATIONS

The GBD is a critical resource for policymakers, researchers, donors, and others to make informed decisions and guide priorities using the most current information possible. In order to maximize the benefit of the GBD as a global public good, IHME strongly encourages the robust production of publications that provide important insight and implications from GBD results, as well as disseminations of the results, for example via presentations and posters.

By participating in the GBD as a GBD Collaborator, GBD Scientific Council member, GBD Management Team member, and/or Core Analytic Team member, individuals are provided multiple opportunities for authorship on GBD publications.

The following sections provide more details specific to the process by which different types of publications will be created as well as specific criteria for authorship. In all cases, eligible authors must conform to the criteria as specified by the International Committee of Medical Journal Editors (ICMJE) and the individual journals to which the publications are submitted.

Negotiated publication arrangements with journals

Capstone papers presenting overall estimates

Following on the demand and interest generated by the triple issue in *The Lancet* devoted entirely to the GBD 2010, GBD and *The Lancet* have entered a strategic partnership to produce a similar set of capstone papers for future iterations of the GBD, should manuscripts be accepted through the normal peer review process of *The Lancet*. *The Lancet* aims to produce a set of capstone papers that will present the updated estimates, describe any methodological innovations, and highlight a selection of particularly policy-relevant topics.

The Lancet will publish a set of capstone papers providing a detailed analysis of the following indicators, which are subject to change:

1. all-cause mortality
2. causes of death
3. non-fatal health outcomes
4. DALYs and HALE

5. risk factors

The GBD PI will oversee the analysis and writing process for these papers. IHME will provide support for the writing process in terms of data preparation, writing and editing, figure and table development, and process management.

Regular updates of disease-specific, risk factor-specific, and country-specific papers published as part of negotiated arrangements with journals

In addition to the capstone papers presenting overall estimates, IHME has negotiated the regular publication of updates on targeted causes, risk factors, and country-specific GBD results with a number of key public health and epidemiological journals. For each of these papers, a writing committee will be formed. Coordinating Authors named by the GBD PI will drive the overall writing process for the regular update papers.

As appropriate, IHME will provide support for the writing process in terms of data preparation, writing and editing, figure and table development, and process management.

Other papers

In addition to the negotiated journal publications outlined in the section above, IHME highly encourages the publication of a robust set of additional manuscripts that examine more closely:

1. the results and trends for all-cause mortality and specific diseases, injuries, or risk factors
2. the results and trends for a country or set of countries
3. data sources, lay descriptions, or methodological enhancements for disability weights
4. innovations in methodology used
5. results of subnational GBD analyses

These manuscripts can be spearheaded either by GBD Collaborators or by GBD Core Analytic Team members.

Timeline for publication of other papers

The GBD capstone papers will typically be published before any of the regular update papers or other papers. Once a capstone paper is published, the data for that capstone paper are also published and made available to the public. Any GBD Collaborator may draft a paper about their enrolled area of expertise using published data.

Process for writing other papers

In all cases and at all times, the GBD Management Team must be formally notified in writing of all publications utilizing GBD data, methods, and/or results. While a GBD Collaborator may take the initiative to draft a paper on their own, IHME encourages continued collaboration within the GBD Collaborator Network and advises Collaborators to follow these steps:

1. We suggest that if a GBD Collaborator would like to collaborate on the development of a publication, that collaborator should submit a publication plan to the GBD Secretariat at gbdsec@uw.edu.
2. The GBD Management Team and the GBD Principal Investigator will review proposals at least monthly to determine the feasibility of a proposed publication collaboration, and if approved, the nature and extent of the collaboration and the type this paper will fall under (see below). For example, in some cases, a paper may require novel analyses to be conducted by IHME to produce the desired results. These analyses may or may not be feasible given competing priorities, and the GBD Management Team will determine if/when such analyses are feasible.
3. In select cases, IHME may provide support for manuscript preparation in terms of writing, editing, and process management.
4. If the paper proposed is already in production, IHME will connect the collaborator with those working on the topic.

Types of collaborator-led papers

Type A: A collaborator takes an active role in conceptualizing or writing the paper, but Core Analytic Team members assist with writing, perform novel analyses, and/or create figures and tables for the paper. For these papers, IHME staff will circulate the draft to relevant collaborators across the network, collate collaborator comments, and manage responses to collaborators and peer reviewers. A Core Analytic Team member will be corresponding author or co-corresponding author with a GBD collaborator. Collaboration on these papers is subject to mutual agreement on available resources and timeline. Examples of this type: country-specific subnational capstone papers, disease-specific global papers.

Type B: A collaborator takes the lead role in conceptualizing or writing the paper, but the Core Analytic Team may provide limited support to access information and/or to create figures and tables for the paper. Some of these papers may utilize results that are not yet in the public domain (i.e., subnational results that have not yet been released) and thus will require support from the Core Analytic Team to access results. For these papers, IHME staff will circulate the draft to relevant collaborators across the network, collate collaborator comments, and may confirm comments were addressed in the paper's revision. The collaborator will be corresponding author. Collaboration on these papers is subject to mutual agreement on available resources and timeline. Example of this type: country-specific papers.

Type C: A collaborator uses information in the public domain to write a paper without assistance from IHME staff. The collaborator must inform the GBD Management Team through Kate Muller, Assistant Director of Scientific Communications (winnekat@uw.edu), that such a paper is being written. The collaborator will be corresponding author. Example of this type: disease-specific papers focused on a single country.

Subnational Country Papers

Subnational country papers highlight the methods and results of subnational analyses for a particular country.

Collaborators in a given country play a critical role in the drafting, review, and promotion of subnational country papers, as well as translate the results at the local and national level to generate policy uptake.

Formation of writing committees for GBD paper production

To ensure the timely publication of rigorously generated results and to provide GBD Collaborators with multiple opportunities to engage with the work, the GBD PI will look for opportunities to organize the manuscript-writing effort through writing committees. This writing committee process could apply to any of the following categories of publications:

- Capstone papers presenting overall estimates or all-cause mortality
- Regular updates of disease-specific, risk factor-specific, and country-specific papers published as part of negotiated arrangements with journals
- Other papers

Authorship criteria for GBD publications

The GBD conforms to the principles of authorship, disclosure, and scientific integrity as outlined in the requirements of the individual peer-reviewed journal to which a given publication is submitted, as well as to the overall criteria of the International Committee of Medical Journal Editors. All authors listed on publications from the GBD study should meet those criteria. All eligible authors will need to submit an authorship form in accordance with the journal regulations in order to be included. Note that journals vary in their standards for authorship; some journals may allow fewer authors than others.

In order to qualify for authorship, potential authors must meet the following criteria:

1. Contributing substantially to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work.
2. Drafting the work or revising it critically for important intellectual content.
3. Giving final approval of the version of the manuscript to be submitted.
4. Agreeing to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Should any journal have specific criteria for authorship beyond those listed above, the GBD will additionally adhere to those criteria.

Categories of authors' contributions

Starting with the GBD 2016 capstone papers, IHME will indicate authors' contributions (by category) toward individual papers in the supplementary appendix for each paper. This method will more accurately recognize the many varied contributions from authors. Authors can select several or all of the following categories for contribution:

- Providing data or critical feedback on data sources

- Developing methods or computational machinery
- Applying analytical methods to produce estimates
- Providing critical feedback on methods or results
- Drafting the work or revising it critically for important intellectual content
- Extracting, cleaning, or cataloging data; designing or coding figures and tables
- Managing the overall research enterprise

When claiming authorship for a paper, authors will self-identify to which of the above categories they belong. To make sure authors are not inadvertently missed, IHME will cross-check authors in some categories (for example, by checking authors against logged comments for papers or the list of collaborators who provided data). Where appropriate, we will also use the paper's "Contributors" section to recognize individual authors' contributions.

Order of names in author lists

Starting with the GBD 2016 capstone papers, one or two individuals will be called out as first authors (to be listed first in the list of author names) and as senior authors (to be listed last). These designations will be selected by the paper's senior author. All other authors will be listed alphabetically, with their individual contributions delineated by category in the appendix as described above.

Non-author contributions

In general, contributors who were actively involved in the project for the paper in question will be considered for authorship. All contributors who are not listed as authors will be considered for acknowledgment. Depending on the limitations of the journal, an attempt will be made to acknowledge all non-author contributors. If a methodological advance or other important contribution by a contributor already has been published and that contributor is no longer actively involved in the project, that work is more likely to be cited in the paper instead of giving authorship or acknowledgment.

GBD citation

All publications and presentations – including those that use data derived from the GBD effort and those that are a product of individual GBD Collaborators using data as part of their privileged access to GBD data and results – must include the following citation:

> *"This research has been conducted as part of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), coordinated by the Institute for Health Metrics and Evaluation. The GBD was partially funded by the Bill & Melinda Gates Foundation; the funders had no role in the study design, data analysis, data interpretation, or writing of the report."*

Posters

In select cases, and only with the permission of the GBD Management Team, conference poster abstracts may be allowed to use preliminary (not-yet published) GBD results. All requests to use preliminary results should be formally submitted to the GBD Management Team at gbdsec@uw.edu. In cases where a request to use preliminary results is granted, approved posters must be labeled with:

> "Preliminary results from the Global Burden of Disease. Source: Institute for Health Metrics and Evaluation, http://www.healthdata.org/gbd."

In general, authorship on the abstract should follow the same principles as described above for the appropriate topic-specific subcategory of peer-reviewed publications.

Presentations

Presentations of already published methods and results can be made at any time. In select cases, and only with the permission of the GBD Management Team, presentations may be allowed to use preliminary (not-yet published) GBD results. All requests to use preliminary results should be formally submitted to the GBD Management Team at gbdsec@uw.edu. In cases where a request to use preliminary results is granted, each slide in the presentation must be labeled with:

> "Preliminary results from the Global Burden of Disease. Source: Institute for Health Metrics and Evaluation http://www.healthdata.org/gbd."

SECTION 10. POLICY ENGAGEMENT

In addition to disseminating findings via peer-reviewed academic publications, presentations, and posters, IHME also strongly encourages collaborators to share the findings with decision-makers to raise awareness of GBD as a valuable resource.

Engaging decision-makers

IHME encourages collaborators to engage decision-makers in their countries and/or focus area(s) to demonstrate how GBD can be an important tool for policymaking and priority setting. To learn more about ways that GBD collaborators are using findings from the study to inform decision-making, see IHME's *Acting on Data* blog, which includes case studies from countries such as Ethiopia, Ghana, Norway, Ukraine, the United Kingdom, the United States, and others. To facilitate joint learning across the collaborator network and beyond, IHME encourages collaborators to share other ways that GBD is influencing decision-making with IHME by emailing gbdsec@uw.edu. IHME may include this information on its *Acting on Data* blog and/or may invite the collaborator(s) to speak at a policy-focused event.

Policy materials

IHME will often produce materials for non-academic audiences, such as policymakers, nonprofits, donors, and other decision-makers, that can be helpful to collaborators as they engage with decision-makers. When needed, IHME also encourages collaborators to create materials (such as presentations, one-pagers, and reports) that are tailored to decision-makers in their country and/or focus area.

The materials that IHME produces will include reports, briefs, graphic illustrations, videos, and website content. These materials will be produced by IHME and may be jointly produced with other stakeholders

or collaborators. They may summarize results overall or for a specific region, disease, injury, or risk factor, or highlight select trends that are relevant for policymakers in a given health area or geographic region. For example, the GBD country profiles provide succinct summaries of GBD results, available at http://www.healthdata.org/results/country-profiles. From the GBD 2015 study, a good example of a report is the publication titled "Rethinking Development and Health: Findings from the Global Burden of Disease Study," available at http://www.healthdata.org/policy-report/rethinking-development-and-health-findings-global-burden-disease-study. There will be no specific author attribution on these materials; instead, they will be listed with corporate authorship and will explicitly reference the GBD. Individuals who play a significant role in the content creation and assembly will be noted in the acknowledgments, where appropriate.

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