

Estimating the global burden of foodborne diseases

Progress update for 6th expert meeting of the FERG
5 December 2023

WHO secretariat

[Department of Nutrition and Food Safety](#)



Background

- New assembly resolution in 2020
- First-ever WHO estimates (2010) reported in 2015

Mandate ([WHA73.5](#))

The Seventy-third World Health Assembly requests the Director-General to monitor regularly, and to report to Member States on, the global burden of foodborne and zoonotic diseases at national, regional and international levels, and in particular to **prepare, by 2025, a new report** on the global burden of foodborne diseases with up-to-date estimates of mortality, as well as incidence, and burden in terms of disability-adjusted life years.

SEVENTY-THIRD WORLD HEALTH ASSEMBLY

WHA73.5

Agenda item 15.3

3 August 2020

Strengthening efforts on food safety

The Seventy-third World Health Assembly,

Having adopted the written silence procedure through decision WHA73(7) (2020);¹

Recalling resolutions WHA53.15 (2000) on food safety and WHA63.3 (2010) on advancing food safety initiatives, and acknowledging that the challenges outlined in these resolutions continue as the food safety systems of many Member States are under development and need significant improvements in their key components, such as regulatory infrastructure, enforcement, surveillance, inspection, laboratory capacity and capability, coordination mechanisms, emergency response and food safety education and training;

Recalling also the international conferences in 2019 on food safety convened by WHO, FAO, and WTO and the African Union in Addis Ababa and Geneva, which identified key actions and strategies to tackle current and future challenges to food safety globally;

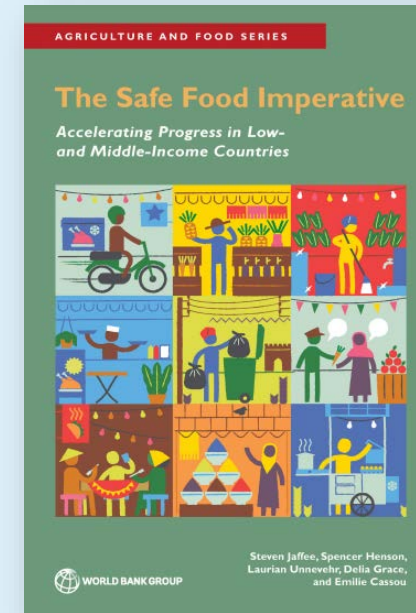
Noting that food safety plays a critical role in the achievement of many of the Sustainable Development Goals and contributes to relevant areas of WHO's Thirteenth General Programme of Work, 2019–2023 and efforts to address universal health coverage;

Considering that WHO published estimates on the global burden of foodborne diseases for the first time in 2015, in which it estimated that more than 600 million cases of foodborne illnesses and 420 000 deaths occur in a year² and that the burden of foodborne diseases falls disproportionately

Mandate ([WHA73.5](#))

“...Considering that [WHO published estimates on the global burden of foodborne diseases for the first time in 2015](#), in which it estimated that more than 600 million cases of foodborne illnesses and 420 000 deaths could occur in a year; and that the burden of foodborne diseases falls disproportionately on groups in vulnerable situations and especially on children under 5 years of age, with the highest burden in developing countries;

Recalling the World Bank study, [The safe food imperative: accelerating progress in low- and middle-income countries](#), which called upon national governments to increase investments in their food safety infrastructure, and which noted that foodborne diseases resulting from the consumption of unsafe foods cost low- and middle-income countries at least US\$ 110 billion in lost productivity and medical expenses annually;...”



[PLOS Collections on WHO Estimates of the Global Burden of Foodborne Diseases](#)

Hazards for which burden of foodborne disease estimates were reported in 2015

*Hazards in grey and blue boxes were not included in the global overview

PDTF: Parasitic Disease Task Force
CTTF: Chemicals and Toxins Task Force
EDTF: Enteric Disease Task Force

PDTF	CTTF	EDTF (HAZARDS CAUSING HEALTH EFFECTS OTHER THAN ENTERIC DISEASE)	EDTF (HAZARDS CAUSING ENTERIC DISEASE)
<i>Ascaris</i> spp.	Aflatoxin	<i>Brucella</i> spp.	<i>Bacillus cereus</i> ¹
<i>Echinococcus multilocularis</i>	Arsenic	<i>Clostridium botulinum</i> ³	<i>Campylobacter</i> spp. ²
<i>Echinococcus granulosus</i>	Cadmium	Hepatitis A virus	<i>Cryptosporidium</i> spp
<i>Clonorchis sinensis</i>	Cassava cyanide	<i>Listeria</i> spp.	<i>Clostridium perfringens</i> ¹
<i>Fasciola</i> spp.	Dioxin	<i>Mycobacterium bovis</i>	<i>Entamoeba histolytica</i>
Intestinal flukes ⁴	Lead	<i>Salmonella enterica</i> (invasive infections) non-typhoidal	Enteropathogenic <i>E. coli</i> (EPEC)
<i>Opisthorchis</i> spp.	Methyl mercury	<i>Salmonella enterica</i> Paratyphi A	Enterotoxigenic <i>E. coli</i> (ETEC)
<i>Paragonimus</i> spp.	Peanut allergens ⁵	<i>Salmonella enterica</i> Typhi	<i>Giardia</i> spp.
<i>Taenia solium</i>			Norovirus
<i>Toxoplasma gondii</i> ⁶			<i>Salmonella enterica</i> (non-invasive infections) non-typhoidal
<i>Trichinella</i> spp.			<i>Shigella</i> spp.
			Shiga toxin-producing <i>E. coli</i> (STEC)
			<i>Staphylococcus aureus</i> ¹
			<i>Vibrio cholerae</i>

Note that salmonellosis and invasive salmonellosis are counted as a single hazard causing two diseases.

Data (2010) reported in 2015 and included metrics



World Health Organization
Foodborne Disease Burden Epidemiology Reference Group

Estimates of the global burden of foodborne disease, 2010
all ages

S1 Table. Foodborne illnesses, 2010 (median, 95% uncertainty interval)
S2 Table. Foodborne deaths, 2010 (median, 95% uncertainty interval)
S3 Table. Foodborne years lived with disability, 2010 (median, 95% uncertainty interval)
S4 Table. Foodborne years of life lost, 2010 (median, 95% uncertainty interval)
S5 Table. Foodborne disability-adjusted life years, 2010 (median, 95% uncertainty interval)
S6 Table. Foodborne illnesses per 100,000, 2010 (median, 95% uncertainty interval)
S7 Table. Foodborne deaths per 100,000, 2010 (median, 95% uncertainty interval)
S8 Table. Foodborne years lived with disability per 100,000, 2010 (median, 95% uncertainty interval)
S9 Table. Foodborne years of life lost per 100,000, 2010 (median, 95% uncertainty interval)
S10 Table. Foodborne disability-adjusted life years per 100,000, 2010 (median, 95% uncertainty interval)
S11 Table. Foodborne years lived with disability per case, 2010 (median, 95% uncertainty interval)
S12 Table. Foodborne years of life lost per case, 2010 (median, 95% uncertainty interval)
S13 Table. Foodborne disability-adjusted life years per case, 2010 (median, 95% uncertainty interval)
S14 Table. Illnesses, 2010 (median, 95% uncertainty interval)
S15 Table. Deaths, 2010 (median, 95% uncertainty interval)
S16 Table. Years lived with disability, 2010 (median, 95% uncertainty interval)
S17 Table. Years of life lost, 2010 (median, 95% uncertainty interval)
S18 Table. Disability-adjusted life years, 2010 (median, 95% uncertainty interval)

- **Levels**
 - Global
 - Regional
 - Sub-regional
 - National (calculated, unreported publicly)
- **Aggregations**
 - All ages
 - People ≥ 5 years of age
 - People < 5 years of age
- The original data set available for [download](#)

Updating the estimates

- Foodborne Disease Burden Epidemiology Reference Group (FERG) 2021-2025
- Hazard list
- Commissioned systematic review teams
- Source attribution
- Economic burden of foodborne diseases

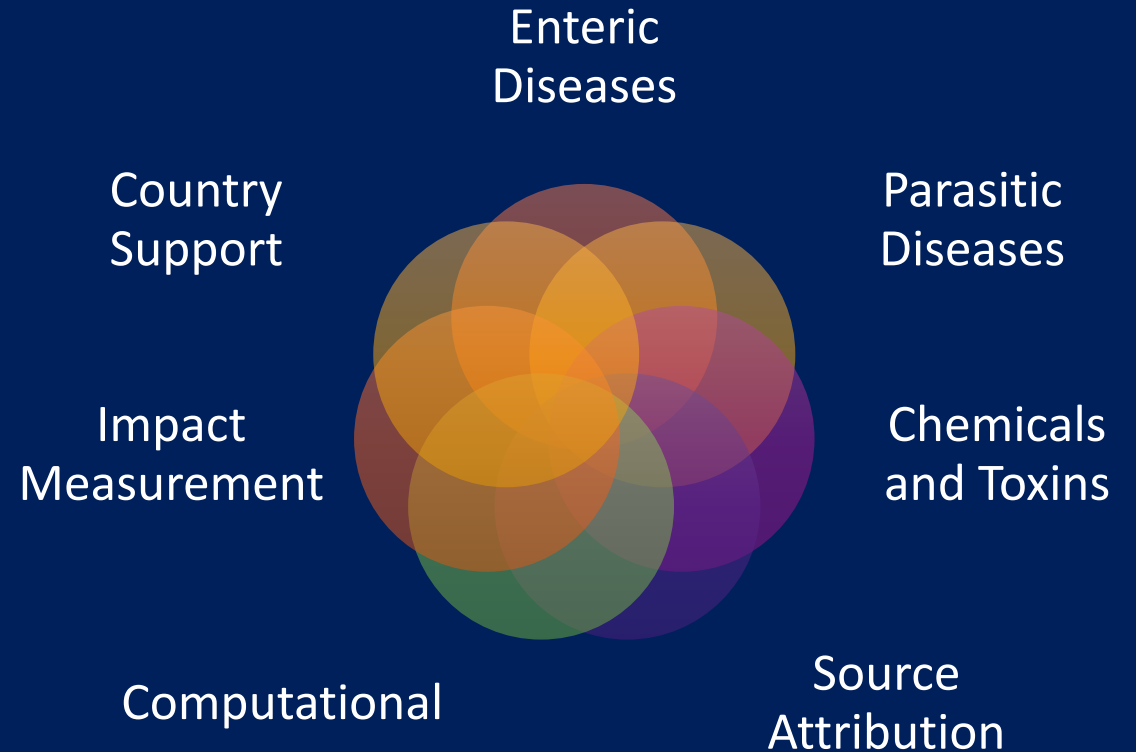
WHO Technical Advisory Group: Foodborne Disease Burden Epidemiology Reference Group (FERG) for 2021-2025



FERG Task Forces (TF)

FERG chair: Dr Rob Lake

1. EDTF: Enteric Disease Task Force
2. PDTF: Parasitic Disease Task Force
3. CTF: Chemicals and Toxins Task Force
4. SATF: Source Attribution Task Force
5. CTF: Computational Task Force
6. IMTF: Impact Measurement Task Force
7. CSTF: Country Support Task Force



Hazards for which burden of foodborne disease estimates are being considered for next updates

Parasitic Diseases	Chemicals and Toxins	Enteric Diseases (non-diarrhoeal diseases)	Enteric Diseases (diarrhoeal diseases)
<i>Ascaris</i> spp. <i>Echinococcus multilocularis</i> <i>Echinococcus granulosus</i> <i>Clonorchis sinensis</i> <i>Fasciola</i> spp. Intestinal flukes <i>Opisthorchis</i> spp. <i>Paragonimus</i> spp. <i>Taenia solium</i> <i>Toxoplasma gondii</i> <i>Trichinella</i> spp. <i>Trypanosoma cruzi</i> (new)*	Aflatoxin B1 Aflatoxin M1 (new) Arsenic Cadmium Cassava cyanide* Dioxin Lead Methylmercury Peanut allergens	<i>Brucella</i> spp. <i>Clostridium botulinum</i> Hepatitis A virus <i>Listeria</i> spp. <i>Mycobacterium bovis</i> <i>Salmonella enterica</i> (invasive infections) non-typhoidal <i>Salmonella enterica</i> Paratyphi A <i>Salmonella enterica</i> Typhi	<i>Campylobacter</i> spp. <i>Cryptosporidium</i> spp. <i>Cyclospora</i> (new) <i>Entamoeba histolytica</i> Enteroaggregative <i>E.coli</i> (EAEC) (new) Enteropathogenic <i>E.coli</i> (EPEC) Enterotoxigenic <i>E.coli</i> (ETEC) <i>Giardia</i> spp. Norovirus Rotavirus (new) <i>Salmonella enterica</i> (non-invasive infections) non-typhoidal <i>Shigella</i> spp. Shiga toxin-producing <i>E.coli</i> (STEC) <i>Vibrio cholerae</i>

*Data collection for these two hazards have yet to start and are currently under technical discussions

Data collection through systematic reviews

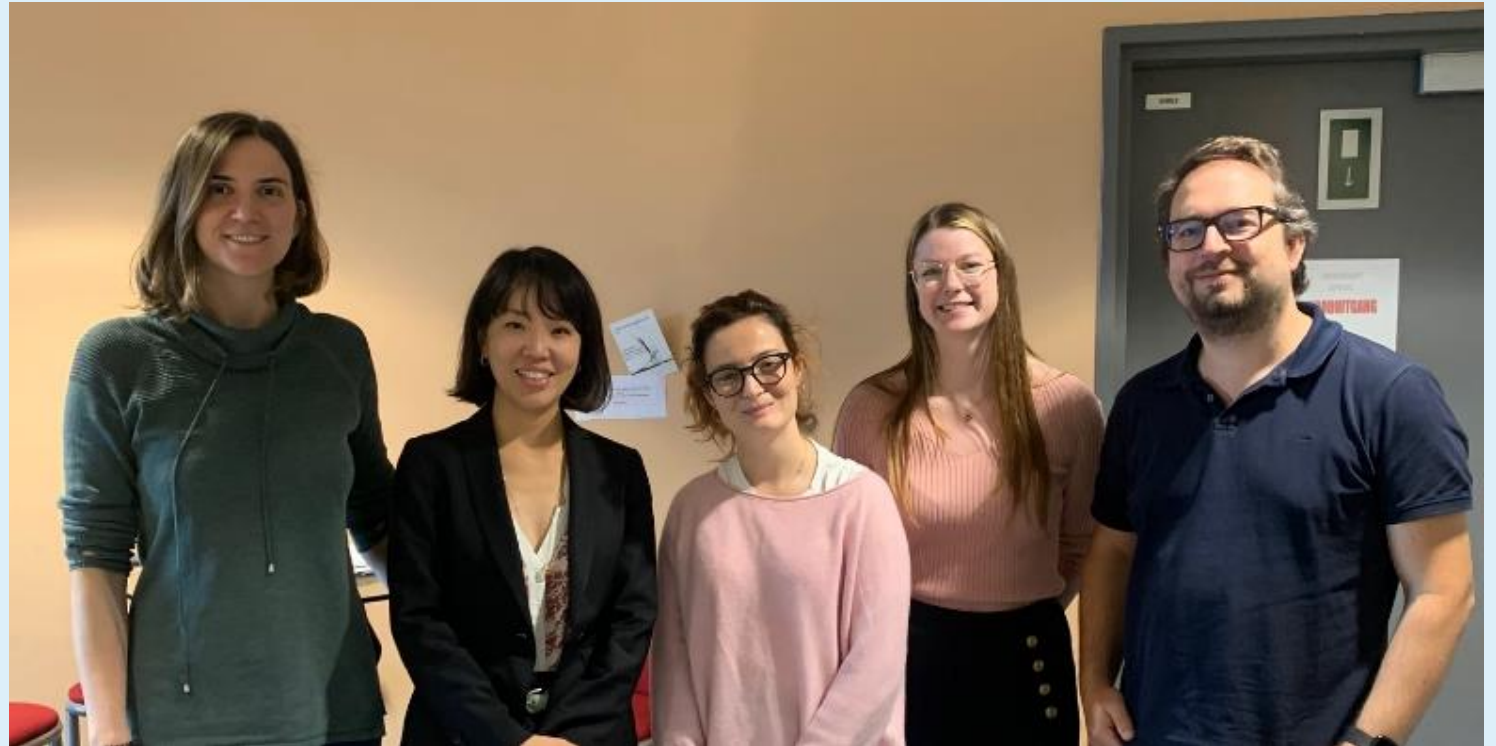
The following systematic review teams have been or will be commissioned to collect required data to estimate the burden of foodborne diseases based on the [general approach](#) set by the FERG.

Commissioned teams	Country	Scope of work	Commissioned teams (Continued)	Country	Scope of work
Australian National University	Australia	<i>Clostridium botulinum</i>	Shahid Beheshti University of Medical Sciences and others	Iran	Methylmercury
China National Center for Food Safety Risk Assessment	China	Cadmium	Technical University of Denmark	Denmark	Dioxin, Peanut allergies
Ghent University	Belgium	Acute aflatoxicosis, growth impairment caused by aflatoxins	University of Melbourne / Babol University of Medical Sciences	Australia / Iran	<i>Ascaris</i> spp.
Gibb & O'Leary Epidemiology Consulting	USA	Inorganic Arsenic , Lead	University of Montreal	Canada	Taenia solium
Hokkaido University	Japan	<i>Mycobacterium bovis</i>	University of Otago	New Zealand	Non-typhoidal <i>salmonella enterica</i> (invasive salmonellosis)
Michigan State University	USA	Aflatoxins B1 , M1	University of Virginia	USA	Diarrhoeal diseases and deaths caused by 14 pathogens commonly transmitted by food
Murdoch University	Australia	<i>Brucella</i> spp.	University of Waterloo	Canada	Haemolytic uraemic syndrome, End-stage renal disease caused by STEC
National Institute for Public Health and the Environment*	Netherlands	<i>Fasciola</i> spp.	University of Zurich	Switzerland	<i>Echinococcus granulosus</i> , <i>Echinococcus multilocularis</i> , <i>Toxoplasma gondii</i>
Sciensano	Belgium	<i>Listeria monocytogenes</i> , <i>Clonorchis sinensis</i> , Intestinal flukes, <i>Opisthorchis</i> spp., <i>Paragonimus</i> spp., <i>Trichinella</i> spp.			

*WHO Collaborating Centre (WCC) ([NET-42](#))

Collaboration with Sciensano

Sciensano, Belgium Institute for Health, was commissioned to support WHO on computational activities for estimating the burden of foodborne diseases, including monitoring data collection status across systematic review teams, providing data templates, and ensuring consistent data inputs based on the approach advised by the FERG.



Collaboration with Institute for Health Metrics and Evaluation (IHME)

WHO is under technical discussions with the Institute for Health Metrics and Evaluation ([IHME](#)) at the University of Washington in Seattle, USA on data sharing for selected hazards/health outcomes.



Source attribution to foodborne transmission

Global expert elicitation study will be conducted for attribution of burden of foodborne transmission and to specific foods.

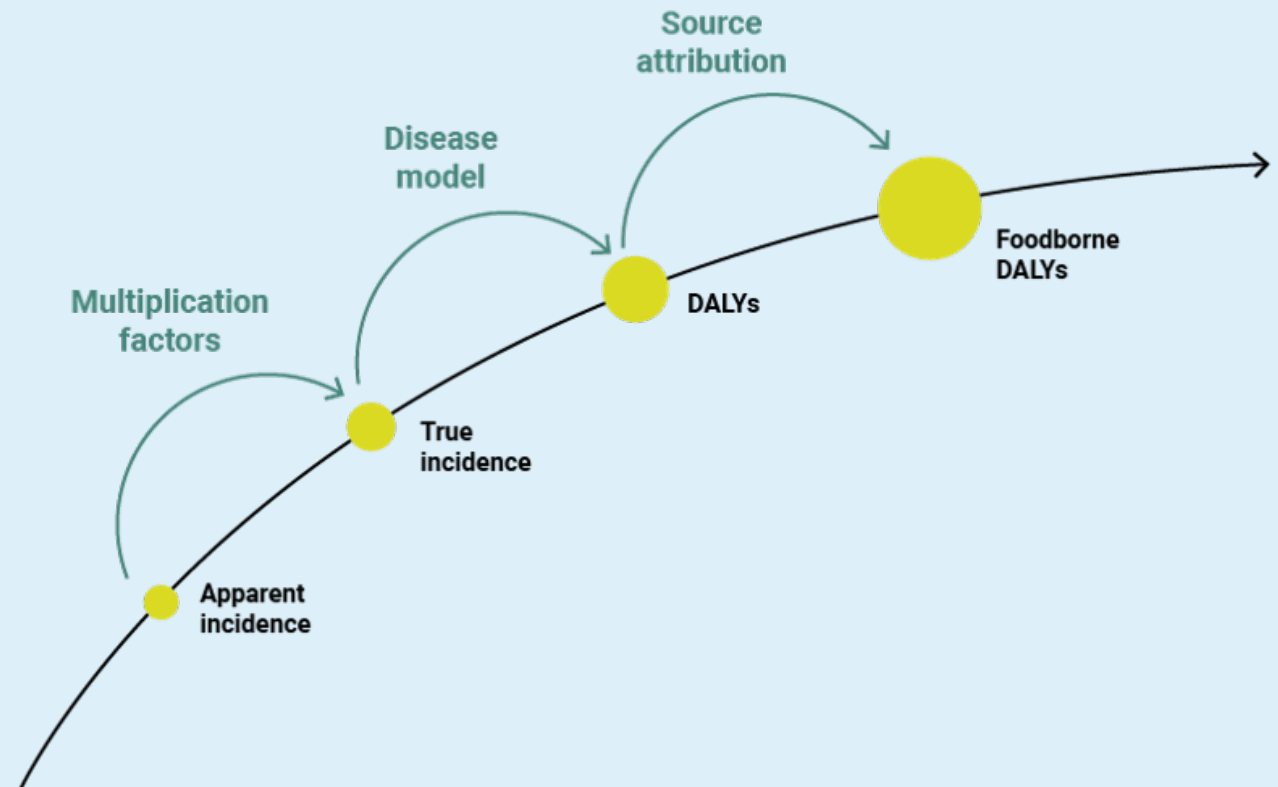
The study will be led by a team of scientists at the Delft University of Technology and Technical University of Denmark based on the advertised [terms of reference](#).

Related calls advertised online

- [Call for experts](#)
- [Call for elicitors](#)
- [Call for outbreak data](#)

Previous study results

- [WHO estimates of the relative contributions of food to the burden of foodborne disease due to selected foodborne hazards: a structured expert elicitation](#)
- [Attribution of global foodborne disease to specific foods: findings from a WHO structured expert elicitation](#)



Economic health valuation of foodborne diseases

The World Bank and WHO agreed to work together to develop estimates of the economic impact of foodborne diseases based on the updated WHO global burden of foodborne disease estimates.

WHO issued an open [call for experts](#) (deadline: 7 January 2024) to advise on valuation of foodborne diseases at the global, regional, and national levels. In particular, advice is needed on current economic health valuation practices and their use in low- and middle-income countries, and on the availability and representativeness of medical treatment cost data in all countries.



Administration and consultation

- Country consultation
- Data sharing
- Planned timeline
- Budget in 2022-23 and in 2024

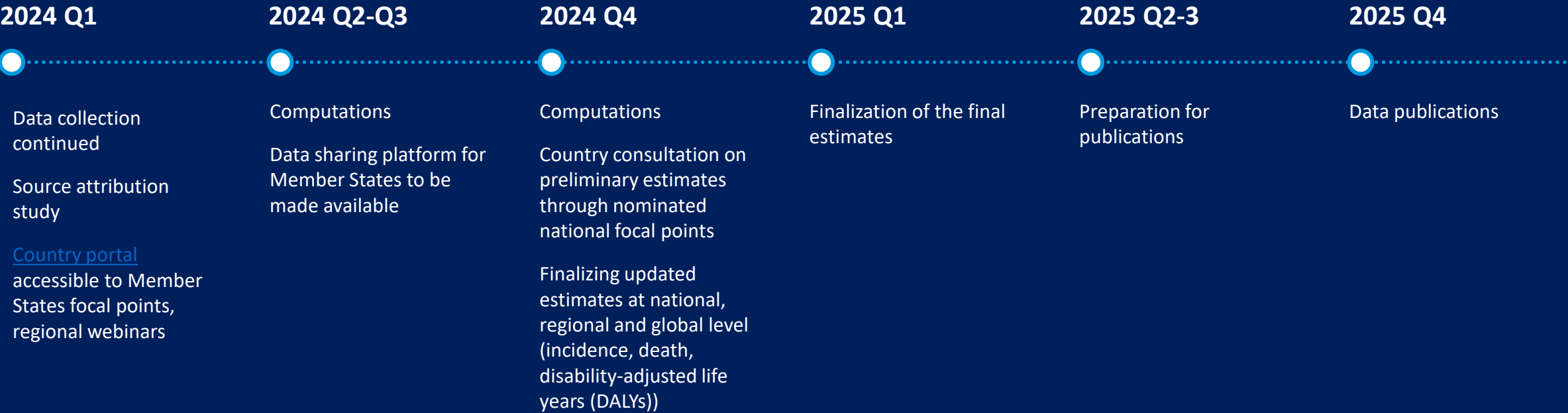
Country consultation & data sharing

- [Country Portal](#) will be made available for all WHO Member States through nominated national focal points to engage on the work related to the burden estimates of foodborne diseases
- [WHO data principles](#)
 - WHO shall treat data as a public good
 - WHO shall uphold Member States' trust in data
 - WHO shall support Member States' data and health information systems capacity
 - WHO shall be a responsible data manager and steward
 - WHO shall strive to fill public health data gaps
- Unpublished national estimates of burden of foodborne diseases (2010)
 - Available upon request to WHO secretariat (fbd-burden@who.int)
 - In accordance with [WHO Data Policy](#)

Provide impartial and inclusive consultation

Upholding Member States' trust in data requires an impartial and inclusive process for consulting with Member States prior to the use of their data by WHO. Consultations with Member States will be transparent, predictable, proportionate, inclusive and coordinated processes with streamlined communication that allows Member States and WHO to easily prepare for, respond to and participate in discussions.

Planned timeline



Financial resources (in USD)

2022-23	\$612,000 Funds spent to support the implementation of activities to estimate the burden of foodborne diseases	Donors Primary donors: - Gov. of Japan - US Department of Agriculture - Gov. of the Netherlands (via WCC activities)	
2024	\$300,000 Expected minimally planned budget for 2024 (as of Dec 2023) for an activity to estimate the burden of foodborne diseases (excluding costs for other activities and human resources)	50% gap 150,000 USD is a present funding gap for activities in 2024	Donors Planned supports committed by: - United Arab Emirates (in-kind) - US CDC - US FDA



World Health Organization

Other resources

1. Webinar was held on 6 June 2023 on [Health consequences of unsafe food](#) (Web [report](#) and [recording](#) available)
2. [WHO global strategy for food safety 2022-2023](#): towards stronger food safety systems and global cooperation (A global indicator on diarrhoeal diseases caused by selected pathogens will be calculated using the approach advised by the FERG).
3. WHO Food Safety [Community of Practice](#) (in which more webinars on foodborne diseases will be hosted in future)

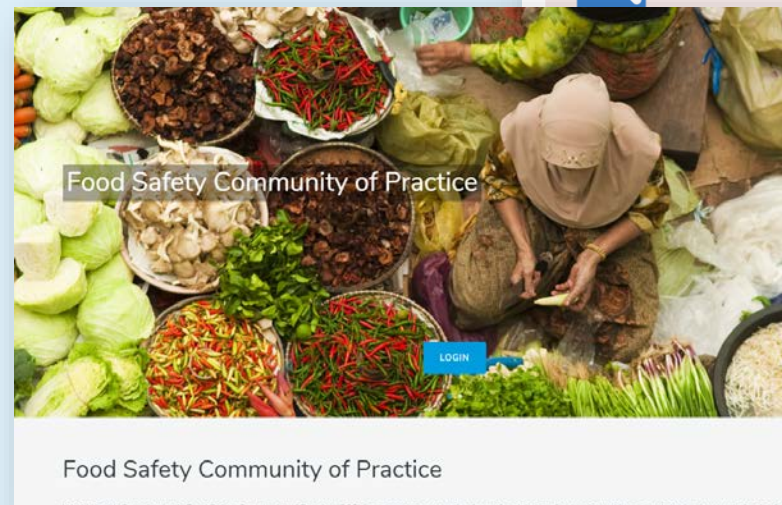
WHO Webinar - Health consequences of unsafe food

6 June 2023 | video (webinar)



Table 1. Indicators proposed for the WHO Global Strategy for Food Safety and targets

Indicator	Type	Source	Indicator as of 2022	Target by 2030
 Foodborne diarrhoeal disease incidence estimated per 100 000 population	Outcome indicator (impact)	WHO global estimates on foodborne disease burden informed by FERG ^{8,9}	4 154*	40% reduction in the global average
 Multisectoral collaboration mechanism for food safety events	Capacity indicator (progress)	International Health Regulations (2005): State Party Self-Assessment Annual Reporting Tool ⁽⁵⁷⁾	57% of countries with at least 80% capacity**	100% of countries with at least 80% capacity
 Surveillance of foodborne diseases and contamination		International Health Regulations (2005): Joint External Evaluation Tool ¹⁰	1.5	Global average capacity score 3.5



Thank you

This presentation has been designed to be accessible, for a positive and inclusive user experience for all.

For more information, please contact:

WHO secretariat

[Monitoring Nutritional Status and Food Safety Events \(MNF\) Unit](#)

Email: fbd-burden@who.int

