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Organization



International Food Safety Authorities Network (INFOSAN)

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INFOSAN Information Note No. 5/2008 – WHO Initiative to Estimate the Global Burden of Foodborne Diseases

WHO Initiative to Estimate the Global Burden of Foodborne Diseases

SUMMARY NOTES

- Foodborne Diseases (FBD) encompass a wide spectrum of illnesses and are an important cause of morbidity and mortality worldwide.
- Precise information on the overall FBD burden, as well as its attribution to responsible source(s) of contamination and exposure route(s), are urgently needed to identify and prioritize effective food safety policies and interventions.
- To fill the long-standing data vacuum, the WHO Department of Food Safety, Zoonoses and Foodborne Diseases (FOS), in collaboration with multiple partners, launched a new Initiative to comprehensively estimate the global burden of disease arising from food and identify the responsible food sources.

How high is the burden of foodborne diseases?

Foodborne diseases (FBD) result from the ingestion of contaminated food and food products. They include a broad group of illnesses caused by bacteria, viruses and parasites, chemicals and biotoxins, which contaminate food all along the 'farm-to-consumption' chain. The diseases arising from foodborne infections and intoxication range from mild and self-limiting symptoms (nausea, vomiting and diarrhoea) to debilitating and life-threatening illness (such as kidney and liver failure, brain and neural disorders, paralysis and cancers). Billions of people are at risk and fall ill every year; many die as a result of consuming unsafe food. Diarrhoeal diseases alone kill an estimated 1.8 million children globally every year, a considerable proportion of which is thought to be foodborne.

Although most of these diarrhoeal deaths occur in developing countries, FBD are not limited to the developing world. It is estimated that each year FBD cause approximately 76 million illnesses, 325 000 hospitalizations and 5000 deaths in the United States of America (USA)¹; in England and Wales, they account for 2 366 000 cases, 21 138 hospitalizations and 718 deaths annually². The incidence of severe episodes of food contamination has increased during the last few decades, raising international concern. Global developments – such as growing transnational travel and migration, increasing trade of live animals and food products, the rapid urbanization in developing countries associated with changes in food handling and consumption, and the increasing number of immunocompromised persons, largely as a result of the HIV/AIDS epidemic, malaria and other diseases such as tuberculosis – have contributed to the increase in the burden of FBD, despite the widespread introduction of Hazard Analysis and Critical Control Points (HACCP) as a food safety risk management system. The full extent

¹ Mead PS, Slutsker L, Dietz V, McCaig LF, Bresee JS, Shapiro C, Griffin PM, Tauxe RV. Food-related illness and death in the United States. *Emerg Infect Dis.* 1999; 5(5):607-25.

² Adak GK, Long SM, O'Brien SJ. Trends in indigenous foodborne disease and deaths, England and Wales: 1992 to 2000. *Gut* 2002; 51(6):832-41.

of the disease burden and cost of unsafe food is still unknown but the impact is considered to be significant, affecting particularly:

a) Global health security:

Through the globalization of food marketing and distribution, both accidentally and deliberately contaminated food products can affect the health of people in numerous countries at the same time.

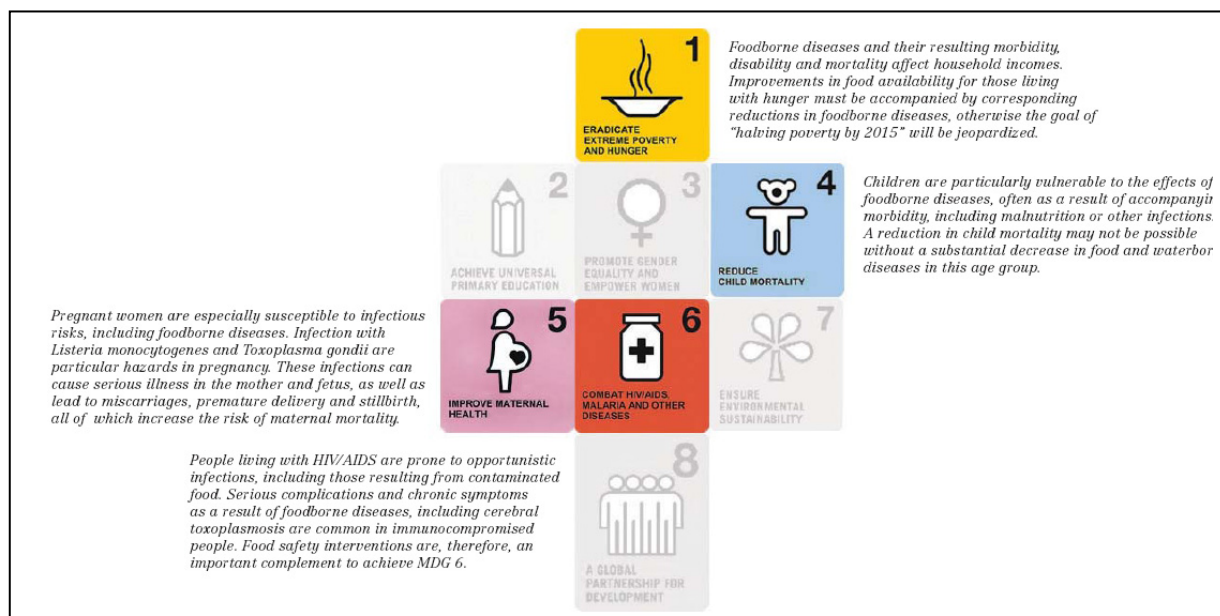
b) Economy:

The identification of a single contaminated food ingredient can lead to the recall of large amounts of food products resulting in considerable economic losses from trade embargoes. The cost of the 1999 Belgian dioxin crisis to the agricultural sector and the food industry amounted to US\$ 1.54 billion³.

c) Development:

As illustrated in figure 1, the achievement of the Millennium Development Goals, including the overarching goal of poverty reduction, will in part depend on a successful reduction of the burden of FBD, particularly among vulnerable groups.

Figure 1: Foodborne Diseases and the Millennium Development Goals



How to measure the size of the problem?

The (reported) disease incidence is the most widely used public health indicator to quantify the health impact of FBD caused by microorganisms. Such surveillance data, however, capture only a small proportion of the existing burden describing merely the tip of the iceberg (cf. figure 2). Comparisons of public health surveillance data between countries are difficult, due to differences in healthcare systems, healthcare seeking behaviour, notification requirements and case-definitions. Furthermore, information on incidences of FBD does not capture the full disease impact, i.e. it



Figure 2: Surveillance of Foodborne Diseases

³ Belgium Sees Dioxin Crisis Costing \$60 billion Belgian Francs, *Reuters*, June 30, 1999.

does not reflect severity and differences in mortality. To estimate disease burden comprehensively and provide comparable information for policy-makers, a standardized burden of disease metric is required, such as the Disability Adjusted Life Year (DALY)⁴. The DALY is a single, internally consistent measure of burden which combines the years of life lost due to premature death (YLL) and the years lived with disability (YLD) for varying degrees of severity, making time itself the common metric for death and disability. One DALY is a health gap measure, equating to one year of healthy life lost.

Where does the burden stem from?

To identify priority interventions and provide the scientific basis for food safety policies, including the standard setting and evaluation activities of the Codex Alimentarius, it is important to:

- determine the proportion of disease that is attributable to food, and
- identify which specific food sources were contaminated that led to illness.

A wide variety of approaches to attribute human disease to responsible food sources are used around the world. To date, these have been focusing largely on enteric disease burden. The source attribution approaches in use include microbial subtyping, microbial and chemical exposure and risk assessment, expert elicitation and analyses of outbreak data, case-control studies, and intervention studies. Each method of source attribution has different strengths and weaknesses and addresses different points of contamination in the food-chain.

How is WHO filling the current data gap?

WHO Initiative to Estimate the Global Burden of Foodborne Diseases

To examine how WHO could address the current data gap, WHO convened an international consultation with over 50 experts in September 2006⁵. This consultation marked the launch of a new initiative to estimate the global burden of foodborne diseases from all major causes using health metrics that combine morbidity, mortality and disability in the form of the Disability Adjusted Life Year (DALY). The consultation participants proposed a strategic framework to execute the initiative and mandated WHO/FOS to lead these efforts. One of the major recommendations of the 2006 consultation was the establishment of the *Foodborne Disease Burden Epidemiology Reference Group (FERG)* which is charged with implementing the recommendations of the consultation. Following a public call for advisers in the scientific press and a transparent selection process, the WHO Director-General appointed the FERG members from a large pool of applicants.

The Foodborne Disease Burden Epidemiology Reference Group (FERG)

The FERG is an advisory body to the WHO and its members are mandated to engage in:

- assembling, appraising and reporting on currently existing burden of foodborne disease estimates;
- conducting epidemiological reviews for mortality, morbidity and disability in each of the major FBD;
- providing models for the estimation of FBD burden where data are lacking;
- developing cause and source attribution models to estimate the proportion of diseases that are foodborne, and
- developing user-friendly tools for burden of FBD studies at country level.

⁴ Murray CJL, Lopez AD (eds), 1996. The Global Burden of Disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Global Burden of Disease and Injuries Series, Volume 1. Cambridge: Harvard University Press.

⁵ WHO Consultation to Develop a Strategy to Estimate the Global Burden of Foodborne Diseases. WHO, Geneva, 2007. www.who.int/foodsafety/publications/foodborne_disease/fbd_2006.pdf

The FERG consists of three different entities:

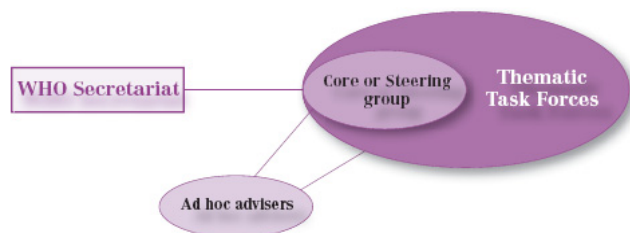


Figure 3: Composition and structure of the Foodborne Disease Burden Epidemiology Reference Group (FERG)

- A **Core or Steering Group** which functions as a steering committee and is charged with monitoring and appraising the technical and epidemiological work of the Task Forces.
- Four **Thematic Task Forces** advancing the work in:
 - a) Infectious Diseases (enteric & parasitic),
 - b) Chemicals and Toxins,
 - c) Source Attribution, and
 - d) Country Burden of Diseases Study Protocols (to equip countries to conduct their own burden of foodborne disease studies).
- **Resource Advisers** who are called upon on an ad hoc basis to provide additional skills required in the work of FERG.

The **WHO Secretariat**, comprised of staff from WHO Department of Food Safety Zoonoses and Foodborne Diseases and eight other WHO departments, coordinates and manages the FERG. The **Food and Agriculture Organization of the United Nations (FAO)** and the **World Organisation for Animal Health (OIE)** are important partners in this Initiative and have representation on the FERG Steering Group.

The FERG is guided by the strategic framework developed during the 2006 Consultation and is expected to provide a Global Report and Atlas on the Burden of Foodborne Diseases as well as a series of journal papers over the course of 5 years⁶. All FERG products will undergo a rigorous peer-review process involving scientists outside the expert group to ensure highest quality and policy impact. The Initiative follows a comprehensive communication strategy to ensure regular dialogue among stakeholders and the effective distribution and use of results. The Initiative works in synergy and close partnership with Member States, technical institutions, non-governmental organizations, industry, donors and other key stakeholders to increase efficiency and avoid duplication.

FERG took up its work in 2007. During the first formal FERG meeting in November 2007⁷, the group established extensive workplans covering epidemiological work for 2008 in three major areas – enteric, parasitic and chemical causes. These workplans, which are now executed by the WHO Secretariat, include the commissioning of major pieces of review, research and modelling work. First interim results will be discussed in the second formal FERG meeting in November 2008 and presented to diverse constituencies with an interest in food safety (i.e. food industry, consumer groups, WHO Member States, donor agencies, the media, etc.) at a specially scheduled stakeholders' event.

Scientists interested in collaborating with the FERG are invited to submit their application to serve as an ad hoc Resource Adviser on the group. More information on the application procedures can be found at: www.who.int/foodsafety/foodborne_disease/ferg_advisers/en/.

⁶ WHO Initiative to Estimate the Global Burden of Foodborne Diseases. First formal meeting of the Foodborne Disease Burden Epidemiology Reference Group (FERG). WHO, Geneva, 2008. p. 7.
www.who.int/foodsafety/publications/foodborne_disease/FERG_Nov07.pdf

⁷ WHO Initiative to Estimate the Global Burden of Foodborne Diseases. First formal meeting of the Foodborne Disease Burden Epidemiology Reference Group (FERG). WHO, Geneva, 2008.
www.who.int/foodsafety/publications/foodborne_disease/FERG_Nov07.pdf

WHO has already made a major resource investment in this project, but is seeking further contributions in the order of US\$ 6 million to complete its tasks. Agencies and institutions invested in strengthening food safety systems as well as country capacity to research and reduce the burden of disease will be interested in the work of FERG.

Source Attribution Task Force

The Task Force on Source Attribution is charged with identifying the proportion of disease burden that is due to food contamination and aims to attribute the relevant fraction of disease burden to the specific food sources responsible (e.g. quantifying the proportion of human *Salmonella* Enteritidis burden that stems from eggs). The Task Force commenced its work in April 2008. During a three-day meeting, attribution methods for all cause groups were evaluated, and further research to advance source attribution in each area proposed. The first Source Attribution meeting led to the following key outputs:

1. Conceptual frameworks for source attribution pathways for the Chemical, Enteric and Parasitic Task Forces
2. An evaluation of the presented attribution methods & their applicability for each Task Force
3. Recommendations of specific and relevant work to be initiated (in coordination with already ongoing work) to advance source attribution in each Task Force in the form of detailed workplans

The full Source Attribution Task Force meeting report, including abstracts of presentations, discussions and outputs is currently in preparation and can soon be downloaded at www.who.int/foodsafety/foodborne_disease/ferg/en/index8.html

INFOSAN serves as a vehicle for food safety authorities and other relevant agencies to exchange food safety information and to improve collaboration among food safety authorities at both the national and international level.

INFOSAN Emergency, embedded in INFOSAN, links official national contact points to address outbreaks and emergencies of international importance and allows for the rapid exchange of information. INFOSAN Emergency is intended to complement and support the existing WHO Global Outbreak Alert and Response Network (GOARN).

INFOSAN is operated/managed by WHO, Geneva. It currently includes 167 Member States.

More information is available at: www.who.int/foodsafety